Summary of Field and Contaminant Data for the 2002 Collection of Bluenose-East Caribou near Deline, NT

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Summary

This report summarises the data from the analysis of liver and kidney tissues from caribou collected south and west of Deline, NT in March, 2002. The samples were analysed by ICP/MS for a full suite of twenty-two metals by Taiga Laboratory in Yellowknife. The same tissues were analysed for naturally-occurring radionuclides and cesium-137 by Whiteshell Laboratories in Pinawa, MB.

Most metals were detected in the two tissues in all the caribou harvested, however beryllium, lithium and uranium were not detected in any sample. Other metals, like aluminum, thallium, and silver were only detectable in a few samples of either liver or kidney. Metals of concern, like cadmium and mercury, are relatively low in these animals and are not expected to be a danger to the animals or people who hunt them.

Several natural radionuclides were measured in the tissues, but all levels remain within the normal range found in caribou in the North. Potassium-40, a natural nuclide found in all living tissues, remained at slightly less than 100 Bq/kg, consistent with all other caribou. Uranium-235, radium-226 and thorium-232 are all natural nuclides that form from the decay of uranium-238, but are found at very low concentrations in these animals. Lead-210 and polonium-210, two natural nuclides, are present at levels within the ranges normally found for caribou in the NWT. Although meat wasn't tested in this study, it is expected from other studies that these isotopes would be <10 Bq/kg in meat. These data indicate that there is no evidence of contamination of metals or radionuclides, and that the caribou meat remains a healthy, nutritious food source.

Methods

Sampling

Biological samples used in this study were obtained with the consent and participation of the community of Deline, Northwest Territories. From 2 March - 14 March 2002, a party consisting of two Deline residents and one biologist hunted caribou south of Great Bear Lake and the Bear River. Collections were limited to a maximum of two caribou per group, and only one group was sampled per day. Effort was made to sample areas utilized by hunters from the community.

A total of twenty animals (18 females and 2 males) were harvested yielding various biological samples and measurements. Body mass is reported as the total body mass before skinning and includes antlers, hide, and ingesta. Body length is the distance from the upper lip to the base of the tail, measured along the contour of the body. Tail length is measured from its base (where the vertebrae flex with the pelvic girdle) to the tip of the last bone. Back fat thickness is determined by making an incision, one-inch from base of the tail at 45° to the spine, and measured at the thickest part of the fat. Girth is the body circumference behind the elbow with the leg in its 'normal' relaxed position. Shoulder mass is the total skinned weight of the entire right leg and shoulder. Reproductive status was also recorded.

Kidneys, perirenal fat, and livers were placed in whirl-top bags and frozen in the field. The organ samples were thawed, weighted, and refrozen at the RWED Wildlife Research Laboratory

in Norman Wells, NT prior to contaminants testing. One whole kidney and a ca. 300g sample of liver was the sent to the Taiga Environmental Laboratory in Yellowknife, NT for heavy metal analysis. Samples were received at Taiga Laboratory on March 27, 2002 and analysed in mid-May, 2002. The other kidney and remaining liver was sent to the AECL Whiteshell Laboratories in Pinawa, MB for radionuclide analysis.

For analysis of parasites and disease, back straps, fecals, abomasums, and blood serum were sent to Dr. Susan Kutz, Research Group for Arctic Parasitology Canadian Cooperative Wildlife Health Centre, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, SK. Whole blood samples were sent to Dr. Henry Table, University of Saskatchewan, Saskatoon, to test for trypanosome blood parasites.

Age was determined by counting cementum annuli of primary incisors (Matson's 1981).

Femur marrow fat content was calculated by oven drying a ca. 10g sample at 150°C to determine dry weight, and applying the predictive equation provided by Neiland (1970).

Total dissectible fat was calculated from back fat depth and kidney fat weight according to the predictive equation provided by Adamczeskwi (1987).

Data Analysis
All mean values are calculated as arithmetic means and standard deviations using Excel 2000 spreadsheets. Averages are reported for samples sets with >50% of the samples above detection limits. In those cases with <50% below detection limits, values of one-half the detction limit were used to calculate the average. None of the means have been corrected for the age of the animals.

Results

Raw data for the metal and radionuclide analysis of the livers and kidneys are reported in Tables 4 to 9. Averages with standard deviations are presented for each sample set with >50% of the samples above the detection limits. The number of samples with measurable levels of the metals or radionuclides ranges from 20 (100% of the samples analysed) to 0 (none of the samples analysed).

Metals
Beryllium, lithium and uranium are below detection limits of 0.1 or 0.3 mg/kg dw in all samples. Aluminum was present at 54 mg/kg dw in one liver sample, however, because it was below the detection limit of 30 mg/kg in all other liver and kidney samples, the measurement may have been caused by contamination during the sample process. Arsenic and thallium were close to the detection limits in all samples, and the concentrations in the two tissues are probably close to the reported minimum detection limit of 0.5 (arsenic) to 0.1 (thallium) mg/kg dw.

All of the other metals were detected in most, if not all, liver and kidney samples and are in the range of levels reported elsewhere for caribou. Cobalt, copper and zinc are nutritional

requirements for caribou and people, and their concentration is generally regulated within a fairly narrow range of concentrations, although the levels may change seasonally with the nutritional status of the caribou.

Two major metals of concern, cadmium and mercury, are present at relatively low concentrations in the tissues analysed. The average cadmium level in kidney is 34.0 mg/kg, or about 10 mg/kg wet weight, relatively low compared to some other caribou herds in the north. Mean mercury concentrations remains at 0.33 mg/kg ww in liver and 1.55 mg/kg ww in kidney. neither tissue is expected to be a danger to the caribou, or a major source of the metal to people.

Radionuclides

The results for the 7 major naturally-occurring radionuclides, and for cesium-137, are presented in Table 8 and 9. Potassium-40, a nuclide found in all living cells, was found at 88.7 and 96.7 Bq/kg ww in liver and kidney, respectively. This value is virtually the same for all caribou and reindeer and provides a good internal check for the analytical methods. The reported values indicate that the analysis

Uranium-235, an isotope which usually makes up <5% of natural uranium, is below detection limits in all tissues. Similarly, both radium-226 and thorium-232 are natural decay products of uranium-238 and are only detectable in a few liver kidney samples in these caribou. The levels observed are within the range expected for natural background radiation.

The major contributors of dose to the caribou and people feeding on caribou are lead-210 and polonium-210, two isotopes that are formed by the decay of uranium-238. The levels of these two isotopes are within the range of levels normally found in caribou, and are lower than other major herds found in the north. Typically, the highest levels of these isotopes in caribou are found in these tissues, with the lowest levels being found in the meat. The concentrations of these isotopes found this study probably correspond to levels in muscle <10 Bq/kg ww.

Cesium-137 is the only man-made radionuclide measured in the tissues. The concentrations of this isotope reached a maximum in the north during the 1960's when atmospheric nuclear weapons tests were delivering the nuclide to the atmosphere. In animals, the highest levels are observed in kidney, which is about 30% higher than in muscle. The concentrations reported here are consistent with other studies and are about 10 times lower than the levels thirty years ago. Without any further additions of cesium-137 to the environment, the levels should continue to decline through time.

Table 1 – Collection data for the twenty caribou collected by the SSRB in March, 2002.

Sample ID	Age	Sex	Date of Collection	Location			Net Body Weight (kg)	Body Length (cm)	Girth (cm)
BE-02-01	3	F	Mar 2, 2002	Deline	65°01.705’	123°28.729’	83.9	169	117.5
BE-02-02	2	F	Mar 2, 2002	Deline	65°01.705’	123°28.729’	77.1	147	109
BE-02-03	6	M	Mar 3, 2002	Porcupine R.	65°04.177’	123°39.983’	103	182	125
BE-02-04	11	F	Mar 3, 2002	Winter Road	65°07.625’	123°32.778’	90.3	160	118
BE-02-05	1	F	Mar 3, 2002	Winter Road	65°07.625’	123°32.778’	83.9	157	117
BE-02-06	2	F	Mar 5, 2002	S. of Deline	65°02.721’	123°31.015’	63.5	150	111
BE-02-07	1	M	Mar 5, 2002	S. of Deline	65°02.721’	123°31.015’	54.9	148	107
BE-02-08	4	F	Mar 6, 2002	S. of Deline	65°01.489’	123°12.093’	89.8	158	110
BE-02-09	5	F	Mar 6, 2002	S. of Deline	65°01.489’	123°12.093’	99.8	160	118
BE-02-10	10	F	Mar 7, 2002	Porcupine R.	65°04.177’	123°39.983’	89.8	160	117
BE-02-11	7	F	Mar 7, 2002	Porcupine R.	65°04.177’	123°39.983’	79.4	156	118
BE-02-12	3	F	Mar 8, 2002	S. of Deline	65°01.161’	123°20.286’	85.3	166	116
BE-02-13	4	F	Mar 8, 2002	S. of Deline	65°01.161’	123°20.286’	73.5	116	105
BE-02-14	1	F	Mar 9, 2002	W. of Deline	65°00.793’	123°43.634’	56.2	143	102
BE-02-15	2	F	Mar 9, 2002	W. of Deline	65°00.793’	123°43.634’	78	163	117
BE-02-16	2	F	Mar 12, 2002	S. of Deline	65°05.071’	123°32.174’	83.9	164	120
BE-02-17	2	F	Mar 12, 2002	S. of Deline	65°05.071’	123°32.174’	74.4	153	117
BE-02-18	3	F	Mar 14, 2002	S. Deline	65°04.489’	123°32.938’	79.4	162	109
BE-02-19	3	F	Mar 14, 2002	S. of Deline	65°04.489’	123°32.938’	89.8	169	116
BE-02-20	5	F	Mar 14, 2002	S. of Deline	65°04.489’	123°32.938’	80.7	157	112

Table 2 - Summary of body condition indices for adult (= 3 year old) and sub-adult (< 3 year old) male and female Bluenose-East caribou collected 2-14 March 2002.

	Female		Male	
Measurement	**Adult**	**Sub-Adult**	**Adult**	**Sub-Adult**
Sample size (n)	11	7	1	1
Boby mass (kg)	85.6±7.3	73.9±10.4	103.0	54.9
Shoulder mass (kg)	5.1±0.7	4.8±0.7	8.5	4.0
Body length (cm)	162±5	154±8	182	148
Tail length (cm)	12.5±1.6	12.1±1.2	15.0	10.0
Girth (cm)	114±5	113±6	125	107
Back fat (cm)	1.8±0.8	1.3±1.0	1.0	0.0
Liver mass (g)	916±104	775±134	1184	663
Kidney fat (kg)	0.060±0.016	0.047±0.018	0.059	0.018
Kidney fat index (%)	87.3±27.9	69.2±26.1	55.1	28.1
Dissectable fat (kg)[1]	3.24±1.26	2.30±1.56	1.90	0.46
Femur mass (g)	351±25	339±37	500	310
Femur length (cm)	26.0±0.5	25.6±1.0	30.0	24.0
Femur fat (%)[2]	95.1±0.6	94.8±0.9	94.0	94.6

[1]Dissectable fat = -0.246 + (1.151 x back fat depth [cm]) + (26.401 x kidney fat weight [kg])
[2]Femur fat = (1.0444 x [final marrow weight/initial marrow weight] - 0.065) x 100

Table 3 - Moisture content of caribou tissues from the Bluenose-East herd, sampled in March, 2002.

Sample ID	Kidney	Liver
BE-02-01	78.3	69.8
BE-02-02	77.5	68.8
BE-02-03	77.9	71
BE-02-04	77.6	70.5
BE-02-05	76.2	69.3
BE-02-06	80	69
BE-02-07	79	69.5
BE-02-08	78	71.2
BE-02-09	78.9	72.6
BE-02-10	77.2	70.6
BE-02-11	77.9	68.7
BE-02-12	78.8	70.9
BE-02-13	77.7	70.9
BE-02-14	78.7	71.7
BE-02-15	78.7	73.8
BE-02-16	79.4	71.2
BE-02-17	78.6	72.4
BE-02-18	78.4	71.2
BE-02-19	79.7	72.6
BE-02-20	80.1	75.2
Average	**78.43**	**71.05**
Standard Deviation	**0.97**	**1.69**

Table 4 – Raw data and average metal concentrations in the liver of Bluenose-East caribou collected in the Sahtu in March, 2002 (Part 2). All concentrations are in mg/kg dry weight, or ppm.

Sample ID	Age	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium
BE-02-01	3	<30	<0.1	<0.5	0.2	<0.2	5.1	0.2	0.5	0.2	29.8	1630	0.8	<0.3
BE-02-02	2	<30	<0.1	<0.5	0.1	<0.2	2.8	0.2	0.8	0.2	60.4	429	0.3	<0.3
BE-02-03	6	<30	<0.1	0.9	0.1	<0.2	6.3	0.1	1.0	0.3	164	1570	0.5	<0.3
BE-02-04	11	<30	<0.1	<0.5	0.2	<0.2	4.2	0.2	0.8	0.2	55.2	458	0.3	<0.3
BE-02-05	1	<30	<0.1	0.5	0.1	<0.2	2.3	0.1	0.9	0.2	16.7	656	0.2	<0.3
BE-02-06	2	<30	<0.1	0.7	0.1	<0.2	2.9	0.1	0.6	0.2	116	640	0.3	<0.3
BE-02-07	1	<30	<0.1	<0.5	0.1	<0.2	4.0	0.2	0.5	0.2	54.2	1200	0.5	<0.3
BE-02-08	4	<30	<0.1	<0.5	0.1	<0.2	3.0	0.1	0.6	0.2	78.5	621	0.3	<0.3
BE-02-09	5	<30	<0.1	1.0	0.2	<0.2	3.8	0.1	0.6	0.2	59.7	661	0.3	<0.3
BE-02-10	10	<30	<0.1	<0.5	0.2	<0.2	6.1	0.2	0.5	0.2	123	1140	0.5	<0.3
BE-02-11	7	<30	0.1	0.7	0.1	<0.2	14.1	0.2	0.5	0.2	34.0	689	0.3	<0.3
BE-02-12	3	<30	<0.1	<0.5	0.2	<0.2	3.5	0.2	0.6	0.2	35.5	1550	0.7	<0.3
BE-02-13	4	<30	<0.1	0.5	0.1	<0.2	4.9	0.1	0.7	0.2	53.2	766	0.3	<0.3
BE-02-14	1	<30	0.1	0.9	0.2	<0.2	1.7	0.2	1.0	0.2	107	1010	0.3	<0.3
BE-02-15	2	<30	<0.1	1.0	0.2	<0.2	3.2	0.2	0.8	0.2	169	787	0.5	<0.3
BE-02-16	2	<30	<0.1	<0.5	0.2	<0.2	4.8	0.1	0.9	0.3	44.9	762	0.4	<0.3
BE-02-17	2	<30	<0.1	0.9	0.2	<0.2	2.0	0.1	1.0	0.2	150	1260	0.4	<0.3
BE-02-18	3	<30	<0.1	<0.5	0.1	<0.2	2.2	0.1	0.7	0.2	17.2	1050	0.4	<0.3
BE-02-19	3	54	<0.1	<0.5	0.1	<0.2	3.7	0.1	0.6	0.2	35.0	494	0.2	<0.3
BE-02-20	5	<30	<0.1	<0.5	0.2	<0.2	4.3	0.1	0.5	0.1	58.5	1260	0.7	<0.3
Samples Analysed		20	20	20	20	20	20	20	20	20	20	20	20	20
Samples Above Detection Limit		1	2	9	20	0	20	20	20	20	20	20	20	0
Average		**<30**	**<0.1**	**<0.5**	**0.15**		**4.25**	**0.15**	**0.71**	**0.21**	**73.1**	**932**	**0.41**	**<0.3**
Standard Deviation		**-**	**-**	**-**	**0.05**	**-**	**2.65**	**0.05**	**0.18**	**0.04**	**48.1**	**381**	**0.17**	**-**

Table 5 – Raw data and average metal concentrations in the liver of Bluenose-East caribou collected in the Sahtu in March, 2002 (Part 2). All concentrations are in mg/kg dry weight, or ppm, except for mercury, which is on a wet weight basis.

Sample ID	Age	Manganese	Mercury	Molybdenum	Nickel	Rubidium	Selenium	Silver	Strontium	Thallium	Titanium	Uranium	Vanadium	Zinc
BE-02-01	3	12.8	0.25	2.3	0.3	77.6	2	0.4	0.1	<0.1	0.5	<0.1	0.2	95
BE-02-02	2	11.3	0.37	2.3	0.1	72.7	2	0.4	0.1	<0.1	0.4	<0.1	0.3	81
BE-02-03	6	13	0.24	2	0.1	106	2	0.7	0.1	<0.1	0.4	<0.1	0.3	82
BE-02-04	11	11	0.3	2.2	0.2	82	2	0.4	0.1	<0.1	0.4	<0.1	0.2	92
BE-02-05	1	9.4	0.31	2.1	0.1	85.8	2	0.2	0.1	<0.1	0.4	<0.1	0.2	113
BE-02-06	2	11.5	0.37	2.1	0.1	87.5	2	0.7	0.1	<0.1	0.4	<0.1	0.1	85
BE-02-07	1	9.8	0.32	2.2	0.1	74.6	2	0.1	0.1	<0.1	0.3	<0.1	0.1	105
BE-02-08	4	10.8	0.26	2.5	0.4	72.6	2	0.4	0.1	<0.1	0.8	<0.1	<0.1	71
BE-02-09	5	8.9	0.37	2.2	0.1	79.8	2	0.5	0.1	<0.1	0.6	<0.1	0.1	93
BE-02-10	10	12.9	0.29	2.6	0.6	102	2	0.2	0.1	<0.1	0.5	<0.1	0.1	109
BE-02-11	7	11.1	0.34	2.7	0.1	74.3	2	0.2	0.1	<0.1	0.5	<0.1	0.2	110
BE-02-12	3	9	0.35	1.5	0.9	70.6	2	0.2	0.1	<0.1	0.5	<0.1	0.1	85
BE-02-13	4	10.4	0.18	2.4	0.6	68.5	2	0.3	0.1	<0.1	0.6	<0.1	0.1	92
BE-02-14	1	14.7	0.32	3.1	0.8	98.9	2	0.3	0.1	<0.1	0.9	<0.1	0.1	116
BE-02-15	2	14.8	0.39	2.6	0.3	77.4	2	0.1	0.1	<0.1	0.6	<0.1	0.4	110
BE-02-16	2	11.9	0.33	2.3	0.2	56.6	2	0.4	0.1	<0.1	0.5	<0.1	0.1	106
BE-02-17	2	9.4	0.38	2.3	2	44.1	1	0.5	<0.1	<0.1	0.4	<0.1	0.9	78
BE-02-18	3	9.5	0.59	1.6	0.6	71.3	2	0.1	<0.1	<0.1	0.3	<0.1	<0.1	74
BE-02-19	3	8.6	0.34	2.4	0.1	71.5	3	0.3	<0.1	<0.1	0.4	<0.1	0.3	84
BE-02-20	5	9.2	0.32	1.5	0.1	67.6	1	0.3	<0.1	<0.1	<0.3	<0.1	0.1	89
Samples Analysed		20	20	20	20	20	20	20	20	20	20	20	20	20
Samples Above Detection Limit		20	20	20	20	20	20	20	16	0	19	0	18	20
Average		**11**	**0.33**	**2.25**	**0.39**	**77.1**	**1.95**	**0.34**	**0.09**	**<0.1**	**0.48**	**<0.1**	**0.20**	**93.5**
Standard Deviation		**1.87**	**0.08**	**0.39**	**0.46**	**14.5**	**0.39**	**0.18**	**0.02**	**-**	**0.17**	**-**	**0.19**	**13.8**

Table 6 – Raw data and average metal concentrations in the kidney of Bluenose-East caribou collected in the Sahtu in March, 2002 (Part 1). All concentrations are in mg/kg dw, or ppm.

Sample ID	Age	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium
BE-02-01	3	<30	0.05	<0.5	0.5	<0.2	29.2	0.5	0.8	0.2	22.5	258	0.3	<0.3
BE-02-02	2	<30	0.2	<0.5	0.5	<0.2	19.6	0.5	1.1	0.2	23.8	211	0.2	<0.3
BE-02-03	6	<30	1.8	<0.5	0.4	<0.2	27.5	0.4	1	0.2	26.2	280	0.3	<0.3
BE-02-04	11	<30	0.2	<0.5	0.6	<0.2	57.2	0.6	2.8	0.2	21.7	271	0.2	<0.3
BE-02-05	1	<30	0.05	<0.5	0.5	<0.2	21.9	0.3	0.4	0.2	25.9	253	0.4	<0.3
BE-02-06	2	<30	0.2	<0.5	0.5	<0.2	13	0.3	0.8	0.3	18.9	197	0.2	<0.3
BE-02-07	1	<30	0.05	0.5	0.3	<0.2	15.3	0.4	0.4	0.2	22.5	228	0.2	<0.3
BE-02-08	4	<30	0.05	<0.5	0.9	<0.2	26.7	0.3	0.6	0.2	25.7	219	0.6	<0.3
BE-02-09	5	<30	0.1	<0.5	0.6	<0.2	25.9	0.3	0.5	0.2	21.9	326	0.2	<0.3
BE-02-10	10	<30	0.4	<0.5	0.6	<0.2	53.9	0.6	0.9	0.2	20.1	242	0.2	<0.3
BE-02-11	7	<30	0.2	<0.5	0.5	<0.2	175	0.4	1	0.3	26.8	180	0.4	<0.3
BE-02-12	3	<30	0.05	<0.5	0.6	<0.2	21.6	0.6	0.8	0.2	24.9	205	0.2	<0.3
BE-02-13	4	<30	0.2	<0.5	0.7	<0.2	42.7	0.3	0.8	0.2	22.4	250	0.3	<0.3
BE-02-14	1	<30	0.05	<0.5	0.4	<0.2	7.9	0.5	0.9	0.2	24	251	0.2	<0.3
BE-02-15	2	<30	0.05	<0.5	0.5	<0.2	25.3	0.5	1	0.2	25.7	372	0.3	<0.3
BE-02-16	2	<30	0.2	<0.5	0.6	<0.2	29.2	0.4	1	0.2	18	367	0.1	<0.3
BE-02-17	2	<30	0.05	<0.5	0.4	<0.2	14.7	0.3	0.7	0.2	26.8	259	0.3	<0.3
BE-02-18	3	<30	0.05	<0.5	0.5	<0.2	15.8	0.2	0.6	0.3	21.1	316	0.2	<0.3
BE-02-19	3	<30	0.3	<0.5	0.5	<0.2	27.9	0.4	1.4	0.2	21.7	267	0.2	<0.3
BE-02-20	5	<30	0.05	0.6	0.5	<0.2	29.6	0.3	0.9	0.1	17.8	412	0.3	<0.3
Samples Analysed		20	20	20	20	20	20	20	20	20	20	20	20	20
Samples Above Detection Limit		0	10	2	20	0	20	20	20	20	20	20	20	0
Average		**<30**	**0.22**	**<0.5**	**0.53**	**<0.2**	**34.0**	**0.41**	**0.92**	**0.21**	**22.9**	**268**	**0.27**	**<0.3**
Standard Deviation		**-**	**0.39**	**-**	**0.13**	**-**	**35.5**	**0.12**	**0.51**	**0.04**	**2.8**	**62**	**0.11**	**-**

Table 7 – Metal concentrations in caribou kidney collected near Deline in March, 2002. All concentrations are in mg/kg dw, or ppm, except mercury which is on a wet weight basis.

Sample ID	Age	Manganese	Mercury	Molybdenum	Nickel	Rubidium	Selenium	Silver	Strontium	Thallium	Titanium	Uranium	Vanadium	Zinc
BE-02-01	3	9.2	1.7	0.5	0.3	78.7	6	0.1	0.2	0.1	0.4	<0.1	0.2	121
BE-02-02	2	9.4	1.1	0.5	0.5	67.6	5	<0.1	0.1	<0.1	0.4	<0.1	0.3	109
BE-02-03	6	8.1	2	0.4	0.3	88.7	7	<0.1	0.2	<0.1	0.4	<0.1	0.1	127
BE-02-04	11	10.9	1.2	1.1	1.5	77.7	6	<0.1	0.1	<0.1	0.4	<0.1	0.1	122
BE-02-05	1	7.8	1.7	0.5	0.2	71.3	6	<0.1	0.1	<0.1	0.4	<0.1	<0.1	123
BE-02-06	2	8.4	1.8	0.5	0.2	76.2	5	<0.1	0.2	0.1	0.4	<0.1	0.2	106
BE-02-07	1	8.7	0.87	0.6	0.1	54.8	5	<0.1	0.1	<0.1	0.4	<0.1	0.1	96
BE-02-08	4	11.1	1.7	1	0.2	73.1	6	0.1	0.2	<0.1	0.9	<0.1	0.1	116
BE-02-09	5	7	1.7	0.7	0.5	67.3	6	<0.1	0.2	<0.1	0.5	<0.1	0.1	109
BE-02-10	10	6.6	2	0.5	0.2	85.2	5	<0.1	0.2	0.1	0.3	<0.1	0.1	121
BE-02-11	7	8.8	1.6	0.7	0.3	73.8	5	<0.1	0.1	<0.1	0.4	<0.1	0.3	176
BE-02-12	3	9.8	1.9	0.5	0.4	76.4	7	<0.1	0.2	0.1	0.5	<0.1	0.1	117
BE-02-13	4	8.2	2	0.8	0.1	58.8	6	<0.1	0.2	<0.1	0.5	<0.1	0.1	125
BE-02-14	1	8.5	1	0.8	0.3	67	6	<0.1	0.1	0.1	0.6	<0.1	0.2	117
BE-02-15	2	13.1	2	1	0.2	90	8	<0.1	0.2	<0.1	0.6	<0.1	0.1	128
BE-02-16	2	7	1.3	0.5	0.4	75.5	5	<0.1	0.3	<0.1	0.6	<0.1	0.2	99
BE-02-17	2	8.4	1.7	0.7	0.7	43.2	5	<0.1	0.1	<0.1	0.4	<0.1	0.2	112
BE-02-18	3	8.5	1.5	0.6	0.3	80.9	7	<0.1	0.2	0.1	0.4	<0.1	0.2	111
BE-02-19	3	7.8	1.6	0.8	0.6	70	5	<0.1	0.2	<0.1	0.5	<0.1	0.2	112
BE-02-20	5	8.7	0.71	0.5	0.3	74.1	6	<0.1	0.2	<0.1	0.5	<0.1	0.1	108
Samples Analysed		20	20	20	20	20	20	20	20	20	20	20	20	20
Samples Above Detection Limit		20	20	20	20	20	20	2	20	6	20	0	19	20
Average		**8.80**	**1.55**	**0.66**	**0.38**	**72.5**	**5.85**	**<0.1**	**0.17**	**<0.1**	**0.48**	**<0.1**	**0.16**	**118**
Standard Deviation		**1.53**	**0.40**	**0.20**	**0.31**	**11.1**	**0.88**	**-**	**0.06**	**-**	**0.13**	**-**	**0.07**	**16.3**

Table 8 – Raw data of the analysis of natural radionuclides and cesium-137 in caribou kidneys from the collection near Deline in March, 2002. Values are reported in Bq/kg wet weight.

Sample ID	Age	Potassium-40	Cesium-137	Lead-210	Polonium-210	Radium-226	Thorium-232	Uranium-235
BE-02-01	3	112	637.1	68.8	58.6	<1.4	<1.5	<2.8
BE-02-02	2	99	465.3	50.5	78.1	<0.8	<1.3	<2.6
BE-02-03	6	104	302.8	76.1	42.1	<1.3	<1.5	<2.5
BE-02-04	11	102	530.2	50.6	67.4	<1.4	<1.1	<2.1
BE-02-05	1	112	318.1	79.4	54.3	<0.9	<1.3	<2.2
BE-02-06	2	97	359.2	57.8	56.7	<0.7	<1.1	<1.9
BE-02-07	1	96	450.5	55.6	105.9	1.1	<1.4	<2.6
BE-02-08	4	94	303.5	42.1	66.0	2.1	<1.6	<2.7
BE-02-09	5	94	242.0	46.7	50.2	<1.0	<1.0	<1.8
BE-02-10	10	98	401.5	71.2	55.3	0.8	<1.3	<2.4
BE-02-11	7	104	353.3	68.8	50.3	<1.3	<1.2	<2.1
BE-02-12	3	124	549.8	46.8	43.9	1.6	<1.5	<2.7
BE-02-13	4	90	322.9	62.2	96.1	<1.9	<1.4	<2.4
BE-02-14	1	87	465.7	33.7	83.2	<0.9	<1.4	<2.5
BE-02-15	2	78	305.4	54.7	25.6	<1.9	<1.3	<2.5
BE-02-16	2	84	353.8	28.7	65.6	<1.3	0.5	<2.3
BE-02-17	2	92	310.7	44.1	84.6	<1.5	<1.1	<2.1
BE-02-18	3	103	247.9	51.7	66.9	<0.7	<1.1	<2.0
BE-02-19	3	87	357.6	37.8	66.3	<1.0	<1.3	<2.3
BE-02-20	5	77	310.4	55.6	102.0	<0.7	<1.0	<1.9
Samples Analysed		20	20	20	20	20	20	20
Samples Above Detection Limit		20	20	20	20	4	1	0
Average		**96.7**	**379**	**54.1**	**66.0**	**<1.2**	**<1.2**	**<2.3**
Standard Deviation		**11.5**	**105**	**13.8**	**20.7**			

Table 9 – Raw data of the analysis of natural radionuclides and cesium-137 in caribou livers from the collection near Deline in March, 2002. Units are in Bq/kg ww. ND – not determined.

Sample ID	Age	Potassium-40	Cesium-137	Lead-210	Polonium-210	Radium-226	Thorium-232	Uranium-235
BE-02-01	3	99	187.6	242.5	ND	<1.2	0.6	<2.0
BE-02-02	2	98	170.3	85.7	155.4	<0.8	<1.1	<1.9
BE-02-03	6	109	95.6	145.8	ND	<0.8	<0.9	<1.5
BE-02-04	11	92	190.4	96.3	147.4	<1.2	<1.0	<1.8
BE-02-05	1	96	145.3	96.3	109.7	0.8	<1.0	<1.8
BE-02-06	2	105	135.8	95.1	261.7	<0.9	<1.0	<1.7
BE-02-07	1	95	232.5	122.0	136.8	<1.0	<1.1	<0.2
BE-02-08	4	93	132.5	89.3	97.9	<0.7	<1.0	<1.6
BE-02-09	5	71	115.2	75.9	124.1	1.1	0.5	<1.7
BE-02-10	10	99	145.9	159.0	77.3	<0.8	<1.1	<1.8
BE-02-11	7	89	155.9	94.1	94.4	0.8	<0.9	<1.5
BE-02-12	3	102	182.4	250.5	212.9	0.7	<1.0	<1.8
BE-02-13	4	94	102.2	81.7	279.0	<0.6	<0.8	<1.4
BE-02-14	1	98	165.7	63.9	179.9	<0.7	<0.9	<1.6
BE-02-15	2	72	149.0	103.9	958.1	1.4	<1.2	<2.1
BE-02-16	2	65	135.4	70.2	268.9	1.0	<1.2	<2.1
BE-02-17	2	68	95.1	78.0	282.3	<0.7	<0.7	<1.3
BE-02-18	3	91	75.6	107.7	137.6	<1.3	<1.0	<1.7
BE-02-19	3	72	119.0	50.1	124.9	<0.7	0.2	<1.3
BE-02-20	5	68	89.4	143.1	149.5	0.9	<0.8	<1.3
Samples Analysed		20	20	20	20	20	20	20
Samples Above Detection Limit		20	20	20	20	7	3	0
Average		**88.7**	**141**	**113**	**211**	**<0.9**	**<0.9**	**<1.6**
Standard Deviation		**13.9**	**40.0**	**53.4**	**198**			