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Biogeochemical survey using lodgepole pine bark: Mount Milligan, Central British Columbia (parts of 93N/1 and 93O/4)

C.E. Dunn, R.G. Balma, S.J. Sibbick

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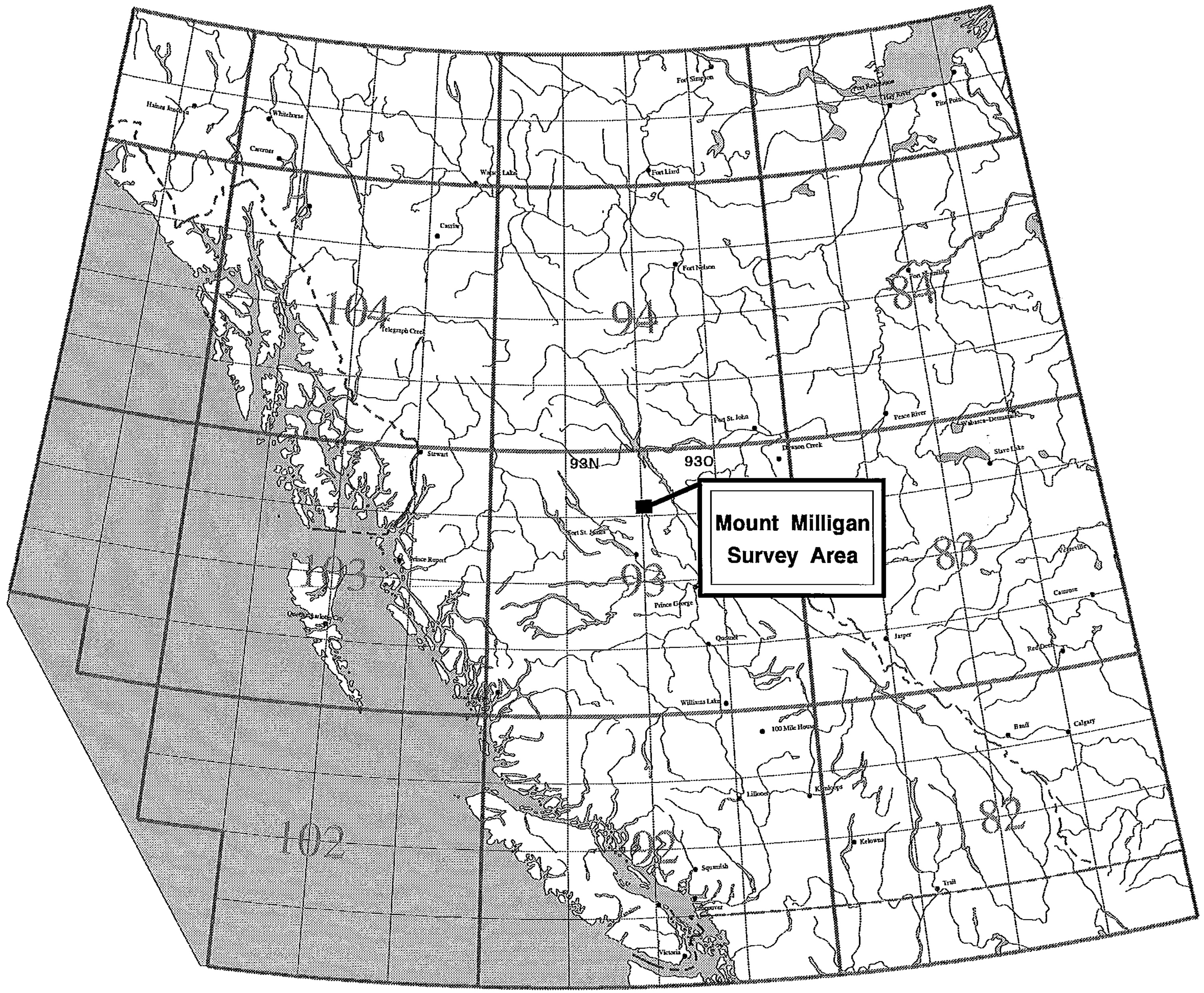

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INTRODUCTION

This Open File contains data from a biogeochemical survey in the Mt. Milligan area of central British Columbia. Samples of outer bark from lodgepole pine (*Pinus contorta*) were collected on three occasions: as part of an orientation survey by one of us (CED) in 1991; in conjunction with a regional till sampling program (Sibbick *et al.*, 1996) in the summer of 1991; and a small follow-up survey in the Philip Lakes area in September, 1995 (CED).

Data listings, statistical summaries, a geology and sample location map, and element distribution maps are presented. The maps show element concentrations in the ash of outer bark scales from lodgepole pine. Instrumental neutron activation analysis (INAA) was used to determine 36 elements, of which 27 were in sufficient concentration to be detected and quantified. In addition, data are included for 12 elements determined by inductively-coupled plasma emission spectrometry (ICP-ES). All data reported are concentrations in ash remaining after controlled ignition at 470°C. For bark of lodgepole pine, the ashing process concentrates the elements with little or no loss of elements except for a few of high volatility (e.g. Br and Hg).

The interpretation of biogeochemical data should be undertaken with due consideration to chemical requirements and tolerances of plants. Plants require certain elements for their survival, and they have the ability to concentrate metals by scavenging them from the substrate. Zinc, for example, is needed for plant metabolism. Therefore, subtle differences in Zn concentrations between sample sites are more likely to reflect the health of the plant than significant differences in the chemistry of the substrate. However, major differences in Zn concentrations may reflect the presence of Zn mineralization. By contrast, plants also have the ability to exclude those elements that would have a detrimental effect on their growth or health. This 'barrier' mechanism (Kovalevskii, 1979) may result in only weak enrichment of an element in a tree from an environment where that element may be enriched in the substrate. As a consequence, for some elements there may be no simple relationship between the chemistry of a tree tissue and the chemistry of the soil and underlying parent material. Brief discussion is provided on the role of each element in plant function in order to assist in data interpretation. Biogeochemistry is a complex science involving the interaction of many organic and inorganic processes. However, careful and systematic collection and preparation of plant samples can provide cost-effective new insight into the chemistry of the substrate and its groundwaters.

This report presents data from the 134 sites at which lodgepole pine bark samples were collected. Except for close-spaced samples in areas of special interest (e.g. zones of known mineralization), samples were collected on as even a grid as was practically possible, attaining an average sample density of approximately 1 site per 1 km^2. The data listed in Appendix A are available in digital form on a CD-ROM as part of a multi-media data set (Williams, 1996), and can be obtained also as a separate MS-DOS (IBM-PC) 3.5" 1.44 Mb diskette, which can be read by any DBASE-compatible software, and as an ASCII comma delimited file. They can be obtained from:

GSC Bookstore
Geological Survey of Canada
601 Booth St.
Ottawa
Ontario, K1A 0E8 Tel: (613) 995-4342 Fax: (613) 943-0646

DESCRIPTION OF THE SURVEY AREA

The Mount Milligan survey area, centred at latitude 55° 07'N and longitude 124° 00'W, is located approximately 150 kilometres northwest of Prince George in central British Columbia (Fig. 1). The area has limited access by logging road from Fort St. James and from Windy Point on Highway 97. There is a network of exploration roads in the western third of the area near the Mount Milligan deposits (MBX and Southern Star), but access to the eastern two-thirds of the area is restricted to a few roads of limited extent.

Located on the Nechako Plateau, the study area is characterised by a relatively flat to hummocky plain at 1000 metres elevation, bounded on the west and east by north trending ridges of 1300 to 1500 metres elevation. Mount Milligan, eight kilometres northwest of the Mount Milligan deposits, rises to an elevation of 1508 metres.

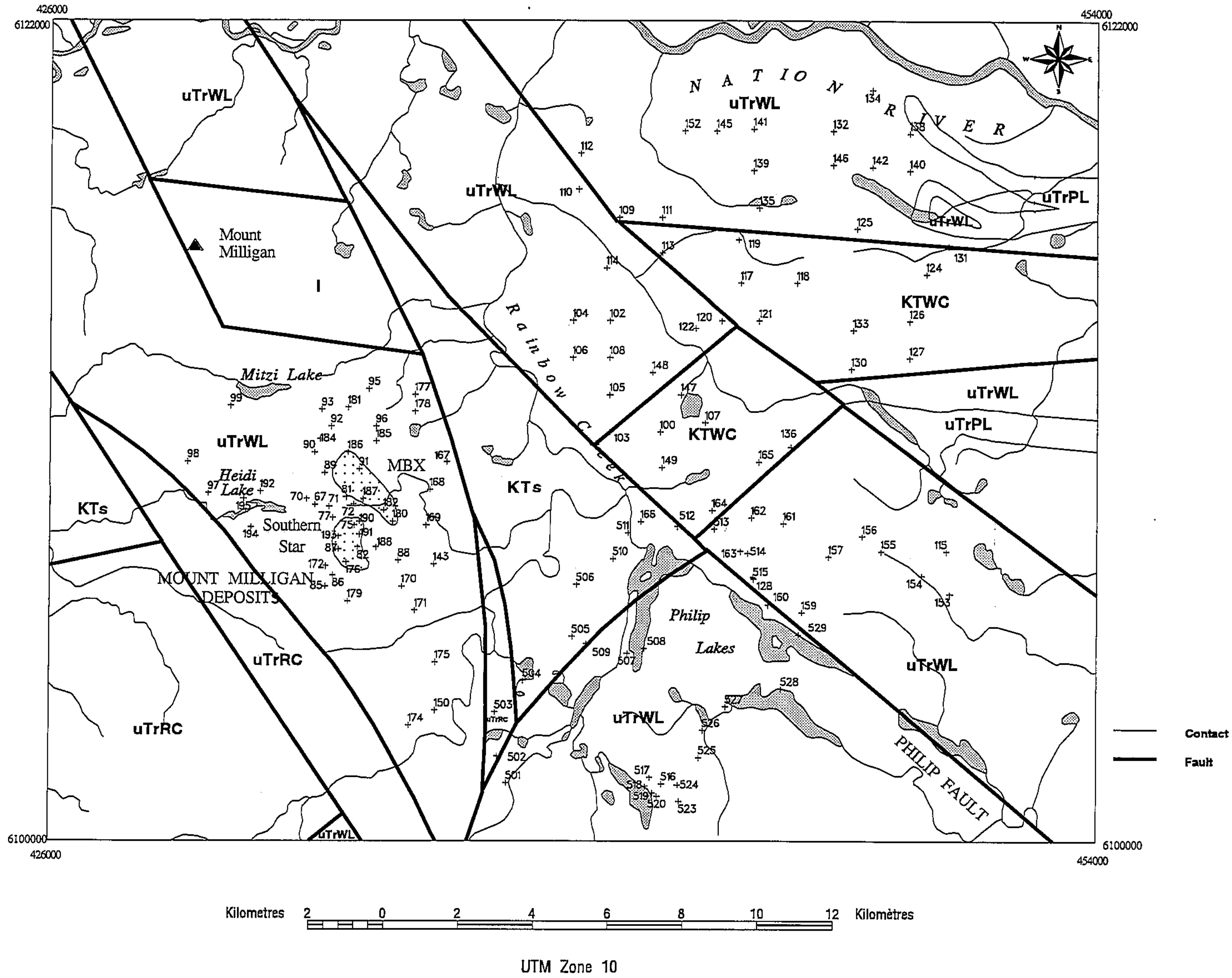
The area lies within the sub-boreal pine-spruce biogeoclimatic zone (Pojar *et al.*, 1987). The cold, dry climate supports a forest cover of generally low productivity. The extensive fire history of the area has resulted in many even-aged lodgepole pine stands. The dominant cover is lodgepole pine, with minor white spruce (*Picea glauca*), black spruce (*Picea mariana*), trembling aspen (*Populus tremuloides*), and paper birch (*Betula papyrifera*). In the understory there are sitka alder (*Alnus sinuata*), glandular birch (*Betula glandulosa*), various species of willow (*Salix spp.*), blueberries (*Vaccinium spp.*), lichens, feather mosses and grasses.

REGIONAL GEOLOGY AND MINERALIZATION (Fig. 2)

Takla Group rocks of the Quesnel Terrane underlie the Mount Milligan area (Nelson *et al.*, 1991). The Quesnel Terrane is an early Mesozoic island-arc sequence bounded on the west by oceanic rocks of the Cache Creek Terrane and on the east by oceanic rocks of the Slide Mountain Terrane. Metamorphic rocks of the Wolverine Complex are also in contact with the eastern boundary of the Takla Group/Quesnel Terrane (Struik, 1992). The Takla Group is Upper Triassic in age, consisting of rocks of sedimentary, extrusive volcanic, pyroclastic and epiclastic origin. Numerous coeval plutons, up to Early Jurassic age, intrude the Takla Group.

The Mount Milligan deposits are centred on Early Jurassic crowded plagioclase-porphyritic monzonite intrusions known as the MBX and Southern Star stocks (Nelson *et al.*, 1991). These, and numerous smaller stocks, intrude Upper Triassic Takla Group augite (+/- plagioclase) porphyry agglomerate, trachyte breccias and flows, and bedded epiclastic sediments of the Witch Lake Formation. Directly east of the intrusions, the Philip fault (also known as the Great Eastern fault) juxtaposes Takla Group rocks against Eocene continental sediments within an extensional basin (Nelson *et al.*, 1991). The eastern half of the study area is underlain by Witch Lake Formation, as well as basalt, diorite and locally limestone of the Philip Lakes succession (Struik, 1992). Quartzo-feldspathic gneiss, schist and granite pegmatite of the Cretaceous-Tertiary Wolverine Metamorphic Complex outcrop in the east and northeast (Struik, 1992).

Alteration associated with the deposits comprises a crudely zoned potassic core centred on the intrusions (DeLong *et al.*, 1991), and surrounded by an east-west elongate 3.0 by 4.5 kilometre propylitic halo. Mineralization consists primarily of disseminated and fracture-filling chalcopyrite and pyrite. Lesser quantities of bornite are present within the potassic alteration zone. Approximately 70% of the mineralization is hosted by the Witch Lake volcanics with the remaining 30% in the monzonite intrusives. Gold is associated with chalcopyrite, pyrite and bornite and occurs as small grains up to 100 μm in diameter along sulphide grain boundaries and microfractures in pyrite (Faulkner *et al.*, 1990). Both gold and chalcopyrite are associated with the potassic alteration zone (DeLong *et al.*, 1991). Reserves of the deposit are estimated at 298.4 million tonnes grading 0.45 gram per tonne gold and 0.22% copper (Schroeter, 1994).



LEGEND

CRETACEOUS-TERTIARY

KTs Eocene-Oligocene: basalt, volcanic wacke and fossiliferous volcanic ash-rich mudstone, sandstone

KTWC Cretaceous-Tertiary Wolverine Complex: quartzo-feldspathic gneiss, schist, pegmatite, amphibolite, calc-silicate and marble

UPPER TRIASSIC (-JURASSIC?) - TAKLA GROUP

uTrWL Witch Lake Formation and Philip Lakes succession correlatives: augite porphyry agglomerate, volcanic breccia, lapilli tuff and epiclastic sediments; local trachyte flows and tuff-breccias

uTrPL Philip Lakes succession limestone

uTrRC Rainbow Creek Formation: grey slate, thin-bedded siltstone, minor volcaniclastic sediments

INTRUSIVE ROCKS - (I)

Late Triassic-Early Jurassic: coarse grained, equigranular diorite/monzonite intruded by Late Cretaceous-Early Tertiary(?) equigranular, coarse grained granite with local rhyodacite and dacite.

MBX and Southern Star stocks: crowded plagioclase porphyritic monzonite (Late Triassic-Early Jurassic)

Fig. 2: Simplified geology of Mt. Milligan survey area, compiled from Nelson *et al.* (1991), and Struik (1992), with modifications by J. Nelson (personal communication, 1994)

Subparallel polymetallic sulphide veins, containing disseminated to massive pyrite and chalcopyrite, radiate outward from the MBX stock in the propylitic alteration zone. The best-developed veins are 0.3 to 3.0 metres thick and contain 3 to 100 grams per tonne gold, 0.2 to 10% copper, 1 to 3% sphalerite, and traces of arsenopyrite and galena (Faulkner *et al.,* 1990).

SURFICIAL GEOLOGY

The last glacial event in the Mount Milligan region occurred during the Late Wisconsinan (Fraser Glaciation) between 25,940+/-380 years B.P. and 10,100+/-90 years B.P. (Clague, 1981). Regional ice movement during this event was primarily to the northeast, as interpreted from ice-flow indicators such as well-developed striae scoured into bedrock and drumlinoid features developed in unconsolidated sediments. This observation of regional flow is in accordance with earlier studies to the north, west and south of the Milligan area (Armstrong, 1949), and more recently by Plouffe (1991, 1992) in the Stuart and Fraser lakes area to the southwest. In the McLeod Lake region to the southeast, Struik and Fuller (1988) mapped the extent of glacial lake deposits and noted the presence of mineralized clasts in morainal deposits.

Surficial sediments of the study area include till, glaciofluvial and fluvial sand and gravel, glaciolacustrine sand, silt and clay, colluvium and organic materials (Kerr, 1991). Two surficial units predominate: an extensive morainal (till) blanket and large glaciofluvial outwash complexes. Till was deposited during the last glacial episode and is commonly hummocky and forms drumlins. It consists of a dense matrix-supported diamicton composed of very poorly sorted, angular to well-rounded pebbles to cobbles in a sand-silt-clay matrix. These sediments are more continuous in the eastern half of the map area, from south of Philip Lakes to north of Nation River. Flow was toward the northeast during full glacial conditions. South of Nation River, a gradual change in flow direction towards the east is indicated by drumlinoid features.

Large concentrations of glaciofluvial sand and gravel dominate the central part of the study area along the axis of Rainbow Creek, and the Nation River valley to the north and to the west of the Mount Milligan deposits. These outwash-sediment complexes consist of sinuous esker ridges up to 10 kilometres long, kame deposits and a series of broad overlapping outwash fans deposited by glacial meltwater during ice retreat. They represent the end product of a long period of glacial and fluvial erosion, transportation and reworking of many types of surficial sediments. Within the narrow Nation River valley, glaciofluvial sediments are locally overlain by up to 20 metres of glaciolacustrine silt and clay. During ice retreat, these sediments were deposited in a glacial lake with an elevation of approximately 850 metres. Colluvial sediments derived from till and weathered bedrock form a veneer over steep hill sides and valley walls in the highlands north and south of the Mount Milligan deposits. Highlands to the northeast of the Philip Lakes are also mantled by colluvial sediment.

Drift thickness is highly variable, ranging from less than 1 metre on rocky highlands to over 80 metres in the Rainbow Creek area (Kerr and Sibbick, 1992). Thicknesses in excess of 100 metres are common directly east of the Mount Milligan deposits (Kerr and Bobrowsky, 1991). Ronning (1989) has reported overburden depths in excess of 200 metres in the Nation Lakes area to the west.

Humo-ferric podzol is the main soil type of the region. Modifications of the original till substrate by soil-forming processes extend to an average depth of approximately 0.5 metre. Oxidation of the parent materials generally extends to a depth of 2 metres.

SAMPLE COLLECTION, PREPARATION AND ANALYSIS

The outer bark of lodgepole pine was collected by scraping about 50 g of loose scales into a standard 'kraft' paper soil bag. A paint scraper proved to be an effective tool for removing the bark scales. Care was taken not to include the inner bark because its composition is substantially different from that of the outer bark. Whereas there are seasonal variations in the chemistry of twigs and leaves, the chemistry of the outer bark does not change during the course of the year. This is because the bark is dead tissue, and therefore can be collected at any time, and samples from different survey periods can be integrated without the need to normalize data to a common time datum.

Approximately 50 g of dry bark was weighed into aluminum trays. The trays were placed in a pottery kiln, and the temperature slowly raised (over 2 - 3 hours) to 470°C. After a further 12 hours at this temperature, no charcoal remained and the bark was reduced to approximately 1 g of ash. Half was accurately weighed and compacted into small polyethylene vials, suitable for instrumental neutron activation analysis (INAA), and submitted for the determination of 36 elements at Activation Laboratories Ltd., Ancaster, Ontario. Maps are provided for 26 of these elements. Of the remaining 10 elements: the data for Mo were good, but not as precise as those obtained by ICP-ES, therefore data by the latter method were plotted; similarly, the data for Ni were better by ICP-ES; for Ag, Se and W only a few sites yielded concentrations slightly above the detection limit for these elements of 2 ppm, and the precision of the data was poor. A few sites yielded detectable levels of Ta (>0.5 ppm): these data are included in the elemental listings, but the precision was considered inadequate to warrant plotting distribution maps or generating statistics. Concentrations of Hg, Ir, and Tb were all below the detection levels of 1 ppm, 2 ppb, and 0.5 ppm, respectively. Detection levels for Sn by INAA vary with the matrix composition of the sample, and are commonly between 50 and 100 ppm Sn: no sample yielded concentrations above detection by this method.

The remaining half of the ash sample was submitted to Min-En Laboratories Ltd., Vancouver, British Columbia, for multi-element analysis by inductively coupled plasma emission spectrometry (ICP-ES), following an aqua regia digestion. For most elements this extraction is 'total', although for some (e.g. Al, B) it is only partial. The analytical precision was acceptable for the 12 elements for which data are provided (Tables 1 and 2).

Appropriate standards and duplicates were inserted to ensure quality control. The precision varied among elements and with element concentration. Standard V2 (GSC vegetation ash standard) was included with the first batches of samples, submitted for analysis in 1991. Subsequently this standard has all been used, and it has been replaced by GSC standard ash V6c - mostly pine twigs. From the data listings of Table 1, it is evident that there is consistently good precision for most elements. Also, from many similar analyses of these standard samples by several laboratories the data have been found to be accurate. Of the elements reported here, most samples contained levels substantially higher than detection limits, thereby providing analytical precision generally better than +/- 10%. Table 1 lists data obtained on standard ash samples inserted randomly within each batch of 20 samples. Table 2 lists analyses of duplicate pairs of ash samples, each pair inserted at random within each batch of 20 samples, and shows excellent replication for most elements in most samples. The classic 'nugget' effect of Au occurs in a few samples. Table 3 shows the determination (lowermost detection) limits quoted for each element by the analytical laboratories. In the few instances where element concentrations were not detectable, a value of half the determination limit was substituted for statistical calculations.

Table 1: Standards V2 & V6c - Concentrations in Ash Determined by INAA & ICP-ES

INAA

Standard	Au	As	Ba	Br	Ca	Ce	Co	Cr	Cs	Eu	Fe	Hf	K	La	Lu	Na	Nd	Rb	Sb	Sc	Sm	Sr	Ta	Th	U	Yb	Zn
	ppb	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	5*	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
V2	15	1.0	2900	22	27.0	7	4	29	2.7	<0.02	1.50	1.5	7.40	4.5	0.07	5910	<5	200	1.0	1.1	0.5	1500	<0.5	1.0	0.6	0.26	2600
V2	14	2.0	2600	22	28.0	8	4	29	2.6	<0.02	1.68	1.7	7.92	4.7	<0.05	5960	<5	200	1.0	1.1	0.5	1400	<0.5	1.0	0.6	0.22	2600
V2	15	1.0	2700	22	27.3	7	4	29	2.6	0.14	1.17	1.7	7.26	4.2	0.05	6320	<5	210	1.0	1.1	0.6	1300	<0.5	1.0	0.8	0.25	2600
V2	15	1.0	2900	22	28.5	10	4	29	3.1	<0.02	1.03	1.5	8.69	4.4	<0.05	6000	<5	220	1.0	1.2	0.6	1300	<0.5	1.0	0.7	0.31	2600
V2	15	1.8	2700	19	25.3	7	5	38	2.8	0.18	1.86	1.3	6.81	4.0	<0.05	5710	<5	200	1.2	1.1	0.5	1500	<0.5	1.2	0.7	0.18	2400
V2	14	1.7	2700	17	26.0	7	4	30	2.7	<0.02	1.57	1.3	7.05	3.8	<0.05	5500	<5	180	1.3	1.2	0.5	1500	<0.5	1.0	0.5	0.16	2500
V2	14	2.7	2900	21	29.8	8	4	30	2.9	0.17	1.15	1.6	7.34	4.6	<0.05	5540	<5	230	1.2	1.2	0.6	1400	<0.5	1.2	0.8	0.33	2400
V2	14	1.8	2700	21	29.8	8	4	31	2.7	<0.02	1.10	1.6	7.79	3.8	0.06	5710	<5	200	1.2	1.1	0.5	1300	<0.5	1.1	0.5	0.23	2400
V2	12	2.0	2700	20	29.9	9	4	30	3.0	<0.02	1.72	1.3	7.58	4.5	<0.05	6360	<5	210	1.2	1.1	0.6	1500	<0.5	1.3	0.9	0.27	2400
V6c	13	6.6	400	13	15.7	44	9	61	<0.5	0.89	1.67	5.5	3.11	20	0.28	11600	23	45	1.1	4.4	3.0	890	<0.5	3.0	1.2	1.76	710
V6c	15	7.8	390	11	14.7	42	9	67	0.9	0.71	1.77	4.9	3.26	20	0.31	12000	24	43	1.2	4.4	3.0	1100	<0.5	3.0	1.5	1.62	790
V6c	20	6.4	420	11	15.1	40	8	63	0.7	0.73	1.63	5.2	4.28	19	0.31	11400	21	41	1.0	4.2	2.9	970	<0.5	3.3	1.0	1.66	890
V6c	17	6.4	400	11	14.5	41	7	67	1.3	0.81	1.71	5.2	3.22	19	0.30	11600	21	50	1.0	4.3	3.3	690	<0.5	2.6	0.9	1.41	640

ICP-ES

Standard	Al	B	Cd	Cu	Li	Mg	Mn	Mo	Ni	P	Pb	V
	pct	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm
	0.01*	2	0.2	1	2	0.01	1	1	1	0.001	3	2
V2	1.923	168	<0.2	147	<2	3.148	17374	2	40	1.005	419	16.1
V2	0.792	169	2.4	129	<2	3.259	17861	3	45	1.047	421	15.4
V2	0.802	153	3.5	122	2	3.248	18054	3	44	1.061	479	15.7
V2	0.767	172	2.2	115	<2	3.145	17567	3	42	1.023	322	14.5
V2	0.703	166	2.3	115	<2	2.996	17054	3	40	1.002	273	13.9
V2	0.742	173	1.6	114	<2	3.117	17577	3	42	1.036	285	14.3
V2	0.724	175	1.5	122	<2	3.122	17663	2	36	1.018	272	14.4
V2	0.721	173	3.4	123	<2	3.127	17621	4	42	1.027	282	14.9
V2	0.712	166	2.8	110	2	3.067	16993	4	41	0.999	284	14.2
V6c	1.190	152	3.8	128	5	2.230	676	8	54	0.604	240	24.0
V6c	1.180	145	3.7	131	4	2.140	672	5	54	0.589	234	23.0
V6c	1.250	157	2.3	139	5	2.220	739	5	60	0.663	239	26.0
V6c	1.260	166	3.7	147	5	2.300	698	7	56	0.712	242	26.0

* First row of data shows determination limits

Table 2: Laboratory Duplicates - Concentrations in Ash Determined by INAA & ICP-ES

INAA

Sample Number	Au	As	Ba	Br	Ca	Ce	Co	Cr	Cs	Eu	Fe	Hf	K	La	Lu	Na	Nd	Rb	Sb	Sc	Sm	Sr	Ta	Th	U	Yb	Zn
	ppb	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	5*	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
AL91/1684	5	13.0	740	12	15.7	30	17	65	2.2	0.92	3.22	2.8	4.18	15.0	0.28	16000	18	57	1.0	13.0	3.2	430	0.5	2.0	1.4	1.86	670
AL91/1685	<5	13.0	710	12	14.2	29	16	65	2.2	0.81	3.16	2.8	2.56	15.0	0.30	15700	18	49	1.0	13.0	3.1	560	0.6	2.0	1.3	1.95	690
AL91/1717	13	14.0	680	22	14.6	30	21	61	3.0	0.80	3.32	2.7	3.51	14.0	0.28	12500	17	88	2.0	12.0	2.9	560	<0.5	2.0	<0.2	1.79	1000
AL91/1718	<5	13.0	700	23	16.0	29	23	71	3.0	0.75	3.44	2.7	3.39	15.0	0.30	13800	16	71	2.0	13.0	3.1	580	<0.5	2.0	1.3	2.02	1100
AL91/1741	19	4.0	1800	16	31.3	11	9	35	<0.5	0.34	1.41	1.7	1.93	5.2	0.11	6790	<5	37	<0.1	5.5	1.1	1000	<0.5	<0.1	<0.1	0.65	1100
AL91/1742	21	5.0	1800	18	28.7	13	9	48	1.1	0.34	1.53	1.4	1.58	5.5	0.14	7070	7	43	1.0	5.9	1.2	1100	1.2	<0.1	<0.1	0.73	1200
AL91/1761	<5	1.0	7700	22	32.7	4	4	12	0.8	<0.02	0.51	1.9	8.19	2.6	0.05	2480	<5	130	<0.1	1.6	0.4	1400	<0.5	<0.1	<0.1	0.32	2200
AL91/1762	<5	1.0	7300	22	28.7	4	4	10	0.6	<0.02	0.50	<0.5	7.07	2.6	<0.05	2360	<5	120	<0.1	1.6	0.4	1500	<0.5	<0.1	<0.1	0.26	2100
AL91/1553	5	1.9	1600	22	28.4	4	6	4	0.8	<0.02	0.27	0.7	4.39	2.3	<0.05	1490	<5	73	0.7	1.0	0.3	1500	<0.5	0.3	<0.1	<0.05	2800
AL91/1554	<5	2.0	1700	21	27.0	<3	5	5	<0.5	0.12	0.26	<0.5	4.02	2.2	<0.05	1440	<5	62	0.7	0.9	0.3	1500	<0.5	<0.1	<0.1	0.25	2800
AL91/1575	5	6.3	540	15	6.7	18	50	630	1.3	0.57	3.37	2.0	1.42	9.1	0.26	9530	10	26	0.9	10.0	2.0	300	<0.5	1.5	1.0	1.28	490
AL91/1576	5	6.2	570	15	6.8	18	49	650	1.4	0.57	3.57	1.9	1.60	9.5	0.24	10000	10	33	0.9	10.0	2.1	350	<0.5	1.6	1.1	1.31	490
AL91/1598	27	5.5	1200	15	15.9	23	11	50	2.4	0.66	2.42	2.4	2.37	11.0	0.22	14700	14	76	1.9	9.1	2.2	680	<0.5	1.8	0.9	1.52	1100
AL91/1599	<5	4.9	1200	14	17.5	23	10	53	1.8	0.66	2.29	2.3	2.42	11.0	0.25	14800	13	71	1.8	9.0	2.2	690	<0.5	1.7	<0.1	1.40	950
AL91/1624	34	11.0	1000	17	22.7	16	17	57	1.9	0.35	2.46	1.9	2.17	7.9	0.16	8130	9	83	1.8	6.5	1.5	770	<0.5	1.6	0.5	0.97	1500
AL91/1625	23	10.0	970	17	23.8	16	17	42	<0.5	<0.02	2.49	2.2	2.42	8.0	0.17	8030	11	70	2.0	6.7	1.5	920	<0.5	1.4	0.5	0.94	1400
AL91/1644	<5	2.2	730	25	36.7	4	7	13	<0.5	<0.02	0.56	0.7	1.23	2.5	0.06	2190	<5	29	0.8	1.9	0.5	590	<0.5	0.4	<0.1	0.20	1400
AL91/1645	<5	2.4	680	26	36.8	4	7	15	<0.5	<0.02	0.56	0.6	0.65	2.2	<0.05	2150	<5	30	0.6	1.9	0.4	750	<0.5	0.4	<0.1	0.25	1400
AL95/1329	<5	7.2	450	11	23.0	18	14	72	0.9	0.57	2.14	1.7	3.03	8.5	0.22	9150	10	51	1.7	8.0	1.7	<300	<0.5	1.3	0.7	1.10	1100
AL95/1330	6	7.5	400	10	22.1	18	15	79	1.5	0.58	2.16	1.6	3.72	8.6	0.22	9450	10	43	1.7	8.3	1.8	600	<0.5	1.3	0.7	1.14	1100
AL95/1339	5	1.5	640	22	31.5	<3	4	3	<0.5	<0.02	0.14	<0.5	1.52	<0.1	<0.05	1000	<5	50	0.4	0.4	0.1	810	<0.5	0.2	<0.1	<0.05	1400
AL95/1340	9	1.5	680	22	32.3	<3	5	3	<0.5	<0.02	0.13	<0.5	1.47	0.9	<0.05	996	<5	49	0.6	0.4	0.2	860	<0.5	0.2	<0.1	<0.05	1400

* First row of data shows determination limits

Table 2 (cont'd): Laboratory Duplicates - Concentrations in Ash Determined by INAA & ICP-ES

ICP-ES

Sample Number	Al pct 0.01*	B ppm 2	Cd ppm 0.2	Cu ppm 1	Li ppm 2	Mg % 0.01	Mn ppm 1	Mo ppm 1	Ni ppm 1	P % 0.001	Pb ppm 3	V ppm 2
ICP91/1553	2.94	175	6.0	139	<2	1.45	15798	3	40	0.736	84	13
ICP91/1554	2.61	135	5.5	125	<2	1.26	13927	3	34	0.636	62	11
ICP91/1575	1.98	43	<0.2	46	4	9.46	4210	<1	747	0.147	<3	64
ICP91/1576	1.93	41	<0.2	47	4	9.37	4665	<1	751	0.154	3	62
ICP91/1598	2.56	56	5.5	107	6	1.18	9104	2	35	0.383	61	74
ICP91/1599	2.69	61	3.3	114	6	1.24	9879	2	37	0.420	65	76
ICP91/1624	2.72	53	6.8	197	4	1.39	5936	3	27	0.729	43	54
ICP91/1625	2.47	47	8.0	181	4	1.28	5503	2	25	0.667	40	50
ICP91/1644	1.11	46	20.7	87	<2	0.92	8222	2	24	0.612	44	14
ICP91/1645	1.11	47	16.3	89	<2	0.89	8118	3	23	0.624	43	15
ICP91/1684	1.93	43	1.1	104	6	1.14	2326	<1	20	0.344	31	71
ICP91/1685	2.01	45	1.3	106	6	1.16	2383	<1	21	0.342	30	75
ICP91/1717	2.77	64	4.0	173	10	1.77	5079	2	37	0.602	47	89
ICP91/1718	2.57	60	2.5	163	9	1.68	4765	<1	36	0.576	44	81
ICP91/1741	0.64	78	1.2	130	2	0.86	4529	2	20	0.375	30	34
ICP91/1742	0.60	78	1.1	124	2	0.85	4565	<1	19	0.371	30	32
ICP91/1761	0.44	119	4.0	96	<2	0.94	17565	2	39	0.661	51	17
ICP91/1762	0.41	126	3.4	93	<2	0.97	18586	3	39	0.638	54	15
ICP95/1329	1.24	113	15.2	123	4	1.19	1658	2	20	0.352	216	43
ICP95/1330	1.18	114	14.0	117	4	1.17	1624	<1	18	0.342	85	40
ICP95/1339	2.62	159	29.8	132	<2	1.17	7512	<1	8	0.543	16	<2
ICP95/1340	2.79	165	30.5	141	<2	1.24	8026	<1	8	0.583	6	<2

* First row of data shows determination limits

Table 3: Determination Limits for Elements Analyzed by INAA & ICP-ES

INAA

Element		*Units of Measure*	*Determination Limit*
Gold	Au	ppb	5
Arsenic	As	ppm	0.5
Barium	Ba	ppm	10
Bromine	Br	ppm	1
Calcium	Ca	%	0.2
Cerium	Ce	ppm	3
Cobalt	Co	ppm	1
Chromium	Cr	ppm	1
Cesium	Cs	ppm	0.5
Europium	Eu	ppm	0.02
Iron	Fe	%	0.05
Hafnium	Hf	ppm	0.5
Potassium	K	%	0.05
Lanthanum	La	ppm	0.1
Lutetium	Lu	ppm	0.05
Sodium	Na	ppm	10
Neodymium	Nd	ppm	5
Rubidium	Rb	ppm	5
Antimony	Sb	ppm	0.1
Scandium	Sc	ppm	0.1
Samarium	Sm	ppm	0.1
Strontium	Sr	ppm	300
Tantalum	Ta	ppm	0.5
Thorium	Th	ppm	0.1
Uranium	U	ppm	0.1
Ytterbium	Yb	ppm	0.05
Zinc	Zn	ppm	20

ICP-ES

Element		*Units of Measure*	*Determination Limit*
Aluminum	Al	pct	0.01
Boron	B	ppm	2
Cadmium	Cd	ppm	0.2
Copper	Cu	ppm	1
Lithium	Li	ppm	2
Magnesium	Mg	%	0.01
Manganese	Mn	ppm	1
Molybdenum	Mo	ppm	1
Nickel	Ni	ppm	1
Phosphorus	P	%	0.001
Lead	Pb	ppm	3
Vanadium	V	ppm	2

MAP PRODUCTION AND DATA HANDLING

The proportional dot maps for this Open File are all plotted using the Universal Transverse Mercator projection (NAD27 datum), with a central meridian of 123^0 (Zone 10). The hydrography bases (NTS 93N and 93O) for the dot maps were obtained in digital form from Surveys, Mapping and Remote Sensing Sector (SMRSS) of the Department of Natural Resources, Canada. The digital hydrography base was produced by splicing together the two 1:250 000 digital bases and then clipping the appropriate sub-area. The index map (Fig. 1) was also obtained from SMRSS and is presented using a Lambert Conformal Conic projection, Clarke 1866 spheroid, central meridian 95^0, and standard parallels of 49^0 and 77^0.

The geological base map is a compilation of those published by Nelson *et al.* (1991), and Struik (1992). The base was manually digitized and then transformed into the appropriate projection. Spatial point-in-polygon operations were then used to extract rock unit information for the individual sample sites. The rock unit attribute data were used in preparing the statistical summaries.

Map plots in this Open File were produced by ESRI's ARC/INFO software. Computations were performed on UNIX workstations, with output to a 600 dpi Hewlett-Packard Laserjet printer. The proportional dot maps were generated using AML (ARC/INFO Macro Language). The macro, with its corresponding input menu, prompts the user to input percentile break-points and an appropriate scaling exponent for each element to be mapped. Proportional dots are then generated, using the ARC/INFO SPOTSIZE, POINTSPOT and SPOT commands, with the user specifying an appropriate minimum and maximum dot size. For the purposes of this Open File, analytical values for a particular element that were greater than or equal to the 98th percentile were plotted at the maximum dot size; values less than the 98th percentile were scaled according to the user defined exponent. Exponents for individual elements were chosen to provide the best view of the analytical data. Accordingly, care should be exercised when attempting to compare different elements plotted with different exponents.

Element concentrations below analytical detection limits were reduced to half of the detection limit for data plotting and statistical calculations. For samples with duplicate analyses, data from the first of each duplicate pair were plotted.

ELEMENT DISTRIBUTION MAPS

Before interpreting the element distribution maps, the reader is advised to note the comments provided under each of the element headings. These notes are organized alphabetically by element symbol, dealing first with those elements determined by INAA, followed by those determined by ICP-ES. This sequence is the same as the element listings in Appendix A and the statistical summary in Appendix B.

Transparent Overlay

A transparent overlay at the same scale as the element distribution maps is provided to help locate individual samples and to relate their positions to bedrock geology and known mineral deposits.

Distribution Maps of Elements Determined by INAA

Gold (Au)

Gold is not known to be essential for plant growth and health. Consequently, patterns of Au distribution reflect zones of relative Au enrichment in soils, surficial deposits, groundwaters and near surface rocks. Background levels of Au in the ash of lodgepole pine bark are commonly < 5 ppb Au. The median value obtained for the current data set is < 5 ppb Au, and the 80th percentile is only 7 ppb (Appendix B, p.

B2) whereas the maximum reaches 185 ppb Au at site #187.

As might be expected, the highest concentrations are over the porphyry Cu/Au mineralization at the MBX and Southern Star deposits. Elsewhere concentrations are low, with the exception of a single site at the north end of Philip Lakes, near Rainbow Creek, with 147 ppb Au (site #166). The high ash yield of this sample (7.5%) may in part be due to its high Fe content, but may reflect also some contamination by airborne dust. Regardless, the high Au content is an indication of relative enrichment of Au in the immediate vicinity. To the southeast of this location a few samples yielded detectable Au. This area is of interest in that bark samples were also enriched in As.

Arsenic (As)

Arsenic is known for its toxicity, yet some tree species can accumulate extraordinary amounts without exhibiting any visible harmful affects (Warren *et al.*, 1964; Dunn and Scagel, 1989). Arsenic is an essential element for the metabolism of carbohydrates in fungi and algae, and a few ppm As in most conifer tissues is to be expected. The median value of 3.25 ppm As for the data set is a typical background concentration for lodgepole pine bark. The map of As distribution shows two areas of interest: around the MBX and Southern Star deposits and adjacent to the northeastern limit of Philip Lakes. The latter area has coincident enrichment of Fe and several elements commonly associated with Fe in plant tissues - Hf, Sc, REE, Na, and Th. This 'iron factor' in plants (Dunn, 1995, p.407) has been found in gold-rich areas to have an additional association with As, Sb, Cr and Au. Sample of twigs from white and black spruce collected from this area in September, 1995, confirm that there is enrichment of As, with above background levels of Au, Ag, Sb, Cu, U, and Th. The implication for the Philip Lakes area is that there may be a zone of concealed mineralization. Gossans are reported from this area (L. Struik, personal communication, 1996).

Barium (Ba)

All samples yielded substantially more barium than the INAA detection limit of 10 ppm Ba. The median value of 590 ppm Ba is similar to the 560 ppm Ba obtained from the same sample medium collected around the Nickel Plate mine in southern British Columbia (unpublished data). It is noteworthy that there appears to be a spatial relationship among distributions of Ba, As and Au. Highest Ba concentrations are not coincident with those of As and Au, but are peripheral to them. This observation is consistent with that noted around Au mineralization in the boreal forest of northern Saskatchewan (Dunn, 1984).

Bromine (Br)

Bromine is a volatile element, present in most, if not all terrestrial plants, but it is not known to be an essential element. It can form many different complexes within plants. Some complexes volatilize during the ashing process, causing losses of 30 - 90 percent of the Br contained within the plant tissues. However, it has been noted (Dunn, 1986) that where gold mineralization exists, there is sometimes enrichment of Br in plant ash, indicating that a stable Br compound is retained. Within the survey area the range of Br values is small and there are no notable concentrations of Br.

Calcium (Ca)

Calcium is a major 'building block' element, essential for the rigidity of cell walls in most plants. The variations in Ca content of the bark may influence the distribution of some trace elements. For example, a statistical analysis of multi-element data sets commonly reveals a strong association of Ca with Ba and Zn. Comparison of the distribution patterns of Ca and Ba shows some positive correlations in the western part of the survey area, but no clear relationship with Zn.

Cerium (Ce) and other Rare Earth Elements (Eu, La, Lu, Nd, Sm, Tb, Yb)

The 36 element INAA scan includes data for eight rare earth elements (REE): lanthanum (La), cerium (Ce), neodymium (Nd), samarium (Sm), europium (Eu), terbium (Tb), ytterbium (Yb), and lutetium (Lu). Of these elements, only Tb consistently yields concentrations below the detection level of 0.5 ppm and therefore no map of Tb is included. Because of the geochemical coherence of the REE they are all considered together in this section. Maps of distribution patterns are very similar, with relatively high concentrations over the Mount Milligan deposits and in the Philip Lakes area. The iron factor discussed above (under arsenic) is probably the dominant control on the content of REE in the pine bark.

Cobalt (Co)

Traces of Co are required by some plants to assist in the fixation of major nutrients (Kabata-Pendias and Pendias, 1984). One ppm Co in ash is sufficient for growth of most plants, but conifer bark usually contains 5 - 10 ppm Co. Plant tissues commonly contain elevated levels of Co over ultramafic rocks, and it has been observed that some plants exhibit Co enrichment in the vicinities of gold mineralization in northern Saskatchewan (Dunn, 1986). In the survey area it is noteworthy that the highest Co concentrations occur over the Mount Milligan deposits, and at sites east of Philip Lakes where there is also enrichment of As and Fe-related elements.

Chromium (Cr)

Chromium is a non-essential element for which precise INAA data are obtained at low ppm levels. Concentrations in 25 percent of the samples are higher than the 10 - 20 ppm Cr that is characteristic of pine bark ash. The sites with the higher levels reflect relatively high abundances of soluble Cr in the substrate. The mechanisms of absorption and translocation of Cr in plants (especially as the soluble Cr^{2+} and Cr^{6+}) are similar to those of Fe, giving rise to a fairly stable Cr/Fe ratio in plant tissues (Cary *et al.*, 1977). This association is apparent from comparison of the Cr and Fe maps. The trees are unlikely to reflect any enrichment of Cr^{3+} (e.g. in chromite) in the substrate because root tissues are not capable of reducing the poorly soluble Cr^{3+} to the soluble Cr^{2+}.

Cesium (Cs)

This alkali metal performs no known essential function in plant tissues, and is usually present at less than 3 ppm Cs in ash of conifer bark. The median value for this data set is 1.3 ppm Cs and, although no sites of unusual enrichment are present, clusters of relative enrichment occur in bark samples from sites near Heidi and Philip Lakes. Near some gold deposits there is a spatial relationship of Cs in plant tissue with highest concentrations peripheral to zones of Au enrichment (Dunn, 1995).

Europium (Eu) - see cerium

Iron (Fe)

Iron is essential for photosynthesis and is a major constituent of chlorophyll. In addition, there is a residual content of Fe which reflects the composition of the substrate. Iron that is in a soluble form in soils and waters, or can become soluble in the acidic micro-environment around roots, is easily taken up in large amounts by plants. Therefore, the inference from the map of Fe distribution is that Fe is present in a readily soluble form near the Mount Milligan deposits, and to the east of Philip Lakes. There is a notable association of several elements at these sites, which are collectively referred to as the 'Fe factor' (see section on As).

Hafnium (Hf)

The content of Hf in the ash of lodgepole pine bark is commonly less than 1 ppm, and it is not known to perform any useful role in plant growth. Hafnium in plants commonly exhibits a close relationship to Fe, and within the survey area the pattern of Hf distribution is almost identical to that of Fe. The uptake of Hf by plants may also be linked to Zr, due to their close geochemical affinities.

Potassium (K)

Potassium has no structural role in plants, but it serves a number of catalytic roles and is required in large amounts (Bidwell, 1979). It is very important in the overall metabolism of plants. Lower concentrations are present in bark than in most other plant tissues, with just over 4% as the median value. In environments where there is an abundance of K, trees may excrete unwanted amounts into the outer bark. If this is the case, sites with relatively high levels of K in bark may reflect a potassic-rich substrate (e.g. K-rich clays or felsic rocks). It should be noted, however, that interactions with other elements (e.g. Al) can complicate the picture. Consequently, unless the substrate is moderately uniform (i.e. similar lithology) and there are similar environmental conditions within a survey area, variation in K content of trees is likely to be difficult to interpret, and therefore not of great value for mineral exploration.

Lanthanum (La) - see cerium

Lutetium (Lu) - see cerium

Sodium (Na)

Sodium concentrations between 0.1 and 1 percent are common in conifer tissues and may reach several percent over zones of Na enrichment in the substrate. Some Na enrichment commonly occurs in association with Fe, and in the survey area there is a strong correlation between these elements. Highest concentrations occur near the Mount Milligan deposits and Philip Lakes.

Neodymium (Nd) - see cerium

Rubidium (Rb)

Although Rb may substitute for K in rock-forming minerals, there is an antagonism between K and Rb in plants (Kabata-Pendias and Pendias, 1984). This results from their competition for the same binding sites, thereby causing different distribution patterns for the two elements. Cesium is also involved and differences between the Cs and Rb maps indicate that the strong geochemical affinity commonly shown by these elements does not occur universally throughout the survey area, and that some partitioning has taken place.

Antimony (Sb)

Excellent analytical precision is obtained for traces of Sb by INAA, so that variations in the sub-ppm concentrations are real, and not an artifact of the analytical technique. Although Sb can be readily taken up by plants in soluble forms, it is considered a non-essential element (Kabata-Pendias and Pendias, 1984) and is usually present at low ppm levels. The median value for the present data set is 1.1 ppm Sb. Higher concentrations (maximum of 5 ppm) occur in samples from the area of the Mount Milligan deposits, and at several sites east of Philip Lakes where there is coincident enrichment of arsenic and other elements. As noted above, there is a good correlation with Fe and Fe-related elements.

Scandium (Sc)

Data on the essentiality of Sc in biologic systems are inconclusive (Horovitz, 1988). If required, Sc is needed only in 'ultra-trace' amounts, and therefore its presence in bark is controlled essentially by the chemistry of the substrate and by the distribution of other elements. In particular, there is commonly a near perfect correlation between Sc and Fe in plant tissues and a comparison of the maps of these two elements clearly demonstrates this association.

Samarium (Sm) - see cerium

Strontium (Sr)

INAA has poor sensitivity to traces of Sr, and analytical precision is inferior to that for most other elements considered in this study. However, Sr concentrations are significantly above detection limits in over 80 percent of the samples, such that the areas of Sr enrichment depict significant regional variations.

Strontium is known to be essential for some plant species, but its general essentiality still needs confirmation. It performs a function similar to Ca in plants, and may be incorporated into their structural components. However, interactions between Ca and Sr are complex and, as demonstrated by the distribution maps, there is not a close relationship between these elements in bark samples from the survey area.

Thorium (Th)

Thorium has low solubility and is not essential for plant growth. Its concentration in plant ash is typically < 2 ppm Th, and even over zones of Th-rich mineralization (e.g. allanite with > 5000 ppm Th in northern Saskatchewan) only a few ppm accumulate in the tissues (Dunn and Hoffman, 1986). The median value in the survey area is 0.6 ppm Th, with a maximum of only 2.5 ppm Th. However, although the range of concentrations is small, the excellent precision of the analytical data permits resolution of the subtle regional differences. Of note is the strong similarity of the Th and Fe distributions. However, the relationship is not linear, since there is an 8-fold increase from the median to maximum values of Fe, yet only a 4-fold increase in Th over the same statistical range.

Uranium (U)

Although U_3O_8 has high solubility, it rarely exceeds concentrations of more than 2 ppm in plant ash. The are a number of notable exceptions, particularly in northern Saskatchewan where enrichments in spruce twigs are locally more than three orders of magnitude (Dunn, 1983). The maximum in the survey area is 1.6 ppm U, and more than 50% of the samples yielded <0.1 ppm U. In a relative sense, the highest values are over the Southern Star zone, and at a few isolated sites to the east. The Fe/U association that occurs in some biogeochemical data sets is not present in the survey area.

Ytterbium (Yb) - see cerium.

Zinc (Zn)

Because Zn is essential for carbohydrate and protein metabolism, differences of a few 100 ppm Zn in ash are probably related to the health of the tree rather than subtle changes in substrate chemistry. In general, concentrations of Zn in bark samples from the survey area are moderately high. Typical background concentrations in pine bark from elsewhere in British Columbia are approximately 1500 ppm Zn, whereas the median value for this data set is 2300 ppm. Slightly elevated levels occur peripheral to the Mount Milligan deposits, but the highest concentrations are at sites on the Wolverine Complex in the northeast, and south of Philip Lakes.

Distribution Maps of Elements Determined by ICP-ES

Aluminum (Al)

All dry vegetation samples were placed in Al trays for ashing. Therefore a certain amount of contamination from this source is inevitable. However, the wide range in Al concentrations, and the high levels of Al in the samples suggest that areas of *relative* Al enrichment are significant. The aqua regia extraction used is not 'total', but good precision was obtained for duplicate samples. Tests to compare data obtained from a total analysis with those by ICP-ES (aqua regia digestion) indicate that the acid digestion releases approximately 50% of the Al. There is no obvious relationship of Al concentrations in the pine bark to underlying lithologies or known zones of mineralization. Most of the highest concentrations are isolated occurrences.

Boron (B)

Borosilicate test tubes were used for the acid digestion of the ash samples, from which the analysts suggest 5 - 10 ppm B may be released. This is an insignificant amount in comparison with the concentrations of B present in the ash. Tests indicate that the analytical procedure used provides data which represent about 50% of the true concentrations of B in the samples. Precision, however, is excellent.

Boron is an element that is essential for plant growth, and it is believed to play an important role in the translocation of sugars (Bonilla *et al.*, 1980). In general, B uptake is low from Ca-rich soils. Comparison of the maps of Ca and B distributions shows that there is a generally an inverse relationship between the two elements.

Cadmium (Cd)

Cadmium is extremely easily absorbed by plants and can therefore be expected to reflect relative Cd concentrations in the soils and groundwaters. However, it can be captured by a variety of organic compounds in cell walls and therefore not all will be transported to the tree extremities. Pine bark commonly contains higher levels of Cd than tissues from most other tree species, with the notable exception of birch.

Although there is a strong geochemical association between Cd and Zn in many geochemical environments, this is not always evident in plant tissues because of the *requirement* that plants have for Zn but not for Cd and therefore partitioning may take place. There are similarities in distribution patterns of Zn and Cd, but the correlation is far from perfect. Cadmium concentrations are remarkably high, reaching a maximum of 160 ppm Cd. The background level for the area is approximately 16 ppm Cd, which is higher than the usual level <10 ppm Cd in bark of pines from a wide range of geological terranes. Highest concentrations occur in samples from the northeast over rocks of the Wolverine Complex and the Witch Lake Formation. Elsewhere, high levels of Cd in plant tissues have been found to reflect concealed base-metal mineralization (Dunn, 1995).

Copper (Cu)

Data obtained for Cu by ICP-ES from the aqua regia leach are both precise and accurate. Copper plays a fundamental role in a plant's metabolism. It assists in such processes as respiration, photosynthesis, nitrogen fixation and valence changes, and is present in many micro-components of plants (small and large molecules, chloroplasts, mitochondria etc.). As a consequence, the 'background ' concentration of Cu in ash of the bark (median value of 174 ppm Cu) is high compared to many trace elements.

The interpretation of Cu distribution patterns in tree tissues should be approached with caution, since laboratory studies report numerous antagonistic and synergistic interactions with both major and minor elements. These are reviewed briefly by Kabata-Pendias and Pendias (1984). However, despite the essentiality of Cu and the complex metabolic roles that it may play, substantial differences among the survey samples are more likely to reflect major differences of Cu in the substrate than the relatively small differences attributable to micronutrient functions. As would be expected, there are anomalous concentrations in some samples from above the MBX zone and at a number of sites to the northeast. Several sites at the south end of Philip Lakes yielded relatively high Cu concentrations.

Lithium (Li)

Lithium commonly follows Rb and Cs in nature. In conifer bark it is less abundant than Rb but commonly enriched with respect to Cs. It is not known to be essential to plant metabolism. Its high solubility (except where firmly bonded to clay minerals) causes Li enrichment in soils and waters to be readily reflected in plant tissues. In the survey area there is weak enrichment of Li in the Heidi and Philip Lakes areas at sites where there are also anomalous levels of the 'Fe factor' elements (see section on As).

Magnesium (Mg)

Magnesium is a macronutrient which plays several important roles in plant health, including photosynthesis and numerous enzymic reactions. From a biogeochemical prospecting perspective, major differences in Mg concentrations in plants can indicate significant differences in the underlying lithology, but smaller differences are not known to be of value in delineating zones of mineralization. The relatively high Mg content to samples in the northern half of the survey area suggests a higher mafic component to the substrate.

Manganese (Mn)

Manganese is an essential element which is readily taken up by plants, especially where the acidity of the ground is high (e.g. boggy areas). In acidic environments there is a Mn/Fe antagonism, which is extended to elements with a broad affinity for Fe.

Molybdenum (Mo)

Molybdenum is required in trace amounts by most plants for nitrogen fixation and nitrate reduction. Concentrations are usually <2 ppm Mo in lodgepole pine bark, although over highly alkaline soils the trees more readily absorb Mo and therefore slightly higher levels may be expected. In view of the Cu/Mo association with Mt. Milligan porphyry deposits, it is of interest to note the close correspondence between Cu and Mo elsewhere in the survey area.

Nickel (Ni)

The presence of Ni may assist in the translocation of nitrogen in some plants, but its general essentiality is unproven. When in solution, Ni is readily taken up by plants, therefore it may be expected that the Ni content of the bark may be positively correlated with Ni concentrations in groundwaters.

INAA has low sensitivity to Ni (detection limit of 50 ppm Ni in ash). In contrast, excellent precision and accuracy are obtained by ICP-ES down to the minimum level (4 ppm) recorded for this data set. The pattern of Ni distribution is similar to that of Mg and P, and, to a lesser extent, Cu and Mo.

Phosphorus (P)

Phosphorus plays a vital role in plant energy metabolism, and it is extremely important as a structural part of many organic compounds. Its uptake by trees may be antagonized by excess Ca but, from the maps showing distribution patterns of Ca and P, this antagonism is not apparent in the pine bark. Similarly, high levels of P may influence the uptake of numerous trace metals, although this effect appears to be subordinate to the over-riding effect of the substrate chemistry. In the present data set the strongest association with P is among Mg, Cu, and Mo.

Lead (Pb)

Despite the known toxic effects of Pb, it occurs naturally in all plants, and in small traces Pb may even be an essential element (Broyer *et al.*, 1972). It is taken up mainly by root hairs and stored as a pyrophosphate in cell walls. Within lodgepole pine, Pb is stored mostly in the roots with lesser amounts in the outer bark and lower twigs. Concentrations are moderately high at a few sites, notably around Philip Lakes. At the south end of Philip Lakes a single high value for Pb is close to the site of enrichment in Zn, Cu, and Mo.

Vanadium (V)

Although V is detectable in all but one of the bark samples, its essentiality for plants other than green algae has not been proven. Soluble V is easily taken up by roots, and it may play a similar role to Mo in fixing nitrogen. In acidic soils, such as those in the Mt. Milligan area, the soluble VO^{2+} species is more rapidly absorbed by roots than the VO_3^- and HVO_4^{2-} that predominate in neutral and alkaline environments (Welch, 1973). In the survey area the almost identical patterns of Fe and V distribution show that V is closely related to the 'Fe factor' (see As section).

DISCUSSION

A companion geochemical study to this Open File report displays and discusses the element content of till samples, most of which were collected at the same time and at the same sites as the lodgepole pine bark samples (Sibbick *et al.*, 1996). There are some similarities, but also some significant differences in the element distribution patterns which require some explanation.

Firstly, analysis of a till sample involves sieving and selection of one size fraction from a bulk sample commonly weighing approximately 5 kg, dug from a single small pit. The tree roots, however, may extend through several cubic metres of soil (all horizons) and till, on occasion reaching and penetrating joints and fractures in bedrock. The tree, therefore, extracts elements from a large volume of material of diverse composition, including groundwater. Some elements dissolved in groundwater and readily extracted by the tree roots may not precipitate on till and soil particles.

A second factor of importance is the barrier mechanism established at the root/sediment interface by some plants for some elements (Kovalevskii, 1979). Because each species of plant has a different requirement for and tolerance to a range of chemical elements, some partitioning of elements takes place and there is selective absorption and translocation into the plants. For biogeochemical exploration, conifers are good sample media because they are primitive plants that have a wide tolerance to many trace elements. The outer bark may, by analogy, be equated with biotite in rocks, in that it is something of a repository for many elements that do not fit elsewhere or are not required for the metabolic function of the tree.

A third factor is that slight enrichments of metals in till samples are unlikely to be reflected in the vegetation as weak biogeochemical anomalies. This is especially true in the ppb (Au) and ppm ranges of concentration common in till samples. Some of these metals may not be present in a chemical form *available* for uptake (e.g. Cr structurally bound in chromite); some may be excluded from uptake at the roots or only partially absorbed; and some may be taken up but dispersed among tree tissues to the extent that inter-site variations are so small that they cannot be detected.

The net result of these factors is that the geochemical information supplied by the vegetation is different from that of the till. Just as two methods of geophysical survey will provide totally different information, so will two methods of geochemical survey. A high correlation between distribution patterns of two geochemical sample media is the exception rather than the rule. In geological environments where there is sufficient concentration of metals to form a mineral deposit, such a 'critical mass' of elements may be sufficient to generate biogeochemical anomalies above (by upward diffusion) or close to (by movement in electrochemical cells) the mineral source. Tills, however, usually have geochemical anomalies displaced down-ice from the mineralized source. Such factors need to be taken into consideration when interpreting geochemical results. Valuable exploration information can be obtained from the analysis of till samples. When this information is coupled with analysis of vegetation samples, a powerful combination is provided for assisting in the exploration for mineral deposits.

NOTES ON DATA LISTINGS (APPENDICES A and B)

Appendix A lists all analytical data obtained for the lodgepole pine bark ash. Appendix B provides some simple statistical analyses of the data by treating the data set as a whole, and by dividing the data according to the underlying bedrock geology (according to stratigraphic unit). Abbreviations used in the appendices are explained in Fig. 2.

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Appendix A

Data Listings

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - INAA

Site Number	Easting	Northing	Rock Unit	Ash Yield %	Au ppb	As ppm	Ba ppm	Br ppm	Ca %	Ce ppm	Co ppm	Cr ppm	Cs ppm	Eu ppm	Fe %	Hf ppm	K %	La ppm	Lu ppm	Na ppm	Nd ppm	Rb ppm	Sb ppm	Sc ppm	Sm ppm	Sr ppm	Ta ppm	Th ppm	U ppm	Yb ppm	Zn ppm
					5	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
67	433120	6109050	uTrWL	1.50	45	9.7	450	15	23.0	16	15	29	2.1	0.42	1.95	1.4	3.89	7.3	0.14	6250	10	79	2.4	5.5	1.4	860	<0.5	1.1	0.6	0.69	1700
70	432900	6109200	uTrWL	1.40	<5	4.9	880	25	27.5	18	8	16	2.8	<0.02	1.00	0.8	4.16	6.4	0.11	3640	8	140	1.9	3.2	1.2	990	<0.5	1.0	<0.1	0.64	1500
71	433500	6109000	uTrWL	1.60	135	60.0	510	15	17.5	22	28	63	2.4	0.53	3.86	2.9	3.79	11.0	0.23	10300	16	84	5.0	9.6	2.0	880	1.1	2.1	0.7	1.33	2200
72	434150	6109060	uTrWL	2.80	59	14.0	700	15	18.6	18	21	64	3.4	0.40	2.76	2.4	3.02	9.1	0.22	10200	9	160	2.5	8.3	1.8	580	0.8	1.5	0.8	1.10	1700
75	434160	6108500	uTrWL	1.10	25	6.9	620	22	23.5	15	9	30	2.6	0.30	1.59	1.2	5.59	7.5	0.12	7380	7	200	1.3	5.0	1.4	710	<0.5	1.2	0.7	0.95	2100
77	433600	6108700	uTrWL	3.80	34	12.0	610	25	25.1	14	16	41	2.2	0.34	2.01	1.6	2.18	6.9	0.19	7840	8	42	2.4	7.0	1.4	<300	<0.5	1.2	0.9	0.88	1400
81	433950	6109250	uTrWL	2.80	69	10.0	590	18	24.7	14	15	99	3.0	0.36	2.98	1.8	3.96	7.0	0.16	6450	<5	220	1.5	7.1	1.3	680	<0.5	1.2	0.6	0.90	1700
82	434250	6107900	uTrWL	3.50	30	8.6	940	19	17.0	26	15	69	1.8	0.53	3.23	2.7	2.07	12.0	0.25	12400	13	66	2.4	9.2	2.2	920	<0.5	2.0	1.2	1.48	1900
85	433400	6106850	uTrWL	2.20	<5	3.1	410	36	36.2	5	5	6	1.7	0.19	0.31	0.6	3.68	2.2	0.05	1360	<5	78	0.8	1.0	0.4	530	0.7	0.6	<0.1	0.19	870
86	433600	6107150	uTrWL	2.00	<5	2.9	500	30	37.3	6	6	5	1.1	0.14	0.33	<0.5	1.76	2.3	<0.05	1380	<5	33	0.9	1.2	0.4	440	<0.5	0.5	<0.1	0.22	3000
87	433750	6107850	uTrWL	0.90	14	8.6	590	26	28.2	11	9	24	3.2	0.24	1.25	1.2	4.14	5.8	0.15	4990	<5	170	1.6	3.8	1.1	1100	<0.5	1.2	<0.1	0.59	2700
88	435350	6107550	uTrWL	2.60	<5	3.4	520	28	35.8	5	7	12	0.9	0.14	0.47	0.8	1.49	2.4	<0.05	2180	<5	37	0.6	1.7	0.4	580	<0.5	0.5	0.5	<0.05	1700
89	433375	6109900	uTrWL	3.90	<5	0.7	5400	18	40.8	<3	4	3	1.1	<0.02	0.20	<0.5	1.74	0.9	<0.05	595	<5	41	0.2	0.6	0.1	2300	<0.5	0.2	<0.1	<0.05	2200
90	433100	6110450	uTrWL	2.50	<5	1.9	550	35	37.9	4	3	5	1.4	<0.02	0.22	<0.5	1.53	1.4	<0.05	928	<5	44	0.6	0.8	0.3	370	<0.5	0.3	<0.1	0.13	1200
91	434300	6110000	uTrWL	3.00	<5	2.2	730	25	36.7	4	7	13	<0.5	<0.02	0.56	0.7	1.23	2.5	0.06	2190	<5	29	0.8	1.9	0.5	590	<0.5	0.4	<0.1	0.20	1400
92	433550	6111150	uTrWL	1.30	<5	7.5	830	31	23.7	15	12	42	2.6	0.39	1.51	1.3	4.46	7.0	0.13	6020	12	85	2.0	5.9	1.4	690	<0.5	1.1	<0.1	0.76	2400
93	433300	6111600	uTrWL	0.90	<5	3.5	900	26	26.8	11	8	14	1.4	0.33	0.67	<0.5	5.51	5.6	0.09	2840	<5	88	1.6	2.4	0.9	1500	<0.5	0.5	0.8	0.53	2000
95	434550	6112150	uTrWL	1.00	<5	2.4	620	5	26.2	8	6	7	1.3	0.25	0.44	<0.5	7.15	3.5	<0.05	1680	<5	170	1.3	1.4	0.7	960	<0.5	0.5	<0.1	0.31	3000
96	434750	6111150	uTrWL	1.00	6	4.3	540	17	27.5	9	8	19	7.1	0.16	0.81	1.1	5.63	5.1	0.10	3810	8	300	1.7	2.9	1.0	670	<0.5	0.7	<0.1	0.47	3500
97	430250	6109350	uTrWL	1.00	<5	4.4	360	16	26.9	16	6	21	1.9	0.26	0.99	1.1	6.33	7.2	0.12	4830	12	89	1.9	3.5	1.4	640	<0.5	1.1	<0.1	0.62	1200
98	429700	6110200	uTrWL	0.90	5	1.7	310	28	32.2	9	5	12	1.9	0.22	0.64	<0.5	4.38	4.2	0.10	2440	8	190	1.3	2.2	0.9	610	<0.5	0.8	0.5	0.41	2000
99	430850	6111700	uTrWL	0.70	6	5.2	450	17	22.4	11	8	14	1.0	0.27	0.85	0.8	10.50	6.2	0.11	2830	11	79	1.7	2.6	1.2	850	<0.5	0.8	<0.1	0.53	2200
100	442350	6111000	KTWC	2.60	<5	3.4	720	14	11.2	20	10	53	1.5	0.64	2.11	3.0	3.65	11.0	0.22	15700	13	100	1.1	8.6	2.1	840	<0.5	1.7	1.0	1.15	1100
102	441000	6114000	uTrWL	1.00	<5	3.1	150	16	27.2	<3	4	6	<0.5	0.12	0.27	<0.5	6.32	1.4	<0.05	1520	<5	110	0.7	0.9	0.3	700	<0.5	0.3	<0.1	<0.05	2000
103	441000	6111000	KTWC	1.50	<5	2.1	330	18	27.3	6	6	8	5.1	<0.02	0.43	0.6	3.48	2.5	<0.05	1520	<5	110	1.2	1.4	0.5	380	0.5	0.4	<0.1	0.28	2100
104	440000	6114000	uTrWL	1.40	<5	1.4	180	12	29.7	<3	3	3	1.2	<0.02	0.19	<0.5	4.88	1.1	<0.05	915	<5	150	0.6	0.6	0.2	750	<0.5	0.2	<0.1	<0.05	1600
105	441000	6112000	uTrWL	0.90	<5	4.2	380	22	24.8	7	7	7	1.7	<0.02	0.53	<0.5	7.06	3.6	0.07	2220	7	89	1.3	1.7	0.7	870	<0.5	0.6	<0.1	0.35	2700
106	440000	6113000	uTrWL	1.10	<5	1.6	260	14	27.6	5	7	5	1.3	<0.02	0.30	<0.5	4.85	1.6	<0.05	1230	<5	92	0.8	0.8	0.4	<300	<0.5	<0.1	<0.1	0.12	3000
107	443550	6111250	KTWC	1.30	<5	1.6	620	16	22.0	9	8	19	1.4	<0.02	0.81	1.0	3.71	4.0	0.10	4010	<5	63	1.1	3.1	0.9	<300	<0.5	0.9	0.3	0.29	2100
108	441000	6113000	uTrWL	1.20	9	1.6	270	14	26.5	6	6	12	1.3	0.21	0.61	<0.5	3.92	4.2	0.06	2570	<5	63	1.2	2.2	0.9	700	<0.5	0.6	<0.1	0.38	1800

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - ICP-ES

Site Number	Easting	Northing	Rock Unit	Al %	B ppm	Cd ppm	Cu ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Ni ppm	P %	Pb ppm	V ppm
				0.01	2	0.2	1	2	0.01	1	1	1	0.001	3	2
67	433120	6109050	uTrWL	3.17	124	8.2	300	2	2.31	3223	10	42	1.423	67	34
70	432900	6109200	uTrWL	3.25	127	5.9	236	4	1.89	6887	14	49	1.719	104	29
71	433500	6109000	uTrWL	2.06	197	6.2	409	4	1.76	1599	5	52	1.141	56	54
72	434150	6109060	uTrWL	1.90	26	15.5	206	3	1.53	9877	3	39	0.718	54	65
75	434160	6108500	uTrWL	1.16	54	2.4	90	<2	0.65	3228	2	15	0.457	26	16
77	433600	6108700	uTrWL	2.21	64	19.3	261	3	0.99	4501	3	27	0.481	42	50
81	433950	6109250	uTrWL	2.08	58	11.9	165	2	1.91	9389	3	48	0.850	46	49
82	434250	6107900	uTrWL	2.90	34	9.9	169	3	1.19	6632	2	28	0.554	50	71
85	433400	6106850	uTrWL	2.66	72	2.2	109	<2	0.98	2616	2	18	0.914	43	10
86	433600	6107150	uTrWL	1.80	66	22.9	121	<2	1.28	18143	3	36	0.882	77	12
87	433750	6107850	uTrWL	2.79	125	4.1	232	<2	1.85	6843	5	30	1.208	91	25
88	435350	6107550	uTrWL	2.23	86	10.1	67	<2	1.61	9732	2	27	0.539	47	14
89	433375	6109900	uTrWL	0.10	67	0.8	141	<2	0.76	5373	2	14	0.397	32	8
90	433100	6110450	uTrWL	1.48	52	5.8	78	<2	1.13	8078	3	21	0.660	50	9
91	434300	6110000	uTrWL	1.11	46	20.7	87	<2	0.92	8222	2	24	0.612	44	14
92	433550	6111150	uTrWL	2.96	105	5.1	199	3	2.06	13524	5	41	1.463	89	36
93	433300	6111600	uTrWL	4.20	127	3.9	292	<2	2.86	7812	7	47	1.685	107	18
95	434550	6112150	uTrWL	3.89	189	13.9	267	<2	3.48	12855	4	38	1.787	73	15
96	434750	6111150	uTrWL	2.98	138	45.1	326	4	2.14	17923	9	57	2.235	110	25
97	430250	6109350	uTrWL	2.84	86	6.1	258	2	2.00	3820	11	32	1.828	80	23
98	429700	6110200	uTrWL	0.47	140	24.7	372	3	2.37	2450	11	21	1.641	60	21
99	430850	6111700	uTrWL	2.75	147	5.3	132	2	1.35	14723	5	36	0.712	63	14
100	442350	6111000	KTWC	2.11	75	2.5	126	5	1.75	4326	1	26	0.799	37	61
102	441000	6114000	uTrWL	0.38	169	30.0	233	<2	2.55	3399	3	11	0.858	38	10
103	441000	6111000	KTWC	-	-	-	-	-	-	-	-	-	-	-	-
104	440000	6114000	uTrWL	0.39	141	11.5	251	<2	2.67	3084	3	11	0.918	33	9
105	441000	6112000	uTrWL	1.87	215	3.4	301	2	3.63	12114	9	47	1.890	84	21
106	440000	6113000	uTrWL	1.48	119	24.3	279	<2	2.73	7021	3	22	1.049	52	11
107	443550	6111250	KTWC	3.17	98	18.9	202	<2	1.89	4234	5	25	1.527	55	19
108	441000	6113000	uTrWL	2.64	139	<0.2	209	3	1.84	3211	9	35	1.488	63	20

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - INAA

Site Number	Easting	Northing	Rock Unit	Ash Yield	Au	As	Ba	Br	Ca	Ce	Co	Cr	Cs	Eu	Fe	Hf	K	La	Lu	Na	Nd	Rb	Sb	Sc	Sm	Sr	Ta	Th	U	Yb	Zn
				%	ppb	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
					5	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
109	441250	6116750	uTrWL	1.20	8	2.7	270	19	25.5	7	6	12	0.9	0.18	0.63	1.2	4.66	4.1	0.11	2510	<5	81	1.2	2.2	0.7	1100	<0.5	0.8	0.5	0.32	2700
110	440150	6117500	uTrWL	1.30	<5	3.6	370	36	26.2	8	6	12	1.4	0.24	0.64	1.2	4.32	4.6	0.06	2830	<5	75	1.5	2.3	0.8	990	<0.5	0.7	<0.1	0.44	2500
111	442400	6116750	uTrWL	1.00	<5	2.1	490	17	22.1	8	8	9	<0.5	<0.02	0.61	0.7	6.36	4.2	0.07	2300	<5	53	1.8	2.0	0.9	560	<0.5	0.7	<0.1	0.36	3000
112	440200	6118450	uTrWL	1.10	<5	2.6	330	16	27.1	5	5	6	3.0	<0.02	0.40	<0.5	4.75	2.3	<0.05	1630	<5	130	1.0	1.3	0.5	990	<0.5	0.3	0.4	0.21	2200
113	442400	6115800	KTWC	1.30	<5	2.9	200	17	26.5	7	5	8	1.4	0.17	0.53	0.6	5.03	3.6	0.07	1970	<5	77	1.1	1.8	0.7	540	<0.5	0.6	<0.1	<0.05	2600
114	440900	6115400	uTrWL	1.30	<5	2.1	580	16	26.7	5	6	6	<0.5	0.14	0.35	0.6	3.20	2.3	<0.05	1590	<5	59	0.7	1.2	0.4	720	<0.5	0.3	<0.1	0.11	2900
115	450000	6107800	uTrWL	1.60	5	1.7	680	8	29.1	7	6	8	1.3	0.22	0.57	<0.5	2.71	3.8	<0.05	2520	<5	61	1.6	2.1	0.7	<300	<0.5	0.6	0.5	0.43	2500
117	444500	6115000	KTWC	1.40	<5	2.8	490	23	28.5	5	6	5	1.1	0.16	0.36	<0.5	4.02	2.5	<0.05	1350	<5	89	1.0	1.1	0.5	610	1.6	0.4	0.7	0.25	2300
118	446000	6115000	KTWC	1.10	7	6.2	390	19	35.2	12	6	16	2.7	<0.03	0.76	0.7	5.62	5.5	0.11	2460	11	130	2.5	2.6	1.1	1700	<0.5	0.7	0.8	0.60	4100
119	444450	6116150	KTWC	1.10	<5	3.0	500	13	25.0	5	8	6	1.6	<0.02	0.38	<0.5	7.04	2.6	<0.05	1400	<5	82	1.0	1.1	0.5	580	1.3	0.9	<0.1	0.22	1800
120	444000	6114000	uTrWL	1.00	<5	2.8	320	12	25.0	7	5	10	1.4	<0.02	0.51	<0.5	5.27	3.7	<0.05	1970	<5	88	1.2	1.6	0.7	<300	<0.5	0.6	<0.1	0.20	2200
121	445000	6114000	KTWC	1.20	<5	3.4	450	21	33.2	7	4	8	1.5	<0.03	0.44	<0.5	5.42	3.5	<0.05	1730	<5	120	1.2	1.3	0.6	820	1.3	0.4	<0.1	0.37	3700
122	443300	6113800	uTrWL	1.40	<5	3.6	640	31	30.3	5	7	10	1.1	0.18	0.40	0.5	4.34	3.0	<0.05	1940	<5	100	1.5	1.3	0.5	960	<0.5	0.7	<0.1	0.26	2500
124	449450	6115250	KTWC	1.00	<5	5.0	260	25	29.0	11	4	21	2.2	<0.03	0.67	1.0	7.67	4.8	0.08	3280	<5	160	1.7	2.3	0.9	<300	<0.5	0.9	<0.2	0.37	3100
125	447600	6116450	uTrWL	1.10	<5	5.2	620	33	31.0	7	5	10	1.3	0.18	0.50	0.8	5.60	3.8	<0.05	1830	<5	63	1.7	1.5	0.7	470	1.1	0.6	<0.1	0.48	3100
126	449000	6114000	KTWC	1.10	<5	2.8	330	16	30.0	13	4	17	2.2	<0.02	0.75	1.2	4.49	7.2	0.11	2930	<5	230	1.3	2.6	1.2	600	<0.5	1.1	1.6	0.59	1800
127	449000	6113000	KTWC	1.30	<5	2.9	360	19	32.8	6	2	8	1.3	0.17	0.38	<0.5	5.14	3.0	0.06	1650	<5	150	1.2	1.2	0.5	960	<0.5	0.6	<0.1	0.33	2500
128	444850	6107100	uTrWL	2.10	<5	8.5	550	17	25.4	14	15	30	1.9	0.49	1.74	1.3	3.37	7.3	0.15	7100	8	53	1.6	6.4	1.6	<300	1.6	1.3	0.5	0.89	1800
130	447450	6112700	KTWC	1.70	<5	2.9	550	19	32.5	6	5	10	<0.5	0.15	0.39	0.6	4.39	3.0	<0.05	1640	<5	36	0.9	1.2	0.6	890	0.8	0.7	0.4	0.25	2900
131	450050	6116000	uTrWL	1.30	<5	5.4	470	17	29.3	7	6	13	<0.5	0.19	0.40	<0.5	5.32	3.3	<0.05	1690	<5	33	1.1	1.3	0.6	<300	<0.5	0.3	<0.1	<0.05	3200
132	446950	6119050	uTrWL	1.90	<5	2.6	660	19	33.0	4	3	6	0.8	0.13	0.35	<0.5	2.80	2.5	0.05	1370	<5	39	0.9	1.1	0.5	510	0.7	0.5	<0.1	0.27	1500
133	447500	6113750	KTWC	1.20	<5	3.6	680	10	29.0	5	3	8	2.7	<0.02	0.38	<0.5	4.38	2.9	<0.05	1560	<5	150	0.9	1.2	0.6	<300	<0.5	0.4	<0.1	0.26	2000
134	448000	6120150	uTrWL	1.80	7	2.4	250	18	30.4	6	4	7	0.9	0.11	0.38	<0.5	4.19	2.9	<0.05	1620	<5	32	0.9	1.4	0.5	690	1.1	0.6	0.4	0.27	2400
135	445000	6117000	uTrWL	1.80	<5	2.7	440	24	34.2	4	3	3	2.0	<0.02	0.26	0.5	4.19	1.7	<0.05	1200	<5	81	0.6	0.7	0.3	790	<0.5	0.4	0.3	0.20	2500
136	445850	6110600	KTWC	1.20	<5	5.5	840	16	24.2	19	10	50	1.7	0.43	1.65	1.9	4.30	8.6	0.20	8170	15	110	1.4	6.1	1.8	1100	<0.5	1.5	1.0	1.00	2100
138	449000	6119000	uTrWL	1.30	<5	4.2	390	23	32.7	7	5	8	1.1	<0.02	0.47	<0.5	5.39	3.7	0.07	1970	<5	53	1.2	1.5	0.6	<300	<0.5	0.6	0.6	0.27	2000
139	444850	6118000	uTrWL	1.70	<5	4.1	380	23	32.2	6	3	12	2.9	<0.02	0.64	0.8	5.11	3.3	0.06	4350	7	110	0.8	2.2	0.6	1300	<0.5	0.7	<0.1	0.32	2800
140	449000	6118000	uTrWL	1.00	<5	3.0	210	18	38.5	4	3	6	1.2	<0.02	0.39	<0.5	5.66	2.6	<0.05	1600	<5	81	0.8	1.1	0.5	590	<0.5	0.4	<0.1	0.15	2300
141	444850	6119100	uTrWL	1.10	<5	3.0	520	18	31.6	4	7	9	0.8	0.16	0.44	<0.5	7.10	3.3	<0.05	1630	<5	78	0.9	1.2	0.6	<300	1.1	0.4	0.6	0.24	2700
142	448000	6118100	uTrWL	1.70	<5	3.8	1100	20	31.6	6	5	10	1.2	0.14	0.45	0.9	4.15	4.0	0.06	2150	<5	47	1.1	1.6	0.6	930	<0.5	0.5	0.5	0.27	2600

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - ICP-ES

Site Number	Easting	Northing	Rock Unit	Al % 0.01	B ppm 2	Cd ppm 0.2	Cu ppm 1	Li ppm 2	Mg % 0.01	Mn ppm 1	Mo ppm 1	Ni ppm 1	P % 0.001	Pb ppm 3	V ppm 2
109	441250	6116750	uTrWL	0.83	95	10.2	224	2	3.13	4786	10	26	1.819	66	22
110	440150	6117500	uTrWL	1.78	117	13.7	174	3	2.53	10846	9	35	1.756	77	21
111	442400	6116750	uTrWL	3.82	128	25.2	300	2	3.10	8591	9	69	2.411	74	22
112	440200	6118450	uTrWL	0.69	112	20.9	219	2	2.46	4091	7	21	1.376	52	15
113	442400	6115800	KTWC	0.70	100	26.0	171	2	3.28	7466	9	25	1.454	76	20
114	440900	6115400	uTrWL	2.18	165	42.3	194	2	2.23	11817	5	36	0.958	62	14
115	450000	6107800	uTrWL	1.90	83	28.4	167	3	1.70	10461	6	45	1.519	78	19
117	444500	6115000	KTWC	3.21	90	32.4	139	<2	1.78	11739	4	40	1.140	67	12
118	446000	6115000	KTWC	0.81	94	100.3	280	2	3.27	6350	12	36	2.120	114	24
119	444450	6116150	KTWC	2.79	160	73.2	266	<2	2.87	10260	6	33	1.416	69	16
120	444000	6114000	uTrWL	2.83	212	70.5	268	<2	2.45	13139	9	47	2.231	91	21
121	445000	6114000	KTWC	2.61	165	26.7	196	<2	2.48	8048	6	31	1.443	62	16
122	443300	6113800	uTrWL	2.87	149	19.7	167	<2	2.71	13665	5	41	1.165	72	17
124	449450	6115250	KTWC	1.09	101	36.1	340	2	3.34	5344	11	36	2.374	86	22
125	447600	6116450	uTrWL	2.44	80	160.8	233	<2	3.02	13921	7	48	1.670	92	20
126	449000	6114000	KTWC	1.08	114	37.4	214	4	1.75	4772	8	30	1.697	75	22
127	449000	6113000	KTWC	0.43	134	29.3	197	<2	1.90	2246	7	14	1.551	59	15
128	444850	6107100	uTrWL	1.95	110	30.3	130	4	2.39	6863	2	35	0.786	51	44
130	447450	6112700	KTWC	1.76	112	39.8	117	<2	2.23	8915	5	30	1.125	63	14
131	450050	6116000	uTrWL	2.51	169	66.5	279	<2	2.49	10619	8	46	1.805	87	16
132	446950	6119050	uTrWL	2.42	84	14.7	89	<2	1.16	10973	5	26	1.193	73	12
133	447500	6113750	KTWC	4.20	141	19.7	277	<2	1.80	8672	6	34	1.641	57	14
134	448000	6120150	uTrWL	1.99	99	23.8	107	<2	1.68	8251	4	29	1.211	63	12
135	445000	6117000	uTrWL	0.70	154	56.5	125	<2	1.77	4483	3	16	0.771	40	9
136	445850	6110600	KTWC	2.90	102	17.7	227	3	2.08	10666	4	40	1.253	69	46
138	449000	6119000	uTrWL	2.52	115	41.1	175	<2	1.81	8458	8	42	1.796	76	17
139	444850	6118000	uTrWL	0.40	119	54.6	110	<2	2.03	2444	4	13	1.503	36	18
140	449000	6118000	uTrWL	0.38	122	32.0	206	<2	1.70	2267	6	11	1.217	58	14
141	444850	6119100	uTrWL	2.94	195	35.8	231	<2	2.88	7892	4	42	1.918	61	12
142	448000	6118100	uTrWL	-	-	-	-	-	-	-	-	-	-	-	-

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - INAA

Site Number	Easting	Northing	Rock Unit	Ash Yield %	Au ppb	As ppm	Ba ppm	Br ppm	Ca %	Ce ppm	Co ppm	Cr ppm	Cs ppm	Eu ppm	Fe %	Hf ppm	K %	La ppm	Lu ppm	Na ppm	Nd ppm	Rb ppm	Sb ppm	Sc ppm	Sm ppm	Sr ppm	Ta ppm	Th ppm	U ppm	Yb ppm	Zn ppm
					5	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
143	436300	6107450	uTrWL	2.90	7	5.5	810	15	21.7	20	11	46	3.0	0.46	1.98	2.1	2.06	9.1	0.19	10800	9	78	1.4	7.6	1.8	<300	<0.5	1.4	<0.1	1.23	2400
145	443850	6119050	uTrWL	1.10	<5	4.1	590	16	31.1	11	7	8	1.3	0.17	0.58	0.7	6.23	4.7	0.08	2310	<5	100	1.5	2.1	0.8	1000	0.6	0.7	0.6	0.39	3200
146	446950	6118150	uTrWL	1.80	<5	3.5	1100	29	33.9	4	5	7	1.1	0.21	0.30	0.6	4.20	2.7	<0.05	1300	7	34	0.8	1.0	0.4	670	<0.5	0.2	<0.1	0.24	2600
147	442900	6112000	KTWC	1.40	<5	3.6	270	16	31.7	5	4	8	1.4	0.15	0.33	<0.5	6.83	2.5	0.05	2080	<5	170	0.8	1.2	0.5	660	<0.5	0.6	<0.1	0.16	1600
148	442150	6112600	uTrWL	0.90	<5	3.6	460	20	22.5	11	7	18	2.5	0.22	0.73	1.0	6.59	5.0	0.09	3850	7	180	1.1	2.6	1.0	510	1.2	0.7	<0.1	0.46	3000
149	442400	6110050	KTWC	1.30	<5	4.6	440	25	25.9	14	9	25	4.3	0.34	1.02	1.2	3.87	6.4	0.08	5330	10	100	1.5	3.8	1.3	560	<0.5	1.0	<0.1	0.74	2400
150	436350	6103500	uTrWL	2.40	19	5.3	820	17	23.6	16	9	37	1.4	0.43	1.39	1.5	3.38	7.8	0.15	8740	9	84	1.0	6.3	1.5	580	<0.5	1.3	0.7	0.95	1800
152	443000	6119050	uTrWL	1.30	<5	2.5	510	21	35.8	5	4	5	0.9	<0.02	0.29	<0.5	4.71	2.4	<0.05	1080	<5	74	0.8	0.9	0.4	550	0.9	<0.1	<0.1	0.16	2200
153	450100	6106650	uTrWL	0.90	11	8.9	610	23	17.9	25	19	40	2.9	0.68	2.22	2.1	8.67	12.0	0.26	8150	17	150	2.9	7.8	2.4	<300	<0.5	1.7	1.2	1.40	1600
154	449350	6107150	uTrWL	1.40	<5	4.4	710	17	28.2	12	11	24	<0.5	0.27	1.27	<0.5	4.08	5.9	0.11	5140	<5	63	1.1	4.8	1.2	600	<0.5	0.8	0.8	0.81	2000
155	448250	6107800	uTrWL	1.60	<5	2.4	1100	26	31.4	<3	4	4	0.5	<0.02	0.23	<0.5	1.29	1.3	<0.05	963	<5	28	0.4	0.7	0.2	720	<0.5	0.4	<0.1	0.15	2400
156	447750	6108200	uTrWL	1.60	<5	3.8	650	23	29.5	5	27	12	1.8	<0.02	0.42	0.9	3.62	2.2	<0.05	2490	<5	97	4.0	1.5	0.4	700	0.7	0.3	<0.1	0.22	2500
157	446850	6107650	uTrWL	1.50	<5	4.4	470	25	29.2	11	8	14	1.2	0.24	0.74	1.3	3.02	5.3	0.10	3420	7	65	1.5	2.6	1.0	600	<0.5	0.7	<0.1	0.54	2600
159	446150	6106150	uTrWL	1.30	<5	3.6	630	24	29.2	6	7	10	0.9	<0.02	0.53	0.5	5.89	3.1	0.05	2960	6	70	0.9	1.9	0.6	730	<0.5	0.5	<0.1	0.39	3100
160	445250	6106350	uTrWL	2.60	13	14.0	680	22	14.6	30	21	61	3.0	0.80	3.32	2.7	3.51	14.0	0.28	12500	17	88	2.3	12.0	2.9	560	<0.5	2.3	<0.2	1.79	1000
161	445650	6108550	uTrWL	1.60	<5	2.3	410	34	31.6	5	9	10	0.9	<0.03	0.52	<0.5	2.86	2.8	0.10	2840	<5	30	0.8	1.9	0.6	<300	0.9	0.6	<0.1	<0.05	3000
162	444800	6108700	uTrWL	1.60	<5	5.2	620	30	34.7	6	9	9	1.0	<0.02	0.46	<0.5	4.84	2.8	<0.05	3460	<5	46	0.9	1.5	0.5	1800	0.7	0.4	<0.1	0.25	2800
163	444500	6107800	uTrWL	4.40	11	19.0	960	21	13.2	31	20	60	4.5	1.00	3.90	2.7	3.58	14.0	0.37	17300	15	86	3.0	15.0	3.4	<300	<0.5	2.1	1.3	2.07	980
164	443750	6108900	KTWC	1.60	<5	5.9	1100	26	25.1	10	9	22	2.0	0.34	1.60	1.5	5.13	5.9	0.15	9130	<5	61	1.2	6.0	1.3	1100	<0.5	0.7	<0.2	0.73	2900
165	445000	6110200	KTWC	1.00	6	4.0	620	25	29.3	12	10	26	1.1	0.39	1.05	1.3	6.14	5.8	0.12	7030	8	90	0.9	3.8	1.1	<300	1.4	0.6	<0.2	0.65	2100
166	441850	6108600	KTS	7.50	147	7.3	740	12	13.3	35	13	88	1.8	0.84	2.96	3.7	3.87	17.0	0.29	19200	20	64	1.3	12.0	3.3	890	<0.5	2.5	<0.2	1.92	620
167	436650	6110200	uTrWL	1.10	<5	3.2	460	14	30.2	7	5	9	1.9	0.12	0.47	<0.5	4.08	2.7	<0.05	2380	<5	220	0.7	1.5	0.5	710	<0.5	0.3	<0.1	0.35	2600
168	436200	6109450	uTrWL	1.60	<5	3.2	1000	17	28.8	13	7	22	2.2	0.36	1.33	1.5	5.16	6.9	0.13	6160	8	93	1.2	4.6	1.2	850	1.1	1.2	<0.1	0.81	2400
169	436100	6108500	uTrWL	2.00	<5	2.5	410	19	34.0	3	11	6	1.2	<0.02	0.29	<0.5	3.50	1.8	<0.05	1320	<5	45	0.4	0.9	0.3	720	<0.5	0.6	<0.1	0.20	1900
170	435450	6106850	uTrWL	2.60	<5	3.4	580	27	38.7	6	4	13	1.2	0.25	0.53	0.6	1.41	3.2	0.09	2350	<5	51	1.0	2.0	0.6	1200	1.1	0.6	<0.1	0.38	1900
171	435800	6106200	uTrWL	2.10	<5	2.0	540	18	35.2	3	6	6	1.1	<0.02	0.25	<0.5	3.79	1.4	<0.05	1160	<5	98	0.7	0.8	0.2	630	<0.5	0.3	<0.1	0.16	2100
172	433400	6107400	uTrWL	1.80	<5	5.5	570	18	30.2	9	7	12	1.9	0.19	0.69	0.7	4.83	4.3	0.07	2500	<5	98	1.3	2.2	0.8	<300	1.3	0.9	<0.1	0.38	3200
174	435650	6103100	uTrWL	1.50	<5	2.8	680	14	34.9	3	4	6	1.3	<0.02	0.28	<0.5	4.22	1.7	<0.05	1420	<5	95	0.6	1.0	0.3	560	0.9	0.4	0.5	0.14	1900
175	436350	6104800	uTrWL	3.10	<5	4.9	1000	18	24.1	16	9	34	0.7	0.36	1.49	1.8	2.92	7.5	0.15	7730	<5	71	1.1	5.9	1.4	<300	<0.5	1.5	<0.1	0.93	1700
176	433950	6107500	uTrWL	3.30	7	4.4	3100	18	31.8	8	5	13	1.4	0.16	1.01	1.5	1.67	3.1	0.09	5580	<5	45	0.6	3.4	0.6	640	<0.5	0.6	<0.1	0.55	2300

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - ICP-ES

Site Number	Easting	Northing	Rock Unit	Al %	B ppm	Cd ppm	Cu ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Ni ppm	P %	Pb ppm	V ppm
				0.01	2	0.2	1	2	0.01	1	1	1	0.001	3	2
143	436300	6107450	uTrWL	1.44	31	33.5	108	2	2.03	15368	2	37	0.663	55	50
145	443850	6119050	uTrWL	2.14	145	69.4	186	<2	2.83	12875	9	54	1.898	89	20
146	446950	6118150	uTrWL	2.73	112	79.3	101	<2	1.82	11632	5	46	1.028	71	14
147	442900	6112000	KTWC	1.82	158	28.0	146	<2	1.21	2682	4	17	0.750	44	11
148	442150	6112600	uTrWL	4.42	189	<0.2	357	<2	3.31	14572	7	63	1.856	76	26
149	442400	6110050	KTWC	-	-	-	-	-	-	-	-	-	-	-	-
150	436350	6103500	uTrWL	2.05	77	0.4	128	3	1.58	9084	3	28	0.624	50	36
152	443000	6119050	uTrWL	2.50	122	<0.2	204	<2	1.86	5646	5	24	1.058	55	13
153	450100	6106650	uTrWL	-	-	-	-	-	-	-	-	-	-	-	-
154	449350	6107150	uTrWL	2.00	149	11.1	164	3	1.26	5147	4	27	1.063	46	36
155	448250	6107800	uTrWL	2.94	104	4.1	138	<2	1.57	26027	2	48	0.627	76	11
156	447750	6108200	uTrWL	1.77	151	2.4	125	<2	2.42	9652	2	28	0.643	54	14
157	446850	6107650	uTrWL	2.98	74	2.0	134	<2	2.15	14254	6	44	1.132	85	21
159	446150	6106150	uTrWL	3.39	157	11.0	186	<2	1.93	6750	4	32	0.999	62	15
160	445250	6106350	uTrWL	2.77	64	4.0	173	10	1.77	5079	2	37	0.602	47	89
161	445650	6108550	uTrWL	3.81	66	13.1	119	<2	1.99	13181	4	50	0.900	53	18
162	444800	6108700	uTrWL	1.68	122	<0.2	175	<2	2.48	5698	2	23	0.797	40	13
163	444500	6107800	uTrWL	2.14	37	<0.2	145	8	1.36	7267	1	32	0.413	49	68
164	443750	6108900	KTWC	2.84	145	<0.2	166	3	2.80	6093	1	22	0.726	52	32
165	445000	6110200	KTWC	1.93	203	27.6	325	2	2.00	10037	5	31	1.581	58	31
166	441850	6108600	KTS	1.62	23	2.8	72	4	1.37	3496	1	24	0.319	33	70
167	436650	6110200	uTrWL	2.25	160	10.2	247	<2	2.55	13384	5	35	1.154	62	18
168	436200	6109450	uTrWL	2.88	103	4.8	172	4	1.52	11258	6	35	1.191	70	42
169	436100	6108500	uTrWL	2.05	87	6.0	102	<2	2.41	6417	2	27	0.684	38	11
170	435450	6106850	uTrWL	0.28	39	21.0	132	<2	1.39	1965	5	12	0.775	39	15
171	435800	6106200	uTrWL	1.67	122	11.6	105	<2	1.36	12233	3	33	0.595	58	10
172	433400	6107400	uTrWL	2.39	120	20.3	163	2	2.65	16870	8	65	1.785	90	22
174	435650	6103100	uTrWL	1.79	114	6.9	172	<2	1.50	9308	4	22	0.863	51	11
175	436350	6104800	uTrWL	1.86	39	8.8	83	3	0.93	8578	3	28	0.548	51	39
176	433950	6107500	uTrWL	0.24	74	4.5	108	<2	0.70	4020	2	12	0.309	24	15

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - INAA

Site Number	Easting	Northing	Rock Unit	Ash Yield	Au	As	Ba	Br	Ca	Ce	Co	Cr	Cs	Eu	Fe	Hf	K	La	Lu	Na	Nd	Rb	Sb	Sc	Sm	Sr	Ta	Th	U	Yb	Zn
					ppb	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
				%	5	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
177	435800	6112000	uTrWL	1.20	<5	2.4	400	18	32.0	9	6	14	1.9	0.23	0.63	0.8	4.83	4.4	0.09	2810	<5	150	1.2	2.3	0.9	590	<0.5	0.6	<0.1	0.43	2800
178	435800	6111550	uTrWL	1.00	<5	7.1	530	20	27.1	10	8	12	2.3	0.26	0.60	0.8	6.42	4.1	0.07	2240	<5	240	1.5	1.9	0.8	850	<0.5	0.6	<0.1	0.32	2600
179	434000	6106450	uTrWL	1.90	<5	2.1	620	22	37.8	3	5	5	2.4	<0.02	0.23	<0.5	2.44	1.6	<0.05	1200	<5	83	0.7	0.8	0.3	<300	<0.5	0.3	<0.1	<0.05	2600
180	435200	6108600	uTrWL	2.50	<5	1.9	1100	24	41.6	6	3	8	<0.5	0.19	0.47	0.6	1.66	2.8	<0.05	1780	<5	27	0.9	1.5	0.5	720	<0.5	0.7	<0.1	0.27	2700
181	434000	6111650	uTrWL	1.30	<5	3.6	570	19	32.6	8	6	11	1.1	0.24	0.56	<0.5	5.57	4.6	0.05	2200	<5	96	1.7	1.8	0.8	770	1.0	0.6	0.5	0.50	2500
182	434950	6108900	uTrWL	4.20	19	4.8	1800	16	31.3	11	9	35	<0.5	0.34	1.41	1.7	1.93	5.2	0.11	6790	<5	37	0.8	5.5	1.1	1000	<0.5	0.7	<0.1	0.65	1100
184	433250	6110800	uTrWL	3.50	<5	2.7	2200	16	35.7	4	5	19	<0.5	0.17	0.79	1.3	1.68	2.6	0.08	3140	<5	28	0.4	2.7	0.5	1400	<0.5	0.5	0.5	0.36	2000
185	434750	6110750	uTrWL	2.30	<5	2.9	740	21	34.6	3	11	7	0.9	<0.02	0.34	0.5	2.98	1.5	<0.05	1600	<5	54	0.3	1.2	0.3	960	0.8	0.3	<0.1	<0.05	3300
186	434000	6110450	uTrWL	4.60	<5	1.6	3000	12	35.4	4	2	11	<0.5	<0.02	0.44	1.0	1.24	2.1	0.07	2110	<5	<5	0.2	1.9	0.4	1400	<0.5	0.5	<0.1	0.26	1600
187	434400	6109200	uTrWL	2.90	185	5.7	550	15	25.9	9	10	44	3.8	0.28	1.41	1.4	2.66	5.1	0.13	5760	6	110	1.2	4.3	0.9	660	<0.5	1.0	0.5	0.67	1600
188	434750	6107900	uTrWL	2.30	5	2.4	1000	18	32.0	6	8	12	0.8	0.22	0.63	<0.5	0.70	3.2	0.06	2820	<5	26	0.5	2.3	0.6	720	0.9	0.4	<0.1	0.38	3000
190	434300	6108600	uTrWL	5.50	29	10.0	760	8	5.2	26	15	90	1.8	0.82	4.12	3.9	3.41	14.0	0.28	20900	16	63	1.8	13.0	2.8	300	0.7	2.1	1.3	1.72	420
191	434300	6108250	uTrWL	1.10	<5	2.3	170	14	30.2	<3	4	9	0.9	0.15	0.44	<0.5	5.69	2.3	<0.05	2160	<5	75	0.8	1.4	0.5	<300	<0.5	<0.1	0.5	0.22	1000
192	431650	6109400	uTrWL	1.00	<5	3.4	360	16	27.4	10	6	15	2.6	0.27	0.63	0.7	5.22	5.3	0.07	2800	<5	250	1.5	2.2	1.0	560	<0.5	0.6	0.6	0.47	2000
193	433750	6108200	uTrWL	1.00	6	4.5	300	13	26.6	10	6	11	1.0	0.26	0.65	0.6	7.56	4.4	0.08	3140	<5	77	1.2	2.3	0.9	320	<0.5	0.6	<0.1	0.44	1500
194	431400	6108450	uTrWL	1.20	7	5.4	1500	30	30.5	8	9	8	1.3	0.22	0.39	<0.5	7.22	3.5	<0.05	2100	<5	130	1.4	1.4	0.7	1000	0.7	0.6	<0.1	0.29	2300
195	431200	6109200	uTrWL	1.10	<5	3.5	430	17	24.9	12	6	21	1.1	0.37	1.00	0.9	7.03	5.3	0.14	5170	10	71	1.5	3.1	1.0	640	<0.5	1.0	0.9	0.47	2100
501	438260	6101560	uTrWL	1.24	8	3.6	360	12	31.7	8	4	29	1.7	<0.02	0.54	0.7	4.15	3.6	0.07	2150	<5	65	1.8	1.7	0.6	1100	<0.5	0.7	<0.1	0.29	2600
502	438000	6102270	uTrRC	1.53	7	1.8	300	11	32.6	6	3	12	0.9	0.19	0.53	0.6	2.93	3.1	0.08	2690	<5	30	0.8	1.8	0.5	480	<0.5	0.4	<0.1	0.40	3500
503	437950	6103450	uTrRC	1.82	7	1.5	880	16	31.0	7	4	11	0.6	0.13	0.44	<0.5	3.17	3.5	0.05	1830	<5	72	1.1	1.4	0.5	940	<0.5	0.6	<0.1	0.31	2400
504	438700	6104300	KTS	1.53	9	1.6	490	16	25.9	7	5	8	1.4	<0.01	0.43	<0.5	4.57	3.0	0.07	2190	<5	86	0.9	1.5	0.6	600	<0.5	0.4	<0.1	0.29	2400
505	440000	6105500	KTS	2.01	<5	1.6	1700	12	33.0	<3	3	4	<0.5	<0.01	0.21	<0.5	2.65	1.9	<0.05	1410	<5	21	0.4	0.8	0.3	1200	<0.5	0.3	<0.1	0.15	2800
506	440120	6106900	KTS	1.86	7	2.2	2100	16	27.7	3	4	73	0.6	<0.02	0.24	<0.5	3.33	2.2	0.05	1220	<5	67	0.6	0.8	0.3	1400	<0.5	<0.1	<0.1	0.13	3000
507	441480	6105040	uTrWL	2.51	<5	1.8	770	24	33.2	4	5	6	0.9	<0.02	0.31	<0.5	2.71	2.0	<0.05	1280	6	33	0.9	0.9	0.4	910	<0.5	<0.1	<0.1	0.20	2400
508	441941	6105171	uTrWL	1.72	<5	3.3	980	9	20.7	15	8	36	1.0	0.45	1.19	1.8	4.06	7.8	0.14	8020	10	100	1.0	5.1	1.4	820	<0.5	1.1	0.6	0.80	1700
509	440380	6105300	KTS	2.00	<5	2.0	2500	13	31.4	4	3	12	0.6	<0.02	0.43	0.9	3.20	2.5	0.05	2470	<5	44	0.5	1.4	0.4	1900	<0.5	0.5	<0.1	0.25	2100
510	441100	6107600	KTS	1.52	<5	2.5	1300	14	26.0	9	6	13	<0.5	0.25	0.70	0.8	3.36	4.4	0.10	3760	9	65	0.7	2.6	0.7	1200	<0.5	0.6	<0.1	0.38	2200
511	441500	6108300	KTS	3.02	6	1.5	670	22	32.5	<3	7	4	0.8	<0.01	0.21	<0.5	2.30	1.2	<0.05	1090	<5	34	0.6	0.7	0.2	980	<0.5	0.2	<0.1	0.15	2200
512	442820	6108470	KTS	1.82	<5	2.3	620	14	28.5	7	5	13	0.8	0.16	0.58	0.6	3.23	3.4	0.10	2910	<5	17	0.8	2.0	0.6	890	<0.5	0.6	0.4	0.40	1900
513	443800	6108400	uTrWL	2.04	12	3.9	770	26	25.5	10	11	22	1.5	0.35	1.01	1.2	2.98	5.5	0.12	5380	7	37	1.1	4.0	1.1	500	<0.5	0.9	<0.1	0.61	1900

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - ICP-ES

Site Number	Easting	Northing	Rock Unit	Al %	B ppm	Cd ppm	Cu ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Ni ppm	P %	Pb ppm	V ppm
				0.01	2	0.2	1	2	0.01	1	1	1	0.001	3	2
177	435800	6112000	uTrWL	-	-	-	-	-	-	-	-	-	-	-	-
178	435800	6111550	uTrWL	3.46	94	3.9	310	<2	3.15	13384	7	55	1.961	79	21
179	434000	6106450	uTrWL	1.36	120	10.2	131	<2	2.09	8550	3	25	0.710	42	10
180	435200	6108600	uTrWL	1.21	54	4.2	104	<2	0.87	14862	4	32	0.721	58	15
181	434000	6111650	uTrWL	2.65	84	<0.2	207	<2	1.98	7551	8	31	1.542	80	19
182	434950	6108900	uTrWL	0.64	78	1.2	130	2	0.86	4529	2	20	0.375	30	34
184	433250	6110800	uTrWL	0.41	93	26.5	70	<2	1.10	4695	2	14	0.397	32	18
185	434750	6110750	uTrWL	1.30	121	29.8	66	<2	3.37	11454	1	30	0.485	36	12
186	434000	6110450	uTrWL	0.17	93	0.6	73	<2	0.48	2955	2	9	0.224	22	12
187	434400	6109200	uTrWL	1.21	68	13.8	172	2	1.77	7036	3	29	0.667	46	35
188	434750	6107900	uTrWL	1.06	103	13.7	87	<2	2.24	19825	2	40	0.478	56	18
190	434300	6108600	uTrWL	2.54	39	<0.2	128	6	0.93	1619	1	18	0.368	28	111
191	434300	6108250	uTrWL	3.19	174	3.9	225	<2	1.94	4421	3	24	1.107	54	13
192	431650	6109400	uTrWL	3.81	107	0.8	232	<2	2.07	6685	9	42	1.490	73	20
193	433750	6108200	uTrWL	1.65	114	12.7	326	<2	1.96	3489	7	24	1.696	62	19
194	431400	6108450	uTrWL	2.69	134	10.7	158	<2	2.02	7033	8	34	1.704	52	14
195	431200	6109200	uTrWL	1.75	162	15.6	224	2	2.59	4311	9	24	1.516	65	24
501	438260	6101560	uTrWL	0.59	131	27.0	196	<2	1.97	4800	9	18	0.967	53	6
502	438000	6102270	uTrRC	0.36	182	8.2	147	<2	1.20	3614	3	6	0.535	37	6
503	437950	6103450	uTrRC	2.69	105	21.8	125	<2	1.00	8973	5	11	0.664	129	5
504	438700	6104300	KTS	2.57	258	22.9	174	<2	2.18	8765	2	10	0.860	22	4
505	440000	6105500	KTS	2.02	228	27.6	98	<2	0.89	14783	3	4	0.369	11	3
506	440120	6106900	KTS	2.01	193	15.5	158	<2	1.69	19574	<1	13	0.526	142	3
507	441480	6105040	uTrWL	2.13	119	19.4	112	<2	1.15	7600	3	9	0.722	33	3
508	441941	6105171	uTrWL	2.47	168	14.7	192	2	1.70	15248	2	19	0.587	31	21
509	440380	6105300	KTS	0.30	193	0.8	77	<2	1.04	8414	<1	5	0.564	22	6
510	441100	6107600	KTS	4.72	191	14.7	220	2	1.46	10296	4	15	0.725	24	11
511	441500	6108300	KTS	0.98	134	45.6	67	<2	1.25	7593	<1	8	0.328	26	2
512	442820	6108470	KTS	2.24	118	49.6	192	<2	1.59	4975	8	20	0.828	28	8
513	443800	6108400	uTrWL	1.72	134	32.7	166	2	1.38	10632	3	23	0.640	31	16

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - INAA

Site Number	Easting	Northing	Rock Unit	Ash Yield	Au	As	Ba	Br	Ca	Ce	Co	Cr	Cs	Eu	Fe	Hf	K	La	Lu	Na	Nd	Rb	Sb	Sc	Sm	Sr	Ta	Th	U	Yb	Zn
				%	ppb	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
					5	0.5	10	1	0.2	3	1	1	0.5	0.02	0.05	0.5	0.05	0.1	0.05	10	5	5	0.1	0.1	0.1	300	0.5	0.1	0.1	0.05	20
514	444700	6107750	uTrWL	2.17	6	8.0	610	12	24.5	13	10	39	2.0	0.47	1.56	1.2	4.71	6.1	0.14	7820	7	57	1.3	6.0	1.4	970	<0.5	1.0	<0.1	0.84	1800
515	444860	6107050	uTrWL	3.07	<5	7.2	450	11	23.0	18	14	72	0.9	0.57	2.14	1.7	3.03	8.5	0.22	9150	10	51	1.7	8.0	1.7	<300	<0.5	1.3	0.7	1.10	1100
516	442420	6101530	uTrWL	1.06	<5	2.8	620	13	24.6	10	9	49	1.2	0.28	0.65	0.8	5.28	4.9	0.08	3230	<5	110	1.7	2.2	0.9	980	<0.5	0.6	<0.1	0.45	3800
517	442100	6101700	uTrWL	1.34	<5	1.9	790	10	27.2	9	9	12	1.1	0.23	0.60	0.8	3.60	3.8	0.08	3050	7	39	0.9	2.0	0.7	860	<0.5	0.7	<0.1	0.36	2300
518	441984	6101461	uTrWL	1.28	<5	2.4	630	16	28.6	6	5	6	2.4	<0.01	0.41	<0.5	4.50	3.0	0.06	1540	<5	99	1.1	1.1	0.6	740	<0.5	0.5	<0.1	0.31	2800
519	442169	6101288	uTrWL	1.00	6	2.7	900	26	26.6	6	8	10	1.7	0.22	0.52	0.5	4.55	3.6	0.06	2110	<5	100	1.2	1.6	0.7	1200	<0.5	0.5	<0.1	0.31	2900
520	442300	6101200	uTrWL	1.05	<5	2.3	1200	12	28.3	6	5	9	0.9	<0.02	0.43	0.6	4.63	4.5	0.06	2260	<5	73	0.8	1.3	0.6	1400	<0.5	0.6	0.4	0.34	3700
523	442880	6101070	uTrWL	1.23	7	2.4	400	12	29.7	6	7	7	1.2	0.13	0.41	<0.5	4.20	3.1	0.07	1570	<5	93	1.1	1.2	0.6	540	<0.5	0.4	<0.1	0.32	2400
524	442840	6101500	uTrWL	0.91	7	2.2	720	13	27.5	7	6	18	1.5	0.18	0.42	0.8	6.68	2.9	0.06	2370	<5	170	0.8	1.4	0.5	1000	<0.5	0.5	<0.1	0.22	2900
525	443400	6102230	uTrWL	3.01	5	1.5	640	22	31.5	<3	4	3	<0.5	<0.01	0.14	<0.5	1.52	<0.1	<0.05	1000	<5	50	0.4	0.4	0.1	810	<0.5	0.2	<0.1	<0.05	1400
526	443500	6102960	uTrWL	1.47	5	2.0	480	15	30.9	6	4	8	<0.5	0.13	0.36	0.6	3.24	2.5	<0.05	1790	<5	50	1.1	1.1	0.4	1300	<0.5	0.5	0.3	0.27	3200
527	444120	6103600	uTrWL	1.86	<5	2.0	2100	20	29.6	<3	5	4	0.5	<0.02	0.22	<0.5	3.05	2.1	<0.05	1190	<5	60	0.4	0.7	0.3	1500	<0.5	<0.1	<0.1	0.13	3000
528	445600	6104078	uTrWL	1.59	6	2.5	390	20	26.0	4	14	9	1.5	0.12	0.40	<0.5	4.24	2.6	<0.05	1940	<5	120	1.3	1.2	0.5	560	<0.5	0.4	<0.1	0.32	2900
529	446060	6105550	uTrWL	1.82	<5	3.4	390	12	31.2	7	8	15	1.1	0.12	0.72	0.8	3.24	3.2	0.07	3050	<5	45	0.9	2.5	0.6	760	<0.5	0.6	<0.1	0.36	1700

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Analytical Data - ICP-ES

Site Number	Easting	Northing	Rock Unit	Al %	B ppm	Cd ppm	Cu ppm	Li ppm	Mg %	Mn ppm	Mo ppm	Ni ppm	P %	Pb ppm	V ppm
				0.01	2	0.2	1	2	0.01	1	1	1	0.001	3	2
514	444700	6107750	uTrWL	1.82	211	44.0	158	2	2.10	4229	1	20	0.484	76	21
515	444860	6107050	uTrWL	1.24	113	15.2	123	4	1.19	1658	2	20	0.352	216	43
516	442420	6101530	uTrWL	2.45	165	27.3	306	<2	2.46	17983	10	23	1.270	52	9
517	442100	6101700	uTrWL	2.05	140	25.0	239	<2	1.36	8324	8	19	0.923	30	8
518	441984	6101461	uTrWL	2.23	174	40.9	263	<2	1.93	12965	7	22	1.005	45	4
519	442169	6101288	uTrWL	3.88	180	39.8	282	<2	2.35	11745	4	28	1.154	38	5
520	442300	6101200	uTrWL	3.07	271	18.0	220	<2	2.02	13301	1	8	0.759	34	4
523	442880	6101070	uTrWL	3.06	119	18.3	259	<2	1.49	9014	6	20	1.052	42	5
524	442840	6101500	uTrWL	2.88	403	15.8	264	<2	3.01	16488	4	11	0.856	171	4
525	443400	6102230	uTrWL	2.62	159	29.8	132	<2	1.17	7512	<1	8	0.543	16	<1
526	443500	6102960	uTrWL	1.09	138	35.0	176	<2	1.74	5637	5	10	0.671	35	4
527	444120	6103600	uTrWL	2.22	191	27.6	106	<2	1.33	15616	<1	6	0.503	14	2
528	445600	6104078	uTrWL	3.43	185	47.7	238	<2	2.69	18392	1	34	0.933	33	3
529	446060	6105550	uTrWL	2.63	198	28.3	234	<2	1.61	6195	1	17	0.600	13	10

Appendix B

Statistical Summary

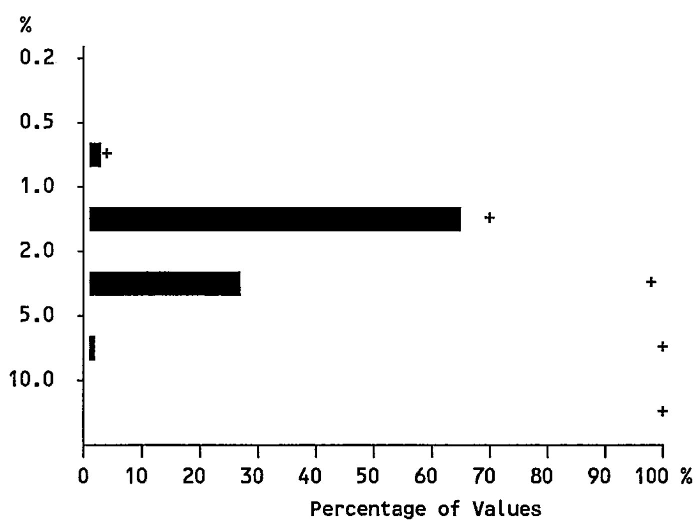
Geological Abbreviations are explained in legend with Fig. 2 and on transparent overlay of geological contacts

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Ash Yield

Number of values - 134

Determination limit - 0.005 %



N	%	Cum %
8	6.0	6.0
88	65.7	71.6
36	26.9	98.5
2	1.5	100.0

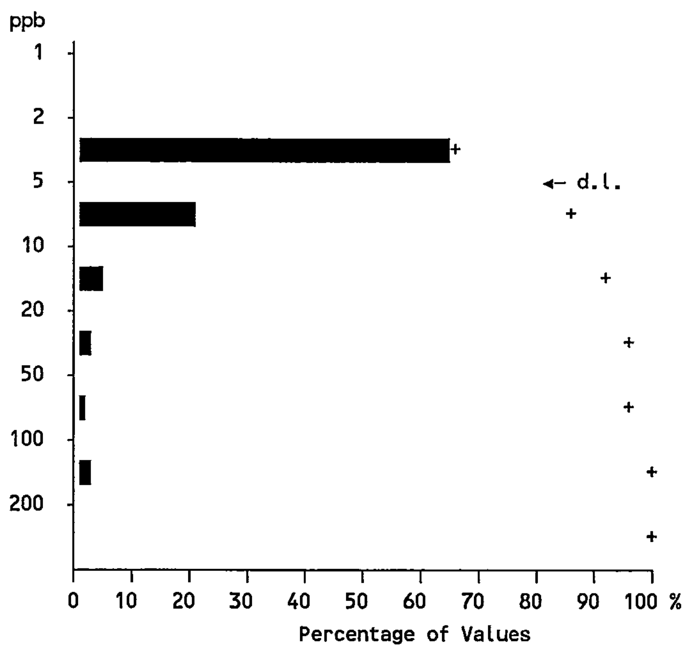
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	1.795	1.808	1.675	1.350	2.658
Standard deviation	0.995	0.933	0.205	0.367	2.012
Skewness	2.405	1.499	0.000	2.110	1.674
Kurtosis	8.306	2.138	-2.750	4.700	1.230
Geometric Mean	1.610	1.623	1.669	1.314	2.275
Percentiles					
Minimum value	0.700	0.700	1.530	1.000	1.520
25th	1.100	1.100	1.530	1.100	1.603
50th	1.500	1.500	1.675	1.300	1.930
75th	2.055	2.225	1.820	1.425	2.768
80th	2.400	2.506	1.820	1.520	3.916
90th	3.015	3.079	1.820	1.790	7.500
95th	3.825	3.865	1.820	2.600	7.500
98th	4.870	4.572	1.820	2.600	7.500
99th	6.800	5.437	1.820	2.600	7.500
Maximum value	7.500	5.500	1.820	2.600	7.500

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Gold (INAA)

Number of values - 134

Determination limit - 5 ppb



N	%	Cum %
90	67.2	67.2
27	20.1	87.3
7	5.2	92.5
5	3.7	96.3
2	1.5	97.8
3	2.2	100.0

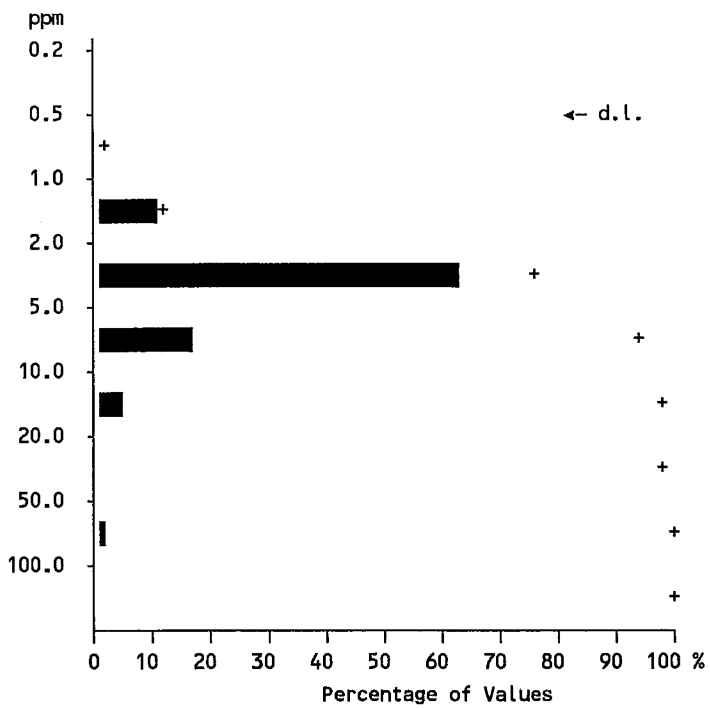
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	90	70	0	16	4
Number of missing values	0	0	0	0	0
Mean	9.396	9.557	7.000	2.944	22.375
Standard deviation	24.410	23.767	0.000	1.305	50.419
Skewness	5.330	5.453	-	2.346	1.847
Kurtosis	30.203	32.952	-	3.867	1.681
Geometric Mean	4.190	4.320	7.000	2.779	6.195
Percentiles					
Minimum value	2.500	2.500	7.000	2.500	2.500
25th	2.500	2.500	7.000	2.500	2.500
50th	2.500	2.500	7.000	2.500	4.250
75th	6.000	6.000	7.000	2.500	8.500
80th	7.000	7.000	7.000	2.500	36.600
90th	13.500	19.000	7.000	6.100	147.000
95th	36.750	41.150	7.000	7.000	147.000
98th	138.600	125.760	7.000	7.000	147.000
99th	171.700	181.500	7.000	7.000	147.000
Maximum value	185.000	185.000	7.000	7.000	147.000

Au

Arsenic (INAA)

Number of values - 134

Determination limit - 0.5 ppm



N	%	Cum %
1	0.7	0.7
17	12.7	13.4
85	63.4	76.9
24	17.9	94.8
6	4.5	99.3
1	0.7	100.0

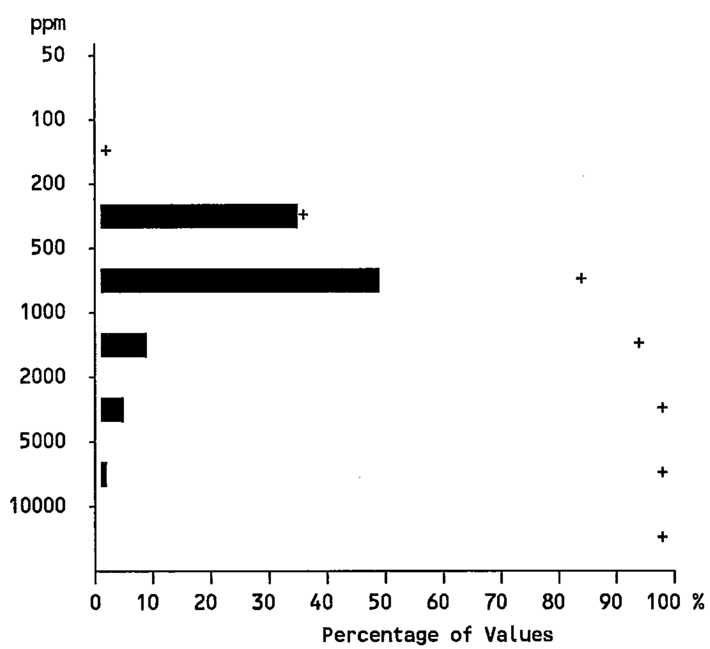
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	4.425	4.741	1.650	3.678	2.625
Standard deviation	5.559	6.167	0.212	1.286	1.924
Skewness	7.695	6.979	0.000	0.527	1.724
Kurtosis	72.119	58.228	-2.750	-0.826	1.393
Geometric Mean	3.471	3.635	1.643	3.471	2.272
Percentiles					
Minimum value	0.700	0.700	1.500	1.600	1.500
25th	2.375	2.400	1.500	2.875	1.600
50th	3.250	3.400	1.650	3.400	2.100
75th	4.825	4.975	1.800	4.700	2.450
80th	5.300	5.400	1.800	5.100	3.460
90th	7.750	8.600	1.800	5.930	7.300
95th	10.000	11.300	1.800	6.200	7.300
98th	15.500	18.300	1.800	6.200	7.300
99th	45.650	57.130	1.800	6.200	7.300
Maximum value	60.000	60.000	1.800	6.200	7.300

As

Barium (INAA)

Number of values - 134

Determination limit - 10 ppm



N	%	Cum %
3	2.2	2.2
46	34.3	36.6
65	48.5	85.1
13	9.7	94.8
6	4.5	99.3
1	0.7	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	728.881	728.491	590.000	508.333	1265.000
Standard deviation	636.991	659.308	410.122	227.861	761.502
Skewness	4.074	4.365	0.000	0.874	0.413
Kurtosis	22.383	24.236	-2.750	0.228	-1.668
Geometric Mean	597.027	597.878	513.809	464.055	1072.274
Percentiles					
Minimum value	150.000	150.000	300.000	200.000	490.000
25th	410.000	425.000	300.000	330.000	632.500
50th	590.000	590.000	590.000	470.000	1020.000
75th	770.000	770.000	880.000	635.000	2000.000
80th	880.000	860.000	880.000	688.000	2180.000
90th	1100.000	1100.000	880.000	866.000	2500.000
95th	2100.000	1995.000	880.000	1100.000	2500.000
98th	3030.000	3086.000	880.000	1100.000	2500.000
99th	4595.000	5239.000	880.000	1100.000	2500.000
Maximum value	5400.000	5400.000	880.000	1100.000	2500.000

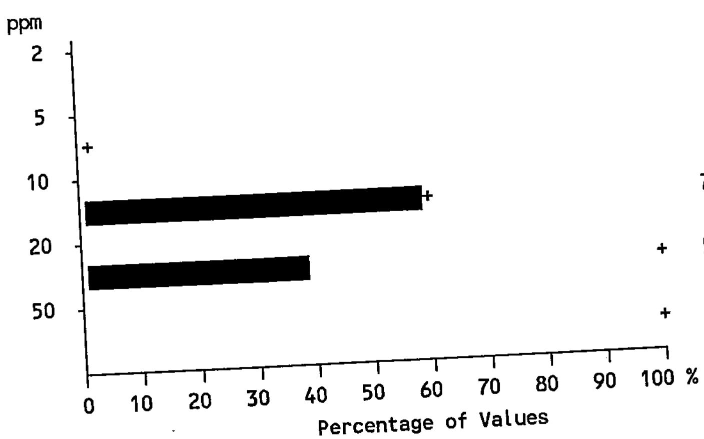
Ba

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Bromine (INAA)

Number of values - 134

Determination limit - 1 ppm



N	%	Cum %
4	3.0	3.0
79	59.0	61.9
51	38.1	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	19.022	19.481	13.500	18.778	14.875
Standard deviation	6.145	6.440	3.536	4.596	3.271
Skewness	0.624	0.540	0.000	0.066	1.104
Kurtosis	0.128	-0.055	-2.750	-1.085	-0.017
Geometric Mean	18.046	18.413	13.266	18.223	14.602
Percentiles					
Minimum value	5.000	5.000	11.000	10.000	12.000
25th	15.000	15.000	11.000	16.000	12.250
50th	18.000	18.000	13.500	18.500	14.000
75th	23.000	24.000	16.000	23.500	16.000
80th	25.000	25.000	16.000	25.000	17.200
90th	27.500	29.300	16.000	25.100	22.000
95th	31.000	32.300	16.000	26.000	22.000
98th	35.300	35.860	16.000	26.000	22.000
99th	36.000	36.000	16.000	26.000	22.000
Maximum value	36.000	36.000	16.000	26.000	22.000

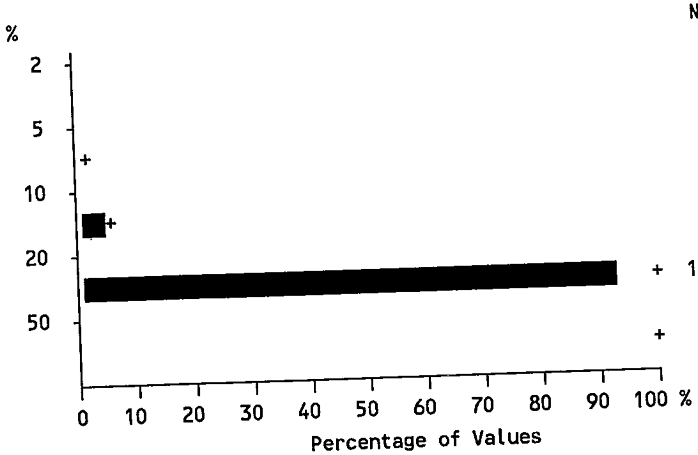
Br

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Calcium (INAA)

Number of values - 134

Determination limit - 0.2 %



N	%	Cum %
1	0.7	0.7
8	6.0	6.7
125	93.3	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	28.512	28.682	31.800	27.689	27.288
Standard deviation	5.773	5.859	1.131	5.419	6.297
Skewness	-0.848	-0.719	0.000	-1.337	-1.172
Kurtosis	1.930	1.748	-2.750	2.207	0.209
Geometric Mean	27.746	27.904	31.790	27.005	26.430
Percentiles					
Minimum value	5.200	5.200	31.000	11.200	13.300
25th	25.500	25.475	31.000	25.075	25.925
50th	29.000	29.150	31.800	28.750	28.100
75th	32.050	32.050	32.600	31.900	32.225
80th	32.700	33.120	32.600	32.560	32.600
90th	35.300	35.800	32.600	33.400	33.000
95th	37.425	37.865	32.600	35.200	33.000
98th	39.330	40.506	32.600	35.200	33.000
99th	41.320	41.544	32.600	35.200	33.000
Maximum value	41.600	41.600	32.600	35.200	33.000

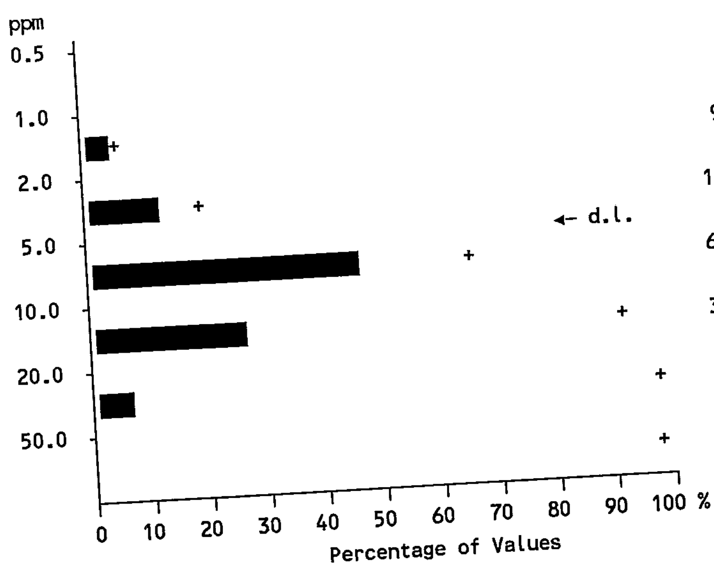
Ca

Cerium (INAA)

Number of values - 134

Determination limit - 3 ppm

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	9	7	0	0	2
Number of missing values	0	0	0	0	0
Mean	8.951	8.929	6.500	9.556	8.500
Standard deviation	6.243	6.117	0.707	4.718	11.055
Skewness	1.688	1.507	0.000	0.844	1.634
Kurtosis	3.302	2.323	-2.750	-0.450	1.179
Geometric Mean	7.193	7.183	6.481	8.593	5.041
Percentiles					
Minimum value	1.500	1.500	6.000	5.000	1.500
25th	5.000	5.000	6.000	5.750	1.875
50th	7.000	7.000	6.500	8.000	5.500
75th	11.000	11.000	7.000	12.250	8.500
80th	13.000	13.000	7.000	13.200	14.200
90th	17.000	16.600	7.000	19.100	35.000
95th	22.750	23.950	7.000	20.000	35.000
98th	30.300	29.440	7.000	20.000	35.000
99th	33.600	30.930	7.000	20.000	35.000
Maximum value	35.000	31.000	7.000	20.000	35.000



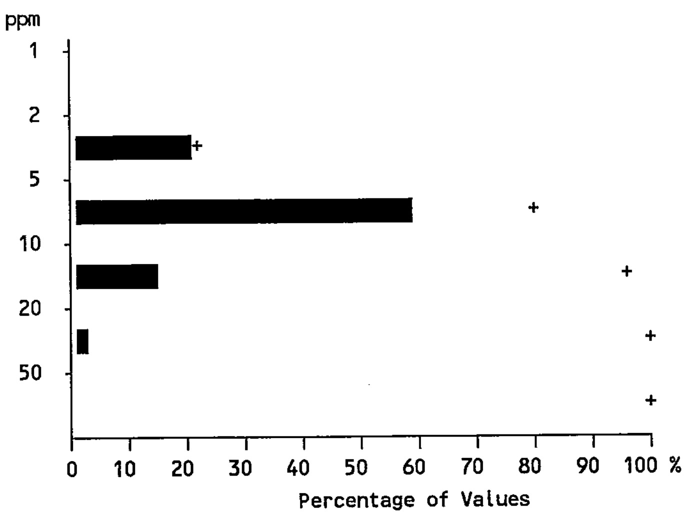
N	%	Cum %
9	6.7	6.7
18	13.4	20.1
62	46.3	66.4
36	26.9	93.3
9	6.7	100.0

Ce

Cobalt (INAA)

Number of values - 134

Determination limit - 1 ppm



N	%	Cum %
30	22.4	22.4
78	58.2	80.6
21	15.7	96.3
5	3.7	100.0

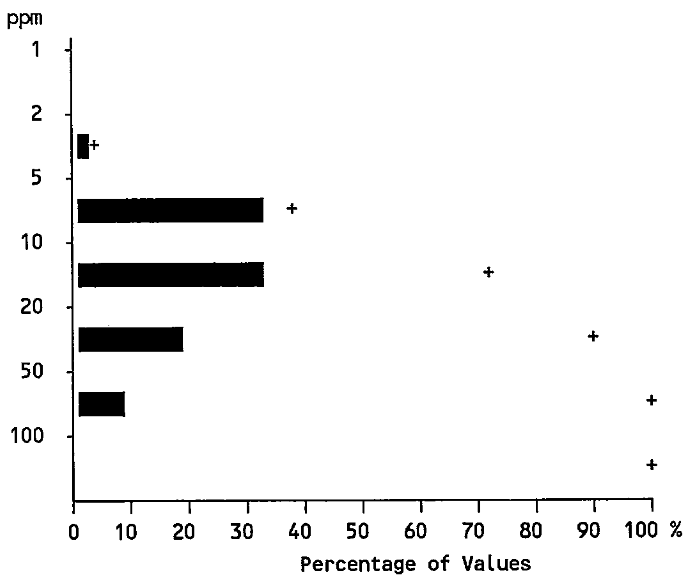
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	7.560	7.991	3.500	6.278	5.750
Standard deviation	4.530	4.812	0.707	2.608	3.240
Skewness	2.036	1.939	0.000	0.126	1.232
Kurtosis	5.156	4.271	-2.750	-1.478	0.276
Geometric Mean	6.585	6.955	3.464	5.720	5.146
Percentiles					
Minimum value	2.000	2.000	3.000	2.000	3.000
25th	5.000	5.000	3.000	4.000	3.250
50th	6.000	7.000	3.500	6.000	5.000
75th	9.000	9.000	4.000	9.000	6.750
80th	9.000	10.000	4.000	9.200	8.200
90th	14.000	15.000	4.000	10.000	13.000
95th	16.750	19.650	4.000	10.000	13.000
98th	22.800	26.160	4.000	10.000	13.000
99th	27.650	27.930	4.000	10.000	13.000
Maximum value	28.000	28.000	4.000	10.000	13.000

Co

Chromium (INAA)

Number of values - 134

Determination limit - 1 ppm



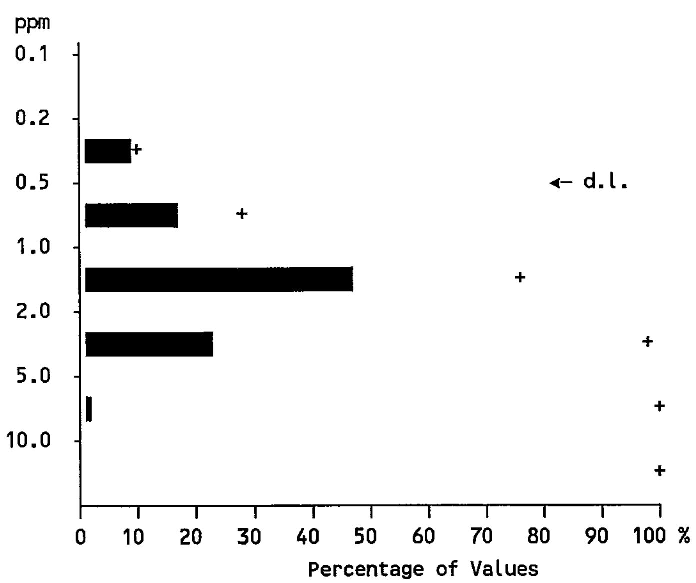
N	%	Cum %
8	6.0	6.0
44	32.8	38.8
45	33.6	72.4
25	18.7	91.0
12	9.0	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	19.075	18.868	11.500	17.667	26.875
Standard deviation	19.379	19.039	0.707	14.075	33.536
Skewness	2.063	2.058	0.000	1.385	0.952
Kurtosis	3.965	4.128	-2.750	0.906	-1.094
Geometric Mean	13.223	13.093	11.489	13.786	14.215
Percentiles					
Minimum value	3.000	3.000	11.000	5.000	4.000
25th	8.000	7.000	11.000	8.000	5.000
50th	12.000	12.000	11.500	13.000	12.500
75th	22.000	22.000	12.000	22.750	58.000
80th	29.000	29.600	12.000	25.200	76.000
90th	47.500	44.600	12.000	50.300	88.000
95th	65.250	63.650	12.000	53.000	88.000
98th	88.600	87.480	12.000	53.000	88.000
99th	95.850	98.370	12.000	53.000	88.000
Maximum value	99.000	99.000	12.000	53.000	88.000

Cesium (INAA)

Number of values - 134

Determination limit - 0.5 ppm



N	%	Cum %
15	11.2	11.2
23	17.2	28.4
64	47.8	76.1
30	22.4	98.5
2	1.5	100.0

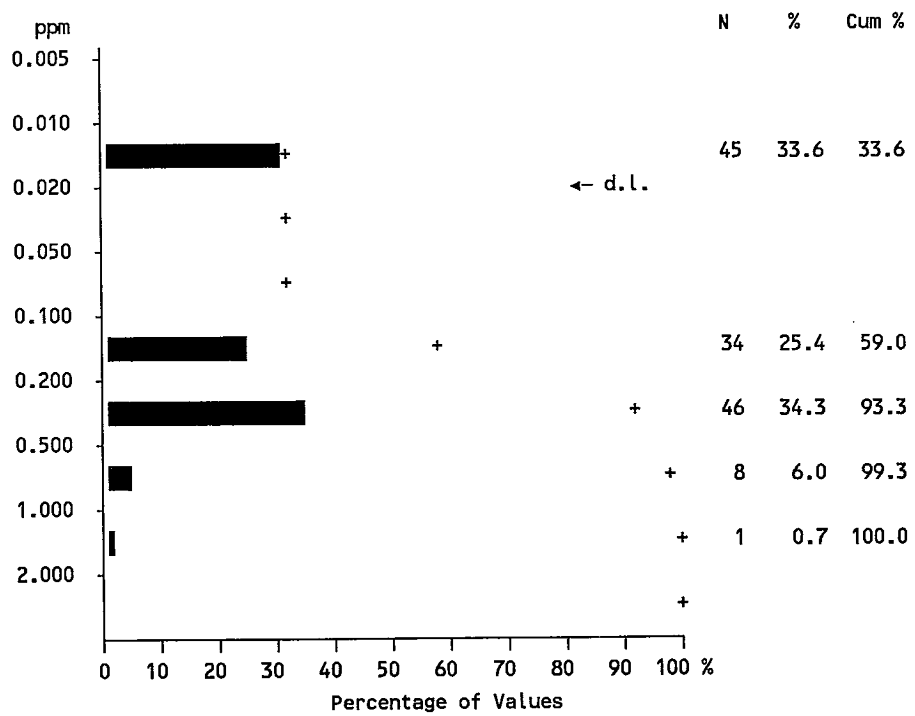
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	15	12	0	1	2
Number of missing values	0	0	0	0	0
Mean	1.529	1.523	0.750	1.969	0.812
Standard deviation	1.033	1.015	0.212	1.162	0.540
Skewness	1.880	1.976	0.000	1.297	0.626
Kurtosis	6.159	7.381	-2.750	1.167	-1.131
Geometric Mean	1.217	1.219	0.735	1.670	0.661
Percentiles					
Minimum value	0.250	0.250	0.600	0.250	0.250
25th	0.900	0.900	0.600	1.375	0.338
50th	1.300	1.300	0.750	1.550	0.700
75th	1.900	1.900	0.900	2.325	1.250
80th	2.200	2.200	0.900	2.700	1.480
90th	2.850	2.900	0.900	4.380	1.800
95th	3.250	3.130	0.900	5.100	1.800
98th	4.680	4.402	0.900	5.100	1.800
99th	6.400	6.918	0.900	5.100	1.800
Maximum value	7.100	7.100	0.900	5.100	1.800

Cs

Europium (INAA)

Number of values - 134

Determination limit - 0.02 ppm



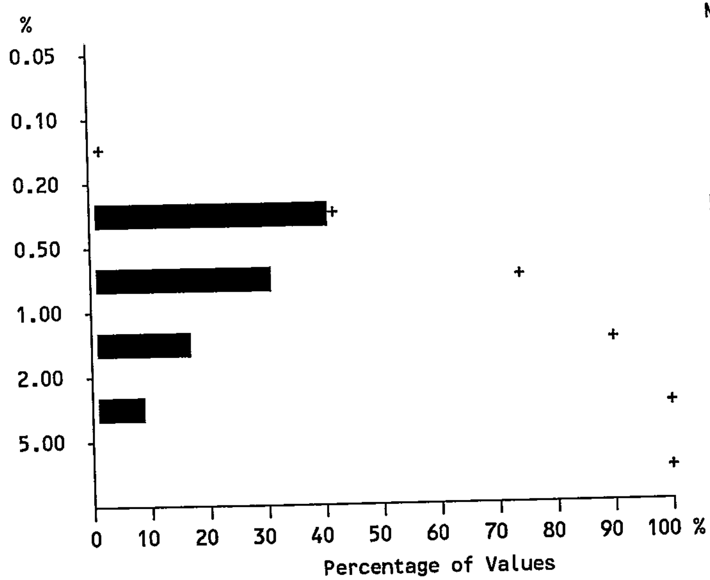
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	45	32	0	8	5
Number of missing values	0	0	0	0	0
Mean	0.196	0.204	0.160	0.168	0.163
Standard deviation	0.196	0.193	0.042	0.188	0.289
Skewness	1.440	1.406	0.000	0.947	1.529
Kurtosis	2.553	2.708	-2.750	-0.166	0.847
Geometric Mean	0.085	0.095	0.157	0.061	0.037
Percentiles					
Minimum value	0.010	0.010	0.130	0.010	0.010
25th	0.010	0.010	0.130	0.010	0.010
50th	0.170	0.180	0.160	0.150	0.010
75th	0.270	0.273	0.190	0.340	0.228
80th	0.340	0.340	0.190	0.350	0.368
90th	0.440	0.453	0.190	0.451	0.840
95th	0.587	0.556	0.190	0.640	0.840
98th	0.826	0.817	0.190	0.640	0.840
99th	0.944	0.987	0.190	0.640	0.840
Maximum value	1.000	1.000	0.190	0.640	0.840

Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Iron (INAA)

Number of values - 134

Determination limit - 0.05 %



N	%	Cum %
2	1.5	1.5
56	41.8	43.3
42	31.3	74.6
22	16.4	91.0
12	9.0	100.0

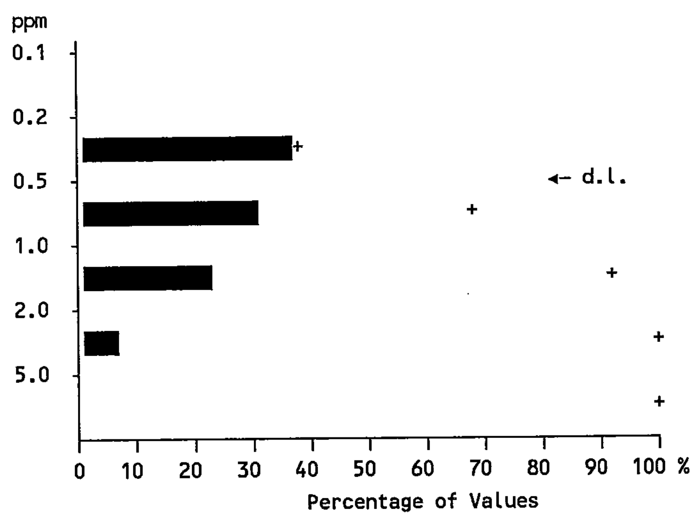
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	0.846	0.874	0.485	0.780	0.720
Standard deviation	0.800	0.839	0.064	0.523	0.922
Skewness	2.222	2.166	0.000	1.194	1.722
Kurtosis	4.810	4.400	-2.750	0.236	1.381
Geometric Mean	0.628	0.641	0.483	0.653	0.469
Percentiles					
Minimum value	0.140	0.140	0.440	0.330	0.210
25th	0.390	0.400	0.440	0.380	0.218
50th	0.535	0.560	0.485	0.600	0.430
75th	1.000	1.003	0.530	1.028	0.670
80th	1.250	1.306	0.530	1.160	1.152
90th	1.965	1.989	0.530	1.696	2.960
95th	2.965	3.142	0.530	2.110	2.960
98th	3.872	3.894	0.530	2.110	2.960
99th	4.043	4.105	0.530	2.110	2.960
Maximum value	4.120	4.120	0.530	2.110	2.960

Fe

Hafnium (INAA)

Number of values - 134

Determination limit - 0.5 ppm



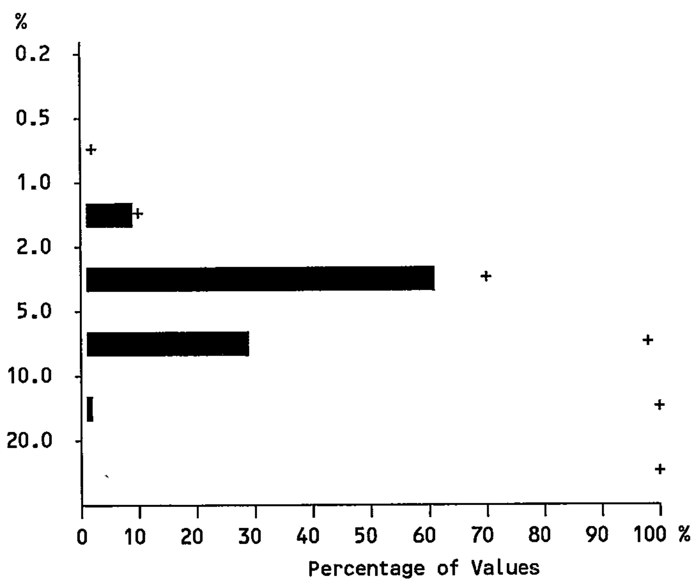
N	%	Cum %
51	38.1	38.1
41	30.6	68.7
32	23.9	92.5
10	7.5	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	51	40	1	6	4
Number of missing values	0	0	0	0	0
Mean	0.841	0.838	0.425	0.894	0.875
Standard deviation	0.737	0.712	0.247	0.727	1.173
Skewness	1.763	1.635	0.000	1.305	1.671
Kurtosis	3.396	2.978	-2.750	1.369	1.252
Geometric Mean	0.606	0.609	0.387	0.662	0.530
Percentiles					
Minimum value	0.250	0.250	0.250	0.250	0.250
25th	0.250	0.250	0.250	0.250	0.250
50th	0.600	0.650	0.425	0.650	0.425
75th	1.200	1.200	0.600	1.225	0.875
80th	1.300	1.300	0.600	1.340	1.460
90th	1.800	1.800	0.600	2.010	3.700
95th	2.700	2.595	0.600	3.000	3.700
98th	3.210	2.872	0.600	3.000	3.700
99th	3.830	3.830	0.600	3.000	3.700
Maximum value	3.900	3.900	0.600	3.000	3.700

Potassium (INAA)

Number of values - 134

Determination limit - 0.05 %



N	%	Cum %
1	0.7	0.7
13	9.7	10.4
81	60.4	70.9
38	28.4	99.3
1	0.7	100.0

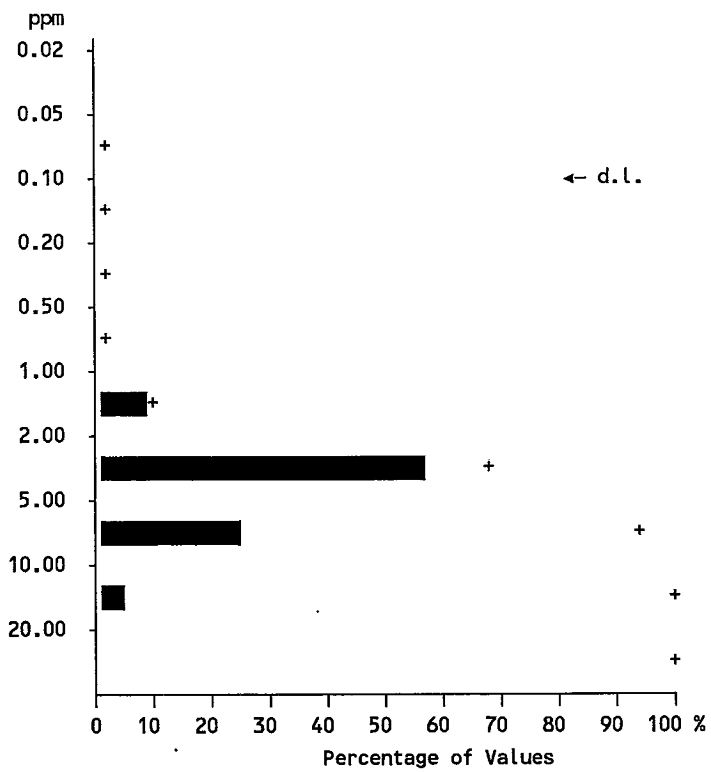
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	4.219	4.174	3.050	5.017	3.314
Standard deviation	1.680	1.759	0.170	1.238	0.695
Skewness	0.496	0.490	0.000	0.663	0.305
Kurtosis	0.644	0.582	-2.750	-0.775	-0.941
Geometric Mean	3.853	3.766	3.048	4.883	3.251
Percentiles					
Minimum value	0.700	0.700	2.930	3.480	2.300
25th	3.140	3.010	2.930	3.983	2.788
50th	4.155	4.155	3.050	4.760	3.280
75th	5.233	5.273	3.170	5.750	3.743
80th	5.570	5.582	3.170	6.278	4.010
90th	6.505	6.471	3.170	7.103	4.570
95th	7.113	7.132	3.170	7.670	4.570
98th	7.970	8.515	3.170	7.670	4.570
99th	9.860	10.372	3.170	7.670	4.570
Maximum value	10.500	10.500	3.170	7.670	4.570

K

Lanthanum (INAA)

Number of values - 134

Determination limit - 0.1 ppm



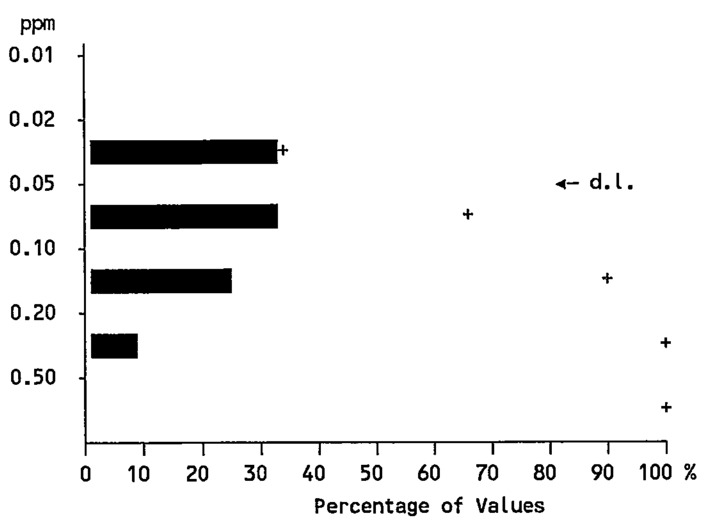
N	%	Cum %
1	0.7	0.7
1	0.7	1.5
13	9.7	11.2
77	57.5	68.7
34	25.4	94.0
8	6.0	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	1	1	0	0	0
Number of missing values	0	0	0	0	0
Mean	4.468	4.446	3.300	4.739	4.450
Standard deviation	2.925	2.843	0.283	2.406	5.164
Skewness	1.747	1.513	0.000	1.044	1.728
Kurtosis	3.528	2.375	-2.750	0.212	1.397
Geometric Mean	3.676	3.636	3.294	4.257	3.145
Percentiles					
Minimum value	0.050	0.050	3.100	2.500	1.200
25th	2.500	2.500	3.100	2.825	1.975
50th	3.600	3.650	3.300	3.800	2.750
75th	5.525	5.525	3.500	6.025	4.150
80th	6.200	6.320	3.500	6.560	6.920
90th	7.800	7.800	3.500	8.840	17.000
95th	11.250	11.650	3.500	11.000	17.000
98th	14.000	14.000	3.500	11.000	17.000
99th	15.950	14.000	3.500	11.000	17.000
Maximum value	17.000	14.000	3.500	11.000	17.000

Lutetium (INAA)

Number of values - 134

Determination limit - 0.05 ppm



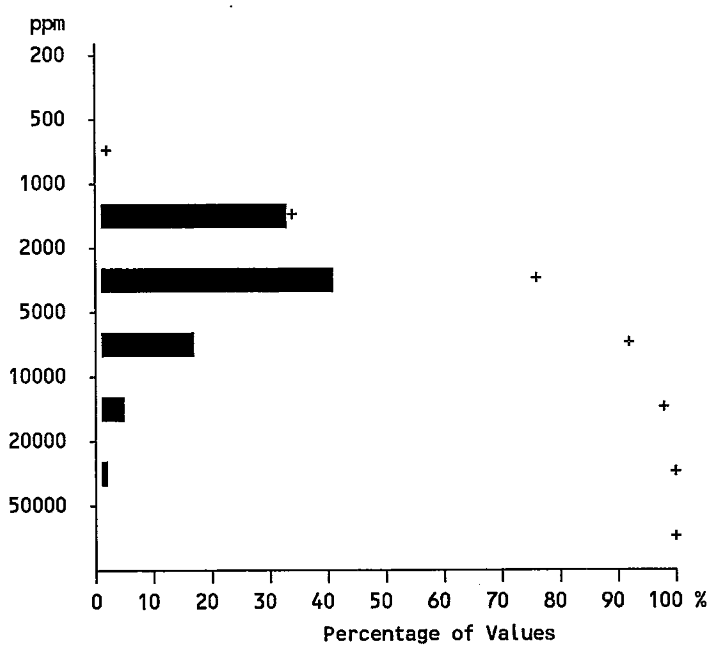
N	%	Cum %
46	34.3	34.3
44	32.8	67.2
33	24.6	91.8
11	8.2	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	46	38	0	6	2
Number of missing values	0	0	0	0	0
Mean	0.083	0.083	0.065	0.083	0.089
Standard deviation	0.068	0.069	0.021	0.060	0.086
Skewness	1.603	1.613	0.000	0.828	1.457
Kurtosis	2.716	2.810	-2.750	-0.382	0.767
Geometric Mean	0.062	0.061	0.063	0.064	0.065
Percentiles					
Minimum value	0.025	0.025	0.050	0.025	0.025
25th	0.025	0.025	0.050	0.025	0.031
50th	0.070	0.070	0.065	0.075	0.060
75th	0.110	0.110	0.080	0.113	0.100
80th	0.120	0.130	0.080	0.126	0.138
90th	0.175	0.169	0.080	0.202	0.290
95th	0.235	0.243	0.080	0.220	0.290
98th	0.283	0.280	0.080	0.220	0.290
99th	0.342	0.364	0.080	0.220	0.290
Maximum value	0.370	0.370	0.080	0.220	0.290

Sodium (INAA)

Number of values - 134

Determination limit - 10 ppm



N	%	Cum %
4	3.0	3.0
44	32.8	35.8
54	40.3	76.1
23	17.2	93.3
8	6.0	99.3
1	0.7	100.0

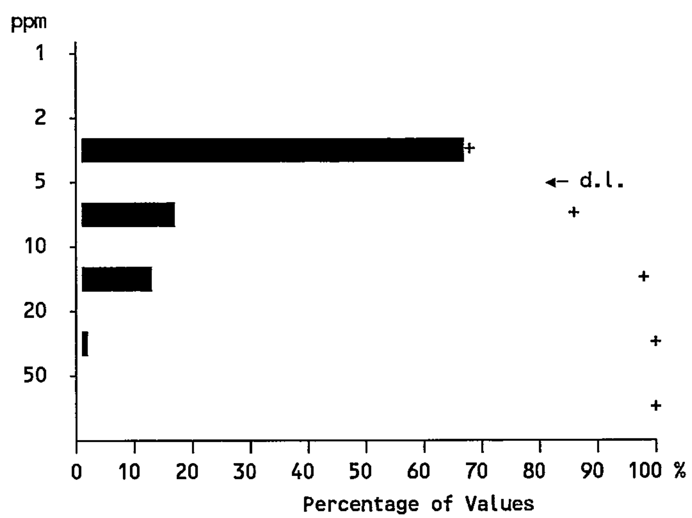
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	3821.052	3776.519	2260.000	4052.222	4281.250
Standard deviation	3624.555	3427.506	608.112	3799.925	6096.539
Skewness	2.381	2.330	0.000	1.697	1.775
Kurtosis	6.393	6.673	-2.750	2.266	1.509
Geometric Mean	2831.374	2836.408	2218.716	2986.693	2606.550
Percentiles					
Minimum value	595.000	595.000	1830.000	1350.000	1090.000
25th	1630.000	1630.000	1830.000	1620.000	1267.500
50th	2410.000	2410.000	2260.000	2270.000	2330.000
75th	4870.000	5027.500	2690.000	5755.000	3547.500
80th	5760.000	5916.000	2690.000	7258.000	6848.000
90th	8160.000	8059.000	2690.000	9787.000	19200.000
95th	11200.000	10625.000	2690.000	15700.000	19200.000
98th	17870.000	16628.000	2690.000	15700.000	19200.000
99th	20305.000	20648.000	2690.000	15700.000	19200.000
Maximum value	20900.000	20900.000	2690.000	15700.000	19200.000

Na

Neodymium (INAA)

Number of values - 134

Determination limit - 5 ppm



N	%	Cum %
93	69.4	69.4
23	17.2	86.6
17	12.7	99.3
1	0.7	100.0

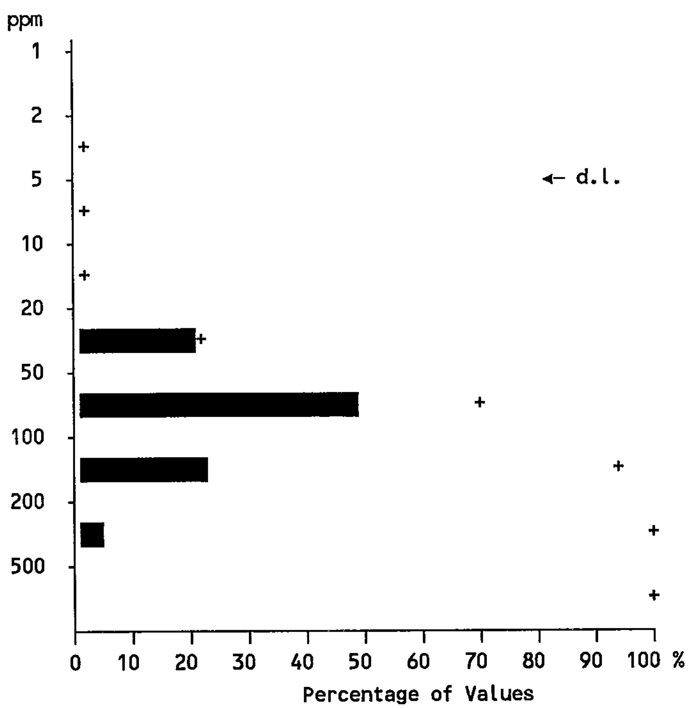
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	93	72	2	13	6
Number of missing values	0	0	0	0	0
Mean	4.802	4.764	2.500	4.972	5.500
Standard deviation	3.992	3.796	0.000	4.306	6.285
Skewness	1.710	1.622	-	1.185	1.475
Kurtosis	2.184	1.817	-	-0.287	0.592
Geometric Mean	3.760	3.781	2.500	3.786	3.805
Percentiles					
Minimum value	2.500	2.500	2.500	2.500	2.500
25th	2.500	2.500	2.500	2.500	2.500
50th	2.500	2.500	2.500	2.500	2.500
75th	7.000	7.000	2.500	8.500	7.375
80th	8.000	8.000	2.500	10.200	11.200
90th	10.500	10.000	2.500	13.200	20.000
95th	15.000	14.300	2.500	15.000	20.000
98th	17.000	16.860	2.500	15.000	20.000
99th	18.950	17.000	2.500	15.000	20.000
Maximum value	20.000	17.000	2.500	15.000	20.000

Nd

Rubidium (INAA)

Number of values - 134

Determination limit - 5 ppm



N	%	Cum %
1	0.7	0.7
1	0.7	1.5
29	21.6	23.1
65	48.5	71.6
31	23.1	94.8
7	5.2	100.0

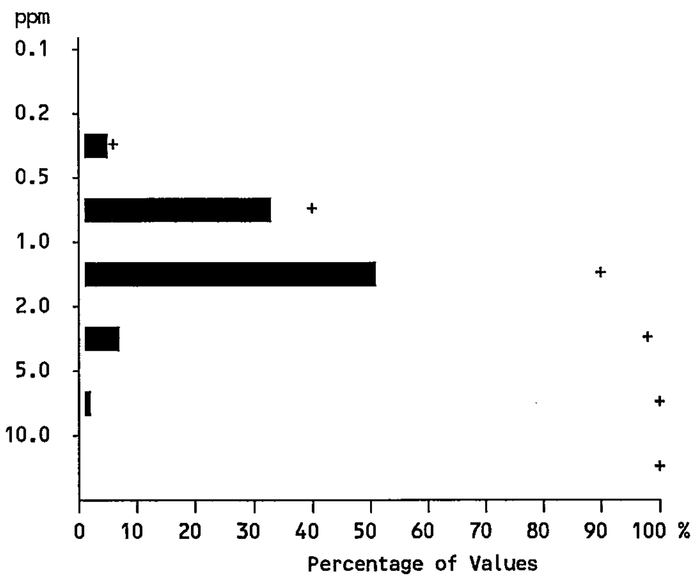
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	1	1	0	0	0
Number of missing values	0	0	0	0	0
Mean	87.563	86.844	51.000	112.667	49.750
Standard deviation	52.567	53.437	29.698	46.698	24.575
Skewness	1.395	1.523	0.000	0.658	-0.032
Kurtosis	2.185	2.529	-2.750	0.040	-1.695
Geometric Mean	73.414	72.669	46.476	103.505	43.492
Percentiles					
Minimum value	2.500	2.500	30.000	36.000	17.000
25th	50.750	50.000	30.000	80.750	24.250
50th	78.000	78.000	51.000	105.000	54.000
75th	100.000	100.000	72.000	150.000	66.500
80th	110.000	110.000	72.000	152.000	70.800
90th	165.000	170.000	72.000	176.000	86.000
95th	205.000	213.000	72.000	230.000	86.000
98th	243.000	248.600	72.000	230.000	86.000
99th	282.500	296.500	72.000	230.000	86.000
Maximum value	300.000	300.000	72.000	230.000	86.000

Rb

Antimony (INAA)

Number of values - 134

Determination limit - 0.1 ppm



N	%	Cum %
9	6.7	6.7
45	33.6	40.3
69	51.5	91.8
10	7.5	99.3
1	0.7	100.0

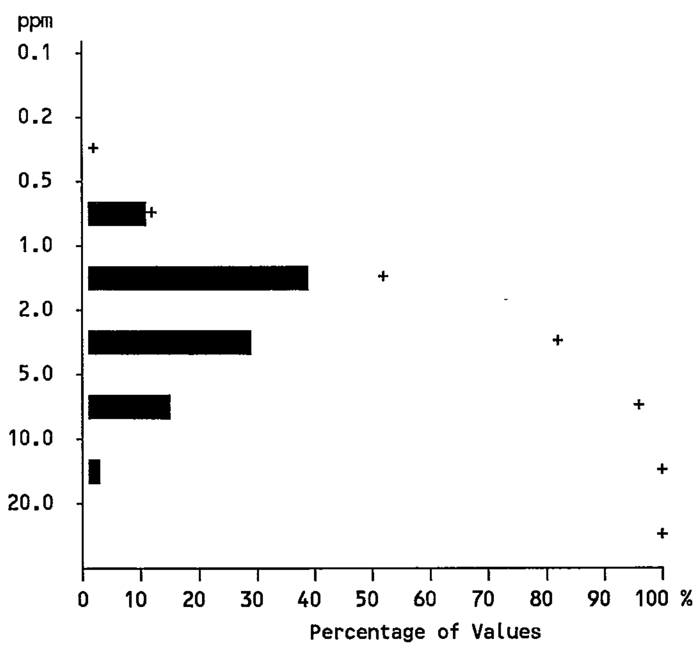
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	1.208	1.247	0.950	1.222	0.725
Standard deviation	0.669	0.718	0.212	0.392	0.282
Skewness	2.244	2.120	0.000	1.864	0.819
Kurtosis	8.524	7.355	-2.750	3.581	-0.525
Geometric Mean	1.062	1.082	0.938	1.177	0.683
Percentiles					
Minimum value	0.200	0.200	0.800	0.800	0.400
25th	0.800	0.800	0.800	0.975	0.525
50th	1.100	1.100	0.950	1.150	0.650
75th	1.500	1.500	1.100	1.325	0.875
80th	1.600	1.660	1.100	1.420	0.980
90th	1.850	1.930	1.100	1.780	1.300
95th	2.425	2.465	1.100	2.500	1.300
98th	3.300	3.860	1.100	2.500	1.300
99th	4.650	4.930	1.100	2.500	1.300
Maximum value	5.000	5.000	1.100	2.500	1.300

Sb

Scandium (INAA)

Number of values - 134

Determination limit - 0.1 ppm



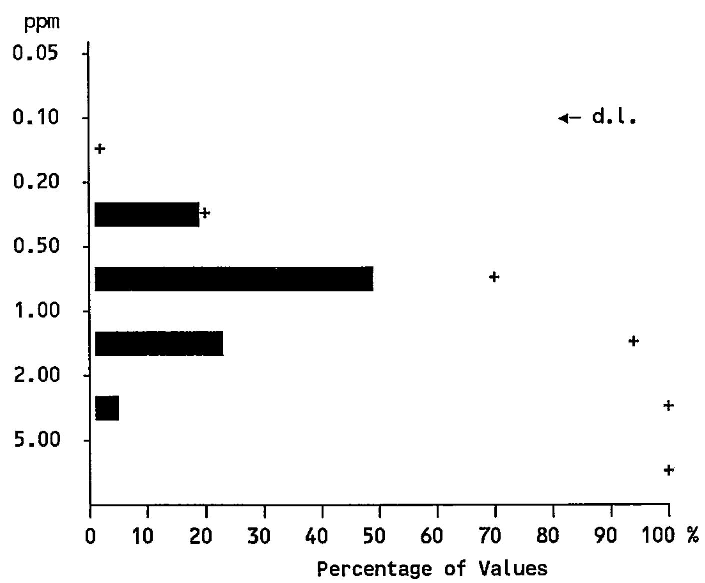
N	%	Cum %
1	0.7	0.7
16	11.9	12.7
53	39.6	52.2
40	29.9	82.1
20	14.9	97.0
4	3.0	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	2.887	2.939	1.600	2.800	2.725
Standard deviation	2.721	2.762	0.283	2.148	3.805
Skewness	2.100	2.067	0.000	1.303	1.749
Kurtosis	4.521	4.455	-2.750	0.681	1.444
Geometric Mean	2.106	2.135	1.587	2.226	1.664
Percentiles					
Minimum value	0.400	0.400	1.400	1.100	0.700
25th	1.200	1.200	1.400	1.200	0.800
50th	1.900	1.900	1.600	2.050	1.450
75th	3.250	3.425	1.800	3.800	2.450
80th	4.300	4.720	1.800	4.240	4.480
90th	6.700	7.030	1.800	6.350	12.000
95th	8.750	8.885	1.800	8.600	12.000
98th	12.300	12.860	1.800	8.600	12.000
99th	14.300	14.860	1.800	8.600	12.000
Maximum value	15.000	15.000	1.800	8.600	12.000

Samarium (INAA)

Number of values - 134

Determination limit - 0.1 ppm



N	%	Cum %
2	1.5	1.5
26	19.4	20.9
66	49.3	70.1
32	23.9	94.0
8	6.0	100.0

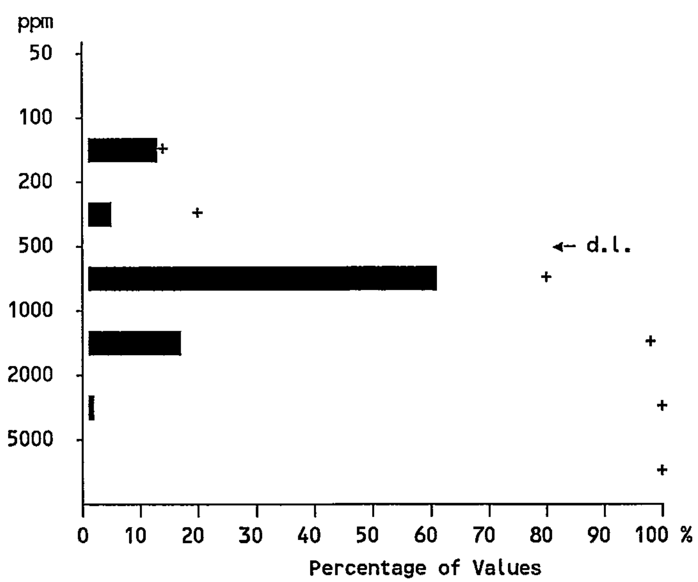
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	0.854	0.852	0.500	0.928	0.800
Standard deviation	0.603	0.592	0.000	0.475	1.025
Skewness	1.918	1.818	-	0.984	1.748
Kurtosis	4.364	3.998	-	-0.035	1.449
Geometric Mean	0.696	0.694	0.500	0.831	0.527
Percentiles					
Minimum value	0.100	0.100	0.500	0.500	0.200
25th	0.500	0.500	0.500	0.500	0.300
50th	0.600	0.700	0.500	0.800	0.500
75th	1.100	1.100	0.500	1.225	0.675
80th	1.200	1.200	0.500	1.300	1.220
90th	1.550	1.530	0.500	1.830	3.300
95th	2.125	2.130	0.500	2.100	3.300
98th	3.020	2.886	0.500	2.100	3.300
99th	3.365	3.365	0.500	2.100	3.300
Maximum value	3.400	3.400	0.500	2.100	3.300

Sm

Strontium (INAA)

Number of values - 134

Determination limit - 300 ppm



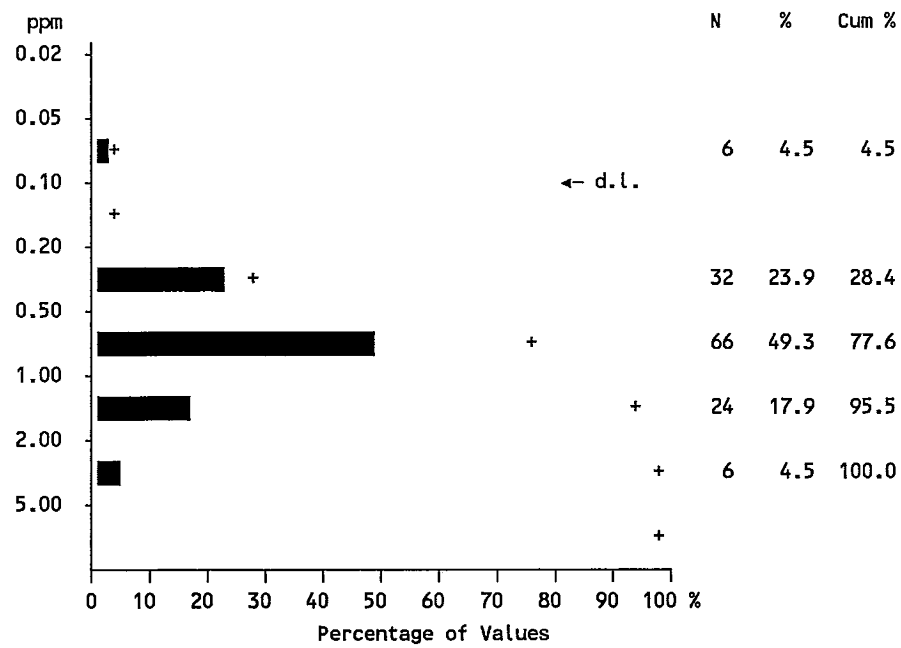
N	%	Cum %
21	15.7	15.7
7	5.2	20.9
81	60.4	81.3
24	17.9	99.3
1	0.7	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	21	17	0	4	0
Number of missing values	0	0	0	0	0
Mean	732.910	715.000	710.000	663.333	1132.500
Standard deviation	397.868	385.808	325.269	407.662	395.357
Skewness	0.752	0.808	0.000	0.623	0.584
Kurtosis	1.365	1.864	-2.750	0.066	-0.749
Geometric Mean	605.855	592.919	671.714	527.107	1075.041
Percentiles					
Minimum value	150.000	150.000	480.000	150.000	600.000
25th	540.000	537.500	480.000	322.500	890.000
50th	700.000	700.000	710.000	605.000	1090.000
75th	960.000	937.500	940.000	907.500	1350.000
80th	990.000	986.000	940.000	988.000	1500.000
90th	1200.000	1200.000	940.000	1160.000	1900.000
95th	1425.000	1400.000	940.000	1700.000	1900.000
98th	1830.000	1758.000	940.000	1700.000	1900.000
99th	2160.000	2265.000	940.000	1700.000	1900.000
Maximum value	2300.000	2300.000	940.000	1700.000	1900.000

Thorium (INAA)

Number of values - 134

Determination limit - 0.1 ppm



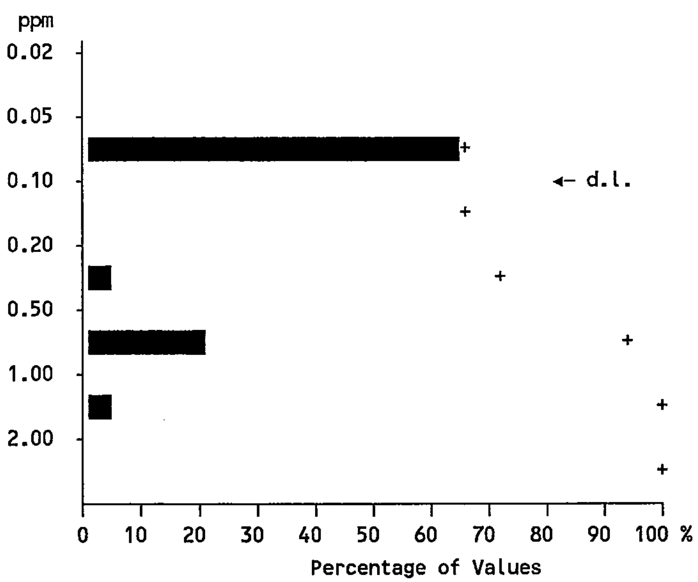
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	6	5	0	0	1
Number of missing values	0	0	0	0	0
Mean	0.715	0.713	0.500	0.783	0.644
Standard deviation	0.470	0.465	0.141	0.367	0.774
Skewness	1.519	1.389	0.000	1.052	1.626
Kurtosis	2.545	1.968	-2.750	0.302	1.191
Geometric Mean	0.570	0.567	0.490	0.714	0.390
Percentiles					
Minimum value	0.050	0.050	0.400	0.400	0.050
25th	0.400	0.400	0.400	0.550	0.225
50th	0.600	0.600	0.500	0.700	0.450
75th	0.900	0.900	0.600	0.925	0.600
80th	1.000	1.060	0.600	1.020	0.980
90th	1.300	1.300	0.600	1.520	2.500
95th	1.775	1.895	0.600	1.700	2.500
98th	2.160	2.100	0.600	1.700	2.500
99th	2.430	2.286	0.600	1.700	2.500
Maximum value	2.500	2.300	0.600	1.700	2.500

Th

Uranium (INAA)

Number of values - 134

Determination limit - 0.1 ppm



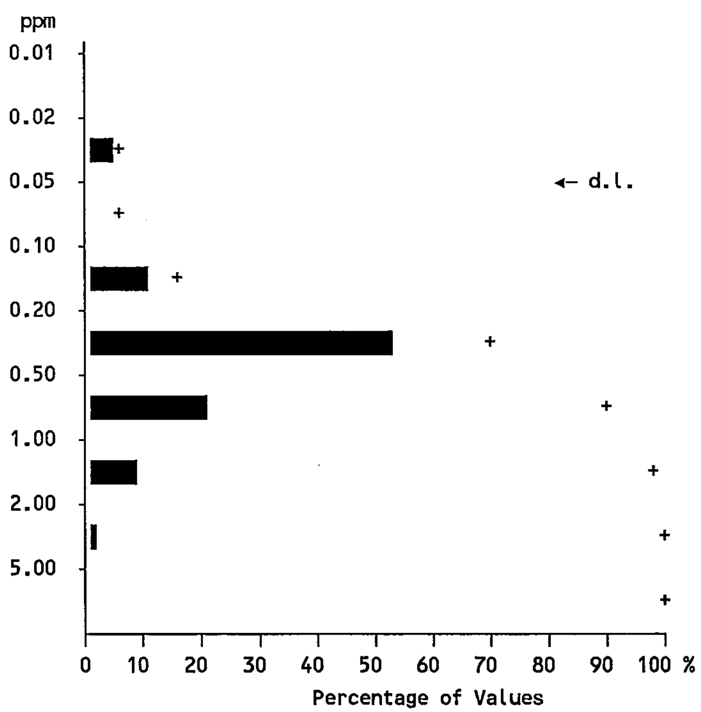
N	%	Cum %
90	67.2	67.2
8	6.0	73.1
29	21.6	94.8
7	5.2	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	90	70	2	11	7
Number of missing values	0	0	0	0	0
Mean	0.255	0.255	0.050	0.353	0.094
Standard deviation	0.339	0.323	0.000	0.468	0.124
Skewness	1.634	1.452	-	1.249	1.856
Kurtosis	2.116	1.323	-	0.372	1.703
Geometric Mean	0.114	0.117	0.050	0.142	0.065
Percentiles					
Minimum value	0.050	0.050	0.050	0.050	0.050
25th	0.050	0.050	0.050	0.050	0.050
50th	0.050	0.050	0.050	0.050	0.050
75th	0.500	0.500	0.050	0.725	0.050
80th	0.500	0.500	0.050	0.840	0.120
90th	0.750	0.700	0.050	1.060	0.400
95th	1.000	0.900	0.050	1.600	0.400
98th	1.300	1.286	0.050	1.600	0.400
99th	1.495	1.300	0.050	1.600	0.400
Maximum value	1.600	1.300	0.050	1.600	0.400

Ytterbium (INAA)

Number of values - 134

Determination limit - 0.05 ppm



N	%	Cum %
10	7.5	7.5
14	10.4	17.9
70	52.2	70.1
28	20.9	91.0
11	8.2	99.3
1	0.7	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	10	9	0	1	0
Number of missing values	0	0	0	0	0
Mean	0.462	0.465	0.355	0.459	0.459
Standard deviation	0.391	0.394	0.064	0.302	0.599
Skewness	1.839	1.745	0.000	0.764	1.747
Kurtosis	3.733	3.325	-2.750	-0.454	1.444
Geometric Mean	0.322	0.318	0.352	0.354	0.298
Percentiles					
Minimum value	0.025	0.025	0.310	0.025	0.130
25th	0.220	0.220	0.310	0.250	0.150
50th	0.350	0.355	0.355	0.350	0.270
75th	0.593	0.595	0.400	0.670	0.395
80th	0.670	0.682	0.400	0.732	0.704
90th	0.950	0.950	0.400	1.015	1.920
95th	1.348	1.375	0.400	1.150	1.920
98th	1.829	1.780	0.400	1.150	1.920
99th	2.018	2.050	0.400	1.150	1.920
Maximum value	2.070	2.070	0.400	1.150	1.920

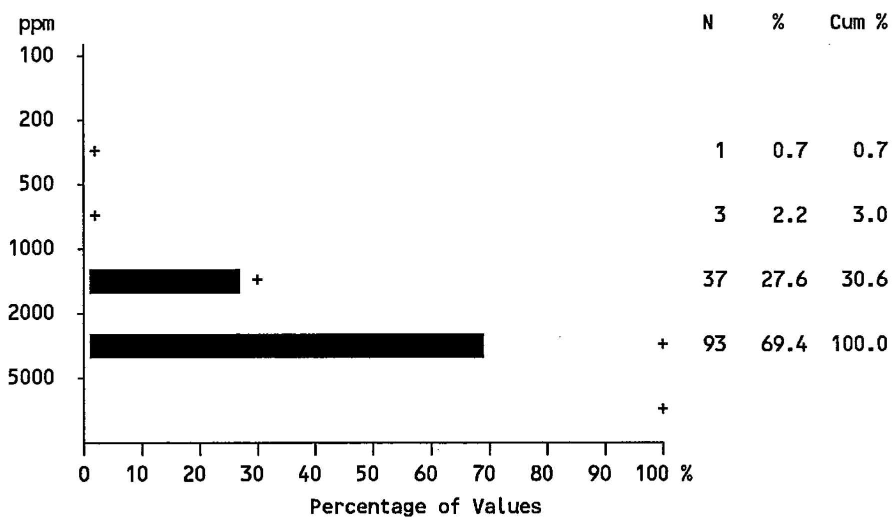
Yb

Zinc (INAA)

Number of values - 134

Determination limit - 20 ppm

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	0	0	0	0	0
Mean	2277.537	2253.491	2950.000	2400.000	2152.500
Standard deviation	678.712	665.349	777.817	735.647	718.963
Skewness	-0.093	-0.194	0.000	0.614	-0.915
Kurtosis	-0.059	-0.373	-2.750	-0.125	-0.092
Geometric Mean	2158.129	2137.100	2898.275	2296.137	1985.352
Percentiles					
Minimum value	420.000	420.000	2400.000	1100.000	620.000
25th	1800.000	1775.000	2400.000	1950.000	1950.000
50th	2300.000	2300.000	2950.000	2200.000	2200.000
75th	2800.000	2725.000	3500.000	2900.000	2700.000
80th	2900.000	2900.000	3500.000	2940.000	2840.000
90th	3100.000	3030.000	3500.000	3740.000	3000.000
95th	3350.000	3200.000	3500.000	4100.000	3000.000
98th	3730.000	3672.000	3500.000	4100.000	3000.000
99th	3995.000	3793.000	3500.000	4100.000	3000.000
Maximum value	4100.000	3800.000	3500.000	4100.000	3000.000

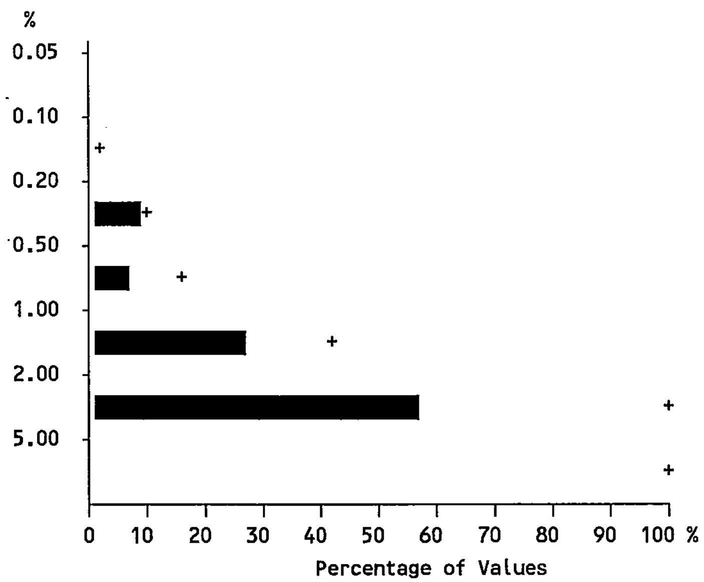


Zn

Aluminum (ICP-ES)

Number of values - 134

Determination limit - 0.01 %



N	%	Cum %
2	1.6	1.6
11	8.5	10.1
8	6.2	16.3
34	26.4	42.6
74	57.4	100.0

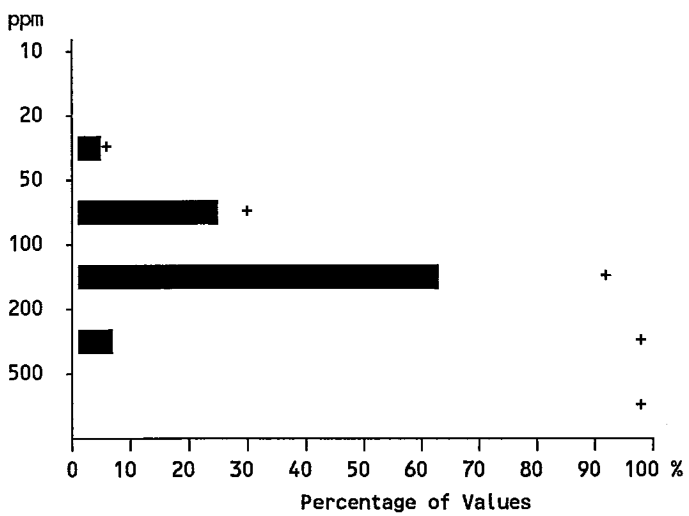
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	2.099	2.114	1.525	2.091	2.058
Standard deviation	1.017	0.989	1.648	1.077	1.300
Skewness	-0.014	-0.139	0.000	0.101	0.697
Kurtosis	-0.434	-0.499	-2.750	-1.149	-0.319
Geometric Mean	1.739	1.761	0.984	1.774	1.641
Percentiles					
Minimum value	0.100	0.100	0.360	0.430	0.300
25th	1.400	1.480	0.360	1.083	1.140
50th	2.130	2.140	1.525	2.020	2.015
75th	2.810	2.830	2.690	2.885	2.488
80th	2.900	2.908	2.690	3.062	3.000
90th	3.250	3.334	2.690	3.507	4.720
95th	3.850	3.818	2.690	4.200	4.720
98th	4.288	4.175	2.690	4.200	4.720
99th	4.630	4.411	2.690	4.200	4.720
Maximum value	4.720	4.420	2.690	4.200	4.720

Al

Boron (ICP-ES)

Number of values - 134

Determination limit - 2 ppm



N	%	Cum %
9	7.0	7.0
31	24.0	31.0
81	62.8	93.8
8	6.2	100.0

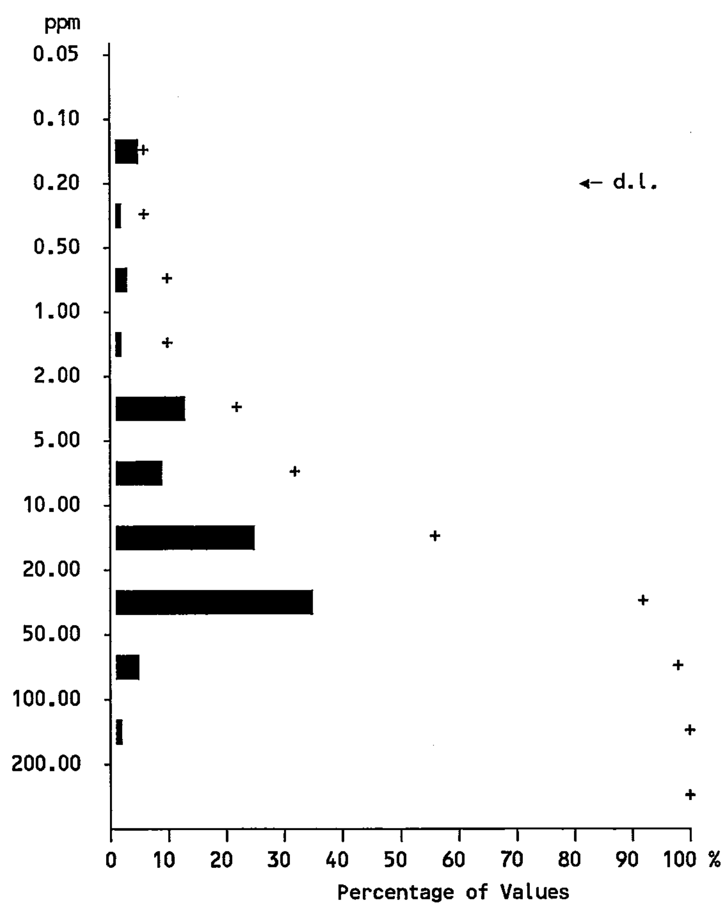
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	125.062	121.515	143.500	124.500	167.250
Standard deviation	55.217	55.550	54.447	34.800	73.829
Skewness	1.105	1.332	0.000	0.586	-0.664
Kurtosis	3.824	4.988	-2.750	-0.720	-0.801
Geometric Mean	112.587	109.111	138.239	120.194	140.541
Percentiles					
Minimum value	23.000	26.000	105.000	75.000	23.000
25th	88.500	84.000	105.000	98.500	122.000
50th	120.000	119.000	143.500	113.000	192.000
75th	158.500	151.000	182.000	154.750	219.250
80th	165.000	162.600	182.000	159.200	234.000
90th	193.000	189.000	182.000	176.400	258.000
95th	211.500	208.400	182.000	203.000	258.000
98th	263.200	266.520	182.000	203.000	258.000
99th	363.400	397.720	182.000	203.000	258.000
Maximum value	403.000	403.000	182.000	203.000	258.000

B

Cadmium (ICP-ES)

Number of values - 134

Determination limit - 0.2 ppm



N	%	Cum %
8	6.2	6.2
1	0.8	7.0
4	3.1	10.1
1	0.8	10.9
16	12.4	23.3
12	9.3	32.6
32	24.8	57.4
46	35.7	93.0
7	5.4	98.4
2	1.6	100.0

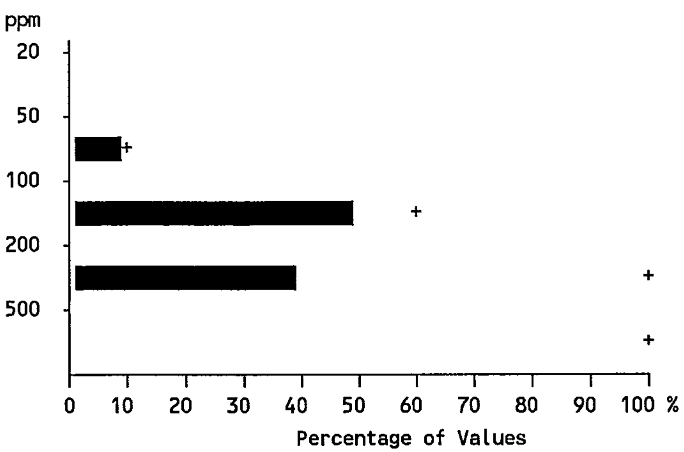
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	8	7	0	1	0
Number of missing values	5	3	0	2	0
Mean	21.478	19.858	15.000	32.231	22.438
Standard deviation	22.319	22.185	9.617	24.482	17.980
Skewness	2.636	3.005	0.000	1.352	0.303
Kurtosis	11.365	14.364	-2.750	1.565	-1.557
Geometric Mean	10.423	9.286	13.370	19.164	12.820
Percentiles					
Minimum value	0.100	0.100	8.200	0.100	0.800
25th	5.550	4.800	8.200	19.100	5.775
50th	15.600	13.800	15.000	27.800	19.200
75th	28.850	27.600	21.800	37.075	41.100
80th	32.400	30.060	21.800	38.840	46.400
90th	45.100	43.320	21.800	81.330	49.600
95th	67.950	64.500	21.800	100.300	49.600
98th	87.700	78.596	21.800	100.300	49.600
99th	142.650	157.540	21.800	100.300	49.600
Maximum value	160.800	160.800	21.800	100.300	49.600

Cd

Copper (ICP-ES)

Number of values - 134

Determination limit - 1 ppm



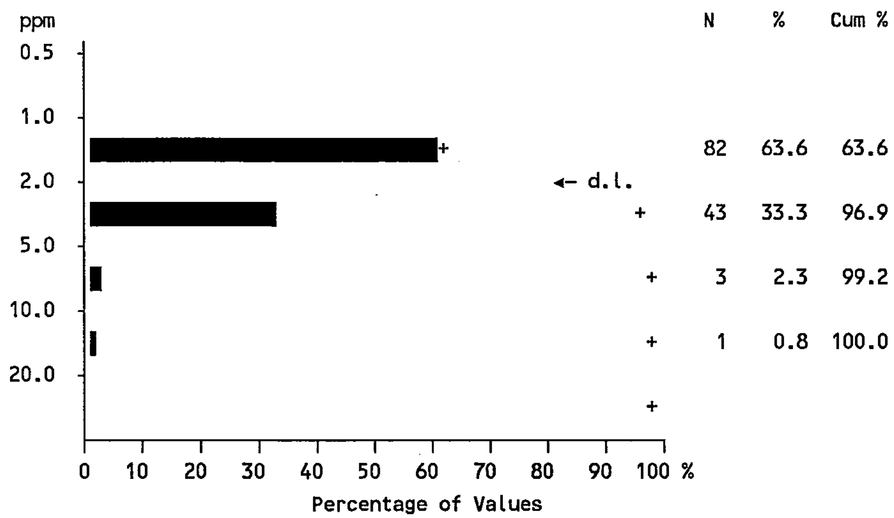
N	%	Cum %
14	10.9	10.9
64	49.6	60.5
51	39.5	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	185.605	186.641	136.000	211.813	132.250
Standard deviation	74.976	75.608	15.556	69.104	60.698
Skewness	0.493	0.505	0.000	0.376	0.153
Kurtosis	-0.366	-0.362	-2.750	-1.159	-1.918
Geometric Mean	170.347	171.336	135.554	201.414	119.745
Percentiles					
Minimum value	66.000	66.000	125.000	117.000	67.000
25th	125.500	125.000	125.000	151.000	73.250
50th	174.000	174.000	136.000	199.500	128.000
75th	233.500	236.000	147.000	274.250	187.500
80th	258.000	258.200	147.000	278.800	197.600
90th	292.000	296.800	147.000	329.500	220.000
95th	325.500	322.800	147.000	340.000	220.000
98th	363.000	370.800	147.000	340.000	220.000
99th	397.900	407.520	147.000	340.000	220.000
Maximum value	409.000	409.000	147.000	340.000	220.000

Lithium (ICP-ES)

Number of values - 134

Determination limit - 2 ppm



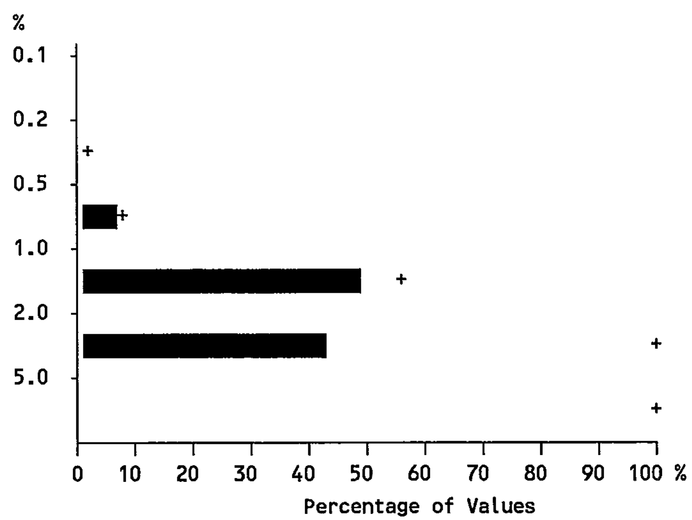
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	82	66	2	8	6
Number of missing values	5	3	0	2	0
Mean	1.752	1.757	1.000	1.938	1.500
Standard deviation	1.381	1.438	0.000	1.237	1.069
Skewness	2.937	3.069	-	1.101	1.535
Kurtosis	11.608	12.117	-	0.068	0.780
Geometric Mean	1.455	1.451	1.000	1.645	1.297
Percentiles					
Minimum value	1.000	1.000	1.000	1.000	1.000
25th	1.000	1.000	1.000	1.000	1.000
50th	1.000	1.000	1.000	1.500	1.000
75th	2.000	2.000	1.000	2.750	1.750
80th	2.000	2.200	1.000	3.000	2.400
90th	3.000	3.000	1.000	4.300	4.000
95th	4.000	4.000	1.000	5.000	4.000
98th	6.800	7.840	1.000	5.000	4.000
99th	9.400	9.920	1.000	5.000	4.000
Maximum value	10.000	10.000	1.000	5.000	4.000

Li

Magnesium (ICP-ES)

Number of values - 134

Determination limit - 0.01 %



N	%	Cum %
1	0.8	0.8
11	8.5	9.3
62	48.1	57.4
55	42.6	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	1.932	1.933	1.100	2.277	1.434
Standard deviation	0.693	0.690	0.141	0.651	0.403
Skewness	0.291	0.208	0.000	0.378	0.398
Kurtosis	-0.514	-0.505	-2.750	-1.239	-0.971
Geometric Mean	1.800	1.799	1.095	2.191	1.385
Percentiles					
Minimum value	0.480	0.480	1.000	1.210	0.890
25th	1.375	1.380	1.000	1.785	1.093
50th	1.890	1.930	1.100	2.040	1.415
75th	2.435	2.450	1.200	2.853	1.665
80th	2.530	2.534	1.200	3.110	1.788
90th	2.880	2.872	1.200	3.298	2.180
95th	3.275	3.146	1.200	3.340	2.180
98th	3.414	3.471	1.200	3.340	2.180
99th	3.585	3.624	1.200	3.340	2.180
Maximum value	3.630	3.630	1.200	3.340	2.180

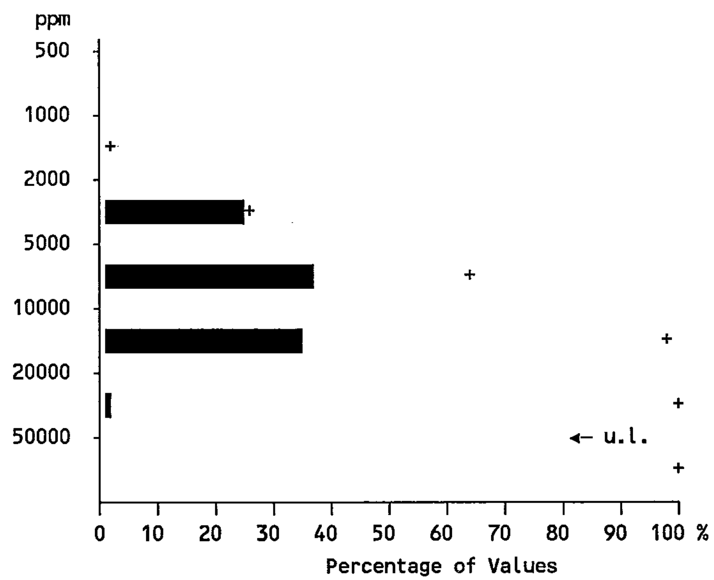
Mount Milligan, British Columbia: Lodgepole Pine Outer Bark
Statistics by Rock Type

Manganese (ICP-ES)

Number of values - 134

Determination limit - 1 ppm

Upper detection limit - 99999 ppm



N	%	Cum %
4	3.1	3.1
31	24.0	27.1
49	38.0	65.1
44	34.1	99.2
1	0.8	100.0

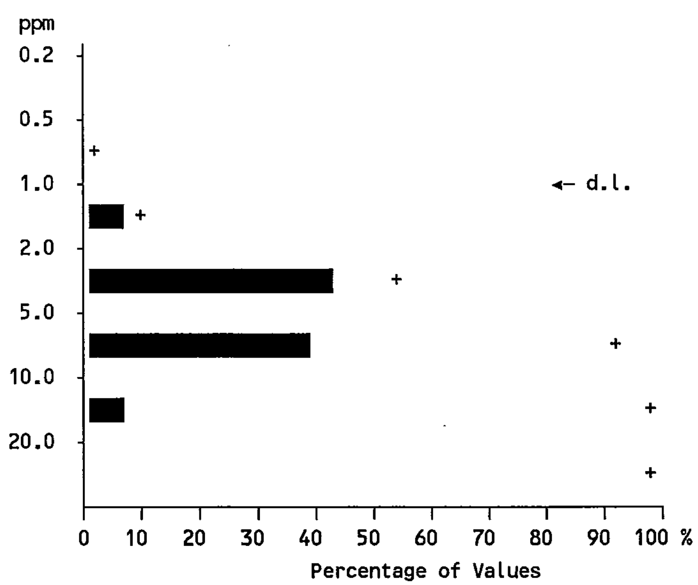
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	8668.078	8891.738	6293.500	6990.625	9737.000
Standard deviation	4682.188	4851.919	3789.385	2927.156	5229.856
Skewness	0.750	0.666	0.000	-0.025	0.626
Kurtosis	0.412	0.196	-2.750	-1.377	-0.983
Geometric Mean	7376.149	7505.178	5694.596	6322.552	8567.032
Percentiles					
Minimum value	1599.000	1599.000	3614.000	2246.000	3496.000
25th	4779.000	4786.000	3614.000	4437.500	5629.500
50th	8078.000	8222.000	6293.500	6908.000	8589.500
75th	11742.000	12855.000	8973.000	9756.500	13661.250
80th	12965.000	13317.600	8973.000	10170.800	15741.200
90th	14862.000	15320.000	8973.000	10987.900	19574.000
95th	17953.000	17971.000	8973.000	11739.000	19574.000
98th	19674.400	19710.360	8973.000	11739.000	19574.000
99th	24166.400	25778.920	8973.000	11739.000	19574.000
Maximum value	26027.000	26027.000	8973.000	11739.000	19574.000

Mn

Molybdenum (ICP-ES)

Number of values - 134

Determination limit - 1 ppm



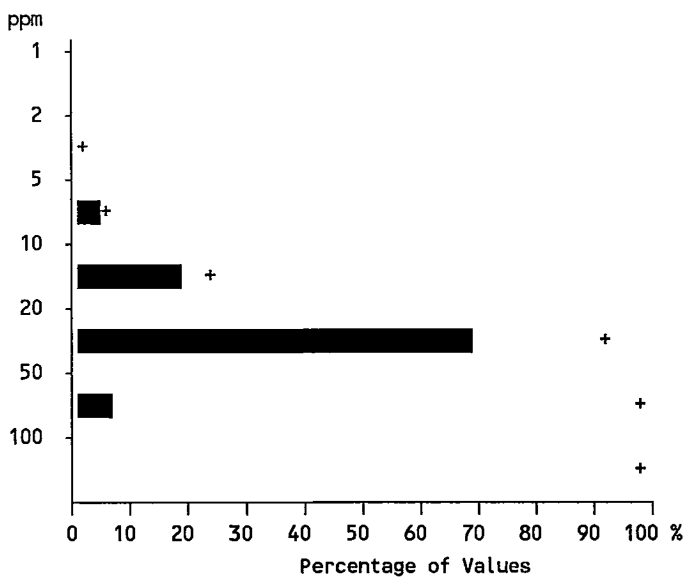
N	%	Cum %
5	3.9	3.9
10	7.8	11.6
55	42.6	54.3
51	39.5	93.8
8	6.2	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	5	2	0	0	3
Number of missing values	5	3	0	2	0
Mean	4.709	4.718	4.000	5.875	2.438
Standard deviation	2.973	2.934	1.414	3.052	2.597
Skewness	0.663	0.702	0.000	0.335	1.079
Kurtosis	-0.321	-0.336	-2.750	-0.564	-0.225
Geometric Mean	3.690	3.785	3.873	4.912	1.488
Percentiles					
Minimum value	0.500	0.500	3.000	1.000	0.500
25th	2.000	2.000	3.000	4.000	0.500
50th	4.000	4.000	4.000	5.500	1.500
75th	7.000	7.000	5.000	7.750	3.750
80th	8.000	8.000	5.000	8.600	4.800
90th	9.000	9.000	5.000	11.300	8.000
95th	10.000	10.000	5.000	12.000	8.000
98th	11.400	11.000	5.000	12.000	8.000
99th	13.400	13.880	5.000	12.000	8.000
Maximum value	14.000	14.000	5.000	12.000	8.000

Nickel (ICP-ES)

Number of values - 134

Determination limit - 1 ppm



N	%	Cum %
1	0.8	0.8
8	6.2	7.0
24	18.6	25.6
88	68.2	93.8
8	6.2	100.0

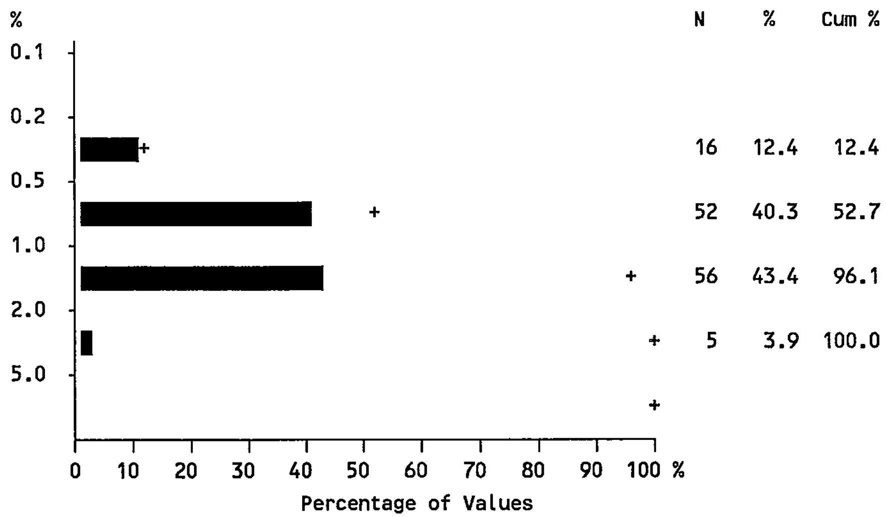
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	28.605	30.136	8.500	29.375	12.375
Standard deviation	13.656	13.824	3.536	7.518	7.070
Skewness	0.446	0.460	0.000	-0.441	0.335
Kurtosis	-0.144	-0.280	-2.750	-0.786	-1.501
Geometric Mean	24.947	26.734	8.124	28.320	10.518
Percentiles					
Minimum value	4.000	6.000	6.000	14.000	4.000
25th	19.000	20.000	6.000	25.000	5.750
50th	28.000	28.000	8.500	30.500	11.500
75th	36.500	40.000	11.000	35.500	18.750
80th	40.000	42.000	11.000	36.000	20.800
90th	47.000	48.000	11.000	40.000	24.000
95th	53.000	54.800	11.000	40.000	24.000
98th	63.800	64.840	11.000	40.000	24.000
99th	67.800	68.840	11.000	40.000	24.000
Maximum value	69.000	69.000	11.000	40.000	24.000

Ni

Phosphorus (ICP-ES)

Number of values - 134

Determination limit - 0.001 %

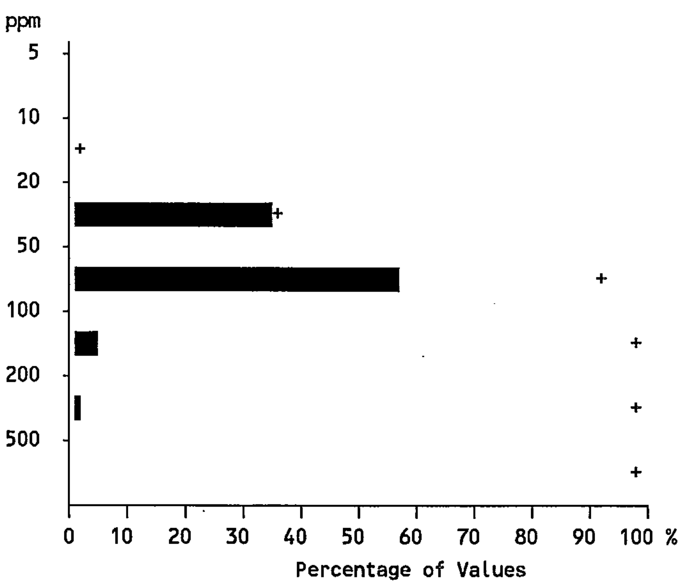


	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	1.064	1.057	0.600	1.412	0.565
Standard deviation	0.522	0.515	0.091	0.454	0.220
Skewness	0.545	0.562	0.000	0.264	0.145
Kurtosis	-0.666	-0.695	-2.750	-0.518	-1.860
Geometric Mean	0.935	0.933	0.596	1.341	0.527
Percentiles					
Minimum value	0.224	0.224	0.535	0.726	0.319
25th	0.642	0.640	0.535	1.129	0.338
50th	0.933	0.933	0.600	1.449	0.545
75th	1.497	1.490	0.664	1.626	0.802
80th	1.581	1.647	0.664	1.675	0.834
90th	1.805	1.813	0.664	2.196	0.860
95th	1.940	1.914	0.664	2.374	0.860
98th	2.291	2.235	0.664	2.374	0.860
99th	2.400	2.404	0.664	2.374	0.860
Maximum value	2.411	2.411	0.664	2.374	0.860

Lead (ICP-ES)

Number of values - 134

Determination limit - 3 ppm



N	%	Cum %
4	3.1	3.1
44	34.1	37.2
73	56.6	93.8
7	5.4	99.2
1	0.8	100.0

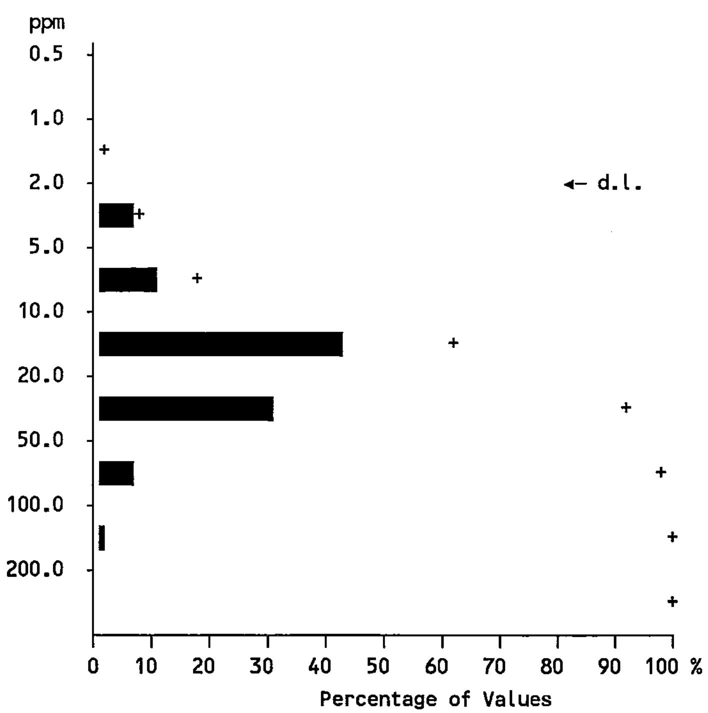
	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	0	0	0	0	0
Number of missing values	5	3	0	2	0
Mean	58.729	58.825	83.000	65.188	38.500
Standard deviation	29.182	28.419	65.054	17.803	42.292
Skewness	1.876	2.207	0.000	1.010	1.773
Kurtosis	6.799	9.189	-2.750	1.212	1.515
Geometric Mean	52.491	53.203	69.087	63.104	28.505
Percentiles					
Minimum value	11.000	13.000	37.000	37.000	11.000
25th	38.500	40.000	37.000	55.500	22.000
50th	55.000	54.000	83.000	62.500	25.000
75th	73.000	73.000	129.000	73.500	31.750
80th	76.000	76.200	129.000	75.600	54.800
90th	89.000	89.000	129.000	94.400	142.000
95th	108.500	101.600	129.000	114.000	142.000
98th	153.600	166.120	129.000	114.000	142.000
99th	202.500	214.200	129.000	114.000	142.000
Maximum value	216.000	216.000	129.000	114.000	142.000

Pb

Vanadium (ICP-ES)

Number of values - 134

Determination limit - 2 ppm



N	%	Cum %
1	0.8	0.8
11	8.5	9.3
13	10.1	19.4
55	42.6	62.0
39	30.2	92.2
9	7.0	99.2
1	0.8	100.0

	All units	uTrWL	uTrRC	KTWC	KTs
Number of values	134	106	2	18	8
Number of values below d.l.	1	1	0	0	0
Number of missing values	5	3	0	2	0
Mean	20.868	21.350	5.500	23.438	13.375
Standard deviation	17.729	17.910	0.707	13.496	23.077
Skewness	2.233	2.358	0.000	1.497	1.795
Kurtosis	6.239	6.957	-2.750	1.385	1.554
Geometric Mean	15.459	16.140	5.477	20.793	6.355
Percentiles					
Minimum value	1.000	1.000	5.000	11.000	2.000
25th	11.000	11.000	5.000	14.250	3.000
50th	16.000	16.000	5.500	19.500	5.000
75th	22.000	22.000	6.000	29.250	10.250
80th	26.000	26.600	6.000	31.600	22.800
90th	44.000	43.600	6.000	50.500	70.000
95th	63.000	62.800	6.000	61.000	70.000
98th	78.200	87.560	6.000	61.000	70.000
99th	104.400	110.120	6.000	61.000	70.000
Maximum value	111.000	111.000	6.000	61.000	70.000

V

Reproduce this sheet as a transparency

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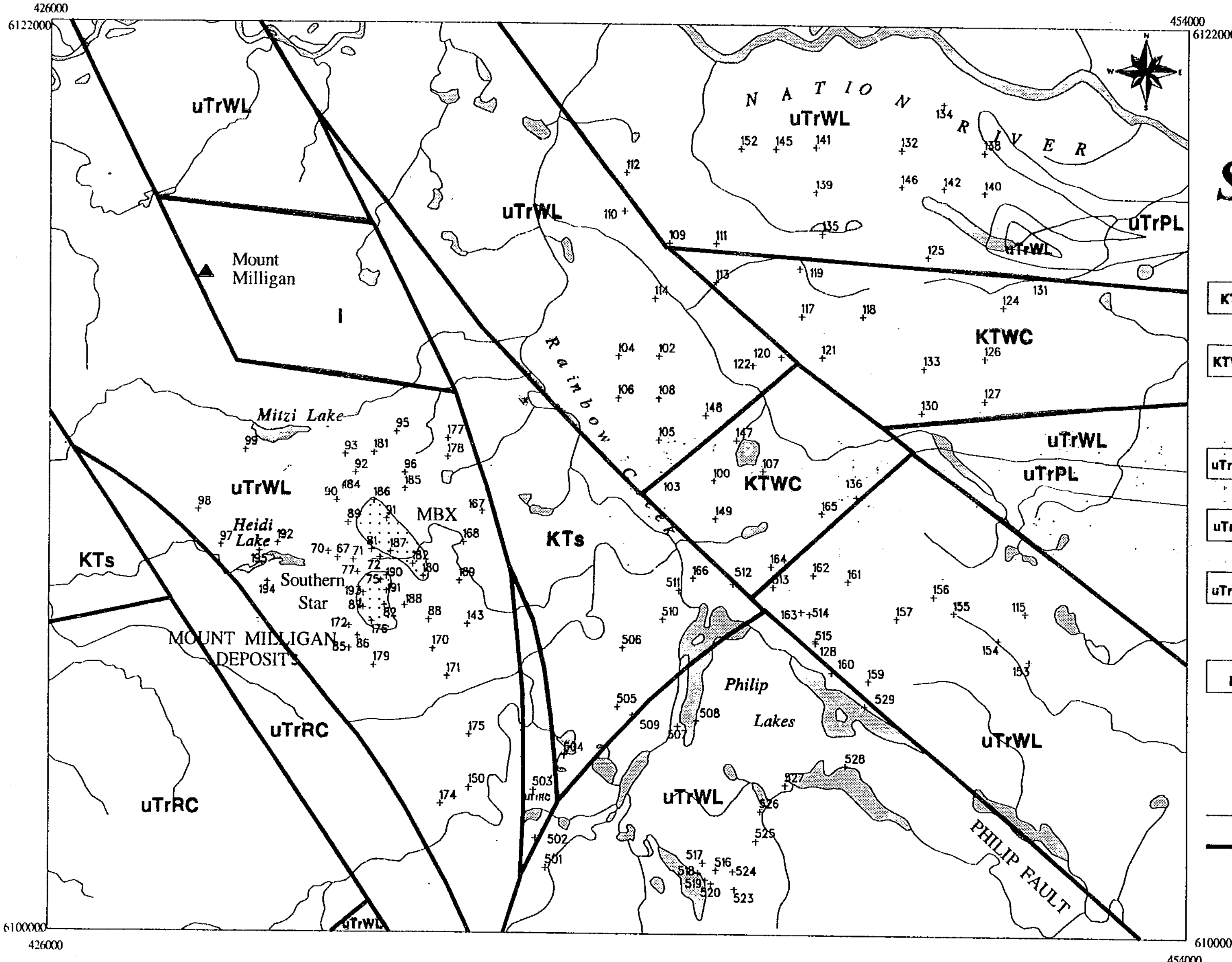
Geology and Sample Sites



CRETACEOUS-TERTIARY

KTs	Eocene-Oligocene sandstone, mudstone, coal and basalt
KTWC	Cretaceous-Tertiary Wolverine Complex

UPPER TRIASSIC (-JURASSIC?)

uTrWL	Witch Lake, Philip Lakes successions and correlatives
uTrPL	Philip Lakes succession limestone
uTrRC	Rainbow Creek succession

INTRUSIVES - EARLY JURASSIC

I	Equigranular coarse-grained granite and monzonite

Contact

Fault

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

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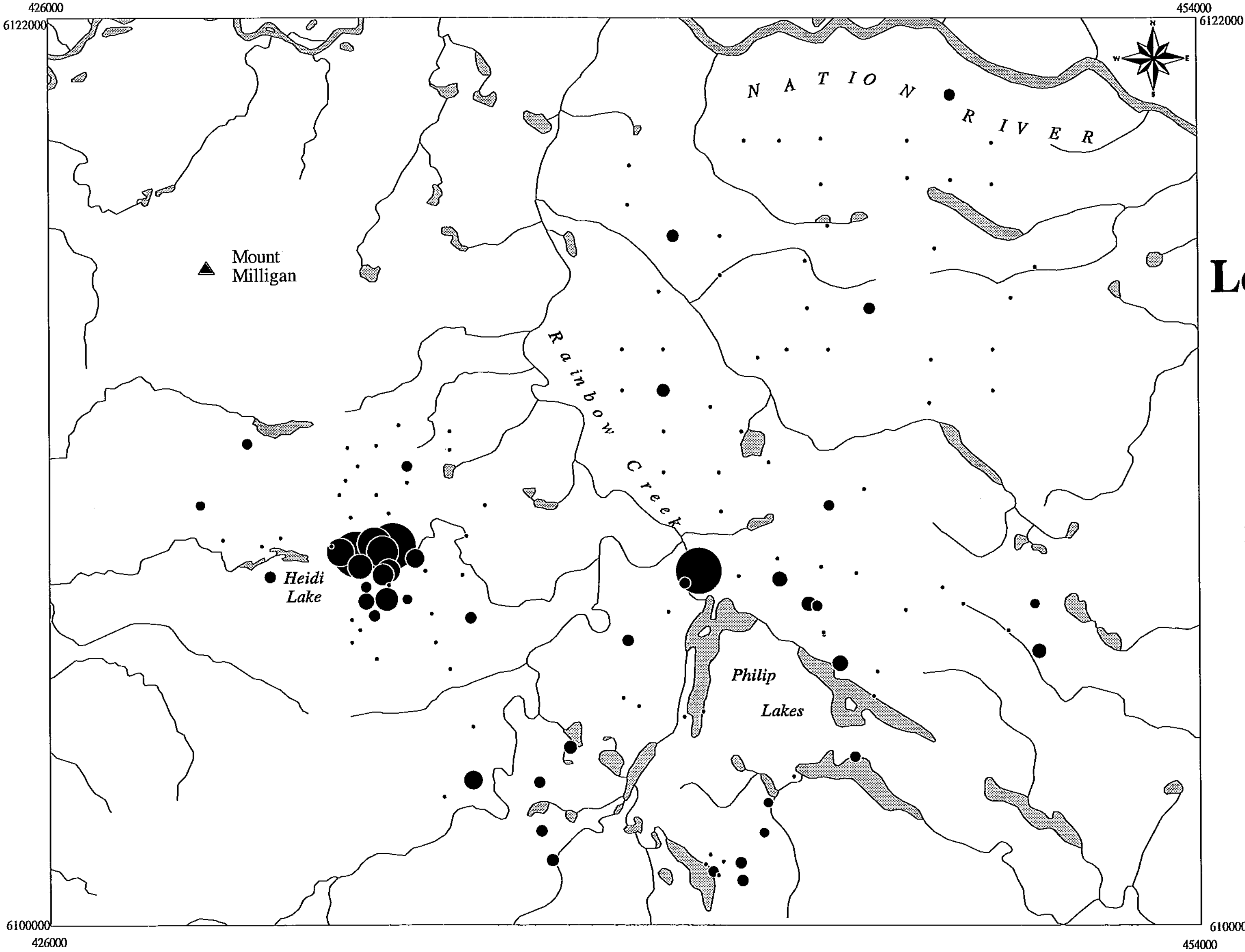
GOLD
in ash of
Lodgepole Pine Bark



INAA

ppb	Au	Percentile
185		Maximum
139		98
37		95
14		90
6		75
<5		50
<5		Minimum

134 Samples

Exponent = 0.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Au

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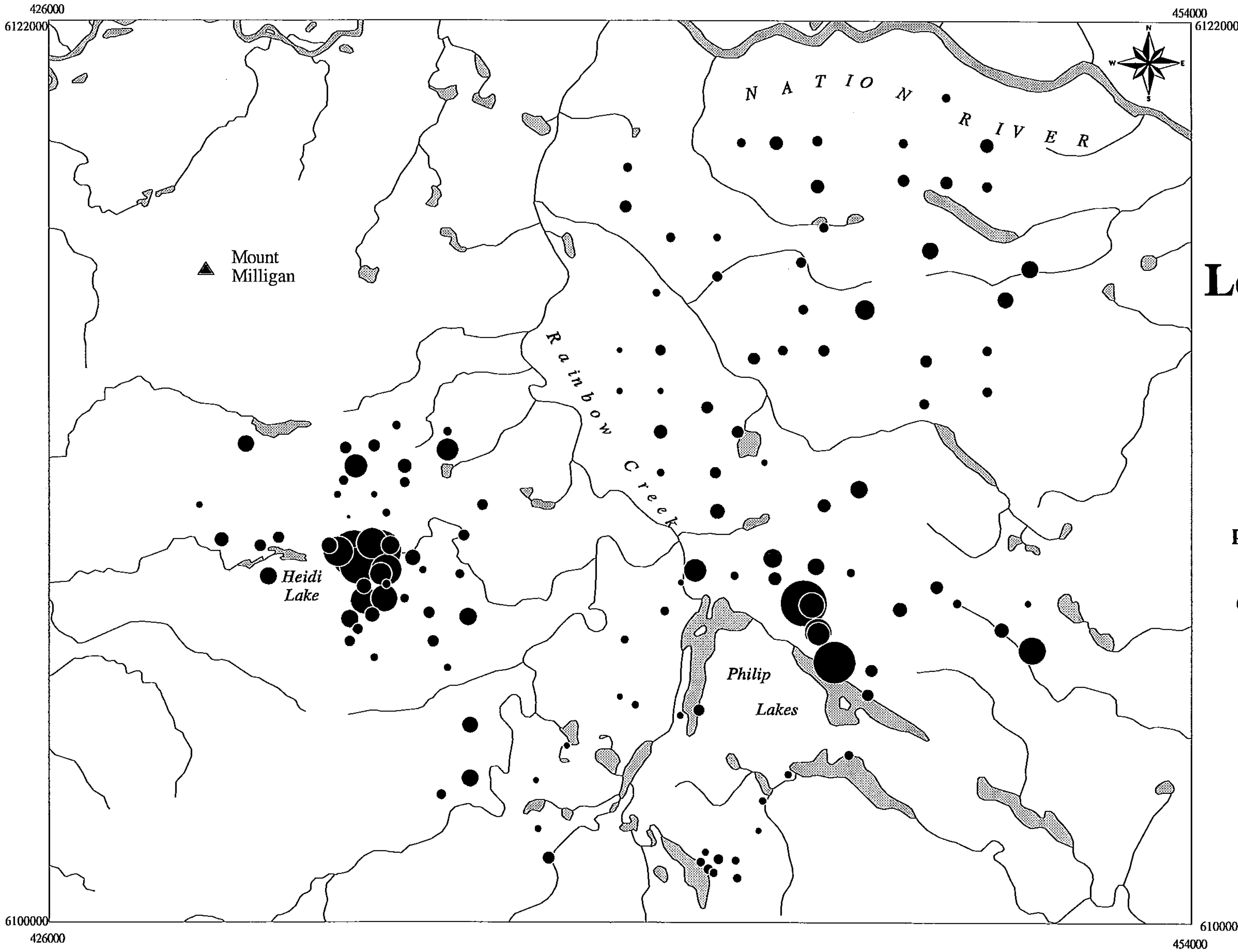
ARSENIC
in ash of
Lodgepole Pine Bark



INAA

ppm	As	Percentile
60.0		Maximum
15.5		98
10.0		95
7.8		90
4.8		75
3.3		50
0.7		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

As

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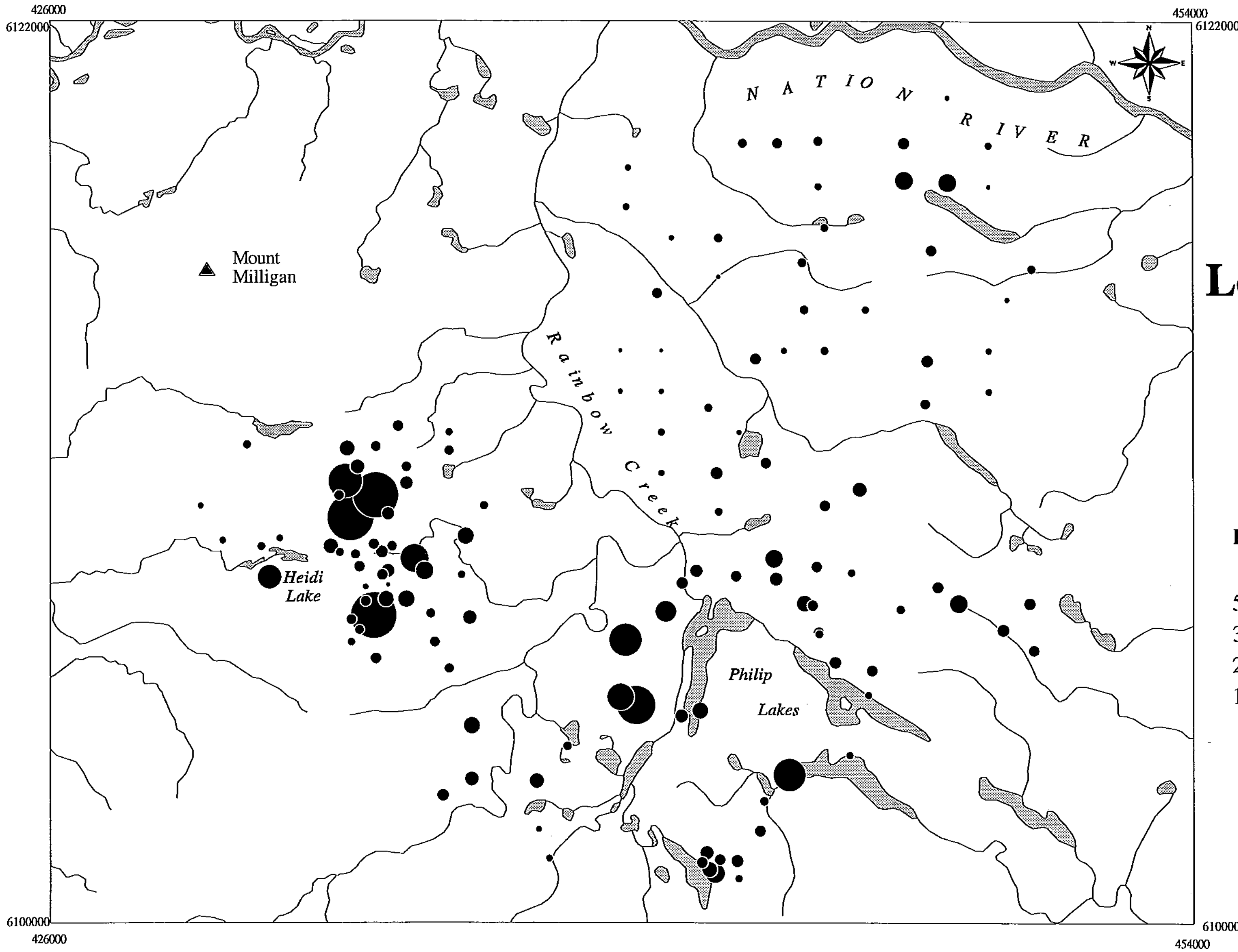

BARIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Ba	Percentile
5400		Maximum
3030		98
2100		95
1100		90
770		75
590		50
150		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Ba

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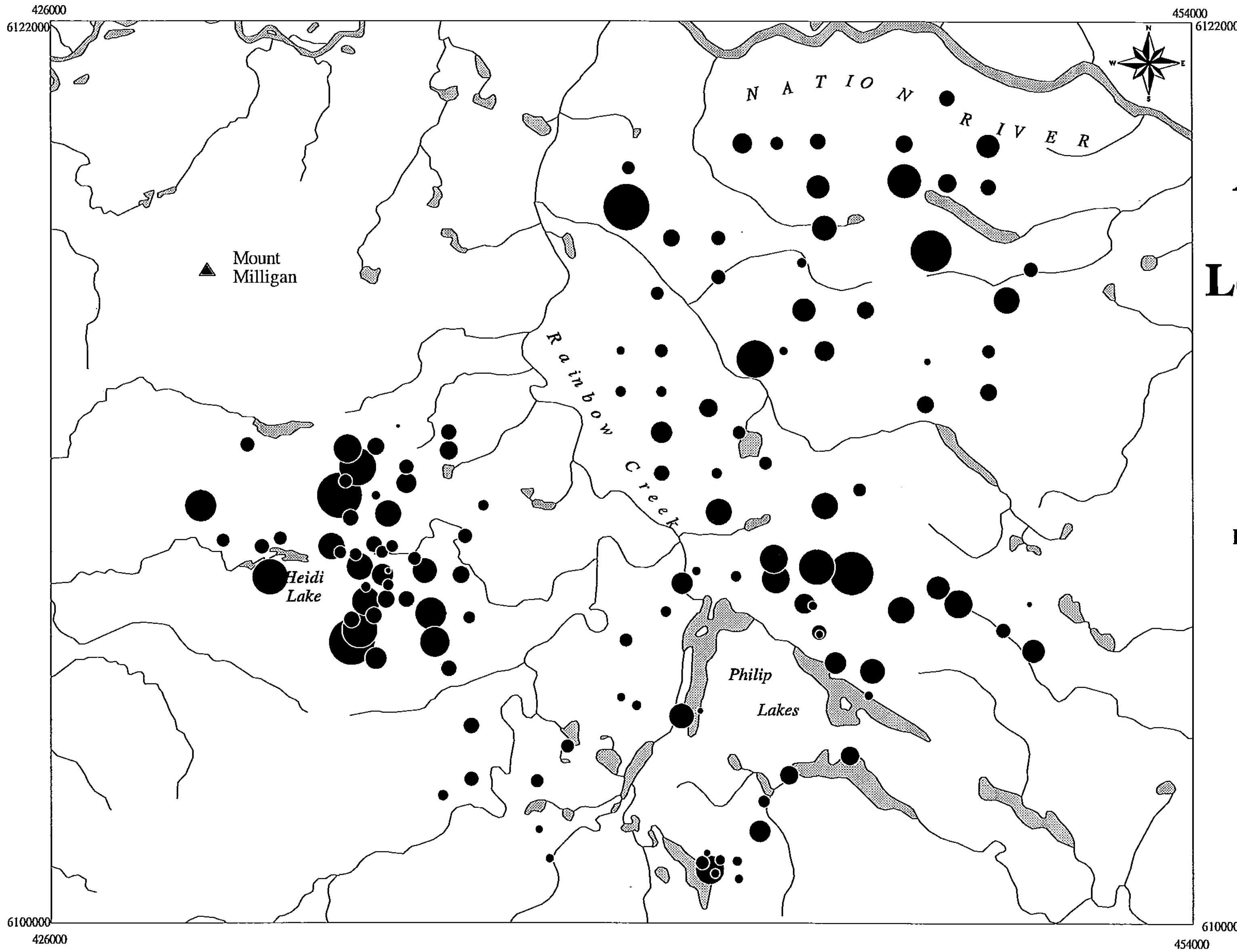

BROMINE

in ash of

Lodgepole Pine Bark

INAA

ppm	Br	Percentile
36		Maximum
35		98
31		95
28		90
23		75
18		50
5		Minimum

134 Samples

Exponent = 1.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Br

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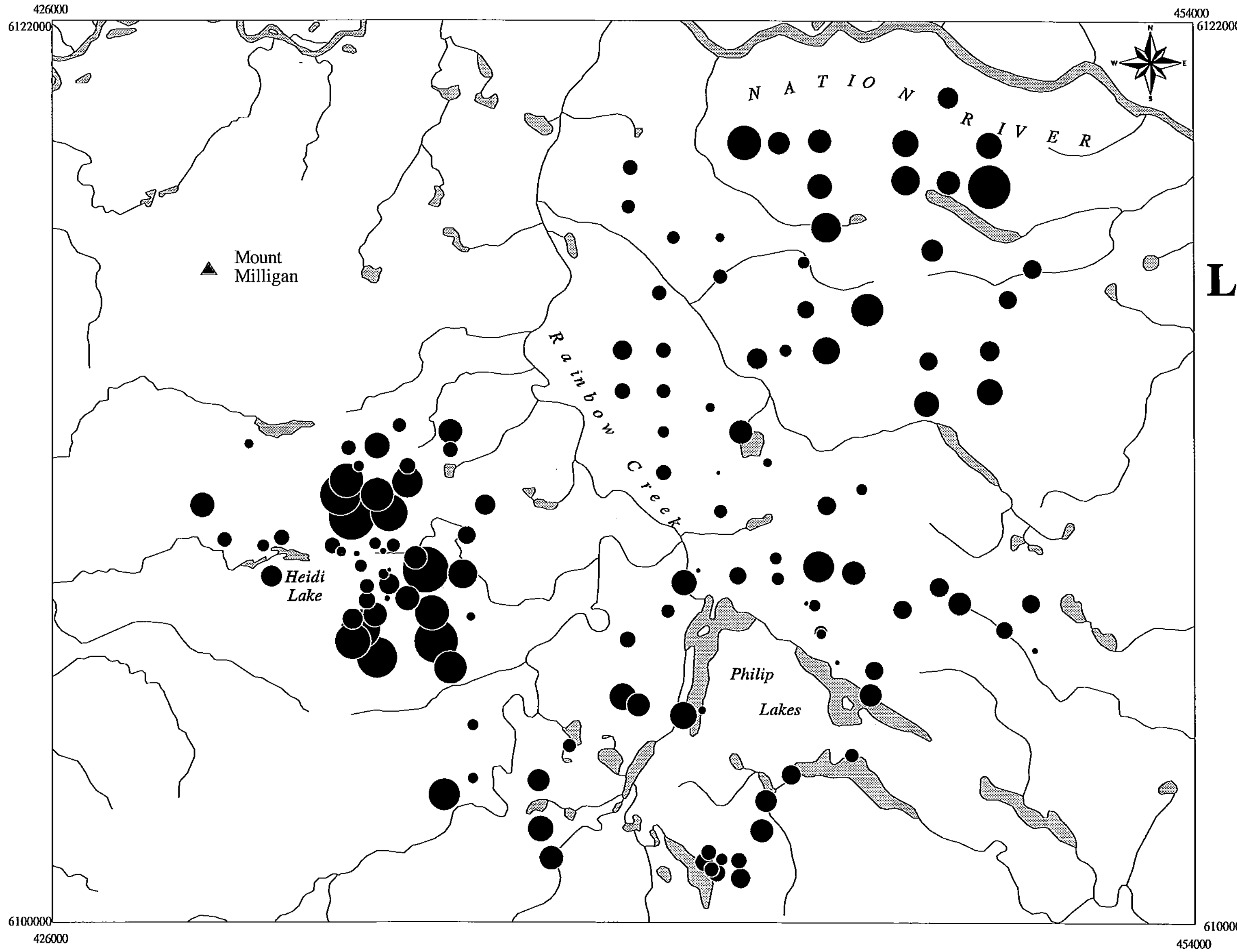

CALCIUM

in ash of

Lodgepole Pine Bark

INAA

pct	Ca	Percentile
41.6		Maximum
39.3		98
37.4		95
35.3		90
32.1		75
29.0		50
5.2		Minimum

134 Samples

Exponent = 3

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

BRITISH COLUMBIA

UTM Zone 10

Ca

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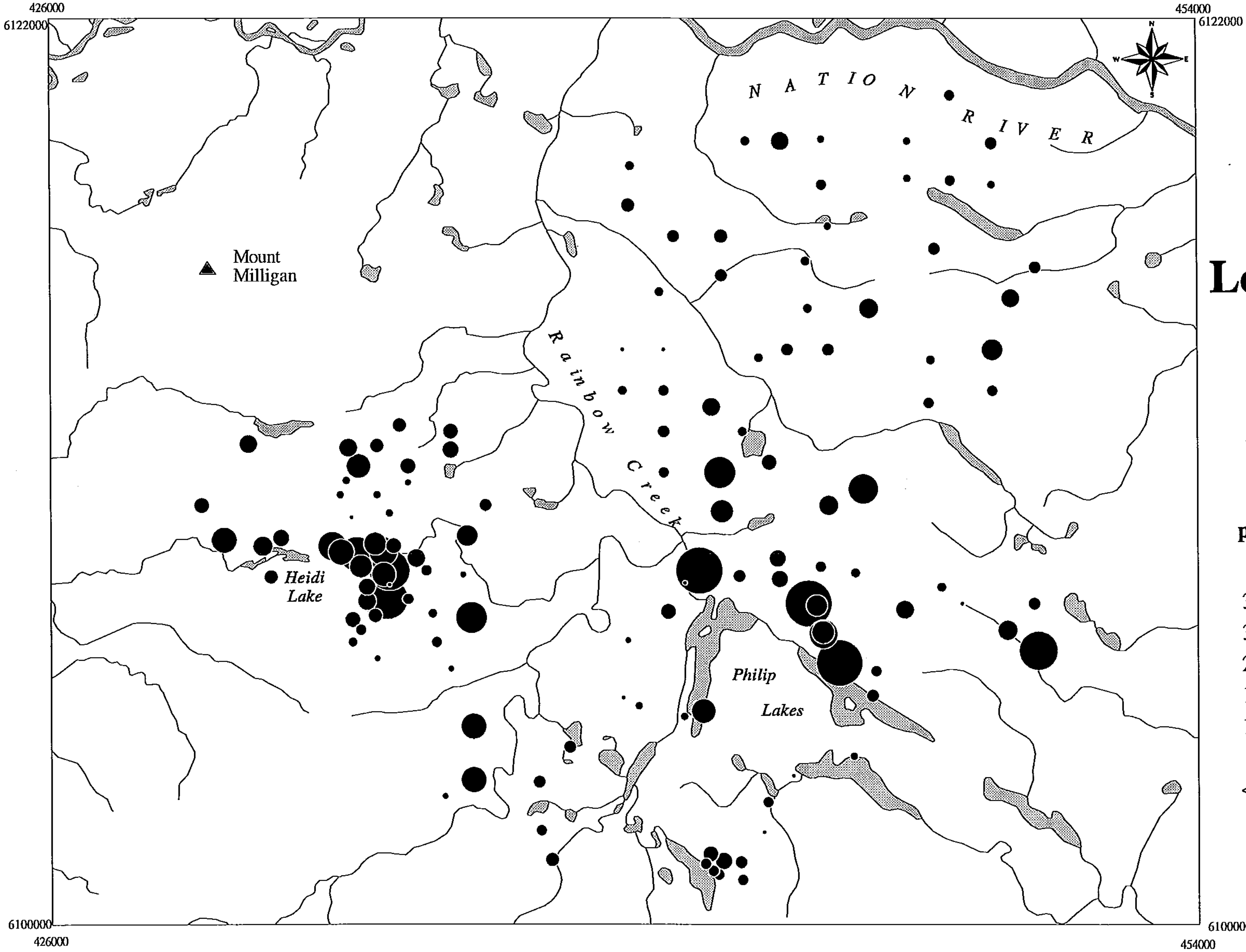

CERIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Ce	Percentile
35.0		Maximum
30.3		98
22.8		95
17.0		90
11.0		75
7.0		50
<3.0		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

BRITISH COLUMBIA

UTM Zone 10

Ce

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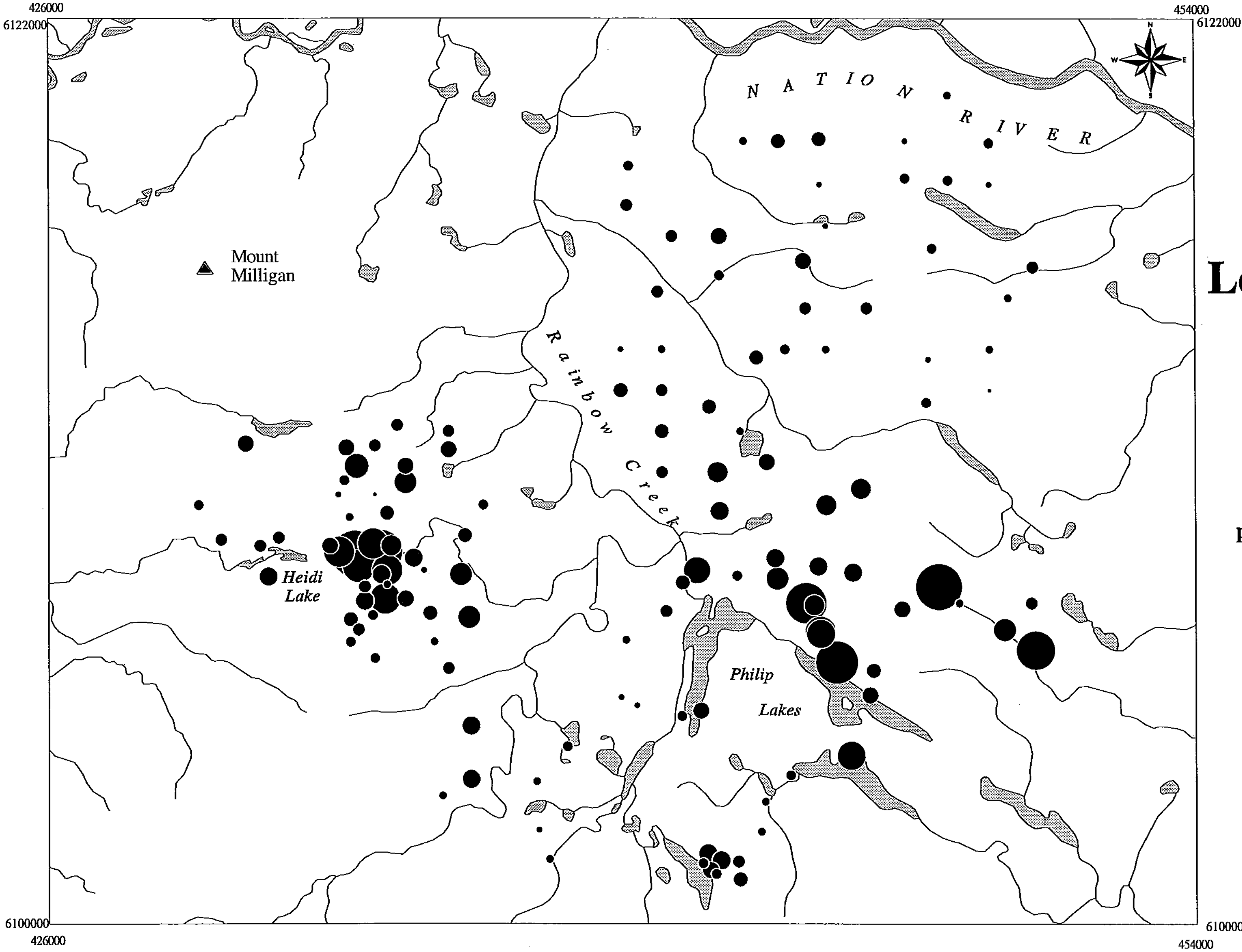
COBALT in ash of Lodgepole Pine Bark



INAA

ppm	Co	Percentile
28		Maximum
23		98
17		95
14		90
9		75
6		50
2		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Co

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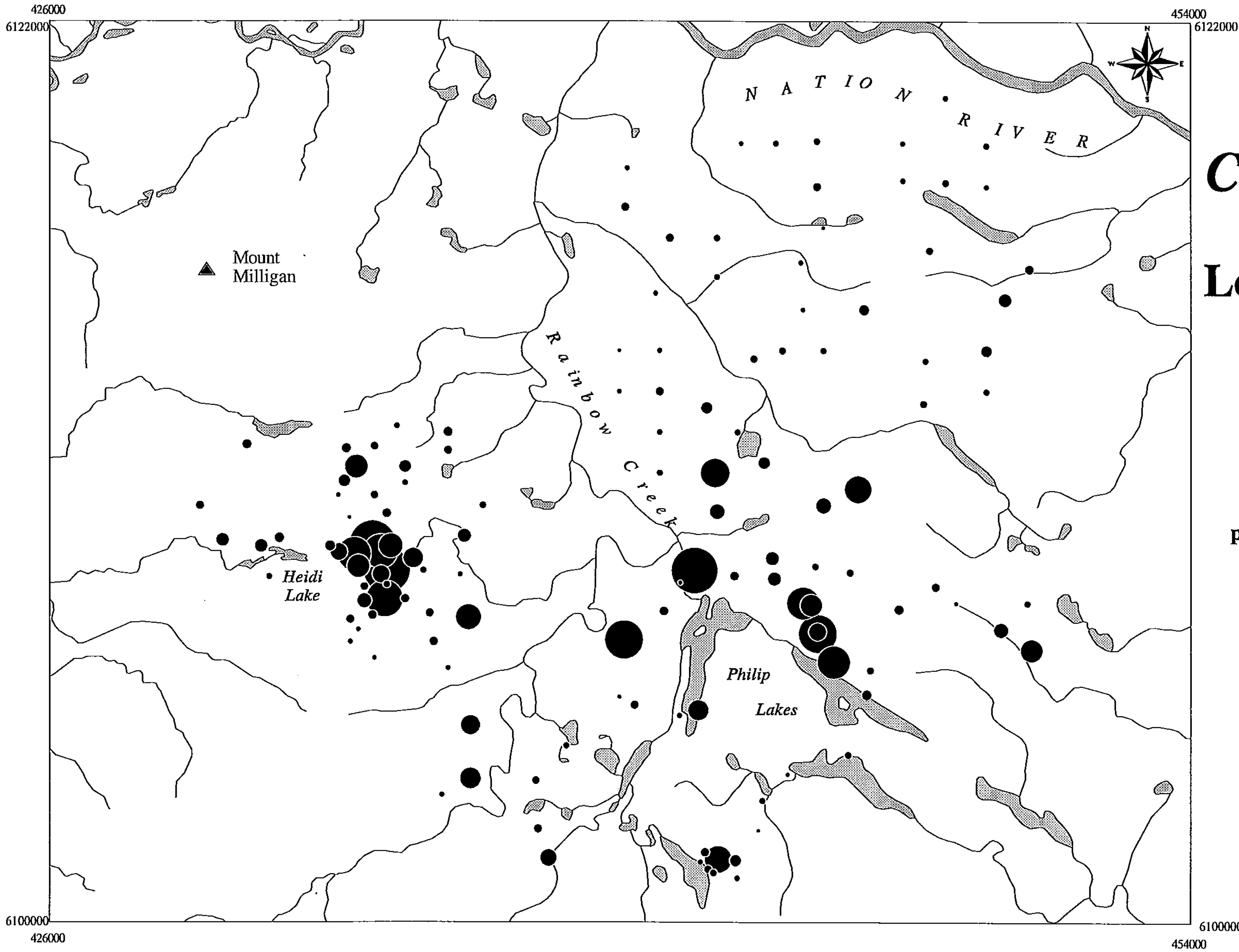

CHROMIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Cr	Percentile
99		Maximum
89		98
65		95
48		90
22		75
12		50
3		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Cr

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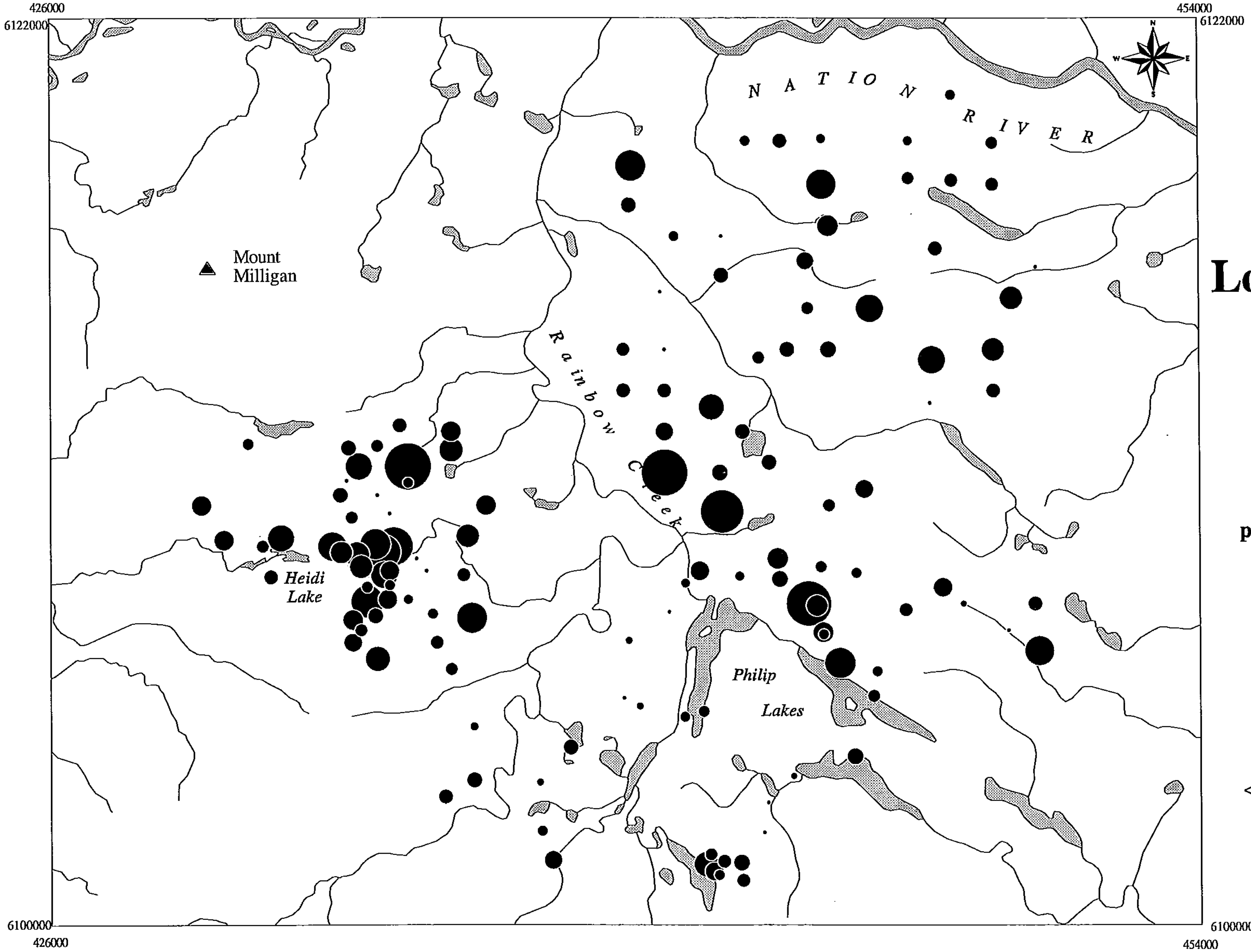

CESIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Cs	Percentile
7.1		Maximum
4.7		98
3.3		95
2.9		90
1.9		75
1.3		50
<0.5		Minimum

134 Samples
Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Cs

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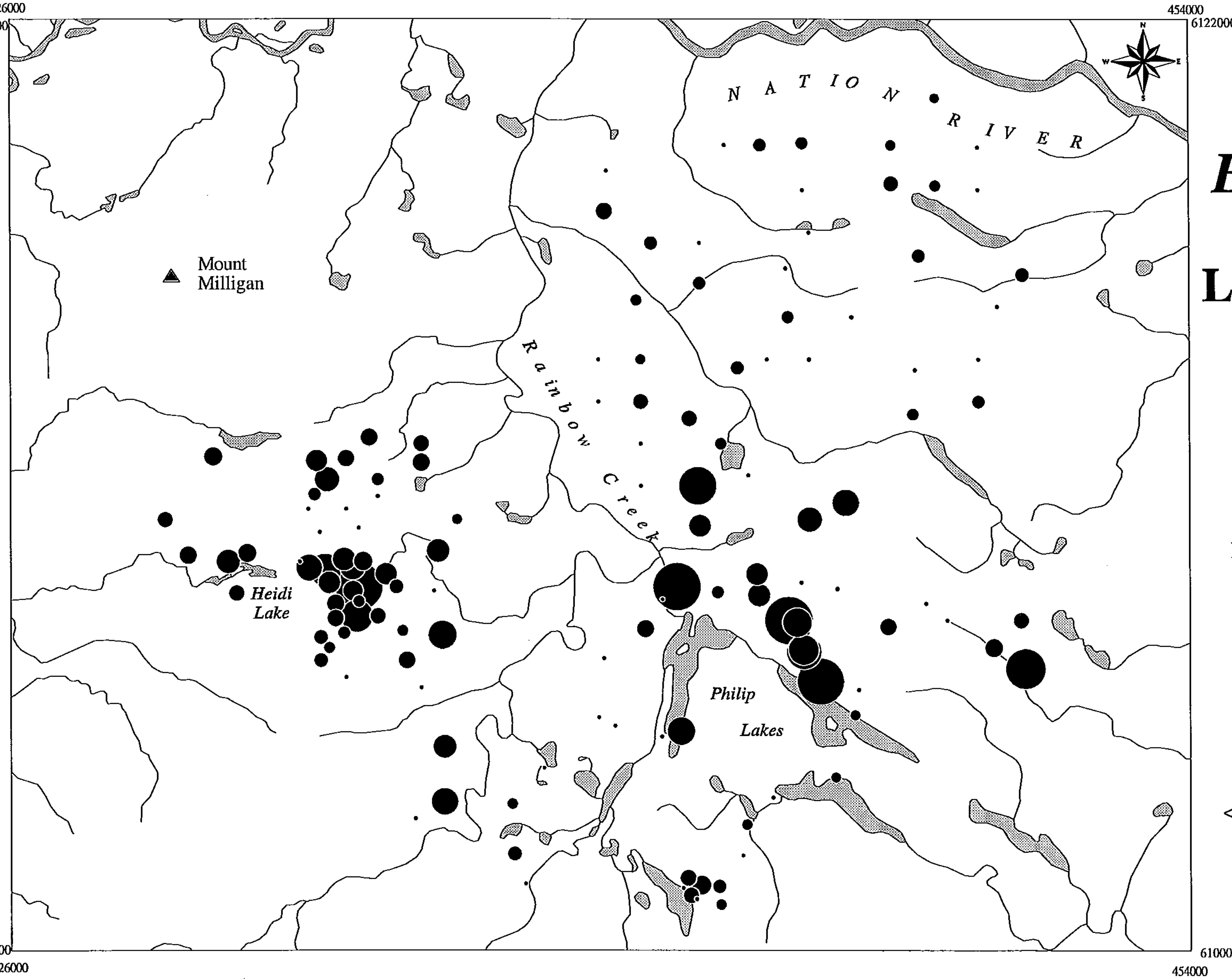

EUROPIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Eu	Percentile
1.00		Maximum
0.83		98
0.59		95
0.44		90
0.27		75
0.17		50
<0.01		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Eu

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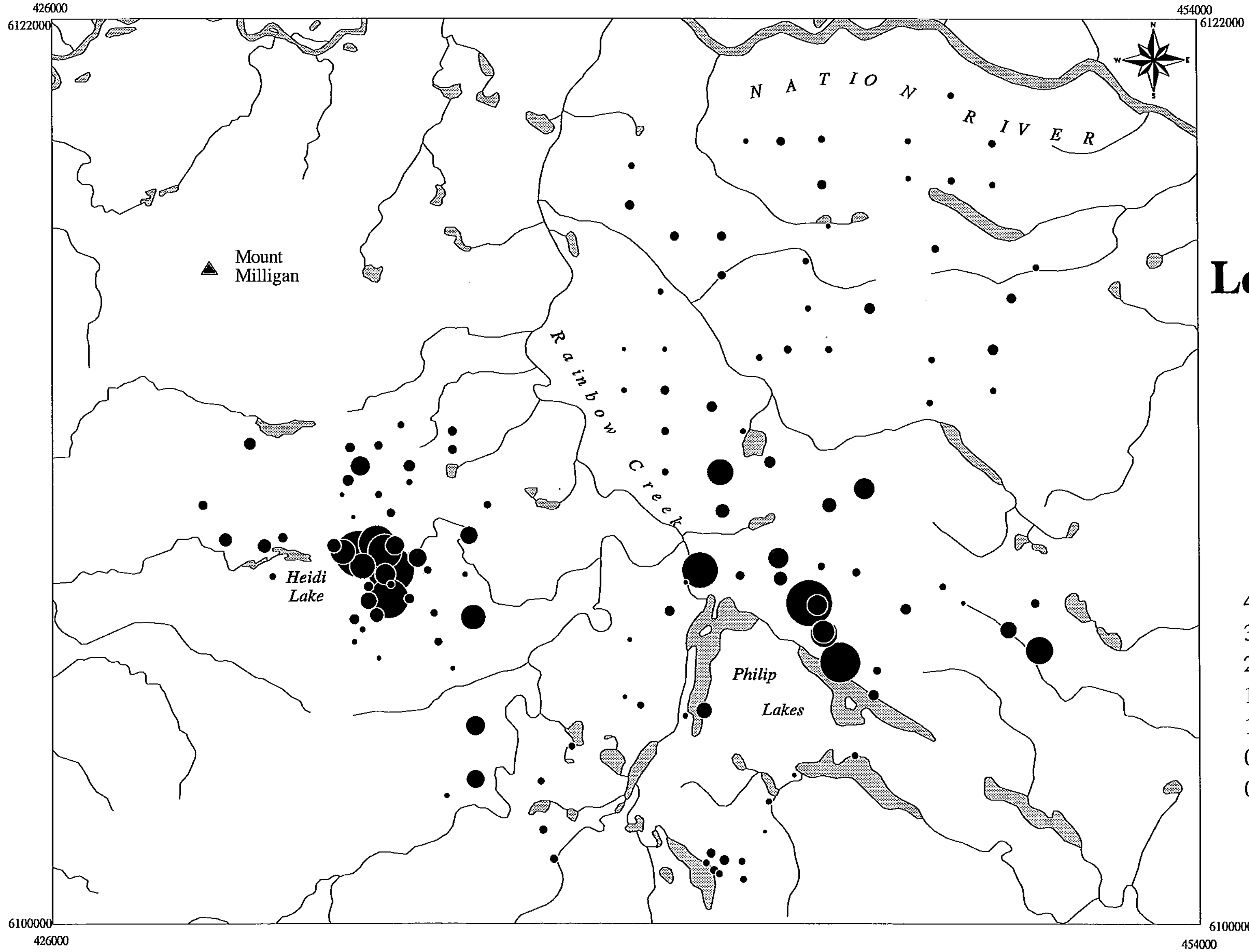

IRON
in ash of
Lodgepole Pine Bark

INAA

pct	Fe	Percentile
4.12		Maximum
3.87		98
2.97		95
1.97		90
1.00		75
0.54		50
0.14		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Fe

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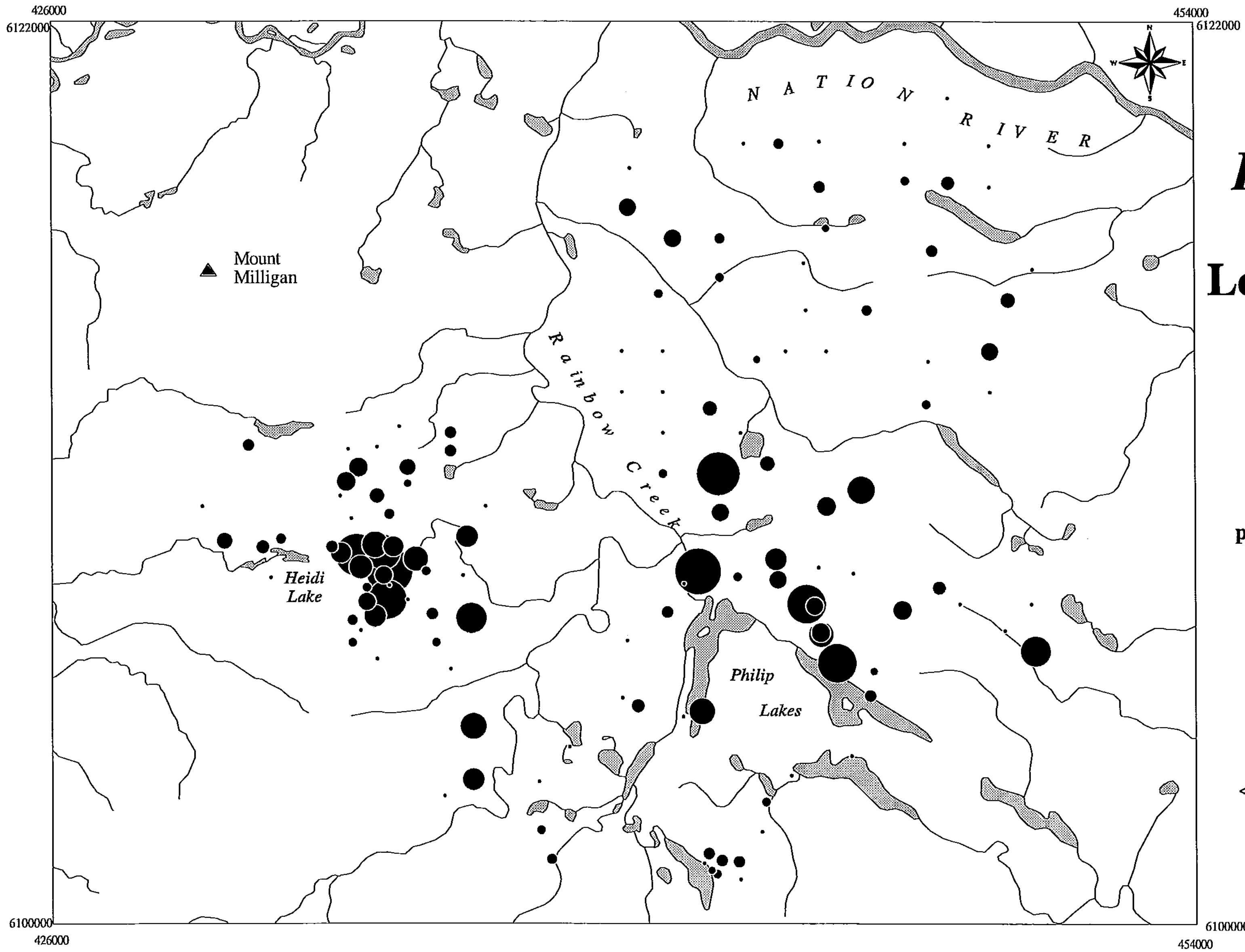

HAFNIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Hf	Percentile
3.9		Maximum
3.2		98
2.7		95
1.8		90
1.2		75
0.6		50
<0.5		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Hf

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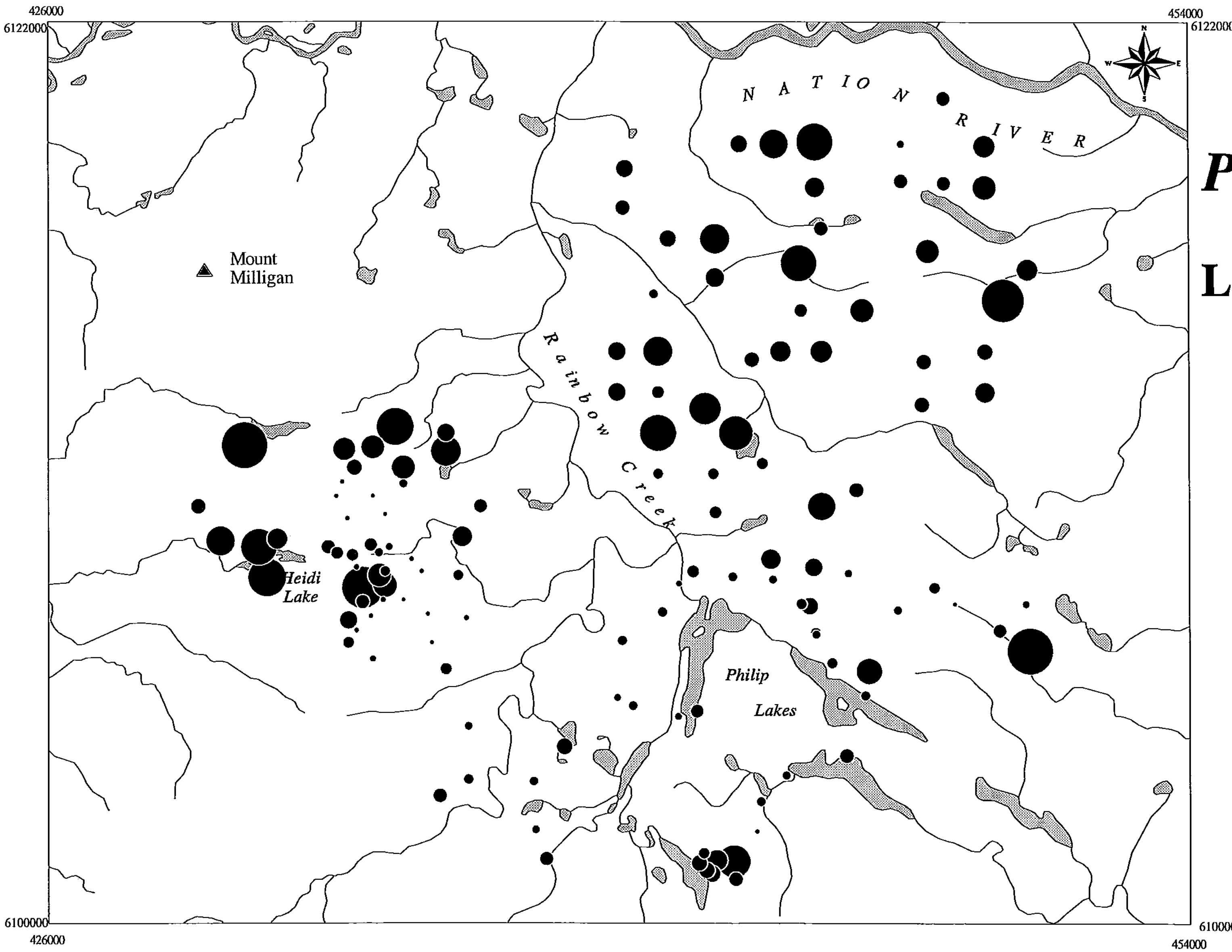

POTASSIUM

in ash of

Lodgepole Pine Bark

INAA

pct	K	Percentile
10.5		Maximum
8.0		98
7.1		95
6.5		90
5.2		75
4.2		50
0.7		Minimum

134 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

K

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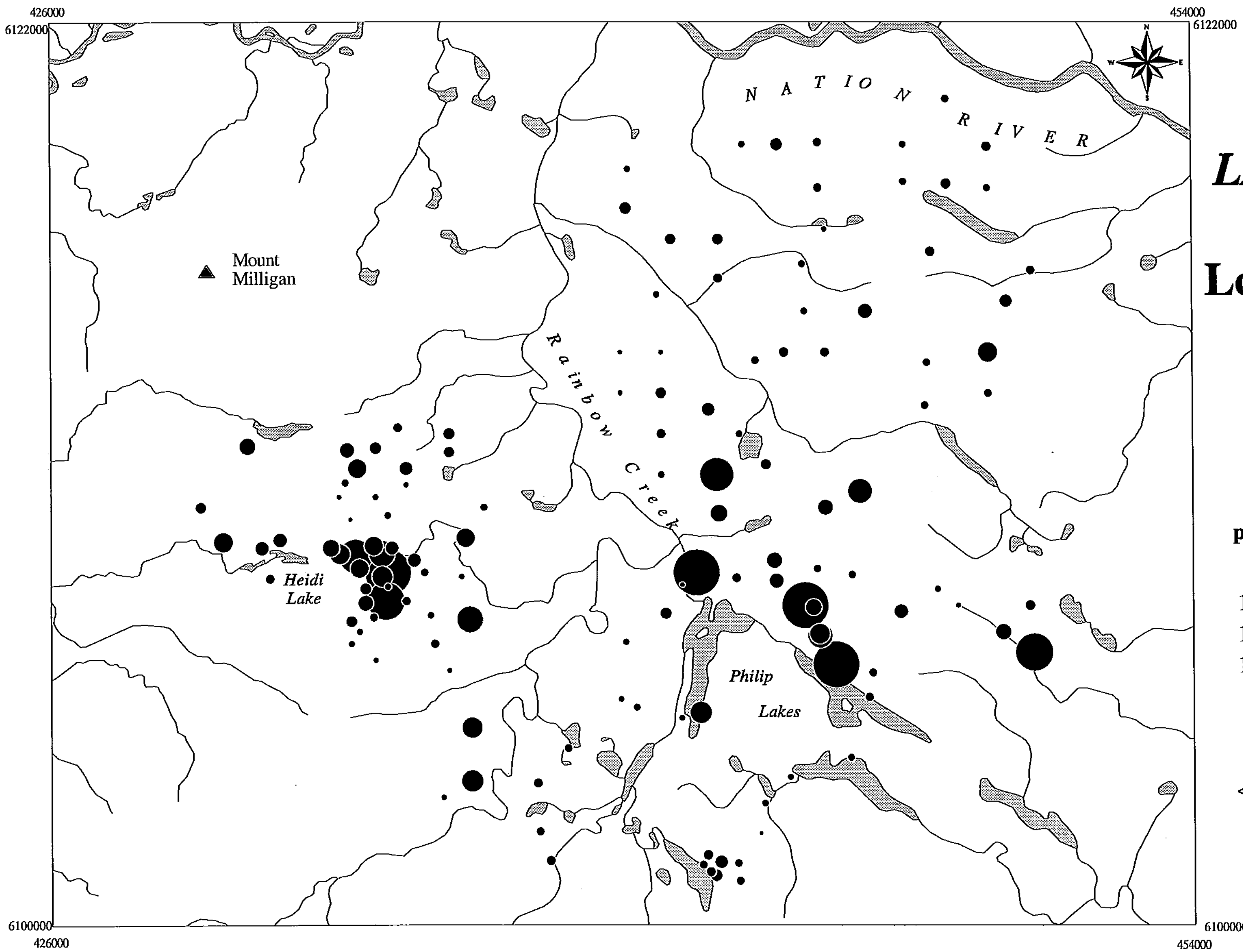
LANTHANUM

in ash of

Lodgepole Pine Bark



INAA

ppm	La	Percentile
17.0		Maximum
14.0		98
11.3		95
7.8		90
5.5		75
3.6		50
<0.1		Minimum

134 Samples

Exponent = 1.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

La

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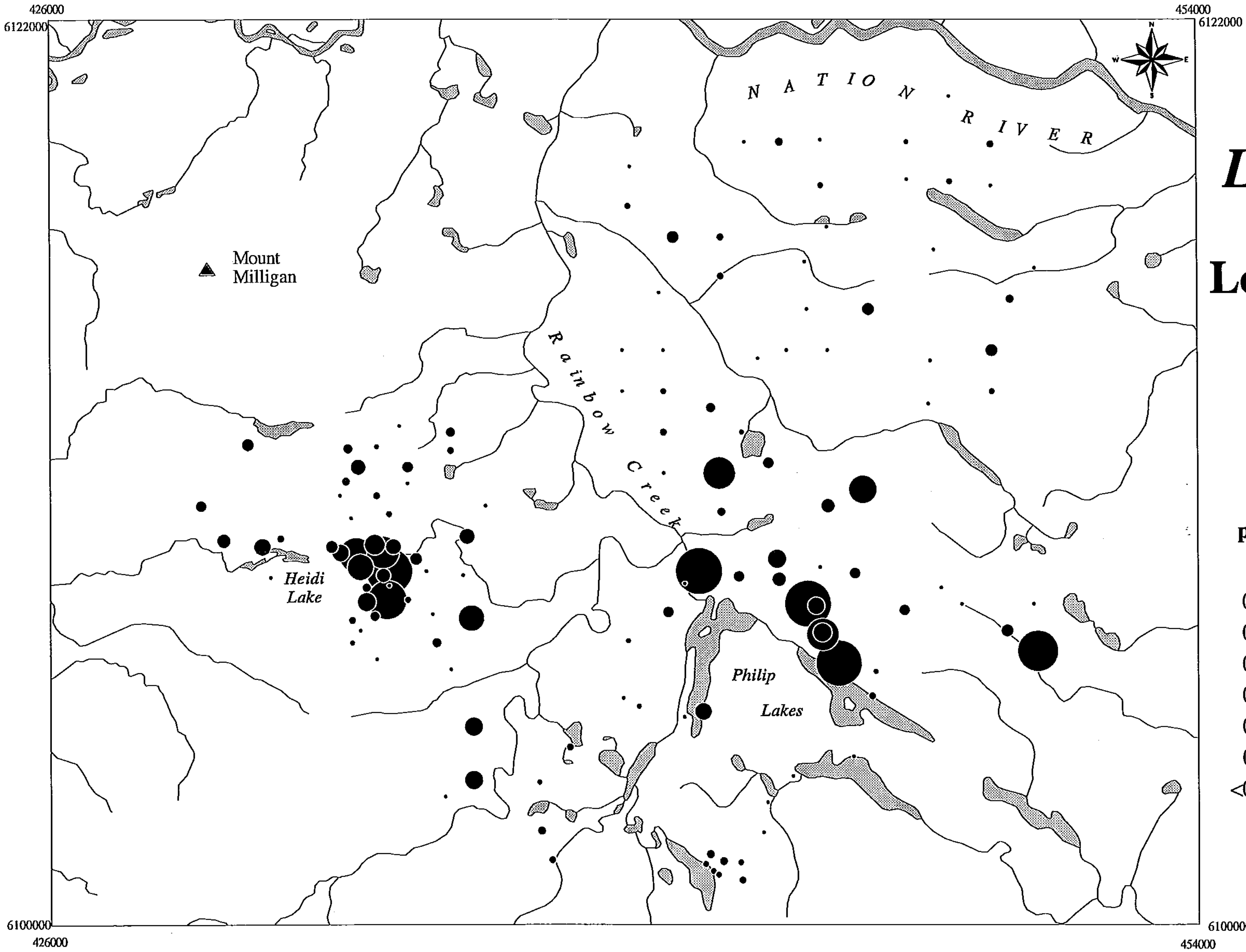

LUTETIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Lu	Percentile
0.37		Maximum
0.28		98
0.24		95
0.18		90
0.11		75
0.07		50
<0.05		Minimum

134 Samples

Exponent = 1.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Lu

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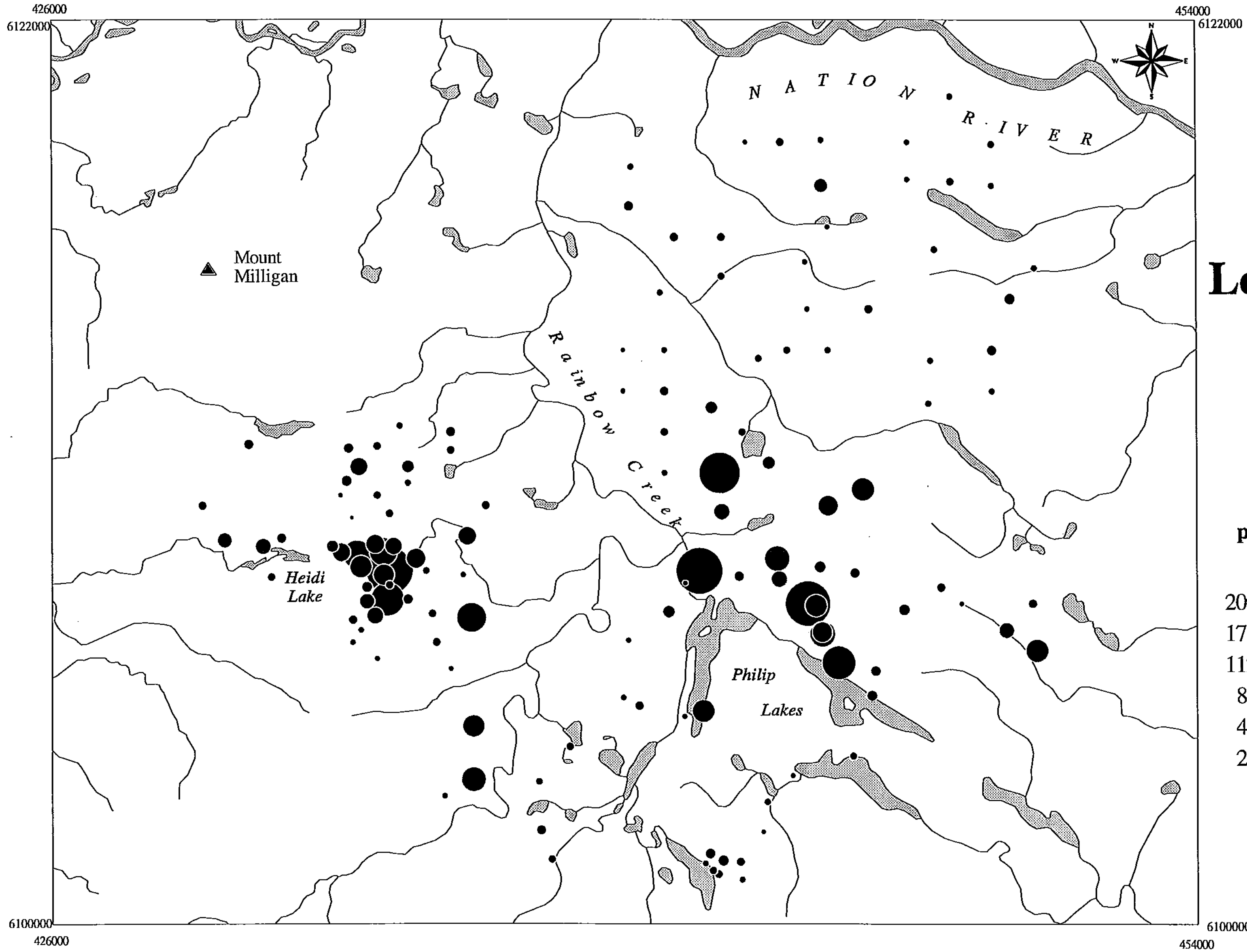

SODIUM
in ash of
Lodgepole Pine Bark

INAA

ppm	Na	Percentile
20900		Maximum
17870		98
11200		95
8160		90
4870		75
2410		50
595		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

BRITISH COLUMBIA

UTM Zone 10

Na

Canada

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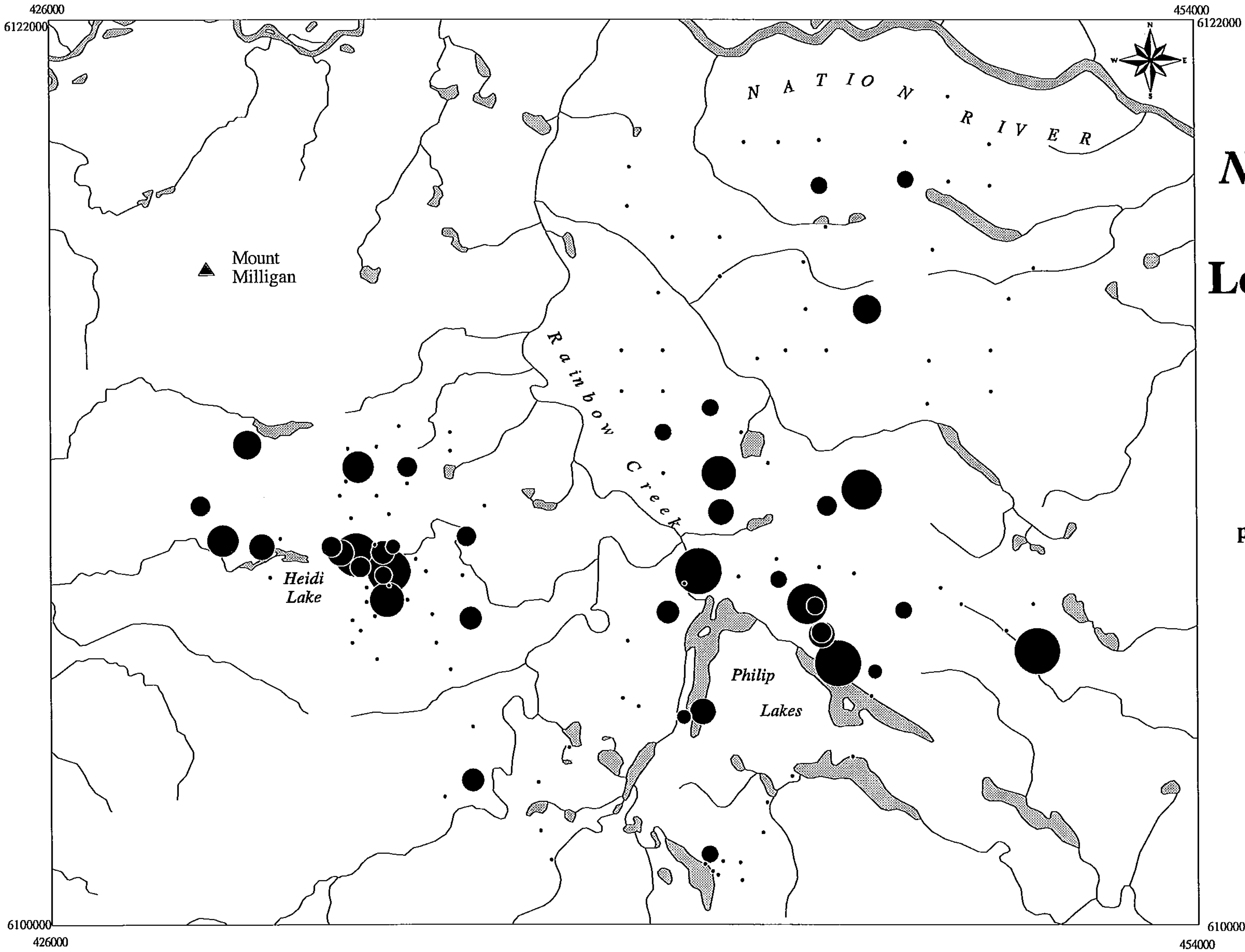

NEODYMIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Nd	Percentile
20		Maximum
17		98
15		95
11		90
7		75
<5		50
<5		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Nd

Canada

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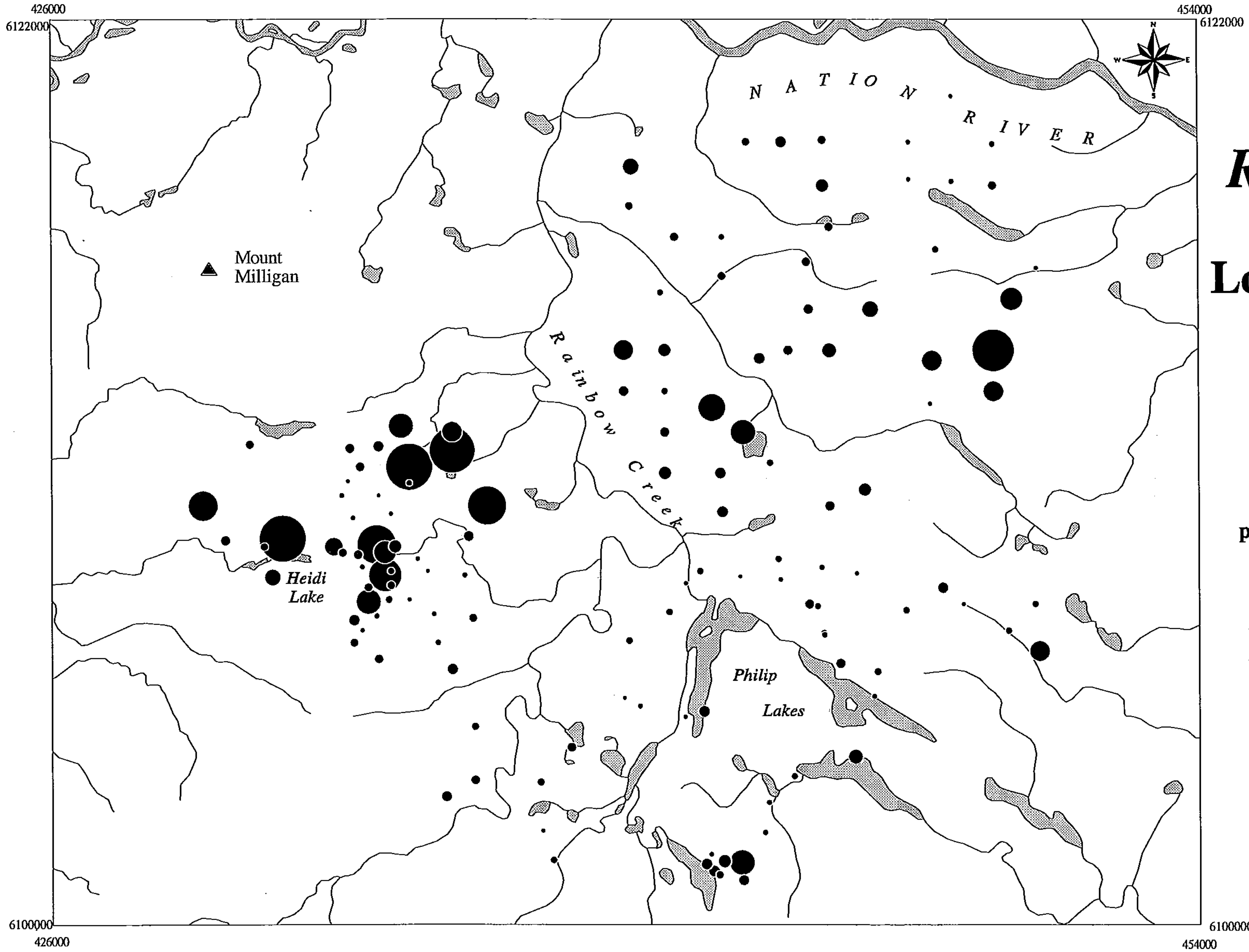

RUBIDIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Rb	Percentile
300		Maximum
243		98
205		95
165		90
100		75
78		50
<5		Minimum

134 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Rb

Canadä

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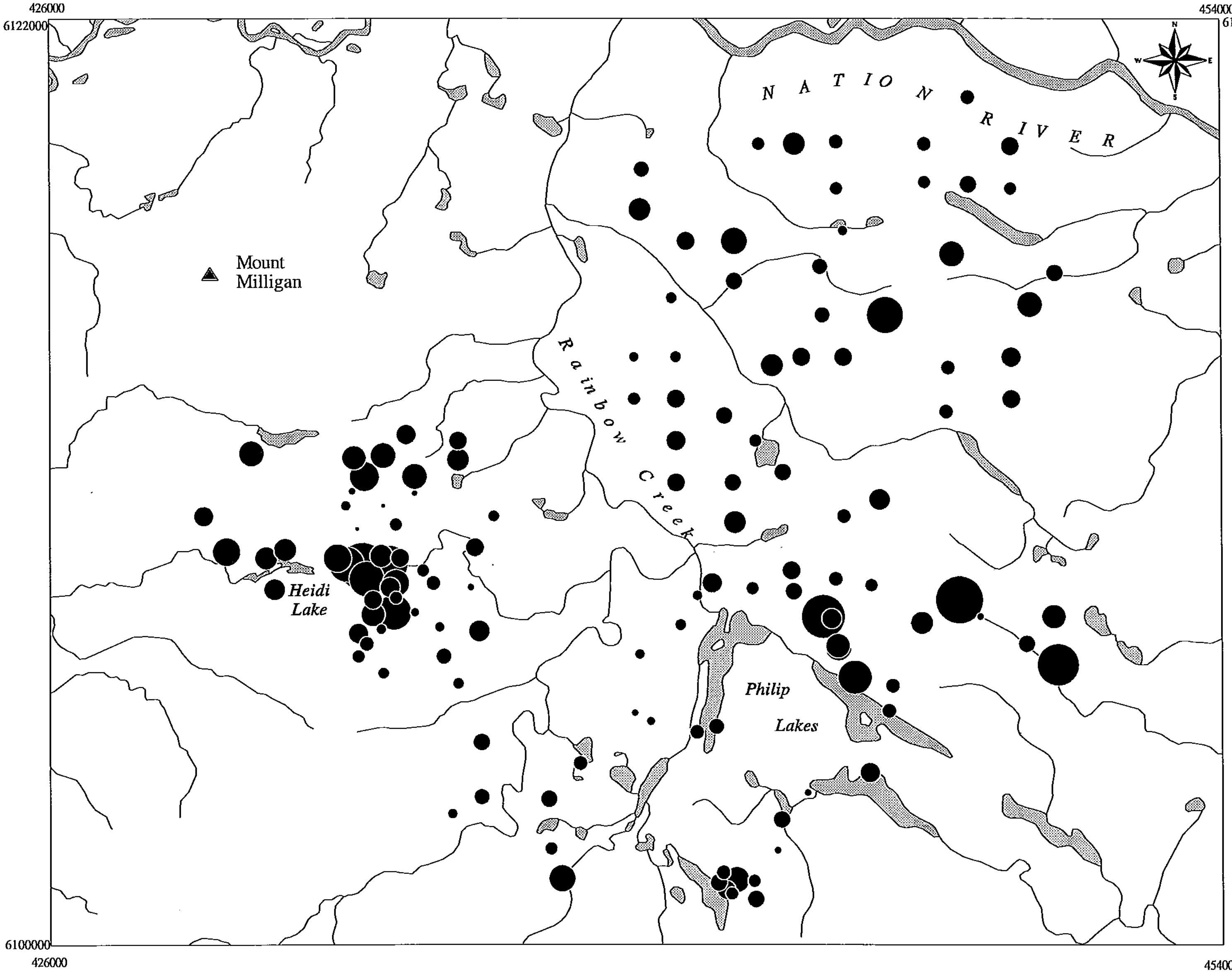
ANTIMONY
in ash of
Lodgepole Pine Bark



INAA

ppm	Sb	Percentile
5.0		Maximum
3.3		98
2.4		95
1.9		90
1.5		75
1.1		50
0.2		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Sb

Canadä

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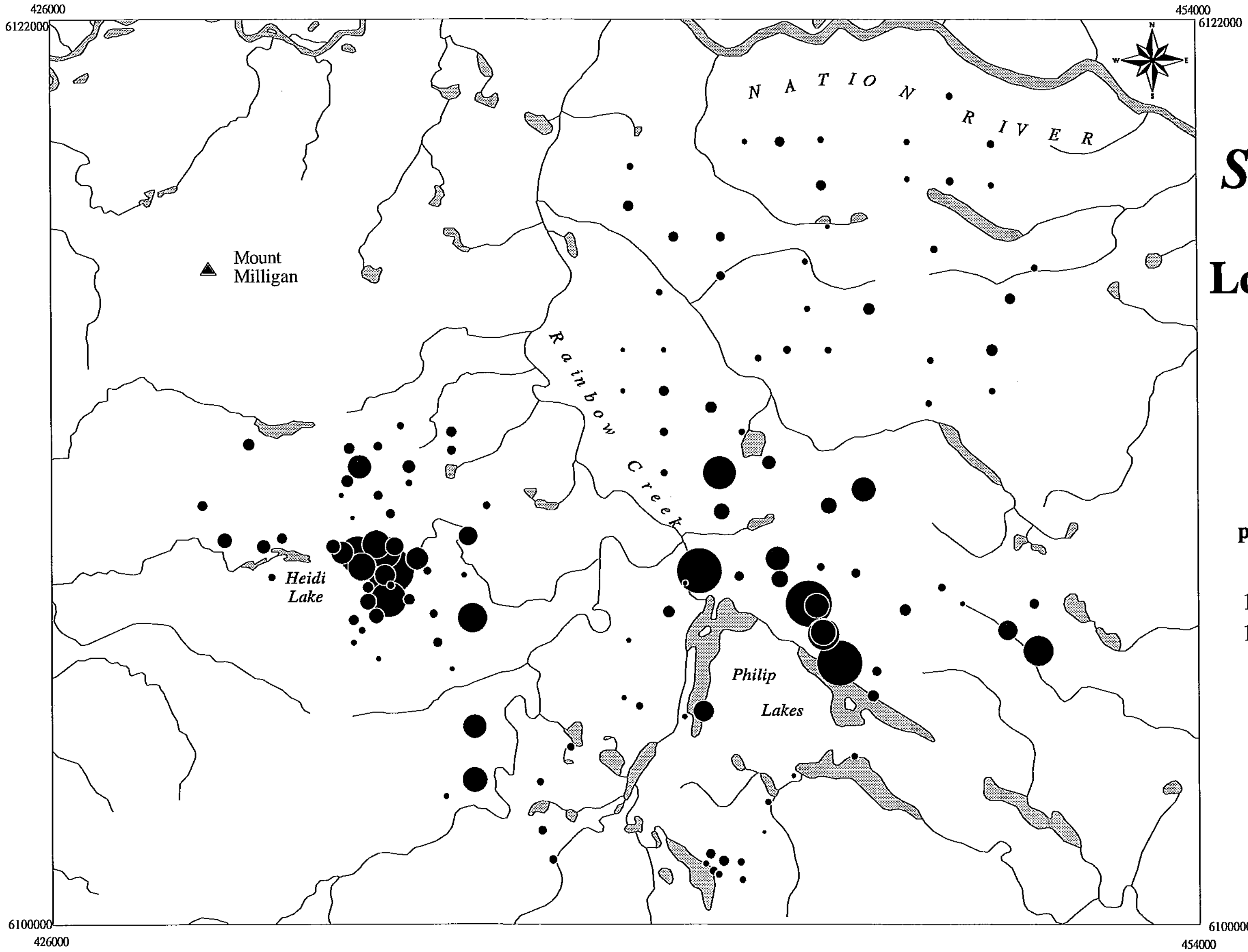
SCANDIUM

in ash of

Lodgepole Pine Bark



INAA

ppm	Sc	Percentile
15.0		Maximum
12.3		98
8.8		95
6.7		90
3.3		75
1.9		50
0.4		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Sc

Canada

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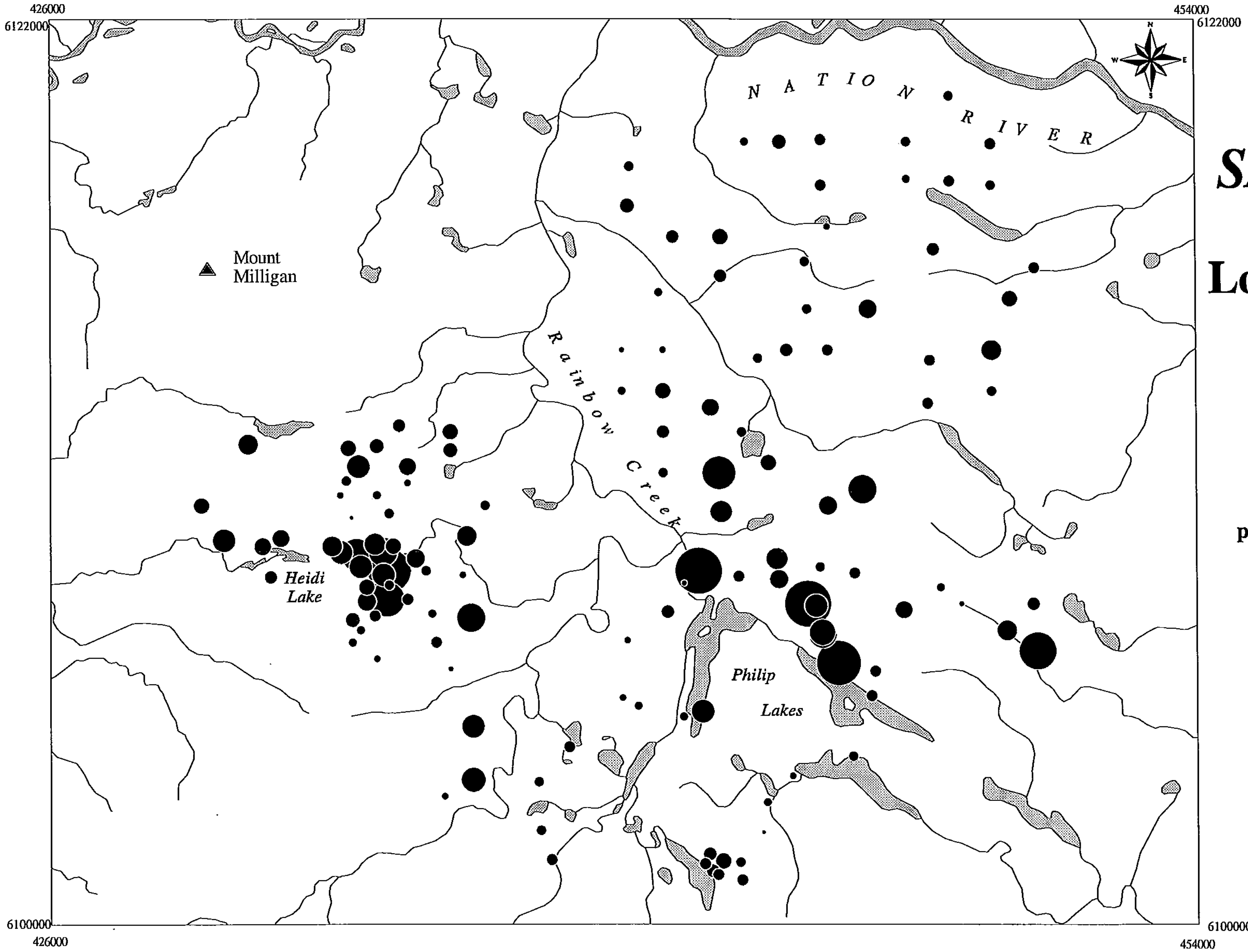

SAMARIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Sm	Percentile
3.4		Maximum
3.0		98
2.1		95
1.6		90
1.1		75
0.6		50
0.1		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Sm

Canada
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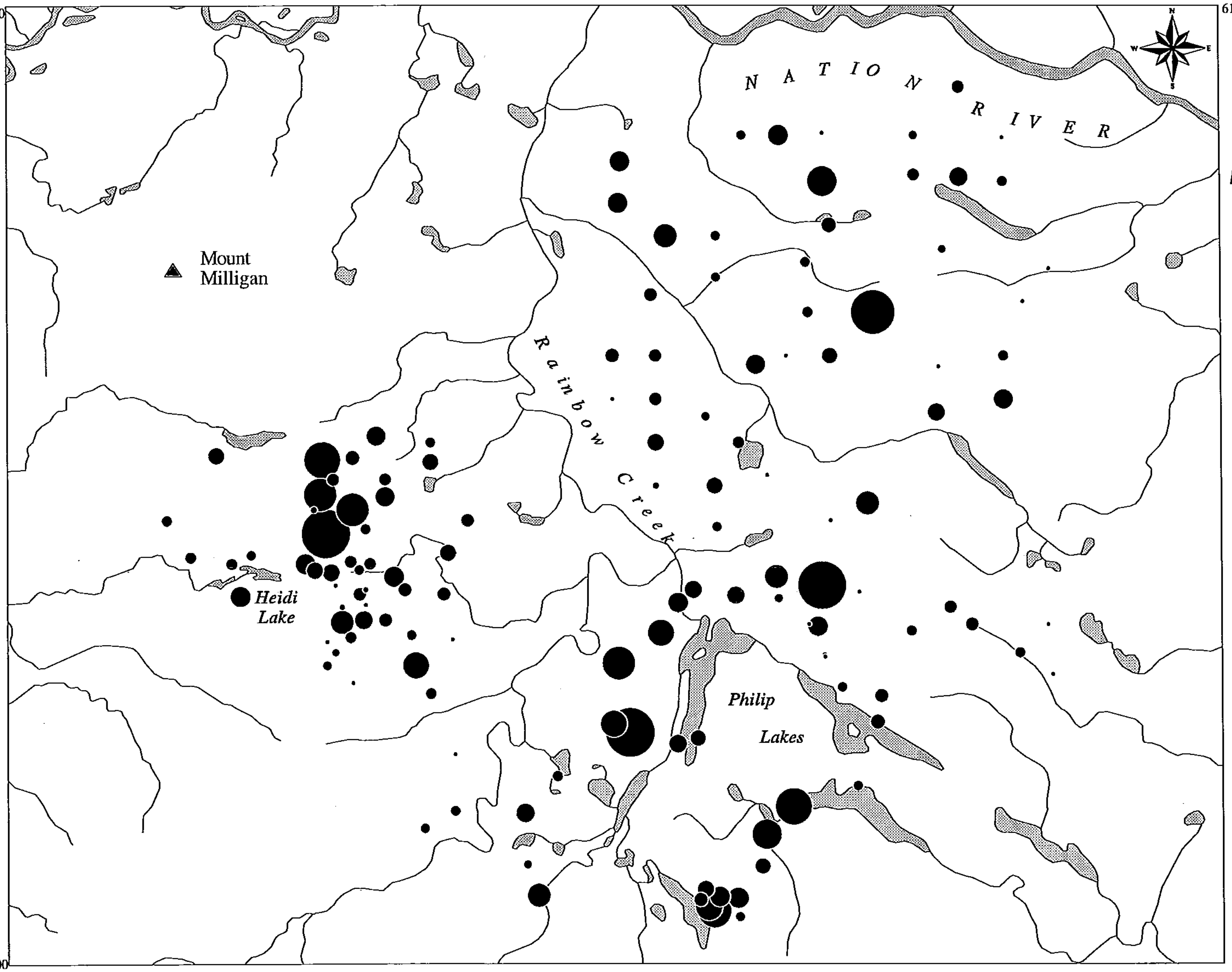

STRONTIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Sr	Percentile
2300		Maximum
1830		98
1425		95
1200		90
960		75
700		50
<300		Minimum

134 Samples

Exponent = 1.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Sr

Canada

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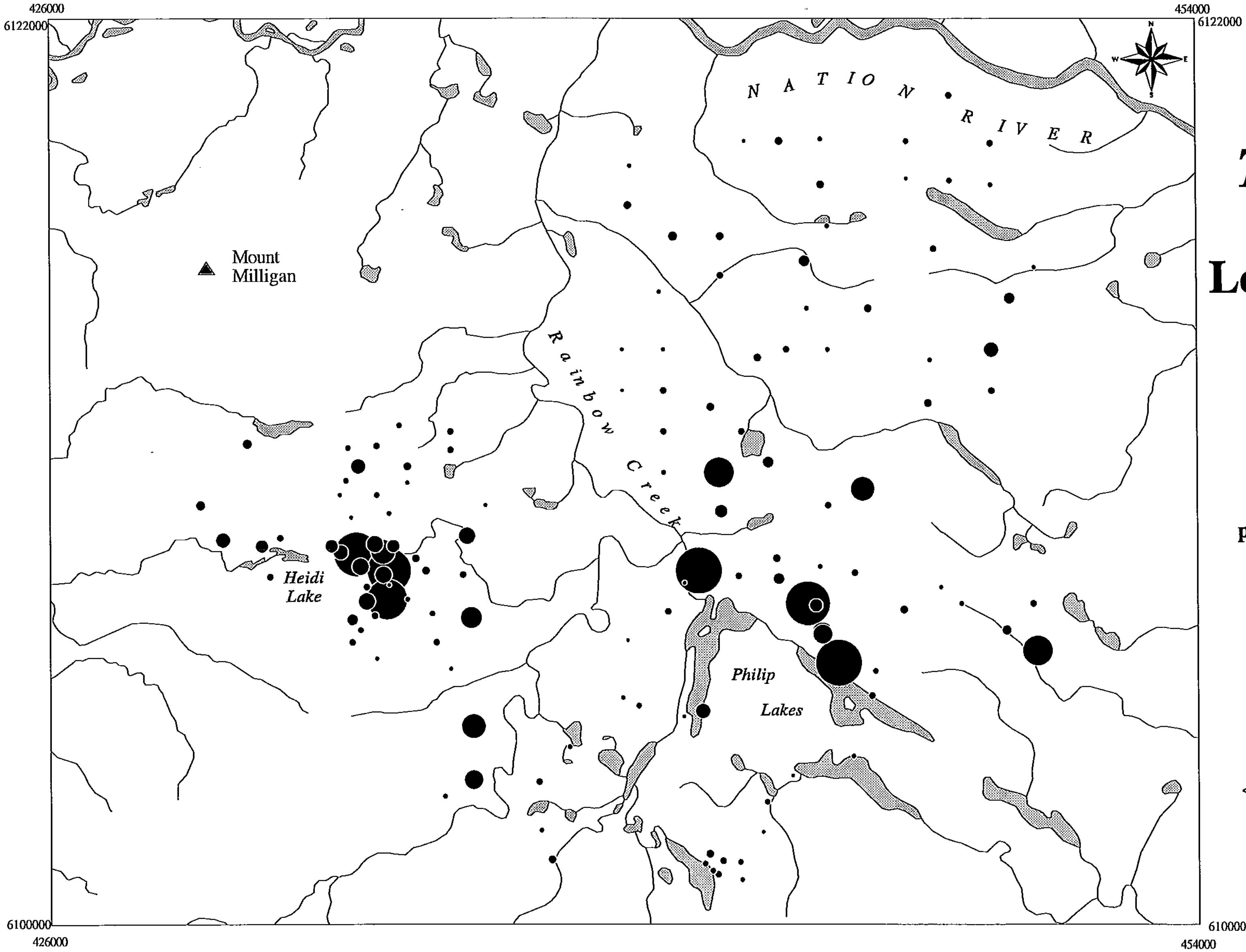

THORIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Th	Percentile
2.5		Maximum
2.2		98
1.8		95
1.3		90
0.9		75
0.6		50
<0.1		Minimum

134 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Th

Canada

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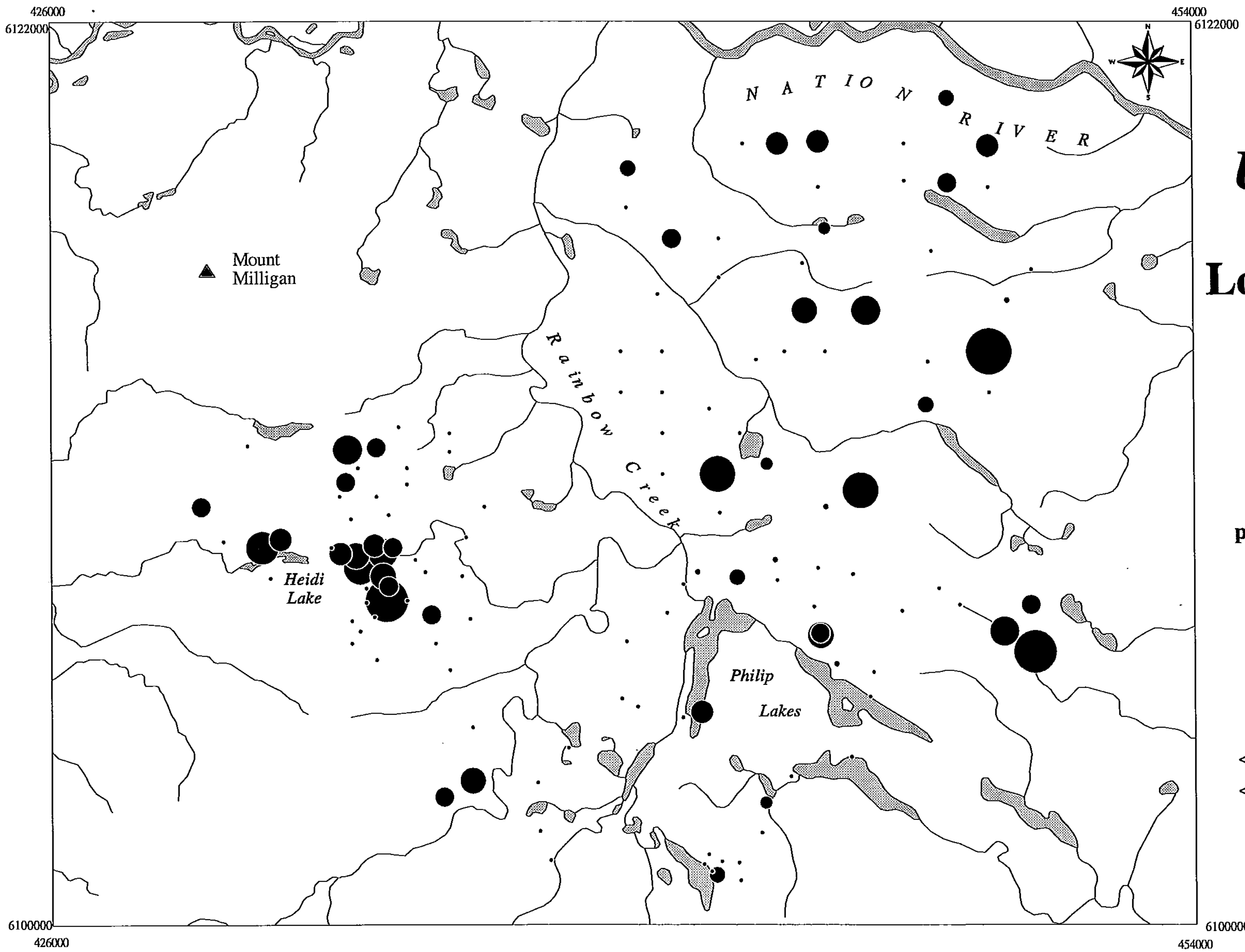

URANIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	U	Percentile
1.6		Maximum
1.3		98
1.0		95
0.8		90
0.5		75
<0.1		50
<0.1		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

U

Canada

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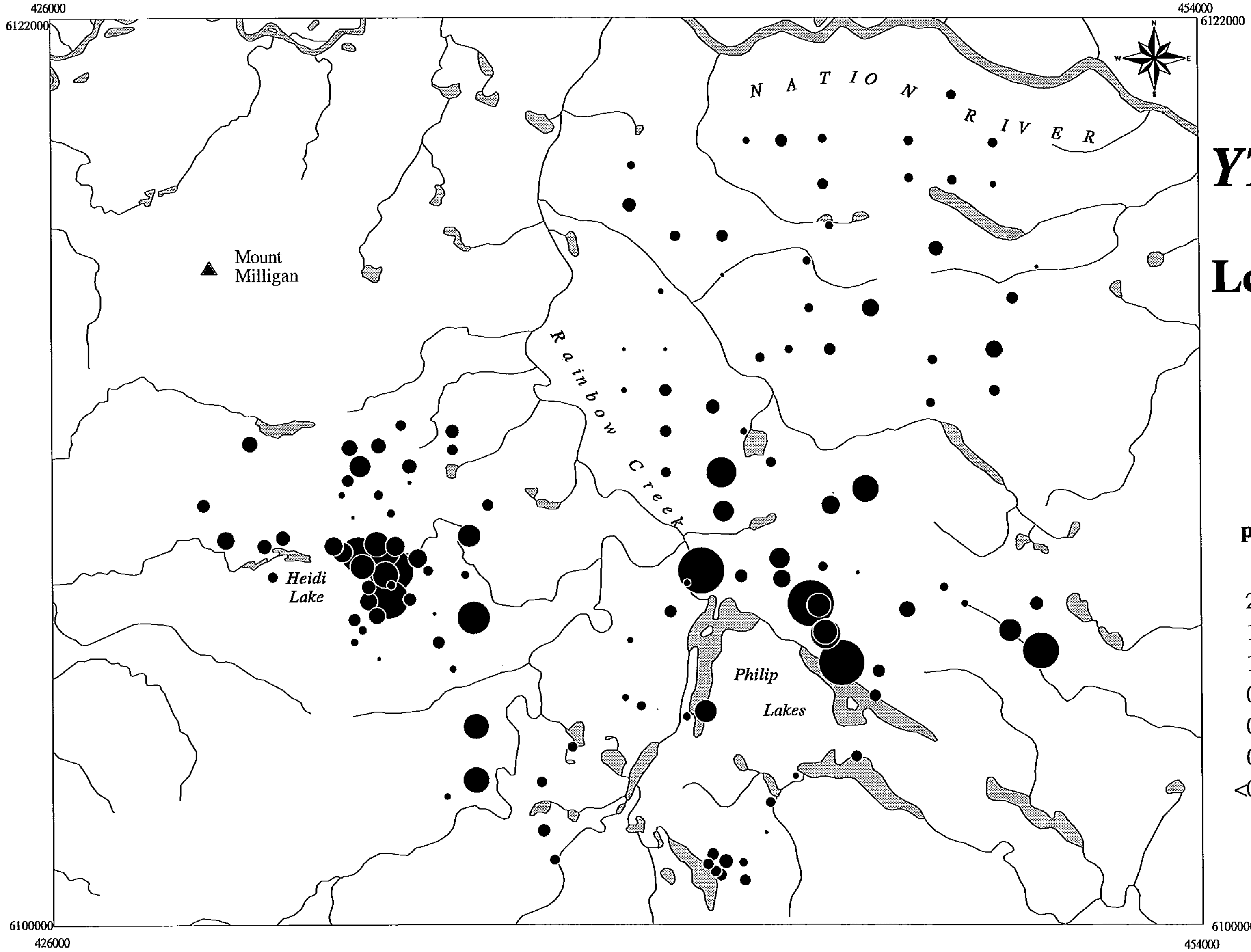

YTTERBIUM

in ash of

Lodgepole Pine Bark

INAA

ppm	Yb	Percentile
2.07		Maximum
1.83		98
1.35		95
0.95		90
0.59		75
0.35		50
<0.05		Minimum

134 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Yb

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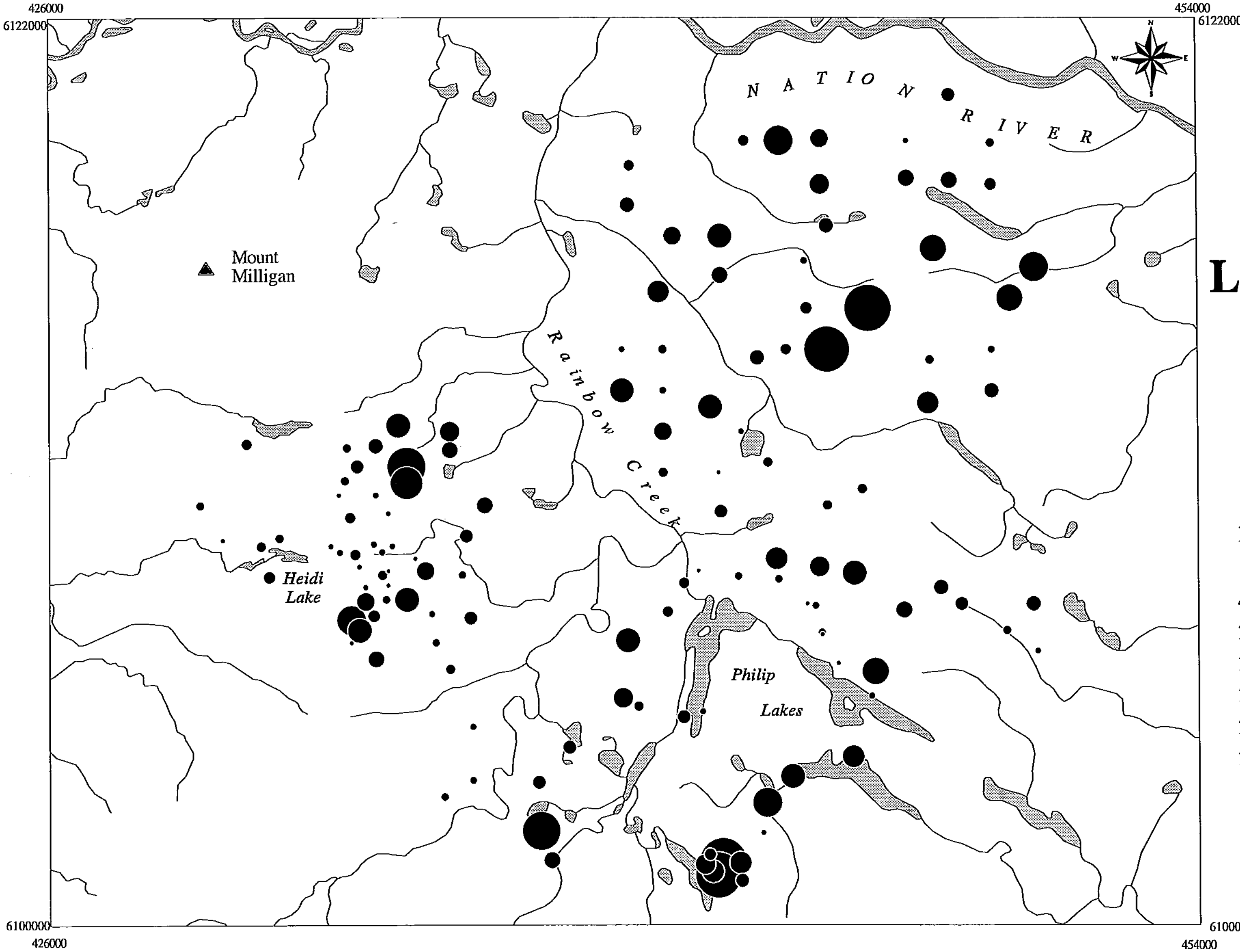

ZINC

in ash of

Lodgepole Pine Bark

INAA

ppm	Zn	Percentile
4100		Maximum
3730		98
3350		95
3100		90
2800		75
2300		50
420		Minimum

134 Samples

Exponent = 3

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Zn

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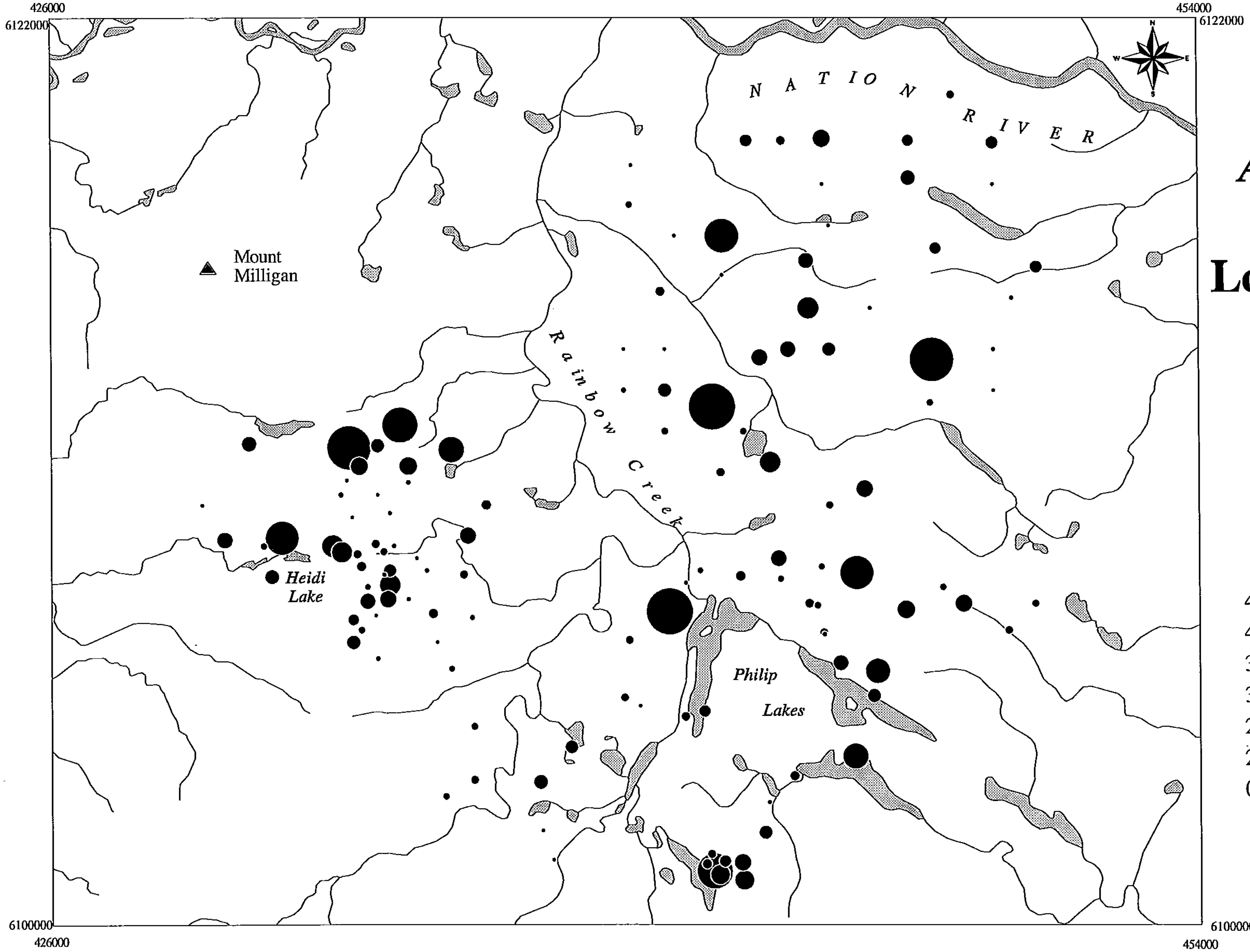

ALUMINUM

in ash of

Lodgepole Pine Bark

ICP-ES

pct	Al	Percentile
4.72	●	Maximum
4.29	●	98
3.85	●	95
3.25	●	90
2.82	●	75
2.13	●	50
0.10	·	Minimum

129 Samples

Exponent = 3

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

British Columbia

Al

Canada

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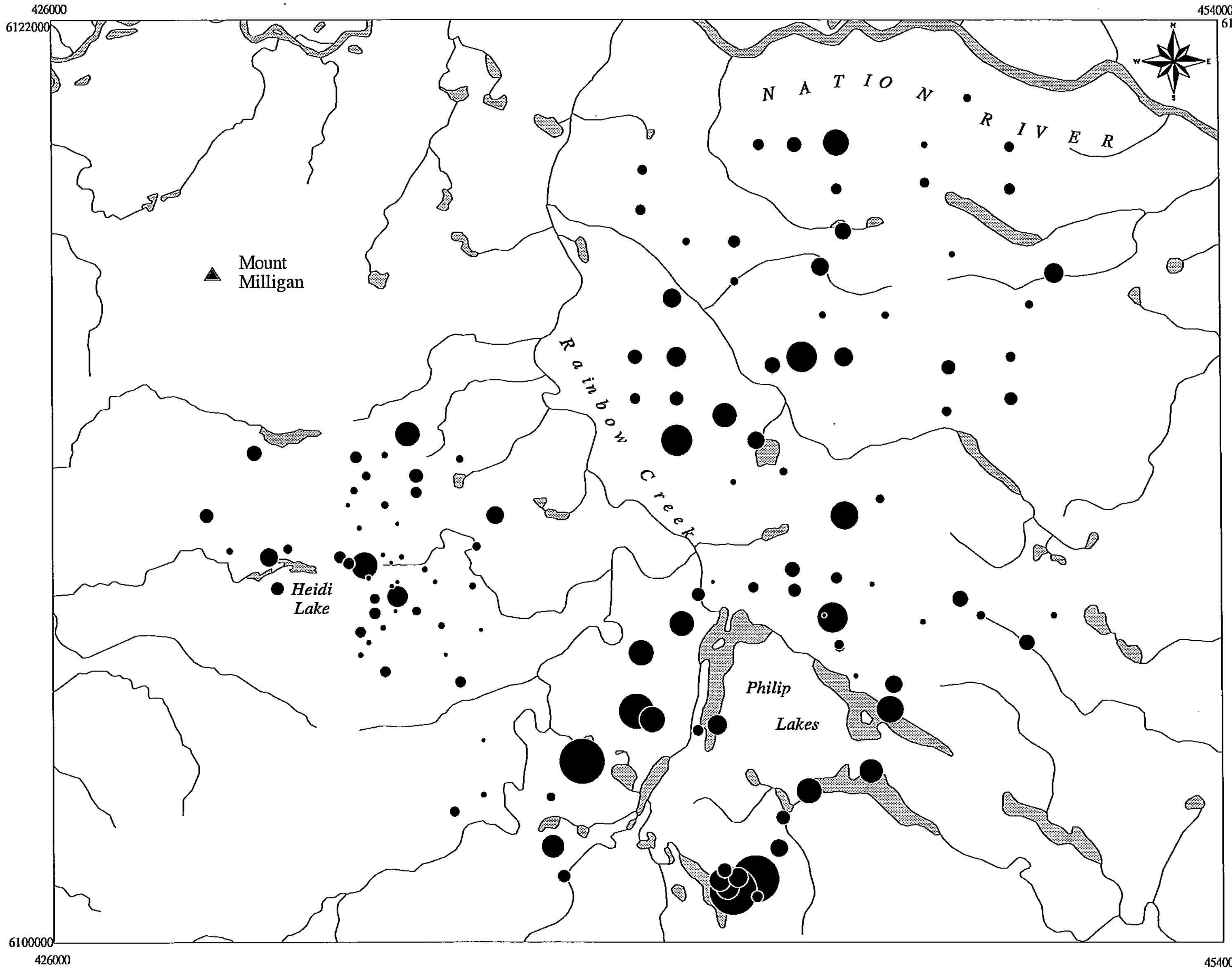

BORON

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	B	Percentile
403		Maximum
263		98
212		95
193		90
159		75
120		50
23		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

B

Canada

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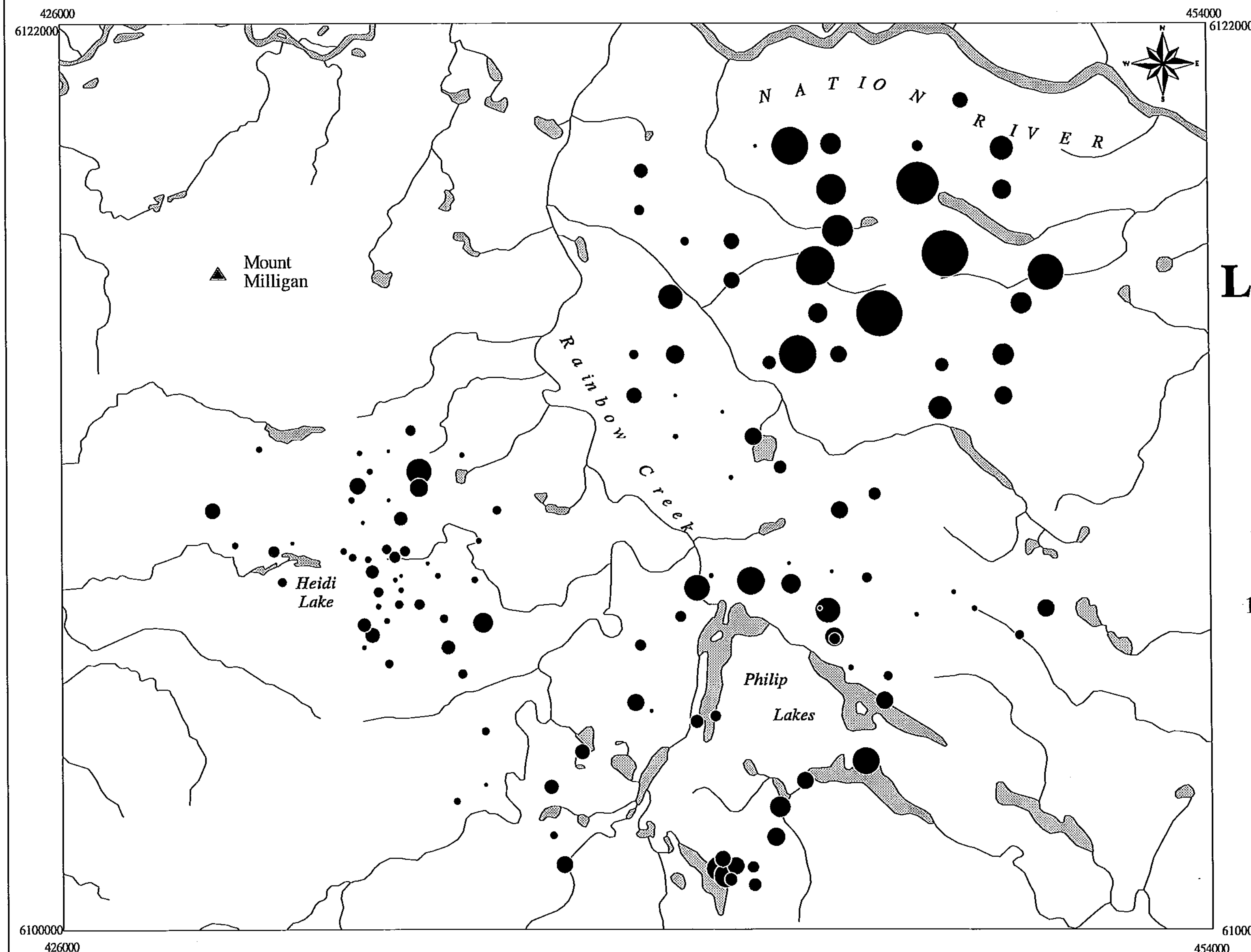

CADMIUM

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Cd	Percentile
160.8		Maximum
87.7		98
68.0		95
45.1		90
28.9		75
15.6		50
0.1		Minimum

129 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Cd

Canada

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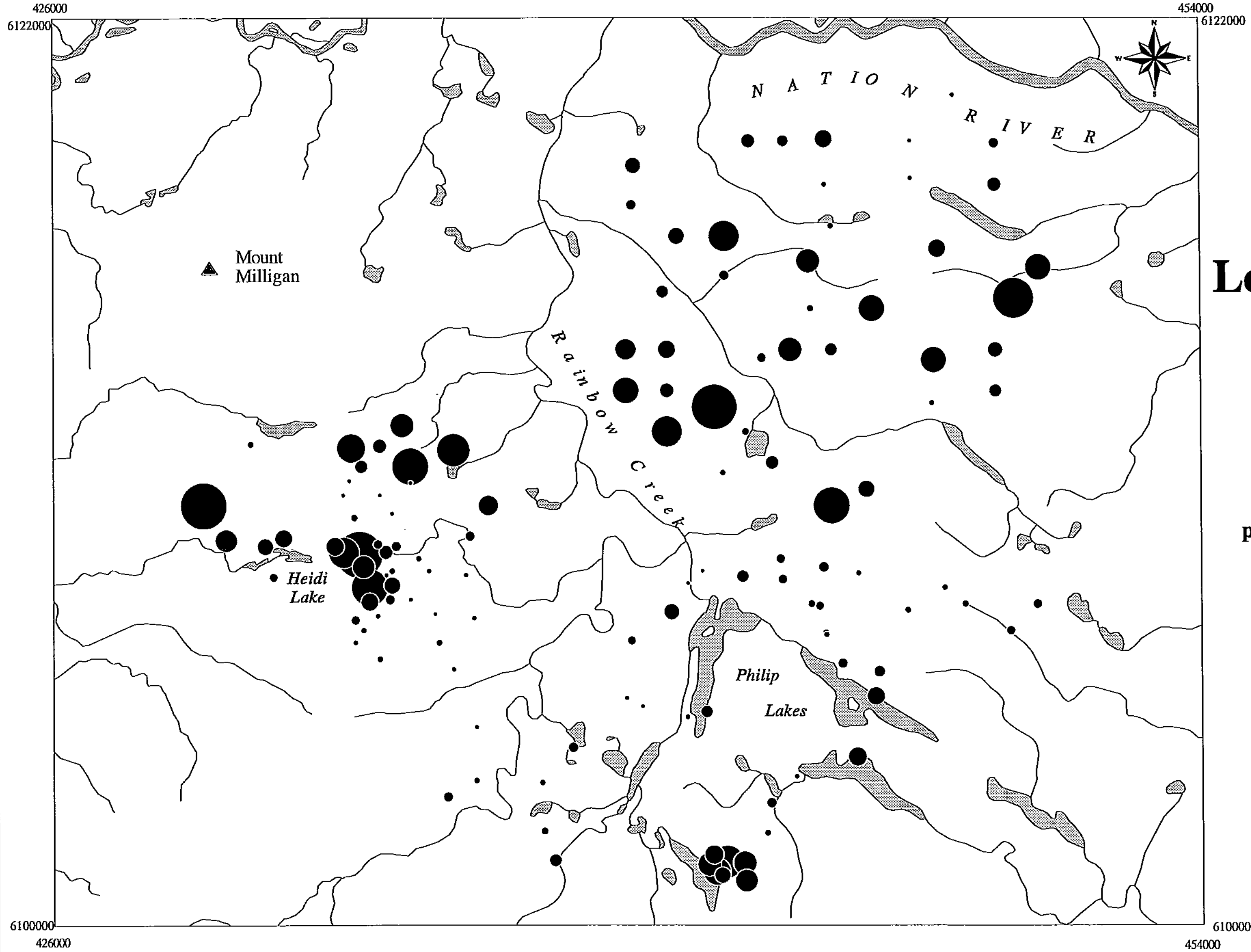

COPPER

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Cu	Percentile
409		Maximum
363		98
326		95
292		90
234		75
174		50
66		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Cu

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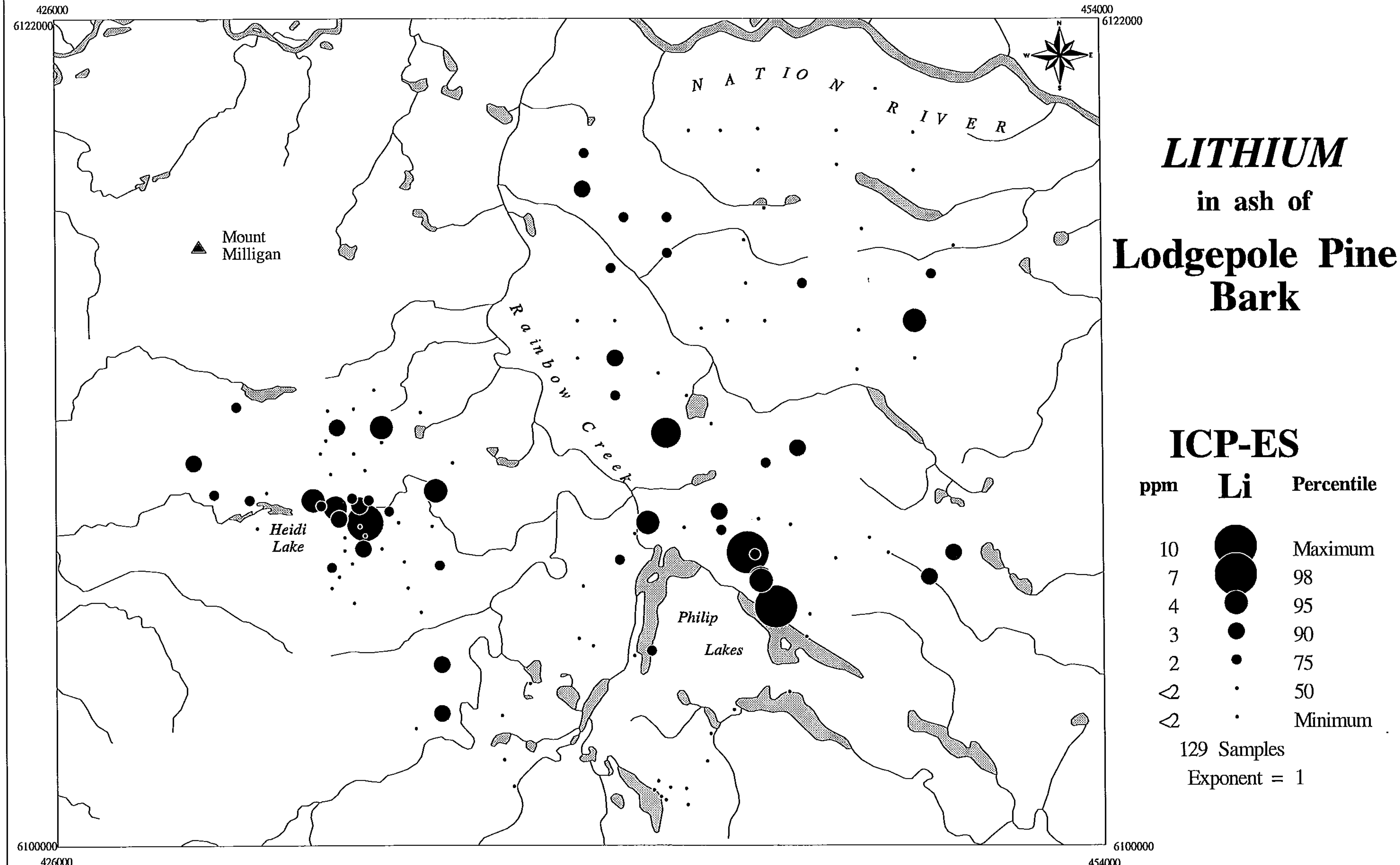
LITHIUM in ash of Lodgepole Pine Bark



Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

British Columbia

Canada

Li

Canada
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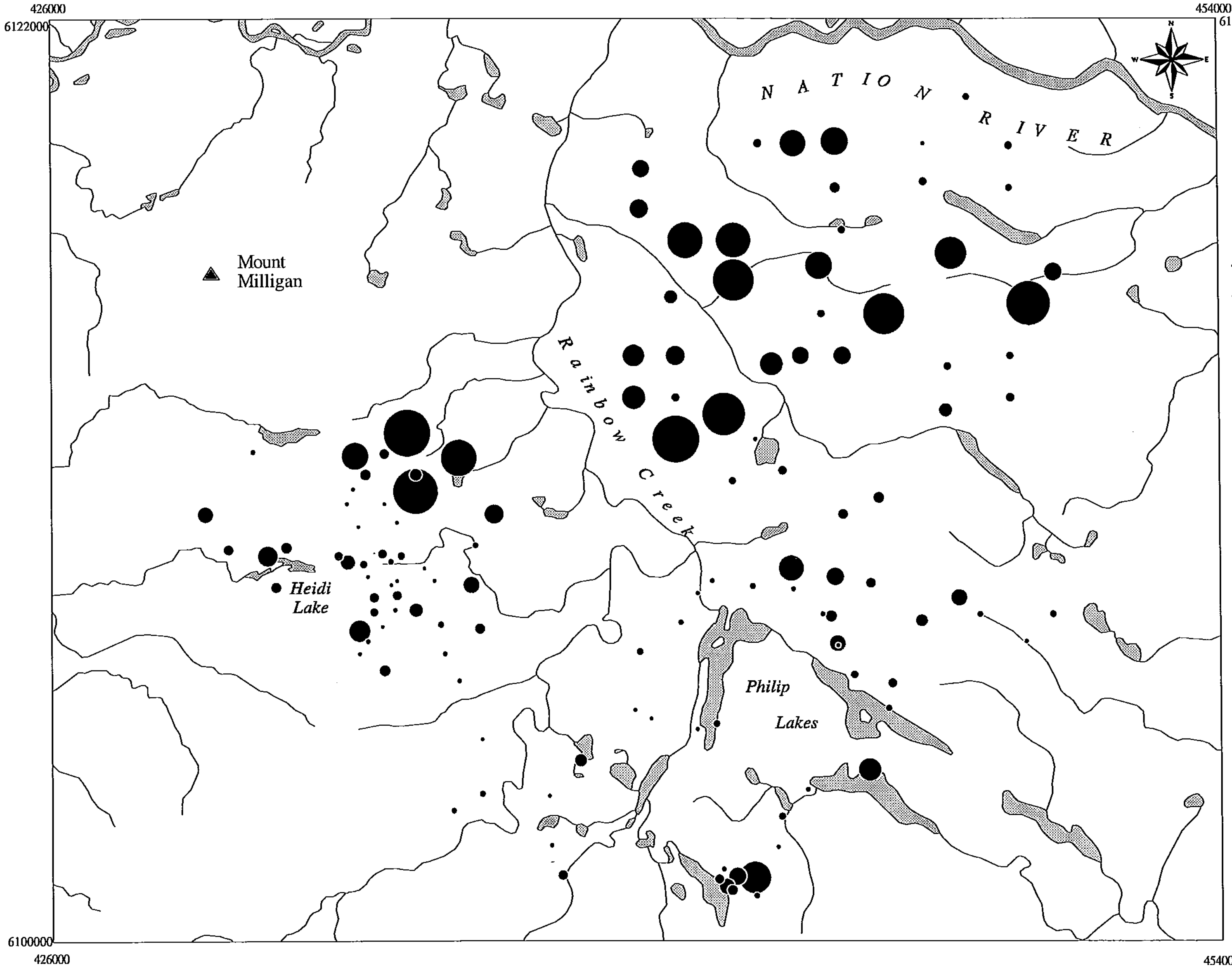
MAGNESIUM

in ash of

Lodgepole Pine Bark



ICP-ES

pct	Mg	Percentile
3.63		Maximum
3.41		98
3.27		95
2.88		90
2.44		75
1.89		50
0.48		Minimum

129 Samples

Exponent = 3

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Mg

Canada

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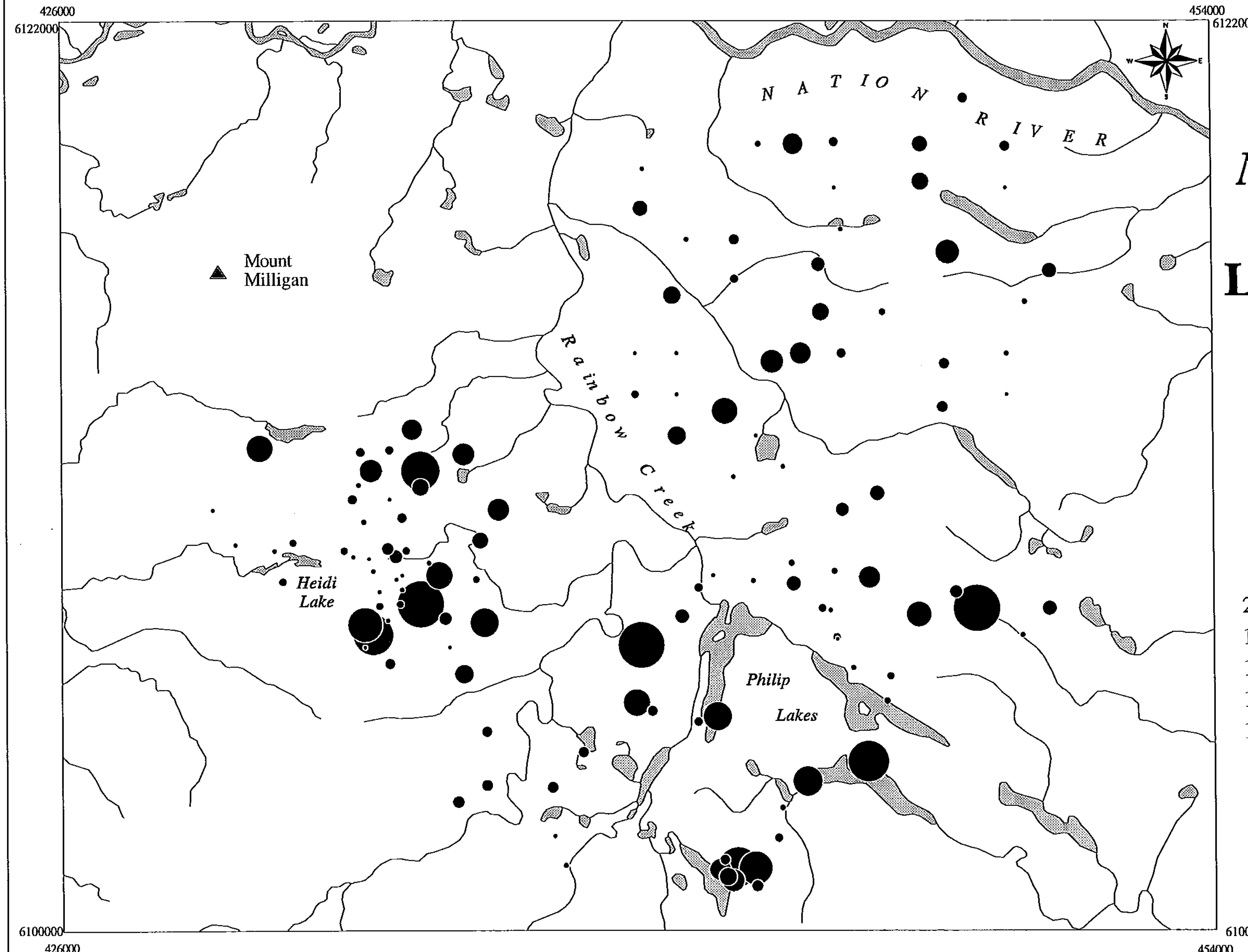

MANGANESE

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Mn	Percentile
26027		Maximum
19674		98
17953		95
14862		90
11742		75
8078		50
1599		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Mn

Canada

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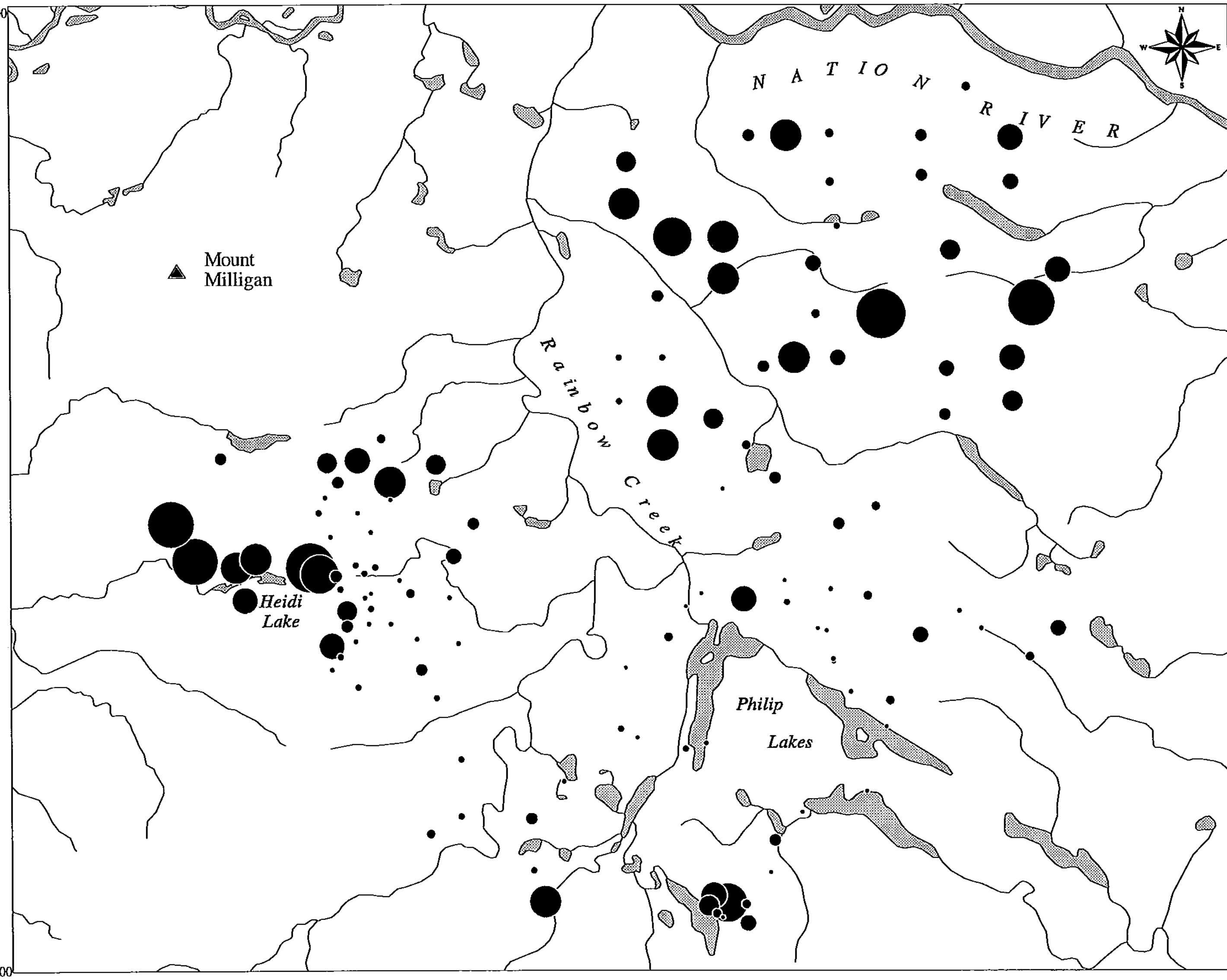

MOLYBDENUM

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Mo	Percentile
14		Maximum
11		98
10		95
9		90
7		75
4		50
<1		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

BRITISH COLUMBIA

UTM Zone 10

Mo

Canada

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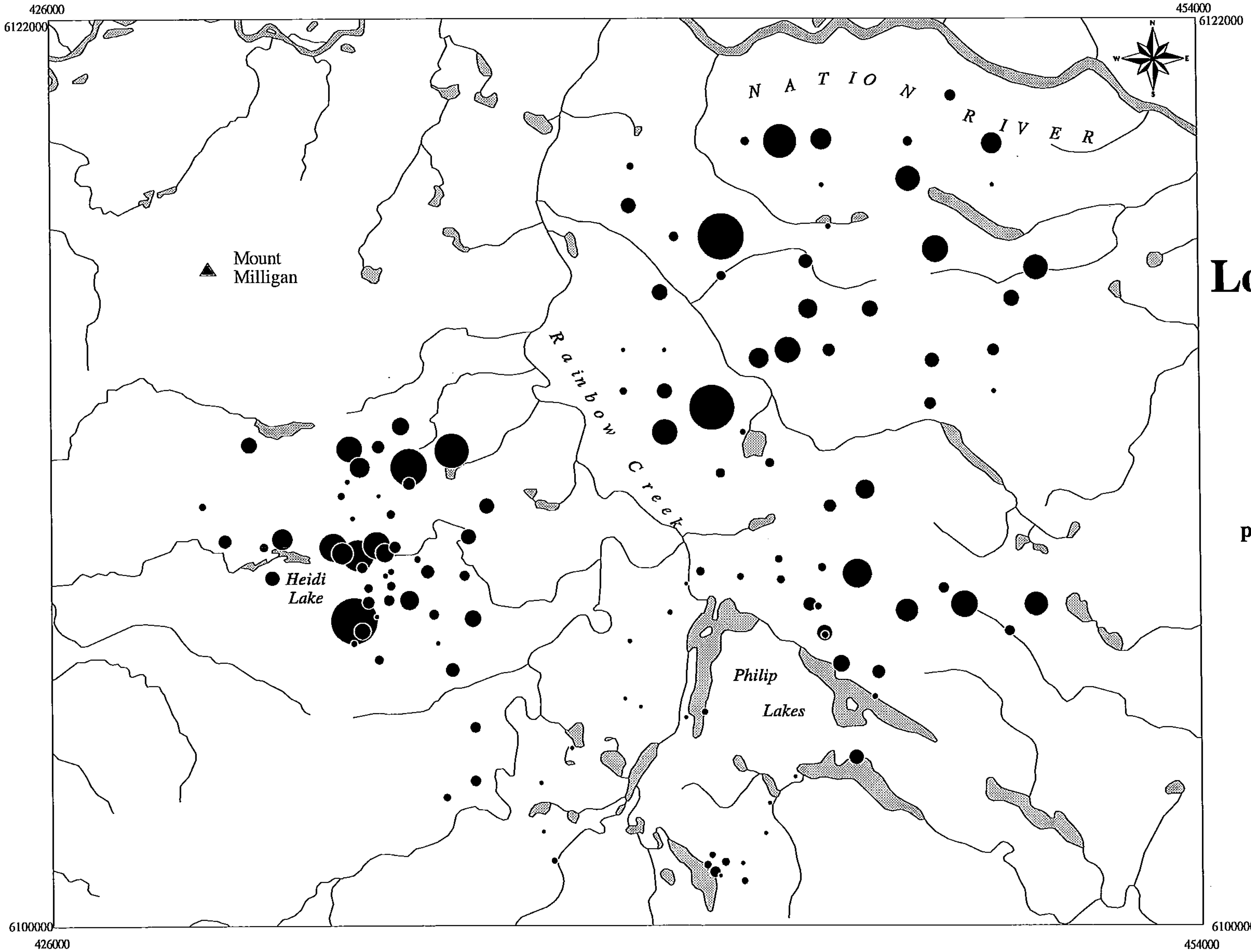

NICKEL

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Ni	Percentile
69		Maximum
64		98
53		95
47		90
37		75
28		50
4		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Ni

Canada

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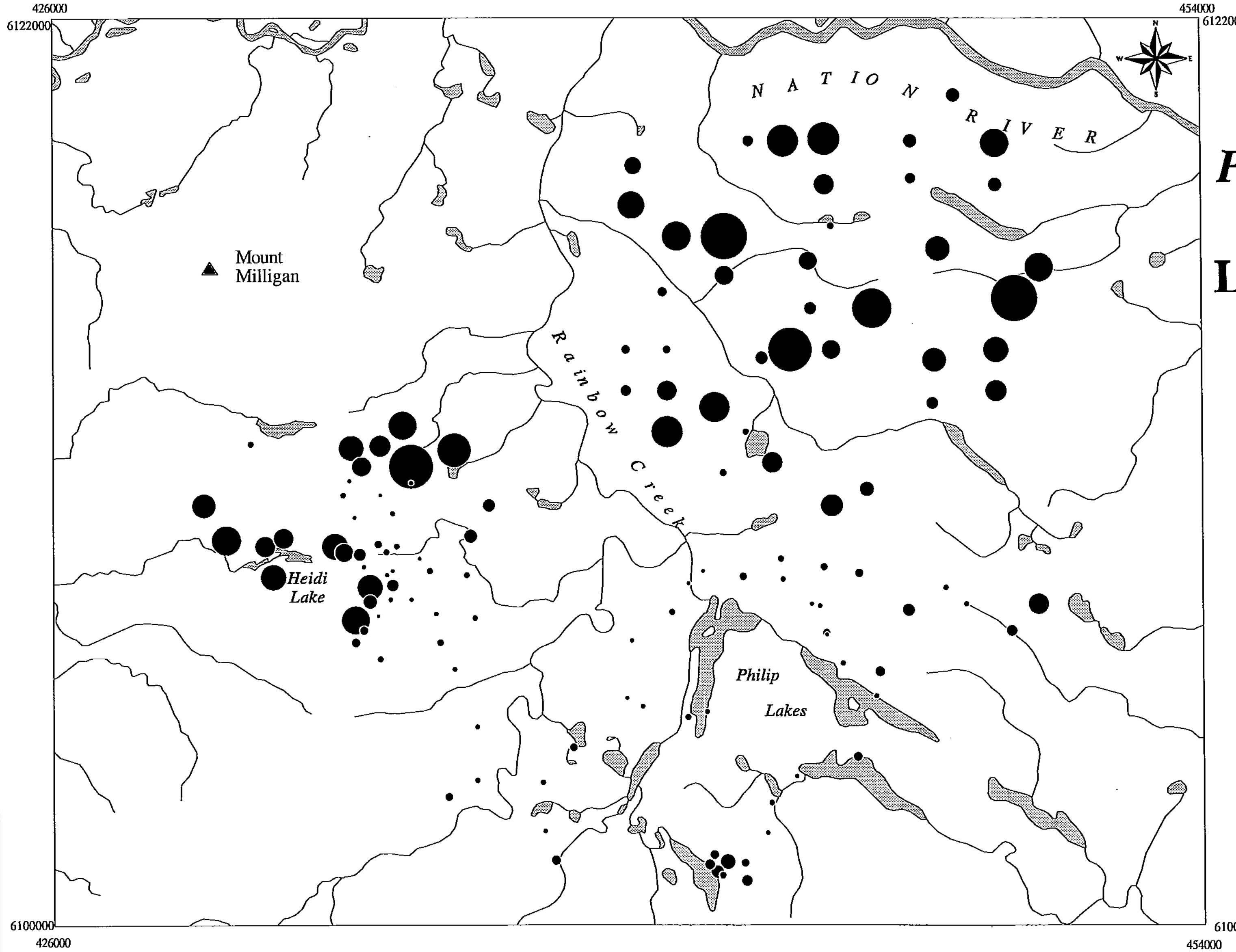

PHOSPHORUS

in ash of

Lodgepole Pine Bark

ICP-ES

pct	P	Percentile
2.411		Maximum
2.291		98
1.940		95
1.805		90
1.497		75
0.933		50
0.224		Minimum

129 Samples

Exponent = 2

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

P

Canada

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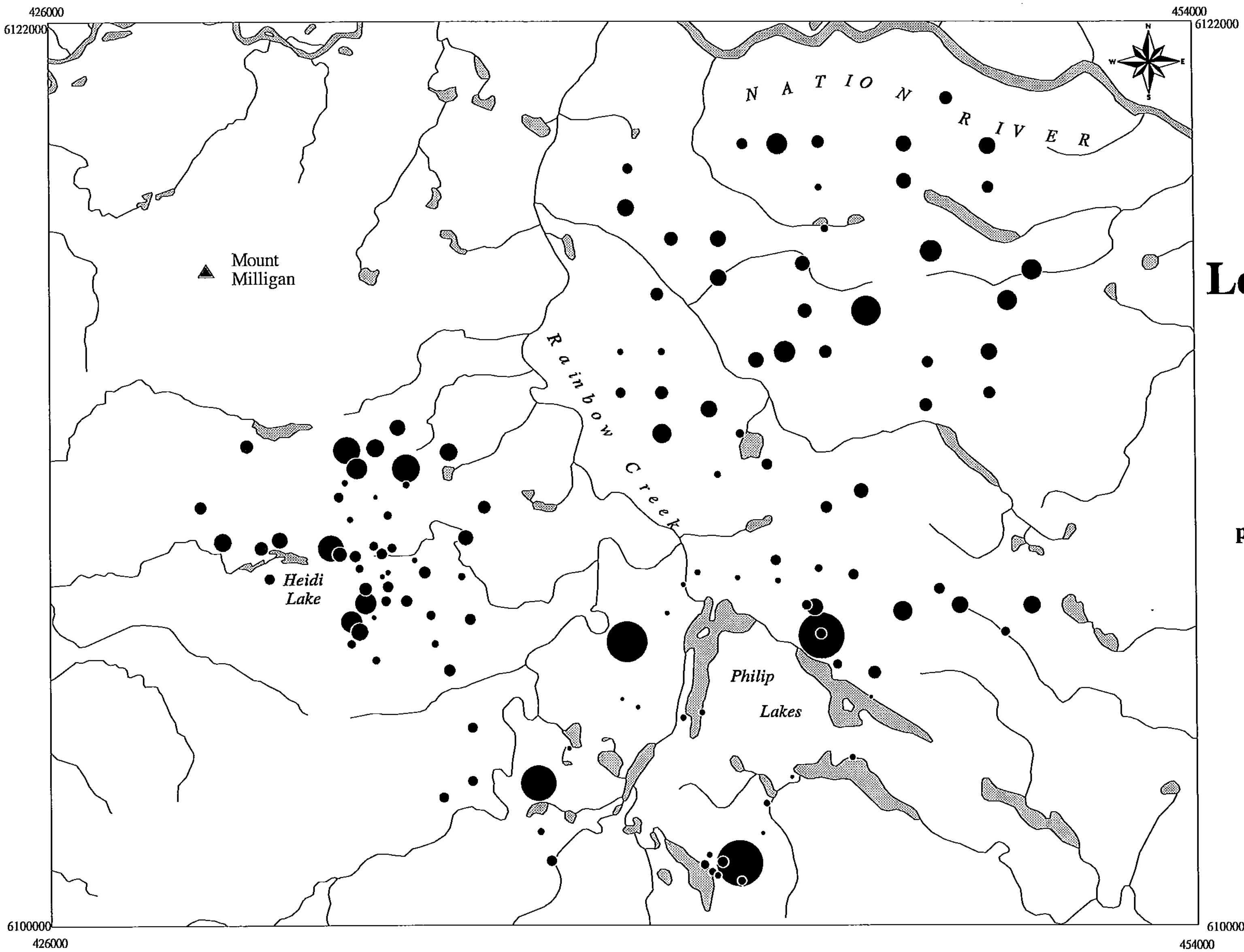

LEAD

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	Pb	Percentile
216		Maximum
154		98
109		95
89		90
73		75
55		50
11		Minimum

129 Samples

Exponent = 1.5

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

Pb

Canada

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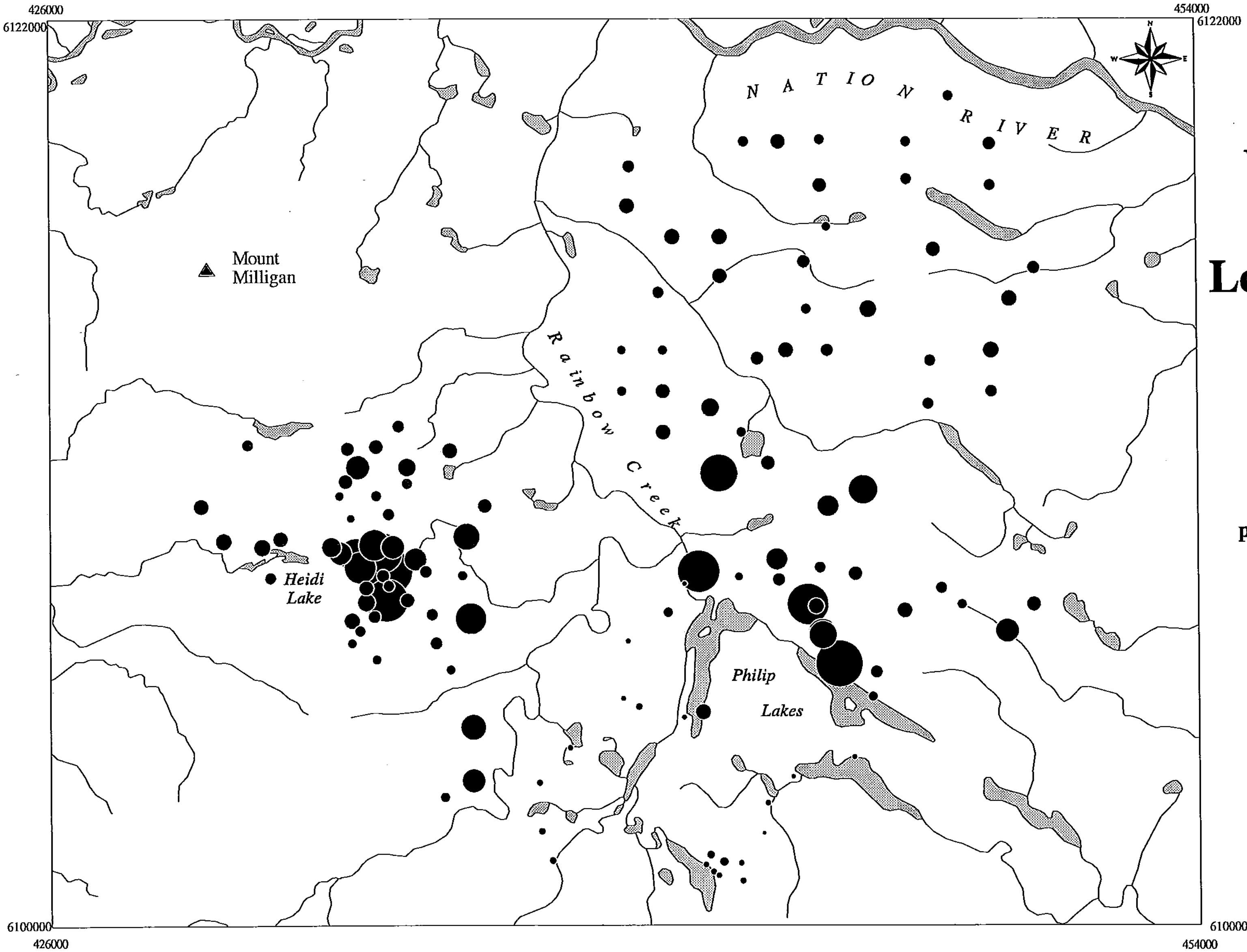

VANADIUM

in ash of

Lodgepole Pine Bark

ICP-ES

ppm	V	Percentile
111		Maximum
78		98
63		95
44		90
22		75
16		50
<1		Minimum

129 Samples

Exponent = 1

Scale 1:150 000 - Échelle 1/150 000

Kilometres 2 0 2 4 6 8 10 12 Kilomètres

UTM Zone 10

BRITISH COLUMBIA

V