Anvil Range Mine Complex - Terrestrial Effects Study: Investigation into Metal Concentrations in Vegetation, Wildlife and Soils

Prepared for
Deloitte & Touche Inc.

Submitted by
Gartner Lee Limited

September 2005

Gartner Lee

Anvil Range Mine Complex - Terrestrial Effects Study: Investigation into Metal Concentrations in Vegetation, Wildlife and Soils

Prepared for
Deloitte & Touche Inc.

In association with
C.E. Jones & Associates
Gamberg Consulting

September 2005

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September 13, 2005

Valerie Chort
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Dear Ms. Chort:

Re: 40569 – Anvil Range Mine Complex – Terrestrial Effects Study: Investigation into Metal Concentrations in Vegetation, Wildlife and Soils

Please find enclosed our final report for Phase I of the *Anvil Range Mine Complex - Terrestrial Effects Study: Investigation into Metal Concentrations in Vegetation, Wildlife and Soils*. The draft version of this report (submitted in April 2005) was finalized with input from internal reviewers and representatives from DIAND, Environment Canada, Faro Project Office, Ross River Dena First Nation, Selkirk First Nation, Senes Consulting, the Town of Faro and Type II Mines (Terrestrial Effects Project Review, minutes from conference call on May 11, 2005; Faro Open House, May 26, 2005; Ross River Open House, May 27 2005; SFN Terrestrial Effects Project Review, minutes from meeting held on July 4, 2005; Terrestrial Effects Project Review, minutes from conference call on July 26, 2005; Terrestrial Effects Project Review, minutes from conference call on August 2, 2005; Selkirk First Nation Open House, August 9, 2005).

Thank you for the opportunity to conduct this work. Please contact the undersigned if you have any questions regarding the information presented in this report.

Yours very truly,
GARTNER LEE LIMITED

Leslie Gomm, Ph.D., P.Eng.
Senior Environmental Engineer
Project Director

mg/:mg

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Executive Summary

Gartner Lee Limited was retained by Deloitte & Touche Inc. (in its capacity as Interim Receiver of the Anvil Range Mine) to develop and execute a Terrestrial Effects Study for the Anvil Range Mine Complex. This study was initiated under the recommendation of the Environmental Assessment conducted in support of the application for Water Licence Renewal for ongoing care and maintenance activities at the Anvil Range Mine Complex (Deloitte & Touche Inc. and Gartner Lee Limited 2003). The findings of the Terrestrial Effects Study will feed into on site care and maintenance activities and into the development of the Final Closure and Reclamation Plan for the Anvil Range Mine Complex.

The overall objective of this project is to provide the field information necessary for a future human and ecological risk assessment (HHERA). In general the objectives aim to address the spatial extent of elevated elemental levels, improve characterization of reference elemental concentrations, determine the timing of elemental deposition from the Anvil Range Mine, and investigate current elemental concentrations in plant and wildlife tissue. Specific objectives, methodological approaches and results are outlined below. It is important to note that while the Terrestrial Effects Study aims to provide an understanding of the spatial extent, timing and concentrations of elements in the terrestrial environment in the vicinity of the Anvil Range Mine, it does not provide an understanding of the significance of these results in terms of human health and ecological risk. A HHERA is the next step in the process and the findings of the Terrestrial Effects Study provides some of the data necessary for input into the HHERA model.

Objective One:

To Improve Characterization of the Spatial Distribution of Elevated Elemental Concentrations

Sampling for the 2004 Terrestrial Effects Study was designed to build on information collected in 2002 (C.E. Jones & Associates Ltd. 2003). Data from 2002 show that elevated elemental concentrations resulting from potential airborne deposition occur in a zone that extends at a minimum of 2 to 3 km in all directions from potential mine-site elemental dust sources, and that the highest concentrations appear to extend northwest to north of the tailings impoundments and mill complex. The 2004 Terrestrial Effects Study objectives relating to spatial distribution were:

1. to provide additional information on near-source elevated elemental concentrations and improve delineation of patterns of elevated elemental concentrations; and
2. to determine the extent of elevated elemental levels, or the maximum distance from the mine complex of identifiable effects.

The determination of spatial distribution of elevated elemental levels in the 2004 data collection program is based primarily on sampling of terrestrial lichens and supported through soil sampling. Soil sampling

provides confirmation of lichen results (in surface horizons) and will also allow for the evaluation of the presence of natural soil mineralization unrelated to mining operations through separate sampling of surface organic, subsurface organic and subsurface mineral samples.

Lichen was collected on all 2004 sample points wherever it occurred (Figure 2) and sent to CanTest Laboratories (Burnaby, BC) for analysis of the 33 elements listed in Table 2. Soil samples were collected at a subset of the sampling locations displayed in Figure 2 and sent to CanTest Laboratories (Burnaby, BC) for analyses of 29 elements listed in Table 3 and pH. A further subset of soils was analyzed by sequential extraction technique for elements listed in Table 3 and for organic matter content and total cyanide.

Lichen analytical results were screened using the Getis-Ord G-statistic (a test of spatial clustering) to investigate the potential occurrence of significant non-random patterns in the distribution of elemental concentrations. Significant results of this test indicate the occurrence of a non-random pattern in elevated elemental concentrations that could be related to mine-related activities. A geostatistical technique known as Kriging is then employed to spatially represent the pattern of elemental concentrations to determine whether patterns indicate an effect of mine-related activities. Soils data were also screened using Getis-Ord methods to detect spatial clustering of elevated lead and zinc in surface and subsurface soils.

The employment of geostatistical analytical techniques allow for the consideration of the gradational nature of these data, i.e., elemental concentrations decreasing with distance from a source. A simple comparison between potentially mine-affected and reference areas, in the absence of this consideration, is confounded by the inherent source of variation is the data, e.g., the variation in the data in potentially mine-affected areas could likely be too great to detect any statistically significant difference between potentially mine-affected and reference areas. Therefore to avoid this confounding effect, geostatistical analytical techniques (in this case Getis-Ord G-statistical test and Kriging) were employed to separate out this source of variation in the data.

The following presents a summary of results (based on lichen data). Categories are defined using extent of elevated elemental concentrations in lichen collected in mine-affected areas relative to reference levels.

- **High Elevation Relative to Reference Levels – Lead and Arsenic**. Maximum mine-affected lead concentrations are 450 times Swim Lakes maxima. Maximum mine-affected arsenic concentrations are up to 250 times the Swim Lake reference maximum. Equivalent-to-reference levels are not reached for the majority of the project area (with the exception of Swim Lakes) for both lead and arsenic. Furthermore, results of sequential extraction indicate that substantial fractions of total lead concentrations exist in a weakly complexed form, which will be relatively mobile as associated compounds decompose or degrade. The implications of these findings are that the lead deposited from the mine site is not simply environmentally inert, but can be expected to have some mobility through plant uptake and leaching through to lower soil horizons;

- **Moderate Elevation Relative to Reference Levels – Zinc, Copper, Iron, Silver, and Thallium**. Maximum mine-affected concentrations are 15-75 times higher than Swim Lakes maxima. Equivalent-to-reference concentrations are generally reached at a distance of 0-2 km from the Vangorda / Grum mine areas, to the northeast along the exposed (mine-side) slopes of Mount Mye, and to the southwest along the exposed slopes of Rose Mountain. Elevated elemental levels generally extend to the northeast along North Rose Creek, to the north up and past Mount Aho, and to the northwest down the Rose Creek valley;
- **Low Elevation Relative to Reference Levels – Barium, Chromium, Mercury, Nickel, and Selenium**. Maximum mine-affected concentrations are 3-9 times the measured Swim Lakes maxima. The zones of elevated elemental levels are generally more limited than those described for lead and the other elements in the High and Moderate categories. Note that the level of elemental elevation associated with selenium relative to Swim Lake maxima is higher (25 times) than the range indicated above, but that selenium has been placed in this "low" elevation category due to the limited extent of apparent elemental elevation;
- **Marginal Elevation Relative to Reference Levels – Antimony, Cadmium, and Cobalt**. These elements show some evidence of elevation in elemental levels associated with the Anvil Range Mine, but also either remain within reported Yukon reference ranges for lichen (antimony and cobalt), or appear normal within the local context, due to measurement of other elevated concentrations that are not mine-related (cadmium); and
- **No Elevation Relative to Reference Levels – Boron, Molybdenum, Titanium, Vanadium, Aluminum, Beryllium, Calcium, Magnesium, Manganese, Phosphorus, Potassium, Silicon, Sodium, Tellurium, Tin and Uranium.** These elements either showed spatially concentrated elevated metals levels in areas other than potential mine-affected areas, or showed no patterns at all. Observed elevated concentrations of these elements in the study area are not attributable to operations of the Anvil Range Mine.

Soils data were examined to search for evidence that elevated elemental levels attributed to mine-generated airborne deposition could be due instead or in part to the influence of underlying mineralized soil materials. This examination indicates that although patterns of lead and zinc concentrations in surface soil are similar to pattern in lichen, no similar pattern of elemental concentrations exists in subsurface organic or mineral soils. Furthermore, no correlation exists between underlying materials and surface-based observations. This supports the hypothesis that the spatial pattern of elevated elemental levels observed in the study area are the result of deposition from the Anvil Range Mine Complex, and eliminates the possibility that these levels should be attributed to natural effects pre-dating mining.

Results for total cyanide analysis in soils show that Rose Creek floodplain samples are below CCME soil-quality guidelines for free cyanide; <0.4 ppm in surface and subsurface mineral soil samples compared to 0.8 ppm for agricultural and residential / parkland soils.

Definition of the full spatial extent of elevation in elemental levels associated with the Anvil Range Minewill require additional sampling to the southwest to northeast of the Anvil Range Mine. Suggested locations for this sampling are presented in Section 2.2.

Objective Two:

To Determine if Deposition is Ongoing

The 2002 metals in soils and vegetation reconnaissance study (C.E. Jones & Associates Ltd. 2003) indicated that likely off-site elemental deposition from mine operations exists, but did not provide any information on the likely timing of this deposition. Understanding whether ongoing deposition exists at the Anvil Range Mine is critical to determining whether measured elemental concentrations are at their maxima, or will continue to increase. It will also provide an indication of the level of prioritization needed with respect to removing any current elemental dust sources during the closure phase of the Anvil Range Mine.

Moss bags were employed to determine whether airborne deposition is currently ongoing (Temple *et al.* 1981; Onianwa 2000). Bags are constructed through acquisition of a standard or uncontaminated source of moss. Moss is rinsed, dried and analyzed for pre-exposure elemental concentrations and then placed into polypropylene mesh bags. Bags are held aerially in monitoring locations, and analyzed after determined exposure intervals. Detected increases in element concentrations from pre-exposure concentrations are indicative of airborne deposition.

Thirty four moss bags were deployed on sample locations: closest to potential dust sources on the Anvil Range Mine; at Swim Lakes reference locations; and near the Town of Faro (Figure 37). Moss bags were first deployed in mid-August and then picked up at roughly ten week intervals to sample the following seasonal periods:

- Fall (between mid-August 2004 – early November 2004);
- Early winter (between early November 2004 – mid-January 2005); and
- Late winter (between mid-January 2005 – late March 2005).

Pre-exposure moss and all post-exposure moss bags collected in November 2004 and January 2005 were sent to CanTest Laboratories (Burnaby, BC) and analyzed for the 33 elements listed in Table 1. Moss bags collected in March 2005 could not be included in this report; samples are pending laboratory analyses.

Concentrations of lead and zinc in exposed moss bags were tested using the Getis-Ord G-statistic (a test of spatial clustering) to investigate the potential occurrence of significant non-random patterns in the distribution of elemental concentrations on the Anvil Range Mine. Spatial analysis through Kriging of moss bag data was not possible, due to the limited number of moss bag sampling stations. Instead, data

are displayed spatially (Figures 38, 40, 42 and 43) to provide information on post-exposure concentrations relative to levels in pre-exposure moss.

Analytical results from moss bags exposed for ten weeks (August to November 2004) and 20 weeks (August 2004 to January 2005) indicate airborne deposition associated with the Anvil Range Mine is ongoing. Deposition levels are highest for lead, and generally follows the patterns of cumulative deposition documented in lichen tissue, i.e., highest elemental elevation is concentrated in the vicinity of the Faro tailings impoundment / mill complex and northwest down the Rose Creek valley. Over the monitored period from August 2004 to January 2005, the majority of current deposition appears to have occurred in the fall (August to November), with no significant additional deposition in the early winter (November to January).

The following presents a summary of elevated elemental concentrations in moss bags. Categories are defined using elemental concentrations in exposed moss bags relative to pre-exposure levels:

- **High Elevation Relative to Pre-exposure Levels – Lead**. Levels greater than or equal to 100 times pre-exposure maximum were recorded at sample points in the immediate vicinity of the Faro tailings impoundment / mill complex. The Getis-Ord test for spatial clustering of lead in moss bags indicates a high probability of non-random elevated concentrations;
- **Moderate Elevation Relative to Pre-exposure Levels – Zinc, Silver, Barium and Nickel**. Levels greater than or equal to three times the pre-exposure maximum were recorded at sample points in the immediate vicinity of the Faro tailings impoundment / mill complex. The Getis-Ord test of spatial clustering of zinc in moss bags shows no significant non-random distribution; elevated levels were found only at the Faro mill site;
- **Low Elevation Relative to Pre-exposure Levels – Arsenic, Copper, Iron, Mercury, Selenium, Antimony, Cadmium and Cobalt**. Arsenic, iron, mercury, antimony concentrations less than or equal to two times the pre-exposure maximum were recorded in the vicinity of the Faro tailings impoundment / mill complex. However, copper, selenium, cadmium and cobalt show more widespread elevation in elemental levels (including elevated levels in the Swim Lake reference area for copper and cobalt), suggesting either an ambient regional deposition of these elements in addition to mine-generated airborne deposition; and / or deposition attributable to a source on the Anvil Range Mine independent of the primary source of airborne dust; and
- **No Elevation Relative to Pre-exposure Levels – Thallium and Chromium**. No evidence of elemental deposition in moss bags was observed for thallium or chromium.

Elements other than lead show some deviation from the observed cumulative patterns in lichen. These discrepancies between observed cumulative elemental elevation and current deposition suggest that:

- the contribution of current mine-site elemental dust sources is different than historical contributions, due to different operational and closure conditions; and / or

- the period monitored to date through moss bag exposure is not representative of the range of conditions that have contributed to cumulative deposition in the study area.

Furthermore, of those elements showing no sign of cumulative mine-generated deposition in lichen tissue, the following showed elevated levels in moss bags relative to unexposed moss: aluminum; molybdenum; manganese; and silicon.

Continued moss bag sampling (throughout spring and summer 2005) and ambient air sampling methods (such as the employment of mini-vol samplers) can be used to aid in the interpretation of these discrepancies between cumulative mine-generated deposition and current deposition. Ambient air sampling using mini-vols will also provide empirical measurements of ambient air concentrations; data that will be required to feed into human and ecological risk assessments. An ambient air sampling program using mini-vols should therefore be considered in the 2005 program.

While moss bags can provide an understanding of the general area of sources of current deposition they cannot identify precise locations. Lead isotope analysis can be used to distinguish specific current elemental dust sources on the Anvil Range Mine. A lead isotope analytical program should also be considered in the 2005 program.

Objective Three:

To Improve Characterization of Reference Elemental Concentrations

Selection of reference sampling locations is critical to conducting a retrospective study of mine impacts on soils and vegetation elemental concentrations where pre-mining sampling does not exist. Near-surface ore bodies that can be mined by open-pit methods are frequently associated with more widespread mineralization of surficial materials and soils. This mineralization can lead to naturally occurring elevated elemental concentrations in both soils and vegetation in areas surrounding ore deposits. It is important that such concentrations not be mistaken as evidence of elemental elevation resulting from mining operations. For this reason, reference sampling locations for the 2002 study (C.E. Jones & Associates Ltd. 2003) were carefully chosen to be located in areas of natural mineralization that would be free from additional mine site impacts. Geological reports on the Anvil Range area indicated a zone of mineralization trending from northwest of the Faro pit, through the mined deposits and to the southeast as far as the Swim Lakes basin (Bond 2001). This information suggested the Swim Lakes basin as the most representative retrospective reference sampling location.

Following the results of the 2002 study (C.E. Jones & Associates Ltd. 2003), concerns were raised by community members of the Town of Faro that the Swim Lakes reference area was not far enough from the footprint of the Anvil Range Mine Complex to be unaffected by mining activities, i.e., potential airborne deposition (Town of Faro Open House, March 2004). It was therefore suggested that a more extensive search for candidate reference areas be conducted in 2004 (GLL and C.E. Jones & Associates

Ltd. 2004). It was suggested that if this search did not yield additional candidate reference areas, a commitment would be made to conduct an expanded sampling program on Swim Lakes with the objectives of:

- expanding the reference data set and ensuring that sampling adequately covered the area of the identified Swim Deposit (Bond 2001); and
- sampling and analyzing lichen, soils and moss bags from the Swim Lakes reference areas to determine the suitability of this area as a reference site through testing for evidence of cumulative and / or ongoing deposition related to the activities of the Anvil Range Mine.

A search for appropriate additional reference sites prior to the 2004 field program did not yield any suitable candidates additional to the Swim Lake basin. The Swim basin is the furthest-removed of the similar deposits that occur off-site from the Anvil Range Mine Complex (Bond 2001) and the Swim basin is situated in the upwind direction for prevailing summer winds (when elemental dust sources on the mine site are not frozen or snow-covered). The only other potential local candidate site is the Grizzly deposit. This site was rejected; it is situated only 4 km SE of the Vangorda mine site.

Elemental concentrations in lichen on Swim Lakes, in elements considered to be affected by the activities Anvil Range Mine, were found to be within published reference concentrations (Crete *et al.* 1992; Gamberg unpub. data; Kabata-Pendias 2001; Rhoades 1999; Shaw and Gunn 1981). This result strongly supports the continued use of Swim Lake as a valid reference location.

Lead levels in Swim Lakes soils samples were compared to those potentially affected by activities of the Anvil Range Mine. In this comparison, if lead concentration in surface soils of Swim Lakes is similar to that in soils of mine-affected areas, it would suggest that Swim Lakes reference area is not free of potential airborne deposition from the Anvil Range Mine. Furthermore, if lead concentrations in subsurface soils of Swim Lakes are dissimilar to those in mine-affected areas, it would suggest that Swim Lakes reference area does not possess similar surficial geochemistry to mine-affected areas.

A comparison of lead values in Swim Lakes samples to those of potentially affected by activities of the Anvil Range Mine shows the following:

- **Surface Organic –** lead levels on the Swim Lake reference area are low in the context of the overall study area (Figure 22), with a median concentration of 10 ppm and a maximum of 18 ppm, compared to a potentially mine-affected median of 269 ppm and a maximum of 5930 ppm;
- **Subsurface Organic –** lead levels in subsurface organic soils are similar to those in mine-affected areas (Figure 28). Where dissimilarities do exist they are related to occurrences of very shallow surface soils (e.g., samples in Rose Creek) where translocation of elements from surface soils into the subsurface organic soils is evident; and

- **Subsurface Mineral –** the median lead level at the Swim Lake reference location is 15 ppm, with a maximum of 61 ppm. The median lead level in comparative soils for the potentially mine-affected study area is 16 ppm, with a maximum of 35 ppm. Figure 30 presents mineral soil lead data across the study area, and shows the comparability of the Swim Lake location to near-mine locations.

In synthesis, soil results show that Swim Lake reference is as comparable as possible (in a retrospective study) to pre-mining conditions on the Faro / Grum / Vangorda areas; Swim Lakes reference area is from the same naturally mineralized deposit type, but has not been affected by any significant mine-generated elemental deposition.

Comparison of elemental concentrations in moss bags deployed on Swim Lakes reference area and those of unexposed moss, show that elemental concentrations of cobalt, copper, lead, manganese and uranium in moss bags on Swim Lakes were elevated compared to unexposed moss. The lack of any evidence of cumulative elemental elevation for the three mine-affected elements (cobalt, copper and lead) in lichen at the Swim Lake reference location, and the lack of relationship in the other two elements to mining activities, suggests some ambient deposition of these elements at the Swim Lakes location independent of any mine influence, rather than a low-level effect from the mine site.

In summary, the lack of evidence in the Swim Lake reference area of cumulative elemental elevation of lichen and surface soil samples, and of current significant deposition in moss bags, strongly indicates that Swim Lakes reference area has not been affected by any significant mine-generated deposition. If concerns remain with regards to the source of elevated elements in moss bags (and therefore the validity of Swim Lake as a reference sampling location), it is suggested that consideration be given to the use of lead isotope analysis to distinguish potential mine-generated and ambient background lead sources on the Swim Lakes reference area.

Objective Four:

To Investigate Elemental Concentrations in Vegetation and Mineral Licks

In order to investigate potential elemental uptake by vegetation species of importance to wildlife (e.g., forage species) and / or humans (e.g., species used for medicinal use and / or consumption) selected vegetation species were sampled and analyzed. Soil samples were also collected at known mineral lick sites. These data can then be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future human health and ecological risk assessment and will also assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.

Vascular (i.e., rooting) vegetation can be influenced by both pre-existing mineralization (by rooting in the soil) and by airborne elemental deposition (through deposition on plant materials and uptake through surface soil). Therefore in order to distinguish between sources of observed elevated elemental

concentrations, and ensure that elevated concentrations are not erroneously attributed to mine operations if this conclusion is incorrect, soils were collected, subsampled and analyzed where vegetation species of importance to wildlife and / or humans were collected.

Vegetation species were selected from an expanded list of species documented to occur in the area of the Anvil Range Mine Complex. This selection aims to sample species that are important to wildlife and / or humans and relied heavily on input from the First Nations community and scientific knowledge regarding local wildlife food habits as well as input from the First Nations and community members of the Town of Faro regarding species of importance for human consumption and use. Samples of vegetation identified to be of importance to wildlife and / or humans were collected opportunistically where they were found to occur at all sample locations visited (including sampling areas defined by First Nations and Faro community members). The location of mineral lick sites were identified by community members on working maps and it was agreed that the location of these sites, as well as the specific location of any harvesting sites, would not be publicly displayed.

A subset of vegetation samples collected (Table 11) were sent to CanTest Laboratories (Burnaby, BC) for analysis of the 33 elements listed in Table 2. A subset of soil samples collected (including those from all mineral lick sites sampled, n = 2) was sent to CanTest Laboratories (Burnaby, BC) for analysis of the 29 elements listed in Table 3 and pH.

Results of the lichen Getis-ord statistical analyses and Kriging (Section 2.2) were used to focus comparative analyses of vegetation data between mine-affected and reference areas. Those elements considered to be affected by Anvil Range Mine operations (as determined through lichen Getis-ord analyses) were statistically compared in vegetation tissues among lichen lead zones (determined through lichen Kriging) and also compared to Swim Lakes reference levels and, wherever possible, published reference sources. Comparison between elemental levels in vegetation species found in mine-affected areas and Swim Lakes reference areas is considered valid despite the potential confounding effects of subsurface soil concentrations; subsurface mineral and organic soils are known to be similar between Anvil Range Mine Complex and Swim Lakes reference area (Figures 28 and 30). Where differences do exist they occur in the subsurface organic and are the result of influence of surface soils, i.e., through translocation of elements through a thin surface organic veneer into the subsurface organic (Section 2.2).

A summary of elemental levels in vegetation indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **High Elevation Relative to Reference Levels – Lead**. Lead concentrations for all species-groups were substantially elevated in the zone immediately adjacent to the Faro tailings impoundment / mill complex, indicating that the identified mine-generated deposition of this element in the study area has consistently affected vascular vegetation (and mushrooms) as well as lichen and soils. Magnitudes of elevation for lead concentration in these zones of highest elemental concentrations in lichen ranged from 2.5 (horsetails) to 410 (tree sap) times the respective Swim Lake reference means. Willows,

grasses, forbs, horsetails, mushrooms, and bear roots had lead levels above reference ranges. There are no reference levels in tree sap available for comparison.

- **Moderate Elevation relative to reference levels – zinc**. Statistically identified elevated levels in the zone immediately adjacent to the Faro tailings impoundment / mill complex were observed for berries, willows, and forbs. Magnitudes of elevation ranged from three (berries) to 20 (forbs) times the Swim Lake reference mean. Forbs, willow, mushroom and bear roots had zinc levels in the most mine-affected zones in excess of documented Yukon background ranges. There are no reference levels in tree sap available for comparison.
- **Low Elevation relative to reference levels – copper, nickel, silver, mercury and thallium.** These elements all showed isolated occurrence of statistically identifiable elevated concentrations relative to Swim Lake reference data. Magnitudes of elevation ranged from approximately two (copper in willows) to nine (silver in willows and thallium in Labrador tea) times Swim Lakes reference means.

There is also some evidence of elevation of other elements (in addition to those listed above) in northern rough stemmed mushrooms, bear roots and tree sap within mine-affected areas compared to Swim Lakes or Yukon reference levels: antimony; arsenic; barium; cadmium; chromium; cobalt; iron; and mercury. Most notably, maximum arsenic concentration in northern rough stemmed mushroom and tree sap in mine-affected areas are 11 times reference levels and maximum iron concentration in tree sap is 22 times reference levels. However, statistical comparison between mine-affected areas and Swim Lakes reference area was compromised by low sample size and lack of samples from the reference area in these species (and in horsetails). It is therefore suggested that additional samples of the following vegetation species be collected during the 2005 field season: northern rough stemmed mushroom; bear root; tree sap and horsetails. Lichen samples collected in 2005 can also be used to provide data necessary to classify those vegetation samples collected outside the 2004 Kriging zone by lichen lead kriging zone. Aquatic grasses were not sampled during 2004 since appropriate habitat conditions were not encountered during routine fieldwork activities. It is suggested that aquatic grasses be collected sites at selected through image interpretation (Landsat or orthophoto) to improve field efficiency.

Soil samples were collected from two mineral lick sites; one in the vicinity of the Anvil Range Mine (mineral lick site 2) and one in an area that was anticipated (during field work) to be within reference areas (mineral lick site 1). The results of the analysis of soils collected at mineral lick site 2 (within lichen lead zone 2) indicate the potential exists for the consumption of soils containing marginally elevated levels of mine-related elements, particularly lead, but show no substantial effects of mine-generated elemental elevation. Lead levels at mineral lick site 2 are no higher than Swim Lakes maxima or published maxima. These results will be investigated further upon classification of mineral lick site 1, i.e., following establishment of whether site 1 can be considered a representative reference mineral lick site through classification of this area by lichen lead kriging zone in 2005.

Objective Five:

To Investigate Elemental Concentrations in Wildlife Tissues

To investigate potential elemental uptake by wildlife species and wildlife species of importance to humans (e.g., species used for medicinal use and / or consumption) selected wildlife species were sampled and analyzed. Three main groups of animals have been considered in this evaluation:

- small mammals such as voles and shrews (given their significance as a food species of many other animals such as marten and foxes);
- furbearers such as snowshoe hare (*Lepus americanus*) given their significance as a food species of people and wildlife and marten (*Martes americana)* given their position in the food chain as consumers of other animal species; and
- hunted animals such as moose (*Alces alces*) and willow ptarmigan (*Lagopus lagopus*) given their significance as a food species of people and wildlife.

These data can then be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future human health and ecological risk assessment and will also assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.

Small mammal trap lines were laid out in the immediate vicinity of the mine site and in the Swim Lake reference area. A combination of standard snap traps and pit fall traps were placed in areas where small mammals were anticipated to be found, e.g., outside tunnel entrances, under logs and near the base of trees with low, over-hanging branches. Snap traps were used to target mice and voles and pit fall traps were employed to sample shrews (RIC 1998). Samples of muscle, liver and whole kidneys from small mammal carcasses were processed and stored separately for analysis and transported frozen to CanTest Laboratories Ltd. (Burnaby, BC) for ICP-MS analysis of the 33 elements listed in Table 2.

Tissues samples and / or whole carcasses were obtained from hunters and trappers active in the area of the Anvil Range Mine and Swim Lakes. In 2004, tissue samples from moose, woodland caribou and stone sheep were donated by hunters and carcasses of marten were submitted by trappers. In addition, carcasses of marten and willow ptarmigan were collected by Department of Environment Staff.

Hunters, trappers and Department of Environment Staff were requested to provide information on the animal hunted, trapped or collected (e.g., species and gender), on the sample donated (e.g., whole carcass or kidney) and on the location of where the animal was hunted through the completion of a wildlife submission form (Appendix I). To protect the confidentiality of information on the location of hunted and trapped animals, the location is recorded by grid cell (1 km by 1 km UTM grid) rather than exact location (e.g., GPS coordinates). Assurance was made that the exact location of where the animal was hunted or trapped would not be publicly displayed.

Samples of muscle, liver and whole kidneys from furbearer and small game were removed from submitted carcasses. Liver and muscle tissues of large game were subsampled from samples removed by hunters in the field in accordance with the Northern Contaminants Monitoring program methodology. Kidneys were maintained as entire organs. All liver, kidneys and muscle tissue were processed and stored separately for analysis and transported frozen to Elemental Research (Vancouver, BC) for ICP-MS analysis of the 26 elements listed in Table 12. Ungulate teeth submitted by hunters were aged by Department of Environment Staff in accordance with the Northern Contaminants Monitoring program methodology.

Results of the lichen Getis-ord statistical analyses and Kriging (Section 2.2) were used to focus comparative analyses of small mammal data between mine-affected and reference areas. Those elements considered to be affected by Anvil Range Mine operations (as determined through lichen Getis-ord analyses) were statistically compared in small mammal tissues among lichen lead zones (determined through lichen Kriging) and also compared to Swim Lakes reference levels and, wherever possible, published reference sources. Elemental concentrations in small mammal tissues of those elements considered to be unaffected by Anvil Range Mine operations (determined through lichen Getis-ord analyses) were compared only to Swim Lakes reference levels and, wherever possible, published reference sources.

A summary of elemental levels in northern red-backed voles tissues and organs indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **High Elevation Relative to Reference Levels – Lead.** Lead concentrations in all tissues and organs analyzed were substantially elevated in the zones immediately adjacent to the Faro tailings impoundment / mill complex, indicating that the identified mine-generated effect of this element in the study area has consistently affected northern red-backed voles as well as vascular vegetation (and mushrooms), lichen and soils. Magnitudes of elevation for lead concentration in these highly elevated zones ranged from > 11x (muscle tissue) to > 38 (kidney) times the respective Swim Lake reference means. These values exceed published reference levels in all tissues and organs analyzed.
- **Moderate Elevation Relative to Reference Levels –** copper; iron; thallium; and nickel. Statistically identified elevated levels in the zones immediately adjacent to the Faro tailings impoundment / mill complex were observed for muscle (nickel) and liver (nickel and iron). Maximum elemental concentrations in kidney observed in mine-affected areas exceeded those on the Swim Lakes reference area in copper, iron, thallium and nickel. Magnitudes of elevation ranged from 1.2 (copper in kidney) to 6.2 (nickel in muscle) times the Swim Lake reference mean. Copper in kidney and iron in liver and kidney exceed published reference levels, however, levels on Swim Lakes also exceed published reference levels. There are no reference data available on thallium and nickel levels in the tissues or organs of herbivorous rodents.

- **Low Elevation Relative to Reference Levels – Silver; Chromium; and Selenium.** These elements all showed isolated occurrences of elevated concentrations relative to Swim Lake reference data. Magnitudes of elevation ranged from approximately 1.5 (selenium in liver) to 2.9 (chromium in muscle) times Swim Lakes reference means. These elements were elevated only on Vangorda / Grum and not in the area of the Faro tailings impoundment / mill complex. No values exceed published reference levels.
- **No Elevation Relative to Reference Levels – Arsenic; Zinc; Barium; Mercury; Antimony; Cadmium and Cobalt.** While data obtained from specimens of northern red-backed voles are representative of other herbivorous rodents (e.g., heather vole and Siberian lemming), we have no representation of an omnivorous (deer mouse) or primarily carnivorous species (common shrew). It is therefore suggested that additional small mammal trapping be conducted in fall 2005 to focus collection of a sufficient number of shrew specimens for analysis. It is also suggested that given the small average body mass of shrew specimens collected (average of 2.69g [± 0.574g, n = 16]), consideration be given to analyzing shrew samples as total body samples rather than by muscle, kidney and liver samples.

Those elements considered to be affected by Anvil Range Mine operations (determined through lichen Getis-ord analyses) were statistically compared to Yukon Hunter Survey data using an analysis of variance (ANOVA). Since the age of an animal can have a discernable effect on the concentration of elements in their tissues (Gamberg unpub. data) age was controlled for within the ANOVA computation (with the exception of comparisons of concentration in muscle tissue; YHS muscle tissues were pooled from a number of animals with disparate ages).

A summary of elemental levels in ungulate tissues and organs indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **Moderate Elevation Relative to Reference Levels – Lead.** Statistically identified elevated levels were observed in the liver and kidney of woodland caribou hunted in the vicinity of the ARM relative to Yukon Hunter Survey (YHS) data. Magnitudes of elevation ranged from 1.1 (kidney) to 1.6 (liver) times the YHS maxima;
- **Low Elevation Relative to Reference Levels – Zinc; Iron; Silver; and Selenium.** Statistically identified elevated levels were either not observed for these elements in the tissues of ungulates hunted in the vicinity of the ARM or interpretation was undermined by low sample numbers but isolated occurrences of elevated concentrations relative to Yukon Hunter Survey (YHS) maxima were observed. Magnitudes of elevation ranged from 1.1 (selenium in sheep kidney) to 5.4 (silver in woodland caribou muscle) times the YHS maxima.
- **No Elevation Relative to Reference Levels – Arsenic; Copper; Thallium; Barium; Chromium; Mercury; Nickel; Antimony; Cadmium; and Cobalt.** It should be noted that sample sizes for all ungulate data from the Anvil Range Mine are low (Table 15) and this is particularly true of the sheep

data, where only one liver and one set of kidneys from two different sheep were available for comparison with Yukon Hunter Survey data. Caution should therefore be applied in the interpretation of all ungulate statistical analyses and additional attempts made in 2005 to expand the ungulate dataset, particularly samples from stone sheep.

Of the original species list presented in Section 6.1, samples from the following species are still to be collected: grouse; beaver; muskrat; ground squirrel; hoary marmot; snowshoe hare; grizzly bear; and black bear (as well as samples of fox, wolverine, lynx and wolf). Samples are also required of willow ptarmigan from Swim Lakes reference area. It is suggested that samples of fox, wolverine, lynx and wolf are not actively pursued in 2005. Marten can be considered representative of these medium sized carnivores (and small carnivores such as least weasel and ermine) given similarity in food habits.

An integral part of this study is information exchange between and members of the local communities of Ross River, Faro and Pelly Crossing and project personnel. Frequent contact not only allows project personnel to provide community members with regular updates on project progress, it also provides an effective forum for input from community members into study design. The following provides a summary of meetings held within the communities during the design and execution phases of this project:

- Open House, Town of Faro, March 15, 2004, Faro;
- Selkirk First Nation Traditional Knowledge Workshop, April 21 – 22, 2004, Pelly Crossing;
- Ross River Terrestrial Effects Workshop, May 5, 2004, Ross River;
- Terrestrial Effects Update and Traditional Knowledge Data Handling, August 25, 2004, Ross River; and
- Selkirk First Nation Faro Closure Plan Workshop, November 25 and 26, 2004, Pelly Crossing.

The following information was provided during these meetings and fed into study design:

- identification of vegetation species of importance to wildlife and humans for consumption and / or medicinal use;
- identification of wildlife species of importance to wildlife and humans for consumption and / or medicinal use;
- general location of berry and game harvesting areas;
- general location of wildlife sightings and wildlife foraging areas;
- specific location of mineral lick sites;
- methods of collected tree sap;
- provision of names of local trappers and hunters to facilitate the collection of wildlife tissues; and
- request for consideration of cyanide in the analysis of soils.

Community updates and requests for community participation have also been made through the release of project updates through local newsletters and posters and through informal meetings with community members.

Discussion on the appropriate use of traditional data collected through the Terrestrial Effects Study field program was also initiated. In exploring areas of concern to the First Nation, it was confirmed that sensitivity lies in two areas:

- Documenting information on the species of animal or plant consumed by people is acceptable to the First Nation. However, the First Nation does not want information published on the reasons for or values associated with consumption (e.g., specific medicinal use); and
- The First Nation is also concerned that data not divulge exact locations where traditional harvesting takes place. Information respecting the general location is acceptable for publication, but exact locations (e.g., GPS coordinates) are not acceptable.

Assurances were given by Gartner Lee Ltd. that these two areas of concern would be respected in the recording and reporting of project results.

A number of Open Houses were planned in the original project design in Ross River, the Town of Faro and in Pelly Crossing in February / March 2005 (Gartner Lee Limited 2004). However it was decided that these meetings be delayed until the final project report was finalized and project results could be presented and discussed.

Four assistants from Ross River Dena Council and Selkirk First Nation were employed by Gartner Lee Ltd. as part of the Anvil Range Mine Complex Terrestrial Effects Study to assist in the field and office components of this project. Field assistants were provided training in the following areas prior to and during field and office work:

- Gartner Lee bear awareness course;
- proper handling and storage protocols for soil, vegetation and small mammal samples;
- education of risks of contamination of samples and effects on data interpretation;
- training in basic soils descriptions (all assistants have existing plant identification skills);
- GPS and navigation skills;
- helicopter safety;
- field logistics;
- field habitat description methods; and
- small mammal trapping techniques.

Field assistants contributed to the program in completion of the following tasks:

- moss bag creation;
- soil and vegetation collection;
- soil and vegetation sample organization and shipping;
- moss bag deployment and pick up;
- small mammal trapping; and
- soil and vegetation sample organization and shipping.

1. Background and Objectives

Gartner Lee Limited was retained by Deloitte & Touche Inc. (in its capacity as Interim Receiver of the Anvil Range Mine) to develop and execute a Terrestrial Effects Study Design for the Anvil Range Mine Complex. This study was initiated under the recommendation of the Environmental Assessment conducted in support of the application for Water Licence Renewal for ongoing care and maintenance activities at the Anvil Range Mine Complex (Deloitte & Touche Inc. and Gartner Lee Limited 2003). The findings of the Terrestrial Effects Study will feed into on site care and maintenance activities and into the development of the Final Closure and Reclamation Plan for the Anvil Range Mine Complex.

The Anvil Range Mine Complex (including both the Faro and Vangorda Plateau mine sites) has been in existence since 1968 / 69 under various owners and has been managed in a care and maintenance state by the Interim Receiver (Deloitte & Touche Inc.) of the last mine owner, Anvil Range Mining Corporation, since April 1998. Project funding is now provided by the Department of Indian Affairs and Northern Development (DIAND). The federal and territorial governments formally recognized, in January 2003, that the Anvil Range Mine Complex was not economically operable and would not be operated again. They committed to jointly develop a Final Closure and Reclamation Plan for the mine property, in concert with First Nations. A Type II Mines Office, managed jointly by DIAND and the Yukon Government (YG), is managing the development of the Final Closure and Reclamation Plan. One of the information needs identified was the development of closure objectives for several technical topic areas (e.g., water quality, flood design, economic issues). One of the topic areas identified was terrestrial resources related to potential elevated metal concentrations in vegetation, soils and wildlife in the vicinity of the Anvil Range Mine Complex.

The overall objective of this project is to provide the field information necessary for a future human and ecological risk assessment (HHERA). In general the objectives aim to address the spatial extent of elevated elemental levels, improve characterization of reference elemental concentrations, determine the timing of elemental deposition from the Anvil Range Mine, and investigate current elemental concentrations in plant and wildlife tissue. Specific objectives, methodological approaches and results are outlined below. It is important to note that while the Terrestrial Effects Study aims to provide an understanding of the spatial extent, timing and concentrations of elements in the terrestrial environment in the vicinity of the Anvil Range Mine, it does not provide an understanding of the significance of these results in terms of human health and ecological risk. A HHERA is the next step in the process and the findings of the Terrestrial Effects Study provides some of the data necessary for input into the HHERA model.

Table 1 summarizes the specific objectives of the Terrestrial Effects Study. The table also outlines the broad methods and rationale for each objective.

Table 1. Objectives of Terrestrial Effects Study

	Objective	How will the Objectives be Addressed?	What will be Achieved?	Section Reference
1	**To improve characterization of the spatial distribution of elevated elemental concentrations**	• Non-random sampling design overlain on a grid network; • Sampling of *Cladina* lichen; and • Sampling of surface (moss), h-horizon, b-horizon at a subset of sites.	• Will improve delineation of spatial extent of zone of elevated elemental concentrations. The preliminary 2002 study did not define these zones.	Section 2
2	**To determine if deposition is ongoing**	• Moss bag sampling	• Will assist in determining if the terrestrial environment is being exposed to ongoing sources of elevated metal concentrations, and will assist in determining mitigative options for final closure.	Section 3
3	**To improve characterization of elemental concentrations in reference materials**	• Conduct additional reference sampling; • Search for additional candidate reference locations; and • Results of interpolation will also assist in interpretation of where elevated metal concentrations level off	• Verify that the comparison of potentially influenced data points to reference concentrations is valid.	Section 4
4	**To investigate element al concentrations in vegetation and mineral licks**	• Sample vegetation species of interest or importance to humans (e.g., species used for medicinal and / or consumption use) and wildlife (e.g., forage species); and • Sample soils at mineral lick sites	• Will provide data for a human health and ecological risk assessment; and • Will assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.	Section 5
5	**To investigate elemental concentrations in wildlife tissues**	• Collect tissue samples (liver, kidneys and muscle) from wildlife species in the vicinity of the mine	• Will provide data for a human health and ecological risk assessment; • Will assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.	Section 6

2. Characterization of Spatial Distribution of Elevated Elemental Concentrations

2.1 Methods

2.1.1 General Approach

Sampling for the 2004 Terrestrial Effects Study was designed to build on information collected in 2002 (C.E. Jones & Associates Ltd. 2003). Data from 2002 show that elevated elemental concentrations resulting from potential airborne deposition occur in a zone that extends at a minimum of 2 to 3 km in all directions from potential mine-site elemental dust sources, and that the highest concentrations appear to extend northwest to north of the tailings impoundments and mill complex. The 2004 Terrestrial Effects Study objectives relating to spatial distribution were:

1. To provide additional information on near-source elevated elemental levels and improve delineation of patterns of elevated elemental concentrations; and
2. To determine the extent of elevated elemental levels, or the maximum distance from the mine complex of identifiable effects.

The determination of spatial distribution of elevated elemental levels in the 2004 data collection program is based primarily on sampling of terrestrial lichens and supported through soil sampling. Soil sampling provides confirmation of lichen results (in surface horizons) and will also allow for the evaluation of the presence of natural soil mineralization unrelated to mining operations through separate sampling of surface organic, subsurface organic and subsurface mineral samples.

2.1.2 Lichen Sampling

Lichen are entirely dependent on airborne or precipitation sources of nutrients (and metals), and thus are isolated from underlying soil mineralization. A study of the till geochemistry in the area of the Anvil Range Mine Complex (Bond 2001) indicates a dispersal train of mineralized till (subsurface mineral) trending north and west from the Faro deposits towards Next Creek and Rose Creek (Figure 1). This coincides with the primary direction of airborne dispersal indicated by the 2002 vegetation and soils metals study (C.E. Jones & Associates Ltd. 2003). Thus, in the 2004 study, every precaution was taken to ensure that elevated elemental concentrations resulting from natural mineralization are not misattributed to effects of airborne deposition generated by mining operations. To this end it was concluded that the determination of the spatial distribution of elevated elemental concentrations in the 2004 data collection program be based primarily on lichen sampling. Furthermore, lichen are long-lived perennial

accumulators i.e., do not annually renew "foliar" tissue, as deciduous species do. As a result, elemental concentrations in lichen tissues represent a cumulative history of airborne deposition.

Lichen Sampling Locations

Geostatistical analysis (Kriging) of 2002 lichen data was used to assist in the identification of 2004 sample locations. Where the results of the Kriging exercise showed data gaps (through analysis of confidence in interpolation between 2002 sample points), potential sampling locations were identified. Sample sites were then selected by eye with the objective of filling these identified data gaps. Figure 2 shows the distribution of sampling locations for both the 2004 and 2002 field sessions. This figure shows an increased sample point density within the projected affected areas (e.g., surrounding the tailings impoundments and mill complex), an extension of existing transects (e.g., northwest to north of the tailings impoundments and mill complex and downstream Rose Creek) as well as an increased coverage of all areas surrounding the mine footprint (e.g., Grum / Vangorda mine areas, along the haul road between the Faro and Grum / Vangorda mine areas and between the Town of Faro and the haul road). There are a number of outlying sample locations that have been incorporated into this sampling program in response to specific public input, e.g., at the confluence of Anvil Creek and the Pelly River and within the Town of Faro.

A primary objective of the 2004 sampling program was to delineate the maximum distance from the Anvil Range Mine Complex of elevated lichen elemental concentrations. A conservative approach was adopted based on the limited information available from the 2002 results. This approach was informed by two factors:

1. It was hypothesized that lichen elemental concentrations might not decay consistently with distance from the Anvil Range Mine Complex elemental dust sources but might decrease abruptly from the influence of significant topographic features; and
2. Kriging functions best as an interpolation tool, and is weak as an extrapolation tool.

Based on these factors, 2004 sampling transects were extended 1-2 points past the local significant "heights-of-land" surrounding the Faro tailings impoundment / mill complex (e.g., Rose Mountain and Mount Aho). It was reasoned that this approach would allow abrupt lichen elemental concentration breaks to be captured within the Kriging interpolation zone.

The 2002 lichen data set showed that one of the major zones of elevated elemental concentrations was the Rose Creek drainage downstream of the mine complex. There are a number of potentially confounding elemental sources within this drainage. In addition to the hypothesized airborne elemental depositionoriginating from the mine complex, there are potential water- and sediment-borne elemental

sources. These latter sources include the historical Faro tailings dam breach[1] and fluvial transport of native naturally mineralized surficial material. In an attempt to differentiate between these sources in the Rose Creek drainage, sixteen paired sample points were established, with one sample point of each pair located on the current (fluvial) floodplain of Rose Creek, and the corresponding point located on the adjacent (northern) till side slope. Sample points on the till side slope are isolated from fluvial transport of anthropogenic or native sediment.

Lichen Sampling Methods

The primary terrestrial lichen species sampled was *Cladina mitis* – this species was collected on all sample points wherever it occurred (Figure 2). A small number of sample points contain tissues from *Cladina stellaris* as well, due to failure to distinguish between this species and *C. mitis* in the field.

Lichen samples were collected using un-powdered nitrile gloves, with new gloves used at each sample site. Non-lichen material was removed from the samples at each sample site, to ensure comparability of samples. Samples were collected in metalized polyester Kapak bags (designed to be trace element-free) and isolated from other potential contaminant sources prior to laboratory analysis.

A copy of the field data form used during lichen sampling can be found in Appendix A.

Lichen Laboratory Analysis

Lichen samples were sent to CanTest Laboratories (Burnaby, BC) for analysis of the 33 elements listed in Table 2. Samples were first digested using a nitric acid - hydrogen peroxide digestion procedure based on U.S. Environmental Protection Agency Method 200.3. Analysis of all elements except mercury was performed using ICP-MS (Inductively Coupled Argon Plasma Spectroscopy - Mass Spectrometry). Analysis of mercury was performed using Cold Vapour Atomic Absorption or Fluorescence Spectrophotometry.

[1] A tailings dam breach occurred in 1975 resulted in the deposition of mine waste materials in the Rose Creek drainage.

Table 2. Analytical Parameters for Tissue and Detection Limits at CanTest Laboratories in μg /g (ppm)

Element		Reported Detection Limit
Aluminum	Al	0.5
Antimony	Sb	0.1
Arsenic	As	0.1
Barium	Ba	0.1
Beryllium	Be	0.02
Boron	B	2
Cadmium	Cd	0.02
Calcium	Ca	1
Chromium	Cr	0.1
Cobalt	Co	0.1
Copper	Cu	0.1
Iron	Fe	5
Lead	Pb	0.1
Magnesium	Mg	0.5
Manganese	Mn	0.1
Mercury	Hg	0.01
Molybdenum	Mo	0.1
Nickel	Ni	0.1
Phosphorus	PO_4	0.5
Potassium	K	1
Selenium	Se	0.2
Silicon	SiO2	10
Silver	Ag	0.01
Sodium	Na	1
Strontium	Sr	0.05
Tellurium	Te	0.1
Thallium	Tl	0.02
Tin	Sn	0.1
Titanium	Ti	0.3
Uranium	U	0.04
Vanadium	V	0.5
Zinc	Zn	0.5
Zirconium	Zr	3

Lichen Data Analysis

Geostatistical analytical techniques applied to lichen data to delineate patterns of elevated elemental concentrations surrounding the Anvil Range Mine Complex are noted in Section 2.2. A complete discussion of these techniques is provided in Appendix B.

2.1.3 Soil Sampling

Soils are also perennial accumulators and therefore provide a cumulative history of airborne deposition. However, mineral soils are also subject to confounding influences through natural mineralization and glacial transport. Sampling soils as part of the spatial distribution program therefore enables:

- confirmation of lichen results; and
- evaluation of the presence of naturally elevated elemental concentrations unrelated to mine operations in local surficial materials.

In order to allow this latter evaluation, soils were sampled separately by horizon / parent material, as follows:

- surface organic (0-2 cm of F horizon) – obtained directly under live vegetation and its associated litter layer;
- subsurface organic (lower F / H horizon) – obtained directly over the organic/mineral interface, at a minimum depth of 5 cm from soil surface; and
- subsurface mineral sample (B horizon).

This stratification by depth and type of soil material provides some interpretative power (e.g., elevated elemental concentrations in surface organics in comparison to sub-surface organics would support the airborne deposition hypothesis, whereas elevated concentrations throughout the organic and mineral profile would suggest mineralization pre-dating mining operations).

Soil Sampling Locations

For the purposes of the spatial distribution program, soil samples were collected at a subset of the sampling locations displayed in Figure 2 including the paired sample sites on Rose and Anvil Creeks, all sites on Swim Lakes reference areas and a representative number of sites throughout the study area. Soil samples were also collected on sites where vegetation species of importance to humans and / or wildlife were collected (Section 5).

Soil Sampling Methods

Soil samples were collected using stainless-steel shovels to minimize metal contamination during sampling. Shovels were cleaned with 99% isopropanol prior to sampling at each site. Soil was handled wearing un-powdered nitrile gloves, with new gloves used at each sample site. Living vegetation and rocks were removed from the samples, to ensure comparability of samples. Samples were collected in metalized polyester Kapak bags (designed to be trace element-free) and isolated from other potential contaminant sources prior to laboratory analysis.

Soil samples were collected at all three depths described above (where available):

- surface organic (0-2 cm of F horizon);
- subsurface organic (lower F / H horizon); and
- subsurface mineral sample (B horizon).

A small number of collected soil samples did not fit into the categories described above. For instance, a small number of surface mineral samples were collected on the Rose Creek floodplain, as fluvial activity at the sample point has prevented deep surface organic layers from forming, or has removed these layers. Some anomalous materials were also collected, such as samples of White River Ash[2] deposits, typically encountered at the organic / mineral interface.

A copy of the field data form used during soil sampling can be found in Appendix A.

Soil Sub-sampling Methods

A subset of soil samples collected was selected for immediate analyses of elemental concentrations. The remaining soil samples were archived for any future analyses. Soils were selected for immediate analyses as follows:

- where lichen samples showed highest levels of lead and zinc (e.g., lead levels were at least 10 x Swim Lakes maximum);
- from all soil samples collected in the Rose Creek area;
- from all soil samples collected from Swim Lakes reference area;
- from all soil samples collected near the Town of Faro; and
- from soil samples collected where vegetation samples were collected in areas identified as valued foraging areas for wildlife and humans (Section 5).

A further subset of samples was analyzed using a sequential extraction technique, in order to provide information on relative mobility of metals deposited as a result of mining operations. This sample subset was also analyzed for organic matter content, to investigate the effects of organic complexation of metals by evaluating potential correlations between mobility as indicated by sequential extraction and organic matter content. This subset of samples was selected to adequately represent the Swim Lake reference area and the most highly mine-affected areas.

[2] The White River Ash is a voluminous deposit of Holocene airfall tephra covering an area of 540,000 square kilometers across parts of Alaska and portions of the Yukon and Northwest Territories. The deposit was created as the product of two explosive eruptions of Mount Churchill, approximately 1887 and 1147 years B.P.

Cyanide was analyzed on a further subset of analyzed samples in response to public concerns raised during a community meeting (Selkirk First Nation Faro Mine Remediation Plan Update and Closure Plan Objectives Workshop November 2004) with regards to the absence of cyanide in the list of elements analyzed (Table 3). Although it was suspected that cyanide was unlikely to be an issue in the terrestrial environment, confirmatory sampling was conducted. Soil sample selection focused on areas anticipated to have the greatest potential to be influenced by cyanide, i.e., those areas subject to the tailings dam breach in Rose Creek. Samples collected on Rose Creek floodplain were then compared to CCME guidelines.

Soil Laboratory Analysis

The subset of soil samples collected for metals analyses was sent to CanTest Laboratories (Burnaby, BC) for analysis of the 29 elements listed in Table 3 and pH. Soil pH was analyzed based on procedures described in the Manual on Soil Sampling and Methods of Analysis, published by the Canadian Society of Soil Science, 1993. The test was performed using a deionized water leach with measurement by pH meter. Strong acid leachable metals analysis was used to test all elements (except mercury, arsenic and selenium) in soils: analysis was performed using British Columbia Ministry of Environment, Lands and Parks Method, Strong Acid Leachable Metals in Soil, Version 1 (Province of British Columbia 2001). This method involves drying the sample at 60 degrees Celsius, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was then performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP). The same preparation procedures (i.e., drying, sieving and digestion using a mixture of hydrochloric and nitric acids) were used to prepare arsenic, selenium and mercury for analysis. Arsenic and selenium were analyzed using ICP-MS and mercury was analyzed using Cold Vapour Atomic Fluorescence.

The sequential extraction used was based on that developed by Tessier *et al*. (1979). The first extraction, with hydroxylamine hydrochloride ($NH_2OH \bullet HCl$), releases Fe and Mn oxides in addition to soluble and exchangeable metals, metals bound to carbonates and fulvic acids, and possibly amorphous metal sulphides (Zhang *et al.* 2001). The second extraction, with sodium pyrophosphate ($Na_4P_2O_7$), releases organically bound metals as described in Lavkulich (1981). The final extraction by aqua regia digest SALM method (Province of British Columbia 2001) releases the residual fraction (metals bound to sulphur compounds, some recalcitrant organics, and crystalline structures). All extract solutions were analyzed for metals using ICP-MS. Mercury in extract solutions was determined using a procedure based on the US EPA method 1631 oxidative digestion using bromination, then analyzed by Cold Vapour Atomic Fluorescence Spectroscopy.

Cyanide analysis was performed using procedures based on those described in British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials (Province of British Columbia 1994) and Standard Methods for the Examination of Water and Wastewater (American Public Health Association).

Table 3. Analytical Parameters for Soil and Detection Limits at CanTest Laboratories in μg /g (ppm)

Element		Reported Detection Limit
Aluminum	Al	10
Antimony	Sb	10
Arsenic	As	0.1
Barium	Ba	1
Beryllium	Be	0.02
Boron	B	1
Cadmium	Cd	0.5
Calcium	Ca	1
Chromium	Cr	2
Cobalt	Co	1
Copper	Cu	1
Iron	Fe	2
Lead	Pb	5
Magnesium	Mg	0.1
Manganese	Mn	1
Mercury	Hg	0.01
Molybdenum	Mo	4
Nickel	Ni	2
Phosphorus	PO_4	20
Potassium	K	10
Selenium	Se	0.2
Silver	Ag	2
Sodium	Na	5
Strontium	Sr	1
Tin	Sn	5
Titanium	Ti	1
Vanadium	V	1
Zinc	Zn	1
Zirconium	Zr	1

Soil Data Analysis

Geostatistical techniques used to analyze soil data are discussed in Section 2.2. A full presentation of geostatistical methods employed in this study is attached as Appendix B.

2.2 Results

2.2.1 Lichen Sampling

Lichen Sampling Locations

Figure 3 shows the distribution of lichen samples collected and analyzed during 2002 and 2004 field sessions.

Lichen Sampling Methods

Table 4 summarizes the number of lichen samples collected. All lichen samples were collected during a 10 day field session at the beginning of August 2004.

Table 4. Summary of All Lichen Samples Collected and Analyzed by ICP-MS in 2002 and 2004

Year	Number of Lichen Samples Analyzed
2002	38
2004	132
Total	170

Lichen Laboratory Analysis

Lichen raw data is presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided by standard batch QA / QC procedures performed by CanTest. The results of these QA / QC analyses are presented in Appendix E.

Lichen Data Analysis and Interpretation

Analytical Approach

Lichen elemental concentration results for 2002 and 2004 were pooled to create an integrated data set of 170 samples (Table 4). It should be noted that samples collected in 2002 were analyzed for a restricted set of elements: silver; arsenic; cadmium; chromium; copper; mercury; nickel; lead; selenium; and zinc. Results reported for these elements therefore represent the integrated 2002 / 2004 data set. Results presented for all other elements are obtained from 2004 sampling efforts only.

The lichen data set were screened using the Getis-Ord G-statistic (a test of spatial clustering) to investigate the potential occurrence of significant non-random patterns in the distribution of elemental concentrations (a full discussion of geostatistical analytical techniques employed in this study is provided in Appendix B). Non-significant results of this test indicate no spatial pattern in elevated elemental

concentrations, and thus no statistically identifiable effect of mine-related activities on lichen elemental concentrations. Significant results of this test indicate the occurrence of a non-random pattern in elevated elemental concentrations that could be related to mine-related activities. A geostatistical technique known as Kriging is then employed to spatially represent the pattern of elemental concentrations to determine whether patterns indicate an effect of mine-related activities, e.g., by showing that the location of highest elemental concentrations is centred on the Anvil Range Mine Complex. The Kriging technique uses known information from spatially located data points to create a contour surface of interpolated and known concentrations across the study area. The interpolated surface is limited to an area where concentrations are known with a selected minimum confidence; in this case the prediction is constrained to one third of the total predicted standard error. A full discussion of Kriging technique and the methods used in this study is provided in Appendix B.

The employment of geostatistical analytical techniques allow for the consideration of the gradational nature of these data, i.e., elemental concentrations decreasing with distance from a source. A simple comparison between potentially mine-affected and reference areas, in the absence of this consideration, is confounded by the inherent source of variation is the data, e.g., the variation in the data in potentially mine-affected areas could likely be too great to detect any statistically significant difference between potentially mine-affected and reference areas. Therefore, to avoid this confounding effect, geostatistical analytical techniques (in this case Getis-Ord G-statistical test and Kriging) were employed to separate out this source of variation in the data.

Spatial Patterns of Elemental Concentrations

Of the elements analyzed in 2004, aluminum, beryllium, calcium, magnesium, manganese, phosphorus, potassium, silicon, sodium, tellurium, tin and uranium showed no significant spatial patterns in lichen tissue, i.e., the pattern of elemental concentrations was random throughout the project area. These elements were not investigated further, as these data show no identifiable effect of mine-related activities on the distribution of these elements within the project area. The following elements do show statistically significant spatial patterns of elevated concentrations: antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, silver, thallium, titanium, vanadium, and zinc. There are two elements, boron and molybdenum, that show significant spatial patterns of concentration by Getis-Ord analysis, but were not investigated through Kriging. These two elements could not be Kriged, as the majority of results (94% for boron and 88% for molybdenum) were below the laboratory detection limits of 2 ppm and 0.1 ppm, respectively. For both elements, levels recorded above detection limit were found both in the Swim Lake reference (background) location and at sample points in the potentially mine-affected area. These results were only marginally in excess of detection limits (2-3 ppm for boron; 0.1-0.4 ppm for molybdenum) at both background and potentially mine-affected sample points. Thus, despite the appearance of spatial clustering of these data, there is no evidence of any effects of mining operations at the Anvil Range Mine on lichen tissue boron or molybdenum concentrations. Furthermore, the maximum recorded concentrations for these elements are

within or close to published reference (non-contaminated) concentration ranges for these elements (Rhoades 1999).

Characterization of Spatial Distribution of Affected Elements

The remaining 17 elements showing statistically significant spatial concentrations of elevated levels were analyzed by Kriging technique. These results of these analyses are discussed by element, below. In the attached figures (Figures 4 - 20), levels predicted to be equal to or lower than the observed Swim Lake reference maxima are shown within the first zone (coloured light blue). The maximum elemental concentration in this first zone corresponds to the maximum elemental concentration observed on Swim Lakes reference area. All other breaks were defined using Jenk's algorithm; this method defines natural breaks in the data. Note that in order to avoid the potential confounding influence of water and sediment transport in the Rose Creek drainage, the following analyses are based only on results from the side slope (till-based) sample points of the paired Rose Creek points (Section 2.1), and do not include the floodplain points. This precaution is in addition to the use of lichen as an indicator, which was chosen explicitly to avoid confounding effects from underlying mineralized soil materials.

Appendix D provides a summary of the areal extent of each zone of elevated elemental concentration within the Kriging surface of each element. These data aim to supplement the descriptions of the spatial extent of elevated elemental concentrations described below. However, it should be noted that since reference levels, in the majority of mine-affected elements, were not reached in 2004 these quantitative estimates do not, in most cases, represent the true areal extent of each zone.

Lead

Results of the Kriging analysis of the integrated 2002 / 2004 data set for lead are presented in Figure 4. This figure indicates the following trends in lead concentrations in lichen tissue:

1. The highest lead concentrations (red zone) are found in the area immediately to the north and west of the Faro tailings impoundment / mill complex. Concentrations in this zone are approximately 150-450 times the maximum levels found in the Swim Lakes reference area. The highest concentration observed, 747.7 ppm, was found on a sample point located approximately 1 km north of the Faro tailings impoundment / mill complex. This concentration is comparable to some of the highest concentrations reported in the world for vegetation growing adjacent to mining and metal-processing areas (Kabata-Pendias 2001 – note that these published data are for annual tissues of vascular vegetation);
2. Lead deposition from the Anvil Range Mine appears to be concentrated in three major areas, in addition to the most highly affected zone discussed above: 1) to the northwest of the Faro tailings impoundment / mill complex down the Rose Creek valley; 2) northeast of the Faro Pit, along the North Fork of Rose Creek, and 3) in isolated areas to the southeast of the Faro mine area, towards and including the Grum / Vangorda mine areas. These areas are represented by orange and red

shading in Figure 4 and concentrations within these zones are a minimum of 15 times higher than the maximum concentration measured at the Swim Lakes reference area. Of the three areas described above, the most extensive and affected is that northwest in the Rose Creek valley. At a distance of over 10 km northwest of the Faro tailings impoundment / mill complex a pair of lichen samples show lead concentrations of 85 ppm, over 50 times the Swim Lakes maximum. Concentrations observed near the confluence of Rose Creek and Anvil Creek, almost 15 km from the tailings impoundments, are still over 15 times higher than the Swim Lakes maximum.

3. Despite the objective of defining the maximum spatial limit of elevation in mine-generated elemental levels, in general the sampling program in 2004 failed to extend far enough to identify this limit. Concentrations within the range observed at the Swim Lakes reference sites (indicating the probable end of mine-generated elemental elevation) were measured in the following locations: southeast of the Grum / Vangorda mine areas, approaching the Swim Lakes reference area; southwest of the Grum / Vangorda mine areas, near the Town of Faro; southwest of the Rose Creek tailings impoundments, on the lee (southwest) side of Rose Mountain; and at the confluence of Anvil Creek and the Pelly River, approximately 35 km from the Faro tailings impoundment / mill complex. The observed points below the Swim Lakes maximum value, and the interpolated Kriging surface, suggest the following:

- The southeast boundary of elevated elemental levels originating from the Anvil Range Mine is known, and occurs in the vicinity of the Blind Creek Valley. This boundary is approximately 10 km from the Grum / Vangorda mine areas;
- The southwest boundary of elevated elemental levels is not known. Two points along the 2004 margin of sampling in this direction (near the Town of Faro and on the lee side of Rose Mountain) have lichen lead levels within the Swim Lakes reference range; however, other samples in this area have elevated lead concentrations in comparison to reference. Establishment of this boundary will require further sampling, likely in the Pelly River valley, on the exposed hills on the southwest side of the Pelly River;
- The northwest boundary of elevated elemental levels is not known and is known to extend at least past the Rose Creek / Anvil Creek confluence. The single lichen sample collected at the confluence of Anvil Creek and the Pelly River (on the Anvil / Pelly floodplain) suggests that elevated levels do not extend to the Pelly River; however, this result is not consistent with the surface soil sample obtained on the adjacent side slope, which shows a lead concentration roughly twice the Swim Lake reference maximum. Sampling shows that lichen lead concentrations on Mount Aho are substantially less than those immediately northwest of the Faro tailings impoundment / mill complex, but at the furthest sampled distance from the mine are still 3-6 times those found in the Swim Lake background area; and
- The northeast boundary of elevated elemental levels is not known. Data from points on the sampled margin in this direction in 2004 suggest that the boundary likely extends furthest to the northeast in the vicinity of the Faro tailings impoundment / mill complex, where lichen lead

concentrations are still 5-20 times those observed in the Swim Lakes reference area, particularly in the North Fork of Rose Creek valley. The boundary likely extends less far in the vicinity of the Grum / Vangorda mine areas, where concentrations are 1.5-2.5 times higher than in Swim Lake.

Zinc

Results of the Kriging analysis of the integrated 2002 / 2004 data set for zinc are presented in Figure 5. This figure and associated data set indicates the following:

1. In terms of relative patterns of elemental elevation by direction, zinc shows a similar pattern to those documented for lead in lichen, that is:
   - Maximum elevation in elemental levels has occurred immediately to the north and west of the Faro tailings impoundment / mill complex, and down the Rose Creek valley.
   - However, elevated concentrations are lower in zinc and extend a shorter distance from the mine site to the southeast and southwest.
2. Zinc has either been at relatively lower concentrations on the Anvil Range Mine in comparison to lead, or has been less persistent due to its higher mobility. The maximum zinc level recorded in this study of 1,043 ppm (sampled at the same 2002 point as the maximum lead level discussed above) is only 35 times the maximum reference value, as opposed to 450 times the reference value for lead. Furthermore, zinc data suggests a return to levels equivalent to reference at the margins (or before the margins) of much of the study area, unlike lead, which returned to reference levels approaching the Swim Lake basin only. Zinc data show concentrations within reference ranges on the southeast, the majority of the southwest, and half of the northeast boundary. Nevertheless, as with lead, the maximum zinc concentrations observed near the Faro tailings impoundment / mill complex are comparable to the upper range of published concentrations from contaminated sites worldwide (Kabata-Pendias 2001 – note that these published data are for annual tissues of vascular vegetation).

Overall, the zinc data indicate elemental elevation patterns similar to lead, but show less elevated current levels relative to reference, and less extensive distribution of elevated elemental levels.

Antimony

Antimony shows evidence of mine-generated elemental elevation in the immediate vicinity of the Faro tailings impoundment / mill complex and northwest down the Rose Creek Valley (Figure 6). Levels recorded elsewhere in the study area are equivalent to reference. The maximum concentration of antimony recorded near the mine site is 0.7 ppm, versus levels uniformly less than detection limit (0.1 ppm) in the Swim Lake reference samples. However, this maximum level is within the reference range observed in the Yukon (Gamberg unpub. data). Overall, there is evidence that mining operations at the Anvil Range Mine have increased local lichen tissue antimony concentrations through airborne

elemental deposition, but that absolute levels even in the immediate vicinity of the mine site remain within "normal" ranges for the territory.

Arsenic

Data on arsenic concentrations in lichen tissue show evidence of mine-generated elemental elevation, with a pattern similar to that reported for lead (Figure 7). Arsenic levels in the vicinity of the Faro tailings impoundment / mill complex and northwest down the Rose Creek valley are approximately 10-250 times the Swim Lakes reference maxima. The maximum arsenic level recorded in the area adjacent to the Faro tailings impoundment / mill complex is 23.7 ppm – this is not only significantly in excess of the study reference levels, but is ten times the reference levels documented in Yukon (Gamberg unpub. data). This maximum level is still far below levels published for vegetation growing on contaminated sites worldwide (Kabata-Pendias 2001).

Overall, it appears that the magnitude and extent of arsenic elevation originatingfrom the Anvil Range Mine has been between that of lead and zinc, with substantial elevations above local reference levels and extensive distribution of elevated elemental levels, but not at the relative magnitude or extent associated with lead in the study area.

Barium

Barium data from lichen tissue shows a limited pattern of elemental elevation similar to that of antimony, with elevated levels concentrated to the northwest of the Faro tailings impoundment / mill complex and down the Rose Creek valley (Figure 8). Concentrations at all other sample points were equivalent to Swim Lakes reference. Concentrations in the most highly mine-affected zone are approximately 100-300 ppm, or 3-8 times the Swim Lake reference maximum. These mine-affected maxima are higher than published reference levels for barium in vegetation tissue (Shaw and Gunn 1981 in lichen; Kabata-Pendias 2001 in vascular vegetation).

Off-site barium deposition generated by operations at the Anvil Range Mine has been limited in extent, and moderate in magnitude (<10 times background levels, but 2-5 times published reference levels).

Cadmium

Cadmium data show evidence of two centres of elevated elemental levels: one in the vicinity of the Faro tailings impoundment / mill complex, and the other east of lower Blind Creek, near the Swim Lakes basin (Figure 9). All other sampled areas are equivalent to reference. The highest cadmium concentration recorded in this study (2.52 ppm) is found in the lower Blind Creek area. Maximum values recorded near the Faro tailings impoundment / mill complex are approximately 4-5 times those measured at the Swim Lakes reference location, but half of that measured at the near-Blind Creek site.

Overall, it appears that mining operations have resulted in some elevation of lichen-tissue cadmium concentrations in the immediate vicinity of the Faro tailings impoundment / mill complex, but that these elevated levels are not anomalous in the local context.

Chromium

Chromium shows an uneven pattern of mine-generated elemental elevation, with elevated levels concentrated around the Faro tailings impoundment / mill complex, historic fresh-water reservoir, and Vangorda / Grum mine areas (Figure 10). No evidence of elemental elevationwas observed northwest down the Rose Creek valley. The maximum recorded value of 4.6 ppm is from a sample point adjacent to the historic fresh-water reservoir, and is approximately 20 times higher than the Swim Lake reference maximum. Other mine-affected samples (0.77-1.80 ppm) are between 3-7 times higher than the Swim Lakes maximum. These samples are marginally elevated in comparison to reference levels published for *Cladina rangiferina* in North America's Pacific Northwest (Rhoades 1999), and in comparison to a review of concentrations in tissues of vascular vegetation worldwide (Kabata-Pendias 2001).

Cobalt

Cobalt shows evidence of limited elemental elevation centred on the Faro tailings impoundment / mill complex, and extending northwest down the Rose Creek valley, southeast to the Vangorda / Grum mine area, and northeast of the Faro Pit (Figure 11). The maximum cobalt concentration recorded in mine-affected areas was 1.0 ppm, ten times the Swim Lakes reference maximum. However, the maximum mine-affected concentration is within the reference range reported for the Yukon (Gamberg unpub. data).

As with antimony, it appears that mining activities at the Anvil Range Mine have elevated lichen tissue concentrations in comparison to local reference levels, but that these affected concentrations remain within the range observed in uncontaminated lichen in the Yukon.

Copper

Copper shows evidence of moderate elemental elevation resulting from the Anvil Range Mine, similar to that of zinc, with the familiar pattern of elevated concentrations centred on the Faro tailings impoundment / mill complex, and extending northwest down the Rose Creek valley, southeast to the Grum / Vangorda area, and northeast up the North Fork of Rose Creek valley (Figure 12). Concentrations in these mine-affected areas are 1.7-35.4 ppm, 1.5-30 times the Swim Lakes maximum. The maximum mine-affected levels exceed reference levels reported in other studies (Rhoades 1999).

Equivalent-to-background levels are reached to the southeast approaching the Swim Lake basin, to the northeast at Mount Mye, and to the southwest along Rose Mountain. Overall, copper shows moderate elemental elevation resulting from mining operations at the Anvil Range Mine, both in terms of extent and magnitude of concentration elevation.

Iron

Iron shows a pattern of elemental elevation very similar to that discussed for copper, above. Maximum elevated elemental levels are concentrated on the Faro tailings impoundment / mill complex, northwest down the Rose Creek valley and southeast to the Grum / Vangorda mine sites (Figure 13). Equivalent-to-reference levels are reached approaching the Swim Lakes basin to the southeast, and along the northeast and southwest sampled margins along Mount Mye and Rose Mountain. The maximum mine-affected concentration of 1,950 ppm (recorded immediately northwest of the Faro mill complex) is approximately 15 times the maximum reference concentration. This maximum mine-affected concentration also exceeds published reference levels for terrestrial lichen in the Pacific Northwest (Rhoades 1999).

Mercury

Mercury shows a very restricted zone of elemental elevation immediately adjacent to the Faro tailings impoundment / mill complex, and extending no more than 2 km from mine disturbances until return to reference levels (Figure 14). The maximum mine-affected concentration is 0.51 ppm (recorded at the point of maximum lead and zinc concentration) and is approximately seven times the Swim Lakes reference maximum, and approximately double maximum published reference levels for mercury in lichen (Crete *et al.* 1992). This maximum level is within the mid-range of published vascular-vegetation mercury levels from mercury-contaminated sites (Kabata-Pendias 2001).

Nickel

The pattern of elemental elevation for nickel is sporadic, similar to that of chromium. Maximum elevated elemental levels are centred on all areas immediately adjacent to mine disturbances, with levels equivalent to reference reached at most sampling margins (Figure 15). The maximum recorded mine-affected nickel level in lichen is 4.61 ppm, approximately nine times the Swim Lakes reference maximum of 0.5 ppm. This maximum mine-affected nickel concentration is within published reference ranges for lichen (Rhoades 1999).

Selenium

Selenium data from lichen tissue show little spatial patterning, as the majority of observations were below laboratory minimum detection limits (0.2 and 1 ppm in 2004 and 2002, respectively). Nevertheless, there is evidence of a zone of elemental elevation surrounding the Faro tailings impoundment / mill complex (Figure 16). The maximum selenium concentration observed in this zone was 4.53 ppm, approximately 25 times the 2004 detection limit (all Swim Lakes reference samples were below detection limits). This maximum mine-affected value is above published reference concentrations for lichen (Kabata-Pendias 2001).

Silver

Silver shows a pattern of elemental elevation similar to that documented for zinc, copper and iron, with elevated levels centred on the Faro tailings impoundment / mill complex and extending primarily to the northwest down the Rose Creek valley (Figure 17). The maximum mine-affected concentration of 1.8 ppm is 36 times the Swim Lake reference maximum, and approximately ten times the maximum reference concentration observed in the Yukon (Gamberg unpub. data).

Thallium

Thallium shows the highest levels of elemental elevation (1.52 ppm) at a sample point approximately 1 km west of the Faro Pit and north of the Faro tailings impoundment / mill complex (Figure 18). This level is approximately 75 times the parameter detection limit of 0.2 ppm (all Swim Lake reference samples were below detection limit). A zone of moderate elemental elevation (3-30 times detection limit) spreads northeast of the Faro Pit through the North Fork of Rose Creek valley, and northwest of the Faro tailings impoundment / mill complex up Mount Aho. The maximum mine-affected concentration is in excess of published reference levels for vascular vegetation (Kabata-Pendias 2001).

Titanium

Titanium shows evidence of marginally elevated concentrations (1.25-1.75 times Swim Lake background maximum) in the vicinity of the Faro tailings impoundment / mill complex, but shows maximum recorded concentrations on Mount Aho and at the Pelly River / Anvil Creek confluence (Figure 19). Based on these data, it appears that the observed significant spatial patterns in lichen titanium concentrations are not mine-related.

Vanadium

Vanadium concentrations show a pattern like that of titanium. The maximum lichen vanadium concentration of 1.2 ppm was recorded at the Pelly River / Anvil Creek confluence (Figure 20). Although there is a mine-site maximum concentration of 0.9 ppm along the haul road, this value is only 1.8 times the parameter detection limit of 0.5 ppm. Based on this evidence, it appears unlikely that there has been any mine-generated elevation in vanadium levels in the study area.

2.2.2 Soil Sampling

Soil Sampling Locations

Figure 21 shows the distribution of soil samples collected and analyzed during 2004 field session.

Soil Sampling and Sub-sampling Methods

All soil samples were collected from August to November 2004. Tables 5 – 7 summarize the soil samples selected for analysis by analysis type (29 elements listed in Table 3 and pH; cyanide; sequential extraction) by depth / parent material.

Table 5. Summary of all Soil Samples Collected and Analyzed for 29 elements and pH in 2004 by Depth / Parent Material

Depth / Parent Material	Number of Soil Samples Analyzed
Surface organic	72
Subsurface organic	42
Subsurface mineral	44
Surface mineral	6
Ash	2

Table 6. Summary of Soil Samples Collected and Analyzed for Cyanide in 2004 by Depth / Parent Material

Depth / Parent Material	Number of Soil Samples Analyzed
Surface organic	0
Subsurface organic	0
Subsurface mineral[1]	1
Surface mineral[1]	1
Ash	0
Total	**2**

[1]*samples are fluvial deposits.*

Table 7. Summary of Soil Samples Collected and Analyzed by Sequential Extraction in 2004 by Depth / Parent Material

Depth / Parent Material	Number of Soil Samples Analyzed
Surface organic	13
Subsurface organic	13
Subsurface mineral	10
Surface mineral	1

Soil Laboratory Analysis

Soil raw data is presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided by standard batch QA / QC procedures performed by CanTest. The results of these QA / QC analyses are presented in

Appendix E. Duplicate soil samples were also sent to CanTest and the results of these analyses are also found in Appendix E.

Soil Data Analysis and Interpretation

The stratification of samples used in 2004 (surface organic, subsurface organic and subsurface mineral – see Section 2.1) was designed to allow inferences to be drawn on potential elemental sources (anthropogenic versus "natural"), and to identify trends in underlying till mineralization. Information from surface organic samples is reflective of recent deposition levels, and is expected to be similar to lichen data. Information from subsurface organic samples is reflective of surface deposition in the period far pre-dating operations at the Anvil Range Mine. If data from these samples show a similar pattern to lichen and surface organic-soil data, it could suggest that the source of apparent elemental elevation is not anthropogenic. Information from subsurface mineral samples reflects native mineralization in study-area surficial materials, again independent of recent deposition. Comparison of information from the different soil strata thus provides some interpretive power. If the source of observed elevated elemental concentrations is primarily the Anvil Range Mine, then one would expect data from surface soil samples to be distributed in a spatially similar pattern to lichen data, and have little relationship to underlying subsurface organic and mineral samples (assuming limited translocation of elements downward through the profile). Identifiable spatial patterns throughout the soil profile would either indicate substantial translocation (unlikely in a relatively immobile element such as lead in soils with thick surface organic accumulations), or would indicate a pre-mining source of elevated elemental concentrations.

The primary objectives of the soil sampling program in 2004 were:

- To explore the validity of anthropogenically caused elemental elevation based on lichen data by examining the current and pre-mining data record of surficial soil materials; and
- To provide data to aid in interpretation of vascular plant elemental concentrations (Section 5). Unlike lichen, vascular plants integrate potentially confounding influences; many species annually shed above-ground tissues (predominantly those sampled) and therefore may be poor indicators of airborne deposition. In addition, their ability to root throughout the surface and subsurface profile allows them to uptake more mobile elements, and thus potentially reflect surface deposition directly on leaves, surface deposition on soil translocated to leaves, and subsurface mineralization translocated to leaves. Data on elemental concentrations in soil in different materials and depths, may allow the possibility of partitioning observed effects in above-ground tissue of vascular plants.

Results and interpretation relevant to the first objective are discussed in the following sections. Results and interpretation relevant to the second objective are discussed in Section 5.

Analytical Approach

As with lichen data, soils data were screened using Getis-Ord methods to detect spatial clustering of elevated elemental levels. Significant results indicate non-random distribution of data. In soils, this

examination was conducted for lead and zinc only, as these are the two primary elements of interest on the Anvil Range Mine.

Getis-Ord testing of the soil data indicates significant non-random distribution of lead and zinc in surface organic soils, but no identifiable spatial patterns for these elements in subsurface organic or mineral soils.

Surface Organic Soils

The Kriging surfaces for lead and zinc in surface organic soils are presented in Figures 22 (lead) and 23 (zinc). These figures show patterns of elevated elemental levels in the surface soil samples that are very similar to those documented in lichen (Figures 4 and 5 respectively). The figure of lead in surface soil shows the zone of highest elemental levels centred on the Faro tailings impoundment / mill complex, and extending primarily northwest down the Rose Creek valley, and northeast up the North Fork of Rose Creek valley. The maximum surface soil lead concentration on the Anvil Range Mine is approximately 350 times that of the Swim Lakes maximum, a similar magnitude of elevation to that observed in lichen (450 times). Concentration patterns for zinc are similar, but consistent with the lower elemental levels associated with this element, with a maximum mine-affected value roughly five times the maximum observed at Swim Lakes. This lesser magnitude of elevation in comparison to lichen (35 times the Swim Lakes reference) may be indicative of relatively high mobility of zinc in soils (see below). Note that the lead kriging presented in Figure 22 does not include the Rose Creek floodplain samples; to avoid the potentially confounding influence of fluvially transported sediment on soils data. The zinc kriging does contain these points, however, as elimination of them causes unacceptable degradation of the prediction surface.

Comparison to Underlying Materials

The presence of significant non-random patterns of lead and zinc in surface organic soils, and the lack of identifiable spatial patterns for these elements in subsurface organic or mineral soils, indicates that the sources of lead and zinc in surface soils are not related to those in subsurface samples. This premise is supported by comparisons presented in Figures 24 - 27 of lead and zinc in subsurface mineral versus subsurface organic (Figures 24 and 25), and subsurface organic versus surface organic (Figures 26 and 27).

The comparison presented in Figures 24 and 25 indicates no correlation between lead and zinc concentrations in till and those found in organic material directly overlying the till. This lack of correlation suggests that there is no significant translocation upward of these metals into the overlying organics. This in effect indicates that the surface organic soils and lichen growing on them are insulated from, and thus not impacted by, mineralization in the underlying till.

The comparison presented in Figures 26 and 27 indicates no correlation between lead and zinc concentrations in subsurface and surface organic soils. Again, this indicates insignificant influence of the

underlying organic material on the surface samples. The cluster of points along the y axes in these figures show the substantial enrichment of lead and zinc in surface samples versus subsurface samples. This observation suggests a relatively recent, as opposed to constant, source of airborne deposition of these metals over the period of organic matter accumulation (since the end of the McConnell glaciation, 15,000 years ago), and supports the spatial data in the premise that this source is the Anvil Range Mine.

Subsurface Organic Soils

Lead and zinc concentrations in subsurface organic samples in the study area are presented in Figures 28 and 29 (these figures do not include the Rose Creek floodplain samples). These figures confirm the general lack of relationship between the lichen kriging data (Figures 4 and 5) and trends in subsurface soils. While elevated lead and zinc levels in lichen are concentrated around the Faro tailings impoundment / mill complex and northwest down the Rose Creek valley, elevated subsurface organic levels of these elements are distributed throughout the study area, and include highly elevated levels in the Swim Lakes reference area (directly overlying the Swim Deposit), in the North Fork of Rose Creek valley, the Rose creek valley and the Mount Mye area.

Subsurface Mineral Soils

Lead and zinc concentrations in subsurface mineral samples in the study area are presented in Figures 30 and 31 (these figures do not include the Rose Creek floodplain samples). Again, these figures confirm the general lack of relationship between the lichen kriging data (Figures 4 and 5) and trends in subsurface soils. Mineral soils show elevated lead levels in the Swim Lakes reference area, and at a sample point on fluvial material directly below the Faro waste rock dumps. The most highly elevated zinc levels in mineral soil samples are found in the Swim Lake reference area only, with other elevated levels found on Blind Creek, near the Faro town site, and on Rose Mountain, in addition to two near-mine sample points.

Rose Creek Soils

As discussed in the methods section, paired sampling was employed in the Rose Creek valley, in order to isolate effects of airborne deposition from potential effects from fluvial transport of naturally mineralized materials, and from the tailings dam breach that occurred in 1975. For this reason, much of the preceding data analyses used only data from side slope sampling points (as opposed to floodplain points). The following discussion presents comparative information on results from both the side slope and floodplain Rose Creek valley sampling points.

Organic Horizons

Figure 32 displays lead concentrations in surface organic soil samples in the Rose / Anvil Creek valleys, and indicates general comparability between side slope and floodplain positions. Of the five points where paired surface organic soil information was available, all are within the same or immediately adjacent concentration categories, with the side slope concentration higher than the floodplain at one paired location and lower in two locations. This figure also indicates that the surface organic sample from the

side slope location nearest the Pelly River / Anvil Creek confluence has roughly twice the lead concentration of the Swim Lakes reference maximum, although the sample taken on the Anvil Creek floodplain has a concentration within the Swim Lakes reference range. This one observation may indicate that elevation in lead levels extends as far as the Pelly River / Anvil Creek confluence. The next closest points to the Anvil Range Mine, at the Anvil / Rose Creek confluence, have lead concentrations (224 and 245 ppm) 12-14 times the Swim Lakes maximum. The lichen sample at this point was approximately 16 times the reference maximum. These data indicate consistency in cumulative elemental elevation (i.e., between lichen and surface soil) down the Rose Creek valley.

Only one subsurface organic sample pair was analyzed from the Rose Creek valley. Both the side slope and floodplain sample of this pair were within the same concentration category.

Mineral Horizons

At two of the paired Rose Creek sample points, the floodplain sampling sites were located on the active floodplain of Rose Creek (as evidenced by lack of surface organic horizon and early-successional vegetation). Due to lack of organic accumulation at the soil surface, the surface soil samples collected were therefore mineral. These samples contained lead concentrations of 402 and 1,140 ppm (at sites further and closer to the mine respectively). These concentrations are not elevated in comparison to other surface samples in the Rose Creek valley (these range from 224-1,310 ppm) but are elevated for mineral samples (for a given amount of elemental concentration, mineral soils should report lower concentrations by mass than organics, due to higher soil density in mineral soils). In addition, the site with 1,140 ppm in the surface mineral sample has a subsurface sample from 15-20 cm below surface that has a lead concentration of 1,330 ppm, the highest level recorded in the Rose Creek valley. These results suggest a source of substantial but discontinuous elemental elevation on the active floodplain of Rose Creek. The source of this elemental elevation is not known, but two possibilities exist: 1) the transport and deposition of naturally mineralized materials (till, fluvial or glaciofluvial); or 2) the transport of tailings from the 1975 impoundment breach. No evidence of a sorted or stratified sand deposit was found in excavation of soil samples in the sites discussed (which would indicate the presence of tailings materials). Furthermore, sampling conducted directly downstream of the tailings breach for the purpose of identifying the distribution of the breach (Gartner Lee 2003, draft report) shows very high lead concentrations in soils, but also reports no identifiable tailings materials (hypothesizing deposition of a very thin veneer of tailings materials, and subsequent oxidation of these materials to the point that they cannot be distinguished from native soils). Another possibility could be the continued fluvial transport of tailings materials downstream (and therefore the absence of any observable tailings materials). These results could therefore indicate a discontinuous and in some places, substantial, elevation in elemental levels in the Rose Creek floodplain (as a result of fluvial transport), rather than a continuous, distance related decline in elemental concentrations. The extent of elemental elevation could extend beyond the sampled area and be found apparently sporadically throughout the continuous floodplain. More detailed investigation would be required to more fully understand the distribution and potential source of observed elevated lead on the Rose Creek floodplain.

It is important to note that all analyses of cumulative elemental elevation patterns have been conducted independent of Rose Creek floodplain samples. Thus, identification of this additional source of elemental elevation on the active Rose Creek floodplain does not alter conclusions on the extent and magnitude of mine-generated airborne elemental deposition in the project study area.

White River Ash

As noted in Section 2.2, the White River Ash is a voluminous deposit of Holocene airfall tephra covering an area of 540,000 square kilometers across parts of Alaska and portions of the Yukon and Northwest Territories. The deposit was created as the product of two explosive eruptions of Mount Churchill, approximately 1,887 and 1,147 years B.P. This material was frequently encountered during soil sampling approximately at the organic / mineral interface. Two collected samples of the ash were submitted for laboratory analyses, to investigate potential effects of this deposit on study-area soils. Results of these analyses are presented in Appendix C. This information indicates no elevated metals contents in this material, with both samples below the 5-ppm detection limit. A comparison to results from mineral soil samples from the Swim Lakes reference area indicates that in the ash samples, only potassium, sodium and strontium exceeded Swim Lakes maxima. It is thus concluded that the White River Ash deposit has no effect on study parameters.

Soil Sequential Analyses

The objective behind the limited sequential analysis program for soil samples was to gain some understanding of the relative mobility of lead and zinc in soil samples, in addition to data on total concentrations. Extraction / digestion methods used are presented in Section 2.1. The subset of soils selected for analysis included representative samples from:

- Swim Lakes reference are; and
- mine-affected areas (containing elevated lead concentrations) in order to provide information on relative mobility in sites of highest elemental concentrations.

Results of the soils sequential analyses for lead, zinc, copper and cadmium are presented in Figures 33 - 36. These elements were selected for display for the following reasons:

- the Tessier extraction sequence was developed for analysis of these elements;
- lead, zinc, copper represent elements that show evidence of high and moderate elemental elevation within mine-affected areas; and
- cadmium shows relatively high mobility through uptake by vascular plants (cadmium).

The following figures present information by element, area (Swim Lake reference versus mine-affected), soil sample type (surface organic, subsurface organic and subsurface mineral), and relative mobility categories:

- Weakly complexed – this extraction (hydroxylamine hydrochloride) releases metals associated with iron and manganese oxides, carbonates and fulvic acids, and amorphous metal sulphides. This extraction step would also include water-soluble and exchangeable metals; however, it is not anticipated that substantial amounts of the analyzed metals exist in these latter forms in the study area. Therefore, results from this extraction process reflect metals complexation by more labile compounds. These metals are not readily mobile, but are relatively readily mobilized as associated compounds decompose or are degraded;
- Strongly complexed – this extraction (sodium pyrophosphate) releases metals complexed by more recalcitrant organic compounds. These compounds are relatively persistent, and will release metals very slowly; and
- Immobile – the last extraction (digestion) procedure used was the *aqua regia* process used to determine total elemental concentrations for the analysis of soils. Results from this step in the sequential extraction process reflect metals that are bound by residual recalcitrant organics, sulphur compounds, and crystalline structures.

Figure 33 reflects low overall lead concentrations in Swim Lake reference samples. Of these total concentrations, only approximately 1-8 ppm (average – maximum approx. 20 ppm) are in the Weakly Complexed category. In contrast, mine-affected soils show an average of 536 ppm (maximum approx. 3,100 ppm) of lead in this category. These data indicate that a greater proportion, and much greater absolute amount, of lead in surface soil samples in mine-affected areas exists in a weakly complexed (relatively more "mobile") form than in the reference area. In both surface organic and subsurface mineral samples on the mine-affected area, the Weakly Complexed fraction is highly negatively correlated with organic matter content (r^2 = 0.71-0.95), indicating more strong complexation capacities (reduced relative mobility) in soils with higher organic content.

Results presented in Figure 34 reflect the relatively greater mobility of zinc, in comparison to lead, with approximately 50-60% of total zinc existing in a Weakly Complexed form. Again, the absolute magnitude of this weakly complexed zinc is greater on the mine-affected sites, but not to the same degree as observed in lead (the average mine-affected surface organic sample has approximately five times the weakly complexed zinc as found at the reference site, versus 500 times for lead). This is consistent with evidence of relatively less cumulative elemental elevation of zinc versus lead in the study area.

Copper shows very little potential mobility in all samples, with only 1-3 ppm of the Weakly Complexed fraction. These results indicate that despite moderate mine-generated elevation of copper, there is little difference between the reference location and the mine-affected study area in more labile forms of this element.

Figure 36 shows little difference by site in cadmium concentrations, but shows the relatively high proportion of this element that is only weakly complexed, with 30-50% of total concentrations in this category in surface organic samples. This is reflected in vascular plant data, which has shown relatively

high cadmium concentrations in the above-ground tissues of some species in both relatively unaffected and more mine-affected areas.

Soil Cyanide

Analytical Approach

The CCME soil-quality guideline for cyanide is based on free cyanide; however, this analysis requires immediate analysis after collection. This was not possible in the current study; concerns regarding the absence of cyanide in our analytical profile were raised after the holding time for free cyanide analysis had expired for the soil samples collected. Two samples were therefore analyzed for total cyanide concentration and compared to CCME guidelines for free cyanide with the assumption that since total cyanide concentrations will be greater than free cyanide, if total cyanide concentrations from Rose Creek floodplain sites were below CCME guidelines for free cyanide, then free cyanide concentrations would be below CCME guidelines. Total cyanide results provide the sum of concentrations of:

- strong iron-cyanide complexes;
- weak and moderately strong metal-cyanide complexes of silver, cadmium, copper, mercury, nickel, and zinc; and
- free cyanide (HCN and CN^-).

One concern with this assumption could be the loss of free cyanide in our soil samples between collection and sampling. It is known that many of the metal-cyanide complexes are unstable, and will undergo photolysis from the upper levels of the soil, becoming free cyanide that is either volatilized or degraded to ammonium and carbon dioxide by bacterial activity. However, unless cyanide was deposited within 30 days prior to our sampling event, it is unlikely that any free cyanide was lost from the sample; rather free cyanide has already been volatilized or degraded following the tailings dam breach in 1975.

Total Cyanide in Rose Creek Floodplain Samples

Results for total cyanide analysis in soils show that Rose Creek floodplain samples are below CCME soil-quality guidelines for free cyanide; <0.4 ppm in surface and subsurface mineral soil samples compared to 0.8 ppm for agricultural and residential / parkland soils. It is suggested that if concerns remain with regards to soil cyanide levels, sampling and analysis of free cyanide should be planned in 2005 and that this sampling program should incorporate results of water sampling conducted on site and consider sampling sediments in stagnant water bodies (to investigate potential pathway through airborne deposition in water bodies).

2.3 Discussion and Next Steps

Lead in lichen tissue is the primary parameter by which spatial distribution of elevated elemental levels originating from the Anvil Range Mine is characterized; lichen tissue provides a cumulative bio-assay of airborne lead levels (Section 2.2), and lead is the least mobile of the "heavy" metals (as opposed to zinc, which can be highly mobile in both soils and plants). Lead therefore likely represents the best historic record of elevation in elemental levels resulting from operations at the Anvil Range Mine. Therefore, based on lichen lead levels, the integrated 2002 / 2004 data set shows evidence of substantial mine-generated accumulated elemental elevation. Near-source (Faro tailings impoundment / mill complex) lead levels are 150-450 times those measured at the Swim Lakes reference area. Despite efforts to substantially but reasonable expand the sampled area in 2004, sampling did not reach the maximum spatial extent of elemental elevation in most directions. This zone of elemental elevation (Figure 4) extends to the Blind Creek Valley to the southeast, a minimum of approximately 2-5 km from the Grum / Vangorda mine area in all directions, a minimum of approximately 5-10 km from the Faro tailings impoundment / mill complex to the northeast, northwest and southwest, and a minimum of 15 km northwest down the Rose Creek valley from the tailings impoundment / mill complex. The higher lead levels measured in lichen tissue in this study are elevated in comparison to published lichen reference levels, and are comparable to higher levels documented worldwide in vascular vegetation at lead-contaminated sites.

Soils data were examined to search for evidence that elevated elemental levels attributed to mine-generated airborne deposition could be due instead or in part to the influence of underlying mineralized soil materials. This examination indicates that although patterns of lead and zinc concentrations in surface soil are similar to pattern in lichen, no similar pattern of elemental concentrations exists in subsurface organic or mineral soils. Furthermore, no correlation exists between underlying materials and surface-based observations. This supports the hypothesis that the spatial pattern of elevated elemental levels observed in the study area are the result of elemental deposition from the Anvil Range Mine Complex, and eliminates the possibility that these levels should be attributed to natural effects pre-dating mining. Sequential extractions performed on a sub-set of soil samples indicate that substantial fractions of total lead concentrations exist in a weakly complexed form, which will be relatively mobile as associated compounds decompose or degrade. The implications of these findings are that the lead deposited from the mine site is not simply environmentally inert, but can be expected to have some mobility through plant uptake and leaching through to lower soil horizons, where it will most likely be fixed somewhat more permanently.

The following presents a summary of results (based on lichen data). Categories are defined using extent of elevated elemental concentrations in lichen collected in mine-affected areas relative to reference levels.

- **High Elevation Relative to Reference Levels – Lead and Arsenic**. Maximum mine-affected lead concentrations are 450 times Swim Lakes maxima. Maximum mine-affected arsenic concentrations are up to 250 times the Swim Lake reference maximum. Equivalent-to-reference levels are not

reached for the majority of the project area (with the exception of Swim Lakes) for both lead and arsenic. Furthermore, results of sequential extraction indicate that substantial fractions of total lead concentrations exist in a weakly complexed form, which will be relatively mobile as associated compounds decompose or degrade. The implications of these findings are that the lead deposited from the mine site is not simply environmentally inert, but can be expected to have some mobility through plant uptake and leaching through to lower soil horizons;

- **Moderate Elevation Relative to Reference Levels – Zinc, Copper, Iron, Silver, and Thallium**. Maximum mine-affected concentrations are 15-75 times higher than Swim Lakes maxima. Equivalent-to-reference concentrations are generally reached at a distance of 0-2 km from the Vangorda / Grum mine areas, to the northeast along the exposed (mine-side) slopes of Mount Mye, and to the southwest along the exposed slopes of Rose Mountain. Elevated elemental levels generally extend to the northeast along North Rose Creek, to the north up and past Mount Aho, and to the northwest down the Rose Creek valley;
- **Low Elevation Relative to Reference Levels – Barium, Chromium, Mercury, Nickel, and Selenium**. Maximum mine-affected concentrations are 3-9 times the measured Swim Lakes maxima. The zones of elevated elemental levels are generally more limited than those described for lead and the other elements in the High and Moderate categories. Note that the level of elemental elevation associated with selenium relative to Swim Lake maxima is higher (25 times) than the range indicated above, but that selenium has been placed in this "low" elevation category due to the limited extent of apparent elemental elevation;
- **Marginal Elevation Relative to Reference Levels – Antimony, Cadmium, and Cobalt**. These elements show some evidence of elevation in elemental levels associated with the Anvil Range Mine, but also either remain within reported Yukon reference ranges for lichen (antimony and cobalt), or appear normal within the local context, due to measurement of other elevated concentrations that are not mine-related (cadmium); and
- **No Elevation Relative to Reference Levels – Boron, Molybdenum, Titanium, Vanadium, Aluminum, Beryllium, Calcium, Magnesium, Manganese, Phosphorus, Potassium, Silicon, Sodium, Tellurium, Tin and Uranium.** These elements either showed spatially concentrated elevated metals levels in areas other than potential mine-affected areas, or showed no patterns at all. Observed elevated concentrations of these elements in the study area are not attributable to operations of the Anvil Range Mine.

Definition of the full spatial extent of elevation in elemental levels associated with the Anvil Range Mine will require additional sampling to the southwest to northeast of the Anvil Range Mine. Suggested locations for this sampling are presented in the results section, above.

3. Timing of Deposition of Mine-Related Dust

3.1 Methods

3.1.1 General Approach

The 2002 metals in soils and vegetation reconnaissance study (C.E. Jones & Associates Ltd. 2003) indicated that likely off-site elemental deposition from mine operations exists, but did not provide any information on the likely timing of this deposition. In 2004, one project objective (Table 1) is to determine if ongoing deposition is contributing to the elevated elemental concentrations in vegetation or whether deposition of airborne mine-related dust is historical. Understanding whether ongoing deposition exists at the Anvil Range Mine is critical to determining whether measured elemental concentrations are at their maxima, or will continue to increase. It will also provide an indication of the level of prioritization needed with respect to removing any current elemental dust sources during the closure phase of the Anvil Range Mine.

Moss bags were employed to determine whether airborne deposition is currently ongoing. Establishment and analyses of moss bags is a standard low-technology method for assessing both dry and wet (e.g., dust and precipitation-based) deposition of airborne contaminants (Temple *et al.* 1981; Onianwa 2000). Bags are constructed through acquisition of a standard or uncontaminated source of moss. Moss materials are rinsed, dried and analyzed for pre-exposure metal concentrations and then placed into polypropylene mesh bags. Bags are held aerially in monitoring locations, and analyzed after determined exposure intervals. Detected increases in element concentrations from pre-exposure concentrations are indicative of airborne deposition.

3.1.2 Moss Bag Sampling

Moss Bag Sampling Locations

Moss bag sampling locations were selected from both 2002 and 2004 sample points with the objective of sampling areas: 1) closest to potential dust sources (Faro tailings impoundment / mill complex, Vangorda / Grum pits, the haul road and the connector road between the Town of Faro and the haul road); 2) at Swim Lakes reference locations; 3) on a transect from the immediate vicinity of potential sources (i.e., northwest to north of the tailings impoundments and mill complex) and 4) near the Town of Faro. Figure 37 shows the distribution of moss bag sampling locations.

Duration of Moss Bag Deployment

In previous applications of the moss bag sampling technique, authors have attempted to define optimal periods for the duration of moss bag deployment (Little and Martin 1974; Cameron and Nickless, 1977; Temple *et al.* 1981; Onianwa 2000) and have observed that these durations have varied with environmental conditions, e.g., the rate of deposition of trace elements and therefore the extent of potential saturation and weathering as well as the observation of preferential displacement of some metals (Onianwa 2000). Standard optimal periods for the duration of moss bag deployment have varied from 4 - 10 weeks, however these durations have been adopted where levels of deposition were anticipated to be much higher (e.g., near operational smelters (Temple *et al.* 1981)) than for an un-operational mine site such as the Anvil Range Mine Complex. In order to ensure that the period of duration of exposure would be sufficient to detect any changes in elemental concentrations in moss bags from pre-exposure levels, it was decided that moss bags be deployed for increasing durations (10, 20 and 30 weeks) in attempt to detect low levels of deposition. Therefore three bags were deployed at each sampling location and one bag collected after each 10 week interval:

- Week 10: The first moss bag pick up was in early November and sampled a period representative of fall (August 18, 2004 – November 1, 2004);
- Week 20: The second pick up was in mid-January and sampled a period representative of fall and early winter (August 18, 2004 – January 26, 2005); and
- Week 30: The third pick up was in late March and sampled a period representative of fall through to late winter (August 18, 2004 – March 31, 2005).

Moss Preparation

Moss was sourced locally from the Ross River area during a 2 day field session in mid-July 2004. Golden fuzzy fen (*Tomenthypnum nitens*) moss was collected using non-powdered nitrile gloves and stored in heavy-duty ziplock bags. It was anticipated that approximately 2,000 g (fresh weight) of moss would be required to render roughly 600g (dry weight) of moss (assuming an estimated 70% moisture content). Over 2,000 g (FW) of moss was therefore collected from the Ross River area and transported on ice within 24 hours to Soilcon for preparation and analysis. Moss was soaked overnight in distilled water and then rinsed three times the next day in distilled water (Temple *et al.,* 1981). All moss was spread out to be air dried on laboratory drying racks for 48 hours (Temple *et al.,* 1981). A sub-sample of the prepared moss (i.e., n = 12 (total 36g DW)) was analyzed to obtain pre-exposure metal concentrations and the remainder of the prepared moss was used to create 170 moss bags (3 g dry weight moss per bag). Non-powdered latex or nitrile gloves were worn at all times in the handling and analysis of moss (Temple *et al.,* 1981).

Moss Bag Design and Creation

Temple *et al.* (1981) provides a comprehensive summary of accepted moss bag design specifications and methods. These methods were used as the basis for the design of a method of moss bag sampling for the

Anvil Range Mine Terrestrial Effects Study. Moss bags were prepared using polypropylene mesh (mesh size 1,680 µm by 1,680 µm) purchased from J & K Products, Quebec. This material was pre-cut and folded into 10 cm by 10 cm bags in Whitehorse and shipped with all other moss bag materials (nylon rope loops and plastic zip ties) to CanTest's Soilcon Laboratories (Richmond, BC). Each moss bag was filled with 3 g dry weight of moss at Soilcon laboratories. Before securing the zip ties, two pieces of nylon rope (~20cm long) were placed under the plastic zip at opposite corners to create loops that later served as a means to suspend the moss bag. Prepared moss bags (n = 170) were then shipped back to Whitehorse in Kapak bags for deployment on the project area.

Moss Bag Deployment and Collection Methods

Thirty-four moss bags were deployed on the project area (Figure 37). Moss bags were maintained in Kapak bags until reaching the sampling location and then removed from the Kapak bag and secured onto a tree using the nylon loops described above. Moss bags were deployed and collected using un-powdered nitrile gloves, with new gloves used at each sample site and were collected in metalized polyester Kapak bags (designed to be trace element-free) and isolated from other potential contaminant sources prior to laboratory analysis.

Moss Bag Laboratory Analysis

Pre-exposure moss and all post-exposure moss bags sent to CanTest Laboratories (Burnaby, BC) were analyzed for the 33 elements listed in Table 2. Moss samples were prepared for analysis following the methods of Temple *et al.* (1981), i.e., moss is oven dried, reweighed and homogenized in a Wiley mill. Dried, ground moss samples were then digested using a nitric acid-hydrogen peroxide digestion procedure based on U.S. Environmental Protection Agency Method 200.3. Analysis of all elements except mercury was performed using ICP-MS (Inductively Coupled Argon Plasma Spectroscopy - Mass Spectrometry). Analysis of mercury was performed using either Cold Vapour Atomic Absorption Spectrophotometry or Cold Vapour Atomic Fluorescence Spectrophotometry.

Moss Bag Data Analysis

Geostatistical analytical techniques were applied to moss bag data to determine whether deposition is ongoing or historical are noted in Section 3.2. A complete discussion of these techniques is provided in Appendix B.

3.2 Results

Moss Bag Laboratory Analysis

Moss bag raw data is presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided by standard batch

QA / QC procedures performed by CanTest. The results of these QA / QC analyses are presented in Appendix E. It should be noted that duplicate moss bags deployed at one station in 2004 were lost (likely due to interference by an animal, e.g., bear or marten). Duplicate samples will be deployed at least two sites in 2005.

Moss Bag Data Analysis and Interpretation

Analytical Approach

Analyses of lead and zinc in moss bags followed those methods used to investigate patterns of elemental concentration in lichen and soil (Section 2.2). Lead and zinc in moss bags were tested using the Getis-Ord G-statistic (a test of spatial clustering) to investigate the potential occurrence of significant non-random patterns in the distribution of elemental concentrations. Non-significant results of this test indicate no spatial pattern in elevated elemental concentrations, and thus no statistically identifiable effect of mine-related activities on moss bag elemental concentrations. Significant results of this test indicate the occurrence of a non-random pattern in elevated elemental concentrations that could be related to mine-related activities. Spatial analysis through Kriging of moss bag data was not possible, due to the limited number of moss bag sampling stations. Instead, data are displayed spatially through colour-themed figures providing information on post-exposure concentrations relative to the pre-exposure data set (i.e., unexposed moss). Results are discussed by element, below.

Lead

Figure 38 shows lead concentrations in moss bags deployed between August and November 2004, relative to lead levels in unexposed moss. Results indicate that significant accumulation of lead has occurred at a number of the sampling stations over the ten week period of exposure. All data in concentration classes greater than pre-exposure levels can be statistically identified as being significantly higher than the pre-exposure population.

The Getis-Ord test for spatial clustering of these data indicates a high probability of non-random elevated concentrations. Maximum accumulated lead levels are found in moss bags immediately adjacent to the Faro tailings impoundment / mill complex, with relative levels in these bags 21-100 times those measured in the unexposed moss. Actual lead concentrations in exposed moss bags ranged from 19.3-57.6 ppm, versus a maximum concentration of 0.6 ppm in unexposed moss bags. Moss bags in the next relative concentration category (11-20 times the pre-exposure maximum), are found in a concentric pattern around those moss bags with highest lead concentrations, including areas adjacent to the Faro tailings impoundment / mill complex, Faro pit, and northwest down the Rose Creek valley. This latter point is located approximately 4 km to the northwest of the northwest extent of the tailings impoundments and has a lead concentration of 11.4 ppm, almost 20 times the pre-exposure maximum. Sample stations with data in the lowest elevated category, 2-10 times the pre-exposure data set, were located to the north and northwest of the Faro tailings impoundment / mill complex, towards Mount Aho, and to the southeast of the Faro tailings impoundment / mill complex, to the Grum area. Sample stations with lead

concentrations comparable to pre-exposure levels were located around the Vangorda mine area, adjacent to the Town of Faro, and in the Swim Lakes reference area. The deposition pattern apparent in lead concentrations in moss bags exposed for 10 weeks during fall is consistent with wind directions for this period recorded at the Vangorda / Grum meteorological station (Figure 39). This figure indicates that the dominant (approximately 43% of total observations) wind directions over the exposed period are from east to south-southeast, which is consistent with maximum deposition occurring to the west to northwest of the Faro tailings impoundments / mill complex.

Figure 40 shows lead concentrations in moss bags deployed between August 2004 and January 2005, relative to lead levels in unexposed moss. These data generally show a similar pattern and magnitude of elevated concentrations to the that of moss bags deployed between August and November 2004, i.e., highest levels of lead accumulation found adjacent to the Faro tailings impoundment / mill complex, and a maximum value of 55.5 ppm. There is however some variation in the pattern of concentrations between the ten and 20 week exposed moss bag lead data (Figures 38 and 40). The observed variation in these data could be from two sources that cannot be separated with the current sampling design:

- different bags at each station were placed in slightly different positions and orientations relative to the mine site; and
- potential differences in deposition pattern relating to differences in wind pattern.

It is believed that most variation occurs due to intra-site variation relating to the position of moss bags (this is corroborated by the observation that elemental concentrations can be less in moss bags deployed for 20 weeks than in those deployed for ten weeks at the same site). The potential for differences in deposition pattern relating to differences in wind pattern is considered to be low; a statistical comparison between lead concentrations in moss bags exposed for 10 and 20 weeks show no significant increase (or difference) in the concentration of lead between the two lengths of exposure. These data suggest that the majority of deposition occurred in the initial 10 week period in the fall (i.e., between August and November) and very little occurred in the period between November and January. This premise is supported by wind data from the two periods. August - November wind direction data is presented in Figure 39; November-January wind direction data is presented in Figure 41. Meteorological data from this latter period shows that northwest and north-northwest are the dominant (approximately 44% of total observations) wind directions. The lack of any substantial wind from the southeast (consistent with deposition to the northwest) suggests that deposition in this latter fall / early winter monitored period was relatively insignificant in 2004 / 2005. This suggested pattern is also consistent with physical conditions on the mine site, which would suggest more deposition during periods when potential elemental dust sources are exposed (summer) than when they are frozen or snow-covered (winter).

One notable apparent difference between the 10 and 20 week periods of exposure is that while ten of the 10 week exposed moss bags have lead levels below or equivalent to unexposed moss, only four of the 20 week exposed bags were in this category. All other moss bags exposed for 20 weeks (including one at

the Swim Lake reference area) show some elevation over pre-exposure levels. This observation may indicate an accumulation of lead at low levels across the project area, independent of mine-generated input, which has only be detected in moss bags exposed for longer periods and / or over winter. This finding requires confirmation through further moss bag sampling and analysis or through the employment of a more sensitive monitoring technique, e.g., lead isotope analyses. If supported, these results may suggest an ongoing ambient lead deposition within the region.

Overall, a summary of the lead concentration data in moss bags analyzed to date suggests the following conclusions:

- Mine-generated lead deposition on off-site areas is continuing, and not only historical;
- Results suggest high levels of deposition of lead in off-site areas (up to 100 times that of unexposed moss);
- The general pattern of current lead deposition is consistent with the cumulative pattern reflected by terrestrial lichen analysis (Figure 4), i.e., lead deposition is concentrated in the vicinity of the Faro tailings impoundment / mill complex, and northwest down the Rose Creek valley, with lesser deposition associated with the Grum and Vangorda mine areas. This consistency suggests that both the historical and current deposition have been generated by sources in the area of the Faro tailings impoundment / mill complex. More specific determination of elemental dust sources is not possible with moss bag methodology; and
- Over the period tested, deposition appears to have occurred primarily between August and November. There is no statistical evidence of significant additional deposition in the period from November to January, although a visual examination of the data suggests an ongoing low level of lead deposition across the study area.

Zinc

Zinc levels relative to unexposed moss concentrations in the 10 week and 20 week exposure periods are presented in Figures 42 and 43, respectively. These figures show only one isolated example in each exposure period of zinc concentrations elevated above pre-exposure levels. Elevated zinc concentrations are found at sampling stations M18 and M19 for the 10 week and 20 week exposure periods, respectively. These stations are immediately adjacent to the Faro mill complex and emergency tailings impoundment, suggesting moderate (2-3 times pre-exposure levels) deposition of zinc at these near-source locations.

The Getis-Ord test of spatial clustering in moss bag zinc data shows no significant non-random distribution. This is consistent with the finding from the lichen-based analysis of cumulative depositionthat there has been only moderate deposition of zinc, with elemental levels roughly ten times less than those associated with lead, relative to reference locations.

Other Elements

Elements, other than lead and zinc, in the analytical suite identified as showing signs of cumulative mine-generated elemental elevation in lichen tissue were examined for signs of deposition in exposed moss bags. The following presents a summary of elevated elemental concentrations in moss bags. Categories are defined using elemental concentrations in exposed moss bags relative to pre-exposure levels, with "moderate" elevation defined as elements with at least one sampling station showing levels at least three times pre-exposure values, and "low" elevation defined as elements showing levels two times pre-exposure values.

- **Moderate Elevation Relative to Pre-exposure Levels** – silver, barium and nickel. Levels greater than or equal to three times the pre-exposure maximum were recorded at sample points in the immediate vicinity of the Faro tailings impoundment / mill complex, including M17, 18, 19, 22, 26, 28, 29 and 30 for silver (see Figure 37) M22 and 30 for barium, and M28 for nickel. Maximum relative elemental levels were eight times pre-exposure for silver (M19 and 30), six times for barium (M22), and four times for nickel;
- **Low Elevation Relative to Pre-Exposure Levels – Arsenic, Copper, Iron, Mercury, Selenium, Antimony, Cadmium and Cobalt**. Arsenic, iron, mercury, antimony concentrations less than or equal to two times the pre-exposure maximum were recorded in the vicinity of the Faro tailings impoundment / mill complex. However, copper, selenium, cadmium and cobalt show more widespread elevation in elemental levels (including elevated levels in the Swim Lake reference area for copper and cobalt), suggesting either an ambient regional deposition of these elements in addition to mine-generated airborne deposition; and / or deposition attributable to a source on the Anvil Range Mine independent of the primary source of airborne deposition; and
- **No Elevation Relative to Pre-exposure Levels – Thallium and Chromium**. No evidence of elemental deposition in moss bags was observed for thallium or chromium.

Of those elements showing no sign of cumulative mine-generated elemental elevation in lichen tissue, the following showed elevated levels in moss bags relative to unexposed moss: aluminum; molybdenum; manganese; and silicon. These results may imply an ongoing mechanism of deposition of these elements on the Anvil Range Mine that is independent of the primary mechanism of deposition as observed in the cumulative receptors (lichen). Further investigation would be required to confirm or invalidate these results (i.e., continued moss bag sampling and analysis and ambient air sampling using mini-vols).

3.3 Discussion and Next Steps

Analytical results from moss bags exposed for 10 weeks (August to November 2004) and 20 weeks (August 2004 to January 2005) indicate current mine-generated deposition for a number of elements. Deposition is highest for lead, and generally follows the patterns of cumulative elemental elevation

documented in lichen tissue, i.e., elemental elevation is concentrated in the vicinity of the Faro tailings impoundment / mill complex and northwest down the Rose Creek valley. Over the monitored period from August 2004 to January 2005, the majority of current deposition appears to have occurred in the fall (August to November), with no significant additional deposition in the early winter (November to January).

Elements other than lead show some deviation from the observed cumulative patterns in lichen. Arsenic, for example, has the second highest cumulative elemental concentration in lichen after lead relative to reference levels, but showed evidence of only marginal current deposition. Conversely, barium and nickel results indicated low levels of cumulative concentration in lichen, but these elements were among those elements with higher levels of deposition in moss bags, relative to pre-exposure values. Furthermore, of those elements showing no sign of cumulative mine-generated elemental elevation in lichen tissue, the following showed elevated levels in moss bags relative to unexposed moss: aluminum; molybdenum; manganese; and silicon. These discrepancies between observed cumulative elemental elevation and current elemental deposition suggest that:

- the contribution of current mine-site elemental dust sources is different than historical contributions, due to different operational and closure conditions; and / or
- the period monitored to date through moss bag exposure is not representative of the range of conditions that have contributed to cumulative elemental elevation in the study area.

In order to sample potential ongoing airborne deposition during spring and summer, it has been proposed that an additional set of moss bags be deployed on the study area in early April 2005, with scheduled retrieval dates in mid June and mid August 2005. In the light of project results, it is recommended that moss bag placement and exposure period be modified for the 2005 program. In the original moss bag sampling program design, it was unknown whether airborne deposition was ongoing or whether a 10 week exposure period would be sufficient to detect any changes in elemental concentrations in moss bags from pre-exposure levels. Moss bags were therefore originally deployed for increasing periods in attempt to detect low levels of deposition. However, results to date indicate that measurable deposition is occurring within a ten week period, and that a longer exposure period is not necessary to detect change from pre-exposure levels. Therefore, it is recommended that in 2005, moss bags be deployed for a maximum of ten weeks and placed in identical positions during each sampling event. This will also reduce the confounding influence of within-site variation. Duplicate moss bags will be deployed on at least two sites in 2005 in an attempt to also measure intra-site variation.

Moss bags are useful indicators of the occurrence of airborne deposition. However, they do not provide empirical measurements of ambient air elemental concentrations. The results of this project show that airborne deposition from the Anvil Range Mine Complex is ongoing and therefore it is likely that more sophisticated monitoring techniques will be required to determine ambient air concentrations (e.g., for

feeding into human and ecological risk assessments). An ambient air sampling program using mini-vols should therefore be considered in the 2005 program.

Moss bags can also provide an understanding of the general area of sources of current deposition but cannot provide precise locations. Lead isotope analysis can be used to distinguish specific current elemental dust sources on the Anvil Range Mine. A lead isotope analytical program should also be considered in the 2005 program.

4. Improve Characterization of Reference Concentrations

4.1 Methods

4.1.1 General Approach

Selection of reference sampling locations is critical to conducting a retrospective study of mine impacts on soils and vegetation metal concentrations where pre-mining sampling does not exist. Near-surface ore bodies that can be mined by open-pit methods are frequently associated with more widespread mineralization of surficial materials and soils. This mineralization can lead to naturally occurring elevated elemental concentrations in both soils and vegetation in areas surrounding ore deposits. It is important that such concentrations not be mistaken as evidence of elemental elevation resulting from mining operations. For this reason, reference sampling locations for the 2002 study (C.E. Jones & Associates Ltd. 2003) were carefully chosen to be located in areas of natural mineralization that would be free from additional mine site impacts. Geological reports on the Anvil Range area indicated a zone of mineralization trending from northwest of the Faro pit, through the mined deposits and to the southeast as far as the Swim Lakes basin (Bond 2001). This information suggested the Swim Lakes basin as the most representative retrospective reference sampling location.

Following the results of the 2002 study (C.E. Jones & Associates Ltd. 2003), concerns were raised by community members of the Town of Faro that the Swim Lakes reference area was not far enough from the footprint of the Anvil Range Mine Complex to be unaffected by mining activities, i.e., potential airborne deposition (Town of Faro Open House, March 2004). It was therefore suggested that a more extensive search for candidate reference areas be conducted in 2004 (GLL and C.E. Jones & Associates Ltd. 2004). If this search did not yield additional candidate reference areas, a commitment was made to conduct an expanded sampling program on Swim Lakes with the objectives of:

- expanding the reference data set and ensuring that sampling adequately covered the area of the identified Swim Deposit (Bond 2001); and
- sample and analyze lichen, soils and moss bags from the Swim Lakes reference areas to determine the suitability of this area as a reference site by testing for evidence of cumulative and / or ongoing deposition related to the activities of the Anvil Range Mine.

4.1.2 Search for Additional Candidate Reference Areas

Location of additional reference areas requires that candidate areas must be free of potential airborne deposition from any source and also possess similar surficial geochemistry to that of the project area. The ideal reference location should therefore be far enough removed from the Anvil Range Mine Complex to be free of mine-generated airborne deposition, but within the same deposit type. A study of quaternary geology and till geochemistry of the Anvil district (Bond 2001) reports the following:

> "The Anvil district Zn-Pb-Ag stratiform pyritic massive sulphide deposits occur within a 150-m interval in the pre-Ordovician strata at the contact between Mount Mye and Vangorda formations. Five ore deposits occur in the Anvil District along a southeast curvilinear trend: Faro, Grum, Vangorda, Grizzly, and Swim…. Swim basin is considered to be the most representative area to calculate a regional threshold because of its similar geology, physiography and glacial history to the Vangorda plateau."

The Swim basin was initially selected as the most suitable reference location for the study of the potential effects of the Anvil Range Mine Complex on surrounding terrestrial ecosystems, based on information in Bond's study; the Swim basin is the furthest-removed of the similar deposits that occur off-site from the Anvil Range Mine Complex and the Swim basin is situated in the upwind direction for prevailing summer winds (when elemental dust sources on the mine site are not frozen or snow-covered). The only other potential candidate site is the Grizzly deposit. This site was rejected; it is situated only 4 km SE of the Vangorda mine site.

A search for appropriate additional reference sites prior to the 2004 field program did not yield any suitable candidates additional to the Swim Lake basin. This search was based on:

- a review of the rationale for the original selection of the Swim basin (predominantly Bond's 2001 report); and
- a review of 2002 lichen data from the Swim location, which indicated no elevation in lead or zinc concentrations in the Swim Lakes area relative to published reference levels.

As a result of this search and review process, and the lack of additional suitable candidate reference locations, the approach taken for the 2004 field program was to expand the sampling grid at the Swim Lakes location in order to expand the reference data set and to ensure that sampling adequately covered

the area of the identified Swim Deposit (including areas where Bond's study had previously identified anomalously high lead and zinc concentrations in subsurface till samples). The Swim deposit is located approximately 3 km northwest of the western end of Swim Lake (i.e., at the northern end of the 2002 sampling transect displayed in Figure 2). Anomalously high lead and zinc levels located by Bond were most concentrated in the approximately 5 km x 5 km area directly west of Swim Lake. Both of these areas are covered by the integrated 2002 / 2004 Swim Lake reference location sampling grid.

4.1.3 Sampling and Analysis on Swim Lakes Reference Areas

Lichen

A total of 21 sites were selected for sampling in 2004 on Swim Lakes reference area; this increases reference observations to 28 from the seven collected in 2002. *Cladina mitis* (and occasionally *Cladina stellaris*) were collected wherever these species occurred on the Swim Lakes reference area sample sites (Figure 2). Lichen sampling methods and laboratory analysis follow the procedures outlined in Section 2.1.

Soil

Soil samples were collected on all Swim Lakes reference area sample sites (Figure 2). Soil sampling methods and laboratory analysis follow the procedures outlined in Section 2.1.

Moss Bags

Three moss bag sampling locations were defined on the Swim Lakes reference areas (Figure 37). Moss bag sampling methods and laboratory analysis follow the procedures outlined in Section 3.1.

4.2 Results

4.2.1 Sampling and Analysis on Swim Lakes Reference Areas

Lichen

Table 8 summarizes the number of lichen samples collected on the Swim Lakes reference area. Lichen raw data is presented in Appendix C and summary tables are presented in Appendix D.

Table 8. Summary of Lichen Samples Collected in 2002 and 2004 on Swim Lakes Reference Areas

Year	Number of Lichen Samples Analyzed
2002	6
2004	11
Total	17

Maximum elemental concentrations recorded on Swim Lakes reference area were compared to published concentration ranges for vegetation from uncontaminated areas (Crete *et al.* 1992; Gamberg unpub. data; Kabata-Pendias 2001; Rhoades 1999; Shaw and Gunn 1981). For all elements considered to be affected by the operations of the Anvil Range Mine, elemental concentrations in Swim Lakes lichen could be compared to concentrations in other lichen species except thallium; reference lichen data were not available for this element and therefore levels in vascular plants were used for comparison.

This comparison indicates that for all elements except boron, calcium, magnesium, manganese, silicon, tellurium, titanium and zinc, maximum concentrations recorded at the Swim Lakes reference location fall within published reference ranges. Of these, only the distribution of zinc has been shown in this study to be affected by mining activities at the Anvil Range complex in lichen on the Anvil Range Mine (Section 2.2). The Swim Lakes maximum for zinc, 29.7 ppm, marginally exceeds the published reference level for zinc in a lichen species of the same genus; 20 ppm in *Cladina rangiferina* (Rhoades 1999). However, this value is within reference ranges of Yukon *Cladina spp*.; up to 94.0 ppm (Gamberg unpub. data). Given this variation and the fact that Swim Lakes lichen zinc is closely comparable to published sources, Swim Lakes lichen zinc is considered representative of reference levels in this area. This premise is supported by the fact that lead, the element showing the greatest magnitude and extent of elemental elevation on the Anvil Range Mine, had a median concentration of 1.1 ppm and a maximum concentration of 1.6 ppm in the Swim Lake background area, compared to a published reference level of less than 2 ppm.

The comparison of elemental concentrations in lichen observed in the integrated 2002 / 2004 Swim Lake data set with published reference concentrations strongly supports the continued use of Swim Lake as a valid reference location.

Soil

Table 9 summarizes the number of soil samples collected on the Swim Lakes reference area by depth and parent material. Soil raw data is presented in Appendix C and summary tables are presented in Appendix D.

Table 9. Summary of Soil Samples Collected in 2004 on Swim Lakes Reference Areas

Depth / Parent Material	Number of Soil Samples Analyzed
Surface organic	19
Subsurface organic	13
Subsurface mineral	10
Surface mineral	0
Ash	0
Total	**42**

Lead levels in Swim Lakes soils samples were compared to those potentially affected by activities of the Anvil Range Mine. In this comparison, if lead concentration in surface soils of Swim Lakes is similar to that in soils of mine-affected areas, it would suggest that Swim Lakes reference area is not free of potential airborne deposition from the Anvil Range Mine. Furthermore, if lead concentrations in subsurface soils of Swim Lakes are dissimilar to those in mine-affected areas, it would suggest that Swim Lakes reference area does not possess similar surficial geochemistry to mine-affected areas.

A comparison of lead values in Swim Lakes samples to those of potentially affected by activities of the Anvil Range Mine shows the following:

- **Surface Organic –** lead levels on the Swim Lake reference area are low in the context of the overall study area (Figure 22), with a median concentration of 10 ppm and a maximum of 18 ppm, compared to a potentially mine-affected median of 269 ppm and a maximum of 5,930 ppm;
- **Subsurface Organic –** lead levels in subsurface organic soils are similar to those in mine-affected areas (Figure 28). Where dissimilarities do exist they are related to occurrences of very shallow surface soils (e.g., samples in Rose Creek) where translocation of elements from surface soils into the subsurface organic soils is evident; and
- **Subsurface Mineral –** the median lead level at the Swim Lake reference location is 15 ppm, with a maximum of 61 ppm. The median lead level in comparative soils for the potentially mine-affected study area is 16 ppm, with a maximum of 35 ppm. Figure 30 presents mineral soil lead data across the study area, and shows the comparability of the Swim Lake location to near-mine locations.

Anomalous Reference Soil Values

One Swim Lakes reference location has anomalously high subsurface organic and subsurface mineral lead values (Figure 28), with concentrations of 193 and 60.5 ppm, respectively (and a surface organic concentration of 17 ppm). This sample location is in the vicinity of the mapped Swim deposit discussed by Bond (2001), and has a till (subsurface mineral) lead concentration in his calculated 98-100th percentile grouping. This sample site is located on a steep (20-30°) north-facing slope, with evidence of substantial cryoturbation (frost-heaving). It is likely that this heaving process has caused mixing of the mineral soil and the overlying subsurface organic horizon, resulting in mineral enrichment of this horizon. The high subsurface mineral lead concentration at this sample point confirms that the Swim Lake reference

sampling grid was successful in including the Swim Deposit area. The relatively low surface organic lead value of 17 ppm indicates that the higher lead concentrations observed at depth are not the result of airborne deposition and subsequent vertical translocation.

In synthesis, soil results show that Swim Lake reference is as comparable as possible (in a retrospective study) to pre-mining conditions on the Faro / Grum / Vangorda areas; Swim Lakes reference area is from the same naturally mineralized deposit type, but has not been affected by any significant mine-generated deposition.

Moss Bags

Raw moss bag data is presented in Appendix C and complete results are presented in Section 3.2. Comparison of elemental concentrations in moss bags deployed on Swim Lakes reference area and those of unexposed moss, show that elemental concentrations of cobalt, copper, lead, manganese and uranium in moss bags on Swim Lakes were elevated compared to unexposed moss:

- **Cobalt –** during the 10 week exposure period, cobalt was 0.5 ppm at station M33 (Figure 37) compared to a pre-exposure maximum of 0.3 ppm. This element showed evidence in lichen of marginal mine-generated elevation;
- **Copper –** during the 10 week exposure period, copper was 5.7 ppm at station M33 compared to a pre-exposure maximum of 3.8 ppm. This element showed evidence in lichen of marginal mine-generated elevation;
- **Lead –** during the 20 week exposure period, lead was 1.3 ppm at station M32 compared to a pre-exposure maximum of 0.6 ppm. This element showed evidence in lichen of high mine-generated elevation;
- **Manganese –** during the 10 week exposure period, manganese was 130 ppm at station M33 compared to a pre-exposure maximum of 70.2 ppm. There is no evidence in lichen of high mine-generated elevation; and
- **Uranium –** during the 10 week exposure period uranium was 5.65 ppm at station M33 compared to a pre-exposure maximum of 2.42 ppm. There is no evidence in lichen of high mine-generated elevation.

In summary, moss bags at two of the three sampling stations in the Swim lake reference area showed five exceedances over pre-exposure levels, three in elements shown to be affected by operations at the Anvil Range Mine Complex in lichen (cobalt, copper and lead), and two in elements unrelated to mining operations (manganese and uranium). The lack of any evidence of cumulative elevation for the three mine-affected elements (cobalt, copper and lead) in lichen at the Swim Lake reference location, and the lack of relationship in the other two elements to mining activities, suggests some ambient deposition of

these elements at the Swim Lakes location independent of any mine influence, rather than a low-level effect from the mine site.

4.3 Discussion and Next Steps

Information collected in 2002 and 2004 at the Swim Lake basin sampling area has provided a relatively robust data set on reference lichen and soil elemental concentrations, and on levels of current airborne elemental deposition at this site. Further sampling at this site for these study components is not recommended, as they have been relatively well represented. We believe that the lack of evidence in the Swim Lake reference area of cumulative elemental elevation of lichen and surface soil samples, of current significant deposition in moss bags, and the comparability of lichen results to published reference values indicates that the Swim Lakes reference data set is not only a valid local reference, but represents a fortuitous analogue to pre-development conditions on the Anvil Range Mine Complex. In the absence such a local, upwind, related but unmined deposit, acquisition of a valid local reference data set would have been unachievable. However, if concerns remain with regards to the source of elevated elements in moss bags (and therefore the validity of Swim Lake as a reference sampling location), it is suggested that consideration be given to the use of lead isotope analysis to distinguish potential mine-generated and ambient background lead sources on the Swim Lakes reference area.

5. Elemental Concentrations in Vegetation and Mineral Licks

5.1 Methods

5.1.1 General Approach

In order to investigate potential elemental uptake by vegetation species of importance to wildlife (e.g., forage species) and / or humans (e.g., species used for medicinal use and / or consumption) selected vegetation species were sampled and analyzed. Soils may also influence wildlife species through direct consumption at mineral lick sites (or through consumption of soil during grazing). Soil samples were also collected at known mineral lick sites. These data can then be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future human health and ecological risk assessment and will also assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.

Vascular (i.e., rooting) vegetation can be influenced by both pre-existing mineralization (by rooting in the soil) and by airborne elemental deposition (through deposition on plant materials and uptake through surface soil). Therefore in order to distinguish between sources of observed elevated elemental concentrations, and ensure that elevated concentrations are not erroneously attributed to mine operations if this conclusion is incorrect, soils were collected, subsampled and analyzed where vegetation species of importance to wildlife and / or humans were collected.

5.1.2 Vegetation and Mineral Lick Sampling

Determination of Vegetation Species of Importance to Wildlife and / or Humans

Vegetation species were selected from an expanded list of species documented to occur in the area of the Anvil Range Mine Complex (MEC Ltd. 1976; Weinstein 1992; Staniforth 1998; C.E. Jones & Associates Ltd. 2003; Selkirk First Nation Traditional Knowledge Workshop April 2004; Ross River Dena Council Terrestrial Effects Workshop May 2004). The selection of species from the expanded list aims to sample species that are important to wildlife and / or humans. The selection relied heavily on input from the First Nations community and scientific knowledge regarding local wildlife food habits (Pearson 1976; Weinstein 1992; Schweinsburg 1990; Kuzyk and Farnell 1997; R. Ward, pers. comm., March 2004; Selkirk First Nation Traditional Knowledge Workshop April 2004; Ross River Dena Council Terrestrial Effects Workshop May 2004; McCann, in prep.) and input from the First Nations on species of importance for human consumption and use (Selkirk First Nation Traditional Knowledge Workshop April 2004; Ross River Dena Council Terrestrial Effects Workshop May 2004; Ross River Terrestrial Effects Project Update and Traditional Knowledge Data Handling Meeting, August 2004) and community members of the Town of Faro (A. Domes, pers. comm. August 2004).

Table 10 lists vegetation species that were identified for sampling and analysis in 2004. The selection of vegetation species representing wildlife forage aims to sample broad vegetation groups that are representative of the major food types available and of importance to wildlife in the area of the Anvil Range Mine Complex. A number of vegetation species were identified for each broad vegetation group to allow for variation in abundance and occurrence of specific species on the study area. For example, amongst the forb group, five forb species were identified as potential species to sample to represent forbs: *Epilobium angustifolium* (fireweed); *Petasites frigidus* (coltsfoot); *Artemisia spp.* (sage); *Achillea spp.* (yarrow); and *Nuphar spp.* (water lily).

Vegetation and Mineral Lick Sampling Locations

Samples of vegetation of importance to wildlife and / or humans were collected opportunistically where they were found to occur in sufficient abundance at all sample locations visited (2004 sampling locations in Figure 2). Areas of importance to wildlife and / or humans were also identified by First Nations and

Table 10. Vegetation Species and Groups for Collection and Analysis

Species Group	Selected Species	Plant Part	Wildlife Value	Food / Use for Humans
Grasses and Sedges	*Bromus spp; Calamagrostis spp.; Festuca altaica; and Carex spp.*	Leaves	Potential forage species of small mammals, game birds, ungulates and bears	Not documented
Aquatic grasses	*Beckmannia syzigachne*	Leaves	Potential forage for moose, black bear and muskrat	Not documented
Horsetails	*Equisetum spp.*	Stems	Potential forage for bears and ungulates	Not documented
Forbs	*Epilobium angustifolium, Petasites spp.; Artemisia spp.* (sage); *Achillea spp.* (yarrow); and Water lily (*Nuphar spp.*)	Leaves and stems	Potential forage species of small mammals, game birds, ungulates and bears	Yes
Labrador tea	*Ledum groenlandicum*	Leaves	Not documented as forage species	Yes
Berries	*Empetrum nigrum* (crowberry); *Arctostaphylos uva-ursi* (Kinnikinnick); *Arctostaphylos rubra* (red bearberry); *Arctostaphylos alpine* (alpine bearberry); *Shepherdia canadensis* (Soopolallie); *Vaccinium uliginosum* (bog blueberry)*; Vaccinium vitis-idea* (low bush cranberry)*; Rosa acicularis* (Rosehip); *Viburnum edule* (high bush cranberry); *Ribes spp.* (currants and gooseberries); *Rubus chamaemorous* (cloudberry); and *Juniperus spp.* (juniper).	Berries	Potential forage for small mammals, game birds and bears	Yes
Willow	*Salix spp (S. pulchra* or any browsed species)	Tips	Potential winter forage of moose, caribou, snowshoe hare and bears	Yes
Trees	*Picea glauca* and *Abies lasciocarpa*	Sap	Potential spring food for bears	Yes
Bear root	*Hedysarum alpinium* and *Hedysarum boreale*	Roots	Potential forage for bears	Yes
Mushroom spp.	*Leccinium boreale* and *Agaricus silvicola*	Above ground parts	Potential forage species of small mammals, ungulates and bears	Yes
Lichen	*Cladina mitis*	Branchlets	Potential forage of caribou	Not documented

Faro community members (Town of Faro Open House, March 2004; Ross River Dena Council Terrestrial Effects Workshop May 2004). These areas were included in the selection of sample locations e.g., sample locations were assigned near the Town of Faro, on the north slopes of Blind Creek and in the area of Vangorda Creek. The specific locations of mineral lick sites were identified on working maps during community meetings (Town of Faro Open House, March 2004; Meeting with Anvil Range Mine Site Personnel, March 2004; Ross River Dena Council Terrestrial Effects Workshop May 2004). It was agreed that the specific location of mineral lick sites (and the specific location of any harvesting sites) would not be displayed on any publicly available maps (Section 7).

Vegetation and Mineral Lick Sampling Methods

Garden clippers were used to collect leaf and stem samples of grasses, sedges, horsetails and forbs and the tips of willows. Clippers were cleaned with 99% isopropanol prior to sampling at each site. Labrador tea leaves, berries, bear roots and mushrooms were collected by hand using un-powdered nitrile gloves, with new gloves used at each sample site. Dead vegetation and non-vegetation materials were removed from the samples at each sample site, to ensure comparability of samples. Samples were collected in metalized polyester Kapak bags (designed to be trace element-free) and isolated from other potential contaminant sources prior to laboratory analysis. Methods of tree sap collection followed those provided by First Nations (Ross River Terrestrial Effects Project Update and Traditional Knowledge Data Handling Meeting, August 2004).

The timing of collection of species of importance to humans and wildlife aimed to coincide with one of the seasons of use. For example, mushroom and bear roots were sampled during fall (these species are consumed during fall and bear root is also consumed by bears during early spring), berries and Labrador tea were sampled during summer (these species are consumed during summer and some berry species are also consumed by bears as over-wintered berries during early spring), sap of *Abies lasciocarpa* (locally known as balsam fir) and *Picea glauca* (white spruce) was collected in the fall (these species can be harvested throughout the year), willow twigs were sampled during summer (these species are consumed throughout the year), and grasses, sedges, horsetail and forbs were sampled during summer (these species are consumed from emergence in spring up until senescence in fall). The exception is lichen; lichen samples were collected during summer although lichen is consumed during winter. However, the concentration of trace metals in lichen tissues do not appear to vary seasonally (Berryman *et al*. in prep.) although macronutrients (such as potassium, magnesium and calcium) do (Boonpragob *et al.*, 1989), these elements are not related to the activities of the Anvil Range Mine.

Soil samples from mineral lick sites were collected using a stainless steel shovels to minimize metals contamination during sampling. Shovels were cleaned with 99% isopropanol prior to sampling at each site. Soil was handled wearing un-powdered nitrile gloves, with new gloves used at each sample site. Living vegetation and rocks were removed from the samples, to ensure comparability of samples. Samples were collected in metalized polyester Kapak bags (designed to be trace element-free) and isolated from other potential contaminant sources prior to laboratory analysis. Soil samples were taken

from the horizon where consumption of soil was evident, i.e., through lick marks and / or pawing. Soil samples were also taken at depth (surface organic, subsurface organic and subsurface mineral) at a nearby location, a short distance from the lick site to avoid disruption of the site.

Soil samples were collected at sites where vegetation of importance to wildlife and / or humans was collected to enable interpretations of sources of elevated element concentrations in vascular plants. Soil sampling methods followed those outlined in Section 2.1.

Vegetation and Mineral Lick Sub-sampling Methods

A subset of vegetation samples collected was selected for immediate analysis of elemental concentrations (the remaining samples were archived for any future analysis):

- in areas identified as valued foraging areas for wildlife through literature review, traditional and local knowledge and interpretation of field sign;
- in areas identified as valued foraging areas for humans through traditional and local knowledge;
- where lichen samples showed highest levels of lead and zinc (e.g., lead levels were at least 10 x Swim Lakes maximum); and
- from the Swim Lakes reference areas.

All soil samples from mineral lick sites were sent for analysis.

Soils collected at sites where vegetation of importance to wildlife and / or humans were sub-sampled for elemental analysis to enable interpretations of sources of elevated element concentrations in vascular plants. This approach was identified as an additional means of maximizing use of the data collected while reducing the potential of sampling "clean" sites.

Vegetation and Mineral Lick Laboratory Analysis

Vegetation samples were sent to CanTest Laboratories (Burnaby, BC) for analysis of the 33 elements listed in Table 2. Samples were first dried, grinded and subsampled then digested using a nitric acid - hydrogen peroxide digestion procedure based on U.S. Environmental Protection Agency Method 200.3. Analysis of all elements except mercury was performed using ICP-MS (Inductively Coupled Argon Plasma Spectroscopy - Mass Spectrometry). Analysis of mercury was performed using either Cold Vapour Atomic Absorption Spectrophotometry or Cold Vapour Atomic Fluorescence Spectrophotometry.

The subset of soil samples (including those from mineral lick sites) were sent to CanTest Laboratories (Burnaby, BC) for analysis of the 29 elements listed in Table 3 and pH. Soil pH was analyzed based on procedures described in the Manual on Soil Sampling and Methods of Analysis, published by the Canadian Society of Soil Science 1993. The test was performed using a deionized water leach with measurement by pH meter. Strong acid leachable metals analysis was used to test all elements (except

mercury, arsenic and selenium) in soils: analysis was performed using British Columbia Ministry of Environment, Lands and Parks Method, Strong Acid Leachable Metals in Soil, Version 1 (Province of British Columbia 2001). This method involves drying the sample at 60 degrees Celsius, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was then performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP). The same preparation procedures (i.e., drying, sieving and digestion using a mixture of hydrochloric and nitric acids) were used to prepare arsenic, selenium and mercury for analysis. Arsenic and selenium were analyzed using ICP-MS and mercury was analyzed using Cold Vapour Atomic Fluorescence.

Vegetation and Mineral Lick Data Analysis

Statistical techniques used to analyze vegetation and mineral lick data are discussed in Section 5.2.

5.2 Results

5.2.1 Vegetation and Mineral Lick Sampling

Determination of Vegetation Species of Importance to Wildlife and / or Humans

It should be noted that aquatic grasses were not found on the study area during this field program and therefore could not be sampled. Furthermore, it was originally planned that buds from tree species on the project area would be collected. However, the timing of field sampling (August and September) was not suitable for the collection of growing parts. Instead, tree sap was collected using methods described to project personnel by traditional harvesters (Ross River Terrestrial Effects Project Update and Traditional Knowledge Data Handling Meeting, August 2004).

Vegetation and Mineral Lick Sampling Locations

Figures 44 - 46 show the distribution of vegetation samples collected during 2002 and 2004 field sessions. Samples of grasses, forbs, horsetails, berries, willows and Labrador tea were collected during a 10 day field session at the beginning of August 2004. Berry sampling therefore coincided with those time berries are consumed by both humans and wildlife. Samples of roots and mushrooms were collected throughout August, when these species are fully developed and are consumed by both humans and wildlife. Tree sap was also collected during August.

All mineral lick samples were collected during August 2004. Mineral lick sites were found no closer than 5.5 km from the Anvil Range Mine Complex; one within lichen lead zone 2 (Site 2) and one outside of the kriging surface (Site 1) displayed in Figure 4. It is suspected that Site 1 lies beyond mine-affected areas in the reference zone; however additional lichen sampling in this area will be required to confirm or invalidate this.

Vegetation and Mineral Lick Sampling and Subsampling Methods

Table 11 summarizes the number of vegetation samples collected and analyzed in both 2002 and 2004. All samples analyzed were used in data analysis and interpretation.

Table 11. Summary of Vegetation Samples Collected and Analyzed in 2002 and 2004

Vegetation Group[1]	Samples Collected and Analyzed in 2002	Samples Collected and Analyzed in 2004	Total Number of Samples Available for Analysis
Grasses	26	15	41
Horsetails	0	10	10
Forbs	0	10	10
Labrador tea	0	10	10
Berries	11	33	44
Willow	52	10	62
Roots	0	10	10
Mushrooms	0	10	10
Tree sap	0	10	10
Total	89	118	210

1 It should be noted that lichen data will also be available for interpretation.

In the original work plan (GLL and C.E. Jones & Associates Ltd. 2004), 100 composite vegetation samples and 30 individual samples were proposed for analysis. During field collection, it became apparent that in many cases individual species, rather than composite samples, were more commonly available for collection at each site (e.g., coltsfoot) represented the only forb present at the majority of sites sampled). This was also the case for the majority of vegetation samples collected. The exception was berry samples; these samples were often composite (e.g., a mixture of red bearberry (*Arctostaphylos rubra*) and high bush cranberry (*Viburnum edule*)). Therefore to ensure analysis of individual samples of berries, a total of 33 samples from nine separate species were sent for analysis. A total of 15 grass samples were sent for analysis in an attempt to sample as many areas as possible of high value wildlife habitat identified through literature review, traditional and local knowledge and interpretation of field sign.

Soil samples collected at both mineral lick sites were sent for analysis to provide data on elemental levels in soils known to be directly ingested by wildlife.

Vegetation and Mineral Lick Laboratory Analysis

Vegetation and mineral lick raw data are presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided by standard batch QA / QC procedures performed by CanTest. The results of these QA / QC analyses are presented in Appendix E.

Vegetation and Mineral Lick Data Analysis

Analytical Approach

Results of the lichen Getis-ord statistical analyses and Kriging (Section 2.2) were used to focus comparative analyses of vegetation data between mine-affected and reference areas. Those elements considered to be affected by Anvil Range Mine operations (as determined through lichen Getis-ord analyses) were statistically compared in vegetation tissues among lichen lead zones (determined through lichen Kriging) and also compared to Swim Lakes reference levels and, wherever possible, published reference sources.

Lichen lead zones represent zones of influence of the Anvil Range Mine with strongest influence in the zones of highest lichen lead concentrations (e.g., around Faro tailings impoundment / mill complex), moderate influence in zones of moderate lichen lead concentrations (e.g., Vangorda / Grum area) and no influence in the zone of reference lichen lead concentrations (i.e., Swim Lakes reference areas). Figures 44 - 46 show the spatial distribution of lichen lead zones in relation to vegetation sampling locations. Lichen lead zones were used for categorical analysis of difference by ANOVA (data were log-transformed if necessary to meet assumptions of normal distribution necessary for parametric analysis). In the following tables and discussion, Zone 1 represents the Swim Lakes reference and similar areas; Zone 6 represents the area of highest lead lichen concentration adjacent to the Faro mine area, and Zones 2-5 represent the intermediate areas.

Comparison between elemental levels in vegetation species found in mine-affected areas and Swim Lakes reference areas is considered valid despite the potential confounding effects of subsurface soil concentrations; subsurface mineral and organic soils are known to be similar between Anvil Range Mine Complex and Swim Lakes reference area (Figures 28 and 30). Where differences so exist they occur in the subsurface organic and are the result of influence of surface soils, i.e., through translocation of elements through a thin surface organic veneer into the subsurface organic (Section 2.2).

Vegetation results are discussed by species, below, followed by results from mineral lick samples. This discussion identifies elements for which statistical analyses indicate mine-related effects, and elements for which observed concentrations exceed relevant reference levels.

Berries

Berry results represent concentrations from composites or individuals of the following species: highbush cranberry (*Viburnum edule*); lowbush cranberry (*Vaccinium vitis-idaea*); rose hips (*Rosa acicularis*); crowberry (*Empetrum nigrum*); Kinnikinnick (*Arctostaphylos uva-ursi*); red bearberry (*Arctostaphylos rubra);* Soopolallie (*Shepherdia canadensis*); cloudberry (*Rubus chamaemorous*) and blueberry (*Vaccinium uligonosum*). Of these species, crowberry was most commonly collected (n=15), followed by blueberry (n=8) and red bearberry (n=8).

Analysis of berry elemental concentrations shows statistically identifiable differences clearly related to mine-generated effects for lead and zinc (Appendix F). Lead concentrations are below detection limits in Zones 1-3, and increase to a maximum mean of 2.6 ppm in Zone 6. Note that this mean from the most heavily mine-affected area is still within the normal Yukon background range of 0.02-2.69 ppm documented by Gamberg (unpub. data). Zinc levels in berries show a less consistent pattern, but still are still significantly lower at the Swim Lakes reference area (mean = 10.7 ppm) than in Zone 6 (mean = 27.8 ppm). As with lead, this highest mean is still within the documented normal Yukon reference range of 2.9-44.3 ppm Gamberg (unpub. data). Zone 6 means for lead and zinc are approximately 26 and 2.7 times higher, respectively, than Swim Lakes reference means. This is consistent with lichen elemental concentration results, which showed maximum elevation of lead concentrations roughly ten times that of zinc.

In addition, a comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following (as well as lead and zinc) show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: cadmium; chromium; copper; iron; and nickel.

Labrador Tea

Analysis of Labrador tea elemental concentrations shows statistically identifiable differences clearly related to mine-generated effects in lead and thallium (Appendix F). Lead data shows a regular increase from levels below the detection limit (0.1 ppm) in the Swim Lakes reference area to a mean of 2.6 ppm in Zone 6. These data are almost identical to results reported for berries, with an elevation in Zone 6 of at least 26 times the Swim Lakes mean. This Zone 6 mean also remains within the normal reference range for Yukon (0.02-2.69 ppm) reported by Gamberg (unpub. data). Thallium has a higher mean concentration in Labrador tea samples from Zone 6 (0.18 ppm), in comparison to all other Zones (<0.02-0.05 ppm). However, this Zone 6 mean is still within the cited normal range of 0.008-1.0 ppm (Kabata-Pendias 2001).

In addition, a comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following (as well as lead and thallium) show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: barium; cadmium; chromium; copper; iron; nickel; and zinc.

Willow

Analysis of willow elemental concentrations shows statistically identifiable differences clearly related to mine-generated effects in copper, lead, nickel, silver and zinc (Appendix F):

- Lead – the mean for Zone 6 (28.9 ppm) is significantly higher than means for all other zones (0.3-5.3 ppm). This mean for Zone 6 is roughly 100 times the Swim Lakes reference mean. Means from Zones 3-6 exceed the normal Yukon reference range of 0.01-0.5 ppm (Gamberg, unpub. data). Note that these reference values (Gamberg, unpub. data) are from winter-sampled willow twigs, and are thus likely low in comparison to samples including leaf tissue; however, they represent the only local reference available (other than Swim Lakes);
- Zinc – the mean for Zone 6 (684 ppm) is significantly higher than all other Zones (132-254 ppm), with the exception of Zone 2 (ability to statistically distinguish means from Zone 2 for willow are limited by its small sample size [n = 4]). Zone 6 mean is approximately 4 times that of Swim Lakes reference mean. Means from Zones 5 and 6 exceed the documented normal reference range for Yukon, 30-207 ppm (Gamberg, unpub. data);
- Copper – the mean for the most elevated lichen Zone (6) of 6.6 ppm is significantly higher than the Swim Lakes reference mean of 3.5 ppm. All means are within the normal Yukon reference range, 1.1-11.4 ppm (Gamberg, unpub. data);
- Nickel – the Zone 6 mean (2.8 ppm) is significantly higher than the Swim Lakes reference mean (1.0 ppm). All means are within the normal Yukon reference range 1.0-3.3 ppm (Gamberg, unpub. data); and
- Silver – the Zone 6 mean (0.09 ppm) is significantly higher than the Swim Lakes reference data (<0.01 ppm). All means are within the normal Yukon reference range 0.01-0.20 ppm (Gamberg, unpub. data).

In addition, a comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following (as well as lead, zinc, copper, nickel and silver) show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: arsenic; barium; cadmium; chromium; cobalt; iron; and mercury.

Forbs

Forb results represent concentrations from composites or individuals of the following species: fireweed (*Epilobium angustifolium*) and coltsfoot (*Petasites frigidus*). Analysis of forb elemental concentrations shows statistically identifiable differences clearly related to mine-generated effects in lead and zinc (Appendix F). Both elements show increasing concentrations from Swim Lakes reference means (0.1 and 33 ppm for lead and zinc, respectively) to those observed in Zone 6 (4.3 and 648 ppm for lead and zinc, respectively). Levels in Zone 6 are substantially elevated above the reference means, by approximately 40 times for lead and 20 times for zinc. The lead concentration documented in the single forb sample from Zone 6 (4.3 ppm) is elevated above the upper normal level documented for Yukon (1.5 ppm, based on fireweed samples). The zinc concentration in samples from Zone 5 and 6 are also elevated above the

upper normal limit (40 ppm – Gamberg unpub. data). Note that the maximum zinc level recorded in the Swim Lakes reference location is 47 ppm; this marginally exceeds other Yukon reference data.

A comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following (as well as lead and zinc) show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: barium; chromium; cobalt; copper; iron; and nickel.

Grasses

Analysis of grass elemental concentrations shows statistically identifiable differences clearly related to mine-generated effects in lead and mercury (Appendix F). The mean lead level of 36.8 ppm from Zone (6) is significantly higher than means from all other zones (0.2-8.3 ppm). This represents a concentration elevation in Zone 6 of 220 times that documented in the Swim Lakes reference location. The mean from Zone 6 is roughly double the upper end of the documented NWT reference range (0.6-16.0 ppm – Shaw and Gunn 1981). Mercury data shows a consistent progression from levels below the detection limit (0.01 ppm) in Zones 1-3 to 0.03 ppm in Zone 6. There is no Yukon-specific reference range available for this element. The Zone 6 mean remains within a published normal range (0.01-0.10 ppm) for grass in cattle feed (Puls 1994); however, these published data likely include samples from more anthropogenically impacted sites.

In addition, a comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following (as well as lead and mercury) show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: arsenic; barium; chromium; nickel; silver; thallium; and zinc.

Horsetails

Horsetails sampled include both *Equisetum pratense* and *E. arvense.* Analyses of elemental concentrations in horsetail show no statistically identifiable differences among zones (Appendix F), likely due to small sample size (n = 10). Lead levels elevated above published upper normal threshold (1.0 ppm, Puls 1994) were observed in the samples from Zone 6, which had concentrations of 2.3 and 2.7 ppm.

A comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: barium; cadmium; chromium; cobalt; copper; iron; lead; nickel; silver; and thallium.

Mushrooms

Mushroom samples include both *Leccinium boreale* (northern rough stemmed) and *Agaricus silvicola* (forest mushroom). However, statistical analyses were conducted using only samples of *Leccinium boreale;* the only forest mushroom collected was found outside of the lichen lead kriging zone. Furthermore, samples of northern rough stemmed and forest mushrooms could not be combined for analysis; elemental concentrations were very dissimilar between these two species. Attempts were made to collect more samples of *Agaricus spp.,* in particular *Agaricus campestris* (meadow mushroom); however this species was not found in mine-affected areas or on Swim Lakes reference areas in 2004.

Analyses of elemental concentrations in northern rough stemmed mushrooms show no statistically identifiable differences clearly related to mine-generated effects, likely due to small sample size (n = 8) and the lack of samples from Swim Lakes reference area (Appendix F). A comparison of maximum elemental concentrations in mine-affected areas and Yukon reference levels in another Bolete mushroom (Gamberg unpub. data) shows that of those elements considered to be affected by Anvil Range Mine operations, the following show some evidence of elevation in mine-affected areas in northern rough stemmed mushrooms when compared to Yukon reference areas: arsenic; barium; cadmium; chromium; cobalt; copper; iron; lead; mercury; nickel; and zinc (Appendix D). Lead and zinc concentrations in samples of northern rough stemmed mushroom are 226 and 5 times higher (respectively) than Yukon reference levels. However, there is only one sample from Yukon reference data available for comparison, therefore these results should be considered preliminary and additional efforts be made in 2005 to sample reference areas using 2004 lead lichen data to determine the location of appropriate sampling locations (e.g., at higher elevations in the Blind Creek drainage). Furthermore, the collection of lichen samples in 2005 will provide data necessary to classify those mushroom samples collected outside the 2004 kriging zone by lichen lead kriging zone.

Bear Roots

Bear root samples include both *Hedysarum alpinum* and *Hedysarum boreale.* Statistical analyses were conducted using only eight of the ten samples collected; two samples were collected outside of the lichen lead kriging zone. Analyses of elemental concentrations in bear root show no statistically identifiable differences clearly related to mine-generated effects, likely due to small sample size (n = 8) and the lack of samples from Swim Lakes reference area (Appendix F). A comparison of maximum elemental concentrations in mine-affected areas and Yukon reference levels in bear root (Gamberg unpub. data) shows that of those elements considered to be affected by Anvil Range Mine operations, the following show some evidence of elevation in mine-affected areas in bear root when compared to Yukon reference areas (Appendix D): antimony; arsenic; cadmium; cobalt; iron; lead; and zinc. Lead and zinc concentrations in samples of bear root are 12 and 3 times higher (respectively) than Yukon reference levels.

Additional efforts should be made in 2005 to sample bear roots in reference and mine-affected areas using 2004 lead lichen data to determine the location of appropriate sampling locations (e.g., at lower elevations in the Blind Creek drainage). Furthermore, the collection of lichen samples in 2005 will provide data necessary to classify those bear roots samples collected outside the 2004 kriging zone by lichen lead kriging zone.

Tree Sap

Tree sap samples include both *Abies lasciocarpa* and *Picea glauca*. Analysis of tree sap elemental concentrations shows show no statistically identifiable differences clearly related to mine-generated effects, likely due to small sample size (n = 10) (Appendix F).

A comparison of maximum elemental concentrations in mine-affected areas and Swim Lakes reference area (Appendix D) shows that, of those elements considered to be affected by Anvil Range Mine operations, the following show some evidence of elevation in mine-affected areas when compared to Swim Lakes reference areas: antimony; arsenic; barium; chromium; cobalt; copper; iron; lead; nickel; and zinc. Lead and zinc concentrations in samples of tree sap on Anvil Range Mine are 246 and six times higher (respectively) than Swim Lakes reference levels. There are no Yukon reference levels in tree sap available for comparison.

Additional efforts should be made in 2005 to sample tree sap in reference and mine-affected areas using 2004 lead lichen data to determine the location of appropriate sampling locations.

Mineral Licks

Soil samples were collected from two mineral lick sites; one in the vicinity of the Anvil Range Mine (mineral lick site 2) and one in an area that was anticipated (during field work) to be within reference areas (mineral lick site 1). However, the kriging surface created based on 2002 and 2004 lichen samples (Section 2.2) did not extend far enough to determine whether mineral lick site 1 fell within reference areas. Lichen samples that will be collected in 2005 can be used to provide the data necessary to classify this site by lichen lead kriging zone. This will establish whether Site 1 can be considered a representative reference mineral lick site. There are no known mineral lick sites other than sites 1 and 2 that could be considered to be within any of the five ore deposits that occur within the Anvil District (Section 4) and could therefore represent either mine-affected or reference areas.

In the absence of these data, results of soil analyses from both mineral lick sites were compared to subsurface mineral soils on Swim Lakes reference area (Appendix D); with the assumption that Swim Lakes levels in subsurface mineral soils would be representative of a potential mineral lick site in the reference area. It should be noted that it not assumed that Swim Lakes subsurface mineral levels are representative of concentrations of elements that may be selected for consumption by ungulates; it is likely that these elements may be elevated in mineral lick sites (indeed calcium concentrations are much

higher in Site 1 compared to Swim Lakes reference). Instead, it is assumed that elements considered to be affected by the operations of the Anvil Range Mine (Section 2.2), can be compared between mineral lick sites within potentially mine-affected zones and similar soil type (mineral soil) on Swim Lakes reference areas.

The results show that (of those elements considered to be affected by the operations of the Anvil Range Mine) elemental levels are elevated in barium and mercury in mineral lick site 1 compared to Swim Lakes maxima. However, since the location of mineral lick site 1 is likely within the reference zones of barium and mercury in lichen; it is therefore likely that the elevation of barium and mercury in this sample is not related to the operations of the Anvil Range Mine (and rather related to natural variation in the mineralization of the area). Furthermore, surface soils sampled close to mineral lick site 1 do not show elevations in either barium or mercury.

Mineral Lick Site 2 is located within lichen lead zone 2 (lichen lead levels vary between 1.6 and 7.2 ppm) and the concentration of lead in lichen collected at the mineral lick site is 5.3 ppm (or approximately three times Swim Lakes maximum). However, lead concentration in the mineral lick sample (18 ppm) is not elevated above the Swim Lakes maximum and is within published normal ranges for uncontaminated soils.

These data indicate the potential for the consumption of soils containing marginally elevated levels of mine-related elements, particularly lead at mineral lick site 2, but show no substantial effects of mine-generated elemental elevation.

5.3 Discussion and Next Steps

A summary of elemental levels in vegetation indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **High Elevation Relative to Reference Levels – Lead**. Lead concentrations for all species-groups were substantially elevated in the zone immediately adjacent to the Faro tailings impoundment / mill complex, indicating that the identified mine-generated deposition of this element in the study area has consistently affected vascular vegetation (and mushrooms) as well as lichen and soils. Magnitudes of elevation for lead concentration in these highly elevated zones ranged from 2.5 (horsetails) to 410 (tree sap) times the respective Swim Lake reference means. Willows, grasses, forbs, horsetails, mushrooms, and bear roots had lead levels above reference ranges. There are no reference levels in tree sap available for comparison.
- **Moderate Elevation Relative to Reference Levels – Zinc**. Statistically identified elevated levels in the zone immediately adjacent to the Faro tailings impoundment / mill complex were observed for berries, willows, and forbs. Magnitudes of elevation ranged from three (berries) to 20 (forbs) times

the Swim Lake reference mean. Forbs, willow, mushroom and bear roots had zinc levels in the most mine-affected zones in excess of documented Yukon background ranges. There are no reference levels in tree sap available for comparison.

- **Low Elevation Relative to Reference Levels – Copper, Nickel, Silver, Mercury and Thallium.** These elements all showed isolated occurrence of statistically identifiable elevated concentrations relative to Swim Lake reference data. Magnitudes of elevation ranged from approximately two (copper in willows) to nine (silver in willows and thallium in Labrador tea) times Swim Lakes reference means.

There is also some evidence of elevation of other elements (in addition to those listed above) in northern rough stemmed mushrooms, bear roots and tree sap within mine-affected areas compared to Swim Lakes or Yukon reference levels: antimony; arsenic; barium; cadmium; chromium; cobalt; iron; and mercury. Most notably, maximum arsenic concentration in northern rough stemmed mushroom and tree sap in mine-affected areas are 11 times reference levels and maximum iron concentration in tree sap is 22 times reference levels. However, statistical comparison between mine-affected areas and Swim Lakes reference area was compromised by low sample size and lack of samples from the reference area in these species. It is therefore suggested that additional samples of the following vegetation species be collected during the 2005 field season: northern rough stemmed mushroom; bear root; tree sap and horsetail. Lichen samples collected in 2005 can also be used to provide data necessary to classify those vegetation samples collected outside the 2004 kriging zone by lichen lead kriging zone. Aquatic grasses were not sampled during 2004 since appropriate habitat conditions were not encountered during routine fieldwork activities. It is suggested that aquatic grasses be collected sites at selected through image interpretation (Landsat or orthophoto) to improve field efficiency.

Soil samples were collected from two mineral lick sites; one in the vicinity of the Anvil Range Mine (mineral lick site 2) and one in an area that was anticipated (during field work) to be within reference areas (mineral lick site 1). The results of the analysis of soils collected at mineral lick site 2 (within lichen lead zone 2) indicate the potential exists for the consumption of soils containing marginally elevated levels of mine-related elements, particularly lead, but show no substantial effects of mine-generated elemental elevation. Lead levels at mineral lick site 2 are no higher than Swim Lakes maxima or published maxima. These results will be investigated further upon classification of mineral lick site 1, i.e., following establishment of whether site 1 can be considered a representative reference mineral lick site through classification of this area by lichen lead kriging zone in 2005.

6. Elemental Concentrations in Wildlife Tissue

6.1 Methods

6.1.1 General Approach

To investigate potential element uptake by wildlife species and wildlife species of importance to humans (e.g., species used for medicinal use and / or consumption) selected wildlife species were sampled and analyzed. Three main groups of animals have been considered in this evaluation:

- Small mammals such as voles and shrews (given their significance as a food species of many other animals such as marten and foxes);
- Furbearers such as snowshoe hare (*Lepus americanus*) given their significance as a food species of people and wildlife and marten (*Martes americana)* given their position in the food chain as consumers of other animal species; and
- Hunted animals such as moose (*Alces alces*) and willow ptarmigan (*Lagopus lagopus*) given their significance as a food species of people and wildlife.

These data can then be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future human health and ecological risk assessment and will also assist in predicting possible current and future impacts on local land-users from elevated metals resulting from care and maintenance operations.

6.1.2 Permit Applications

An application for a wildlife research permit for the purposes of small mammal trapping was submitted to the Department of Environment on August 23, 2004, and the permit was issued on September 4, 2004. This permit (Wildlife Research Permit No. 82) allows project staff to trap small mammals for the purposes of the Anvil Range Mine Complex Terrestrial Effects Study and is valid until March 31, 2005. The permit also allows the collection of furbearer and small game carcasses and the collection of liver, kidneys and tissue samples from hunter killed large game within the bounds of a set of listed conditions (e.g., small game can be hunted by Department of Environment staff only and the purchase of organs or tissues from hunter killed large game is not permitted). Originally it was anticipated that trappers active within the project area would submit carcasses of furbearers for the purposes of this study. However, this was only possible for one trapper active on Swim Lakes; the trapper usually active on the mine site could not trap due to illness. Therefore in order to obtain samples of furbearers from on the mine site, Wildlife Research Permit No. 82 was amended in March 2005 to allow Department of Environment staff to trap

marten for the purposes of the Terrestrial Effects Study. Appendix G contains a scanned copy of Wildlife Research Permit No. 82, the March 2005 amendment and the accompanying list of conditions.

A wildlife act permit was issued (Wildlife Act Permit No. 1193) that allows project staff to offer to purchase and purchase carcasses of furbearing animals legally harvested by licensed trappers on their registered Trapping Concessions in accordance with the aforementioned wildlife research permit. The wildlife act permit is also valid until March 31, 2005. Appendix G contains a scanned copy of Wildlife Act Permit No. 1193.

6.1.3 Small Mammal Trapping

Small Mammal Trapping Locations and Methods

Small mammal trap lines were laid out in the immediate vicinity of the mine site and in the Swim Lake reference area. A combination of standard snap traps and pit fall traps were placed in areas where small mammals were anticipated to be found, e.g., outside tunnel entrances, under logs and near the base of trees with low, over-hanging branches. Snap traps were used to target mice and voles and pit fall traps were employed to sample shrews (RIC 1998). Small mammal traps were laid out on a 150 m long transect with ten stations placed approximately 15 m apart beginning at each sample site. At each station two snap traps were deployed and at three of the ten stations, three pit fall traps were also deployed. Therefore at each transect, 20 snap traps and nine pit fall traps were deployed. Traps were set for at least one 24-hour period before being removed. Small mammal trapping was conducted in the fall in an attempt to reduce the impact of mortality on the overall population; populations fluctuate annually with low populations occurring in winter and high populations occurring after the breeding season, typically in fall (RIC 1998).

Small mammal carcasses were collected using un-powdered nitrile gloves (with new gloves used for each transect) and stored in ziplock bags and isolated from other potential contaminant sources prior to laboratory analysis. Field data collected at each trapping location included (Appendix A):

- Transect and capture station number;
- UTM coordinates;
- Date traps set and pulled;
- Number of snap and pit fall traps deployed;
- Morphological measurements (including body mass in grams), gender and age estimation;

- Species of specimen collected. When species could not be identified in hand, additional morphological measurements were taken (including head and body length (mm); tail length (mm), total length (mm), hind foot length (mm), ear size (mm) and notes on pelage, tail and other distinguishing characteristics (e.g., teeth or hairy feet) to aid in species identification; and
- Comments / notes (particularly on habitat type).

At the end of each field day carcasses were immediately frozen to at least minus 20 degrees Celsius, and at the end of the field session carcasses were sorted and bulk transported for tissue processing in Whitehorse.

Small Mammal Processing and Laboratory Analysis

Samples of muscle, liver and whole kidneys from small mammal carcasses were removed, weighed and recorded by unique sample ID. Liver, kidneys and muscle tissues were processed and stored separately in clean polyethylene vials for analysis and transported frozen to CanTest Laboratories Ltd. (Burnaby, BC) for ICP-MS analysis of the 33 elements listed in Table 3.

The moisture content of each sample was calculated gravimetrically by heating a pre-weighed portion of the sample at 105° Celsius and measuring the weight loss. In preparation for elemental analysis, samples were digested using a nitric acid - hydrogen peroxide digestion procedure based on U.S. Environmental Protection Agency Method 200.3. Analysis of all elements except mercury was performed using ICP-MS (Inductively Coupled Argon Plasma Spectroscopy - Mass Spectrometry). Analysis of mercury was performed using Cold Vapour Atomic Absorption Spectrophotometry or Fluorescence Spectrophotometry.

Certified standards obtained from the National Research Council were sent to CanTest for analysis and duplicate small mammal samples were sent from CanTest to Elemental Research for analysis for the purposes of QA / QC. All preparation and digestion procedures employed at Elemental Research Inc. were the same as those used at CanTest outlined above. Differences in laboratory analytical technique include the use of ICP-MS at Elemental Research Inc. for the analysis of all elements tested (i.e., including mercury) and a reduced number of elements tested at Elemental Research Inc. (Table 12).

Hair / fur samples (associated with each tissue sample) were also collected and stored to provide data necessary for future investigation of non-lethal methods of metal sampling, if required. Hair samples and tissue samples from the same animal can be analyzed to determine whether a correlation exists between metal concentration in the muscle tissue / organs and in the hair / fur. If a correlation exists, hair sampling could replace the necessity for killing small mammals when investigating concentrations of elements in small mammals during future monitoring programs.

Effort has been made to ensure that methods of tissue handling and analysis are consistent with those of the Northern Contaminants Monitoring Program. The only deviation from these methods has been in the selection of the laboratory used for the analysis of small mammal samples, i.e., CanTest as opposed to Elemental Research. It should be noted that all samples of furbearer and hunter killed animals (i.e., those more likely to be consumed by humans) will be analyzed by the laboratory used by the Northern Contaminants Monitoring Program (i.e., Elemental Research Inc.).

Small Mammal Data Analysis

Statistical techniques used to analyze small mammal data are discussed in Section 6.2.

Table 12. Analytical Parameters for Tissue and Detection Limits at Elemental Research Laboratories in μg/g (ppm)

Element		Reported Detection Limit
Aluminum	Al	0.5
Antimony	Sb	0.01
Arsenic	As	0.01
Barium	Ba	0.01
Beryllium	Be	0.01
Boron	B	1
Cadmium	Cd	0.01
Calcium	Ca	1
Chromium	Cr	0.2
Cobalt	Co	0.01
Copper	Cu	0.05
Iron	Fe	0.5
Lead	Pb	0.01
Magnesium	Mg	0.01
Manganese	Mn	0.01
Mercury	Hg	0.05
Molybdenum	Mo	0.01
Nickel	Ni	0.05
Selenium	Se	0.1
Silver	Ag	0.005
Strontium	Sr	0.01
Thallium	Tl	0.01
Tin	Sn	0.01
Uranium	U	0.005
Vanadium	V	0.05
Zinc	Zn	0.1

6.1.4 Trapped / Hunted Animal Samples

Methods of Collection of Samples from Trapped / Hunted Animals

According to interpretation of range information the following species of furbearers, small game and large mammals could potentially occur within the area of the Anvil Range Mine Complex:

Furbearers	Small Game	Large Game	Others
• Snowshoe hare • Marten • Ermine • Fox • Beaver • Muskrat • Wolverine • Lynx • Wolf	• Hoary marmot • Ground squirrel • Grouse spp. • Ptarmigan spp.	• Moose • Woodland Caribou • Stone Sheep • Mule deer • Grizzly bear • Black bear	• Least weasel • Chipmunk • Red squirrel • Northern flying squirrel • Collared pika • Porcupine

This species list was taken to community meetings in Ross River (Ross River Dena Council Terrestrial Effects Workshop May 2004), Pelly Crossing (Selkirk First Nation Traditional Knowledge Workshop April 2004) and the Town of Faro (Town of Faro Open House, March 2004) and feedback was requested, particularly on the suitability of species selected and sampling logistics. This feedback was then integrated into project design. In general, community members emphasized the need to sample those species that are currently or have traditionally been harvested for consumption (woodland caribou, moose, sheep, ground squirrel, hoary marmot, grouse, ptarmigan and snowshoe hare). Guidance was given with regards to identification of individuals who trap or hunt on site to facilitate the collection of specimens and samples from species they typically trap (e.g., marten and snowshoe hare) or hunt (e.g., woodland caribou, moose and sheep). Although community members do hunt small game in the area and would typically require, at most, a small game hunting license (for the purpose of hunting for consumption of small game), in this situation where complete carcasses of small game are required for processing (and therefore cannot be consumed) a wildlife research permit is required. Particular emphasis was also made by community members on the collection of beaver (*Castor canadensis*) on site given their use of both aquatic and terrestrial systems. Beaver are not currently trapped on site (Ross River Dena Council Terrestrial Effects Workshop May 2004) therefore it was suggested that in order to facilitate the collection of beaver carcasses, beaver be trapped for the sole purpose of this study (Ross River Dena Council Terrestrial Effects Workshop May 2004). The wildlife research permit therefore allows Department of Environment staff to hunt small game (i.e., grouse, ptarmigan, beaver, hoary marmot (*Marmota caligata*) and ground squirrel (*Spermophilus parryii*)) for the purposes of this study. The importance of collection of samples from carnivore species (e.g., marten and bear) was also reinforced;

these species consume many of the other species sampled. It was anticipated that those animals listed above as "others" would likely not be available for sampling; these species are not typically trapped or hunted.

Public advertisement of our requests for organ, tissue and carcass submissions from hunter killed animals and trapped furbearers was made through the following means:

- Creation and display of a poster requesting donation of organs and tissues from moose, sheep, caribou, black and grizzly bears (Appendix I). This poster was displayed in various locations (e.g., gas stations, grocery stores, restaurants, post offices, RRDC Band Office and Department of Environment offices) in Faro and Ross River as well as on the mine site at the head of ATV trails leading to Mount Aho (northwest of Faro Mill and Tailings Pond area);
- Submission of a project update aimed at community members (Appendix H) to the Faro community newsletter (Focus on Faro) and to Ross River Dena Council (RRDC) and Selkirk First Nation (SFN) band offices. This project update was also distributed in hard copy around Faro and Ross River in early November 2004;
- Direct contact was made with members of the Ladue family from Ross River and Faro. The Ladue family are the most active trappers and hunters in the vicinity of the Anvil Range Mine Complex;
- Direct contact was made with Mr. Henry Dick of Ross River. Mr. Dick is an active trapper in the area of Swim Lakes;

Direct contact was made with community members from the Town of Faro.

Organs (liver and kidneys) and tissue (muscle) samples from hunter killed large mammals and carcasses of trapped animals were collected from First Nation and non-aboriginal hunters and trappers through Department of Environment Staff in Faro and Ross River. Hunters and trappers were requested to provide information on the animal hunted or trapped (e.g., species and gender), on the sample donated (e.g., whole carcass or kidney) and on the location of where the animal was hunted or trapped through the completion of a wildlife submission form (Appendix I). To protect the confidentiality of information on the location of hunted / trapped animals, the location is recorded by grid cell (1 km by 1 km UTM grid) rather than exact location (e.g., GPS coordinates). Assurance was made that the exact location of where the animal was hunted or trapped would not be displayed on any publicly available maps. This submission form was also completed by Department of Environment staff collecting carcasses of marten and willow ptarmigan (*Lagopus lagopus*). Upon submission of each furbearer carcass, a financial reimbursement of $20 was given to the trapper. It should be noted that the wildlife research permit issued for the purposes of this project (Appendix G) does not allow the purchase of organs or tissues from hunter killed animals. Instead, hunters who donate organs and tissues in support of this project may enter their name in a draw to win a custom made hunting knife.

Upon receipt of carcasses or tissues, samples were immediately frozen to at least minus 20° Celsius. All Department of Environment offices contain a lockable freezer stored in a secure location. Carcasses were regularly bulk transported for tissue processing in Whitehorse.

Processing and Laboratory Analysis of Trapped / Hunted Animals

Furbearer and small game carcasses were processed for tissue samples of liver, kidneys and muscle. Samples of muscle, liver and whole kidneys were removed and weighed from the carcasses of furbearers and small game, stored in clean polyethylene vials and recorded by unique sample ID. Liver and muscle tissues of large game were subsampled from samples removed by hunters in the field in accordance with the Northern Contaminants Monitoring program methodology. Kidneys were maintained as entire organs. All liver, kidneys and muscle tissue were processed and stored separately for analysis and transported frozen to Elemental Research (Vancouver, B.C.) for ICP-MS analysis of the 26 elements listed in Table 12. Duplicate samples of selected tissues and certified standards obtained from the National Research Council were submitted for the purposes of QA / QC. In preparation for analysis, kidney samples were thoroughly homogenized. All tissue samples were then digested in a closed Teflon vessel using ultrapure nitric acid. The resulting digestate was then analyzed. Analysis of all elements was performed using ICP-MS. Percent moisture was determined for liver, muscle and kidneys from large game by oven-drying a sub-sample to a constant weight. Kidneys from furbearers and small game (marten and willow ptarmigan) were freeze-dried and weighed before being analyzed to determine moisture content.

Trapped / Hunted Animals Data Analysis

Statistical techniques used to analyze trapped / hunted animal data are discussed in Section 6.2.

6.2 Results

6.2.1 Small Mammal Trapping

Small Mammal Trapping Locations and Results

Figure 47 shows the distribution of small mammal trapping locations in the immediate vicinity of the mine site and in the Swim Lake reference area. Small mammal trapping was conducted during two field sessions: 1) a 7-day field session in mid-September 2004; and 2) a 5-day field session in early November 2004.

During the September small mammal trapping program, sampling effort was 1,087 trap nights[1] and a total of 77 small mammal specimens were collected. Trapping success therefore averaged one specimen collected every 14.1 traps nights but varied greatly among sites (5.8 to 58.0 trap nights) and at two sites no specimens were collected at all. Trapping success was generally lower on the Swim Lakes reference areas; likely due to milder weather conditions in Swim Lakes in September compared to on the mine site resulting in lower activity levels in the small mammals. Only nine specimens were collected on Swim Lakes reference area during the September trapping program.

During the November small mammal trapping program, sampling effort was 480 trap nights and a total of 12 small mammal specimens were collected. Trapping success therefore averaged one specimen collected every 40 traps nights and varied greatly among sites (10 to 80 trap nights) and at four sites no specimens were collected at all. All trapping conducted in November was on the Swim Lakes reference areas. A comparison of trapping success between September (15.9) and November (40) on Swim Lakes suggests that trapping success would likely be higher earlier than November but later than September. Furthermore, field conditions in November did not permit the installation of pit fall traps during November (due to frozen ground and snow cover) that compromised trapping success, particularly of common shrews.

A total of 63 specimens of northern red-backed voles (*Clethrionomys rutilus*) were collected during September and November of 2004 (Table 13). Seventeen specimens of common shrew (*Sorex cinereus*), six heather voles (*Phenacomys intermedius*), one Siberian lemming (*Lemmus sibiricus helvolus*) and one deer mouse (*Peromyscus maniculatus*) were also collected but due to insufficient sample size and / or body mass, these samples were not analyzed and have been archived. While data obtained from specimens of northern red-backed voles are representative of herbivorous species such as heather vole and Siberian lemming, we have no representation of omnivorous (deer mouse) or primarily carnivorous species (common shrew). It is therefore suggested that additional small mammal trapping be conducted in fall 2005 to focus collection of a sufficient number of shrew specimens for analysis. It is also suggested that given the small average body mass of shrew specimens collected (average of 2.69 g (±0.574g, n = 16)), consideration be given to analyzing shrew samples as total body samples rather than by muscle, kidney and liver samples. Specimens collected in 2005 can then be combined with those archived in 2004 to provide sufficient data for a comparative analysis similar to that presented below for northern red-backed voles.

[1] Trap night is a 24-hour period in which a trap is active i.e., set and capable of capturing the focal species or tripped and occupied by the focal species (RIC 1998).

Table 13. Summary of Northern Red-backed Vole Samples Collected and Analyzed in 2004

Area	Specimens of Northern Red-backed Vole
Anvil Range Mine	47
Swim Lakes	16
Total	63

Small Mammal Processing and Laboratory Analysis

Following a review of tissue mass of small mammal muscle, kidney and liver, it became apparent that tissue samples from small mammals would require pooling to create sufficient tissue mass (>5.0g FW) for laboratory analysis (R. Jornitz, pers. comm., December 8, 2004). Given limited sample size and / or body mass of all species other than northern red-backed voles, preparation and analyses were conducted only on northern red-backed vole samples. Tissue samples from specimens of northern red-backed voles collected at transects within the same lichen lead zone were therefore pooled for analyses (Figure 48). For example, all northern red-backed voles captured on any of the three transects around the Vangorda / Grum pits could be pooled for analyses since all transect locations fell within the lichen lead Kriging Zone 4 (lichen lead concentration ranges from 23.4 to 74.7 ppm). Attempts were made to maximize the number of replicate tissue samples within each lichen lead zone, therefore samples from one zone were not pooled into one sample but rather into as many samples as possible of at least 5.0g (FW) mass. Tissues obtained from specimens of northern red-backed vole were pooled to obtain a total of 12 muscle samples, 17 liver samples and 3 kidney samples (Table 14).

Table 14. Summary of Tissue Samples Obtained from Northern Red-backed Vole Specimens Collected and Analyzed in 2004 (number of specimens making up each composite sample in brackets)

Area	Samples Obtained from Northern Red-backed Vole Specimens		
	Muscle	Liver	Kidney
Anvil Range Mine	10 (47)	13 (47)	**2 (30)**
Swim Lakes	2 (16)	4 (16)	1 (15)
Total	**12 (63)**	**17 (63)**	**3 (45)**

Small mammal raw data is presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided by standard batch QA / QC procedures performed by CanTest and through analysis and interpretation of certified standards and blind duplicate samples. The results of the batch specific QA / QC analyses performed by CanTest and the detailed results of the certified standards and duplicates QA / QC are presented in Appendix E. Summary of results of the analysis of blanks, certified standards and duplicates are summarized below.

Blanks, Standards and Duplicates

The analysis of blank samples provides an understanding of the level of contamination of samples that may occur during laboratory analyses. The analysis of blank samples is compared to the reported detection limits and expressed as a relative percent difference (i.e., the difference between the results of blank analysis and the detection limit divided by the average of the two and multiplied by 100%). A relative percent difference of ≤ 20% is considered acceptable. Results of the analyses of blank samples analyzed at CanTest laboratories during batches of small mammal tissue analysis show that the relative percent difference of all blank samples is within 20 % of the detection limit (Appendix E).

The analysis of certified standard reference materials provides an understanding of accuracy of laboratory analyses. The results of the analysis of standards are compared to the known (or certified) values and expressed as a percent recovery (i.e., the certified value / measured value multiplied by 100%). A percent recovery of between 80 and 120 % is considered generally acceptable but larger differences may be acceptable when elemental concentrations of standard materials are themselves variable, e.g., chromium and nickel. The results of the analysis of known standards at CanTest laboratories analyzed during batches of small mammal tissue analysis are presented in (Appendix E); all show percent recovery values of between 80 and 120%. Certified (unknown) standards from the National Research Council (NRC) were also sent to CanTest for analysis and the results of these analyses are presented in Appendix E. These results show that although the average percent recovery value (i.e., of all standards analyzed) for each element analyzed at CanTest laboratories are considered acceptable (although chromium and nickel lie outside the range of 80 - 120 %, the elemental concentration for the standard materials have relatively high variability for these elements) the results of the analysis of individual standards can be outside this range, i.e., for aluminum (125%); chromium (43% - 74%); copper (206%); iron (69%); lead (125% - 150%); nickel (53% - 71%). The implications of these results are that 1) given the potential variation in laboratory results (i.e., in some cases > 20%), it will be more difficult to detect a significant difference in any comparative tests (of the elements listed above) given the background noise in the data. Therefore non-significant results of these elements should be interpreted with caution and supported or rejected based on observation of data trends; 2) caution should be applied in the comparison of these project results to published literature or data from other projects, although comparisons within project data are less confounded in this regard. However, QA / QC results can assist in the determination of the direction of any bias in our data; it appears that there are biases towards either underestimating or overestimating elemental concentrations, i.e., biases are consistently high or low (e.g., all inaccurate determinations of lead concentrations are overestimations); 3) an accepted approach to dealing with results of standard analysis that are outside the acceptable range is to apply correction factors to the data based on calculated percent recoveries. This approach is particularly useful when comparing data from different laboratories with different percent recoveries. However, in this situation all small mammal data were analyzed at CanTest, therefore the application of correction factors would not change the outcome of comparative analyses within project data. As mentioned above caution should be applied when comparing project data to published literature or data from other projects. Duplicate samples of small mammal tissues were analyzed at Elemental Research Inc., however given differences in percent recovery and in analytical

precision (see duplicate analysis below), only data from CanTest were used for data analysis and interpretation.

The analysis of duplicates provides an understanding of precision of laboratory analyses. The analyses of duplicate samples are compared and expressed as a relative percent difference (i.e., the difference between the results of at least two samples (one set of duplicates) divided by the average of the two or more samples and multiplied by 100%). A relative percent difference of ≤20% is considered generally acceptable. Results of the analyses of known duplicate samples analyzed at CanTest laboratories during batches of small mammal tissue analysis show that the relative percent difference of all duplicate samples is within 20% (Appendix E). Samples originally analyzed at CanTest laboratories were also sent as duplicate (unknown) samples to Elemental Research Inc. and the results of these analyses are presented in Appendix E. The results show that there are large differences between laboratories in the results of tissue analyses for a number of elements (aluminum; barium; calcium; cobalt; iron; magnesium; strontium; and tin) and that these differences can be as large as 185%. In order to avoid the confounding effects of the inclusion of laboratory results from different laboratories, the results of duplicate small mammal analysis from Elemental Research Inc. were excluded from data analysis and interpretation.

Small Mammal Data Analysis and Interpretation

Results of the lichen Getis-ord statistical analyses and Kriging (Section 2.2) were used to focus comparative analyses of small mammal data between mine-affected and reference areas. Those elements considered to be affected by Anvil Range Mine operations (as determined through lichen Getis-ord analyses) were statistically compared in small mammal tissues among lichen lead zones (determined through lichen Kriging) and also compared to Swim Lakes reference levels and, wherever possible, published reference sources.

Lichen lead zones represent zones of influence of the Anvil Range Mine with strongest influence in the zones of highest lichen lead concentrations (i.e., zones 5 and 6 around Faro tailings impoundment / mill complex), moderate influence in zones of moderate lichen lead concentrations (i.e., zone 4 near the haul Road and zone 3 around the Vangorda / Grum area) and no influence in the zone of reference lichen lead concentrations (i.e., zone 1 on Swim Lakes reference area). Figure 48 shows the spatial distribution of lichen lead zones in relation to northern red-backed vole capture locations.

Sufficient sample sizes were available for parametric statistical analyses of muscle and liver tissues only. Interpretation of kidney tissue results was restricted to a comparison of maximum elemental concentrations among zones; a maximum of one sample for kidney in each zone was available therefore means and standard deviations could not be calculated.

Elements Considered Affected by Anvil Range Mine Operations

Lead

Analysis of muscle and liver tissue of northern red-backed voles show statistically identifiable differences clearly related to mine generated effects in lead (Appendix F). A similar trend is observed in kidney tissue (Appendix D). The maximum lead concentration in muscle observed in mine-affected areas is >11 x higher than on Swim Lakes reference areas. The corresponding maximum in liver is >26 x and in kidney is >38 x. These values exceed published reference levels from herbivorous rodents for muscle (Andrews *et al.* 1989), liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981). It should be noted that the recovery of lead from standard reference materials in this study was overestimated by an average of 15% and up to 50% in an individual sample. Measured levels in samples may therefore be overestimated and caution should be applied when comparing these results to published literature and unpublished data.

In summary, it is apparent that lead is elevated in the muscle, liver and kidney of northern red-backed voles in mine-affected areas.

Arsenic

Comparisons of mean arsenic concentrations in muscle and liver tissue of northern red-backed voles between mine-affected and reference areas could not be made; the majority of values are below minimum detection limits (Appendix F). Furthermore, there are no observable trends in muscle, liver or kidney tissue arsenic values among lichen lead zones (Appendix D). The maximum arsenic concentrations in muscle, liver and kidney observed in mine-affected areas are no greater than on the Swim Lakes reference area and all values are below normal levels of arsenic in mammalian tissue (CE Jones, unpub. report).

In summary, there is no evidence in these data to suggest that arsenic is elevated in the muscle, liver or kidney of northern red-backed voles in mine-affected areas.

Zinc

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in zinc (Appendix F). There is no observable trend in kidney zinc values among lichen lead zones (Appendix D) and the maximum zinc concentrations in kidney observed in mine-affected areas are no greater than on the Swim Lakes reference area. No values significantly exceed published reference levels from herbivorous rodents for muscle (Andrews *et al.* 1989), liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981).

In summary, there is no evidence in these data to suggest that zinc is elevated in the muscle, liver or kidney of northern red-backed voles in mine-affected areas.

Copper

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in copper (Appendix F). However, there is an observable trend in kidney copper values with increasing concentrations in mine-affected areas (Appendix D) and maximum copper concentration in kidney observed in mine-affected areas is 1.2 x greater than on the Swim Lakes reference area. It should be noted that the recovery of copper from standard reference materials in this study was overestimated by an average of 11% and up to 106% in an individual sample. Measured levels in samples may therefore be overestimated and caution should be applied when comparing these results to published literature and unpublished data.

Although there is no significant difference between muscle and liver tissues collected in mine-affected areas and the Swim Lakes reference area, given the low sample size available for kidney analyses and the observable trend in these data, the possibility that copper is elevated in kidneys of northern red-backed voles in mine-affected areas cannot be discounted. Therefore it is concluded that copper is potentially elevated in kidneys of northern red-backed voles in mine-affected areas and that an increase in sample size would be required to confirm or invalidate this conclusion.

Maximum copper values in muscle, liver and kidney on Swim Lakes and in mine-affected areas are slightly higher than published reference levels from herbivorous rodents for muscle (Hunter *et al.,* 1989), liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981). Elevated levels of all tissues in Swim Lakes and muscle and liver in mine-affected areas are likely indicative of the natural mineralization of this area.

In summary, there is no evidence in these data to suggest that copper is elevated in the muscle and liver of northern red-backed voles in mine-affected areas. However, the potential exists that copper is elevated in kidney of voles in mine-affected areas; an increase in sample size would be required to confirm or invalidate this conclusion.

Iron

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in iron (Appendix F). However, there is an observable trend in kidney iron values with increasing concentrations in mine-affected areas (Appendix D) and maximum iron concentrations in liver and kidney observed in mine-affected areas are greater than on the Swim Lakes reference area (1.4x and 1.3x respectively). It should be noted that the recovery of iron from standard reference materials in this study was underestimated by an average of 13% and by 31% in an individual sample. Measured levels in samples may therefore be underestimated and caution should be applied when comparing these results to published literature and unpublished data.

Although there is no significant difference between muscle tissues collected in mine-affected areas and Swim Lakes reference areas, given the low sample size available for kidney analyses and the observable trend in these data, the possibility that iron is elevated in kidney and liver of northern red-backed voles in mine-affected areas cannot be discounted. Therefore,. it is concluded that iron is potentially elevated in kidney and liver of northern red-backed voles in mine-affected areas and that an increase in sample size would be required to confirm or invalidate this conclusion.

Maximum values for both Swim Lakes and mine-affected areas are slightly higher than published reference levels from herbivorous rodents for liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981). Elevated levels of all tissues in Swim Lakes and muscle in mine-affected areas are likely indicative of the natural mineralization of this area.

In summary, there is no evidence in these data to suggest that iron is elevated in the muscle of northern red-backed voles in mine-affected areas. However, the potential exists that iron is elevated in kidney and liver of voles in mine-affected areas; an increase in sample size would be required to confirm or invalidate this conclusion.

Silver

Comparisons of mean silver concentrations in muscle and liver tissue of northern red-backed voles between mine-affected and reference areas could not be made; the majority of values are below minimum detection limits (Appendix F). There are also no observable trends in muscle, liver or kidney tissue silver values among lichen lead zones (Appendix D).

Maximum silver concentrations in muscle observed in mine-affected areas are no greater than on the Swim Lakes reference area and maximum silver concentrations in liver observed in mine-affected areas could not be calculated since all values are below detection limits. Maximum silver concentrations in kidney are 2.3x higher on Vangorda / Grum than Swim Lakes and the Faro tailings impoundment / mill complex (Appendix D). No values exceed published reference levels from herbivorous rodents liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981).

In summary, given the absence of any observable trends in the data, the high number of samples below detection limits and the fact that all values are below published reference levels, it is considered unlikely that silver is elevated in muscle or liver of northern-red-backed voles in mine-affected areas. However there is some indication in the data that silver is elevated in kidney on Vangorda / Grum compared to both Swim Lakes and the Faro tailings impoundment / mill complex. It is not known at this time whether the observed elevation in kidney silver is associated with mining related activities specific to the Vangorda / Grum area or to naturally occurring variation in the environment between Vangorda / Grum and other areas of the project area. A further investigation of the geochemistry of the project area would be required and / or an increase in small mammal sample size to investigate this result more fully.

Thallium

Comparisons of mean thallium concentrations in muscle and liver tissue of northern red-backed voles between mine-affected and reference areas could not be made; the majority of values are below minimum detection limits (Appendix F). Furthermore, there are no observable trends in muscle or liver tissue thallium values among lichen lead zones (Appendix D). However, there is an observable trend in kidney thallium values with increasing concentrations in mine-affected areas (Appendix D).

Maximum thallium concentrations in muscle and liver observed in mine-affected areas could not be calculated since all are below detection limits. However, maximum thallium concentration in kidney observed in mine-affected areas is 2.5x greater than on the Swim Lakes reference area.

There are no published reference data available for thallium concentrations in muscle, liver or kidney of herbivorous rodent. Data available for other monogastric species (domestic dog, *Canis familiaris*) show that all reported values are below published reference levels for liver and kidney (Puls 1994).

In summary, given the absence of any observable trends in muscle or liver and the high number of samples below detection limits it is considered unlikely that thallium is elevated in the muscle or liver tissues of northern-red-backed voles in mine-affected areas. However, the potential exists that thallium is elevated in kidney of voles in mine-affected areas; an increase in sample size would be required to confirm or invalidate this conclusion.

Barium

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in barium (Appendix F). Furthermore, there is no observable trend in kidney values among lichen lead zones (Appendix D). Highest barium levels in kidney are observed on Swim Lakes reference area. These values are therefore likely reflective of natural mineralization.

Maximum values for both Swim Lakes and mine-affected areas are higher than published reference levels for herbivorous rodents for liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981). Elevated levels of all tissues in Swim Lakes and mine-affected areas are likely indicative of the natural mineralization of this area.

In summary, there is no evidence in these data to suggest that barium is elevated in muscle, liver or kidney of northern red-backed voles in mine-affected areas.

Chromium

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in chromium (Appendix F). There is no observable

trend in kidney chromium values among lichen lead zones (Appendix D) and the maximum chromium concentrations in kidney observed in mine-affected areas are no greater than on the Swim Lakes reference area. However, the maximum chromium concentration in muscle on Vangorda / Grum is notably greater (2.9x) than on the Swim Lakes area and the Faro tailings impoundment / mill complex. No values exceed published reference levels from herbivorous rodents for liver (Shaw and Gunn 1981) or kidney (Shaw and Gunn 1981). It should be noted that the recovery of chromium from standard reference materials in this study was underestimated by an average of 39% and as much as 57% in an individual sample. Measured levels in samples may therefore be underestimated and caution should be applied when comparing these results to published literature and unpublished data. There are no published reference levels available for muscle in herbivorous rodents or other monogastric species.

In summary, there is no evidence in these data to suggest that chromium is elevated in liver or kidney of northern red-backed voles in mine-affected areas. However, there is some indication in the data that chromium is elevated in muscle on Vangorda / Grum compared to both Swim Lakes and the Faro tailings impoundment / mill complex. It is not known at this time whether the observed elevation in kidney chromium is associated with mining related activities specific to the Vangorda / Grum area or to naturally occurring variation in the environment between Vangorda / Grum and other areas of the project area. A further investigation of the geochemistry of the project area would be required and / or an increase in small mammal sample size to investigate this result more fully.

Mercury

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in mercury (Appendix F). Highest mercury levels in muscle, liver and kidney are observed on Swim Lakes reference area (Appendix D). These values are therefore likely indicative of variation in natural mineralization.

Maximum values for both Swim Lakes and mine-affected areas are higher than published reference levels for herbivorous rodents for liver (Pankakoski *et al.,* 1994) and other organs in omnivorous rodents (Underwood 1977). Elevated levels of all tissues in Swim Lakes and mine-affected areas are likely indicative of the natural mineralization of this area.

In summary, there is no evidence in these data to suggest that mercury is elevated in muscle, liver or kidney of northern red-backed voles in mine-affected areas.

Nickel

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in nickel (Appendix F). However, there is an observable trend in kidney nickel values among lichen lead zones (Appendix D). Maximum nickel concentrations in muscle, liver and kidney observed in mine-affected areas are greater than on the Swim

Lakes reference area (6.2x, 3.8x and 5.7x respectively). It should be noted that the recovery of nickel from standard reference materials in this study was underestimated by an average of 31%. Measured levels in samples may therefore be underestimated and caution should be applied when comparing these results to published literature and unpublished data.

There are no published reference data available for nickel concentrations in muscle or liver of herbivorous rodents. Data available for other monogastric species (domestic pig, *Sus scrofa*) show that all reported values of liver are below published reference levels for liver (Puls 1994) and all reported values of kidney are below published reference levels for kidney in herbivorous rodents (Shaw and Gunn 1981). However, reported muscle levels on Vangorda / Grum are slightly above published reference levels for the domestic pig (Puls 1994).

In summary, there is some indication in the data that nickel concentrations in muscle, liver and kidney of northern red-backed voles are elevated in mine-affected areas; an increase in sample size would be required to confirm or invalidate this conclusion.

Selenium

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in selenium (Appendix F). There is no observable trend in kidney selenium values among lichen lead zones (Appendix D) and the maximum selenium concentrations in kidney and muscle observed in mine-affected areas are no greater than on the Swim Lakes reference area. However, maximum selenium concentrations in liver on Vangorda / Grum is greater (1.5x) than on the Swim Lakes area and the Faro tailings impoundment / mill complex. There are no published reference levels available for any tissues of herbivorous rodents. Data available for other monogastric species (domestic pig) show that no values exceed published reference levels (Puls 1994).

In summary, there is no evidence in these data to suggest that selenium is elevated in muscle or kidney of northern red-backed voles in mine-affected areas. However, there is some indication in the data that selenium is elevated in liver on Vangorda / Grum compared to both Swim Lakes and the Faro tailings impoundment / mill complex. It is not known at this time whether the observed elevation in liver selenium is associated with mining related activities specific to the Vangorda / Grum area or to naturally occurring variation in the environment between Vangorda / Grum and other areas of the project area. A further investigation of the geochemistry of the project area would be required and / or an increase in small mammal sample size to investigate this result more fully.

Antimony

Comparisons of mean antimony concentrations in muscle and liver tissue of northern red-backed voles between mine-affected and reference areas could not be made; all values are below minimum detection limits (Appendix F). Furthermore, there are no observable trends in muscle, liver or kidney tissue

antimony values among lichen lead zones (Appendix D). The maximum antimony concentrations in muscle, liver and kidney observed in mine-affected areas could not be calculated; all are values are below minimum detection limits. There are no published reference levels available for any tissues of herbivorous rodents or muscle, liver or kidney of other monogastric species.

In summary, given the absence of any observable trends in muscle, liver or kidney and the high number of samples below detection limits it is considered unlikely that antimony is elevated in any tissues of northern-red-backed voles in mine-affected areas.

Cadmium

Analysis of muscle and liver tissue of northern red-backed voles show no statistically identifiable differences clearly related to mine generated effects in cadmium (Appendix F). There is no observable trend in kidney cadmium values among lichen lead zones (Appendix D) and the maximum cadmium concentrations in muscle, liver and kidney observed in mine-affected areas are no greater than on the Swim Lakes reference area. Indeed, highest cadmium levels in liver and kidney are observed on Swim Lakes reference area (Appendix D). Maximum values for both Swim Lakes and mine-affected areas are higher than published reference levels for herbivorous rodents for muscle (Hunter *et al.,* 1989), liver (Johnson and Roberts 1977) and kidney (Johnson and Roberts 1977). Elevated levels of all tissues in Swim Lakes and mine-affected areas are likely indicative of the natural mineralization of this area.

In summary, there is no evidence in these data to suggest that cadmium is elevated in muscle, liver or kidney of northern red-backed voles in mine-affected areas.

Cobalt

Comparisons of mean cobalt concentrations in muscle and liver tissue of northern red-backed voles between mine-affected and reference areas could not be made; all values are below minimum detection limits (Appendix F). Furthermore, there are no observable trends in muscle, liver or kidney tissue cobalt values among lichen lead zones (Appendix D). The maximum cobalt concentrations in muscle, liver and kidney observed in mine-affected areas could not be calculated; all are values are below minimum detection limits. All values are below published reference levels for herbivorous rodents for liver (Shaw and Gunn 1981) and kidney (Shaw and Gunn 1981).

In summary, there is no evidence in these data to suggest that cobalt is elevated in muscle, liver or kidney of northern red-backed voles in mine-affected areas.

6.2.2 Trapped / Hunted Animal Samples

Collection and Sampling of Trapped / Hunted Animals

Table 15 provides a list of species that have been sampled to date and the number of specimens and samples obtained for analyses. An additional 6 marten have also been collected to date and are currently being processed. Interpretation of results of analysis of willow ptarmigan will await the collection of specimens from Swim Lakes reference area. Therefore only results from ungulate tissue analyses (the only complete dataset) will be documented in this report.

Table 15. Summary of Trapped / Hunted Specimens and Samples Collected and Analyzed in 2004 (number of specimens making up each composite sample in brackets)

Species	Muscle	Liver	Kidney
Woodland Caribou	4 (4)	4 (4)	4 (4)
Moose	3 (3)	3 (3)	4 (3)
Sheep	0 (0)	1 (1)	2 (1)
American Marten	6 (5)	5 (5)	6 (5)
Willow Ptarmigan	8 (7)	8 (7)	8 (7)
Total	21 (19)	21 (20)	24 (20)

All ungulate tissue samples were obtained from ungulates hunted between August 8, 2004 and September 27, 2004 at varying distances from the Anvil Range Mine Complex: between 1.5 – 9km (moose); 4.5 – 10 km (woodland caribou) and 16 km (both sheep). In order to maintain the confidentiality of where animals were hunted, no figure of sampling locations is displayed.

Processing and Laboratory Analysis of Trapped / Hunted Animals

Ungulate raw data is presented in Appendix C and summary tables are presented in Appendix D. Quality control beyond those adopted in the field and during storage / transport was provided through analysis and interpretation of blanks, standards and duplicate samples. Detailed results of the blanks, standards and duplicates QA / QC are presented in Appendix E. Summary of results of the analysis of blanks, certified standards and duplicates are summarized below.

Blanks, Standards and Duplicates

The analysis of blank samples provides an understanding of the level of contamination of samples that may occur during laboratory analyses. The analysis of blank samples is compared to the reported detection limits and expressed as a relative percent difference (i.e., the difference between the results of blank analysis and the detection limit divided by the average of the two and multiplied by 100%). A relative percent difference of ≤ 20% is considered acceptable. Ideally, results of blank analysis should be less than the detection limit or at most no more than 5x the detection limit (in these cases it is not necessary to calculate relative percent differences). Results of the analyses of blank samples analyzed at

Elemental Research Inc. during batches of ungulate tissue analyses show that the results of analyses of all blank samples is under 5x the detection limit (Appendix E) and therefore within acceptable range.

The analysis of certified standard reference materials provides an understanding of accuracy of laboratory analyses. The results of the analysis of standards are compared to the known (or certified) values and expressed as a percent recovery (i.e., the certified value / measured value multiplied by 100%). A percent recovery of between 80 and 120 % is considered generally acceptable but larger differences may be acceptable when elemental concentrations of standard materials are themselves variable, e.g., chromium and nickel. Certified (unknown) standards from the National Research Council (NRC) were sent to Elemental Research Inc. for analysis during batches of ungulate tissue analyses and the results of these analyses are presented in Appendix E. The results show that the average percent recovery value (i.e., of all standards analyzed) is outside the acceptable range for a number of elements: cobalt; manganese and silver (as well as chromium and nickel, however the elemental concentration for these standard materials have relatively high variability for these elements). Furthermore, the results of the analysis of individual standards are also outside the acceptable range, i.e., for arsenic (72%), cadmium (75 – 77%); chromium (38 – 60%); cobalt (79%); copper (79%); iron (60 – 192% in all tissues); lead (65 – 126% in liver tissues); manganese (70 – 75%); nickel (45 – 63%); selenium (79% in liver and 133 – 141% in muscle); silver (69 –78%); zinc (74 – 79%).

The implications of these results are that 1) given the potential variation in laboratory results (i.e., in some cases > 20%), it will be more difficult to detect a significant difference in any comparative tests (in the elements listed above) given the background noise in the data. Therefore non-significant results of these elements should be interpreted with caution and supported or rejected based on observation of data trends; 2) caution should be applied in the comparison of these project results to published literature or data from other projects, although comparisons between project data and Yukon Hunter Survey data are less confounded in this regard; samples from Yukon Hunter Program were also analyzed at Elemental Research Inc.. In these data, in some elements (most notably iron, lead and selenium) there appears to be no bias towards either underestimating or overestimating elemental concentrations. While the differences in estimation in selenium can be separated by tissue type (underestimation in liver and overestimation in muscle), in both iron and lead no assumption can be made with regards to the direction of the bias, i.e., under or overestimation; 3) an acceptable approach to dealing with results of standard analyses outside the acceptable range is to apply correction factors to the data based on calculated percent recoveries. This approach is particularly useful when comparing data from different laboratories where percent recoveries differ. However, in this situation all ungulate data from this project and the Hunter Survey Program were analyzed at Elemental Research Inc.. Therefore, the application of correction factors would not change the outcome of comparative analyses within project data.

The analysis of duplicates provides an understanding of precision of laboratory analyses. The analyses of duplicate samples are compared and expressed as a relative percent difference (i.e., the difference between the results of at least two samples (one set of duplicates) divided by the average of the two or

more samples and multiplied by 100%). A relative percent difference of ≤20% is considered generally acceptable but larger differences may be acceptable when comparing duplicate kidneys; two kidneys from the same animal may vary due to differences in functional ability. Results of the analyses of known and unknown duplicate samples analyzed at Elemental Research Inc. laboratories during batches of ungulate tissue analysis are presented in Appendix E. Results show that in general the results of duplicate kidney, liver and muscle analyses are acceptable with the exception of barium in muscle (43%) and manganese in muscle (28%). The implications of these results are that 1) given the potential variation in laboratory results (i.e., in some cases > 20%), it will be more difficult to detect a significant difference in comparative tests of barium (manganese has not been statistically compared) given the background noise in the data. Therefore non-significant results of barium should be interpreted with caution and supported or rejected based on observation of data trends.

Ungulate Data Analysis and Interpretation

Data from ungulates sampled in the vicinity of the Anvil Range Mine Complex were compared to tissue samples from the same species submitted as part of the Yukon Hunter Survey Program (Gamberg unpub. data). Hunter Survey data collected between 1992 and 1997 were available for comparison. Hunter Survey data were screened for suitability of comparison and data outliers prior to the calculation of mean, standard deviation and maximum elemental concentrations for each species (woodland caribou, moose and sheep) and each tissue (muscle, liver and kidney) analyzed. Samples from all moose and sheep collected as part of the Yukon Hunter Survey Program were considered suitable for comparison (feeding strategies of moose and sheep on the Anvil Range Mine Complex are similar to those of moose and sheep across the territory). However, for the comparison of woodland caribou samples, all barren ground caribou samples were omitted from the analyses; barren ground and woodland caribou differ markedly in their feeding strategies. Furthermore, in order to compare woodland caribou samples collected from the Anvil Range Mine (i.e., those from the Tay River Herd) to those of similar abiotic and biotic environments, only woodland caribou from the neighbouring Finlayson Herd were included in the analyses.

Outlying data were those samples considered to be anomalous due to: 1) sample integrity or 2) atypical sampling location. Samples from five moose and one woodland caribou were omitted from the analyses due to very high lead levels in their tissues; likely related to the presence of lead shot. All samples omitted had lead concentrations in excess of 11.3 ppm dry weight (DW). Samples from one moose were omitted from the analysis due to very high cadmium concentrations (1,380 ppm DW) in the kidney. This concentration is far greater than all other samples collected as part of the Hunter Survey Program and may have been related to atypical mineralization within the home range of the animal.

Those elements considered to be affected by Anvil Range Mine operations (determined through lichen Getis-ord analyses) were statistically compared to Yukon Hunter Survey data using an analysis of variance (ANOVA). Since the age of an animal can have a discernable effect on the concentration of elements in their tissues (Gamberg unpub. data) age was controlled for within the ANOVA computation

(with the exception of comparisons of concentration in muscle tissue; YHS muscle tissues were pooled from a number of animals with disparate ages). In effect, the statistical analyses employed first determined whether age was a factor in the analysis (i.e., were elemental concentrations affected by the age of the animal). If age was determined not be a factor for the element analyzed, ANOVA analysis was run with all data combined regardless of animal age. If age was determined to be a factor for the element analyzed then this source of variation is controlled in the analysis by blocking for age (not testing for an interaction), so that effectively data from animals of the same age only are compared. In situations where data are not distributed normally, data was log transformed. As with all data analyzed in this project, in situations where >50% of all samples are at or below detection limits, statistics are not calculated. It should be noted that sample sizes for all ungulate data from the Anvil Range Mine are low (Table 15) and this is particularly true of the sheep data, where only one liver and one set of kidneys from two different sheep were available for comparison with Yukon Hunter Survey data. Caution should therefore be applied in the interpretation of all ungulate statistical analyses and additional attempts made in 2005 to expand the ungulate dataset, particularly samples from stone sheep.

Elements Considered Affected by Anvil Range Mine Operations

Lead

A comparison of mean lead concentrations in muscle, liver and kidney of woodland caribou show that lead concentrations in liver and kidney are significantly ($P<0.10$) higher in the vicinity of the Anvil Range Mine Complex (ARM) than in animals collected as part of the Yukon Hunter Survey Program (YHS) (Appendix F). Mean lead concentrations in muscle tissue do not vary significantly between tissues collected from animals near ARM and YHS. The maximum lead concentrations in muscle tissues from ARM are no higher than YHS maxima. Maximum lead concentrations in liver and kidney from ARM are 1.6x and 1.1x higher (respectively) than YHS maxima.

In summary, it is apparent that lead is elevated in liver and kidney of woodland caribou in the vicinity of the Anvil Range Mine Complex.

A comparison of mean lead concentrations in muscle, liver and kidney of moose show that mean lead concentrations in muscle, liver and kidney of moose do not vary significantly between tissues collected near the ARM and a Yukon wide sample (Appendix F). Furthermore, maximum lead concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that lead is elevated in the muscle, liver or kidney of moose in the vicinity of the Anvil Range Mine Complex.

No sheep muscle tissues were submitted for analysis in 2004. A comparison of mean lead concentrations in liver and kidney of sheep show that mean lead concentrations in liver and kidney of sheep do not vary significantly between tissues collected near the ARM and a Yukon wide sample (Appendix F).

Furthermore, maximum lead concentrations in liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that lead is elevated in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of lead from standard reference materials in this study was underestimated by an average of 19% and up to 35% in an individual sample. Furthermore, the recovery of lead was overestimated by 26% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Arsenic

A comparison of mean arsenic concentrations in tissues of woodland caribou, moose and sheep show that mean arsenic concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep do not vary significantly between tissues collected near the ARM and a Yukon wide sample (Appendix F). Furthermore, maximum arsenic concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that arsenic is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of arsenic from standard reference materials in this study was underestimated by an average of 4% and up to 28% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Zinc

A comparison of mean zinc concentrations in tissues of woodland caribou, moose and sheep show that mean zinc concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum zinc concentrations in liver and kidney of woodland caribou and liver and kidney of moose and sheep from ARM are no higher than YHS maxima. Maximum zinc concentrations in woodland caribou muscle and moose muscle from ARM are 1.2x and 1.2x higher than YHS maxima (respectively).

In summary, there is no evidence in these data to suggest that zinc is elevated in the liver or kidney of woodland caribou, moose or sheep in the vicinity of the Anvil Range Mine Complex. However, there is

some evidence to suggest that zinc may be elevated in the muscle of caribou and moose in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of zinc from standard reference materials in this study was underestimated by an average of 17% and up to 26% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Copper

A comparison of mean copper concentrations in tissues of woodland caribou, moose and sheep show that mean copper concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum copper concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that copper is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of copper from standard reference materials in this study was underestimated by an average of 14% and up to 21% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Iron

A comparison of mean iron concentrations in tissues of woodland caribou, moose and sheep show that mean iron concentrations in muscle, liver and kidney of woodland caribou, liver and kidney of moose and liver of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum iron concentrations in liver and kidney of woodland caribou and muscle, liver and kidney of moose and liver of sheep from ARM are no higher than YHS maxima.

However, mean iron concentrations in muscle of moose and kidney of sheep are significantly ($P<0.10$) higher in tissues collected in the vicinity of the ARM than those a Yukon wide sample. Furthermore, maximum iron concentrations in muscle of woodland caribou and kidney of sheep are 1.1 x and 1.2 x higher than YHS maxima (respectively).

In summary, there is evidence in these data to suggest that iron is elevated in the muscle of moose and woodland caribou and kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of iron from standard reference materials in this study was underestimated by an average of 14% and up to 40% in an individual sample. Furthermore, the recovery of iron was overestimated by 92% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Silver

A comparison of mean silver concentrations in tissues of woodland caribou and moose show that mean silver concentrations in muscle, liver and kidney of woodland caribou and muscle and liver of moose are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). However, mean silver concentrations in kidney moose are significantly ($P<0.10$) higher in tissues collected in the vicinity of the Anvil Range Mine Complex (ARM) than those in a Yukon wide sample. Mean silver concentrations in liver and kidney of sheep could not be compared with YHS data due to insufficient date; silver was analyzed in only one sample from YHS sheep.

Maximum silver concentrations in liver and kidney of woodland caribou and muscle and liver of moose from ARM are no higher than YHS maxima. Maximum silver concentrations in muscle of woodland caribou and kidney of moose are 5.1 x and 2.4 x higher than YHS maxima (respectively). Maximum silver concentrations in kidney of sheep are higher (3.2 x) than YHS maxima. However, there are very few samples ($n = 2$) available for this comparison, therefore caution should be applied in the interpretation of sheep kidney results. Maximum silver concentrations in liver of sheep could not be compared with YHS sheep data but could be compared with woodland caribou data from YHS. Maximum silver concentrations in liver of sheep are no higher than YHS maxima.

In summary, there is evidence in these data to suggest that silver is elevated in muscle of woodland caribou and kidney of moose and sheep.

It should be noted that the recovery of silver from standard reference materials in this study was underestimated by an average of 26% and up to 31% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Thallium

A comparison of mean thallium concentrations in tissues of woodland caribou, moose and sheep show that mean thallium concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum thallium concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that thallium is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

Barium

A comparison of mean barium concentrations in tissues of woodland caribou, moose and sheep show that mean barium concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum barium concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that barium is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

Chromium

A comparison of mean chromium concentrations in tissues of woodland caribou, moose and sheep show that mean chromium concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum chromium concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that chromium is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of chromium from standard reference materials in this study was underestimated by an average of 53% and up to 62% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Mercury

A comparison of mean mercury concentrations in tissues of woodland caribou, moose and sheep show that mean mercury concentrations in liver and kidney of woodland caribou, muscle, liver and kidney of moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Mean mercury concentrations in muscle of woodland caribou and liver of sheep could not be compared with YHS data; mercury was not analyzed in YHS sheep liver and analyzed in only one sample of woodland caribou muscle. Maximum mercury

concentrations in muscle, liver and kidney of woodland caribou and moose and in kidney of sheep from ARM are no higher than YHS maxima.

Maximum mercury concentrations in liver of sheep could not be compared with YHS sheep data but could be compared with woodland caribou data from YHS. Maximum mercury concentrations in liver of sheep are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that mercury is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

Nickel

A comparison of mean nickel concentrations in tissues of woodland caribou, moose and sheep show that mean nickel concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum nickel concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that nickel is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of nickel from standard reference materials in this study was underestimated by an average of 46% and up to 55% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Selenium

A comparison of mean selenium concentrations in tissues of woodland caribou, moose and sheep show that mean selenium concentrations in muscle, liver and kidney of woodland caribou and moose and liver of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum selenium concentrations in muscle, liver and kidney of woodland caribou and moose and liver of sheep from ARM are no higher than Finlayson or YHS maxima. However, mean selenium concentrations in kidney of sheep are significantly ($P<0.10$) higher in tissues collected in the vicinity of the Anvil Range Mine Complex (ARM) than those in a Yukon wide sample. Furthermore, maximum selenium concentrations in kidney of sheep are higher (1.1 x) than YHS maxima. However, there are very few samples ($n = 6$) available for this comparison (and only one sample available from ARM), therefore caution should be applied in the interpretation of sheep kidney results.

In summary, there is no evidence in these data to suggest that selenium is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver of sheep in the vicinity of the Anvil Range Mine Complex. However, there is some evidence to suggest that selenium is elevated in the kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of selenium from standard reference materials in this study was underestimated by an average of 5% and up to 21% in an individual liver sample. The recovery of selenium was overestimated by 41% in an individual muscle sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Antimony

A comparison of mean antimony concentrations in tissues of woodland caribou, moose and sheep show that mean antimony concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum antimony concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that antimony is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

Cadmium

A comparison of mean cadmium concentrations in tissues of woodland caribou, moose and sheep show that mean cadmium concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum cadmium concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that cadmium is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of cadmium from standard reference materials in this study was underestimated by an average of 20% and up to 25% in an individual sample. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

Cobalt

A comparison of mean cobalt concentrations in tissues of woodland caribou, moose and sheep show that mean cobalt concentrations in muscle, liver and kidney of woodland caribou and moose and liver and kidney of sheep are not significantly higher in tissues collected near the ARM than those in a Yukon wide sample (Appendix F). Maximum cobalt concentrations in muscle, liver and kidney from ARM are no higher than YHS maxima.

In summary, there is no evidence in these data to suggest that cobalt is elevated in the muscle, liver or kidney of woodland caribou or moose or in the liver or kidney of sheep in the vicinity of the Anvil Range Mine Complex.

It should be noted that the recovery of cobalt from standard reference materials in this study was underestimated by an average and maximum of 21%. Caution should therefore be applied when comparing these results to published literature and unpublished data other than the YHS data.

6.3 Discussion and Next Steps

6.3.1 Small Mammals

A summary of elemental levels in northern red-backed voles tissues and organs indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **High Elevation Relative to Reference Levels – Lead.** Lead concentrations in all tissues and organs analyzed were substantially elevated in the zones immediately adjacent to the Faro tailings impoundment / mill complex, indicating that the identified mine-generated effect of this element in the study area has consistently affected northern red-backed voles as well as vascular vegetation (and mushrooms), lichen and soils. Magnitudes of elevation for lead concentration in these highly elevated zones ranged from >11x (muscle tissue) to >38 (kidney) times the respective Swim Lake reference means. These values exceed published reference levels in all tissues and organs analyzed.
- **Moderate Elevation Relative to Reference Levels –** copper; iron; thallium; and nickel. Statistically identified elevated levels in the zone immediately adjacent to the Faro tailings impoundment / mill complex were observed for muscle (nickel) and liver (nickel and iron). Maximum elemental concentrations in kidney observed in mine-affected areas exceeded those on the Swim Lakes reference area in copper, iron, thallium and nickel. Magnitudes of elevation ranged from 1.2 (copper in kidney) to 6.2 (nickel in muscle) times the Swim Lake reference mean. Copper in kidney and iron in liver and kidney exceed published reference levels, however, levels on Swim Lakes also exceed published reference levels. There are no reference data available on thallium and nickel levels in the tissues or organs of herbivorous rodents.

- **Low Elevation Relative to Reference Levels – Silver; Chromium; and Selenium.** These elements all showed isolated occurrences of elevated concentrations relative to Swim Lake reference data. Magnitudes of elevation ranged from approximately 1.5 (selenium in liver) to 2.9 (chromium in muscle) times Swim Lakes reference means. These elements were elevated only on Vangorda / Grum and not in the area of the Faro tailings impoundment / mill complex. No values exceed published reference levels.
- **No Elevation Relative to Reference Levels – Arsenic; Zinc; Barium; Mercury; Antimony; Cadmium and Cobalt.**

While data obtained from specimens of northern red-backed voles are representative of other herbivorous rodents (e.g., heather vole and Siberian lemming), we have no representation of an omnivorous (deer mouse) or primarily carnivorous species (common shrew). It is therefore suggested that additional small mammal trapping be conducted in fall 2005 to focus collection of a sufficient number of shrew specimens for analysis. It is also suggested that given the small average body mass of shrew specimens collected (average of 2.69g (± 0.574g, n = 16)), consideration be given to analyzing shrew samples as total body samples rather than by muscle, kidney and liver samples.

6.3.2 Trapped / Hunted Animal Samples

A summary of elemental levels in ungulate tissues and organs indicates the following categories, based on magnitude of elevation in elemental concentrations above reference levels and consistency of elevated levels:

- **Moderate Elevation Relative to Reference Levels – Lead.** Statistically identified elevated levels were observed in the liver and kidney of woodland caribou hunted in the vicinity of the ARM relative to Yukon Hunter Survey (YHS) data. Magnitudes of elevation ranged from 1.1 (kidney) to 1.6 (liver) times the YHS maxima;
- **Low Elevation Relative to Reference Levels – Zinc; Iron; Silver; and Selenium.** Statistically identified elevated levels were either not observed for these elements in the tissues of ungulates hunted in the vicinity of the ARM or interpretation was undermined by low sample numbers but isolated occurrences of elevated concentrations relative to Yukon Hunter Survey (YHS) maxima were observed. Magnitudes of elevation ranged from 1.1 (selenium in sheep kidney) to 5.4 (silver in woodland caribou muscle) times the YHS maxima.
- **No Elevation relative to Reference Levels – Arsenic; Copper; Thallium; Barium; Chromium; Mercury; Nickel; Antimony; Cadmium; and Cobalt.**

It should be noted that sample sizes for all ungulate data from the Anvil Range Mine are low (Table 15) and this is particularly true of the sheep data, where only one liver and one set of kidneys from two

different sheep were available for comparison with Yukon Hunter Survey data. Caution should therefore be applied in the interpretation of all ungulate statistical analyses and additional attempts made in 2005 to expand the ungulate dataset, particularly samples from stone sheep.

Of the original species list presented in Table 10 samples from the following species are still to be collected: grouse; beaver; ground squirrel; hoary marmot; snowshoe hare; grizzly bear; and black bear (as well as samples of fox, wolverine, lynx and wolf). Samples are also required of willow ptarmigan from Swim Lakes reference area. It is suggested that samples of fox, wolverine, lynx and wolf are not actively pursued in 2005. Marten can be considered representative of these medium sized carnivores (and small carnivores such as least weasel and ermine) given similarity in food habits. Furthermore, marten are likely to be more susceptible to detecting potential effects of the Anvil Range Mine given their small home ranges relative to wolverine, lynx and wolf (home range sizes of marten and fox are similar in size). Muskrat were not considered in the initial sample list and were not mentioned during community meetings (Section 7). However, particular effort will be made in 2005 to determine if muskrat occur near ARM through interpretation of field sign and further communication with community members and government biologists.

7. Public / Community Participation

7.1.1 General Approach

An integral part of this study is information exchange between and members of the local communities of Ross River, Faro and Pelly Crossing and project personnel. Frequent contact not only allows project personnel to provide community members with regular updates on project progress, it also provides an effective forum for input from community members into study design. The following provides a summary of meetings held within the communities during the design and execution phases of this project:

Open House, Town of Faro, March 15, 2004, Faro

A public meeting was held in Faro Council Chambers. Gartner Lee Ltd. provided an update on project design to date. Community members from the Town of Faro provided input into study design, in particular in the identification of vegetation species of importance to humans, the general location of berry gathering areas, the general location of wildlife sightings and the location of a sheep mineral lick site. Names of local trappers were also provided to facilitate the collection of wildlife tissues. General comments and concerns were raised and each has been addressed in Appendix A1 of the project work plan (GLL and C.E. Jones & Associates Ltd. 2004).

Selkirk First Nation Traditional Knowledge Workshop, April 21 – 22, 2004, Pelly Crossing

A traditional knowledge workshop was organized by Selkirk First Nation and held in Pelly Crossing. Gartner Lee Ltd. was invited to attend this workshop to receive input into study design. Gartner Lee Ltd. also provided an update on project design to date. A presentation by M. VanBibber of traditional knowledge collected from SFN Elders formed the medium of input from SFN, supplemented with input from Elders present at the workshop. Information provided was incorporated into the study design, in particular the identification of vegetation species of importance to wildlife and humans and wildlife species of importance as food for other wildlife species and humans. General comments and concerns were raised and each has been addressed in Appendix A1 of the project work plan (GLL and C.E. Jones & Associates Ltd. 2004).

Ross River Terrestrial Effects Workshop, May 5, 2004, Ross River

A workshop was organized by Ross River Dena Council and held in Ross River School Gathering Room. Gartner Lee Ltd. was invited to attend this workshop to provide an update on project design to date and receive comment and input into study design. Information provided was incorporated into the study design, in particular the selection of vegetation species of importance to wildlife and humans, the location of wildlife foraging areas, the location of mineral lick sites and the location of berry and game harvesting areas. General comments and concerns were raised and each has been addressed in Appendix A1 of the project work plan (GLL and C.E. Jones & Associates Ltd. 2004).

Terrestrial Effects Update and Traditional Knowledge Data Handling, August 25, 2004, Ross River

A meeting with RRDC Chief and Council and members was held in Ross River Dena Council Boardroom. Gartner Lee Ltd. provided an update on project design to date and requested input into study design. Information provided was incorporated into study design, in particular the selection of mushroom species of importance to humans and in the methods of sampling required for tree sap collection. Names of local trappers were also provided to facilitate the collection of wildlife tissues.

Discussion on the appropriate use of traditional data collected through the Terrestrial Effects Study field program was also initiated during this meeting. In exploring areas of concern to the First Nation, it was confirmed that sensitivity lies in two areas:

- Documenting information on the species of animal or plant consumed by people is acceptable to the First Nation. However, the First Nation does not want information published on the reasons for or values associated with consumption (e.g., specific medicinal use); and
- The First Nation is also concerned that data not divulge exact locations where traditional harvesting takes place. Information respecting the general location is acceptable for publication, but exact locations (e.g., GPS coordinates) are not acceptable.

Assurances were given by Gartner Lee Ltd. that these two areas of concern would be respected in the recording of data and in the reporting of such data. The level of comfort exhibited by the First Nation representatives can be sustained by consistent effort on two fronts:

- Continued updating of the First Nation regarding progress on the Terrestrial Effects Study; and
- Sharing of draft reports on Terrestrial Effects with the Ross River Dena Council to ensure that the First Nation is comfortable with the treatment of First Nation citizens' input to the study.

Selkirk First Nation Faro Closure Plan Workshop, November 25 and 26, 2004, Pelly Crossing

A workshop was organized by Selkirk First Nation and held in Selkirk Community Hall. Gartner Lee Ltd. was invited to attend this workshop to provide an update on project activities to date and receive comment and input into study design. Information provided was incorporated into the study design, in particular the consideration of cyanide in the analysis of soils.

Community updates and requests for community participation have also been made through the release of project updates through local newsletters and posters (Section 6) and through informal meetings with community members (e.g., meeting with Ms. M. Vanio, August 23, 2004, Faro Council Chambers).

A number of Open Houses were planned in the original project design in Ross River, the Town of Faro and in Pelly Crossing in February / March 2005 (Gartner Lee Limited 2004). However, it was decided (and supported by community representatives) that these meetings be delayed until the final project report was finalized and project results could be presented and discussed.

8. Employment & Training Opportunities

8.1.1 General Approach

Four assistants were employed by Gartner Lee Ltd. as part of the Anvil Range Mine Complex Terrestrial Effects Study to assist in the field and office components of this project. Three of the four individuals are recent graduates of the Yukon College Environmental Officer Training Course (2003-2004) and all were recommended to Gartner Lee Ltd. by their respective First Nations and Yukon College staff. At the onset of the field season in July 2004, a total of four individuals expressed interest in the positions and all four were interviewed either in person or by phone. Two successful candidates were originally selected in July 2004; Mr. Jason Acklack (RRDC) and Mr. George Magrum (SFN) and a third (Mr. Dean Gill) selected in September 2004 to replace Mr. George Magrum in the field component of the project. The fourth assistant (Dean Bolton) was first employed in January 2005 to assist in the moss bag sampling

program; all original assistants were unavailable. The following provides a list of tasks project assistants have completed to date:

- moss bag creation;
- soil and vegetation collection;
- soil and vegetation sample organization and shipping;
- moss bag deployment and pick up;
- small mammal trapping; and
- soil and vegetation sample organization and shipping.

Prior to the onset of fieldwork, all assistants received a Gartner Lee bear awareness course and were requested to review our Health and Safety Plan (GLL and C.E. Jones & Associates Ltd. 2004). Prior to the soil and vegetation field session, a one day training day was held in the field. During this training and throughout the field sessions, field assistants were exposed to proper handling and storage protocols for soil, vegetation and small mammal samples; educated of risks of contamination of samples and effects on data interpretation; trained in basic soils descriptions (all assistants have existing plant identification skills); given opportunity to use their existing GPS and navigation skills; trained in helicopter safety and field logistics and exposed to field habitat description methods and small mammal trapping techniques.

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10. Workshops

Anvil Range Mine Site Personnel Meeting, March 2004. Meeting held in the Guesthouse Boardroom in Faro on March 15, 2004.

Ross River Dena Council Terrestrial Effects Workshop May 2004. Workshop held in Ross River School Gathering Room on May 5, 2004.

Ross River Terrestrial Effects Project Update and Traditional Knowledge Data Handling Meeting, August 2004. Meeting held in Ross River Dena Council Boardroom on August 25, 2004.

Selkirk First Nation Traditional Knowledge Workshop April 2004. Workshop held in Pelly Crossing between April 21 – 22, 2004.

Town of Faro Open House, March 2004. Open House held in Faro Council Chambers on March 15, 2004.

Selkirk First Nation Faro Mine Remediation Plan Update and Closure Plan Objectives Workshop November 2004. Workshop held in Pelly Crossing between November 25 – 26, 2004.

11. Personal Communication

Bond, J. March 2005. Pers. comm. Surficial Geologist, Yukon Geological Survey. Yukon Department of Energy, Mines and Resources, Whitehorse, Yukon.

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INSET MAP

Location of Project Area in Yukon

LEGEND

Road

DATA SOURCES AND DISCLAIMERS:

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_overview_map_11x17_09Mar2005v2.mxd
Revision: 1.1
Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7 8 9 10 11
Kilometres

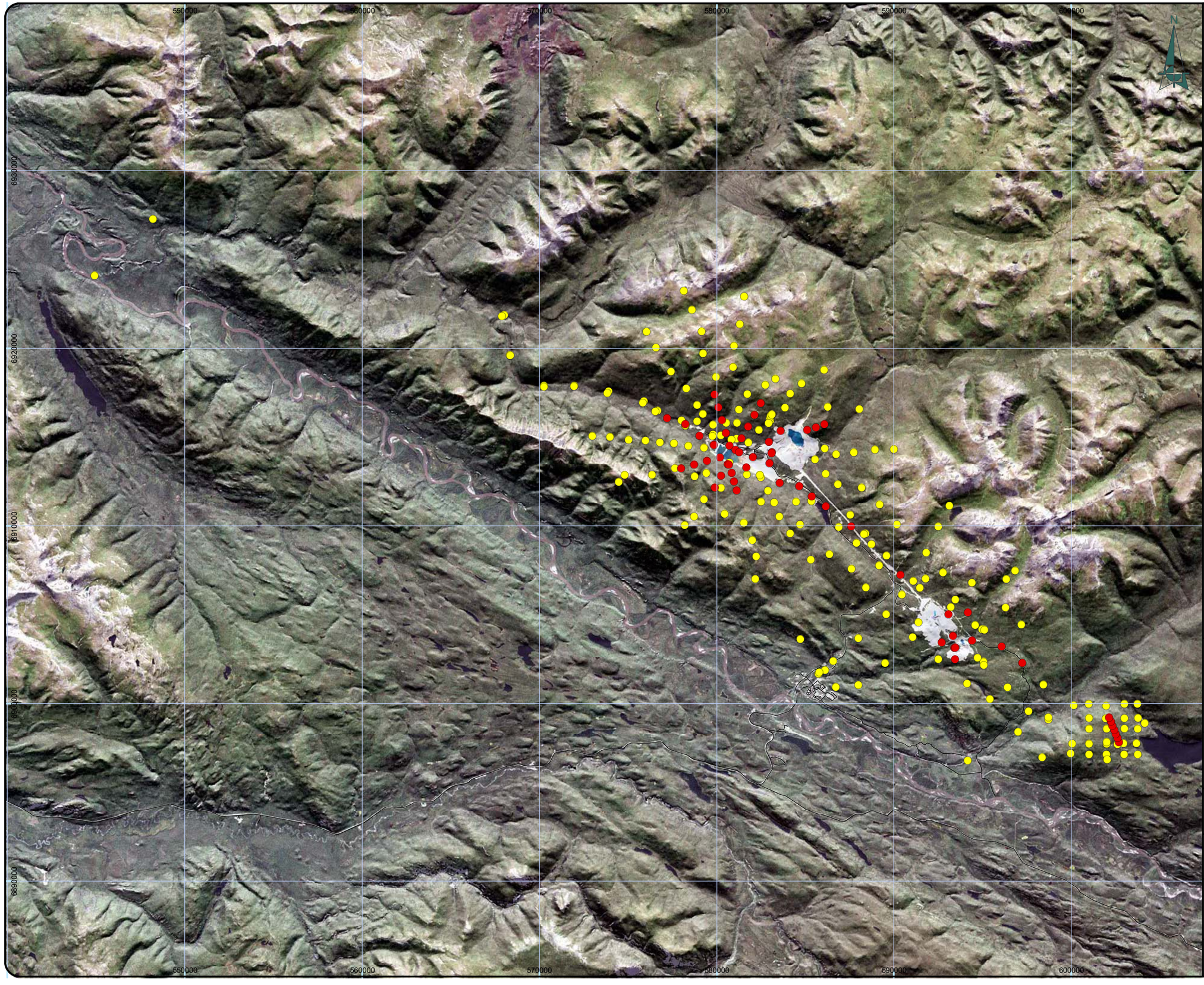
Scale 1: 200 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Overview Map of Project Area

Gartner Lee | JONES | Figure No. 1



LEGEND

- 2002 Sample Locations
- 2004 Sample Locations
- Road

DATA SOURCES AND DISCLAIMERS:

Sample Site Locations determined by field Global Positioning System (GPS). Locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones & Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_distribution_sampling_11x17_09Mar2005v2.mxd
Revision: 1.1
Projection: UTM Zone 8 NAD83

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Kilometres
Scale 1: 200 000

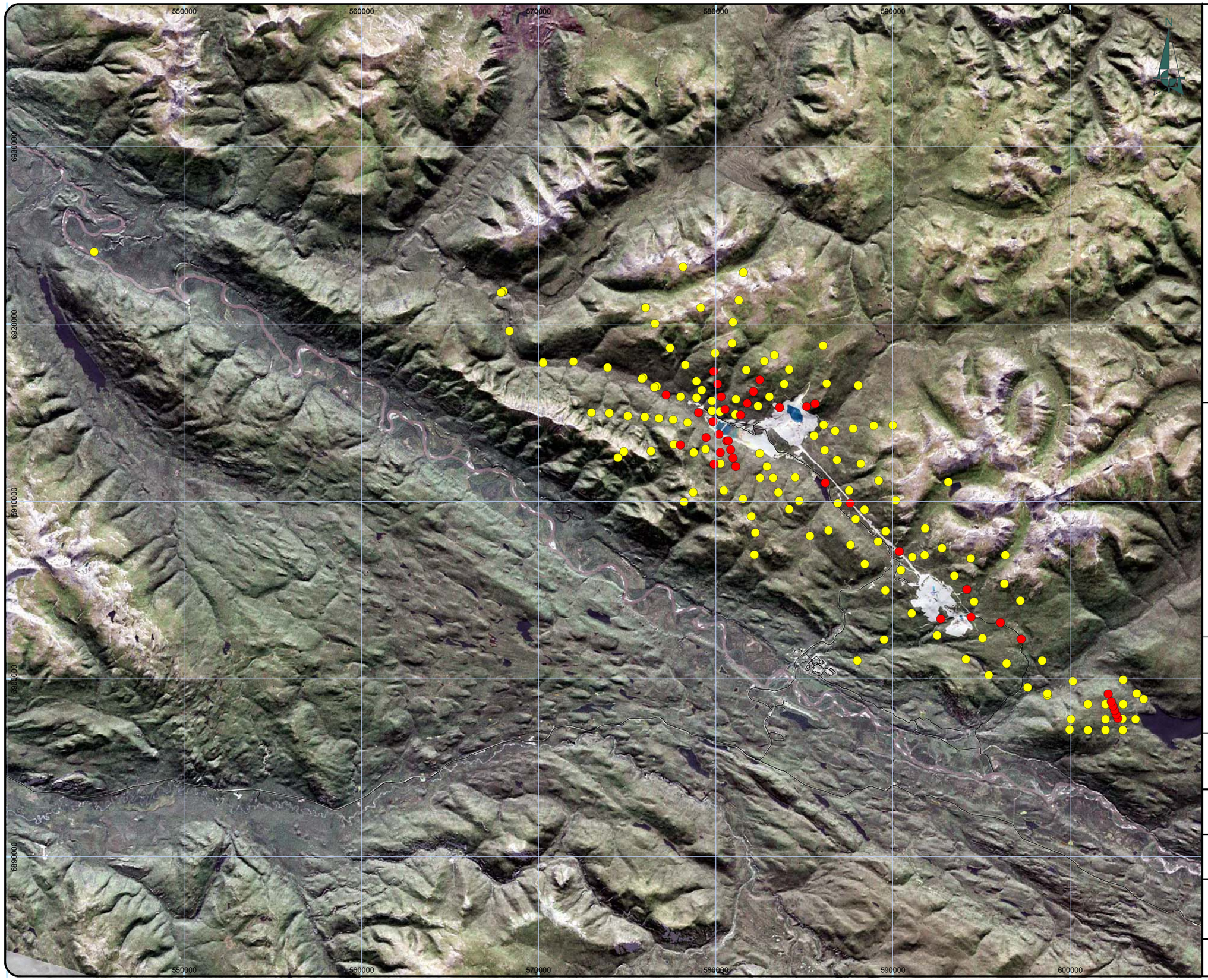
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of 2002 and 2004 Sampling Locations

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 2



LEGEND

- 2002 Lichen Sample Locations
- 2004 Lichen Sample Locations
- Road

DATA SOURCES AND DISCLAIMERS:

Sample Site Locations determined by field Global Positioning System (GPS). Locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones & Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_distribution_sampling_lichen_fig3_11x17_14Mar2005v2.mxd

Revision: 1.1

Projection: UTM Zone 8 NAD83

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Kilometres

Scale 1: 200 000

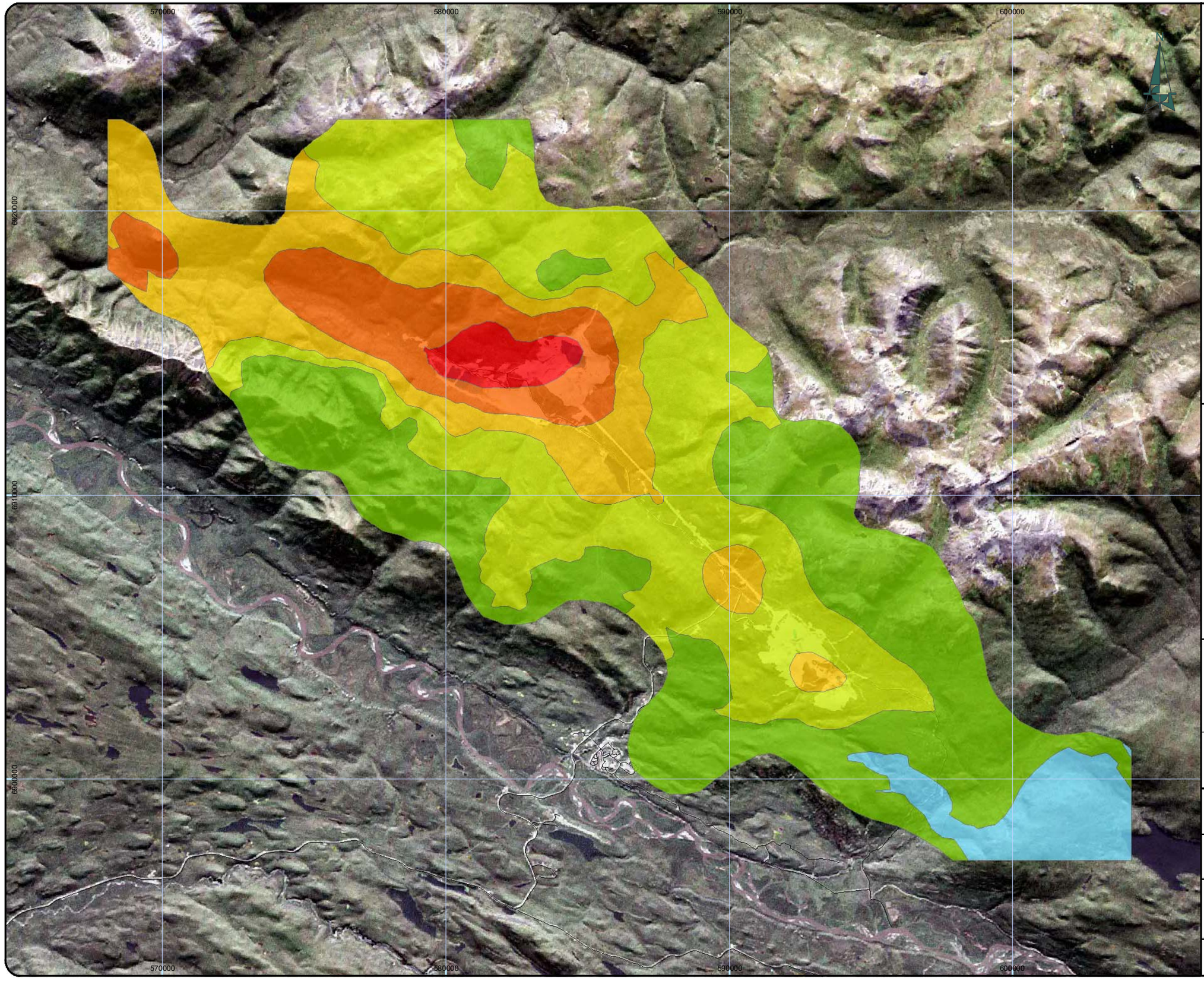
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Lichen Samples Collected and Analyzed in 2002 and 2004

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 3



LEGEND

Lead Concentration (ppm)

- 0.4 - 1.6
- 1.6 - 7.2
- 7.2 - 23.4
- 23.4 - 74.7
- 74.7 - 236.5
- 236.5 - 747.704
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_lead_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Lead in Lichen

Gartner Lee | JONES

Figure No. 4

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Zinc Concentration (ppm)

- 10.7 - 29.7
- 29.7 - 39.7
- 39.7 - 89.8
- 89.8 - 284.7
- 284.7 - 1043.4
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_zinc_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Zinc in Lichen

Gartner Lee | JONES

Figure No. 5

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Antimony Concentration (ppm)

- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 -0.7
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_antimony_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

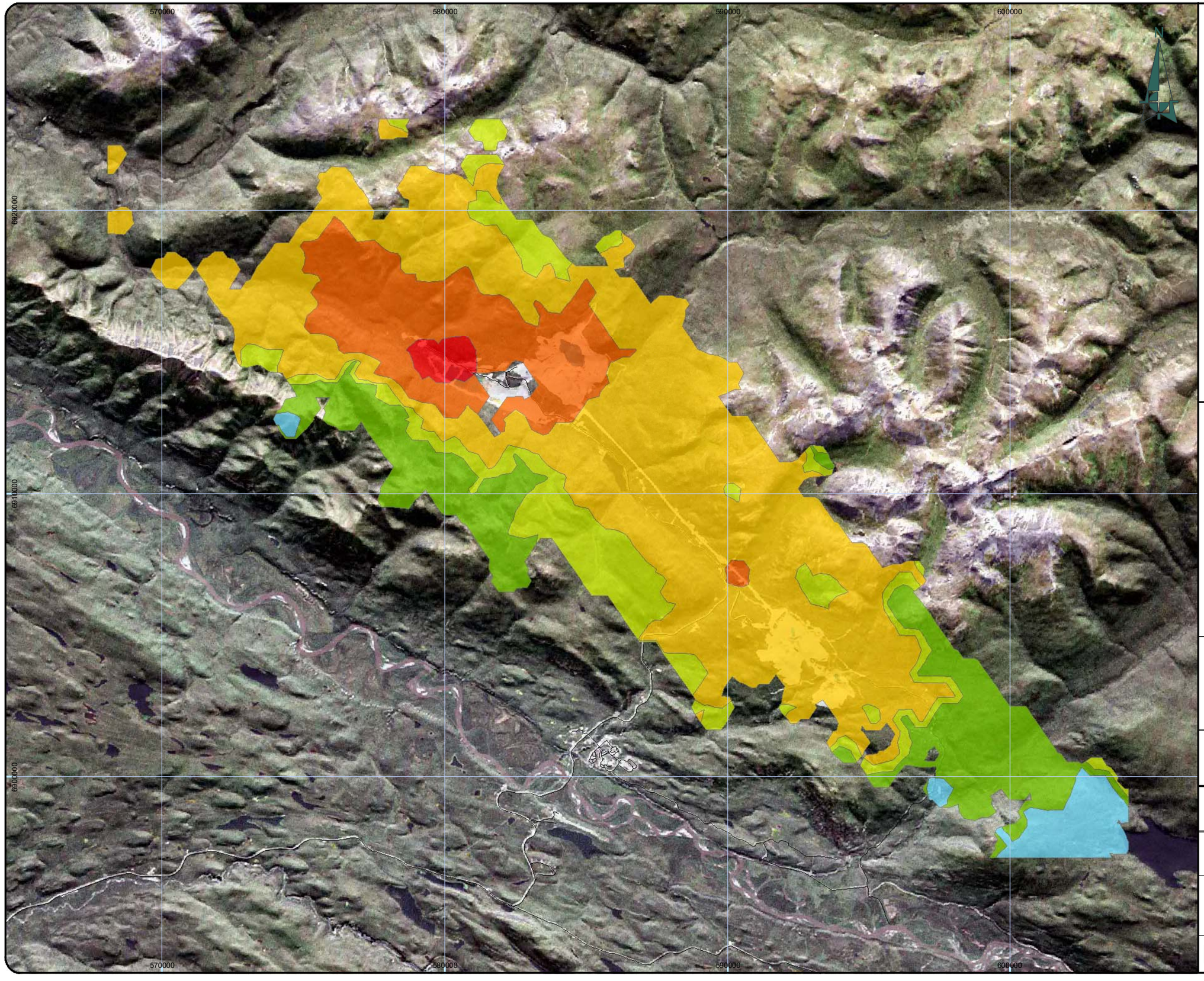
Standard Geostatistical Kriging of Antimony in Lichen

Gartner Lee

JONES

Figure No.

6



LEGEND

Arsenic Concentration (ppm)

- < 0.1 - 0.1
- 0.1 - 0.2
- 0.2 - 0.4
- 0.4 - 1.1
- 1.1 - 4.8
- 4.8 - 23.6
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_arsenic_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

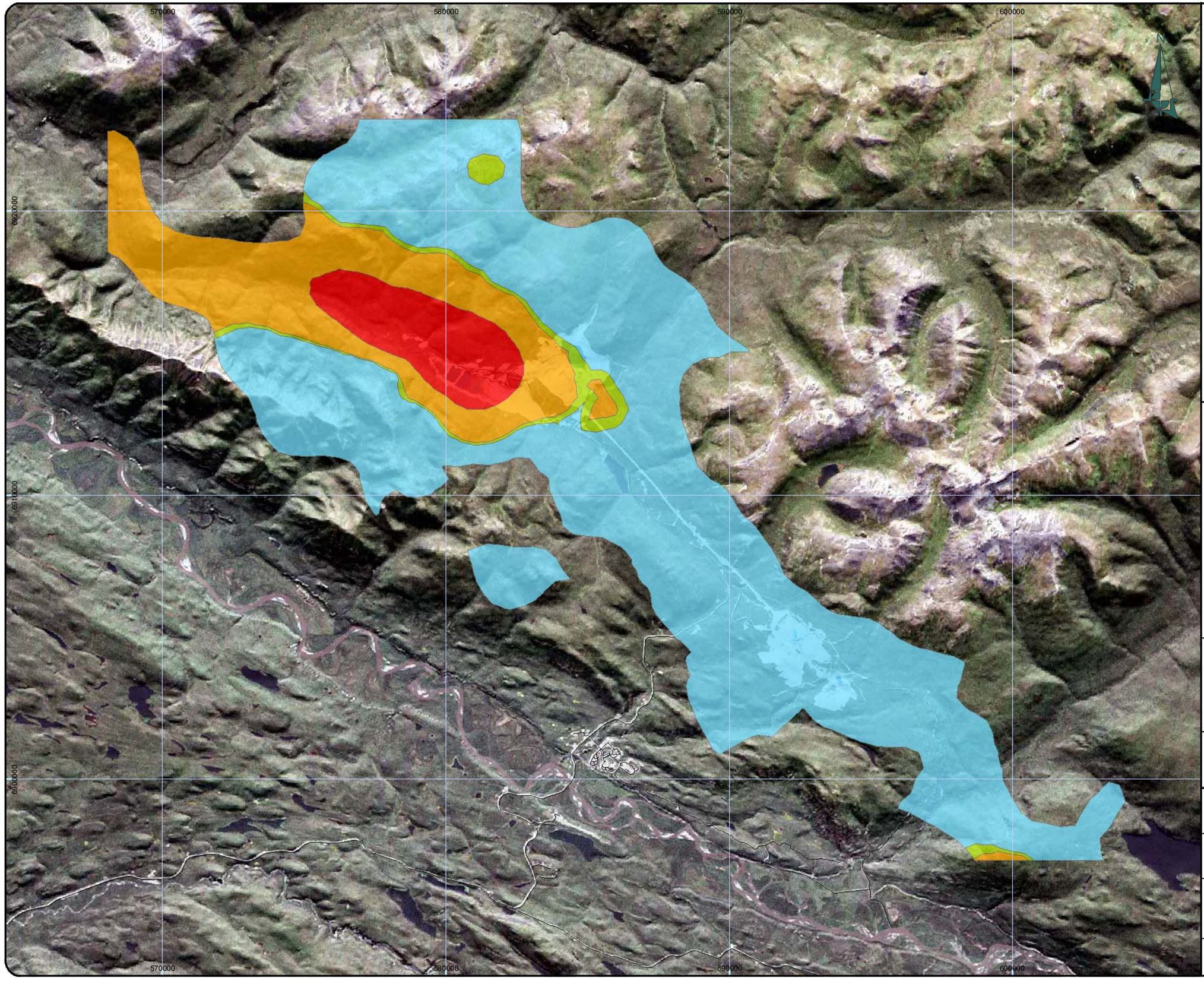
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Arsenic in Lichen

Gartner Lee | JONES

Figure No. 7



LEGEND

Barium Concentration (ppm)

- 5.3 - 37.3
- 37.3 - 41.7
- 41.7 - 107.9
- 107.9 - 317
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_barium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

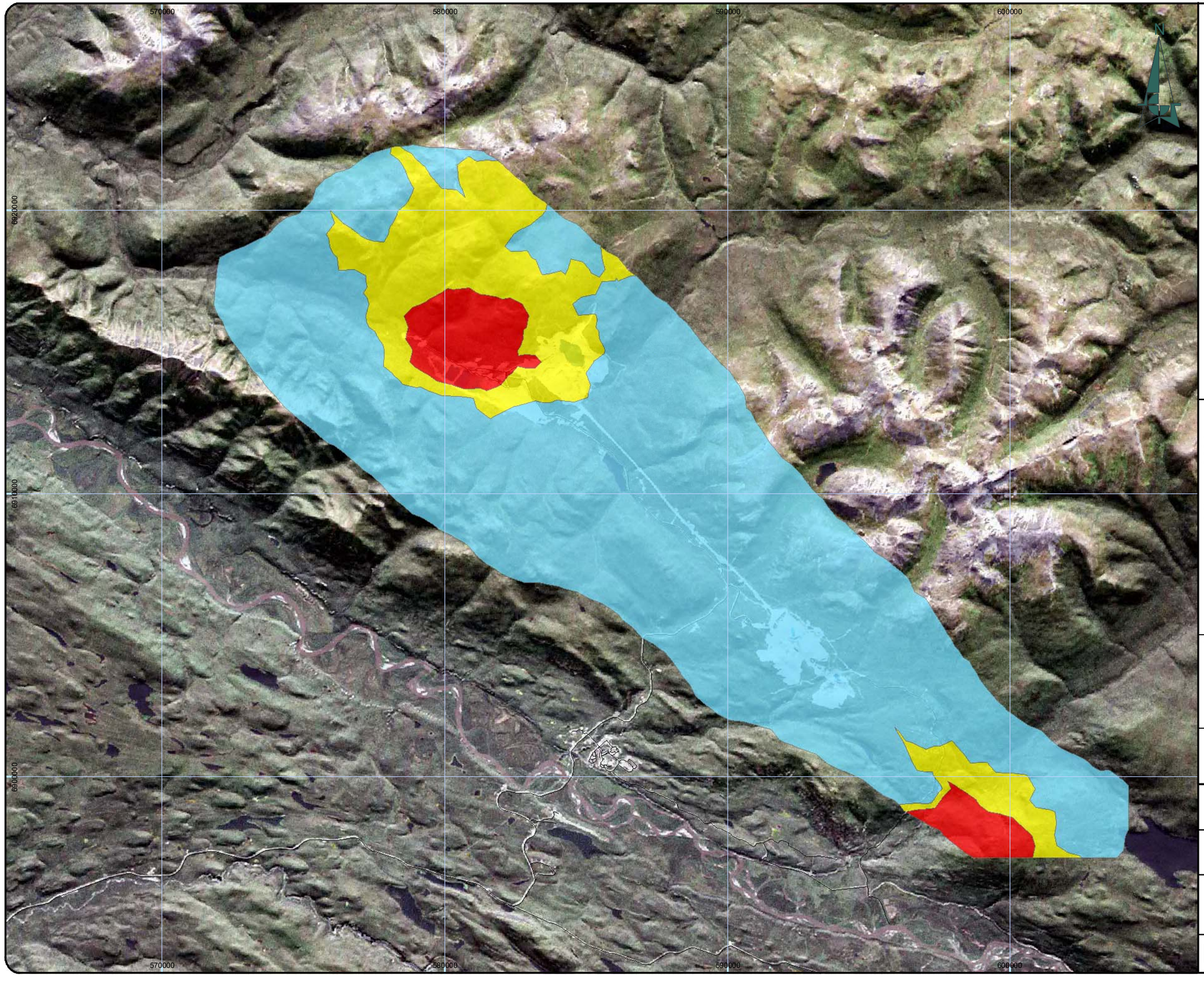
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Barium in Lichen

Gartner Lee | JONES

Figure No. **8**



LEGEND

Cadmium Concentration (ppm)

- < 0.02 - 0.28
- 0.28 - 0.37
- 0.37 - 2.52
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_cadmium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

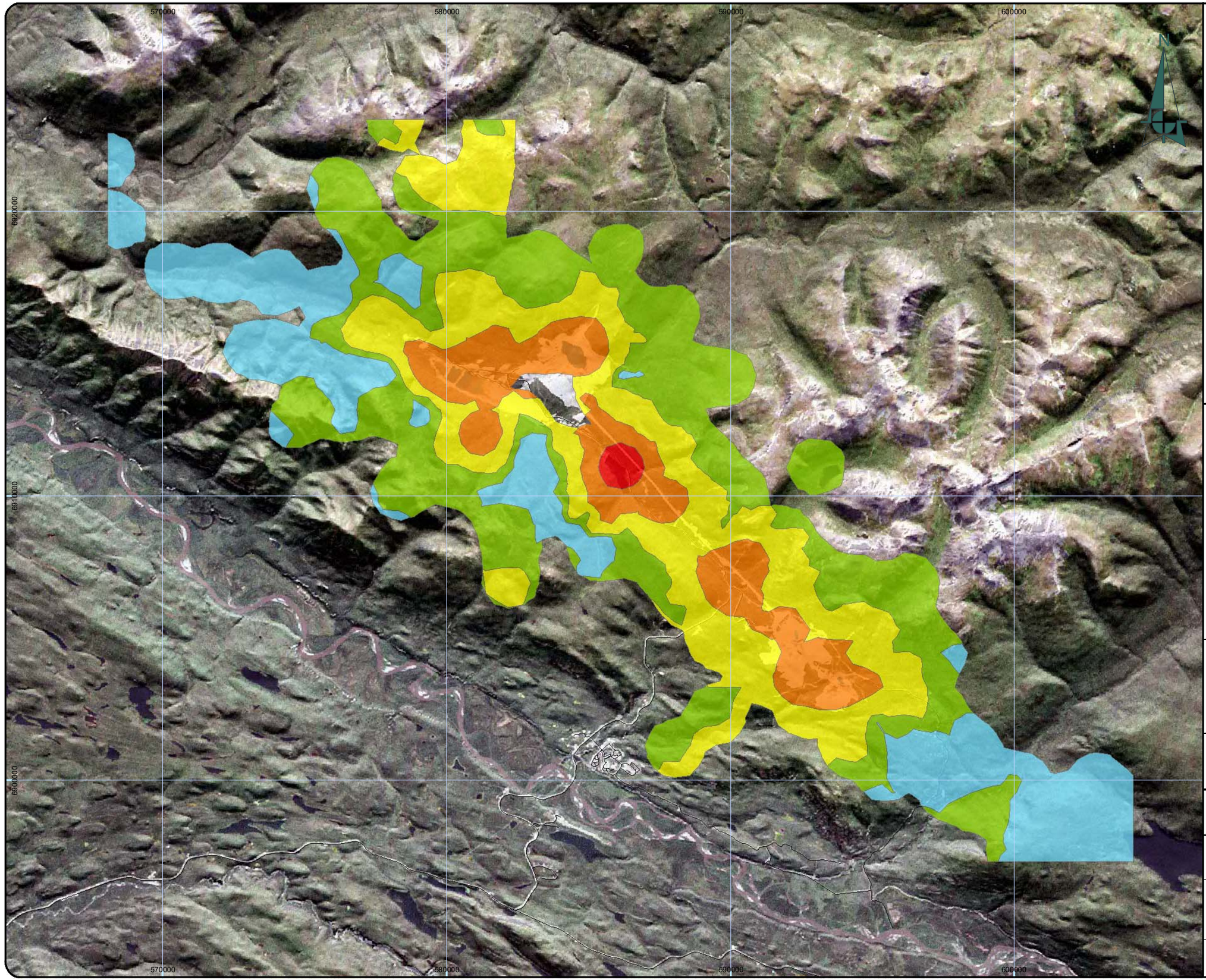
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Cadmium in Lichen

Gartner Lee | JONES

Figure No. 9



LEGEND

Chromium Concentration (ppm)

- < 0.10 - 0.27
- 0.27 - 0.38
- 0.38 - 0.77
- 0.77 - 1.80
- 1.80 - 4.60
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_chromium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

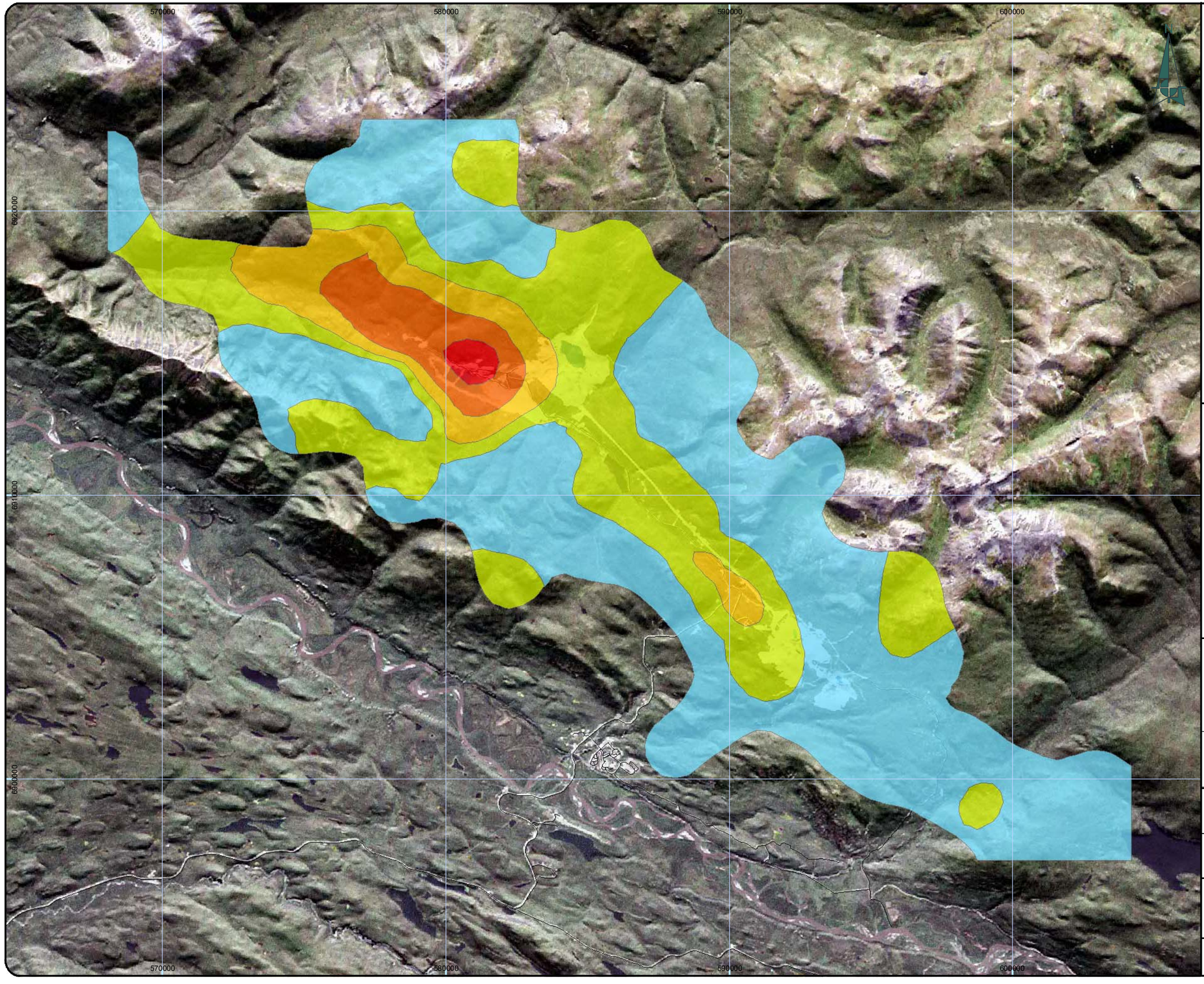
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Chromium in Lichen

Gartner Lee | JONES

Figure No. **10**



LEGEND

Cobalt Concentration (ppm)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_cobalt_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

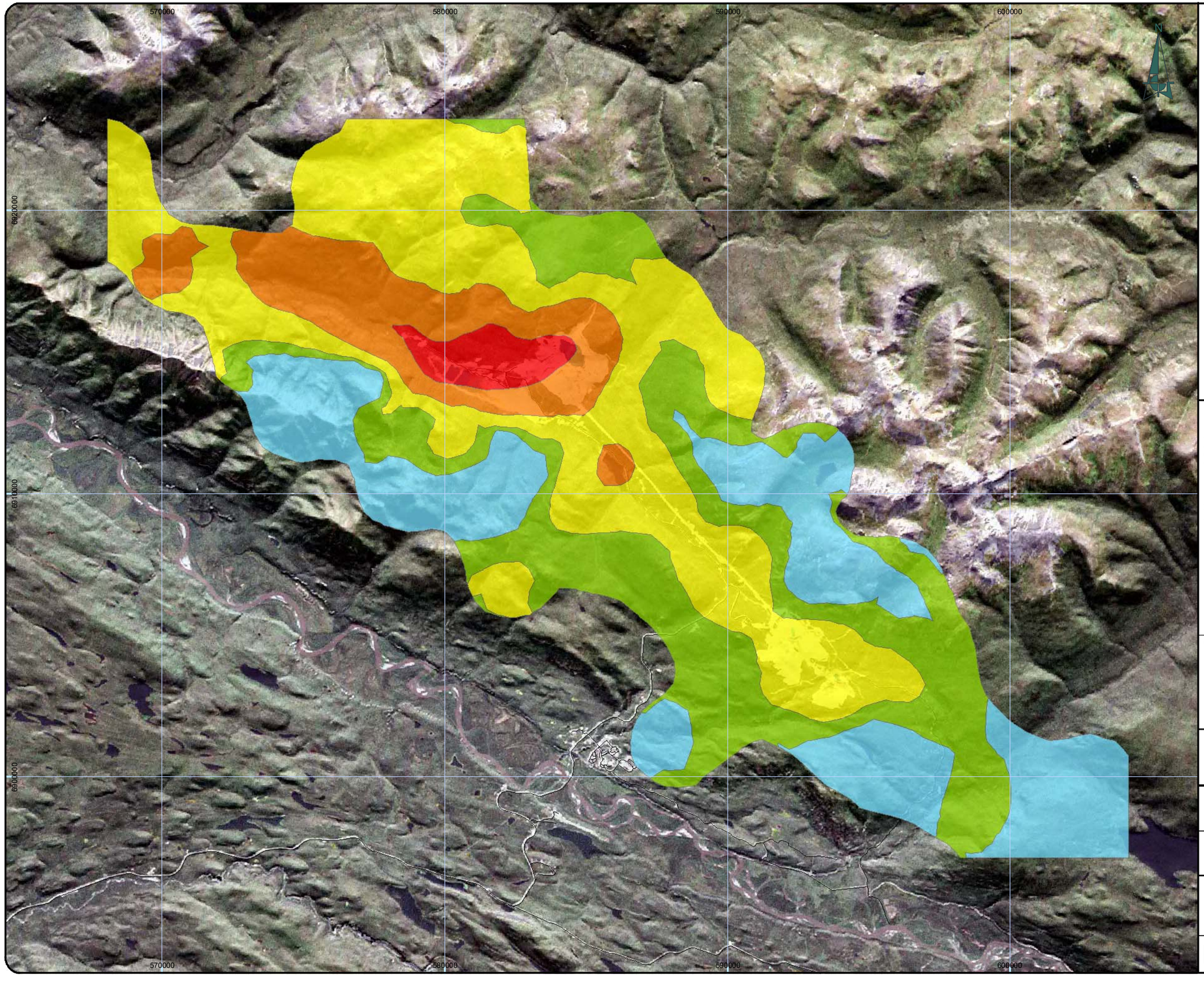
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Cobalt in Lichen

Gartner Lee | JONES

Figure No. **11**



LEGEND

Copper Concentration (ppm)

- 0.6 - 1.3
- 1.3 - 1.7
- 1.7 - 3.6
- 3.6 - 10.3
- 10.3 - 35.4
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_copper_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

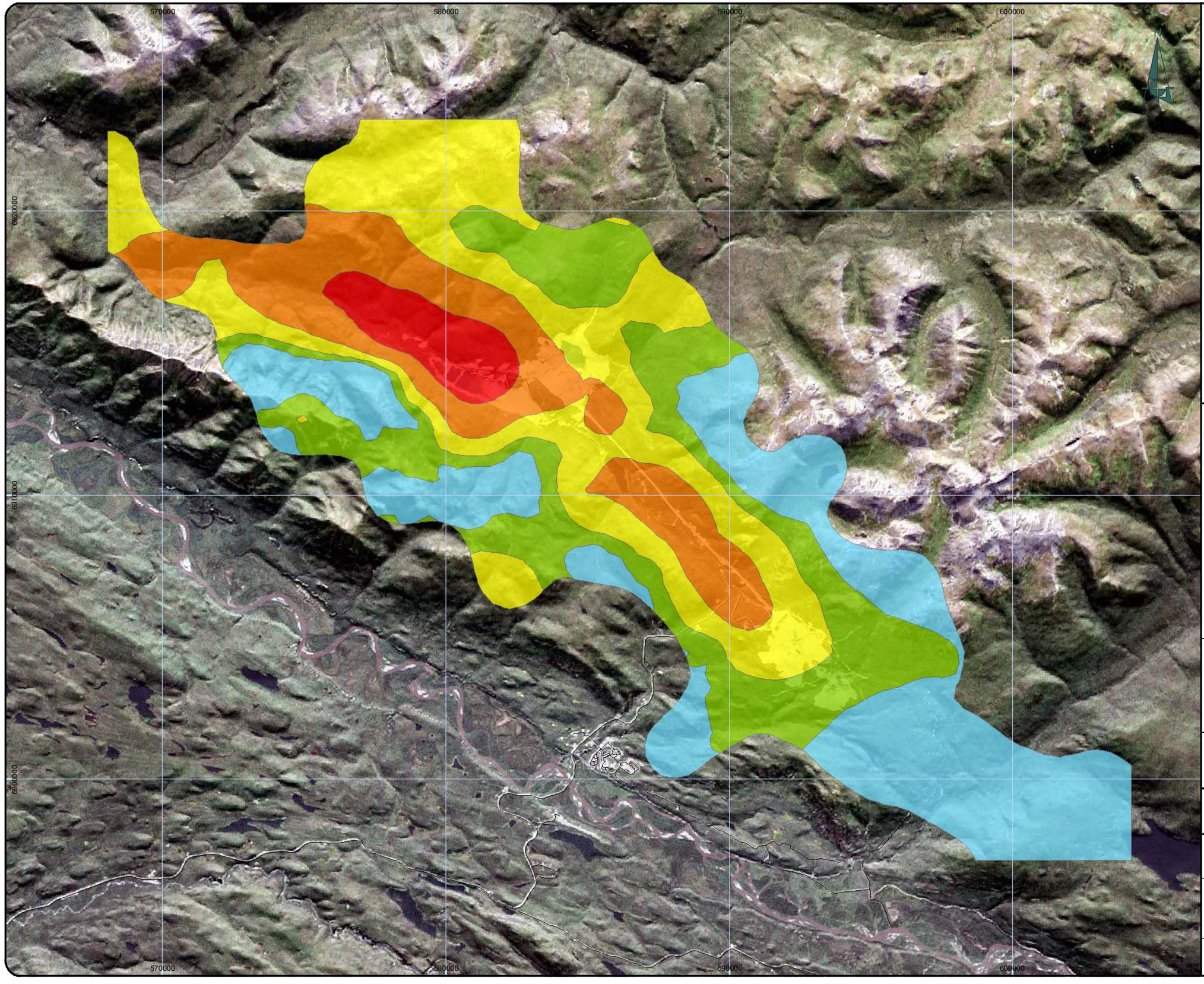
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Copper in Lichen

Gartner Lee | JONES

Figure No. 12



LEGEND

Iron Concentration (ppm)

- 53 - 135
- 135 - 193
- 193 - 353
- 353 - 785
- 785 - 1950
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_iron_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

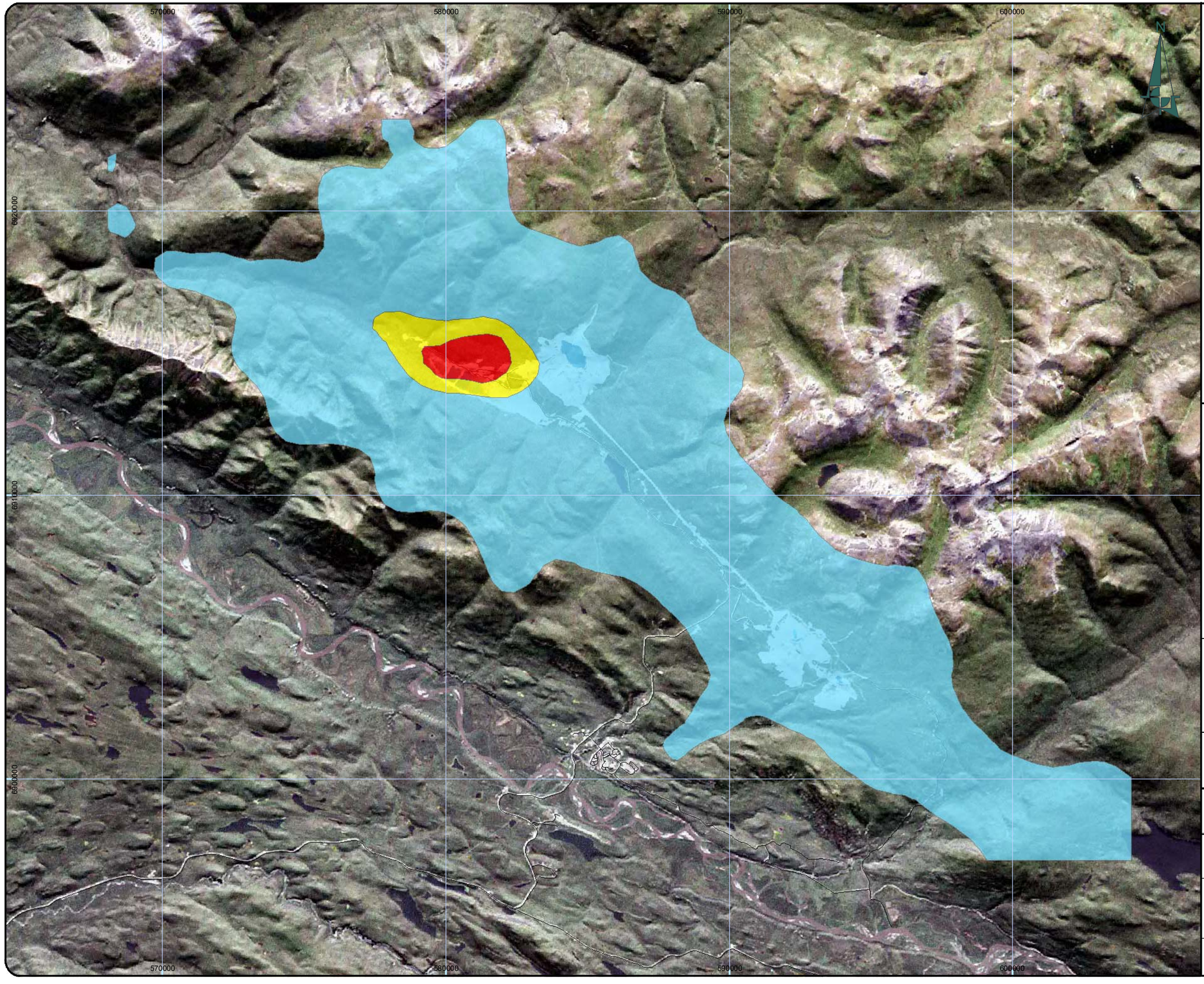
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Iron in Lichen

Gartner Lee | JONES

Figure No. 13



LEGEND

Mercury Concentration (ppm)

- < 0.010 - 0.072
- 0.072 - 0.125
- 0.125 - 0.510
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_mercury_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

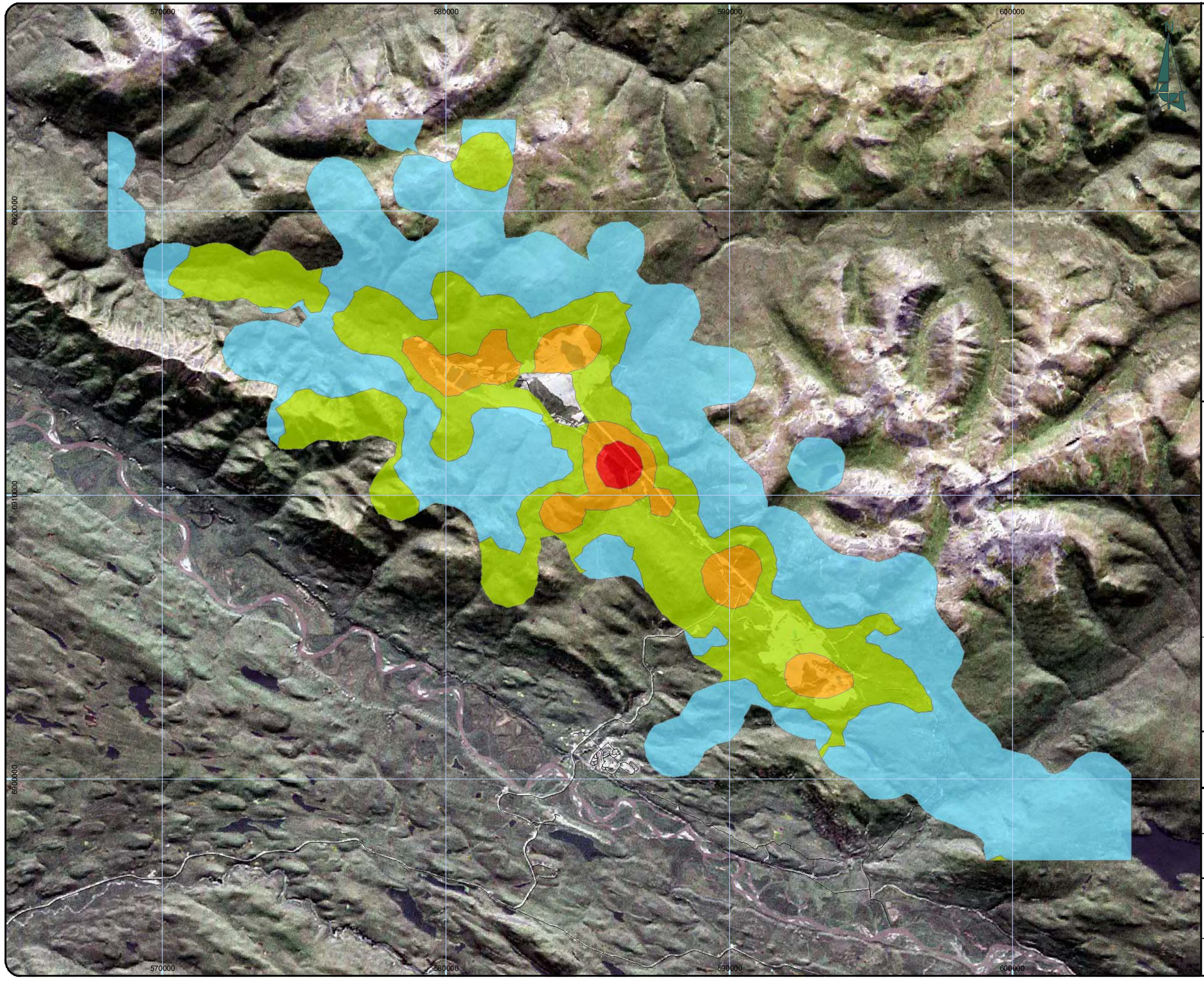
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Mercury in Lichen

Gartner Lee | JONES

Figure No. **14**



LEGEND

Nickel Concentration (ppm)

- < 0.1 - 0.50
- 0.50 - 1.02
- 1.02 - 2.10
- 2.10 - 4.61
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_nickel_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

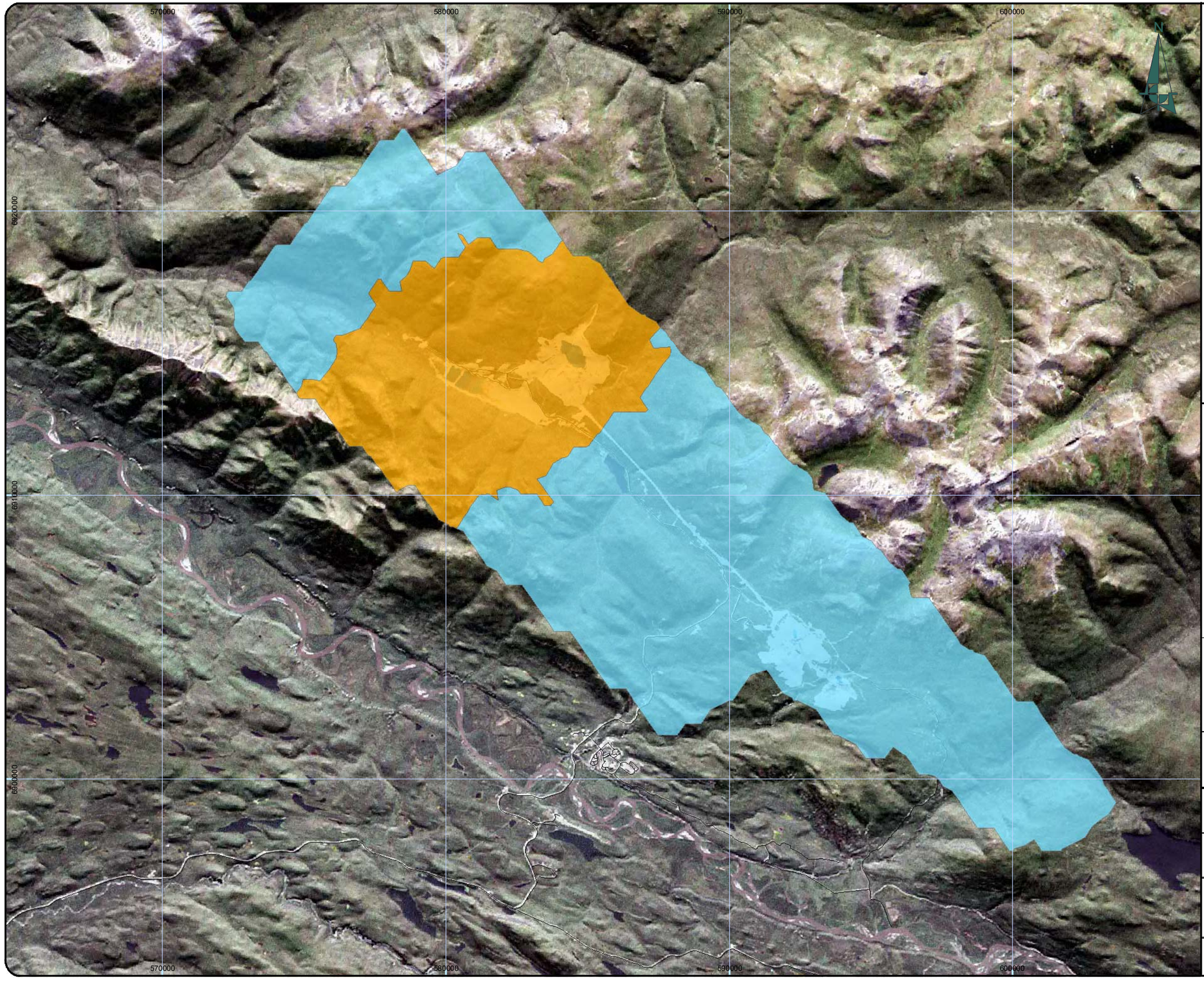
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Nickel in Lichen

Gartner Lee | JONES

Figure No. 15



LEGEND

Selenium Concentration (ppm)

- < 0.2
- 4.53
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_selenium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

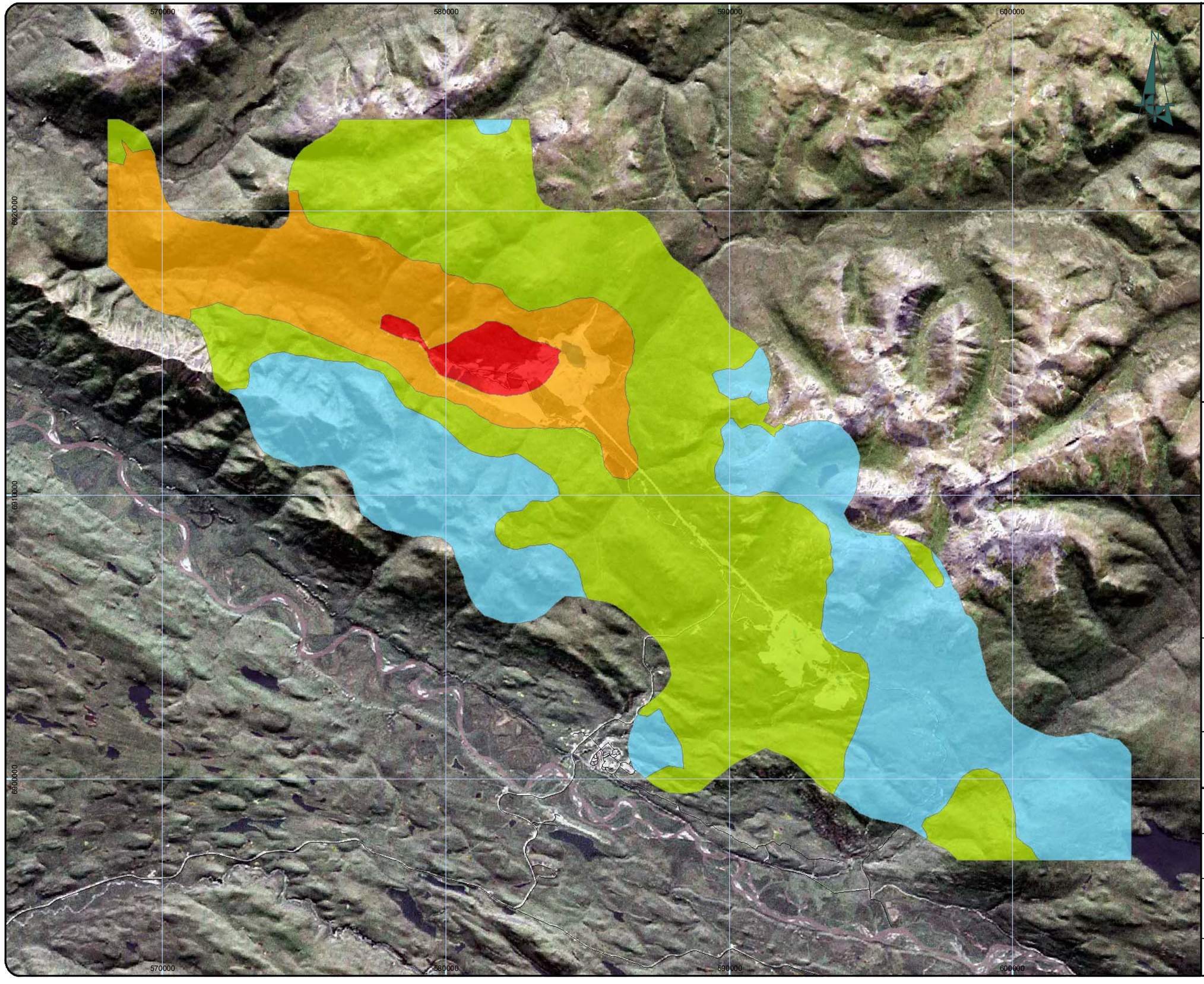
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Selenium in Lichen

Gartner Lee | JONES Associates Ltd.

Figure No. 16



LEGEND

Silver Concentration (ppm)

- < 0.01 - 0.05
- 0.05 - 0.14
- 0.14 - 0.49
- 0.49 - 1.80
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_silver_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

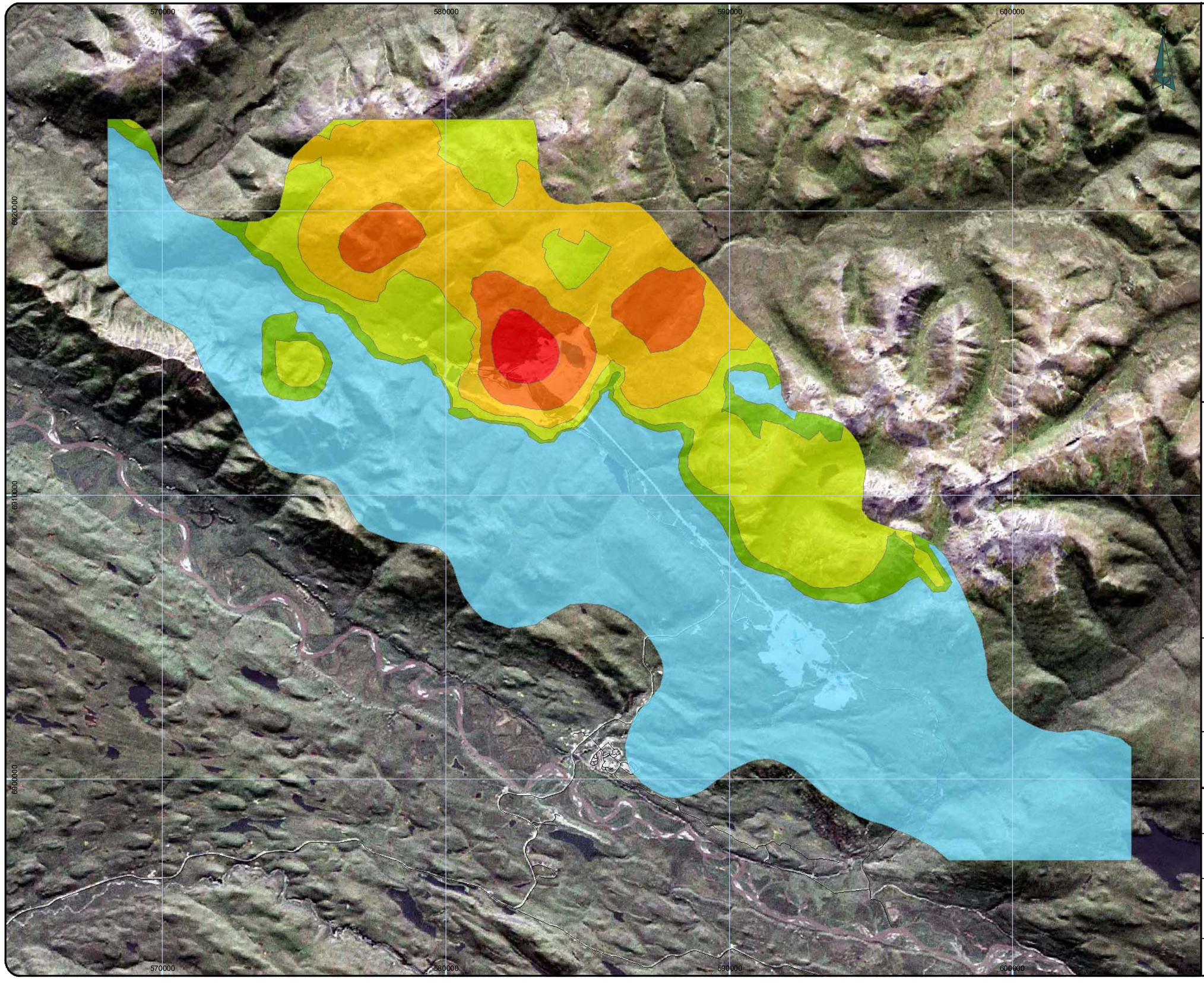
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Silver in Lichen

Gartner Lee | JONES

Figure No. **17**



LEGEND

Thallium Concentration (ppm)

- < 0.02
- 0.02 - 0.03
- 0.03 - 0.07
- 0.07 - 0.19
- 0.19 - 0.54
- 0.54 - 1.52
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_thallium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

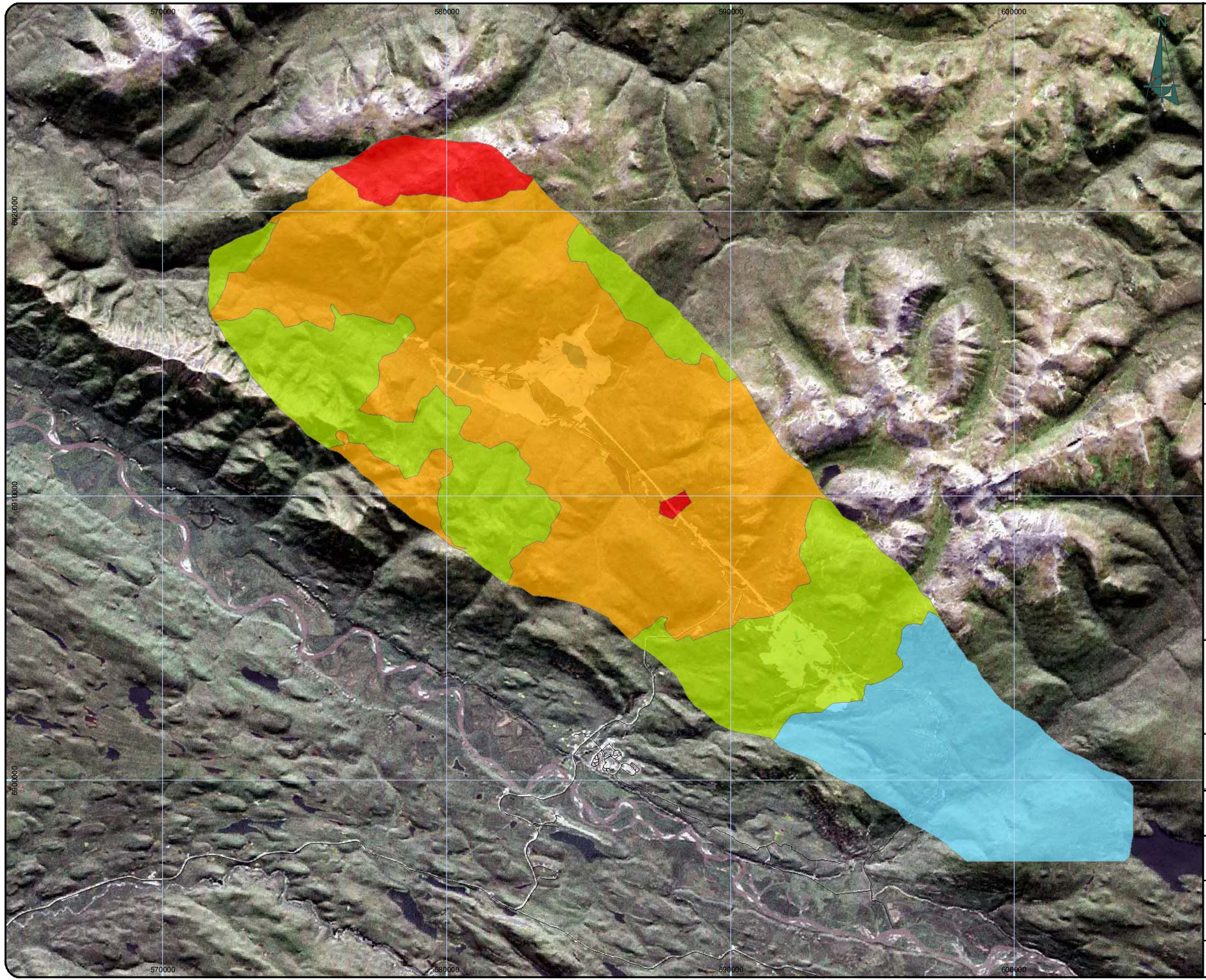
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Thallium in Lichen

Gartner Lee | JONES

Figure No. **18**



LEGEND

Titanium Concentration (ppm)

- 1.8 - 3.0
- 3.0 - 3.8
- 3.8 - 5.2
- 5.2 - 12.1
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_titanium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

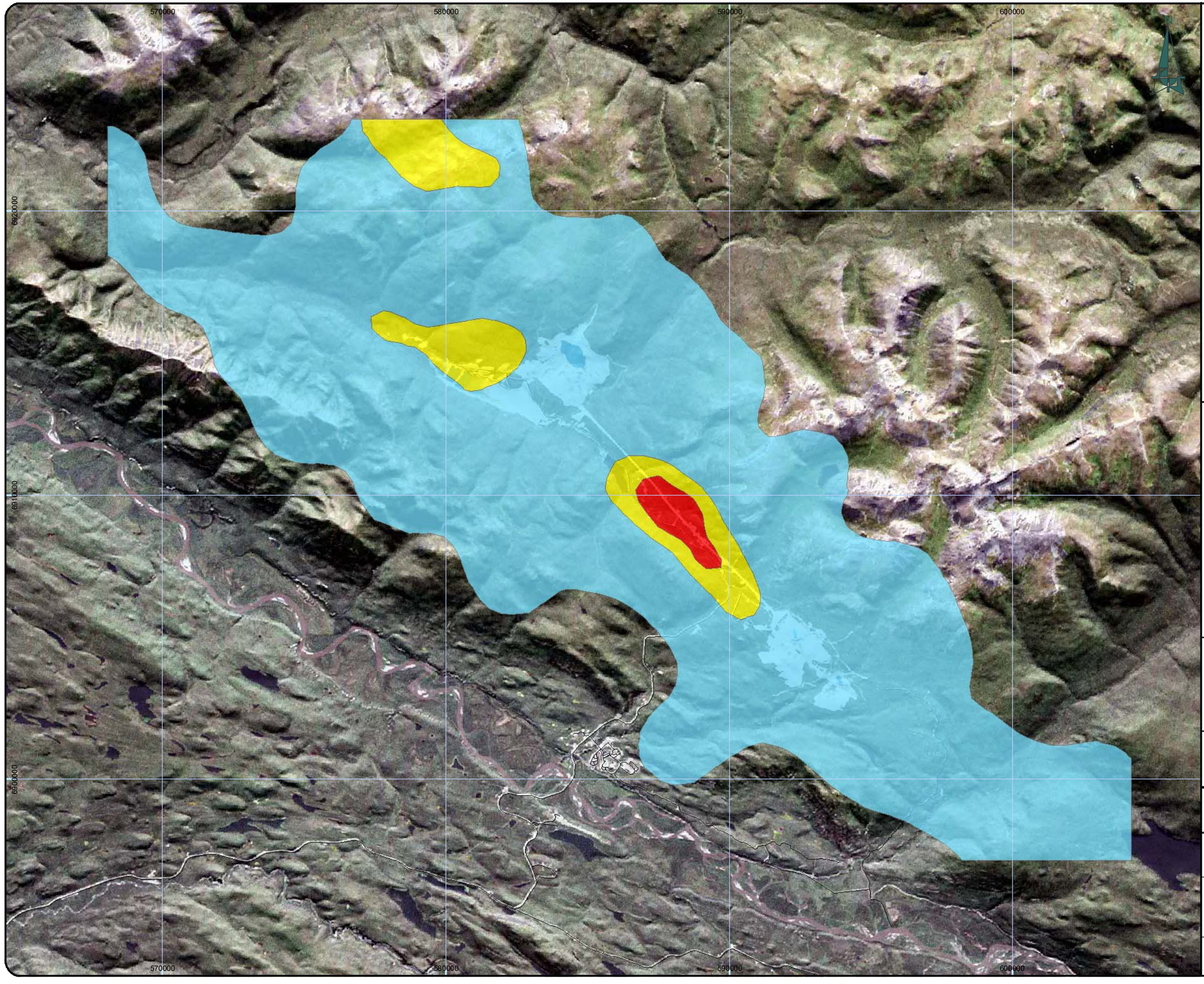
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Titanium in Lichen

Gartner Lee | JONES

Figure No. 19



LEGEND

Vanadium Concentration (ppm)

- < 0.5
- 0.5 - 0.6
- 0.6 - 0.9
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_vanadium_lichen_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

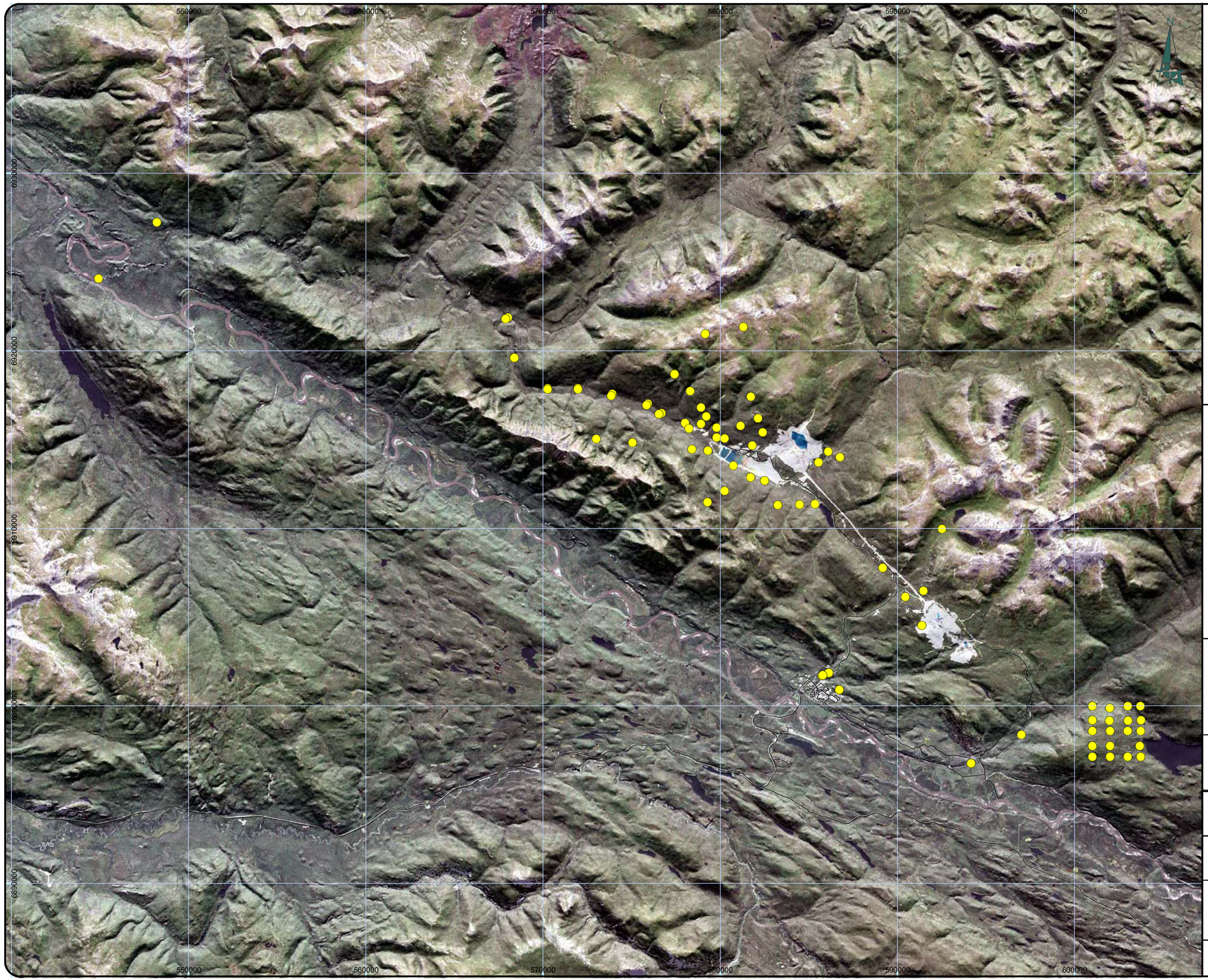
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Vanadium in Lichen

Gartner Lee | JONES

Figure No. **20**



LEGEND

- 2004 Soil Sample Locations
- Road

DATA SOURCES AND DISCLAIMERS:

Sample Site Locations determined by field Global Positioning System (GPS). Locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones & Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_distribution_sampling_soils_fig4_11x17_14Mar2005v2.mxd

Revision: 1.1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7 8 9 10
Kilometres

Scale 1: 200 000

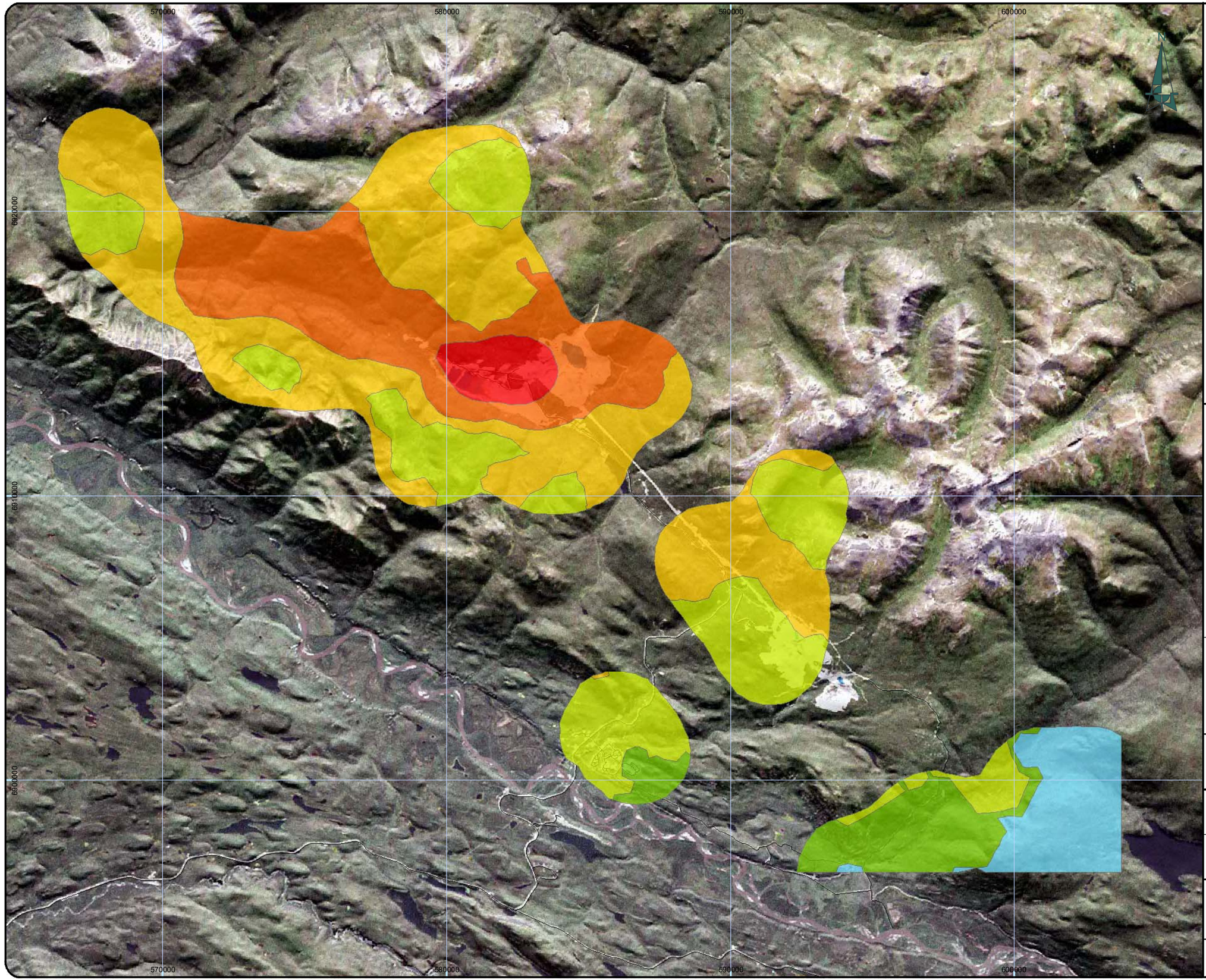
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Soil Samples Collected and Analyzed in 2004

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 21



LEGEND

Lead Concentration (ppm)

- < 18
- 18 - 39
- 39 - 137
- 137 - 482
- 482 - 1691
- 1691 - 5930
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_lead_surface_organic_soils_krig_11x17_28Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

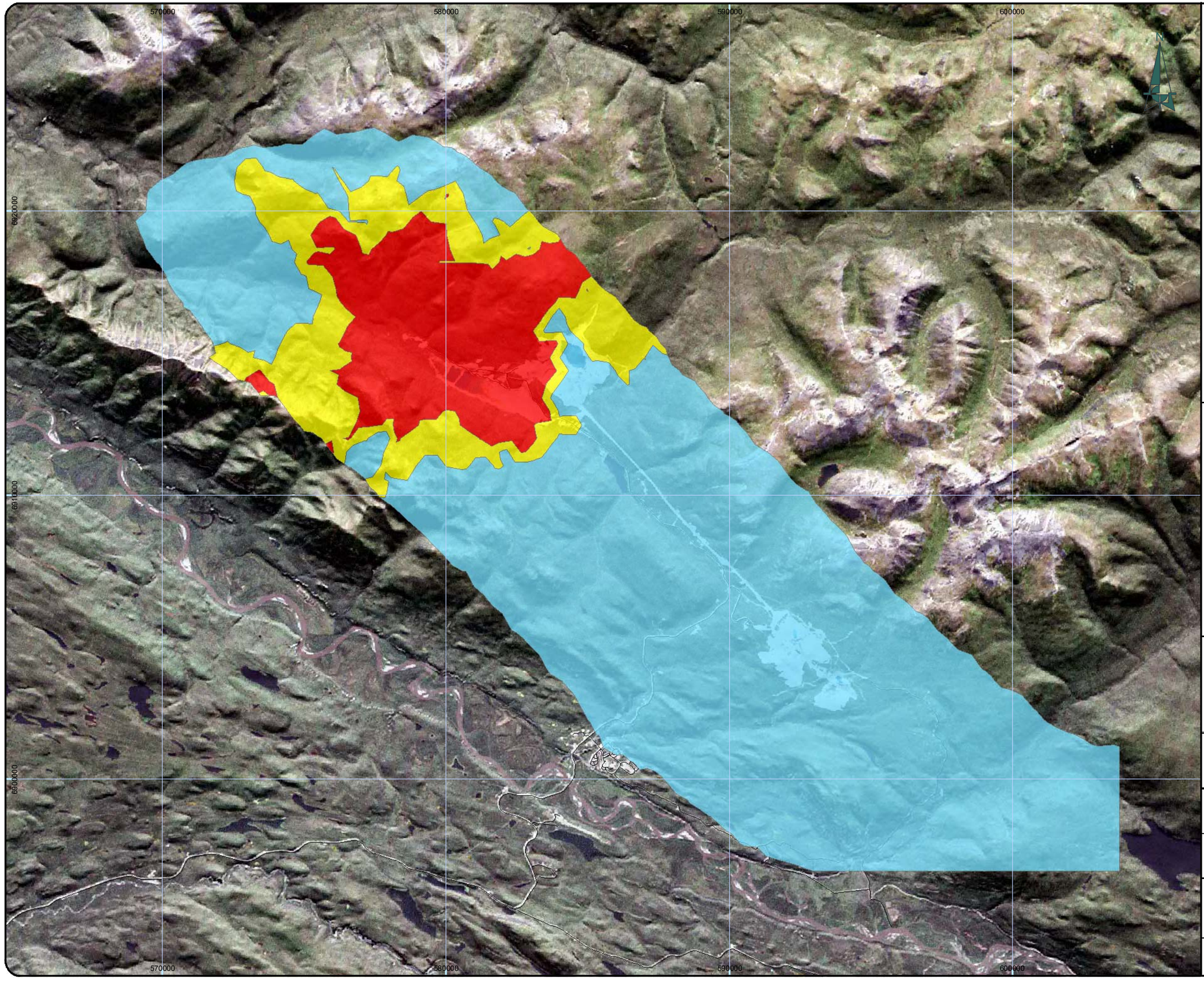
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Lead in Surface Organic Soil

Gartner Lee | JONES Associates Ltd.

Figure No. 22



LEGEND

Zinc Concentration (ppm)

- < 480
- 480 - 581
- 581 - 1327
- Road

DATA SOURCES AND DISCLAIMERS:

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_zinc_surface_organic_soils_krig_11x17_28Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Standard Geostatistical Kriging of Zinc in Surface Organic Soil

Gartner Lee | JONES

Figure No. 23

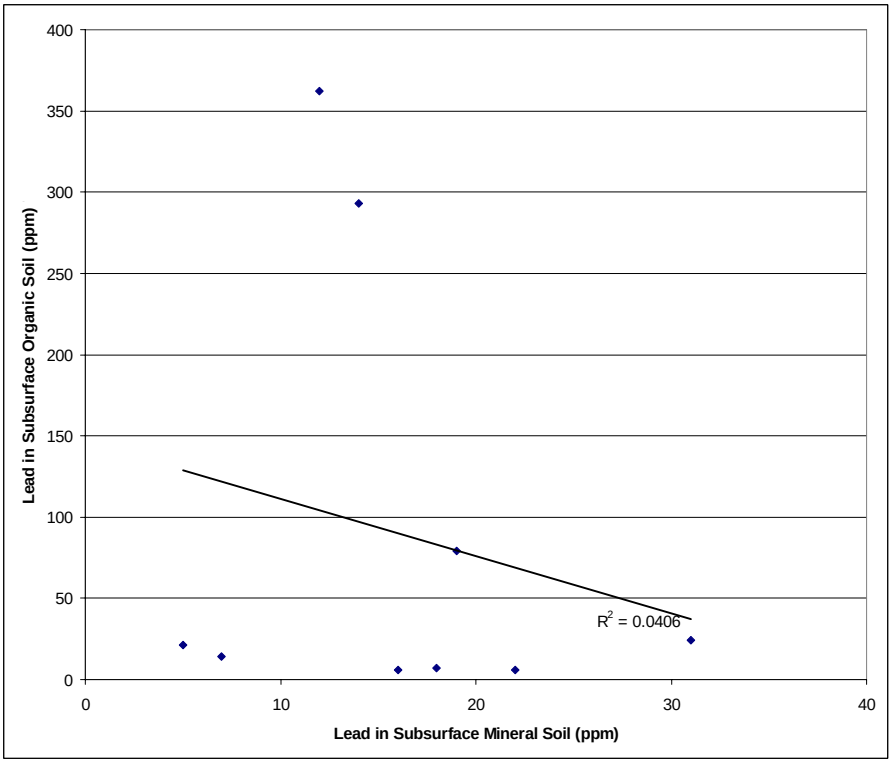


Figure 24. Comparison between Lead in Subsurface Organic and Subsurface Mineral Soils

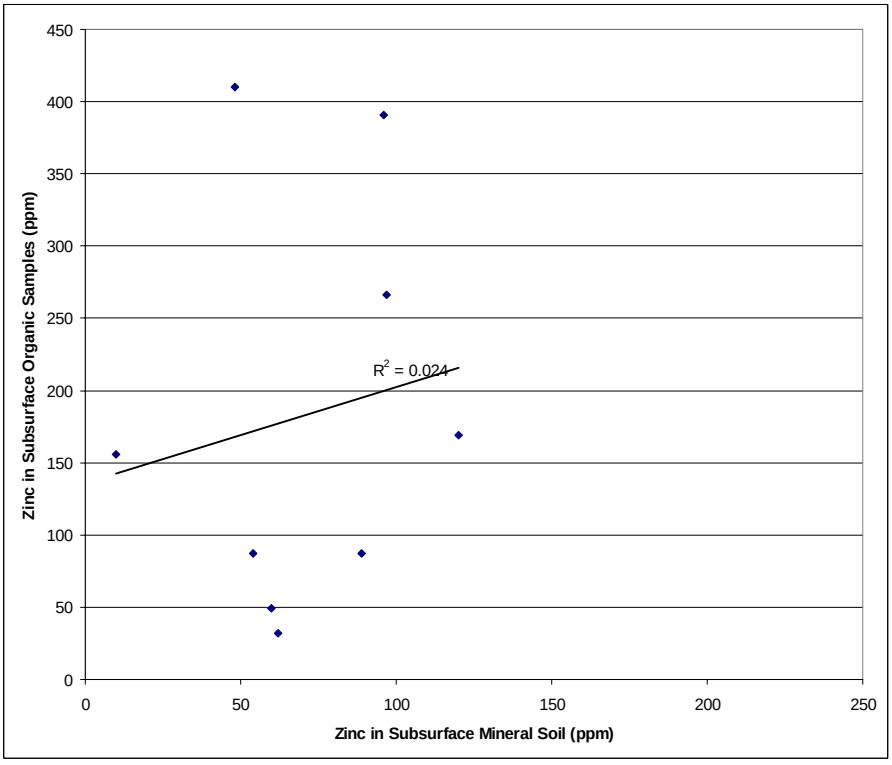


Figure 25. Comparison between Zinc in Subsurface Organic and Subsurface Mineral Soils

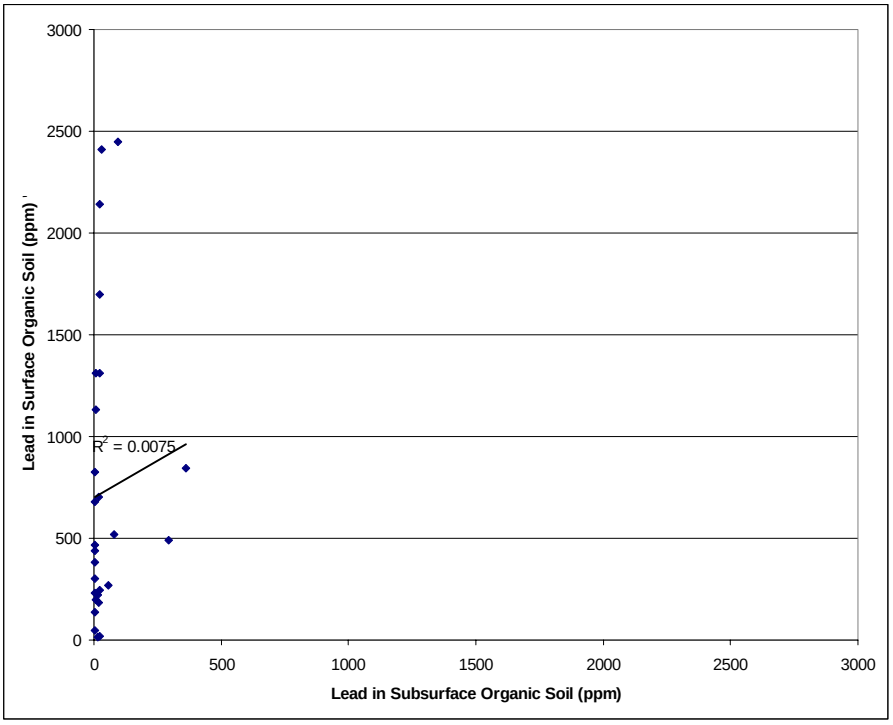


Figure 26. Comparison between Lead in Surface Organic and Subsurface Organic Soils

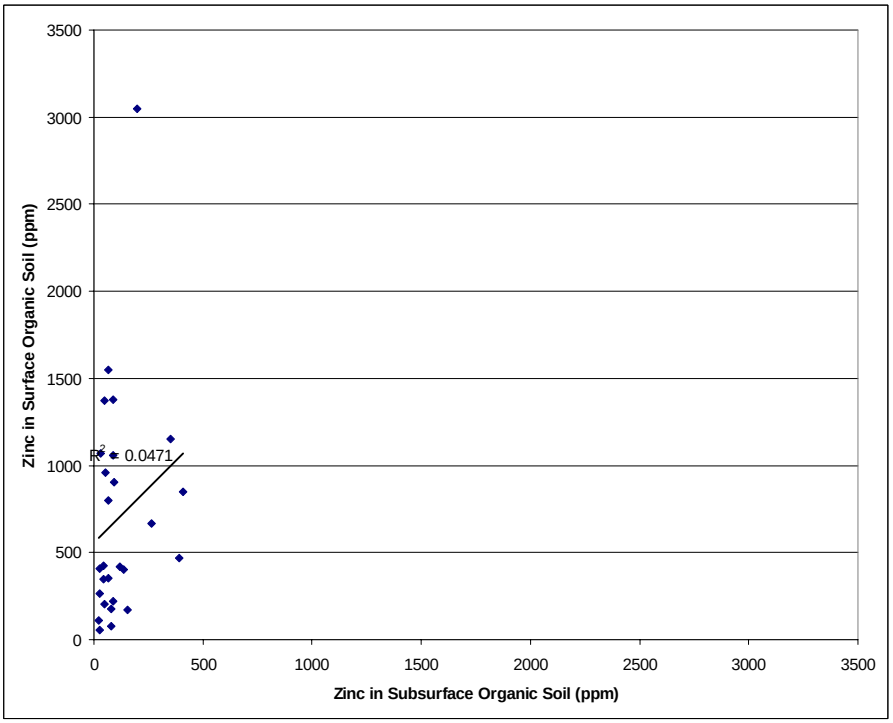
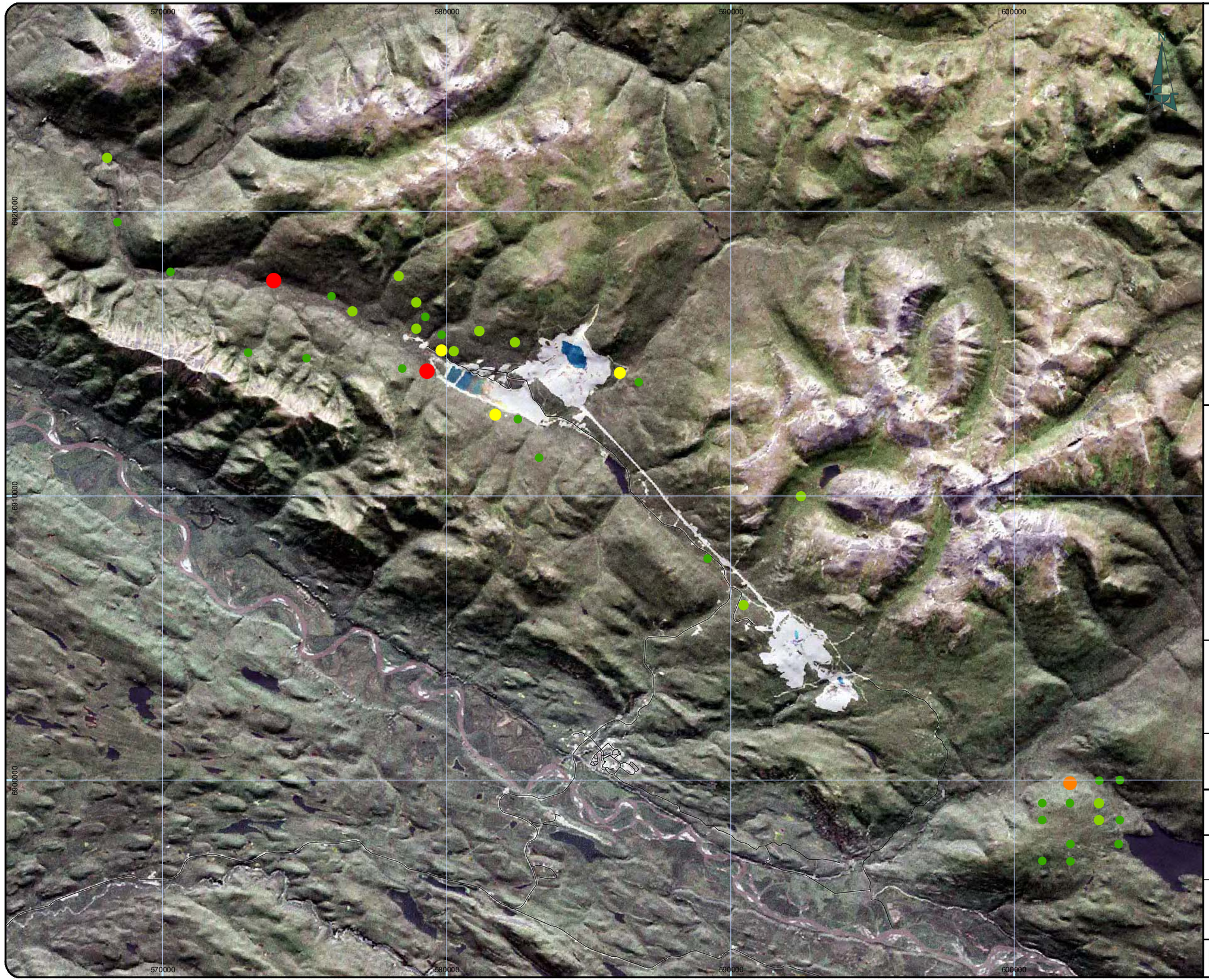


Figure 27. Comparison between Zinc in Surface Organic and Subsurface Organic Soils



LEGEND

Lead Concentration (ppm)

- < 8
- 9 - 30
- 31 - 93
- 94 - 193
- 194 - 362
- Road

DATA SOURCES AND DISCLAIMERS:

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_lead_subsurface_soil_no_rc_11x17_14Apr05.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5

Kilometres

Scale 1: 125 000

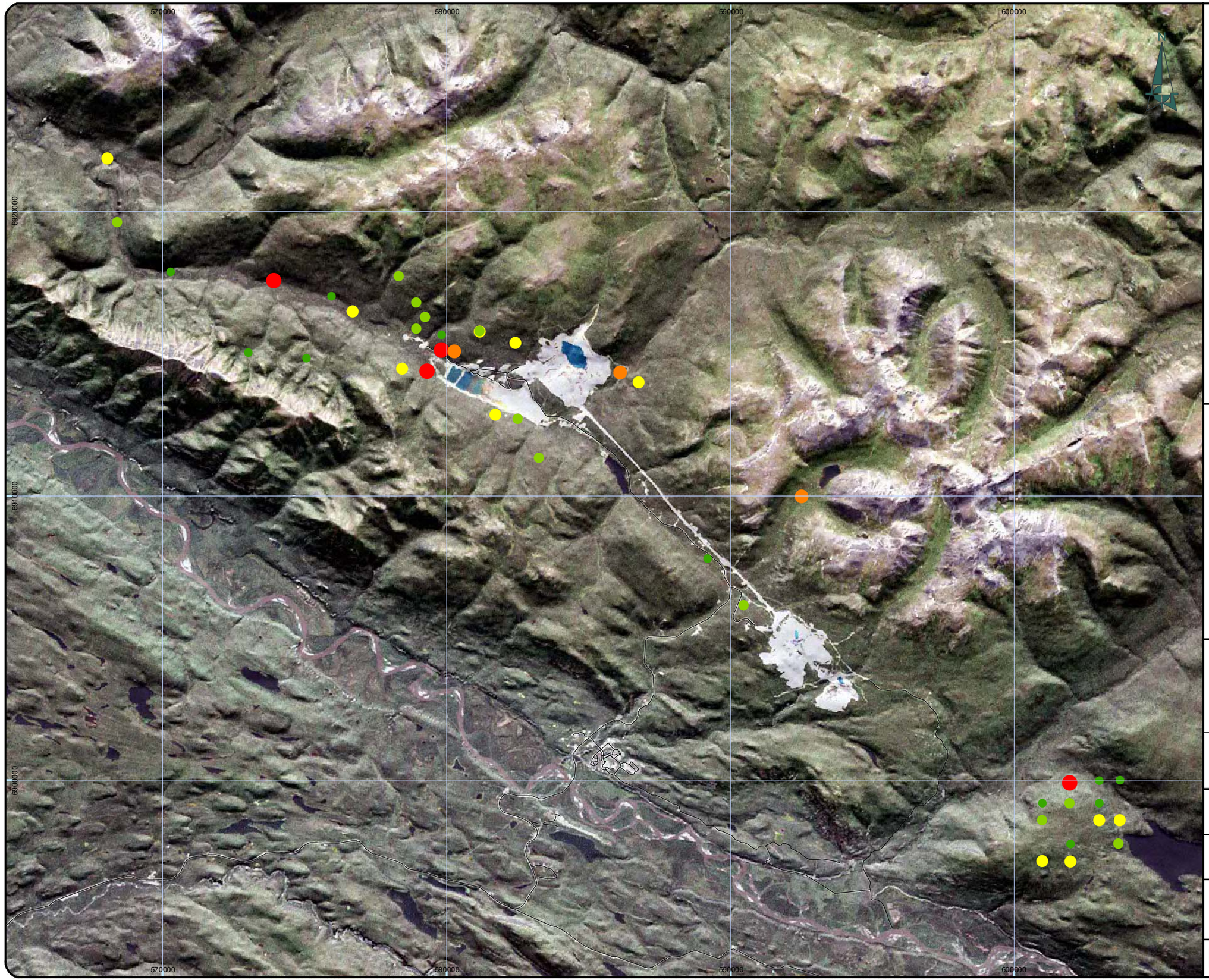
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Lead Levels in Subsurface Organic Soil

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. **28**



LEGEND

Zinc Concentration (ppm)

- 10 - 44
- 45 - 79
- 80 - 135
- 136 - 266
- 267 - 427
- Road

DATA SOURCES AND DISCLAIMERS:

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_zinc_subsurface_soil_no_rc_11x17_14Apr05.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Zinc Levels in Subsurface Organic Soil

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. **29**

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Lead Concentration (ppm)

- < 7
- 8 - 22
- 23 - 60
- 61 - 175
- 176 - 1330
- Road

DATA SOURCES AND DISCLAIMERS:

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_lead_mineral_soil_no_rc_11x17_25Mar2005v2.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7
Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Lead Levels in Subsurface Mineral Soil

Gartner Lee | C.E. JONES & Associates Ltd.

Figure No. 30

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Zinc Concentration (ppm)

- < 17
- 17 - 65
- 65 - 97
- 97 - 134
- 134 - 309
- Road

DATA SOURCES AND DISCLAIMERS:

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_zinc_mineral_soil_no_rc_11x17_25Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7
Kilometres

Scale 1: 125 000

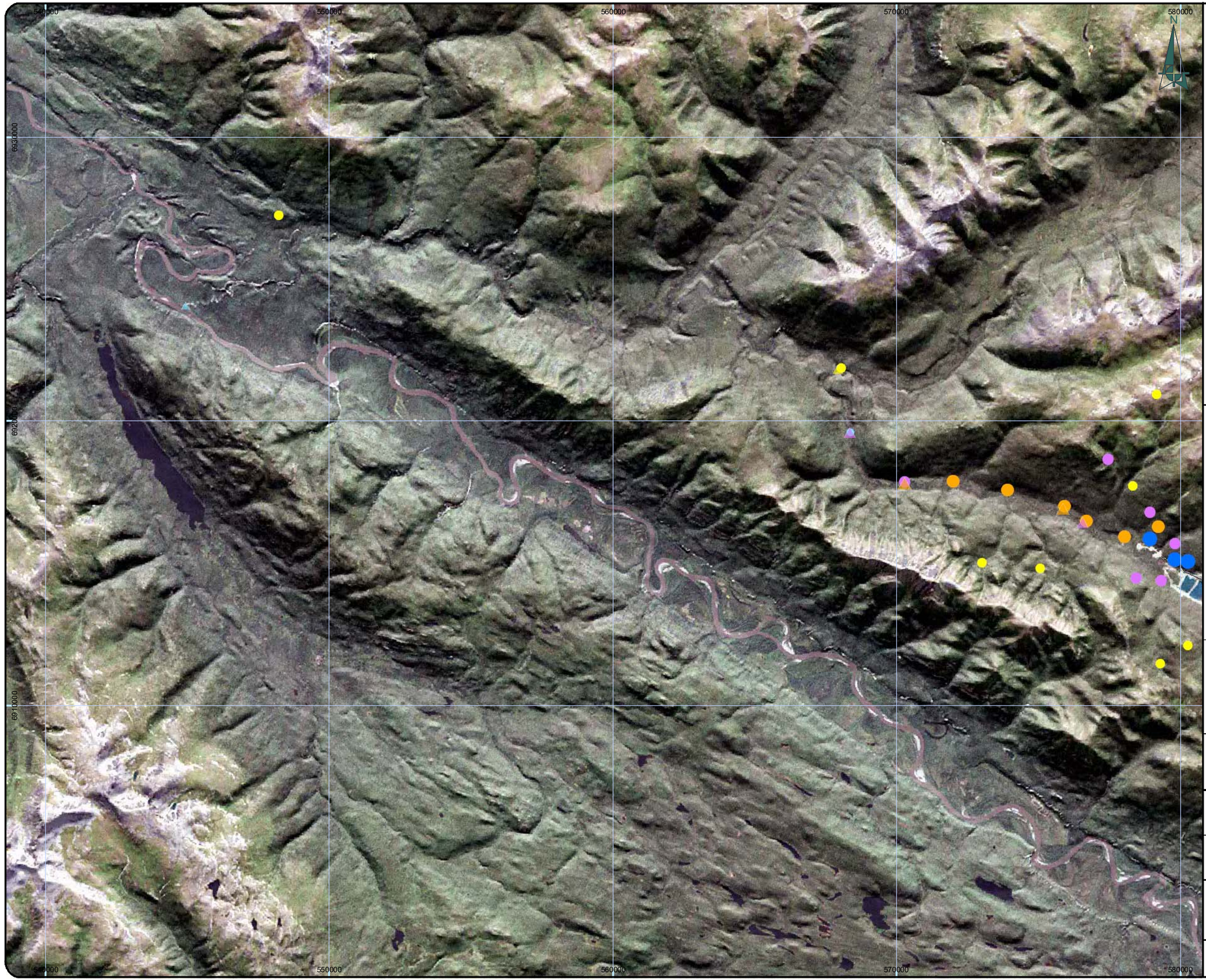
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Zinc Levels in Subsurface Mineral Soil

Gartner Lee | C.E. JONES & Associates Ltd.

Figure No. 31



LEGEND

Lead Concentration (ppm)

Rose Creek Floodplain Sites

- < 18
- 19 - 274
- 275 - 705
- 706 - 1310
- 1311 - 2450
- 2451 - 5930

Side Slope Sites

- < 18
- 19 - 274
- 275 - 705
- 706 - 1310
- 1311 - 2450
- 2451 - 5930
- Road

DATA SOURCES AND DISCLAIMERS:

Sample Site Locations determined by field Global Positioning System (GPS). Locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones & Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_lead_surface_orgainic_soils_11x17_09Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6

Kilometres

Scale 1: 125 000

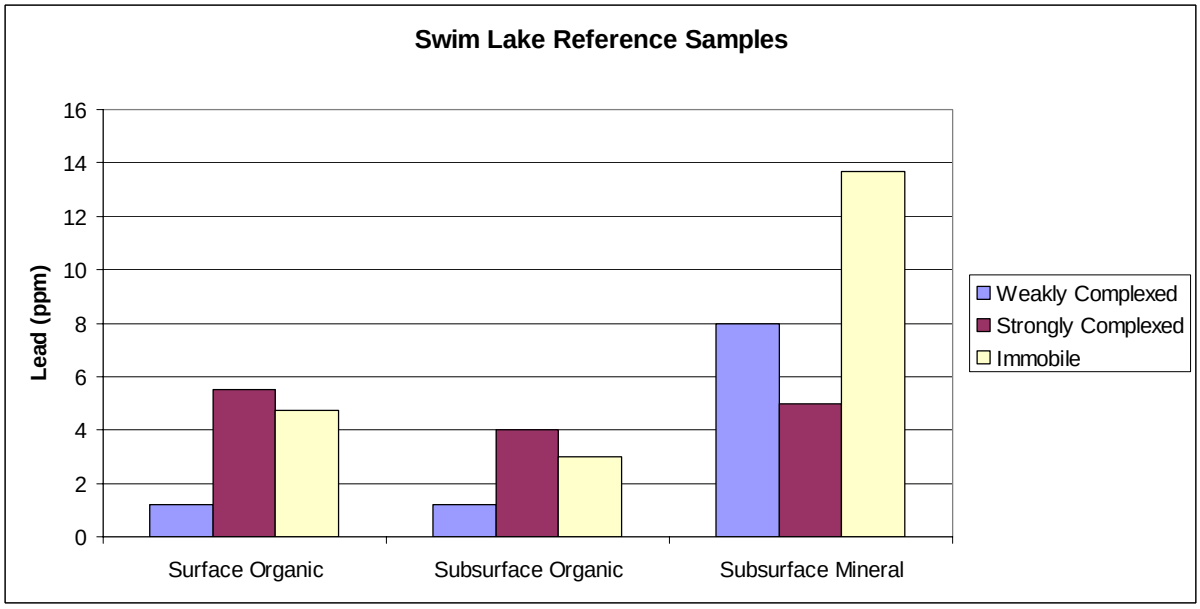
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Lead Levels in Surface Organic Soil in Rose Creek

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 32



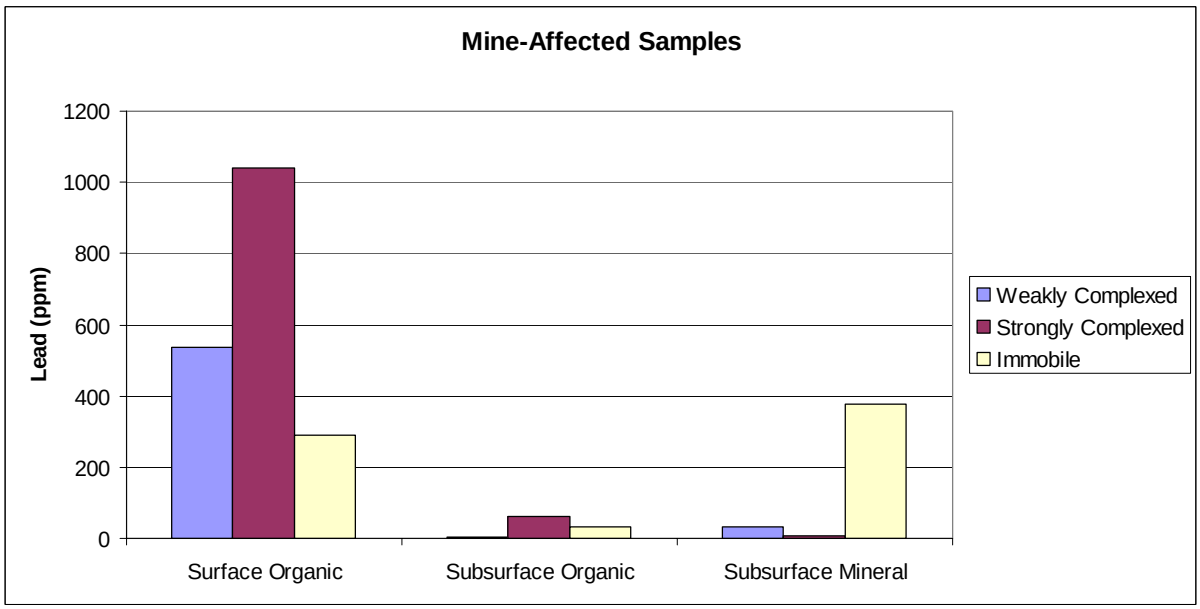
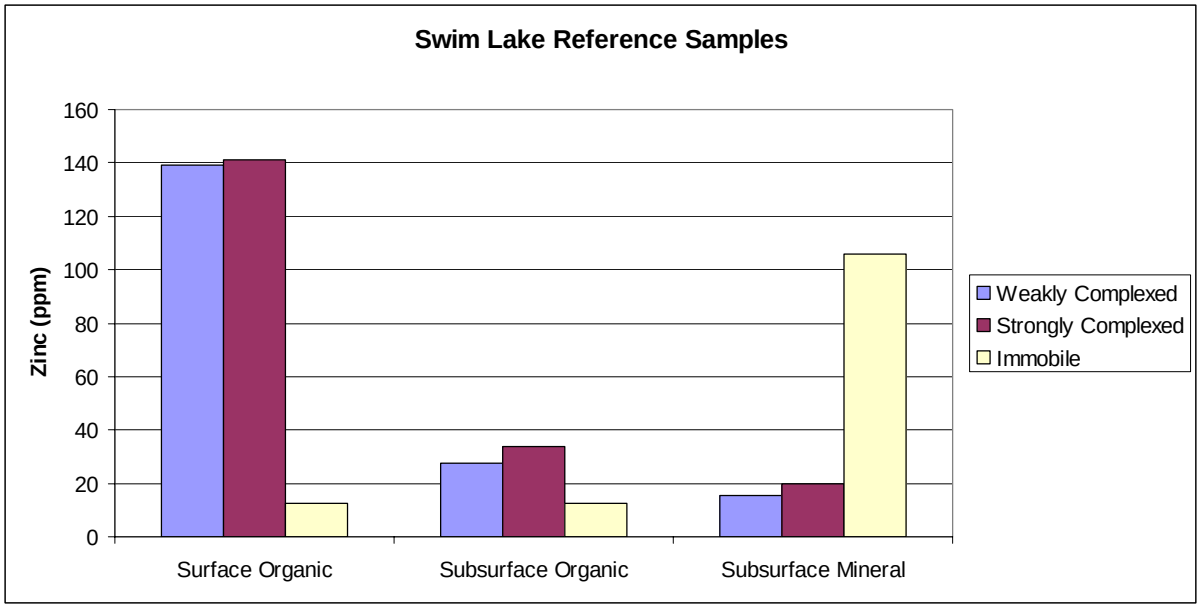


Figure 33. Lead Concentration by Soil Sample Type and Extraction Technique for both Swim Lakes and Mine-Affected Areas



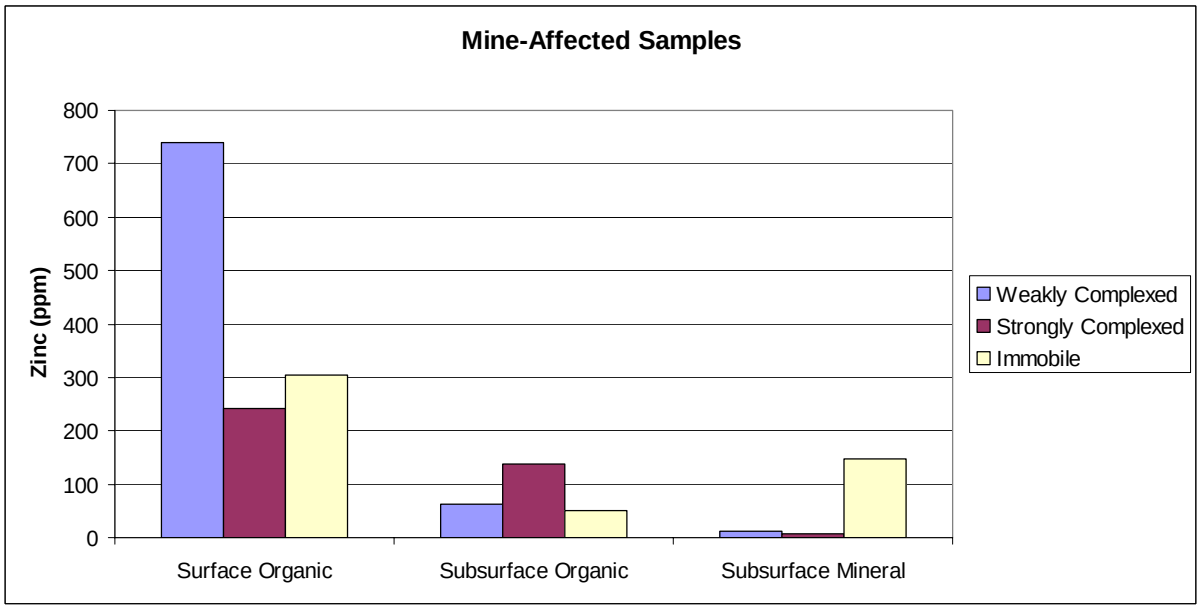
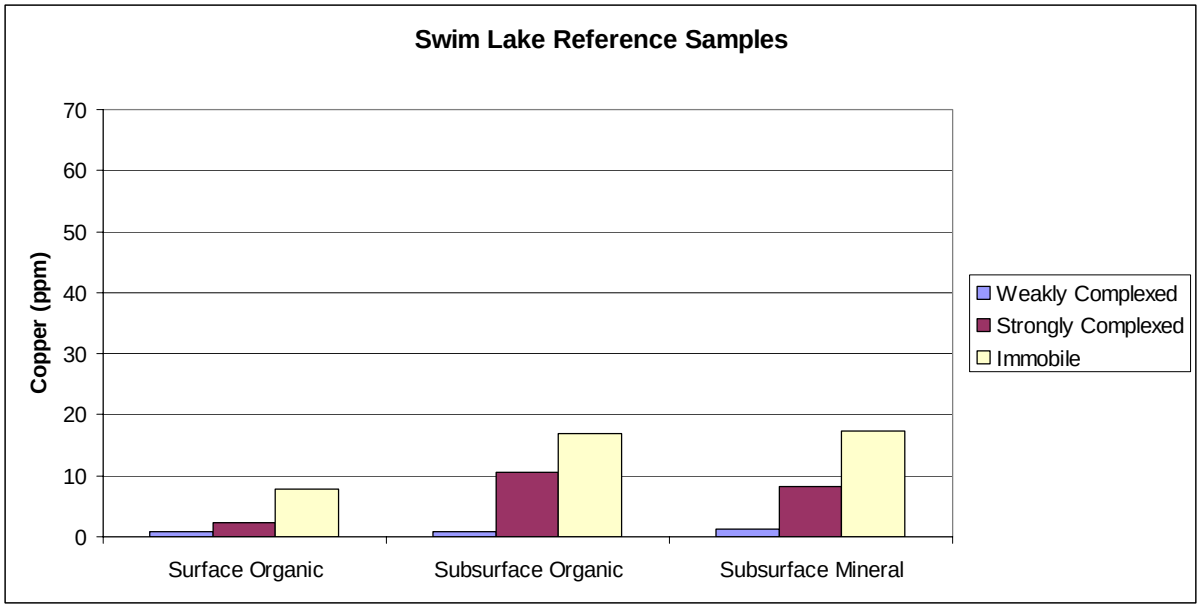


Figure 34. Zinc Concentration by Soil Sample Type and Extraction Technique for both Swim Lakes and Mine-Affected Areas



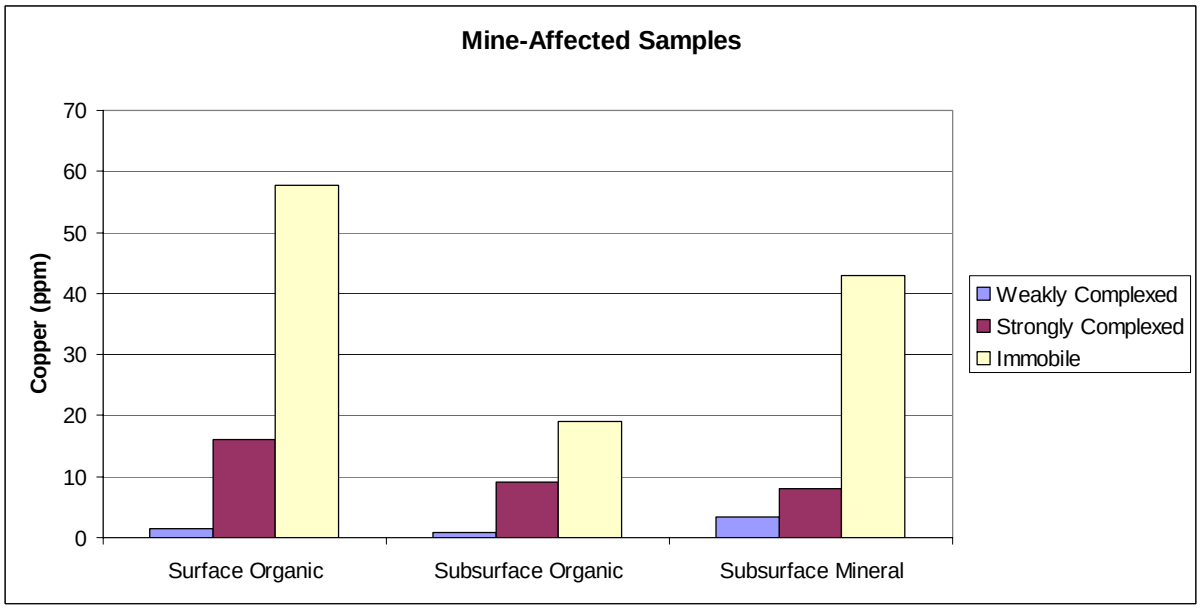
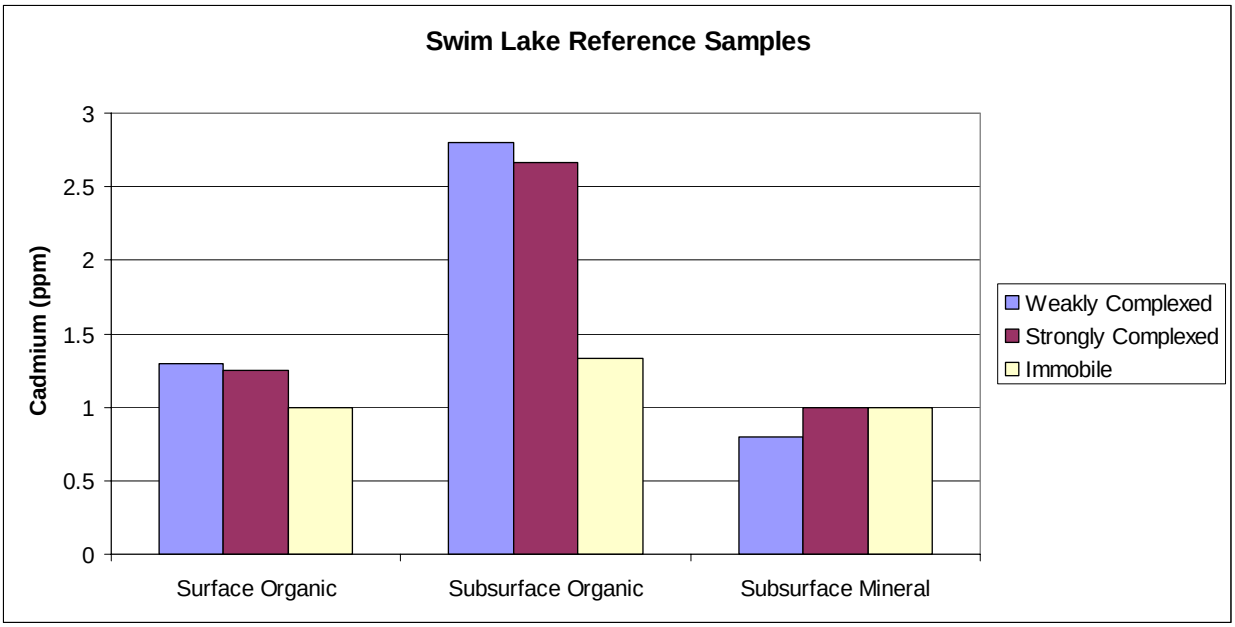


Figure 35. Copper Concentration by Soil Sample Type and Extraction Technique for both Swim Lakes and Mine-Affected Areas



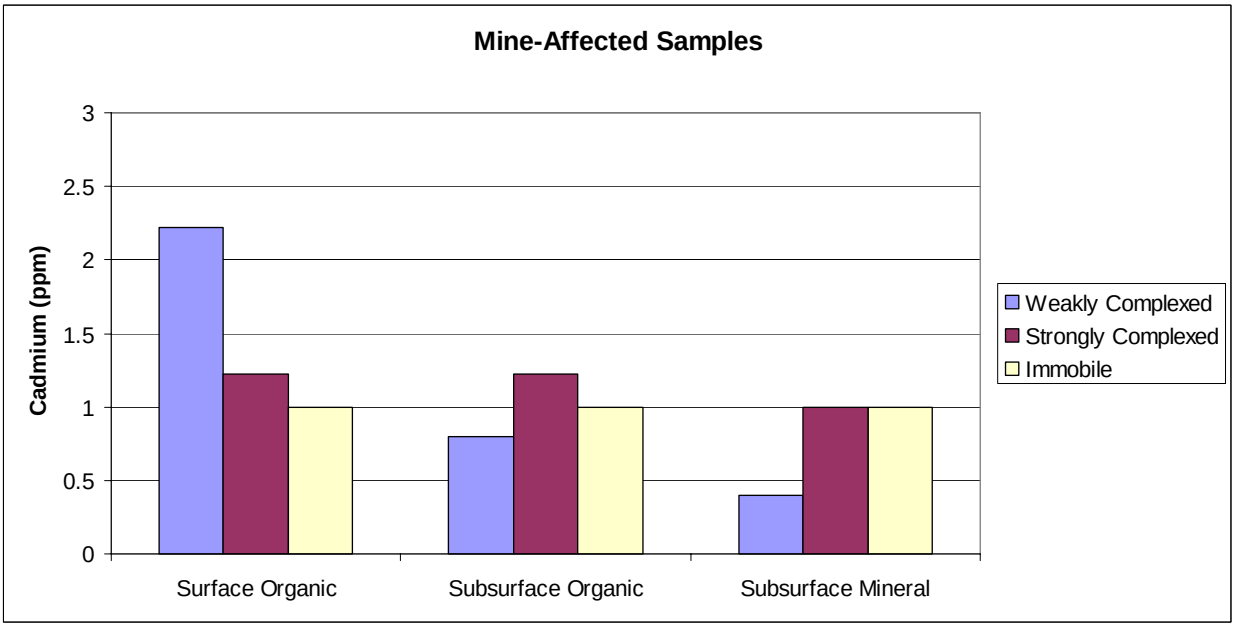
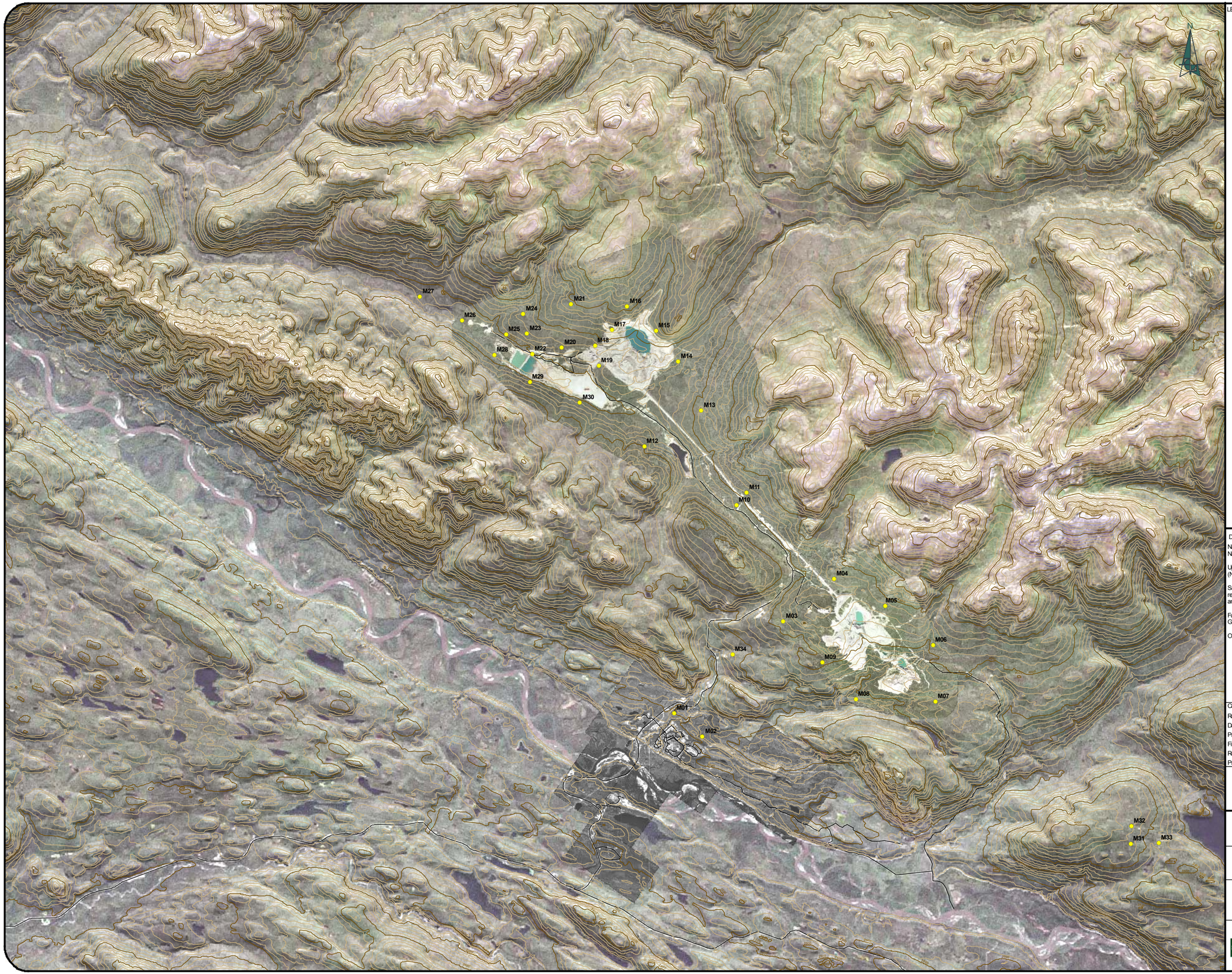


Figure 36. Cadmium Concentration by Soil Sample Type and Extraction Technique for both Swim Lakes and Mine-Affected Areas



LEGEND:

- 2004 Moss Bag Sample Locations
- Roads (Updated Road Network)

DATA SOURCES AND DISCLAIMERS:

National Topographic Data Base (NTDB) contours compiled by Government of Canada, Natural Resources Canada (NRCan), at 1:50 000 scale.

Updated road network complied by Government of Canada, Natural Resources Canada (NRCan) at 5m accuracy.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones and Associates Ltd.

Fused LandSat7 True Colour Image with 30 metre shaded relief prepared by Government of Yukon, Geomatics Yukon, 2003.

Orthophotos flown August 2003.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_moss_bag_sample_locations_23Mar2005.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

0 0.5 1 2 3 4 5 6 7 kms

Scale 1:125 000
Contour Interval: 100 Feet

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Moss Bag Sampling Locations

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 37

LEGEND:

Relative Lead Levels

- 1 x
- 2 - 10 x
- 11 - 20 x
- 21 - 100 x
- Roads (Updated Road Network)

DATA SOURCES AND DISCLAIMERS:

National Topographic Data Base (NTDB) contours compiled by Government of Canada, Natural Resources Canada (NRCan), at 1:50 000 scale.

Updated road network complied by Government of Canada, Natural Resources Canada (NRCan) at 5m accuracy.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones and Associates Ltd.

Fused LandSat7 True Colour Image with 30 metre shaded relief prepared by Government of Yukon, Geomatics Yukon, 2003.

Orthophotos flown August 2003.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_lead_levels_moss_bag_fall_23Mar2005.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

0 0.5 1 2 3 4 5 6 7 kms

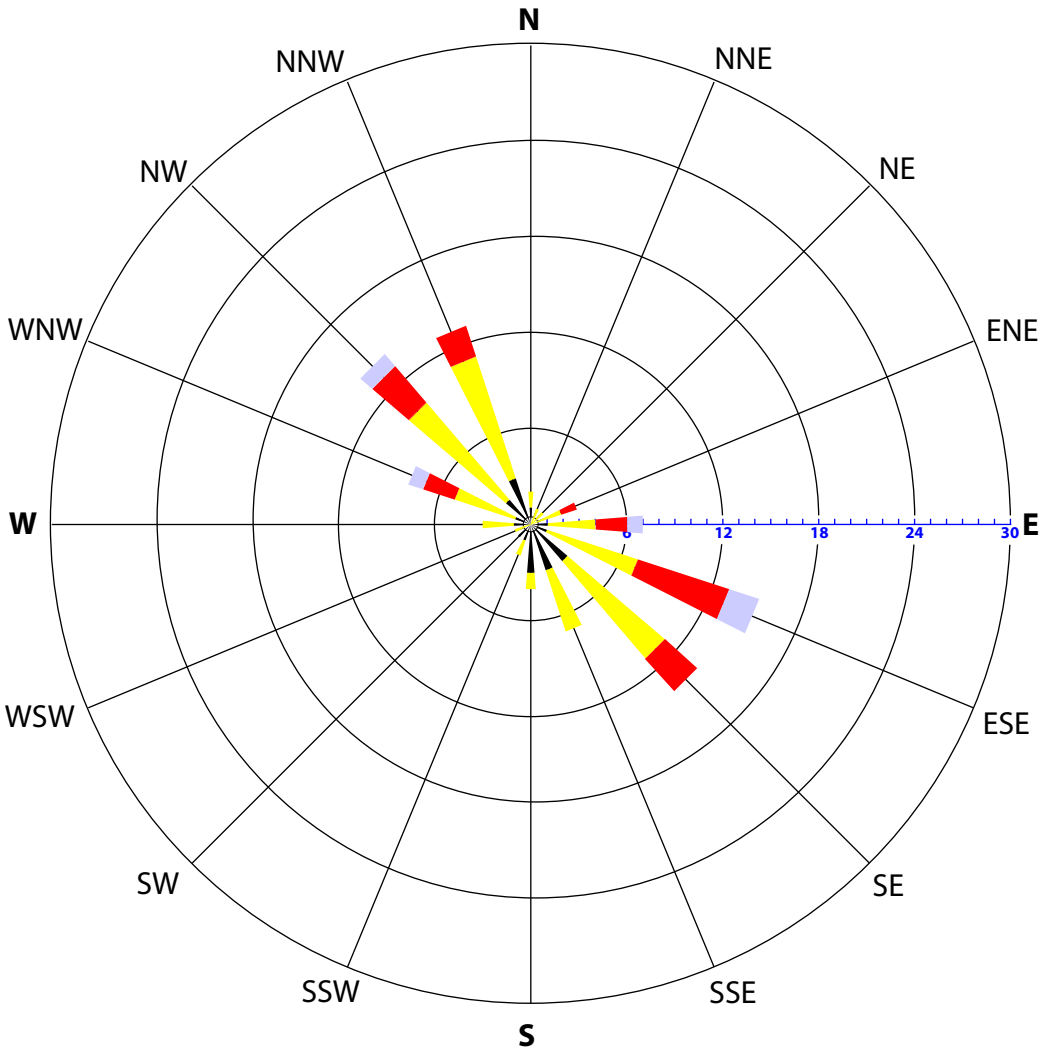
Scale 1:125 000
Contour Interval: 100 Feet

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Lead Levels in Moss Bags During Fall

Gartner Lee | C.E. Jones & Associates Ltd. | Figure No. 38



Wind Speeds (m/s)

- 6 -7.5
- 4.5 - 6
- 3 - 4.5
- 1.5 - 3
- < 1.5

0 6 12 18 24 30

% of occurences
(# of absolute hours)

Gartner Lee

Windrose - Vangorda/Grum Weather Station

August 18, 2004 - November 1, 2004

FIGURE
39

Project 40-569
(2005\40569\2005\Final\Images\Wind01.ai)

LEGEND:

Relative Lead Levels

- 1 x
- 2 - 10 x
- 11 - 20 x
- 21 - 100 x
- Roads (Updated Road Network)

DATA SOURCES AND DISCLAIMERS:

National Topographic Data Base (NTDB) contours compiled by Government of Canada, Natural Resources Canada (NRCan), at 1:50 000 scale.

Updated road network complied by Government of Canada, Natural Resources Canada (NRCan) at 5m accuracy.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones and Associates Ltd.

Fused LandSat7 True Colour Image with 30 metre shaded relief prepared by Government of Yukon, Geomatics Yukon, 2003.

Orthophotos flown August 2003.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_lead_levels_moss_bag_fall_early_winter_23Mar2005.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

0 0.5 1 2 3 4 5 6 7 kms

Scale 1:125 000
Contour Interval: 100 Feet

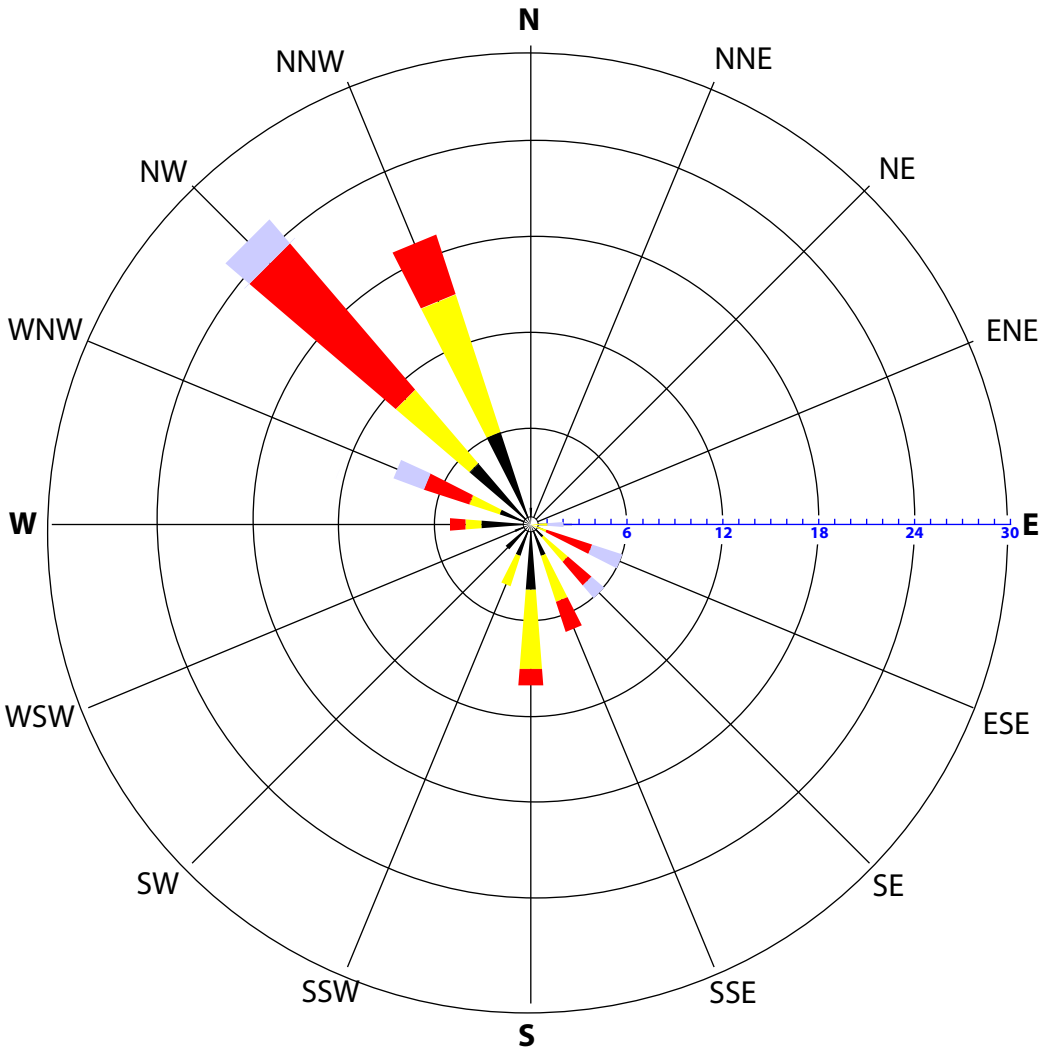
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Lead Levels in Moss Bags During Fall and Early Winter

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 40



Wind Speeds (m/s)

- 6 -7.5
- 4.5 - 6
- 3 - 4.5
- 1.5 - 3
- < 1.5

0 6 12 18 24 30

% of occurences
(# of absolute hours)

Gartner Lee

Windrose - Vangorda/Grum Weather Station

November 1, 2004 - January 26, 2005

FIGURE
41

Project 40-569
(2005\40569\2005\Final\Images\Wind01.ai)

LEGEND:

Relative Zinc Levels

- 1 x
- 2 - 10 x
- Roads (Updated Road Network)

DATA SOURCES AND DISCLAIMERS:

National Topographic Data Base (NTDB) contours compiled by Government of Canada, Natural Resources Canada (NRCan), at 1:50 000 scale.

Updated road network complied by Government of Canada, Natural Resources Canada (NRCan) at 5m accuracy.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones and Associates Ltd.

Fused LandSat7 True Colour Image with 30 metre shaded relief prepared by Government of Yukon, Geomatics Yukon, 2003.

Orthophotos flown August 2003.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_zinc_levels_moss_bag_fall_23Mar2005.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

0 0.5 1 2 3 4 5 6 7 kms

Scale 1:125 000
Contour Interval: 100 Feet

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Zinc Levels in Moss Bags During Fall

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 42

LEGEND:

Relative Zinc Levels

- 1 x
- 2 - 10 x
- Roads (Updated Road Network)

DATA SOURCES AND DISCLAIMERS:

National Topographic Data Base (NTDB) contours compiled by Government of Canada, Natural Resources Canada (NRCan), at 1:50 000 scale.

Updated road network complied by Government of Canada, Natural Resources Canada (NRCan) at 5m accuracy.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. and C.E. Jones and Associates Ltd.

Fused LandSat7 True Colour Image with 30 metre shaded relief prepared by Government of Yukon, Geomatics Yukon, 2003.

Orthophotos flown August 2003.

Created By: AS
Reviewed By: MG
Date Issued: March 2005
Project Number: 40569
File Name: 40569_zinc_levels_moss_bag_fall_early_winter_23Mar2005.mxd
Revision: 1
Projection: UTM Zone 8 NAD83

0 0.5 1 2 3 4 5 6 7 kms

Scale 1:125 000
Contour Interval: 100 Feet

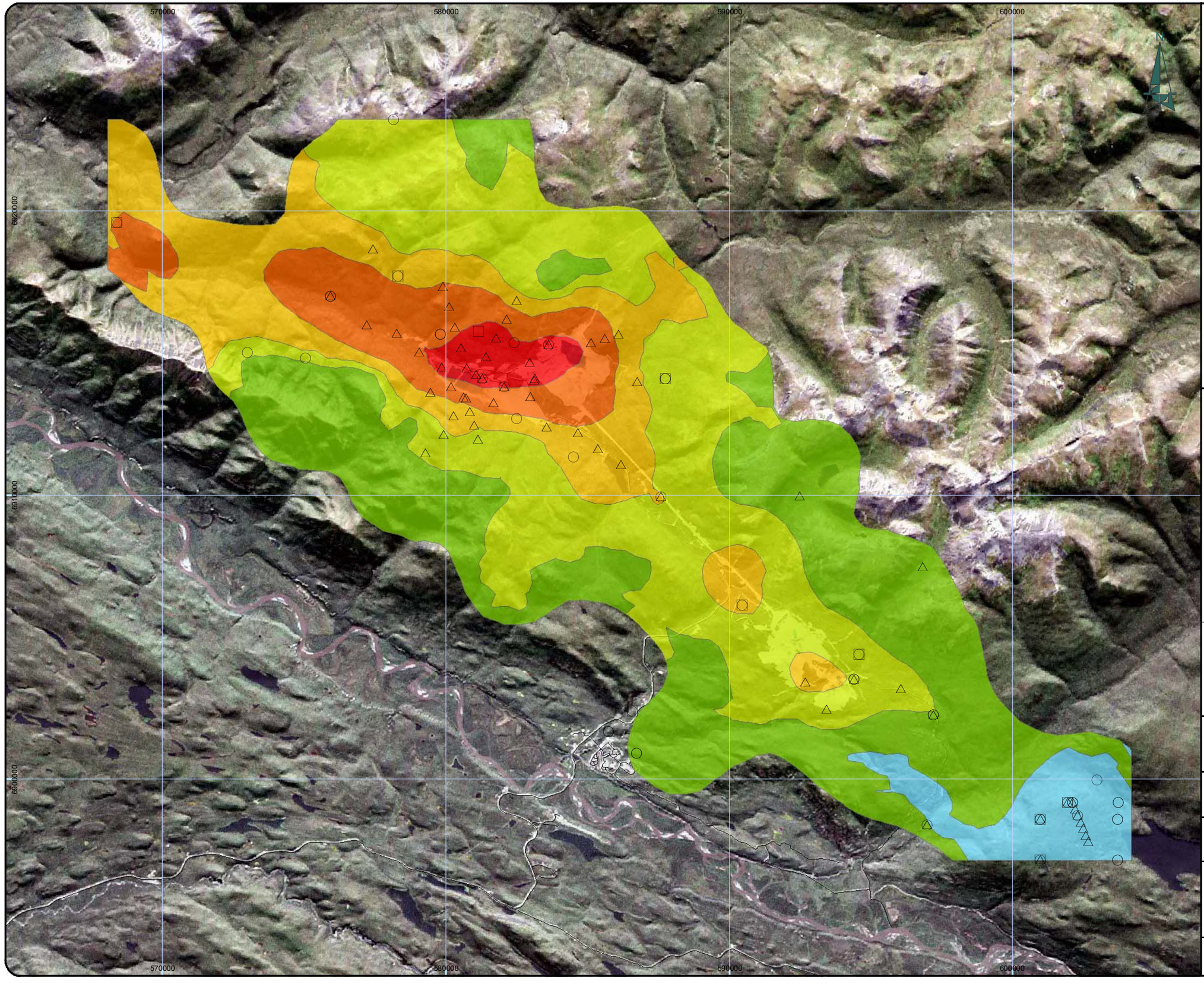
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Zinc Levels in Moss Bags During Fall and Early Winter

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 43



LEGEND

Vegetation Sample Locations

- Berries
- Labrador Tea
- Willows

Lichen Lead Concentration (ppm)

- 0.4 - 1.6
- 1.6 - 7.2
- 7.2 - 23.4
- 23.4 - 74.7
- 74.7 - 236.5
- 236.5 - 747.7
- Road

DATA SOURCES AND DISCLAIMERS:

Vegetation data pooled for analysis by lichen lead concentration as shown on kriging surface.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_berry_tea_willow_distribution_11x17_29Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Berry, Labrador Tea and Willow Samples Collected and Analyzed in 2002 and 2004

Gartner Lee | C.E. JONES & Associates Ltd.

Figure No. 44

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Vegetation Sample Locations

- Forbs
- Grasses
- Horsetails

Lichen Lead Concentration (ppm)

- 0.4 - 1.6
- 1.6 - 7.2
- 7.2 - 23.4
- 23.4 - 74.7
- 74.7 - 236.5
- 236.5 - 747.7
- Road

DATA SOURCES AND DISCLAIMERS:

Vegetation data pooled for analysis by lichen lead concentration as shown on kriging surface.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_forb_grass_horse_distribution_11x17_29Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

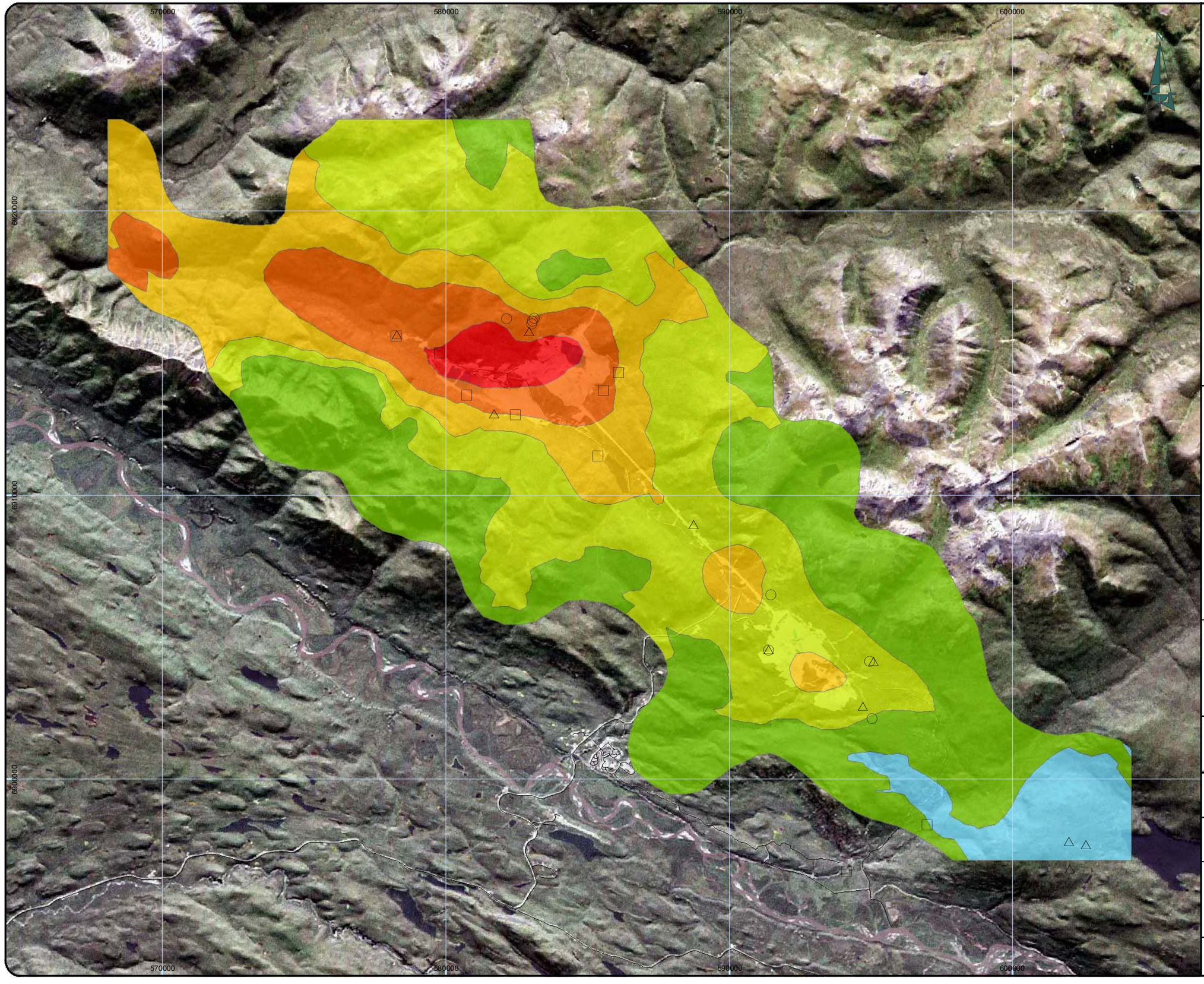
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Forbs, Grasses and Horsetails Samples Collected and Analyzed in 2002 and 2004

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 45



LEGEND

Vegetation Sample Locations

- Mushrooms
- Bear Roots
- Tree Sap

Lichen Lead Concentration (ppm)

- 0.4 - 1.6
- 1.6 - 7.2
- 7.2 - 23.4
- 23.4 - 74.7
- 74.7 - 236.5
- 236.5 - 747.7
- Road

DATA SOURCES AND DISCLAIMERS:

Vegetation data pooled for analysis by lichen lead concentration as shown on kriging surface.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_mushroom_root_sap_distribution_11x17_29Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

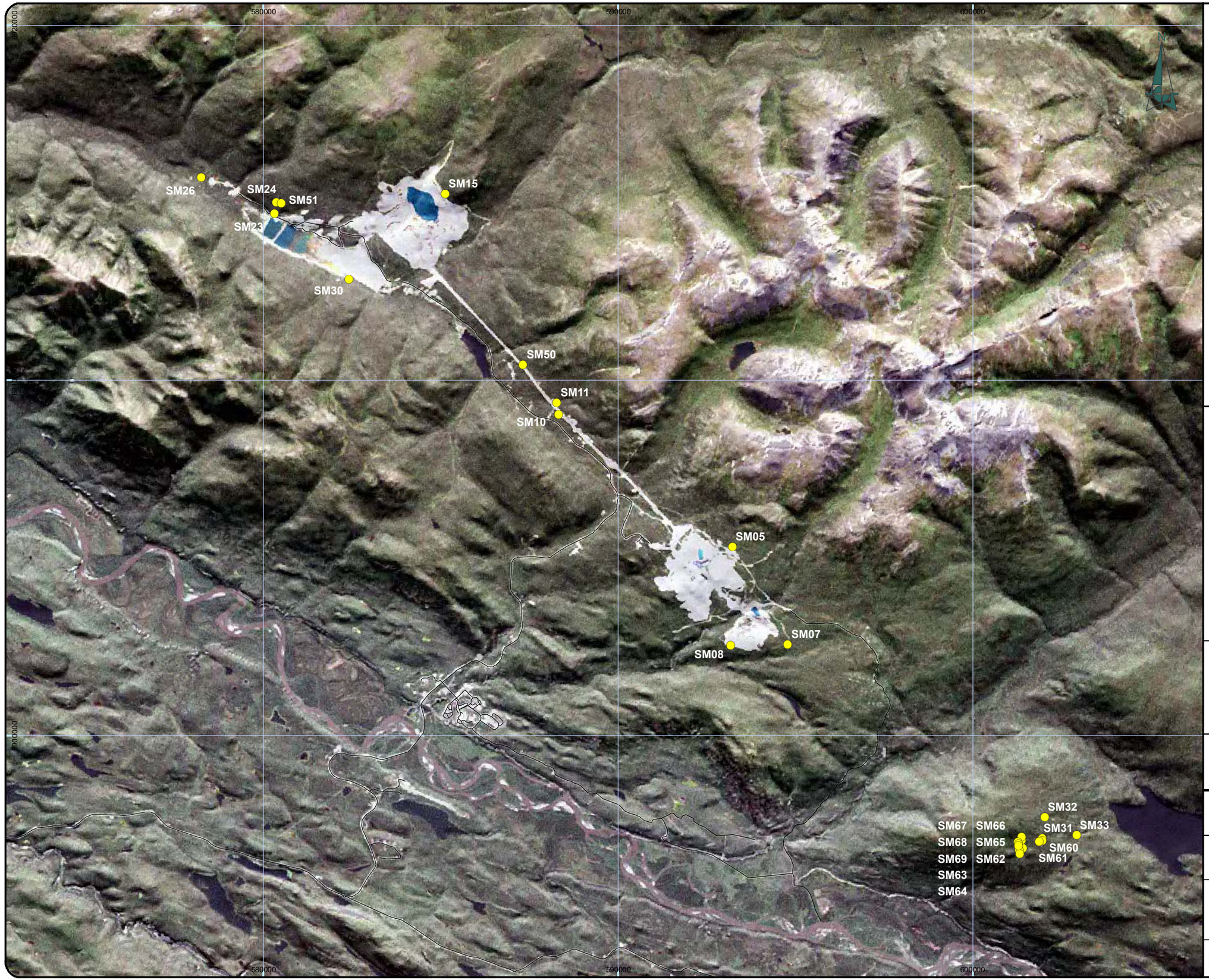
Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Mushrooms, Bear Root and Tree Sap Samples Collected and Analyzed in 2002 and 2004

Gartner Lee | C.E. JONES & Associates Ltd.

Figure No. 46



LEGEND

- Small Mammal Trapping Locations
- Road

DATA SOURCES AND DISCLAIMERS:

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_small_mammal_trap_11x17_25Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5
Kilometres

Scale 1: 100 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Distribution of Small Mammal Trapping Locations

Gartner Lee | C.E. Jones & Associates Ltd.

Figure No. 47

570000
580000
590000
600000
6920000
6910000
6900000

LEGEND

Northern Red-backed Vole Capture Locations

Lichen Lead Concentration (ppm)

- 0.4 - 1.6
- 1.6 - 7.2
- 7.2 - 23.4
- 23.4 - 74.7
- 74.7 - 236.5
- 236.5 - 747.7

Road

DATA SOURCES AND DISCLAIMERS:

Small mammal data pooled for analysis by lichen lead concentration as shown on kriging surface.

Sample site locations determined by field Global Positioning System (GPS) locations recorded in UTM Zone 8, NAD83. All sample locations recorded by Gartner Lee Ltd. And C.E. Jones and Associates Ltd.

Kriging surfaces compiled by Gartner Lee Ltd. Kriging is an interpolation technique based upon a generalized least-squares algorithm using distance-variance relationships as weighting functions. It is used to produce unbiased estimates of concentrations in unsampled areas. The prediction is constrained to one-third of the total prediction standard error.

Updated Road Network compiled by Government of Canada, Natural Resources Canada (NRCan).

Shaded relief colour orthorectified image at 15m resolution compiled by Yukon Territorial Government, Dept. of Infrastructure, Yukon Geomatics, from Landsat 7 image 59-16, bands 3, 2, & 1.

Created By: AS

Reviewed By: MG

Date Issued: March 2005

Project Number: 40569

File Name: 40569_vole_capture_locations_11x17_25Mar2005v2.mxd

Revision: 1

Projection: UTM Zone 8 NAD83

1 0.5 0 1 2 3 4 5 6 7

Kilometres

Scale 1: 125 000

Deloitte.

Project: Anvil Range Project 17a Terrestrial Effects
Location: Faro Mine Site, Yukon
Client: Deloitte & Touche Inc.

Northern Red-backed Vole Capture Locations and Pooling Areas

Gartner Lee | C.E. JONES & Associates Ltd.

Figure No. 48

Appendices

Appendix A

Terrestrial Effects Study Field Forms

Appendix B

Terrestrial Effects Study Geostatistical Analyses

Appendix C

Terrestrial Effects Study Raw Data

Appendix D

Terrestrial Effects Study Summary Tables

Appendix E

Terrestrial Effects Study Laboratory Quality Control / Assurance

Appendix F

Terrestrial Effects Study Statistical Summaries

Appendix G

Terrestrial Effects Study Wildlife Permits

Appendix H

Terrestrial Effects Study Published Community Update

Appendix I

Terrestrial Effects Study Wildlife Poster and Tissue Submission Form

Terrestrial Effects Field Form

Project No.	40569
Date	
Site No.	
UTM Zone	8
UTM E	
UTM N	
Crew	

Soil	Collected
Surface organic (0-2cm of F horizon)	
Subsurface organic (lower F/H horizon)	
Subsurface mineral (B horizon)	

Lichen	Collected

Moss	Deployed (date)	Collected (date)
10 weeks		
20 weeks		
30 weeks		

Photographs	Roll	Number

Comments (including brief habitat description)

Vegetation					
Species	Sample No.	Plant part	Composite / Individual	% cover	Comments

Capture Station Form

Project Name	DTE Study	Project Number	40569		
Prebait Used		Bait Type			
Transect No.		Transect Bearing		Transect Length	
UTM Start		UTM End		Distance Between Stations	15m

Capture Station No		UTM E	UTM N		Set Date	Set Time	Pull Date	Pull Time		Snap Traps	Pit Falls	Comments	
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												

Small Mammal Capture Form

Project Name DTE Study
Project Number 40569

Capture Station No.	Trap No.	Trap Type	Species Group	BM (g)	H&B (mm)	Tail (mm)	TL (mm)	HF (mm)	Ear (mm)	Pelage desc. (colour / pattern)	Tail desc. (bicoloured / hairy)	Species	Sex	Age Class	Teeth	Habitat desc.	Photos

1. Geostatistical Methods

1.1 General Approach

Lichen samples were analyzed for Aluminum (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Boron (B), Cadmium (Cd), Calcium (Ca), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (Mg), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Phosphorus (PO4), Potassium (K), Selenium (Se), Silicon (SiO2), Silver (Ag), Sodium (Na), Strontium (Sr), Tellurium (Te), Thallium (Tl), Tin (Sn), Titanium (Ti), Uranium (U), Vanadium (V), Zinc (Zn), and Zirconium (Zr). In order to determine which elements contained a significant spatial pattern and may be worth pursuing with additional spatial analysis, a Getis-Ord General "G" statistic was calculated for each lichen data set. Soil and moss bag samples were analyzed for Lead (Pb) and Zinc (Zn) only.

1.2 Data Manipulation

Virtually all of the data sets contained "less than" values. There are a number of statistical methods for handling "less than" values in environmental samples. Graphical methods (Travis and Land, 1990), maximum likelihood estimation methods (Helsel, 1990), and mean and variance adjustment methods have all been used. However, most of these methods are for estimating the mean or other central tendency statistic for a data set. More sophisticated methods like Cohen's or Winsor's also produce estimates of means.

The purpose here was to examine spatial distribution. "Less than" values were simply substituted with a value of half of the detection limit. In some cases, there were different detection limits for the 2002 and 2004 data. In those cases, the lower detection limit was substituted and the higher detection limit results were deleted.

1.3 Statistical Approach

All the lichen, moss bag and soils data were represented as points. The technique used to determine the spatial pattern of the results and their significance was the Getis-Ord G-statistic (a test of spatial clustering, or "hot spot" analysis. The Getis-Ord statistic and corresponding z value were used to determine if the spatial pattern was significantly different from random. When spatial patterns were observed to significantly different from random, data were then Kriged to produce a spatial surface of the data.

1.3.1 The Getis-Ord General "G" statistic

This statistic makes it possible to assess the spatial association of a variable within a particular distance of each observation. The general *G* statistics may detect local clusters that exist despite negative tests for global spatial autocorrelation.

$$G_{i,t}^{*} = \frac{\sum_{j} w_{ij,t} v_{j,t} - W_{i,t}^{*} \bar{v}_{t}}{s_{t} \sqrt{\frac{(n_{t} S_{1i,t}^{*}) - W_{i,t}^{*2}}{n_{t} - 1}}}$$

Where

$\bar{v}_{t}$	sample mean
$W_{i,t}^{*}$	sum of the weights
s_{t}	sample standard deviation
n_{t}	number of objects in the geography at time t
$S_{1i,t}^{*} = \sum_{j} w_{ij,t}^{2}$	the sum of the squared weights

A high General G value indicates that high values are clustered within the study area; a low General G value indicates that low values tend to cluster.

Also calculated is the "z score". The z score represents the statistical significance of the index value for the concept of spatial relationships specified (fixed distance, inverse distance, and so on). It, in effect, indicates whether the apparent similarity (or dissimilarity) in values between the feature and its neighbors is greater than one would expect simply by chance.

For this analysis, a Euclidean distance between the points was specified, with an inverse distance relationship defining how the points interacted.

1.3.2 Kriging

Kriging technique breaks down the variance in a data set into three components: a general spatial trend, a spatially dependent component, and a stochastic or random component. The technique involves looking at how different sample results are as a function of distance (called a Semivariogram). One then selects a numerical model that describes the spatial component of the variance, and uses that along with the measured points to produce an interpolated surface of values.

In addition to producing a surface of predicted concentrations (from which contours can be calculated), the Kriging analysis produces a surface of prediction standard errors. We use the prediction standard error surface to constrain the predicted surface so that contour lines are only produced in areas where there is reasonable confidence in the surface.

2. Geostatistical Results

2.1 Getis-Ord

2.1.1 Lichen

A full set of summary statistics for each element in lichen is presented in Section 3, including the details of the G statistic calculations. Table 1 contains a summary of the results of the Getis-Ord statistical analysis.

Table 1. Summary of the Significance of Spatial Clusters for Elements in Lichen

Significant Cluster of High Values (P<0.01)	Significant Cluster of High Values (P<0.05)	Significant Cluster of High Values (P<0.1)	Random Spatial Distribution
Antimony Sb	Boron B		Aluminum Al
Arsenic As			Beryllium Be
Barium Ba			Calcium Ca
Cadmium Cd			Magnesium Mg
Chromium Cr			Manganese Mn
Cobalt Co			Phosphorus PO4
Copper Cu			Potassium K
Iron Fe			Silicon SiO2
Lead Pb			Sodium Na
Mercury Hg			Tellurium Te
Molybdenum Mo			Tin Sn

Nickel Ni			Uranium U
Selenium Se			
Silver Ag			
Thallium Tl			
Titanium Ti			
Vanadium V			
Zinc Zn			

The Getis-Ord G statistic for lead in lichen was 0.0004, with a z score of 16.95. This indicates highly significant clustering of elevated lead values. There was a highly significant spatial pattern of zinc in lichens. The Getis-Ord G statistic for this data set was 0.0003 with a Z score of 15.104, indicating that there was significant clustering of high values, and the z score indicates that the clustering that does occur is highly significantly different from that which would be expected by chance.

2.1.2 Soil

Table 2. Summary of the Significance of Spatial Clusters for Lead and Zinc in Soils

	Significant Cluster of High Values (P<0.01)	**Random Spatial Distribution**
Surface Organic	Lead (Pb) and Zinc (Zn)	
Subsurface Organic		Lead (Pb) and Zinc (Zn)
Subsurface Mineral		Lead (Pb) and Zinc (Zn)

2.1.3 Moss Bags

Table 3. Summary of the Significance of Spatial Clusters for Lead and Zinc in Moss Bags

	Significant Cluster of High Values (P<0.01)	**Random Spatial Distribution**
Moss Bags	Lead (Pb)	Zinc (Zn

The Getis-Ord G statistic for lead in moss bags data set was 1.6771 with a Z score of 5.823, indicating that the high values clustered and that there was a high probability (P<0.01) that the clustering was not random. The pattern of zinc exposure is not significantly different from a random spatial distribution. The Getis-Ord G statistic for this data set was 0.0002 with a Z score

of 1.504, indicating that there was no significant clustering of high values, and the z score indicates that the clustering that does occur is not significantly different from that which would be expected by chance.

2.2 Kriging

Kriging surface were created for all elements exhibiting a pattern of distribution highly significantly different from that which would be expected by chance:

- Lichen – all elements listed as showing a significant cluster of high values listed in Table 1; and
- Soils – lead and zinc in surface organic soils;

The exception was lead in moss bags; the distribution of moss bag locations was not conducive to the creation of a Kriging surface.

3. References

Helsel, D.R., 1990:

Less than obvious: Statistical treatment of data below the detection limit. Environ. Sci. Technol. 24(12): 1766-1774.

Travis, C.C. and M.L. Land, 1990:

Estimating the mean of data sets with nondetectable values. Environ. Sci. Technol. 24(9): 961-962.

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
4	4_lichen	Lichen	Cladina spp.	2004	ug/g	259	0.1	1.4	28.9	< 0.02	< 2
5	5_lichen	Lichen	Cladina spp.	2004	ug/g	154	< 0.1	0.6	19.8	< 0.02	< 2
6	6_lichen	Lichen	Cladina spp.	2004	ug/g	254	0.1	1	29.6	< 0.02	< 2
7	7_lichen	Lichen	Cladina spp.	2004	ug/g	141	< 0.1	0.5	16.4	< 0.02	< 2
8	8_lichen	Lichen	Cladina spp.	2004	ug/g	202	< 0.1	0.6	16	< 0.02	< 2
9	9_lichen	Lichen	Cladina spp.	2004	ug/g	206	< 0.1	0.6	20.5	< 0.02	< 2
10	10_lichen	Lichen	Cladina spp.	2004	ug/g	184	< 0.1	0.5	22	< 0.02	< 2
11	11_lichen	Lichen	Cladina spp.	2004	ug/g	178	< 0.1	0.6	19.6	< 0.02	< 2
13	13_lichen	Lichen	Cladina spp.	2004	ug/g	54	< 0.1	< 0.1	31.4	< 0.02	3
15	15_lichen	Lichen	Cladina spp.	2004	ug/g	49	< 0.1	< 0.1	12.9	< 0.02	< 2
20	20_lichen	Lichen	Cladina spp.	2004	ug/g	40.7	< 0.1	0.1	10.8	< 0.02	< 2
21	21_lichen	Lichen	Cladina spp.	2004	ug/g	50.6	< 0.1	0.1	16.2	0.02	2
22	22_lichen	Lichen	Cladina spp.	2004	ug/g	63.1	< 0.1	< 0.1	37.3	< 0.02	< 2
23	23_lichen	Lichen	Cladina spp.	2004	ug/g	37.5	< 0.1	< 0.1	14	< 0.02	< 2
24	24_lichen	Lichen	Cladina spp.	2004	ug/g	59.2	< 0.1	< 0.1	13.9	< 0.02	< 2
25a	25a_lichen	Lichen	Cladina spp.	2004	ug/g	50.8	< 0.1	0.1	22.2	< 0.02	< 2
25b	25b_lichen	Lichen	Cladina spp.	2004	ug/g	77.8	< 0.1	0.2	12.9	< 0.02	< 2
26b	26b_lichen	Lichen	Cladina spp.	2004	ug/g	79.8	< 0.1	0.2	12.1	< 0.02	< 2
27a	27a_lichen	Lichen	Cladina spp.	2004	ug/g	37.3	< 0.1	< 0.1	11.8	< 0.02	< 2
27b	27b_lichen	Lichen	Cladina spp.	2004	ug/g	68.3	< 0.1	0.3	17.1	< 0.02	< 2
28b	28b_lichen	Lichen	Cladina spp.	2004	ug/g	55.4	< 0.1	0.3	18.7	< 0.02	< 2
29a	29a_lichen	Lichen	Cladina spp.	2004	ug/g	41.9	< 0.1	< 0.1	18.7	< 0.02	< 2
29b	29b_lichen	Lichen	Cladina spp.	2004	ug/g	87.1	< 0.1	0.6	46.3	< 0.02	< 2
31	31_lichen	Lichen	Cladina spp.	2004	ug/g	51.9	< 0.1	< 0.1	6.7	< 0.02	< 2
35	35_lichen	Lichen	Cladina spp.	2004	ug/g	37	< 0.1	0.4	84.7	< 0.02	< 2
36	36_lichen	Lichen	Cladina spp.	2004	ug/g	48.2	< 0.1	0.6	70.3	< 0.02	< 2
38	38_lichen	Lichen	Cladina spp.	2004	ug/g	83.7	0.1	0.8	50.7	< 0.02	< 2

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
39	39_lichen	Lichen	Cladina spp.	2004	ug/g	101	0.2	0.9	73.6	< 0.02	2
40	40_lichen	Lichen	Cladina spp.	2004	ug/g	68.1	< 0.1	0.6	41.4	< 0.02	< 2
41	41_lichen	Lichen	Cladina spp.	2004	ug/g	70.2	0.1	0.8	79.3	< 0.02	< 2
43	43_lichen	Lichen	Cladina spp.	2004	ug/g	106	0.2	1.6	87.8	< 0.02	< 2
45	45_lichen	Lichen	Cladina spp.	2004	ug/g	99.8	0.3	2.3	150	< 0.02	< 2
46	46_lichen	Lichen	Cladina spp.	2004	ug/g	120	0.3	2.3	131	< 0.02	2
47	47_lichen	Lichen	Cladina spp.	2004	ug/g	99.2	0.2	2.2	142	< 0.02	< 2
48	48_lichen	Lichen	Cladina spp.	2004	ug/g	124	0.3	2.2	177	< 0.02	< 2
49	49_lichen	Lichen	Cladina spp.	2004	ug/g	189	0.7	5.4	300	< 0.02	< 2
50	50_lichen	Lichen	Cladina spp.	2004	ug/g	148	0.7	5.8	299	< 0.02	3
51	51_lichen	Lichen	Cladina spp.	2004	ug/g	75.6	0.2	2.1	136	< 0.02	< 2
52	52_lichen	Lichen	Cladina spp.	2004	ug/g	70.2	0.2	2.5	138	< 0.02	2
53	53_lichen	Lichen	Cladina spp.	2004	ug/g	47.3	< 0.1	0.9	46.9	< 0.02	< 2
54	54_lichen	Lichen	Cladina spp.	2004	ug/g	80.4	0.3	2.6	159	< 0.02	< 2
55	55_lichen	Lichen	Cladina spp.	2004	ug/g	108	0.4	4.1	248	< 0.02	3
56	56_lichen	Lichen	Cladina spp.	2004	ug/g	107	0.6	5	282	< 0.02	< 2
57	57_lichen	Lichen	Cladina spp.	2004	ug/g	146	0.7	4.8	317	< 0.02	< 2
58	58_lichen	Lichen	Cladina spp.	2004	ug/g	132	0.3	1.8	117	< 0.02	< 2
64	64_lichen	Lichen	Cladina spp.	2004	ug/g	106	0.4	1.7	98.5	< 0.02	< 2
65	65_lichen	Lichen	Cladina spp.	2004	ug/g	110	0.1	0.8	39.3	< 0.02	< 2
66	66_lichen	Lichen	Cladina spp.	2004	ug/g	139	< 0.1	0.5	23	< 0.02	< 2
67	67_lichen	Lichen	Cladina spp.	2004	ug/g	96.6	< 0.1	0.3	14.6	< 0.02	< 2
69	69_lichen	Lichen	Cladina spp.	2004	ug/g	216	< 0.1	0.3	29	< 0.02	< 2
70	70_lichen	Lichen	Cladina spp.	2004	ug/g	79	< 0.1	0.2	16.4	< 0.02	< 2
71	71_lichen	Lichen	Cladina spp.	2004	ug/g	96	< 0.1	0.5	18	< 0.02	< 2
72	72_lichen	Lichen	Cladina spp.	2004	ug/g	99.3	0.2	1.5	66.1	< 0.02	< 2
73	73_lichen	Lichen	Cladina spp.	2004	ug/g	93	0.1	0.6	35.8	< 0.02	< 2

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
74	74_lichen	Lichen	Cladina spp.	2004	ug/g	108	< 0.1	0.5	47.2	< 0.02	< 2
76	76_lichen	Lichen	Cladina spp.	2004	ug/g	130	< 0.1	0.3	28.9	< 0.02	< 2
78	78_lichen	Lichen	Cladina spp.	2004	ug/g	170	< 0.1	0.3	13.5	< 0.02	< 2
79	79_lichen	Lichen	Cladina spp.	2004	ug/g	77.9	< 0.1	0.2	25.9	< 0.02	< 2
80	80_lichen	Lichen	Cladina spp.	2004	ug/g	704	< 0.1	0.4	51.3	0.1	< 2
81	81_lichen	Lichen	Cladina spp.	2004	ug/g	94.9	< 0.1	0.2	18.6	< 0.02	< 2
82	82_lichen	Lichen	Cladina spp.	2004	ug/g	84.2	< 0.1	0.7	19.8	< 0.02	< 2
83	83_lichen	Lichen	Cladina spp.	2004	ug/g	57.5	< 0.1	0.2	21.6	< 0.02	< 2
84	84_lichen	Lichen	Cladina spp.	2004	ug/g	81.3	< 0.1	0.3	18.3	< 0.02	< 2
85	85_lichen	Lichen	Cladina spp.	2004	ug/g	54.5	0.1	0.6	25.6	< 0.02	< 2
86	86_lichen	Lichen	Cladina spp.	2004	ug/g	60.7	< 0.1	0.5	30	< 0.02	< 2
87	87_lichen	Lichen	Cladina spp.	2004	ug/g	61.3	< 0.1	0.2	12.2	< 0.02	< 2
88	88_lichen	Lichen	Cladina spp.	2004	ug/g	67.8	< 0.1	0.2	13.6	< 0.02	< 2
89	89_lichen	Lichen	Cladina spp.	2004	ug/g	87.4	< 0.1	0.3	11.3	< 0.02	< 2
91	91_lichen	Lichen	Cladina spp.	2004	ug/g	47.8	< 0.1	< 0.1	8.7	< 0.02	< 2
92	92_lichen	Lichen	Cladina spp.	2004	ug/g	82.5	< 0.1	0.3	11.8	< 0.02	< 2
93	93_lichen	Lichen	Cladina spp.	2004	ug/g	68	< 0.1	0.2	9.5	< 0.02	< 2
94	94_lichen	Lichen	Cladina spp.	2004	ug/g	72.1	< 0.1	0.2	14.7	< 0.02	< 2
96	96_lichen	Lichen	Cladina spp.	2004	ug/g	129	< 0.1	0.2	8.6	< 0.02	< 2
100	100_lichen	Lichen	Cladina spp.	2004	ug/g	62	< 0.1	0.4	23.3	< 0.02	< 2
101	101_lichen	Lichen	Cladina spp.	2004	ug/g	54.7	< 0.1	0.3	16.4	< 0.02	< 2
102	102_lichen	Lichen	Cladina spp.	2004	ug/g	60.4	< 0.1	0.2	10.2	< 0.02	< 2
103	103_lichen	Lichen	Cladina spp.	2004	ug/g	52.7	< 0.1	1.9	11	< 0.02	< 2
105	105_lichen	Lichen	Cladina spp.	2004	ug/g	55.6	< 0.1	0.1	5.3	< 0.02	< 2
107	107_lichen	Lichen	Cladina spp.	2004	ug/g	53.2	< 0.1	0.1	8.9	< 0.02	< 2
108	108_lichen	Lichen	Cladina spp.	2004	ug/g	45.5	< 0.1	0.1	70.8	< 0.02	< 2
109	109_lichen	Lichen	Cladina spp.	2004	ug/g	126	< 0.1	0.2	25.2	< 0.02	2

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
112	112_lichen	Lichen	Cladina spp.	2004	ug/g	45.3	< 0.1	0.1	9.1	< 0.02	< 2
113	113_lichen	Lichen	Cladina spp.	2004	ug/g	89.2	< 0.1	0.1	10.1	< 0.02	< 2
114	114_lichen	Lichen	Cladina spp.	2004	ug/g	38.2	< 0.1	0.1	7.9	< 0.02	< 2
115	115_lichen	Lichen	Cladina spp.	2004	ug/g	40.1	< 0.1	0.1	12	< 0.02	< 2
116	116_lichen	Lichen	Cladina spp.	2004	ug/g	63.2	< 0.1	0.2	10.8	< 0.02	< 2
117	117_lichen	Lichen	Cladina spp.	2004	ug/g	50.1	< 0.1	0.2	11.4	< 0.02	< 2
118	118_lichen	Lichen	Cladina spp.	2004	ug/g	39.4	< 0.1	0.1	9.7	< 0.02	< 2
119	119_lichen	Lichen	Cladina spp.	2004	ug/g	29	< 0.1	< 0.1	9.2	< 0.02	< 2
120	120_liche	Lichen	Cladina spp.	2004	ug/g	60.2	< 0.1	0.4	18.8	< 0.02	< 2
122	122_lichen	Lichen	Cladina spp.	2004	ug/g	98.4	< 0.1	0.2	65.6	< 0.02	< 2
123	123_lichen	Lichen	Cladina spp.	2004	ug/g	83.4	< 0.1	0.1	19.3	< 0.02	< 2
124	124_lichen	Lichen	Cladina spp.	2004	ug/g	124	< 0.1	0.1	22.1	< 0.02	< 2
125	125_lichen	Lichen	Cladina spp.	2004	ug/g	115	< 0.1	< 0.1	44.5	< 0.02	< 2
126	126_lichen	Lichen	Cladina spp.	2004	ug/g	62.2	< 0.1	0.2	10.2	< 0.02	< 2
127	127_lichen	Lichen	Cladina spp.	2004	ug/g	91.3	< 0.1	0.3	16.5	< 0.02	< 2
129	129_lichen	Lichen	Cladina spp.	2004	ug/g	74	< 0.1	0.2	23.9	< 0.02	< 2
130	130_lichen	Lichen	Cladina spp.	2004	ug/g	68.7	< 0.1	0.1	8.6	< 0.02	< 2
131	131_lichen	Lichen	Cladina spp.	2004	ug/g	171	< 0.1	0.4	45.2	< 0.02	< 2
132	132_lichen	Lichen	Cladina spp.	2004	ug/g	48.4	< 0.1	0.1	8.1	< 0.02	< 2
133	133_lichen	Lichen	Cladina spp.	2004	ug/g	56.5	< 0.1	0.2	12.9	< 0.02	< 2
134	134_lichen	Lichen	Cladina spp.	2004	ug/g	56.1	< 0.1	0.1	6.9	< 0.02	< 2
135	135_lichen	Lichen	Cladina spp.	2004	ug/g	138	< 0.1	0.2	10.3	< 0.02	< 2
136	136_lichen	Lichen	Cladina spp.	2004	ug/g	97.7	< 0.1	0.2	12.7	< 0.02	< 2
137	137_lichen	Lichen	Cladina spp.	2004	ug/g	131	< 0.1	0.3	25.4	< 0.02	< 2
138	138_lichen	Lichen	Cladina spp.	2004	ug/g	54.3	< 0.1	0.2	9.2	< 0.02	< 2
139	139_lichen	Lichen	Cladina spp.	2004	ug/g	95.4	< 0.1	0.5	26.7	< 0.02	< 2
140	140_lichen	Lichen	Cladina spp.	2004	ug/g	174	< 0.1	0.6	32.3	< 0.02	< 2

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
141	141_lichen	Lichen	Cladina spp.	2004	ug/g	96.1	< 0.1	0.3	16	< 0.02	< 2
142	142_lichen	Lichen	Cladina spp.	2004	ug/g	93.6	< 0.1	0.3	15	< 0.02	< 2
143	143_lichen	Lichen	Cladina spp.	2004	ug/g	140	< 0.1	0.4	17.7	< 0.02	< 2
144	144_lichen	Lichen	Cladina spp.	2004	ug/g	87.1	< 0.1	0.3	12.2	< 0.02	< 2
145	145_lichen	Lichen	Cladina spp.	2004	ug/g	106	< 0.1	0.5	25.4	< 0.02	< 2
146	146_lichen	Lichen	Cladina spp.	2004	ug/g	94.8	< 0.1	0.2	17.9	< 0.02	< 2
147	147_lichen	Lichen	Cladina spp.	2004	ug/g	35.9	< 0.1	0.1	7.6	< 0.02	< 2
148	148_lichen	Lichen	Cladina spp.	2004	ug/g	153	< 0.1	0.3	12.3	< 0.02	< 2
149	149_lichen	Lichen	Cladina spp.	2004	ug/g	59.7	< 0.1	0.2	27.6	< 0.02	< 2
150	150_lichen	Lichen	Cladina spp.	2004	ug/g	34.6	< 0.1	< 0.1	11.6	< 0.02	< 2
151	151_lichen	Lichen	Cladina spp.	2004	ug/g	53.1	< 0.1	< 0.1	18.3	< 0.02	< 2
152	152_lichen	Lichen	Cladina spp.	2004	ug/g	66.4	< 0.1	0.1	17.7	< 0.02	< 2
153	153_lichen	Lichen	Cladina spp.	2004	ug/g	81.8	< 0.1	0.2	14.5	< 0.02	< 2
154	154_lichen	Lichen	Cladina spp.	2004	ug/g	106	< 0.1	0.3	22.9	< 0.02	< 2
155	155_lichen	Lichen	Cladina spp.	2004	ug/g	95.8	< 0.1	0.3	13.8	< 0.02	< 2
156	156_lichen	Lichen	Cladina spp.	2004	ug/g	128	< 0.1	0.5	13.6	< 0.02	< 2
157	157_lichen	Lichen	Cladina spp.	2004	ug/g	90.1	< 0.1	0.3	16.2	< 0.02	< 2
158	158_lichen	Lichen	Cladina spp.	2004	ug/g	143	< 0.1	0.4	15	< 0.02	< 2
159	159_lichen	Lichen	Cladina spp.	2004	ug/g	202	0.1	0.8	50.9	< 0.02	< 2
160	160_lichen	Lichen	Cladina spp.	2004	ug/g	128	< 0.1	0.9	44.4	< 0.02	< 2
161	161_lichen	Lichen	Cladina spp.	2004	ug/g	54	< 0.1	0.4	31.8	< 0.02	< 2
162	162_lichen	Lichen	Cladina spp.	2004	ug/g	38.3	< 0.1	< 0.1	7.3	< 0.02	< 2
164	164_lichen	Lichen	Cladina spp.	2004	ug/g	127	< 0.1	0.2	43.3	< 0.02	< 2
200	200_lichen	Lichen	Cladina spp.	2004	ug/g	241	< 0.1	0.3	49.3	< 0.02	< 2
1-1	1-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	1	-	-	-
1-2	1-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
1-3	1-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
2-1	2-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	3	-	-	-
2-2	2-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	1	-	-	-
2-4	2-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
3-1	3-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	24	-	-	-
3-2	3-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	8	-	-	-
3-4	3-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	5	-	-	-
4-2	4-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	9	-	-	-
4-3	4-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	3	-	-	-
4-4	4-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	1	-	-	-
4-5	4-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
5-2	5-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	4	-	-	-
5-3	5-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	2	-	-	-
5-4	5-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
5-5	5-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
6-2	6-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	1	-	-	-
6-3	6-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
7-4	7-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
8-1	8-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
8-2	8-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
8-3	8-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
8-4	8-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
FARO-1	FARO-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	6	-	-	-
SW-1	SW-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
SW-2	SW-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
SW-3	SW-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
SW-4	SW-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
SW-5	SW-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-

Table C1. Lichen Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
SW-7	SW-7_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
VAN-10	VAN-10_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	1	-	-	-
VAN-4	VAN-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	2	-	-	-
VAN-5	VAN-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
VAN-8	VAN-8_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
VAN-9	VAN-9_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	2	-	-	-
VB-1	VB-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-
VB-2	VB-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<1	-	-	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
4_lichen	Lichen	Cladina spp.	2004	ug/g	0.14	1110	1.1	0.3	2.9	628	30.6
5_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	917	0.4	0.2	1.7	356	18.9
6_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	1840	1	0.3	2.6	646	24.4
7_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	632	0.3	0.1	1.6	318	17.9
8_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	753	0.7	0.2	1.7	466	12.3
9_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	2420	0.7	0.2	2.1	530	14.4
10_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	963	0.6	0.2	2	430	16.7
11_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	1450	0.5	0.2	2	445	15
13_lichen	Lichen	Cladina spp.	2004	ug/g	0.04	3560	< 0.1	< 0.1	1.3	135	1.4
15_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	1340	< 0.1	< 0.1	1	103	1.1
20_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	894	< 0.1	0.1	0.7	63	0.4
21_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	1850	0.1	< 0.1	1.2	114	1.4
22_lichen	Lichen	Cladina spp.	2004	ug/g	0.27	2220	< 0.1	< 0.1	1.3	114	1.1
23_lichen	Lichen	Cladina spp.	2004	ug/g	0.28	2090	< 0.1	< 0.1	0.9	80	0.6
24_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	1420	< 0.1	< 0.1	1.2	119	1.4
25a_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	2980	< 0.1	< 0.1	1.1	117	1.4
25b_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	425	0.1	< 0.1	2.2	150	11.6
26b_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	591	< 0.1	< 0.1	1	137	15
27a_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	1690	< 0.1	< 0.1	0.8	78	0.8
27b_lichen	Lichen	Cladina spp.	2004	ug/g	0.18	747	0.1	< 0.1	1.3	152	19.2
28b_lichen	Lichen	Cladina spp.	2004	ug/g	0.21	1090	< 0.1	< 0.1	1.2	157	15.3
29a_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	1540	< 0.1	< 0.1	1	81	1.1
29b_lichen	Lichen	Cladina spp.	2004	ug/g	0.23	1780	0.2	0.2	2	300	35.8
31_lichen	Lichen	Cladina spp.	2004	ug/g	0.04	640	< 0.1	< 0.1	0.8	101	1.5
35_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	7490	< 0.1	0.1	1.4	222	26
36_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	3160	< 0.1	0.1	1.7	243	21
38_lichen	Lichen	Cladina spp.	2004	ug/g	0.23	2160	0.1	0.1	3	331	85

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
39_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	2780	0.2	0.2	4.8	434	85.1
40_lichen	Lichen	Cladina spp.	2004	ug/g	0.16	1530	< 0.1	0.2	2.7	258	32.6
41_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	2130	< 0.1	0.2	2.9	301	61.5
43_lichen	Lichen	Cladina spp.	2004	ug/g	0.3	2390	0.2	0.3	5.2	642	88.5
45_lichen	Lichen	Cladina spp.	2004	ug/g	0.31	2010	0.2	0.4	6.2	867	164
46_lichen	Lichen	Cladina spp.	2004	ug/g	0.28	2800	0.3	0.4	6.5	917	154
47_lichen	Lichen	Cladina spp.	2004	ug/g	0.22	1970	0.2	0.4	5.8	833	148
48_lichen	Lichen	Cladina spp.	2004	ug/g	0.34	2340	0.4	0.5	8	954	206
49_lichen	Lichen	Cladina spp.	2004	ug/g	0.45	2580	0.7	0.8	11.9	1630	375
50_lichen	Lichen	Cladina spp.	2004	ug/g	0.52	2950	0.6	0.8	12.9	1670	240
51_lichen	Lichen	Cladina spp.	2004	ug/g	0.32	1920	0.2	0.4	5.4	813	109
52_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	2560	0.2	0.5	5.2	997	93
53_lichen	Lichen	Cladina spp.	2004	ug/g	0.15	2250	< 0.1	0.2	2.3	444	26.4
54_lichen	Lichen	Cladina spp.	2004	ug/g	0.36	2500	0.2	0.4	5.8	877	122
55_lichen	Lichen	Cladina spp.	2004	ug/g	0.48	3920	0.3	0.6	8.9	1190	245
56_lichen	Lichen	Cladina spp.	2004	ug/g	0.48	3010	0.4	0.7	11.2	1550	213
57_lichen	Lichen	Cladina spp.	2004	ug/g	0.57	1090	0.5	1	14.4	1950	361
58_lichen	Lichen	Cladina spp.	2004	ug/g	0.35	644	0.3	0.4	7	817	249
64_lichen	Lichen	Cladina spp.	2004	ug/g	0.59	2450	0.5	0.3	8.1	652	150
65_lichen	Lichen	Cladina spp.	2004	ug/g	0.24	539	0.5	0.2	3.8	379	66.8
66_lichen	Lichen	Cladina spp.	2004	ug/g	0.2	563	0.4	0.2	2.9	198	12.9
67_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	642	0.3	0.2	1.6	131	5.8
69_lichen	Lichen	Cladina spp.	2004	ug/g	0.14	863	0.4	0.2	1.4	171	8
70_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	2420	0.3	< 0.1	1.6	184	8.8
71_lichen	Lichen	Cladina spp.	2004	ug/g	0.29	3930	0.4	0.1	1.9	324	11.8
72_lichen	Lichen	Cladina spp.	2004	ug/g	0.38	1230	0.4	0.4	4.1	672	42.5
73_lichen	Lichen	Cladina spp.	2004	ug/g	0.34	3800	0.4	0.2	3.7	363	32.8

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
74_lichen	Lichen	Cladina spp.	2004	ug/g	0.73	3310	0.3	0.1	3	280	22.4
76_lichen	Lichen	Cladina spp.	2004	ug/g	0.5	2050	0.4	0.1	2.1	260	12.5
78_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	932	0.4	0.1	1.7	308	8.3
79_lichen	Lichen	Cladina spp.	2004	ug/g	0.23	3040	0.3	0.1	1.6	172	5.1
80_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	1710	0.8	0.2	2.3	431	5.3
81_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	671	0.4	0.1	1.3	148	9.2
82_lichen	Lichen	Cladina spp.	2004	ug/g	0.3	1250	0.3	0.1	1.8	132	8.5
83_lichen	Lichen	Cladina spp.	2004	ug/g	0.73	2520	0.3	0.1	1.9	144	7.8
84_lichen	Lichen	Cladina spp.	2004	ug/g	0.39	1280	0.3	0.1	1.5	169	10.8
85_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	643	0.3	0.2	2	205	26.5
86_lichen	Lichen	Cladina spp.	2004	ug/g	0.15	513	0.3	0.1	2	237	30.4
87_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	644	0.3	< 0.1	1	130	6.3
88_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	862	0.3	0.1	1	138	3.2
89_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	382	0.4	< 0.1	1.3	199	9.1
91_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	685	0.2	< 0.1	1	90	3
92_lichen	Lichen	Cladina spp.	2004	ug/g	0.14	765	0.4	0.1	1	172	4.3
93_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	643	0.3	< 0.1	1.1	132	2.5
94_lichen	Lichen	Cladina spp.	2004	ug/g	0.18	691	0.3	0.2	1.2	90	2
96_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	1230	0.3	0.2	1.3	138	1.7
100_lichen	Lichen	Cladina spp.	2004	ug/g	0.2	1230	0.3	< 0.1	1.8	182	25.3
101_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	2070	0.3	< 0.1	1.5	143	10.7
102_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	497	0.3	< 0.1	1.2	138	12.3
103_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	660	0.3	0.1	3	117	4.6
105_lichen	Lichen	Cladina spp.	2004	ug/g	0.71	1110	0.3	0.1	1.2	115	1.5
107_lichen	Lichen	Cladina spp.	2004	ug/g	0.17	961	0.3	< 0.1	1	105	1.4
108_lichen	Lichen	Cladina spp.	2004	ug/g	2.52	2300	0.2	< 0.1	1.3	96	1
109_lichen	Lichen	Cladina spp.	2004	ug/g	0.41	2360	0.6	0.2	1.9	143	1.9

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
112_lichen	Lichen	Cladina spp.	2004	ug/g	0.14	1760	0.3	< 0.1	0.9	92	1.1
113_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	936	0.5	< 0.1	0.9	124	1.1
114_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	929	0.2	< 0.1	1.1	73	2
115_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	1470	0.2	< 0.1	1	77	3.3
116_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	770	0.3	< 0.1	1.2	125	7.5
117_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	724	0.2	< 0.1	1	101	14.3
118_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	711	0.1	< 0.1	0.9	72	6.3
119_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	857	0.1	< 0.1	0.9	53	2.5
120_liche	Lichen	Cladina spp.	2004	ug/g	0.11	736	0.2	< 0.1	1.4	158	40.6
122_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	1550	0.4	0.1	2	179	6.6
123_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	988	0.2	0.2	1	123	2.5
124_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	1420	0.5	0.2	1.4	286	2.4
125_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	1410	0.2	0.1	1	93	0.6
126_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	970	0.2	< 0.1	1.1	123	7.7
127_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	409	0.2	< 0.1	1.2	117	18.7
129_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	766	0.3	0.2	0.9	127	2.2
130_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	657	0.3	0.1	1.3	135	3.2
131_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	1320	0.5	0.3	3.6	375	28.8
132_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	588	0.2	< 0.1	1	98	2.3
133_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	1230	0.2	< 0.1	1	99	6.8
134_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	1100	0.2	< 0.1	0.7	102	3.6
135_lichen	Lichen	Cladina spp.	2004	ug/g	0.15	540	0.4	0.1	1.1	151	10.2
136_lichen	Lichen	Cladina spp.	2004	ug/g	0.17	677	0.3	0.1	1.3	153	7.7
137_lichen	Lichen	Cladina spp.	2004	ug/g	0.57	1910	0.5	0.2	2.3	291	8.6
138_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	838	0.2	< 0.1	1	99	5
139_lichen	Lichen	Cladina spp.	2004	ug/g	0.19	440	0.3	0.1	1.6	210	27.7
140_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	2770	0.6	0.2	3.4	431	29.3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
141_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	959	0.3	0.1	1.6	192	8.6
142_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	961	0.3	0.1	1.6	166	6.1
143_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	961	0.4	0.1	1.4	246	14.1
144_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	844	0.3	0.1	1.2	154	4.4
145_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	1020	0.4	0.2	1.4	197	10.6
146_lichen	Lichen	Cladina spp.	2004	ug/g	0.43	686	0.2	< 0.1	1.5	159	7.8
147_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	638	0.3	< 0.1	0.8	64	1.1
148_lichen	Lichen	Cladina spp.	2004	ug/g	0.16	1080	0.3	0.1	1.4	143	4.5
149_lichen	Lichen	Cladina spp.	2004	ug/g	0.27	1810	0.2	0.1	1.2	110	4.3
150_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	986	< 0.1	< 0.1	1	55	1.3
151_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	2240	0.2	< 0.1	1.1	94	1
152_lichen	Lichen	Cladina spp.	2004	ug/g	0.17	1710	0.2	< 0.1	1.3	120	4.4
153_lichen	Lichen	Cladina spp.	2004	ug/g	0.44	2170	0.3	0.1	1.5	153	3.2
154_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	1190	0.3	0.1	1.6	191	8.2
155_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	824	0.3	< 0.1	1.3	175	7.4
156_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	444	0.4	0.1	1.2	224	17.3
157_lichen	Lichen	Cladina spp.	2004	ug/g	0.14	1770	0.4	0.1	1.4	173	17.6
158_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	376	0.3	0.1	1.1	133	11.5
159_lichen	Lichen	Cladina spp.	2004	ug/g	0.26	2470	0.7	0.2	3.8	480	87.6
160_lichen	Lichen	Cladina spp.	2004	ug/g	0.28	953	0.4	0.2	2.8	424	92.3
161_lichen	Lichen	Cladina spp.	2004	ug/g	0.15	1350	0.1	0.1	1.9	195	39
162_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	1370	0.1	< 0.1	0.9	67	1.1
164_lichen	Lichen	Cladina spp.	2004	ug/g	0.47	2590	0.2	0.2	1.9	160	2.8
200_lichen	Lichen	Cladina spp.	2004	ug/g	0.3	3000	0.9	0.2	1.6	483	1
1-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.21	-	0.81	-	5.38		81.3
1-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.05	-	0.59	-	2.03		43.4
1-3_lichen	Lichen	Cladina spp.	2002	ug/g	0.04	-	0.49	-	2.26		16.7

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
2-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.45	-	1.81	-	8.48		145.7
2-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.09	-	0.32	-	1.73		26.6
2-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.05	-	0.58	-	2.34		19.9
3-1_lichen	Lichen	Cladina spp.	2002	ug/g	1.39	-	3.27	-	28.59		412.0
3-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.78	-	1.56	-	14.64		269.4
3-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.51	-	1.22	-	9.43		194.8
4-2_lichen	Lichen	Cladina spp.	2002	ug/g	1.20	-	1.47	-	15.09		432.3
4-3_lichen	Lichen	Cladina spp.	2002	ug/g	0.47	-	0.69	-	7.06		188.0
4-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.22	-	0.56	-	4.06		121.8
4-5_lichen	Lichen	Cladina spp.	2002	ug/g	0.17	-	0.53	-	3.29		99.0
5-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.66	-	2.71	-	35.40		747.7
5-3_lichen	Lichen	Cladina spp.	2002	ug/g	0.56	-	1.53	-	22.01		565.7
5-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.19	-	0.70	-	5.97		120.8
5-5_lichen	Lichen	Cladina spp.	2002	ug/g	0.13	-	0.29	-	2.34		24.7
6-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.70	-	1.78	-	11.12		277.2
6-3_lichen	Lichen	Cladina spp.	2002	ug/g	0.56	-	0.63	-	5.18		59.8
7-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.19	-	4.60	-	5.63		53.7
8-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.18	-	0.67	-	3.62		71.9
8-2_lichen	Lichen	Cladina spp.	2002	ug/g	<0.02	-	0.47	-	2.05		26.3
8-3_lichen	Lichen	Cladina spp.	2002	ug/g	0.03	-	1.64	-	1.74		20.5
8-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.11	-	1.38	-	1.51		24.1
FARO-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.53	-	1.68	-	16.57		411.3
SW-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.13	-	0.22	-	1.04		1.6
SW-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.02	-	0.27	-	0.95		0.7
SW-3_lichen	Lichen	Cladina spp.	2002	ug/g	<0.02	-	0.24	-	0.88		1.5
SW-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.04	-	0.18	-	0.86		1.0
SW-5_lichen	Lichen	Cladina spp.	2002	ug/g	0.03	-	0.21	-	0.98		1.3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
SW-7_lichen	Lichen	Cladina spp.	2002	ug/g	<0.02	-	0.14	-	0.60		1.2
VAN-10_lichen	Lichen	Cladina spp.	2002	ug/g	0.09	-	2.07	-	3.28		37.4
VAN-4_lichen	Lichen	Cladina spp.	2002	ug/g	0.19	-	1.29	-	3.51		29.0
VAN-5_lichen	Lichen	Cladina spp.	2002	ug/g	0.23	-	2.41	-	4.61		37.9
VAN-8_lichen	Lichen	Cladina spp.	2002	ug/g	<0.02	-	0.97	-	2.08		12.2
VAN-9_lichen	Lichen	Cladina spp.	2002	ug/g	0.12	-	3.07	-	4.85		51.3
VB-1_lichen	Lichen	Cladina spp.	2002	ug/g	0.11	-	0.65	-	2.07		10.6
VB-2_lichen	Lichen	Cladina spp.	2002	ug/g	0.06	-	0.35	-	1.73		8.1

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
4_lichen	Lichen	Cladina spp.	2004	ug/g	409	95.8	0.027	< 0.1	1.1	1270
5_lichen	Lichen	Cladina spp.	2004	ug/g	344	128	0.023	< 0.1	0.6	1210
6_lichen	Lichen	Cladina spp.	2004	ug/g	481	64.7	0.036	< 0.1	1	1400
7_lichen	Lichen	Cladina spp.	2004	ug/g	257	64.1	0.019	< 0.1	0.5	1210
8_lichen	Lichen	Cladina spp.	2004	ug/g	327	48.6	0.019	< 0.1	0.9	1280
9_lichen	Lichen	Cladina spp.	2004	ug/g	306	38.6	0.027	< 0.1	0.7	1110
10_lichen	Lichen	Cladina spp.	2004	ug/g	383	129	0.015	< 0.1	0.8	1300
11_lichen	Lichen	Cladina spp.	2004	ug/g	290	32.1	0.025	< 0.1	0.6	1180
13_lichen	Lichen	Cladina spp.	2004	ug/g	373	38.5	0.072	0.4	0.2	1880
15_lichen	Lichen	Cladina spp.	2004	ug/g	349	233	0.02	< 0.1	0.3	1200
20_lichen	Lichen	Cladina spp.	2004	ug/g	252	97.6	0.014	< 0.1	0.3	1220
21_lichen	Lichen	Cladina spp.	2004	ug/g	516	90.6	0.016	< 0.1	0.2	1490
22_lichen	Lichen	Cladina spp.	2004	ug/g	409	253	0.051	0.2	0.5	1880
23_lichen	Lichen	Cladina spp.	2004	ug/g	474	92.8	0.012	0.1	0.3	1490
24_lichen	Lichen	Cladina spp.	2004	ug/g	293	73.5	0.01	0.1	0.3	1190
25a_lichen	Lichen	Cladina spp.	2004	ug/g	629	39.8	0.016	< 0.1	0.3	877
25b_lichen	Lichen	Cladina spp.	2004	ug/g	189	32	0.016	< 0.1	1.9	1070
26b_lichen	Lichen	Cladina spp.	2004	ug/g	204	59.3	0.014	< 0.1	0.3	964
27a_lichen	Lichen	Cladina spp.	2004	ug/g	399	13	< 0.01	< 0.1	0.2	1250
27b_lichen	Lichen	Cladina spp.	2004	ug/g	165	28.5	0.011	< 0.1	0.3	1130
28b_lichen	Lichen	Cladina spp.	2004	ug/g	294	20.7	< 0.01	< 0.1	0.3	1440
29a_lichen	Lichen	Cladina spp.	2004	ug/g	211	90.6	< 0.01	< 0.1	0.2	946
29b_lichen	Lichen	Cladina spp.	2004	ug/g	253	26.8	0.023	< 0.1	0.4	1470
31_lichen	Lichen	Cladina spp.	2004	ug/g	182	72.5	0.013	< 0.1	0.2	829
35_lichen	Lichen	Cladina spp.	2004	ug/g	613	26.9	0.021	< 0.1	0.2	1040
36_lichen	Lichen	Cladina spp.	2004	ug/g	337	84.7	0.025	< 0.1	0.4	1810
38_lichen	Lichen	Cladina spp.	2004	ug/g	336	24.5	0.028	< 0.1	0.3	1040

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
39_lichen	Lichen	Cladina spp.	2004	ug/g	462	55.5	0.063	< 0.1	0.5	1500
40_lichen	Lichen	Cladina spp.	2004	ug/g	368	164	0.036	< 0.1	0.4	1310
41_lichen	Lichen	Cladina spp.	2004	ug/g	315	108	0.047	< 0.1	0.7	1490
43_lichen	Lichen	Cladina spp.	2004	ug/g	436	48.2	0.04	< 0.1	0.6	1460
45_lichen	Lichen	Cladina spp.	2004	ug/g	318	38.1	0.049	< 0.1	0.5	1350
46_lichen	Lichen	Cladina spp.	2004	ug/g	498	26.9	0.072	0.2	0.6	1390
47_lichen	Lichen	Cladina spp.	2004	ug/g	429	129	0.058	< 0.1	0.5	2080
48_lichen	Lichen	Cladina spp.	2004	ug/g	523	170	0.068	< 0.1	0.9	1810
49_lichen	Lichen	Cladina spp.	2004	ug/g	428	73.5	0.111	0.1	1	2200
50_lichen	Lichen	Cladina spp.	2004	ug/g	456	49.1	0.122	0.1	0.7	1780
51_lichen	Lichen	Cladina spp.	2004	ug/g	404	43.4	0.031	< 0.1	0.4	1690
52_lichen	Lichen	Cladina spp.	2004	ug/g	349	46.2	0.051	< 0.1	0.4	1620
53_lichen	Lichen	Cladina spp.	2004	ug/g	296	16.8	0.019	< 0.1	0.2	1010
54_lichen	Lichen	Cladina spp.	2004	ug/g	457	37.8	0.074	< 0.1	0.5	1460
55_lichen	Lichen	Cladina spp.	2004	ug/g	526	48.6	0.073	< 0.1	0.6	1690
56_lichen	Lichen	Cladina spp.	2004	ug/g	373	36.7	0.14	0.1	0.6	1420
57_lichen	Lichen	Cladina spp.	2004	ug/g	272	60.4	0.136	0.1	0.7	1740
58_lichen	Lichen	Cladina spp.	2004	ug/g	297	62.4	0.056	< 0.1	0.5	1530
64_lichen	Lichen	Cladina spp.	2004	ug/g	377	28.5	0.04	< 0.1	0.5	1730
65_lichen	Lichen	Cladina spp.	2004	ug/g	178	68.9	0.013	< 0.1	0.5	1720
66_lichen	Lichen	Cladina spp.	2004	ug/g	201	54.8	< 0.01	< 0.1	0.4	2140
67_lichen	Lichen	Cladina spp.	2004	ug/g	218	139	< 0.01	< 0.1	0.3	2250
69_lichen	Lichen	Cladina spp.	2004	ug/g	123	43.8	< 0.01	< 0.1	0.3	1120
70_lichen	Lichen	Cladina spp.	2004	ug/g	265	72.2	< 0.01	< 0.1	0.5	1170
71_lichen	Lichen	Cladina spp.	2004	ug/g	224	17	< 0.01	< 0.1	0.4	1040
72_lichen	Lichen	Cladina spp.	2004	ug/g	229	164	0.019	< 0.1	0.5	1890
73_lichen	Lichen	Cladina spp.	2004	ug/g	272	54.9	0.018	< 0.1	0.4	1710

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
74_lichen	Lichen	Cladina spp.	2004	ug/g	278	68.3	0.019	< 0.1	0.4	1720
76_lichen	Lichen	Cladina spp.	2004	ug/g	289	76.7	0.013	< 0.1	0.5	1470
78_lichen	Lichen	Cladina spp.	2004	ug/g	176	90	< 0.01	< 0.1	0.3	1480
79_lichen	Lichen	Cladina spp.	2004	ug/g	350	39.4	< 0.01	< 0.1	0.5	1570
80_lichen	Lichen	Cladina spp.	2004	ug/g	205	31.4	< 0.01	< 0.1	0.7	1190
81_lichen	Lichen	Cladina spp.	2004	ug/g	136	60.5	< 0.01	< 0.1	0.3	1220
82_lichen	Lichen	Cladina spp.	2004	ug/g	164	94.6	< 0.01	< 0.1	0.3	1340
83_lichen	Lichen	Cladina spp.	2004	ug/g	290	138	< 0.01	< 0.1	0.3	1570
84_lichen	Lichen	Cladina spp.	2004	ug/g	190	35.8	< 0.01	< 0.1	0.3	1300
85_lichen	Lichen	Cladina spp.	2004	ug/g	257	101	< 0.01	< 0.1	0.5	2180
86_lichen	Lichen	Cladina spp.	2004	ug/g	172	63.2	< 0.01	< 0.1	0.4	1960
87_lichen	Lichen	Cladina spp.	2004	ug/g	179	146	< 0.01	< 0.1	0.3	1640
88_lichen	Lichen	Cladina spp.	2004	ug/g	146	83.4	< 0.01	< 0.1	0.3	1060
89_lichen	Lichen	Cladina spp.	2004	ug/g	139	42.7	< 0.01	< 0.1	0.3	1640
91_lichen	Lichen	Cladina spp.	2004	ug/g	180	133	< 0.01	< 0.1	0.2	1720
92_lichen	Lichen	Cladina spp.	2004	ug/g	185	119	< 0.01	< 0.1	0.4	1500
93_lichen	Lichen	Cladina spp.	2004	ug/g	240	84.1	< 0.01	< 0.1	0.4	2110
94_lichen	Lichen	Cladina spp.	2004	ug/g	206	102	< 0.01	< 0.1	0.5	2170
96_lichen	Lichen	Cladina spp.	2004	ug/g	240	132	< 0.01	< 0.1	0.5	1760
100_lichen	Lichen	Cladina spp.	2004	ug/g	217	44.5	< 0.01	< 0.1	0.3	1290
101_lichen	Lichen	Cladina spp.	2004	ug/g	218	24.1	< 0.01	< 0.1	0.3	1110
102_lichen	Lichen	Cladina spp.	2004	ug/g	170	91.1	< 0.01	< 0.1	0.3	1580
103_lichen	Lichen	Cladina spp.	2004	ug/g	203	172	< 0.01	< 0.1	0.4	1700
105_lichen	Lichen	Cladina spp.	2004	ug/g	192	51.4	< 0.01	< 0.1	0.4	1080
107_lichen	Lichen	Cladina spp.	2004	ug/g	197	111	< 0.01	0.2	0.2	989
108_lichen	Lichen	Cladina spp.	2004	ug/g	297	76	0.011	0.3	0.6	2240
109_lichen	Lichen	Cladina spp.	2004	ug/g	278	75.4	< 0.01	0.1	0.8	1560

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
112_lichen	Lichen	Cladina spp.	2004	ug/g	198	30.1	< 0.01	0.1	0.3	1170
113_lichen	Lichen	Cladina spp.	2004	ug/g	227	49.5	< 0.01	< 0.1	0.5	1580
114_lichen	Lichen	Cladina spp.	2004	ug/g	260	417	< 0.01	< 0.1	0.3	1820
115_lichen	Lichen	Cladina spp.	2004	ug/g	257	62.2	< 0.01	< 0.1	0.2	1500
116_lichen	Lichen	Cladina spp.	2004	ug/g	224	86.4	< 0.01	< 0.1	0.5	1400
117_lichen	Lichen	Cladina spp.	2004	ug/g	182	86.5	0.013	< 0.1	0.2	1280
118_lichen	Lichen	Cladina spp.	2004	ug/g	190	65.9	< 0.01	< 0.1	0.2	1530
119_lichen	Lichen	Cladina spp.	2004	ug/g	279	163	< 0.01	< 0.1	0.2	1390
120_liche	Lichen	Cladina spp.	2004	ug/g	194	27.1	0.014	< 0.1	0.2	920
122_lichen	Lichen	Cladina spp.	2004	ug/g	388	185	0.022	< 0.1	0.7	1680
123_lichen	Lichen	Cladina spp.	2004	ug/g	272	263	0.02	< 0.1	0.6	1400
124_lichen	Lichen	Cladina spp.	2004	ug/g	262	97	0.025	< 0.1	0.6	1030
125_lichen	Lichen	Cladina spp.	2004	ug/g	390	88.6	< 0.01	< 0.1	0.5	1280
126_lichen	Lichen	Cladina spp.	2004	ug/g	263	26.2	< 0.01	< 0.1	0.4	1060
127_lichen	Lichen	Cladina spp.	2004	ug/g	184	28	< 0.01	< 0.1	0.3	1240
129_lichen	Lichen	Cladina spp.	2004	ug/g	251	95.2	0.01	< 0.1	0.4	1200
130_lichen	Lichen	Cladina spp.	2004	ug/g	277	112	0.012	< 0.1	0.7	1260
131_lichen	Lichen	Cladina spp.	2004	ug/g	303	125	0.05	< 0.1	1	1870
132_lichen	Lichen	Cladina spp.	2004	ug/g	230	206	< 0.01	< 0.1	0.3	1820
133_lichen	Lichen	Cladina spp.	2004	ug/g	245	32.6	< 0.01	< 0.1	0.2	1530
134_lichen	Lichen	Cladina spp.	2004	ug/g	246	19.2	0.011	< 0.1	0.2	957
135_lichen	Lichen	Cladina spp.	2004	ug/g	190	44.5	0.01	< 0.1	0.4	1520
136_lichen	Lichen	Cladina spp.	2004	ug/g	215	66.6	0.012	< 0.1	0.4	1200
137_lichen	Lichen	Cladina spp.	2004	ug/g	599	152	0.02	< 0.1	0.8	1650
138_lichen	Lichen	Cladina spp.	2004	ug/g	275	35.6	< 0.01	< 0.1	0.3	1510
139_lichen	Lichen	Cladina spp.	2004	ug/g	163	40.7	0.013	< 0.1	0.4	1240
140_lichen	Lichen	Cladina spp.	2004	ug/g	282	45.2	0.029	< 0.1	0.7	1350

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
141_lichen	Lichen	Cladina spp.	2004	ug/g	305	195	0.015	< 0.1	0.5	1910
142_lichen	Lichen	Cladina spp.	2004	ug/g	441	207	0.016	< 0.1	0.4	2280
143_lichen	Lichen	Cladina spp.	2004	ug/g	224	106	< 0.01	< 0.1	0.6	1330
144_lichen	Lichen	Cladina spp.	2004	ug/g	367	89.7	0.011	< 0.1	0.4	1720
145_lichen	Lichen	Cladina spp.	2004	ug/g	254	56.8	< 0.01	< 0.1	0.5	1150
146_lichen	Lichen	Cladina spp.	2004	ug/g	235	68	0.022	< 0.1	0.3	1350
147_lichen	Lichen	Cladina spp.	2004	ug/g	249	107	0.01	< 0.1	0.2	1300
148_lichen	Lichen	Cladina spp.	2004	ug/g	340	207	0.015	< 0.1	0.4	1840
149_lichen	Lichen	Cladina spp.	2004	ug/g	331	137	< 0.01	< 0.1	0.3	1630
150_lichen	Lichen	Cladina spp.	2004	ug/g	245	86.4	0.012	< 0.1	0.2	1620
151_lichen	Lichen	Cladina spp.	2004	ug/g	426	21.2	0.019	< 0.1	0.2	1790
152_lichen	Lichen	Cladina spp.	2004	ug/g	251	58.2	0.016	0.1	0.3	1200
153_lichen	Lichen	Cladina spp.	2004	ug/g	401	60.8	< 0.01	< 0.1	0.3	1830
154_lichen	Lichen	Cladina spp.	2004	ug/g	366	146	< 0.01	< 0.1	0.5	2080
155_lichen	Lichen	Cladina spp.	2004	ug/g	227	91	< 0.01	< 0.1	0.3	1620
156_lichen	Lichen	Cladina spp.	2004	ug/g	166	40	0.011	< 0.1	0.4	1320
157_lichen	Lichen	Cladina spp.	2004	ug/g	280	52.3	0.017	< 0.1	0.4	1120
158_lichen	Lichen	Cladina spp.	2004	ug/g	150	23.2	0.011	< 0.1	0.3	1550
159_lichen	Lichen	Cladina spp.	2004	ug/g	316	49.5	0.037	< 0.1	0.7	1220
160_lichen	Lichen	Cladina spp.	2004	ug/g	275	43.7	0.012	< 0.1	0.6	1370
161_lichen	Lichen	Cladina spp.	2004	ug/g	339	101	< 0.01	< 0.1	0.3	1640
162_lichen	Lichen	Cladina spp.	2004	ug/g	409	26.9	< 0.01	< 0.1	0.1	1230
164_lichen	Lichen	Cladina spp.	2004	ug/g	293	39	0.011	0.2	0.5	1650
200_lichen	Lichen	Cladina spp.	2004	ug/g	553	51.9	< 0.01	0.2	1.1	1550
1-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	0.7	-
1-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.01	-	0.6	-
1-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	0.6	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
2-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.09	-	1.7	-
2-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	0.5	-
2-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	0.8	-
3-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.35	-	2.1	-
3-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.24	-	2.0	-
3-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.11	-	1.7	-
4-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.17	-	1.2	-
4-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.10	-	0.9	-
4-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.03	-	0.6	-
4-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.7	-
5-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.51	-	1.9	-
5-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.21	-	1.5	-
5-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.01	-	1.0	-
5-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.5	-
6-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.15	-	1.4	-
6-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.03	-	0.8	-
7-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.04	-	4.6	-
8-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.5	-
8-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.6	-
8-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.4	-
8-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.4	-
FARO-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	1.5	-
SW-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	<0.1	-
SW-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	<0.1	-
SW-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	<0.1	-
SW-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	<0.1	-
SW-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.4	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
SW-7_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.3	-
VAN-10_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	1.5	-
VAN-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	1.1	-
VAN-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.02	-	1.8	-
VAN-8_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.6	-
VAN-9_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	0.04	-	2.6	-
VB-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.6	-
VB-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	<0.01	-	0.5	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
4_lichen	Lichen	Cladina spp.	2004	ug/g	1140	< 0.2	125	0.14	14	2.76	< 0.1
5_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	118	0.11	11	3.38	< 0.1
6_lichen	Lichen	Cladina spp.	2004	ug/g	1230	< 0.2	186	0.13	14	6.72	< 0.1
7_lichen	Lichen	Cladina spp.	2004	ug/g	1080	< 0.2	117	0.09	8	2.93	< 0.1
8_lichen	Lichen	Cladina spp.	2004	ug/g	1050	< 0.2	113	0.09	11	3.1	< 0.1
9_lichen	Lichen	Cladina spp.	2004	ug/g	998	< 0.2	377	0.08	8	11.7	< 0.1
10_lichen	Lichen	Cladina spp.	2004	ug/g	1040	< 0.2	116	0.11	8	4.28	< 0.1
11_lichen	Lichen	Cladina spp.	2004	ug/g	1010	< 0.2	113	0.11	14	7.19	< 0.1
13_lichen	Lichen	Cladina spp.	2004	ug/g	1580	< 0.2	418	0.01	19	9.01	< 0.1
15_lichen	Lichen	Cladina spp.	2004	ug/g	1040	< 0.2	302	0.01	20	2.98	< 0.1
20_lichen	Lichen	Cladina spp.	2004	ug/g	1060	< 0.2	201	0.03	13	4.92	< 0.1
21_lichen	Lichen	Cladina spp.	2004	ug/g	1060	< 0.2	267	0.03	31	6.53	0.1
22_lichen	Lichen	Cladina spp.	2004	ug/g	1440	< 0.2	221	0.05	48	8.1	< 0.1
23_lichen	Lichen	Cladina spp.	2004	ug/g	1290	< 0.2	94	0.02	9	7.42	< 0.1
24_lichen	Lichen	Cladina spp.	2004	ug/g	1020	< 0.2	158	0.02	9	3.66	< 0.1
25a_lichen	Lichen	Cladina spp.	2004	ug/g	879	< 0.2	372	0.02	6	17	< 0.1
25b_lichen	Lichen	Cladina spp.	2004	ug/g	1020	< 0.2	125	0.05	9	2.15	< 0.1
26b_lichen	Lichen	Cladina spp.	2004	ug/g	925	< 0.2	113	0.05	7	1.86	< 0.1
27a_lichen	Lichen	Cladina spp.	2004	ug/g	1190	< 0.2	85	< 0.01	6	5.7	< 0.1
27b_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	108	0.07	8	3.78	< 0.1
28b_lichen	Lichen	Cladina spp.	2004	ug/g	1270	< 0.2	124	0.05	6	3.27	< 0.1
29a_lichen	Lichen	Cladina spp.	2004	ug/g	985	< 0.2	134	0.02	10	5.44	< 0.1
29b_lichen	Lichen	Cladina spp.	2004	ug/g	1360	< 0.2	132	0.24	11	4.4	< 0.1
31_lichen	Lichen	Cladina spp.	2004	ug/g	855	< 0.2	125	0.03	11	1.82	< 0.1
35_lichen	Lichen	Cladina spp.	2004	ug/g	1520	< 0.2	253	0.13	196	19.4	< 0.1
36_lichen	Lichen	Cladina spp.	2004	ug/g	1810	< 0.2	337	0.07	11	11.6	< 0.1
38_lichen	Lichen	Cladina spp.	2004	ug/g	863	< 0.2	177	0.17	8	6.98	< 0.1

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
39_lichen	Lichen	Cladina spp.	2004	ug/g	1190	< 0.2	268	0.2	9	13.1	< 0.1
40_lichen	Lichen	Cladina spp.	2004	ug/g	1360	< 0.2	149	0.16	18	4.32	< 0.1
41_lichen	Lichen	Cladina spp.	2004	ug/g	1330	< 0.2	240	0.17	20	7.53	< 0.1
43_lichen	Lichen	Cladina spp.	2004	ug/g	1400	< 0.2	235	0.26	16	8.32	< 0.1
45_lichen	Lichen	Cladina spp.	2004	ug/g	1140	< 0.2	189	0.34	9	7.76	< 0.1
46_lichen	Lichen	Cladina spp.	2004	ug/g	1320	< 0.2	384	0.35	13	10.4	< 0.1
47_lichen	Lichen	Cladina spp.	2004	ug/g	1610	< 0.2	405	0.31	9	9.18	< 0.1
48_lichen	Lichen	Cladina spp.	2004	ug/g	1210	< 0.2	236	0.34	17	8.97	< 0.1
49_lichen	Lichen	Cladina spp.	2004	ug/g	1760	< 0.2	442	0.64	12	12.5	< 0.1
50_lichen	Lichen	Cladina spp.	2004	ug/g	1660	< 0.2	334	0.62	9	15.8	< 0.1
51_lichen	Lichen	Cladina spp.	2004	ug/g	1550	< 0.2	214	0.34	7	7.45	< 0.1
52_lichen	Lichen	Cladina spp.	2004	ug/g	1470	< 0.2	286	0.29	5	8.64	< 0.1
53_lichen	Lichen	Cladina spp.	2004	ug/g	950	< 0.2	149	0.14	8	6.88	< 0.1
54_lichen	Lichen	Cladina spp.	2004	ug/g	1540	< 0.2	324	0.3	13	10.6	< 0.1
55_lichen	Lichen	Cladina spp.	2004	ug/g	1780	< 0.2	423	0.49	23	15.3	< 0.1
56_lichen	Lichen	Cladina spp.	2004	ug/g	1460	< 0.2	298	0.51	16	10.1	< 0.1
57_lichen	Lichen	Cladina spp.	2004	ug/g	1620	< 0.2	171	0.85	7	5.2	< 0.1
58_lichen	Lichen	Cladina spp.	2004	ug/g	1180	< 0.2	144	0.4	8	3.08	< 0.1
64_lichen	Lichen	Cladina spp.	2004	ug/g	1510	< 0.2	303	0.47	5	9.98	< 0.1
65_lichen	Lichen	Cladina spp.	2004	ug/g	1240	< 0.2	221	0.23	8	3.08	< 0.1
66_lichen	Lichen	Cladina spp.	2004	ug/g	1390	< 0.2	242	0.11	7	4.65	0.1
67_lichen	Lichen	Cladina spp.	2004	ug/g	1500	< 0.2	229	0.06	5	2.8	< 0.1
69_lichen	Lichen	Cladina spp.	2004	ug/g	1050	< 0.2	413	0.09	4	8.88	< 0.1
70_lichen	Lichen	Cladina spp.	2004	ug/g	1180	< 0.2	470	0.05	11	10	< 0.1
71_lichen	Lichen	Cladina spp.	2004	ug/g	1030	< 0.2	304	0.09	9	13.8	< 0.1
72_lichen	Lichen	Cladina spp.	2004	ug/g	1380	< 0.2	197	0.17	13	3.57	< 0.1
73_lichen	Lichen	Cladina spp.	2004	ug/g	1160	< 0.2	242	0.15	2	10.5	< 0.1

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
74_lichen	Lichen	Cladina spp.	2004	ug/g	1420	< 0.2	338	0.15	5	22.5	< 0.1
76_lichen	Lichen	Cladina spp.	2004	ug/g	1230	< 0.2	331	0.09	9	14.2	< 0.1
78_lichen	Lichen	Cladina spp.	2004	ug/g	1120	< 0.2	382	0.07	23	4.21	< 0.1
79_lichen	Lichen	Cladina spp.	2004	ug/g	1340	< 0.2	202	0.03	12	19.7	< 0.1
80_lichen	Lichen	Cladina spp.	2004	ug/g	994	< 0.2	881	0.09	11	17	< 0.1
81_lichen	Lichen	Cladina spp.	2004	ug/g	1090	< 0.2	360	0.08	4	5.24	< 0.1
82_lichen	Lichen	Cladina spp.	2004	ug/g	1150	< 0.2	286	0.09	13	7.31	< 0.1
83_lichen	Lichen	Cladina spp.	2004	ug/g	1460	< 0.2	443	0.08	4	13.8	< 0.1
84_lichen	Lichen	Cladina spp.	2004	ug/g	1170	< 0.2	254	0.08	16	8.15	< 0.1
85_lichen	Lichen	Cladina spp.	2004	ug/g	1330	< 0.2	211	0.1	2	3.02	< 0.1
86_lichen	Lichen	Cladina spp.	2004	ug/g	1300	< 0.2	195	0.11	3	2.54	< 0.1
87_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	260	0.05	3	2.59	< 0.1
88_lichen	Lichen	Cladina spp.	2004	ug/g	907	< 0.2	236	0.04	2	5.02	< 0.1
89_lichen	Lichen	Cladina spp.	2004	ug/g	1160	< 0.2	247	0.09	< 1	1.76	< 0.1
91_lichen	Lichen	Cladina spp.	2004	ug/g	1160	< 0.2	248	0.02	< 1	2.61	< 0.1
92_lichen	Lichen	Cladina spp.	2004	ug/g	898	< 0.2	218	0.05	8	2.44	< 0.1
93_lichen	Lichen	Cladina spp.	2004	ug/g	1350	< 0.2	268	0.05	3	2.63	< 0.1
94_lichen	Lichen	Cladina spp.	2004	ug/g	1450	< 0.2	182	0.05	3	3.92	< 0.1
96_lichen	Lichen	Cladina spp.	2004	ug/g	1210	< 0.2	523	0.04	5	7.14	< 0.1
100_lichen	Lichen	Cladina spp.	2004	ug/g	1060	< 0.2	255	0.12	12	5.99	< 0.1
101_lichen	Lichen	Cladina spp.	2004	ug/g	1210	< 0.2	350	0.09	1	7.82	< 0.1
102_lichen	Lichen	Cladina spp.	2004	ug/g	1080	< 0.2	215	0.05	1	1.78	< 0.1
103_lichen	Lichen	Cladina spp.	2004	ug/g	1160	< 0.2	218	0.04	5	2.75	< 0.1
105_lichen	Lichen	Cladina spp.	2004	ug/g	900	< 0.2	221	0.02	6	2.81	< 0.1
107_lichen	Lichen	Cladina spp.	2004	ug/g	890	< 0.2	208	< 0.01	5	2.22	< 0.1
108_lichen	Lichen	Cladina spp.	2004	ug/g	1350	< 0.2	206	0.22	< 1	11.9	< 0.1
109_lichen	Lichen	Cladina spp.	2004	ug/g	1150	< 0.2	617	0.12	74	7.75	< 0.1

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
112_lichen	Lichen	Cladina spp.	2004	ug/g	984	< 0.2	474	0.02	20	5.46	< 0.1
113_lichen	Lichen	Cladina spp.	2004	ug/g	1030	< 0.2	303	0.05	8	3.17	< 0.1
114_lichen	Lichen	Cladina spp.	2004	ug/g	1480	< 0.2	173	0.05	1	1.71	< 0.1
115_lichen	Lichen	Cladina spp.	2004	ug/g	1250	< 0.2	187	0.03	< 1	3.67	< 0.1
116_lichen	Lichen	Cladina spp.	2004	ug/g	1000	< 0.2	200	0.04	1	1.32	< 0.1
117_lichen	Lichen	Cladina spp.	2004	ug/g	1040	< 0.2	108	0.04	5	1.62	< 0.1
118_lichen	Lichen	Cladina spp.	2004	ug/g	1280	< 0.2	111	0.02	3	1.51	< 0.1
119_lichen	Lichen	Cladina spp.	2004	ug/g	1220	< 0.2	103	0.02	4	1.92	< 0.1
120_liche	Lichen	Cladina spp.	2004	ug/g	837	< 0.2	144	0.08	2	2.22	< 0.1
122_lichen	Lichen	Cladina spp.	2004	ug/g	1370	< 0.2	254	0.05	5	10.3	< 0.1
123_lichen	Lichen	Cladina spp.	2004	ug/g	1010	< 0.2	264	0.04	5	3.98	< 0.1
124_lichen	Lichen	Cladina spp.	2004	ug/g	797	< 0.2	246	< 0.01	17	3.64	< 0.1
125_lichen	Lichen	Cladina spp.	2004	ug/g	1070	< 0.2	225	< 0.01	7	6.66	< 0.1
126_lichen	Lichen	Cladina spp.	2004	ug/g	933	< 0.2	171	0.02	2	3	< 0.1
127_lichen	Lichen	Cladina spp.	2004	ug/g	1080	< 0.2	217	0.08	11	1.93	< 0.1
129_lichen	Lichen	Cladina spp.	2004	ug/g	863	< 0.2	250	0.02	7	3.57	< 0.1
130_lichen	Lichen	Cladina spp.	2004	ug/g	904	< 0.2	229	0.01	3	1.7	< 0.1
131_lichen	Lichen	Cladina spp.	2004	ug/g	1040	< 0.2	176	0.07	5	7.99	< 0.1
132_lichen	Lichen	Cladina spp.	2004	ug/g	1330	< 0.2	131	0.02	3	1.16	< 0.1
133_lichen	Lichen	Cladina spp.	2004	ug/g	1210	< 0.2	183	0.03	2	4.04	< 0.1
134_lichen	Lichen	Cladina spp.	2004	ug/g	889	< 0.2	206	0.02	2	2.22	< 0.1
135_lichen	Lichen	Cladina spp.	2004	ug/g	1090	< 0.2	167	0.06	3	3.73	< 0.1
136_lichen	Lichen	Cladina spp.	2004	ug/g	963	< 0.2	185	0.06	4	2.88	< 0.1
137_lichen	Lichen	Cladina spp.	2004	ug/g	1090	< 0.2	346	0.02	3	6.4	< 0.1
138_lichen	Lichen	Cladina spp.	2004	ug/g	1300	< 0.2	184	0.05	3	2.71	< 0.1
139_lichen	Lichen	Cladina spp.	2004	ug/g	1070	< 0.2	145	0.06	3	1.83	< 0.1
140_lichen	Lichen	Cladina spp.	2004	ug/g	1010	< 0.2	323	0.06	3	6.98	< 0.1

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
141_lichen	Lichen	Cladina spp.	2004	ug/g	1290	< 0.2	190	0.05	2	2.38	< 0.1
142_lichen	Lichen	Cladina spp.	2004	ug/g	1620	< 0.2	236	0.06	3	4.03	< 0.1
143_lichen	Lichen	Cladina spp.	2004	ug/g	1000	< 0.2	143	0.07	16	4	< 0.1
144_lichen	Lichen	Cladina spp.	2004	ug/g	1420	< 0.2	158	0.07	2	2.44	< 0.1
145_lichen	Lichen	Cladina spp.	2004	ug/g	1090	< 0.2	165	0.03	2	4.24	< 0.1
146_lichen	Lichen	Cladina spp.	2004	ug/g	1030	< 0.2	158	0.09	< 1	3.02	< 0.1
147_lichen	Lichen	Cladina spp.	2004	ug/g	1200	< 0.2	119	0.04	5	1.51	< 0.1
148_lichen	Lichen	Cladina spp.	2004	ug/g	1510	< 0.2	172	0.14	4	3.1	< 0.1
149_lichen	Lichen	Cladina spp.	2004	ug/g	1120	< 0.2	426	0.03	2	8.01	< 0.1
150_lichen	Lichen	Cladina spp.	2004	ug/g	1250	< 0.2	123	0.02	2	2.89	< 0.1
151_lichen	Lichen	Cladina spp.	2004	ug/g	1560	< 0.2	264	< 0.01	3	10.5	< 0.1
152_lichen	Lichen	Cladina spp.	2004	ug/g	1020	< 0.2	199	0.02	4	5.68	< 0.1
153_lichen	Lichen	Cladina spp.	2004	ug/g	1340	< 0.2	245	0.02	7	7.58	< 0.1
154_lichen	Lichen	Cladina spp.	2004	ug/g	1350	< 0.2	141	0.06	2	5.31	< 0.1
155_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	130	0.05	3	2.56	< 0.1
156_lichen	Lichen	Cladina spp.	2004	ug/g	1060	< 0.2	170	0.07	5	2.3	< 0.1
157_lichen	Lichen	Cladina spp.	2004	ug/g	1120	< 0.2	385	0.08	7	7	< 0.1
158_lichen	Lichen	Cladina spp.	2004	ug/g	1180	< 0.2	177	0.08	3	3.41	< 0.1
159_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	341	0.2	4	13	< 0.1
160_lichen	Lichen	Cladina spp.	2004	ug/g	1110	< 0.2	191	0.17	4	4.8	< 0.1
161_lichen	Lichen	Cladina spp.	2004	ug/g	1640	< 0.2	189	0.14	3	5.02	< 0.1
162_lichen	Lichen	Cladina spp.	2004	ug/g	1050	< 0.2	226	< 0.01	4	4.47	< 0.1
164_lichen	Lichen	Cladina spp.	2004	ug/g	1040	< 0.2	562	0.15	6	13.1	< 0.1
200_lichen	Lichen	Cladina spp.	2004	ug/g	1100	< 0.2	390	< 0.01	6	11.4	< 0.1
1-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.16	-	-	-
1-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	3	-	0.07	-	-	-
1-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.01	-	-	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
2-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.27	-	-	-
2-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.07	-	-	-
2-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	2	-	0.04	-	-	-
3-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	1	-	0.87	-	-	-
3-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	1	-	0.51	-	-	-
3-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	1	-	0.53	-	-	-
4-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.77	-	-	-
4-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.33	-	-	-
4-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.18	-	-	-
4-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.15	-	-	-
5-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	5	-	1.83	-	-	-
5-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	4	-	1.19	-	-	-
5-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	1	-	0.32	-	-	-
5-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.03	-	-	-
6-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	1	-	0.52	-	-	-
6-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.22	-	-	-
7-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.22	-	-	-
8-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.18	-	-	-
8-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.07	-	-	-
8-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.07	-	-	-
8-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.08	-	-	-
FARO-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	2	-	0.61	-	-	-
SW-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
SW-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
SW-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
SW-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
SW-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
SW-7_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
VAN-10_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
VAN-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.08	-	-	-
VAN-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.11	-	-	-
VAN-8_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
VAN-9_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
VB-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	<0.01	-	-	-
VB-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	<1	-	0.03	-	-	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
4_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.4	< 0.04	0.8	88.7	< 3
5_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.9	< 0.04	0.5	46.1	< 3
6_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	8.3	< 0.04	0.9	74.5	< 3
7_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	5.5	< 0.04	0.5	39.4	< 3
8_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	7.6	< 0.04	0.8	36.5	< 3
9_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	8	< 0.04	0.8	46.7	< 3
10_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	6.8	< 0.04	0.7	50.1	< 3
11_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	6.8	< 0.04	0.7	43.7	< 3
13_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3	< 0.04	< 0.5	29.7	< 3
15_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.5	< 0.04	< 0.5	24.1	< 3
20_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	1.8	< 0.04	< 0.5	12.2	< 3
21_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.3	2.6	< 0.04	< 0.5	20.2	< 3
22_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	2.7	< 0.04	< 0.5	21.2	< 3
23_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.3	< 0.04	< 0.5	14.5	< 3
24_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.8	< 0.04	< 0.5	16.7	< 3
25a_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.8	< 0.04	< 0.5	23.9	< 3
25b_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.2	< 0.04	< 0.5	24.4	< 3
26b_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.3	< 0.04	< 0.5	25.7	< 3
27a_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	1.9	< 0.04	< 0.5	11.1	< 3
27b_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.1	< 0.04	< 0.5	31.8	< 3
28b_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.6	< 0.04	< 0.5	27.5	< 3
29a_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.2	< 0.04	< 0.5	10.7	< 3
29b_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.4	3.7	< 0.04	< 0.5	45.5	< 3
31_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.8	< 0.04	< 0.5	13.3	< 3
35_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.5	< 0.04	< 0.5	35.6	< 3
36_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.6	< 0.04	< 0.5	41.9	< 3
38_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.1	< 0.04	< 0.5	88.9	< 3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
39_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.7	< 0.04	0.5	137	< 3
40_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.3	< 0.04	< 0.5	74.8	< 3
41_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.1	< 0.04	< 0.5	92.9	< 3
43_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.2	< 0.04	0.5	119	< 3
45_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	3.9	< 0.04	0.5	159	< 3
46_lichen	Lichen	Cladina spp.	2004	ug/g	0.04	< 0.1	4.9	< 0.04	0.6	174	< 3
47_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	4.3	< 0.04	0.5	155	< 3
48_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	0.5	5	< 0.04	0.6	258	< 3
49_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	< 0.1	7.2	0.04	0.8	373	< 3
50_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	0.2	5.5	< 0.04	0.7	368	< 3
51_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	3.2	< 0.04	< 0.5	129	< 3
52_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	3.1	< 0.04	< 0.5	98.5	< 3
53_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.2	< 0.04	< 0.5	39.9	< 3
54_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	0.1	3.2	< 0.04	0.6	135	< 3
55_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	< 0.1	4	< 0.04	0.6	239	< 3
56_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	< 0.1	4	< 0.04	0.6	267	< 3
57_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	0.1	5.4	< 0.04	0.7	452	< 3
58_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	0.3	5.2	< 0.04	0.6	257	< 3
64_lichen	Lichen	Cladina spp.	2004	ug/g	1.52	0.1	4.6	< 0.04	0.6	290	< 3
65_lichen	Lichen	Cladina spp.	2004	ug/g	0.66	0.1	4.9	< 0.04	0.5	160	< 3
66_lichen	Lichen	Cladina spp.	2004	ug/g	0.13	0.6	3.6	< 0.04	< 0.5	108	< 3
67_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	0.2	2.9	< 0.04	< 0.5	51.7	< 3
69_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	0.1	4.2	< 0.04	< 0.5	78.3	< 3
70_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	0.2	4	< 0.04	< 0.5	30.1	< 3
71_lichen	Lichen	Cladina spp.	2004	ug/g	0.11	< 0.1	5.1	< 0.04	< 0.5	39.9	< 3
72_lichen	Lichen	Cladina spp.	2004	ug/g	0.42	0.1	3.7	< 0.04	< 0.5	90.3	< 3
73_lichen	Lichen	Cladina spp.	2004	ug/g	0.31	< 0.1	4.1	< 0.04	< 0.5	87.7	< 3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
74_lichen	Lichen	Cladina spp.	2004	ug/g	0.21	< 0.1	4.2	< 0.04	< 0.5	95.4	< 3
76_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	< 0.1	5.9	< 0.04	0.6	87	< 3
78_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	< 0.1	11.4	< 0.04	0.7	34.5	< 3
79_lichen	Lichen	Cladina spp.	2004	ug/g	0.04	< 0.1	4	< 0.04	< 0.5	37.4	< 3
80_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	0.6	12.1	< 0.04	0.8	57.6	< 3
81_lichen	Lichen	Cladina spp.	2004	ug/g	0.09	0.2	4.2	< 0.04	< 0.5	39.8	< 3
82_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	0.1	3.9	< 0.04	< 0.5	52	< 3
83_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	< 0.1	3.1	< 0.04	< 0.5	64.2	< 3
84_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	< 0.1	4	< 0.04	< 0.5	65.8	< 3
85_lichen	Lichen	Cladina spp.	2004	ug/g	0.24	< 0.1	3.2	< 0.04	< 0.5	68.1	< 3
86_lichen	Lichen	Cladina spp.	2004	ug/g	0.27	< 0.1	3.3	< 0.04	< 0.5	48.6	< 3
87_lichen	Lichen	Cladina spp.	2004	ug/g	0.06	< 0.1	3.3	< 0.04	< 0.5	38.2	< 3
88_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	4	< 0.04	< 0.5	21.9	< 3
89_lichen	Lichen	Cladina spp.	2004	ug/g	0.08	< 0.1	4.2	< 0.04	< 0.5	26	< 3
91_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	2.5	< 0.04	< 0.5	23.5	< 3
92_lichen	Lichen	Cladina spp.	2004	ug/g	0.05	0.5	3.7	< 0.04	< 0.5	21	< 3
93_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	0.2	3.6	< 0.04	< 0.5	24.5	< 3
94_lichen	Lichen	Cladina spp.	2004	ug/g	0.02	0.1	2.4	< 0.04	< 0.5	25.7	< 3
96_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.3	< 0.04	< 0.5	20.6	< 3
100_lichen	Lichen	Cladina spp.	2004	ug/g	0.24	< 0.1	3	< 0.04	< 0.5	57	< 3
101_lichen	Lichen	Cladina spp.	2004	ug/g	0.1	< 0.1	2.9	< 0.04	< 0.5	42.7	< 3
102_lichen	Lichen	Cladina spp.	2004	ug/g	0.12	< 0.1	3.6	< 0.04	< 0.5	33.7	< 3
103_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.4	< 0.04	< 0.5	43.1	< 3
105_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	8.8	2.6	< 0.04	< 0.5	21.5	< 3
107_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.2	2.5	< 0.04	< 0.5	15.6	< 3
108_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.3	< 0.04	< 0.5	25.2	< 3
109_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.5	3.3	< 0.04	< 0.5	19.1	< 3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
112_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.2	2	< 0.04	< 0.5	15.1	< 3
113_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	3.2	< 0.04	< 0.5	12.7	< 3
114_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.1	< 0.04	< 0.5	20.6	< 3
115_lichen	Lichen	Cladina spp.	2004	ug/g	0.03	< 0.1	2.4	< 0.04	< 0.5	18.5	< 3
116_lichen	Lichen	Cladina spp.	2004	ug/g	0.07	< 0.1	3.6	< 0.04	< 0.5	19.8	< 3
117_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.1	< 0.04	< 0.5	26.2	< 3
118_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.5	< 0.04	< 0.5	16.8	< 3
119_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	35.1	1.8	< 0.04	< 0.5	20.3	< 3
120_liche	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.8	3	< 0.04	< 0.5	43	< 3
122_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.4	4.2	< 0.04	< 0.5	38.5	< 3
123_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	4	< 0.04	< 0.5	23.8	< 3
124_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.2	6.1	< 0.04	0.9	20.5	< 3
125_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.4	< 0.04	< 0.5	21.2	< 3
126_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.4	< 0.04	< 0.5	19.6	< 3
127_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.6	< 0.04	< 0.5	28.8	< 3
129_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.9	< 0.04	< 0.5	25.4	< 3
130_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4	< 0.04	< 0.5	27.3	< 3
131_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	6.9	< 0.04	0.6	55.3	< 3
132_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.8	< 0.04	< 0.5	23.7	< 3
133_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.6	< 0.04	< 0.5	21	< 3
134_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.1	< 0.04	< 0.5	14.8	< 3
135_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.4	4	< 0.04	< 0.5	27.6	< 3
136_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.2	3.1	< 0.04	< 0.5	32.6	< 3
137_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.7	< 0.04	0.6	46	< 3
138_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.7	< 0.04	< 0.5	25.4	< 3
139_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.9	< 0.04	< 0.5	45.4	< 3
140_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	5.8	< 0.04	0.6	65.1	< 3

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
141_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.6	< 0.04	< 0.5	35	< 3
142_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.2	< 0.04	< 0.5	36.7	< 3
143_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.5	< 0.04	< 0.5	34.7	< 3
144_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.6	< 0.04	< 0.5	30.2	< 3
145_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.6	< 0.04	< 0.5	25.6	< 3
146_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.4	< 0.04	< 0.5	23.5	< 3
147_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.3	2	< 0.04	< 0.5	12.3	< 3
148_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	2.5	< 0.04	< 0.5	22	< 3
149_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.4	< 0.04	< 0.5	25.1	< 3
150_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	1.8	< 0.04	< 0.5	14.1	< 3
151_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.4	< 0.04	< 0.5	20.3	< 3
152_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.9	< 0.04	< 0.5	23.2	< 3
153_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.5	< 0.04	< 0.5	23.9	< 3
154_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.6	< 0.04	< 0.5	25.8	< 3
155_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	3.4	< 0.04	< 0.5	22.9	< 3
156_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.5	< 0.04	< 0.5	31.1	< 3
157_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.3	4.4	< 0.04	< 0.5	39.9	< 3
158_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	4.6	< 0.04	< 0.5	35.6	< 3
159_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	0.1	8.2	< 0.04	0.7	115	< 3
160_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	5.4	< 0.04	< 0.5	114	< 3
161_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.5	< 0.04	< 0.5	55.8	< 3
162_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	2.1	< 0.04	< 0.5	15.3	< 3
164_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	4.2	< 0.04	< 0.5	15	< 3
200_lichen	Lichen	Cladina spp.	2004	ug/g	< 0.02	< 0.1	13	< 0.04	1.2	25.8	< 3
1-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	142	-
1-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	46	-
1-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	35	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
2-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	192	-
2-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	57	-
2-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	48	-
3-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	499	-
3-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	352	-
3-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	291	-
4-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	474	-
4-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	185	-
4-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	140	-
4-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	121	-
5-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	1043	-
5-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	771	-
5-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	225	-
5-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	63	-
6-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	320	-
6-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	184	-
7-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	107	-
8-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	124	-
8-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	62	-
8-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	46	-
8-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	39	-
FARO-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	414	-
SW-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	21	-
SW-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	19	-
SW-3_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	15	-
SW-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	24	-
SW-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	18	-

C1. Lichen Raw Data: elements

Sample_ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
SW-7_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	17	-
VAN-10_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	60	-
VAN-4_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	42	-
VAN-5_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	59	-
VAN-8_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	38	-
VAN-9_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	109	-
VB-1_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	39	-
VB-2_lichen	Lichen	Cladina spp.	2002	ug/g	-	-	-	-	-	28	-

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
1	1_F	surface organic	7.25	3195	< 10	2.2	748	< 1	16.5
4	4_F/H	subsurface organic	6	14500	< 10	9.2	190	< 1	< 1
4	4_F	surface organic	5.1	4370	< 10	4.9	196	< 1	4
6	6_F/H	subsurface organic	6.8	6930	< 10	2.4	80	< 1	2
6	6_F	surface organic	7.1	7790	< 10	11.8	241	< 1	11
12	12_ASH	ash	6.4	1570	< 10	0.2	90	< 1	< 1
12	12_B	subsurface mineral	6.1	12100	< 10	4.7	157	< 1	< 1
12	12_F	surface organic	6.6	1950	< 10	1.2	848	< 1	8
13	13_B	subsurface mineral	6.5	17900	< 10	16.8	362	< 1	2
13	13_F/SUB	subsurface organic	5.2	1630	< 10	2	147	< 1	6
13	13_LF	surface organic	6.4	330	< 10	0.6	240	< 1	18
14	14_B	subsurface mineral	5.9	1430	< 10	0.2	31	< 1	< 1
14	14_LF	surface organic	5.5	2300	< 10	0.7	378	< 1	3
15	15_F/SUB	subsurface organic	4.75	1170	< 10	0.8	173.5	< 1	3
15	15_LF	surface organic	4.55	317.5	< 10	0.6	102	< 1	3.5
16	16_F/SUB	subsurface organic	4.9	1000	< 10	1.7	66	< 1	3
16	16_LF	surface organic	4.3	262	< 10	0.5	59	< 1	4
17	17_B	subsurface mineral	6.3	9850	< 10	8.8	145	< 1	< 1
17	17_LF	surface organic	5.4	1300	< 10	0.8	398	< 1	7
18	18_B	subsurface mineral	5.4	15900	< 10	17.4	72	< 1	< 1
18	18_F/SUB	subsurface organic	5.2	3380	< 10	6.2	232	< 1	2
18	18_LF	surface organic	5.2	586	< 10	0.6	137	< 1	6
19	19_F/SUB	subsurface organic	6.3	326	< 10	0.9	71	< 1	3
19	19_LF	surface organic	4.6	176	< 10	0.5	30	< 1	2
20	20_B	subsurface mineral	5.8	13400	< 10	10.5	273	< 1	< 1
20	20_LF	surface organic	4.7	1300	< 10	1	196	< 1	< 1
21	21_F/SUB	subsurface organic	4.7	336	< 10	0.4	26	< 1	6

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
21	21_LF	surface organic	4.9	157	< 10	0.4	65	< 1	9
22	22_F/SUB	subsurface organic	5.1	534	< 10	0.5	733	< 1	10
22	22_LF	surface organic	4.7	292	< 10	0.4	331	< 1	6
23	23_B	subsurface mineral	5.5	13600	< 10	8.7	154	< 1	< 1
23	23_F	surface organic	5.1	3100	< 10	1.4	787	< 1	2
30	30_F/H	subsurface organic	7.3	3485	< 10	3.65	144.5	< 1	17.5
30	30_F	surface organic	7	1405	< 10	1.1	80.5	< 1	26.5
31	31_B	subsurface mineral	6.6	1310	< 10	0.7	34	< 1	< 1
31	31_F/H	subsurface organic	5.2	3530	< 10	2	198	< 1	1
31	31_F	surface organic	4.2	308	< 10	0.5	26	< 1	2
32	32_B	subsurface mineral	7.2	18600	< 10	7.7	221	< 1	< 1
32	32_F	surface organic	5.4	551	< 10	0.6	60	< 1	4
35	35_B	subsurface mineral	7.1	10700	< 10	3.2	230	< 1	< 1
35	35_F/SUB	subsurface organic	7	788	< 10	1.1	417	< 1	8
35	35_LF	surface organic	5.7	509	< 10	1.9	197	< 1	5
36	36_B	subsurface mineral	5	12900	< 10	9	92	< 1	< 1
36	36_LF	surface organic	5.6	412	< 10	2.2	294	< 1	4
37	37_B	subsurface mineral	6.5	13500	< 10	9.5	332	< 1	< 1
37	37_LF	surface organic	6.2	2620	< 10	7.3	661	< 1	5
38	38_LF	surface organic	5.9	609	< 10	3.9	281	< 1	8
38	38_F/SUB	subsurface organic	6.8	5410	< 10	3.1	425	< 1	7
39	39_F/SUB	subsurface organic	6.9	5460	< 10	3.2	187	< 1	7
39	39_LF	surface organic	4	780	< 10	2.8	156	< 1	9
40	40_B	subsurface mineral	5.6	15500	< 10	9.1	311	< 1	< 1
40	40_F/SUB	subsurface organic	4	532	< 10	1	150	< 1	1
40	40_LF	surface organic	4.5	642	< 10	4.3	445	< 1	3
41	41_B	subsurface mineral	5.5	11400	< 10	7	256	< 1	< 1

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
41	41_LF	surface organic	5.7	2590	< 10	5.8	593	< 1	3
42	42_B	surface mineral	4	10400	< 10	32	279	< 1	< 1
43	43_B	subsurface mineral	7.2	17300	< 10	6.6	135	< 1	< 1
43	43_F/SUB	subsurface organic	6.5	2450	< 10	2.6	210	< 1	7
43	43_LF	surface organic	5.8	616	< 10	6.3	471	< 1	9
44	44_B/SUB	subsurface mineral	3.9	9920	< 10	43.3	233	< 1	< 1
44	44_L/B	surface mineral	4.4	8280	< 10	64.8	414	< 1	< 1
45	45_B	subsurface mineral	6.9	15400	< 10	10.5	128	< 1	< 1
45	45_F/SUB	subsurface organic	6.8	6800	< 10	3.3	150	< 1	4
45	45_LF	surface organic	5.8	1790	< 10	7.5	425	< 1	10
46	46_B	subsurface mineral	7.1	1500	< 10	0.3	25	< 1	< 1
46	46_LF	surface organic	6.9	1830	< 10	9.1	229	< 1	12
47	47_B	subsurface mineral	5.9	20900	< 10	8.4	120	< 1	< 1
47	47_F/SUB	subsurface organic	4.6	2640	< 10	1.3	320	< 1	< 1
47	47_LF	surface organic	4.7	1090	< 10	6.7	382	< 1	3
48	48_B	subsurface mineral	6.1	10800	< 10	5.8	51	< 1	< 1
48	48_LF	surface organic	4.4	1990	< 10	4.5	351	< 1	2
49	49_LF	surface organic	6.6	1020	< 10	11.2	451	< 1	5
50	50_F/H	subsurface organic	6.1	14200	< 10	8.1	126	< 1	< 1
50	50_F	surface organic	4.8	1000	< 10	20.9	276	< 1	5
51	51_F/H	subsurface organic	6.5	10400	< 10	3.1	119	< 1	1
51	51_F	surface organic	4.5	1000	< 10	12.5	396	< 1	3
52	52_F/H	subsurface organic	6.3	14500	< 10	6.9	77	< 1	2
52	52_F	surface organic	5.5	625	< 10	8.9	430	< 1	18
53	53_F/H	subsurface organic	6.1	10800	< 10	6.5	94	< 1	< 1
53	53_F	surface organic	5.6	1270	< 10	3.6	111	< 1	8
54	54_F/SUB	subsurface organic	6.4	5200	< 10	2.4	329	< 1	5

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
54	54_LF	surface organic	5.7	1370	< 10	20.45	349	< 1	7
55	55_F/SUB	subsurface organic	5.9	1360	< 10	2.7	182	< 1	10
55	55_LF	surface organic	5.3	1640	< 10	36.3	712	< 1	6
56	56_F/SUB	subsurface organic	5	2260	< 10	3.8	131	< 1	5
56	56_LF	surface organic	5.5	1230	< 10	29.9	147	< 1	14
58	58_F/HA	subsurface organic	4.9	27800	< 10	7.5	189	< 1	< 1
58	58_F/HB	subsurface organic	6	21500	< 10	8.4	182	< 1	< 1
58	58_F	surface organic	4.8	7650	< 10	6.1	290	< 1	1
61	61_B	subsurface mineral	6.35	37750	< 10	6.55	266	< 1	< 1
61	61_LF	surface organic	3.9	3440	< 10	28.5	961	< 1	2
64	64_F/H	subsurface organic	6.5	22300	< 10	4	148	< 1	< 1
64	64_F	surface organic	5.5	1800	< 10	11.1	598	< 1	6
72	72_B	subsurface mineral	5.1	22000	< 10	18.3	164	< 1	< 1
72	72_LF	surface organic	4.2	1020	< 10	3.8	209	< 1	< 1
73	73_B	subsurface mineral	5.9	18400	< 10	4	133	< 1	< 1
73	73_LF	surface organic	5.3	2570	< 10	2.7	137	< 1	3
76	76_B	subsurface mineral	5	1690	< 10	0.2	23	< 1	< 1
76	76_LF	surface organic	4.6	1870	< 10	0.9	468	< 1	2
80	80_B	subsurface mineral	5.1	11400	< 10	4.8	45	< 1	< 1
80	80 Sheeplick	surface mineral	5.3	9720	< 10	4.7	47	< 1	< 1
80	80_LF	surface organic	5.1	9210	< 10	3.2	108	< 1	< 1
90	90_AH horizon	subsurface mineral	6.2	8600	< 10	3.9	147	< 1	< 1
90	90_F/SUB	subsurface organic	6.8	2360	< 10	1.0	317	< 1	5
90	90_LF	surface organic	5.6	247	< 10	0.5	46	< 1	4
100	100_F/SUB	subsurface organic	6.2	2410	< 10	1.4	93	< 1	8
100	100_LF	surface organic	5.3	982	< 10	3.5	323	< 1	7
111	111_B	subsurface mineral	7.2	7840	< 10	9.2	95	< 1	< 1

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
111	111_LF	surface organic	7	4970	< 10	5.2	278	< 1	9
114	114_F/SUB	subsurface organic	4.2	329	< 10	0.2	136	< 1	< 1
114	114_LF	surface organic	4.5	256	< 10	0.5	49	< 1	1
116	116_F/SUB	subsurface organic	4.6	690	< 10	0.5	507	< 1	1
116	116_LF	surface organic	4.3	539	< 10	1.0	187	< 1	1
120	120_F/SUB	subsurface organic	4.7	406	< 10	0.9	46	< 1	4
120	120_LF	surface organic	5	517	< 10	2.2	214	< 1	5
121	121_B	subsurface mineral	7.7	14600	< 10	8.1	207	< 1	1
121	121_F/SUB	subsurface organic	6.6	1990	< 10	4.1	193	< 1	4
121	121_LF	surface organic	5.4	714	< 10	5.4	321	< 1	4
128	128_B	subsurface mineral	5.3	10200	< 10	14.5	220	< 1	< 1
128	128_LF	surface organic	5.6	3710	< 10	1.6	433	< 1	1
131	131_B	subsurface mineral	5	3000	< 10	1.1	32	< 1	< 1
131	131_LF	surface organic	4.7	2050	< 10	1.6	160	< 1	< 1
139	139_B	subsurface mineral	5.9	29800	< 10	8.8	244	< 1	< 1
139	139_LF	surface organic	4.1	2000	< 10	2.1	352	< 1	< 1
160	160_B	subsurface mineral	7.1	11800	< 10	13.7	131	< 1	< 1
161	161_B	subsurface mineral	6.5	20500	< 10	9.6	209	< 1	< 1
161	161_F/SUB	subsurface organic	4.5	10700	< 10	13.9	194	< 1	< 1
161	161_LF	surface organic	5.2	896	< 10	4.7	367	< 1	6
199	199_B	subsurface mineral	7.3	15600	< 10	15.6	276	< 1	< 1
199	199_LF	surface organic	6	1650	< 10	2.6	386	< 1	5
200	200_B	subsurface mineral	6.1	12800	< 10	7	184	< 1	< 1
200	200_LF	surface organic	6.2	1420	< 10	1.6	427	< 1	9
300	300_B	subsurface mineral	6	11900	< 10	16.2	390	< 1	< 1
300	300_F	surface organic	5.6	2370	< 10	2.6	287	< 1	4
301	301_B	subsurface mineral	6.1	13200	< 10	7.5	323	< 1	< 1

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
301	301_F	surface organic	6.3	2890	< 10	1.9	301	< 1	4
307	307_B	surface mineral	6	17600	< 10	23.6	279	< 1	< 1
308	308_F	surface organic	4.5	3030	< 10	4.3	322	< 1	< 1
309	309_B	surface mineral	7.3	24200	< 10	11.0	110	< 1	< 1
311	311_B	surface mineral	8.1	12300	< 10	9.9	83	< 1	< 1
313	313_B	subsurface mineral	5.3	22100	< 10	10.7	149	< 1	< 1
313	313_F	surface organic	4.7	2320	< 10	7.1	216	< 1	< 1
315	315_ash subsurface	ash	8.2	1670	< 10	0.7	100	< 1	< 1
315	315 Sheeplick	subsurface mineral	8.4	10700	< 10	12.4	685	< 1	< 1
315	315_B (sandy red dust)	subsurface mineral	8.4	13500	< 10	10.3	613	< 1	< 1
315	315_F surface	surface organic	7.8	6450	< 10	7.1	363	< 1	4
319	319_B	subsurface mineral	4.9	8550	< 10	26.8	69	< 1	< 1
319	319_LF	surface organic	5.8	4460	< 10	13.4	347	< 1	1
329	329_F/SUB	subsurface organic	4.5	267	< 10	0.9	92	< 1	2
329	329_LF	surface organic	4.9	543	< 10	4.3	231	< 1	3
25a	25a_F/H	subsurface organic	6.6	10700	< 10	14.5	123	< 1	< 1
25a	25a_F	surface organic	5.7	443	< 10	0.8	41	< 1	3
26a	26a_F/H	subsurface organic	4.4	5050	< 10	6.8	241	< 1	1
26a	26a_F	surface organic	6.3	260	< 10	0.5	269	< 1	11
27a	27a_F/H	subsurface organic	6.9	2690	< 10	2.7	335	< 1	8
27a	27a_F	surface organic	6.1	443	< 10	1.3	168	< 1	18
27b	27b_B	subsurface mineral	6.7	19500	< 10	12.1	169	< 1	< 1
27b	27b_F/SUB	subsurface organic	6.5	9530	< 10	3.1	81	< 1	3
27b	27b_LF	surface organic	4.9	715	< 10	2.2	101	< 1	4
28a	28a_B	subsurface mineral	7.7	10100	< 10	10	139	< 1	< 1
28a	28a_F/H	subsurface organic	6.6	362	< 10	1.2	110	< 1	21
28a	28a_F	surface organic	6.1	224	< 10	0.8	100	< 1	18

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
29a	29a_B	subsurface mineral	4.8	13600	< 10	15.6	189	< 1	< 1
29a	29a_F	surface organic	4.2	1170	< 10	0.7	448	< 1	1
29b	29b_F/SUB	subsurface organic	6.2	2810	< 10	1.3	91	< 1	7
29b	29b_LF	surface organic	5.2	1340	< 10	6.7	410	< 1	4

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
1	1_F	surface organic	7.25	2.05	32200	10	3.5	22	5320	48
4	4_F/H	subsurface organic	6	0.6	7150	27	10	16	19700	14
4	4_F	surface organic	5.1	1.4	16100	7	3	19	5180	16
6	6_F/H	subsurface organic	6.8	< 0.5	11300	7	3	11	6220	5
6	6_F	surface organic	7.1	0.8	36600	15	7	37	13700	233
12	12_ASH	ash	6.4	< 0.5	1730	< 2	1	5	2630	< 5
12	12_B	subsurface mineral	6.1	< 0.5	2550	42	10	12	21900	16
12	12_F	surface organic	6.6	1.8	25700	4	3	22	3440	29
13	13_B	subsurface mineral	6.5	2.6	13900	24	11	46	25800	20
13	13_F/SUB	subsurface organic	5.2	3.7	17300	3	1	10	3290	< 5
13	13_LF	surface organic	6.4	2.8	27300	< 2	< 1	7	672	7
14	14_B	subsurface mineral	5.9	< 0.5	700	< 2	< 1	< 1	2420	< 5
14	14_LF	surface organic	5.5	1.9	14900	< 2	3	12	2420	9
15	15_F/SUB	subsurface organic	4.75	5.3	9320	< 2	1	11.5	1460	< 5
15	15_LF	surface organic	4.55	1.7	5525	< 2	< 1	6.5	687.5	17.5
16	16_F/SUB	subsurface organic	4.9	0.7	16200	< 2	< 1	11	1380	< 5
16	16_LF	surface organic	4.3	< 0.5	5810	< 2	< 1	8	566	11
17	17_B	subsurface mineral	6.3	< 0.5	2720	14	5	11	16100	13
17	17_LF	surface organic	5.4	1.4	19700	< 2	1	17	1690	10
18	18_B	subsurface mineral	5.4	0.7	1305	21.5	13.5	40.5	32000	60.5
18	18_F/SUB	subsurface organic	5.2	3.4	7510	3	69	84	8230	193
18	18_LF	surface organic	5.2	2.7	14500	< 2	7	29	736	17
19	19_F/SUB	subsurface organic	6.3	1.4	25000	< 2	< 1	5	556	< 5
19	19_LF	surface organic	4.6	1	4750	< 2	< 1	4	341	11
20	20_B	subsurface mineral	5.8	< 0.5	3220	24	8	21	20100	16
20	20_LF	surface organic	4.7	0.5	4990	< 2	2	6	2050	13
21	21_F/SUB	subsurface organic	4.7	1.2	11600	< 2	< 1	5	403	< 5

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
21	21_LF	surface organic	4.9	0.8	9280	< 2	< 1	4	287	6
22	22_F/SUB	subsurface organic	5.1	8.3	16600	< 2	< 1	10	823	< 5
22	22_LF	surface organic	4.7	2.7	10000	< 2	< 1	5	525	10
23	23_B	subsurface mineral	5.5	< 0.5	1700	18	8	15	20600	14
23	23_F	surface organic	5.1	9.7	15600	3	6	24	4250	8
30	30_F/H	subsurface organic	7.3	1.05	48400	2	4.5	33	3480	< 5
30	30_F	surface organic	7	< 0.5	29600	< 2	< 1	13.5	731	< 5
31	31_B	subsurface mineral	6.6	< 0.5	949	< 2	< 1	2	3430	< 5
31	31_F/H	subsurface organic	5.2	7.7	15600	3	2	56	4600	< 5
31	31_F	surface organic	4.2	0.6	3400	< 2	< 1	3	574	6
32	32_B	subsurface mineral	7.2	0.7	12800	21	11	30	24100	16
32	32_F	surface organic	5.4	0.7	18300	< 2	< 1	9	902	6
35	35_B	subsurface mineral	7.1	< 0.5	5150	25	7	31	12700	7
35	35_F/SUB	subsurface organic	7	1	49400	< 2	< 1	15	988	14
35	35_LF	surface organic	5.7	0.8	17300	< 2	< 1	13	1620	224
36	36_B	subsurface mineral	5	1.1	3410	29	9	18	20000	13
36	36_LF	surface organic	5.6	0.7	14900	< 2	< 1	13	1570	245
37	37_B	subsurface mineral	6.5	< 0.5	5020	41	10	20	20500	16
37	37_LF	surface organic	6.2	5.2	23500	8	9	85	8910	478
38	38_LF	surface organic	5.9	2.1	19500	< 2	< 1	30	2350	302
38	38_F/SUB	subsurface organic	6.8	< 0.5	31600	9	3	29	6710	< 5
39	39_F/SUB	subsurface organic	6.9	0.6	44700	8	4	78	6480	< 5
39	39_LF	surface organic	4	1.3	29600	< 2	1	35	2250	439
40	40_B	subsurface mineral	5.6	2.5	6230	37	13	31	23200	22
40	40_F/SUB	subsurface organic	4	1.7	3140	< 2	< 1	5	983	6
40	40_LF	surface organic	4.5	1.3	4750	< 2	1	33	2760	817
41	41_B	subsurface mineral	5.5	< 0.5	3200	28	9	24	18700	14

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
41	41_LF	surface organic	5.7	2	13700	7	4	41	6270	1020
42	42_B	surface mineral	4	0.5	1620	31	11	69	31900	402
43	43_B	subsurface mineral	7.2	< 0.5	9860	47	11	33	19300	12
43	43_F/SUB	subsurface organic	6.5	1.2	26500	8	2	30	3660	362
43	43_LF	surface organic	5.8	1.8	13700	< 2	2	35	2930	846
44	44_B/SUB	subsurface mineral	3.9	0.7	1650	29	10	96	34800	1330
44	44_L/B	surface mineral	4.4	0.8	1770	24	9	113	37100	1140
45	45_B	subsurface mineral	6.9	< 0.5	11600	32	10	38	20200	16
45	45_F/SUB	subsurface organic	6.8	1	41500	6	4	66	5540	6
45	45_LF	surface organic	5.8	2.3	17600	4	3	56	5730	1130
46	46_B	subsurface mineral	7.1	< 0.5	1200	< 2	< 1	3	1420	< 5
46	46_LF	surface organic	6.9	2.1	28200	4	3	59	6010	1060
47	47_B	subsurface mineral	5.9	< 0.5	3890	44	13	22	25700	31
47	47_F/SUB	subsurface organic	4.6	2.7	7000	4	1	15	3560	24
47	47_LF	surface organic	4.7	2.2	8910	3	2	57	5040	1310
48	48_B	subsurface mineral	6.1	0.6	2900	28	8	14	16800	15
48	48_LF	surface organic	4.4	1.9	7800	5	2	31	4690	480
49	49_LF	surface organic	6.6	2	16400	3	2	48	4740	863
50	50_F/H	subsurface organic	6.1	0.9	19700	30	11	28	20600	21
50	50_F	surface organic	4.8	3.5	11400	3	3	78	7870	1700
51	51_F/H	subsurface organic	6.5	< 0.5	20400	16	4	40	10200	8
51	51_F	surface organic	4.5	2.8	8750	2	3	63	6590	1310
52	52_F/H	subsurface organic	6.3	< 0.5	11500	45	9	24	16500	18
52	52_F	surface organic	5.5	1.6	16700	< 2	2	35	3710	705
53	53_F/H	subsurface organic	6.1	1.3	9800	23	6	38	12000	17
53	53_F	surface organic	5.6	5.1	21700	< 2	1	39	2850	182
54	54_F/SUB	subsurface organic	6.4	1.1	29600	3	7	24	3590	< 5

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
54	54_LF	surface organic	5.7	1.2	19250	3.5	3.5	57	9110	469
55	55_F/SUB	subsurface organic	5.9	3	36700	< 2	1	24	1660	93
55	55_LF	surface organic	5.3	3	12000	5	5	112	12900	2450
56	56_F/SUB	subsurface organic	5	0.5	11600	5	1	9	3860	29
56	56_LF	surface organic	5.5	5.3	18000	4	6	118	11000	2410
58	58_F/HA	subsurface organic	4.9	< 0.5	3410	41	13	31	25500	29
58	58_F/HB	subsurface organic	6	< 0.5	4590	35	12	25	22300	22
58	58_F	surface organic	4.8	1	2610	6	3	33	8510	246
61	61_B	subsurface mineral	6.35	< 0.5	7815	55	18.5	28	31500	35
61	61_LF	surface organic	3.9	1.4	848	7	2	272	17400	5930
64	64_F/H	subsurface organic	6.5	< 0.5	12000	37	11	28	21200	21
64	64_F	surface organic	5.5	3.9	16200	3	3	82	6360	2140
72	72_B	subsurface mineral	5.1	< 0.5	2890	37	10	54	24000	19
72	72_LF	surface organic	4.2	2.8	3370	< 2	1	24	3410	441
73	73_B	subsurface mineral	5.9	0.9	7870	27	8	25	17500	20
73	73_LF	surface organic	5.3	4	15400	3	2	26	4030	274
76	76_B	subsurface mineral	5	< 0.5	532	3	3	6	10400	< 5
76	76_LF	surface organic	4.6	1	7220	< 2	3	13	2010	129
80	80_B	subsurface mineral	5.1	< 0.5	526	12	4	10	13600	10
80	80 Sheeplick	surface mineral	5.3	< 0.5	1020	10	3	10	12700	18
80	80_LF	surface organic	5.1	< 0.5	1250	10	3	11	10000	19
90	90_AH horizon	subsurface mineral	6.2	< 0.5	6310	3	3	22	9620	< 5
90	90_F/SUB	subsurface organic	6.8	1.5	25800	< 2	2	14	3090	21
90	90_LF	surface organic	5.6	0.6	6890	< 2	< 1	6	553	18
100	100_F/SUB	subsurface organic	6.2	1.7	34400	< 2	2	20	2100	< 5
100	100_LF	surface organic	5.3	1.5	13300	3	2	32	3190	681
111	111_B	subsurface mineral	7.2	< 0.5	2220	12	6	12	14400	9

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
111	111_LF	surface organic	7	1.6	19200	7	4	19	8270	12
114	114_F/SUB	subsurface organic	4.2	< 0.5	2180	< 2	< 1	4	524	< 5
114	114_LF	surface organic	4.5	< 0.5	1650	< 2	< 1	5	533	47
116	116_F/SUB	subsurface organic	4.6	0.8	3420	< 2	< 1	7	516	< 5
116	116_LF	surface organic	4.3	< 0.5	1370	< 2	< 1	8	1260	138
120	120_F/SUB	subsurface organic	4.7	1.2	9690	< 2	1	6	821	< 5
120	120_LF	surface organic	5	0.8	7530	< 2	< 1	20	1910	382
121	121_B	subsurface mineral	7.7	< 0.5	13200	42	15	41	26200	14
121	121_F/SUB	subsurface organic	6.6	2.4	32100	8	3	29	5710	293
121	121_LF	surface organic	5.4	1.4	11100	3	1	21	2760	490
128	128_B	subsurface mineral	5.3	1.2	2640	25	8	34	22600	13
128	128_LF	surface organic	5.6	3.1	3590	2	6	19	3600	52
131	131_B	subsurface mineral	5	< 0.5	779	5	2	5	7240	< 5
131	131_LF	surface organic	4.7	0.9	2640	4	1	11	3820	62
139	139_B	subsurface mineral	5.9	< 0.5	2160	40	15	42	25200	20
139	139_LF	surface organic	4.1	< 0.5	2330	3	< 1	13	3340	169
160	160_B	subsurface mineral	7.1	0.5	3630	37	11	32	21400	175
161	161_B	subsurface mineral	6.5	0.5	6770	36	18	52	30600	19
161	161_F/SUB	subsurface organic	4.5	1.4	8390	33	11	44	21400	79
161	161_LF	surface organic	5.2	2.2	7720	3	1	26	3020	521
199	199_B	subsurface mineral	7.3	< 0.5	3100	58	13	19	23100	14
199	199_LF	surface organic	6	< 0.5	16600	8	2	11	2710	34
200	200_B	subsurface mineral	6.1	< 0.5	3430	31	7	14	18800	12
200	200_LF	surface organic	6.2	12.4	25300	4	2	13	2890	5
300	300_B	subsurface mineral	6	< 0.5	2920	22	8	14	23500	20
300	300_F	surface organic	5.6	2	11400	7	2	17	4770	67
301	301_B	subsurface mineral	6.1	0.5	2650	34	9	14	24200	32

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
301	301_F	surface organic	6.3	1.7	9010	6	2	13	4840	41
307	307_B	surface mineral	6	1	4970	39	16	66	29000	338
308	308_F	surface organic	4.5	1	1320	3	1	31	5110	421
309	309_B	surface mineral	7.3	< 0.5	6300	45	21	50	35900	36
311	311_B	surface mineral	8.1	< 0.5	8420	23	9	26	20600	28
313	313_B	subsurface mineral	5.3	< 0.5	811	26	9	21	26100	20
313	313_F	surface organic	4.7	0.8	2210	5	2	15	4760	163
315	315_ash subsurface	ash	8.2	< 0.5	6300	< 2	< 1	7	2560	< 5
315	315 Sheeplick	subsurface mineral	8.4	1.5	37100	23	10	35	22500	16
315	315_B (sandy red dust)	subsurface mineral	8.4	0.7	11400	22	10	29	23300	17
315	315_F surface	surface organic	7.8	1	8990	13	6	24	13700	10
319	319_B	subsurface mineral	4.9	< 0.5	379	12	3	7	17100	16
319	319_LF	surface organic	5.8	0.7	7940	16	5	24	9430	151
329	329_F/SUB	subsurface organic	4.5	< 0.5	4160	< 2	< 1	6	697	56
329	329_LF	surface organic	4.9	0.6	4350	< 2	< 1	18	2180	269
25a	25a_F/H	subsurface organic	6.6	0.8	5490	17	19	38	19100	30
25a	25a_F	surface organic	5.7	1.1	16500	< 2	1	15	718	5
26a	26a_F/H	subsurface organic	4.4	1.5	6900	7	12	40	10700	23
26a	26a_F	surface organic	6.3	1.4	14400	< 2	< 1	10	532	11
27a	27a_F/H	subsurface organic	6.9	1.8	53800	< 2	< 1	56	2000	< 5
27a	27a_F	surface organic	6.1	1.1	25300	< 2	< 1	15	630	8
27b	27b_B	subsurface mineral	6.7	< 0.5	8760	71	17	70	26700	18
27b	27b_F/SUB	subsurface organic	6.5	< 0.5	26800	57	6	38	12800	7
27b	27b_LF	surface organic	4.9	< 0.5	9150	< 2	1	16	1870	199
28a	28a_B	subsurface mineral	7.7	< 0.5	8120	11	7	14	15600	11
28a	28a_F/H	subsurface organic	6.6	0.9	28200	< 2	1	14	761	5
28a	28a_F	surface organic	6.1	< 0.5	17200	< 2	< 1	6	493	17

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
29a	29a_B	subsurface mineral	4.8	< 0.5	864	16	11	11	21000	33
29a	29a_F	surface organic	4.2	2.5	2970	< 2	< 1	8	1620	13
29b	29b_F/SUB	subsurface organic	6.2	0.6	32000	3	1	13	2610	< 5
29b	29b_LF	surface organic	5.2	1.4	9790	4	3	44	6180	827

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
1	1_F	surface organic	7.25	5010	1955	0.1	< 4	18
4	4_F/H	subsurface organic	6	6250	454	0.04	< 4	24
4	4_F	surface organic	5.1	2140	189	0.09	< 4	11
6	6_F/H	subsurface organic	6.8	1450	151	0.02	< 4	7
6	6_F	surface organic	7.1	3440	1190	0.2	< 4	24
12	12_ASH	ash	6.4	332	32	0.01	< 4	3
12	12_B	subsurface mineral	6.1	6550	277	0.03	< 4	37
12	12_F	surface organic	6.6	2970	1200	0.09	< 4	15
13	13_B	subsurface mineral	6.5	6610	527	0.08	6	40
13	13_F/SUB	subsurface organic	5.2	1420	33	0.08	10	5
13	13_LF	surface organic	6.4	1460	296	0.16	7	< 2
14	14_B	subsurface mineral	5.9	162	11	0.01	< 4	< 2
14	14_LF	surface organic	5.5	1060	390	0.11	5	6
15	15_F/SUB	subsurface organic	4.75	1220	64.5	0.12	< 4	7
15	15_LF	surface organic	4.55	801.5	557.5	0.175	< 4	< 2
16	16_F/SUB	subsurface organic	4.9	682	31	0.05	< 4	4
16	16_LF	surface organic	4.3	622	125	0.08	< 4	< 2
17	17_B	subsurface mineral	6.3	2910	125	0.02	< 4	13
17	17_LF	surface organic	5.4	1580	375	0.13	< 4	3
18	18_B	subsurface mineral	5.4	6695	680	0.03	< 4	19.5
18	18_F/SUB	subsurface organic	5.2	1340	1850	0.11	< 4	23
18	18_LF	surface organic	5.2	2060	1530	0.06	< 4	13
19	19_F/SUB	subsurface organic	6.3	6670	30	0.07	< 4	2
19	19_LF	surface organic	4.6	1010	66	0.06	< 4	< 2
20	20_B	subsurface mineral	5.8	5540	282	0.02	< 4	25
20	20_LF	surface organic	4.7	628	641	0.1	5	3
21	21_F/SUB	subsurface organic	4.7	2230	25	0.06	< 4	< 2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
21	21_LF	surface organic	4.9	1630	234	0.07	< 4	< 2
22	22_F/SUB	subsurface organic	5.1	1220	209	0.35	5	5
22	22_LF	surface organic	4.7	827	328	0.31	< 4	2
23	23_B	subsurface mineral	5.5	5390	290	0.01	< 4	19
23	23_F	surface organic	5.1	873	2090	< 0.01	< 4	13
30	30_F/H	subsurface organic	7.3	4135	1125.5	0.055	< 4	7.5
30	30_F	surface organic	7	3525	123.5	0.08	< 4	3
31	31_B	subsurface mineral	6.6	278	49	0.01	< 4	< 2
31	31_F/H	subsurface organic	5.2	1370	51	0.04	< 4	22
31	31_F	surface organic	4.2	311	67	0.14	< 4	< 2
32	32_B	subsurface mineral	7.2	9090	466	0.03	< 4	28
32	32_F	surface organic	5.4	1250	127	0.09	< 4	< 2
35	35_B	subsurface mineral	7.1	5200	91	0.03	< 4	25
35	35_F/SUB	subsurface organic	7	1800	225	0.11	< 4	4
35	35_LF	surface organic	5.7	892	144	0.2	< 4	< 2
36	36_B	subsurface mineral	5	6270	269	0.02	< 4	28
36	36_LF	surface organic	5.6	673	453	0.28	< 4	3
37	37_B	subsurface mineral	6.5	8490	332	0.02	< 4	40
37	37_LF	surface organic	6.2	2320	1450	0.38	< 4	17
38	38_LF	surface organic	5.9	1590	107	0.5	< 4	3
38	38_F/SUB	subsurface organic	6.8	3120	276	0.07	< 4	14
39	39_F/SUB	subsurface organic	6.9	3350	179	0.07	< 4	25
39	39_LF	surface organic	4	2000	205	0.45	< 4	7
40	40_B	subsurface mineral	5.6	7330	486	0.05	< 4	35
40	40_F/SUB	subsurface organic	4	365	43	0.11	< 4	< 2
40	40_LF	surface organic	4.5	542	577	0.54	< 4	2
41	41_B	subsurface mineral	5.5	5830	430	0.02	< 4	29

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
41	41_LF	surface organic	5.7	1660	1100	0.59	< 4	11
42	42_B	surface mineral	4	5190	441	0.38	< 4	26
43	43_B	subsurface mineral	7.2	11600	384	0.02	< 4	38
43	43_F/SUB	subsurface organic	6.5	2930	243	0.27	< 4	11
43	43_LF	surface organic	5.8	1220	221	0.65	< 4	3
44	44_B/SUB	subsurface mineral	3.9	4240	185	1.53	< 4	25
44	44_L/B	surface mineral	4.4	3640	183	1.42	< 4	22
45	45_B	subsurface mineral	6.9	6990	358	< 0.01	< 4	29
45	45_F/SUB	subsurface organic	6.8	2030	340	0.08	< 4	14
45	45_LF	surface organic	5.8	1330	390	0.11	< 4	5
46	46_B	subsurface mineral	7.1	208	36	< 0.01	< 4	< 2
46	46_LF	surface organic	6.9	1800	413	1.03	< 4	4
47	47_B	subsurface mineral	5.9	8900	340	0.02	< 4	33
47	47_F/SUB	subsurface organic	4.6	460	61	0.08	< 4	5
47	47_LF	surface organic	4.7	716	596	1.08	< 4	6
48	48_B	subsurface mineral	6.1	5330	366	< 0.01	< 4	22
48	48_LF	surface organic	4.4	979	350	0.41	< 4	6
49	49_LF	surface organic	6.6	1420	303	1.54	< 4	4
50	50_F/H	subsurface organic	6.1	8250	332	0.06	< 4	27
50	50_F	surface organic	4.8	1090	323	1.55	< 4	4
51	51_F/H	subsurface organic	6.5	3450	200	0.04	< 4	15
51	51_F	surface organic	4.5	728	132	1.07	< 4	4
52	52_F/H	subsurface organic	6.3	7090	251	0.03	< 4	34
52	52_F	surface organic	5.5	943	312	0.58	< 4	3
53	53_F/H	subsurface organic	6.1	4330	202	0.03	< 4	18
53	53_F	surface organic	5.6	1010	109	0.34	< 4	4
54	54_F/SUB	subsurface organic	6.4	1790	2770	0.04	< 4	8

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
54	54_LF	surface organic	5.7	1860	171.5	1.575	< 4	5
55	55_F/SUB	subsurface organic	5.9	1910	272	0.12	< 4	5
55	55_LF	surface organic	5.3	1250	226	2.85	< 4	5
56	56_F/SUB	subsurface organic	5	1060	23	0.11	< 4	3
56	56_LF	surface organic	5.5	964	717	1.92	< 4	5
58	58_F/HA	subsurface organic	4.9	8770	317	0.04	< 4	34
58	58_F/HB	subsurface organic	6	7840	373	0.03	< 4	29
58	58_F	surface organic	4.8	886	37	0.88	< 4	8
61	61_B	subsurface mineral	6.35	14450	449.5	0.02	< 4	43
61	61_LF	surface organic	3.9	681	59	4.3	< 4	7
64	64_F/H	subsurface organic	6.5	8870	303	0.03	< 4	28
64	64_F	surface organic	5.5	1340	179	1.47	< 4	6
72	72_B	subsurface mineral	5.1	7660	285	0.02	< 4	25
72	72_LF	surface organic	4.2	673	289	0.41	< 4	3
73	73_B	subsurface mineral	5.9	4490	433	0.03	< 4	19
73	73_LF	surface organic	5.3	901	522	0.41	< 4	4
76	76_B	subsurface mineral	5	456	51	0.01	< 4	< 2
76	76_LF	surface organic	4.6	739	309	0.26	< 4	5
80	80_B	subsurface mineral	5.1	2560	164	0.01	< 4	8
80	80 Sheeplick	surface mineral	5.3	2060	159	0.03	< 4	6
80	80_LF	surface organic	5.1	1960	137	0.06	< 4	6
90	90_AH horizon	subsurface mineral	6.2	500	284	0.06	< 4	4
90	90_F/SUB	subsurface organic	6.8	1420	1860	0.14	< 4	5
90	90_LF	surface organic	5.6	942	665	0.08	< 4	< 2
100	100_F/SUB	subsurface organic	6.2	906	386	0.09	< 4	4
100	100_LF	surface organic	5.3	1370	360	0.48	< 4	3
111	111_B	subsurface mineral	7.2	4020	309	0.03	< 4	17

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
111	111_LF	surface organic	7	2930	760	0.06	< 4	13
114	114_F/SUB	subsurface organic	4.2	503	273	0.07	< 4	3
114	114_LF	surface organic	4.5	592	439	0.09	< 4	< 2
116	116_F/SUB	subsurface organic	4.6	1100	14	0.11	< 4	10
116	116_LF	surface organic	4.3	445	106	0.25	< 4	3
120	120_F/SUB	subsurface organic	4.7	773	138	< 1	< 4	< 2
120	120_LF	surface organic	5	988	253	0.27	< 4	2
121	121_B	subsurface mineral	7.7	8710	699	0.05	< 4	43
121	121_F/SUB	subsurface organic	6.6	4880	561	0.24	< 4	12
121	121_LF	surface organic	5.4	1780	89	0.39	< 4	3
128	128_B	subsurface mineral	5.3	3250	181	0.14	8	35
128	128_LF	surface organic	5.6	882	4360	0.2	6	6
131	131_B	subsurface mineral	5	985	37	0.04	< 4	3
131	131_LF	surface organic	4.7	577	83	0.16	< 4	3
139	139_B	subsurface mineral	5.9	8380	237	0.01	< 4	45
139	139_LF	surface organic	4.1	414	60	0.23	< 4	4
160	160_B	subsurface mineral	7.1	5720	322	0.08	< 4	38
161	161_B	subsurface mineral	6.5	6420	937	0.08	11	43
161	161_F/SUB	subsurface organic	4.5	5120	302	0.15	4	45
161	161_LF	surface organic	5.2	1130	309	0.44	< 4	4
199	199_B	subsurface mineral	7.3	7880	225	0.01	< 4	45
199	199_LF	surface organic	6	1730	592	0.09	< 4	10
200	200_B	subsurface mineral	6.1	6030	146	0.03	< 4	28
200	200_LF	surface organic	6.2	3080	219	0.08	< 4	7
300	300_B	subsurface mineral	6	3940	244	0.01	< 4	23
300	300_F	surface organic	5.6	2360	595	0.23	5	10
301	301_B	subsurface mineral	6.1	5120	359	0.02	< 4	29

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
301	301_F	surface organic	6.3	1830	561	0.1	< 4	8
307	307_B	surface mineral	6	7200	817	0.29	< 4	41
308	308_F	surface organic	4.5	374	40	0.6	< 4	3
309	309_B	surface mineral	7.3	10100	439	0.03	5	55
311	311_B	surface mineral	8.1	5630	289	0.02	< 4	27
313	313_B	subsurface mineral	5.3	5720	186	0.02	< 4	24
313	313_F	surface organic	4.7	1060	106	0.42	< 4	4
315	315_ash subsurface	ash	8.2	530	28	0.02	< 4	3
315	315 Sheeplick	subsurface mineral	8.4	11200	497	0.15	< 4	35
315	315_B (sandy red dust)	subsurface mineral	8.4	5790	636	0.03	< 4	32
315	315_F surface	surface organic	7.8	3710	420	0.06	< 4	19
319	319_B	subsurface mineral	4.9	2080	117	0.02	< 4	8
319	319_LF	surface organic	5.8	3630	1200	0.3	< 4	17
329	329_F/SUB	subsurface organic	4.5	296	37	0.15	< 4	< 2
329	329_LF	surface organic	4.9	481	201	0.36	< 4	< 2
25a	25a_F/H	subsurface organic	6.6	4490	355	0.02	< 4	34
25a	25a_F	surface organic	5.7	4090	154	< 0.01	< 4	5
26a	26a_F/H	subsurface organic	4.4	2010	184	0.17	< 4	22
26a	26a_F	surface organic	6.3	2580	4390	0.13	< 4	4
27a	27a_F/H	subsurface organic	6.9	3420	93	0.06	< 4	19
27a	27a_F	surface organic	6.1	2380	120	0.09	< 4	4
27b	27b_B	subsurface mineral	6.7	9690	698	0.03	< 4	53
27b	27b_F/SUB	subsurface organic	6.5	5420	424	0.1	< 4	23
27b	27b_LF	surface organic	4.9	636	380	0.27	< 4	2
28a	28a_B	subsurface mineral	7.7	4750	346	0.04	< 4	16
28a	28a_F/H	subsurface organic	6.6	6110	131	0.27	< 4	4
28a	28a_F	surface organic	6.1	3070	148	0.27	< 4	< 2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
29a	29a_B	subsurface mineral	4.8	3530	252	< 0.01	< 4	13
29a	29a_F	surface organic	4.2	310	175	0.11	< 4	3
29b	29b_F/SUB	subsurface organic	6.2	1330	106	0.15	< 4	4
29b	29b_LF	surface organic	5.2	1010	248	0.12	< 4	4

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
1	1_F	surface organic	7.25	1680	969	0.5	< 2	96	145.5
4	4_F/H	subsurface organic	6	493	669	0.3	< 2	127	38
4	4_F	surface organic	5.1	898	706	0.4	< 2	25	100
6	6_F/H	subsurface organic	6.8	430	333	0.5	< 2	329	72
6	6_F	surface organic	7.1	1060	1510	1	< 2	77	169
12	12_ASH	ash	6.4	165	494	< 0.2	< 2	298	15
12	12_B	subsurface mineral	6.1	305	1200	0.2	< 2	49	13
12	12_F	surface organic	6.6	1180	1570	0.7	< 2	46	164
13	13_B	subsurface mineral	6.5	890	1840	2	< 2	107	51
13	13_F/SUB	subsurface organic	5.2	982	1140	1.7	< 2	18	60
13	13_LF	surface organic	6.4	1130	996	0.9	< 2	16	63
14	14_B	subsurface mineral	5.9	114	271	< 0.2	< 2	373	9
14	14_LF	surface organic	5.5	1420	1080	0.4	< 2	73	102
15	15_F/SUB	subsurface organic	4.75	636.5	1105	0.5	< 2	11.5	58.5
15	15_LF	surface organic	4.55	743	1141	0.3	< 2	< 5	22.5
16	16_F/SUB	subsurface organic	4.9	677	280	16.4	< 2	30	47
16	16_LF	surface organic	4.3	787	1140	0.8	< 2	< 5	20
17	17_B	subsurface mineral	6.3	166	825	0.4	< 2	125	16
17	17_LF	surface organic	5.4	1530	1560	1.1	< 2	16	104
18	18_B	subsurface mineral	5.4	452.5	338	< 0.2	< 2	77.5	10.5
18	18_F/SUB	subsurface organic	5.2	1640	710	0.5	< 2	49	41
18	18_LF	surface organic	5.2	1180	1610	0.3	< 2	9	62
19	19_F/SUB	subsurface organic	6.3	546	383	0.9	< 2	14	154
19	19_LF	surface organic	4.6	586	1510	0.2	< 2	138	24
20	20_B	subsurface mineral	5.8	345	420	0.4	< 2	80	18
20	20_LF	surface organic	4.7	845	677	0.7	< 2	75	35
21	21_F/SUB	subsurface organic	4.7	781	807	0.3	< 2	13	56

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
21	21_LF	surface organic	4.9	912	1110	0.2	< 2	13	36
22	22_F/SUB	subsurface organic	5.1	1220	1500	1.1	< 2	10	90
22	22_LF	surface organic	4.7	826	1400	0.7	< 2	37	48
23	23_B	subsurface mineral	5.5	313	480	0.4	< 2	63	11
23	23_F	surface organic	5.1	1110	1320	0.7	2	45	100
30	30_F/H	subsurface organic	7.3	876	349.5	0.95	< 2	78	151.5
30	30_F	surface organic	7	587	914	0.55	< 2	56.5	114
31	31_B	subsurface mineral	6.6	60	275	< 0.2	< 2	434	9
31	31_F/H	subsurface organic	5.2	745	320	0.6	< 2	111	78
31	31_F	surface organic	4.2	599	922	0.4	< 2	< 5	12
32	32_B	subsurface mineral	7.2	574	899	0.6	< 2	164	50
32	32_F	surface organic	5.4	729	813	0.4	< 2	< 5	70
35	35_B	subsurface mineral	7.1	575	1030	0.5	< 2	375	24
35	35_F/SUB	subsurface organic	7	686	480	0.8	< 2	16	143
35	35_LF	surface organic	5.7	693	1130	0.5	< 2	10	48
36	36_B	subsurface mineral	5	1010	825	0.6	< 2	117	21
36	36_LF	surface organic	5.6	904	1480	0.5	< 2	< 5	49
37	37_B	subsurface mineral	6.5	843	1030	0.6	< 2	230	33
37	37_LF	surface organic	6.2	956	1590	0.9	< 2	48	87
38	38_LF	surface organic	5.9	660	1410	0.5	< 2	7	71
38	38_F/SUB	subsurface organic	6.8	880	397	0.5	< 2	99	96
39	39_F/SUB	subsurface organic	6.9	933	815	1.1	< 2	94	164
39	39_LF	surface organic	4	716	1040	0.6	< 2	44	138
40	40_B	subsurface mineral	5.6	658	985	0.7	< 2	175	44
40	40_F/SUB	subsurface organic	4	592	657	0.4	< 2	< 5	21
40	40_LF	surface organic	4.5	810	1250	0.4	< 2	19	19
41	41_B	subsurface mineral	5.5	753	763	0.4	< 2	184	27

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
41	41_LF	surface organic	5.7	949	1220	0.6	< 2	18	52
42	42_B	surface mineral	4	689	1350	0.5	< 2	139	17
43	43_B	subsurface mineral	7.2	469	1600	0.2	< 2	230	35
43	43_F/SUB	subsurface organic	6.5	650	1040	0.4	< 2	17	95
43	43_LF	surface organic	5.8	684	1460	0.3	< 2	7	58
44	44_B/SUB	subsurface mineral	3.9	722	2330	0.5	< 2	152	19
44	44_L/B	surface mineral	4.4	682	2060	0.5	< 2	108	17
45	45_B	subsurface mineral	6.9	454	873	0.4	< 2	369	47
45	45_F/SUB	subsurface organic	6.8	786	277	0.8	< 2	97	102
45	45_LF	surface organic	5.8	847	939	0.7	< 2	16	62
46	46_B	subsurface mineral	7.1	230	331	< 0.2	< 2	425	9
46	46_LF	surface organic	6.9	712	696	2	< 2	83	85
47	47_B	subsurface mineral	5.9	540	1350	< 0.2	< 2	228	27
47	47_F/SUB	subsurface organic	4.6	565	376	0.3	< 2	94	49
47	47_LF	surface organic	4.7	1060	903	0.4	< 2	< 5	44
48	48_B	subsurface mineral	6.1	480	968	0.2	< 2	203	22
48	48_LF	surface organic	4.4	877	841	0.5	< 2	5	41
49	49_LF	surface organic	6.6	827	887	0.4	< 2	26	48
50	50_F/H	subsurface organic	6.1	497	820	0.6	< 2	162	95
50	50_F	surface organic	4.8	838	1910	0.6	2	< 5	49
51	51_F/H	subsurface organic	6.5	551	393	0.4	< 2	242	87
51	51_F	surface organic	4.5	669	780	0.6	< 2	< 5	42
52	52_F/H	subsurface organic	6.3	391	938	0.3	< 2	320	43
52	52_F	surface organic	5.5	812	1840	0.7	< 2	< 5	53
53	53_F/H	subsurface organic	6.1	414	522	0.5	< 2	299	39
53	53_F	surface organic	5.6	854	1470	0.6	< 2	< 5	82
54	54_F/SUB	subsurface organic	6.4	1010	231	0.7	< 2	136	130

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
54	54_LF	surface organic	5.7	757	1190	0.65	2	134.5	105
55	55_F/SUB	subsurface organic	5.9	818	721	0.5	< 2	< 5	152
55	55_LF	surface organic	5.3	1000	949	0.9	3	5	60
56	56_F/SUB	subsurface organic	5	602	542	0.3	< 2	48	55
56	56_LF	surface organic	5.5	1010	1210	1	3	< 5	78
58	58_F/HA	subsurface organic	4.9	525	1000	0.2	< 2	292	26
58	58_F/HB	subsurface organic	6	650	791	0.4	< 2	266	30
58	58_F	surface organic	4.8	956	721	0.5	< 2	83	27
61	61_B	subsurface mineral	6.35	265.5	3360	0.3	< 2	1035	54.5
61	61_LF	surface organic	3.9	804	554	1.2	6	12	23
64	64_F/H	subsurface organic	6.5	383	1290	0.3	< 2	469	64
64	64_F	surface organic	5.5	787	996	0.8	< 2	< 5	76
72	72_B	subsurface mineral	5.1	466	711	0.3	< 2	106	18
72	72_LF	surface organic	4.2	1080	1330	0.5	< 2	10	14
73	73_B	subsurface mineral	5.9	652	730	0.4	< 2	281	32
73	73_LF	surface organic	5.3	971	1360	0.5	< 2	30	55
76	76_B	subsurface mineral	5	196	165	< 0.2	< 2	311	7
76	76_LF	surface organic	4.6	1400	933	0.7	< 2	44	79
80	80_B	subsurface mineral	5.1	443	669	< 0.2	< 2	39	5
80	80 Sheeplick	surface mineral	5.3	618	671	< 0.2	< 2	104	8
80	80_LF	surface organic	5.1	895	578	< 0.2	< 2	89	17
90	90_AH horizon	subsurface mineral	6.2	1360	118	0.7	< 2	101	49
90	90_F/SUB	subsurface organic	6.8	1170	375	0.3	< 2	117	148
90	90_LF	surface organic	5.6	743	1080	< 0.2	< 2	37	41
100	100_F/SUB	subsurface organic	6.2	808	450	0.6	< 2	63	175
100	100_LF	surface organic	5.3	788	929	0.5	< 2	6	78
111	111_B	subsurface mineral	7.2	477	553	0.3	< 2	105	18

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
111	111_LF	surface organic	7	1100	933	0.6	< 2	61	71
114	114_F/SUB	subsurface organic	4.2	533	414	< 0.2	< 2	23	27
114	114_LF	surface organic	4.5	762	919	< 0.2	< 2	35	5
116	116_F/SUB	subsurface organic	4.6	509	361	< 0.2	< 2	34	25
116	116_LF	surface organic	4.3	885	808	< 0.2	< 2	68	9
120	120_F/SUB	subsurface organic	4.7	627	777	0.4	< 2	6	43
120	120_LF	surface organic	5	618	1020	0.4	< 2	45	28
121	121_B	subsurface mineral	7.7	851	740	1.3	< 2	185	44
121	121_F/SUB	subsurface organic	6.6	909	1030	1.1	< 2	< 5	95
121	121_LF	surface organic	5.4	749	1490	0.5	< 2	37	39
128	128_B	subsurface mineral	5.3	1410	407	1.1	< 2	33	16
128	128_LF	surface organic	5.6	2360	1390	0.4	< 2	78	27
131	131_B	subsurface mineral	5	178	231	< 0.2	< 2	298	13
131	131_LF	surface organic	4.7	1640	770	< 0.2	< 2	114	39
139	139_B	subsurface mineral	5.9	327	828	0.3	< 2	282	19
139	139_LF	surface organic	4.1	893	733	0.7	< 2	24	39
160	160_B	subsurface mineral	7.1	583	1650	0.5	< 2	159	25
161	161_B	subsurface mineral	6.5	449	2580	0.6	< 2	219	52
161	161_F/SUB	subsurface organic	4.5	700	1720	1	< 2	67	63
161	161_LF	surface organic	5.2	868	1640	0.5	< 2	12	47
199	199_B	subsurface mineral	7.3	402	1750	0.3	< 2	118	14
199	199_LF	surface organic	6	1020	1530	0.7	< 2	18	51
200	200_B	subsurface mineral	6.1	638	1270	0.7	< 2	103	23
200	200_LF	surface organic	6.2	1490	996	1.9	< 2	9	116
300	300_B	subsurface mineral	6	402	430	0.4	< 2	68	17
300	300_F	surface organic	5.6	836	840	0.5	< 2	40	51
301	301_B	subsurface mineral	6.1	290	883	0.2	< 2	101	15

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
301	301_F	surface organic	6.3	822	769	0.2	< 2	96	43
307	307_B	surface mineral	6	800	1480	0.4	< 2	264	34
308	308_F	surface organic	4.5	1420	408	0.3	< 2	78	24
309	309_B	surface mineral	7.3	646	3610	0.5	< 2	324	36
311	311_B	surface mineral	8.1	552	1420	< 0.2	< 2	194	38
313	313_B	subsurface mineral	5.3	317	611	0.2	< 2	64	9
313	313_F	surface organic	4.7	931	486	< 0.2	< 2	60	27
315	315_ash subsurface	ash	8.2	336	522	0.2	< 2	378	22
315	315 Sheeplick	subsurface mineral	8.4	940	890	0.9	< 2	116	87
315	315_B (sandy red dust)	subsurface mineral	8.4	599	1230	0.6	< 2	95	45
315	315_F surface	surface organic	7.8	821	1110	0.7	< 2	55	35
319	319_B	subsurface mineral	4.9	214	218	< 0.2	< 2	99	5
319	319_LF	surface organic	5.8	879	702	0.2	< 2	19	35
329	329_F/SUB	subsurface organic	4.5	510	431	< 0.2	< 2	17	22
329	329_LF	surface organic	4.9	660	849	< 0.2	< 2	19	16
25a	25a_F/H	subsurface organic	6.6	357	350	2	< 2	166	30
25a	25a_F	surface organic	5.7	642	888	1.1	< 2	13	77
26a	26a_F/H	subsurface organic	4.4	832	1100	0.9	< 2	39	50
26a	26a_F	surface organic	6.3	1140	1970	< 0.2	< 2	13	45
27a	27a_F/H	subsurface organic	6.9	810	209	2.5	< 2	94	175
27a	27a_F	surface organic	6.1	1160	1790	0.5	< 2	< 5	103
27b	27b_B	subsurface mineral	6.7	830	636	0.5	< 2	180	43
27b	27b_F/SUB	subsurface organic	6.5	859	422	0.5	< 2	130	109
27b	27b_LF	surface organic	4.9	652	813	0.4	< 2	12	42
28a	28a_B	subsurface mineral	7.7	529	1030	0.6	< 2	185	32
28a	28a_F/H	subsurface organic	6.6	945	1020	4.6	< 2	31	120
28a	28a_F	surface organic	6.1	870	1300	1	< 2	13	71

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Phosphorus PO4	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr
29a	29a_B	subsurface mineral	4.8	207	508	< 0.2	< 2	60	8
29a	29a_F	surface organic	4.2	880	1170	0.4	< 2	75	31
29b	29b_F/SUB	subsurface organic	6.2	668	648	0.5	< 2	67	83
29b	29b_LF	surface organic	5.2	850	1010	0.3	< 2	< 5	30

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
1	1_F	surface organic	7.25	< 5	92.5	8	328.5	1
4	4_F/H	subsurface organic	6	< 5	84	22	79	2
4	4_F	surface organic	5.1	< 5	46	6	79	2
6	6_F/H	subsurface organic	6.8	< 5	157	7	25	1
6	6_F	surface organic	7.1	< 5	130	15	267	3
12	12_ASH	ash	6.4	< 5	111	7	7	< 1
12	12_B	subsurface mineral	6.1	< 5	357	35	86	3
12	12_F	surface organic	6.6	< 5	44	5	200	< 1
13	13_B	subsurface mineral	6.5	< 5	126	51	241	6
13	13_F/SUB	subsurface organic	5.2	< 5	30	6	85	2
13	13_LF	surface organic	6.4	< 5	11	1	271	< 1
14	14_B	subsurface mineral	5.9	< 5	79	8	3	< 1
14	14_LF	surface organic	5.5	< 5	26	5	51	< 1
15	15_F/SUB	subsurface organic	4.75	< 5	14.5	2	66.5	< 1
15	15_LF	surface organic	4.55	< 5	15	1	112	< 1
16	16_F/SUB	subsurface organic	4.9	6	15	2	41	2
16	16_LF	surface organic	4.3	< 5	8	< 1	54	< 1
17	17_B	subsurface mineral	6.3	< 5	185	26	79	2
17	17_LF	surface organic	5.4	< 5	34	3	86	1
18	18_B	subsurface mineral	5.4	< 5	106.5	18.5	269.5	3
18	18_F/SUB	subsurface organic	5.2	< 5	39	4	337	1
18	18_LF	surface organic	5.2	< 5	6	< 1	480	< 1
19	19_F/SUB	subsurface organic	6.3	< 5	13	< 1	64	< 1
19	19_LF	surface organic	4.6	< 5	6	< 1	80	< 1
20	20_B	subsurface mineral	5.8	< 5	175	50	71	1
20	20_LF	surface organic	4.7	< 5	52	4	65	< 1
21	21_F/SUB	subsurface organic	4.7	< 5	2	< 1	44	< 1

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
21	21_LF	surface organic	4.9	< 5	5	< 1	79	< 1
22	22_F/SUB	subsurface organic	5.1	< 5	18	1	134	< 1
22	22_LF	surface organic	4.7	< 5	10	< 1	99	< 1
23	23_B	subsurface mineral	5.5	< 5	179	24	51	2
23	23_F	surface organic	5.1	< 5	70	8	141	< 1
30	30_F/H	subsurface organic	7.3	< 5	59.5	5	83	1.5
30	30_F	surface organic	7	< 5	9	2.5	97	< 1
31	31_B	subsurface mineral	6.6	< 5	152	11	7	< 1
31	31_F/H	subsurface organic	5.2	< 5	117	7	65	2
31	31_F	surface organic	4.2	< 5	15	< 1	43	< 1
32	32_B	subsurface mineral	7.2	< 5	118	26	88	5
32	32_F	surface organic	5.4	< 5	13	1	49	< 1
35	35_B	subsurface mineral	7.1	< 5	308	30	54	3
35	35_F/SUB	subsurface organic	7	< 5	22	4	87	< 1
35	35_LF	surface organic	5.7	< 5	19	1	222	< 1
36	36_B	subsurface mineral	5	< 5	298	55	87	2
36	36_LF	surface organic	5.6	< 5	16	1	287	< 1
37	37_B	subsurface mineral	6.5	< 5	356	35	119	2
37	37_LF	surface organic	6.2	< 5	68	7	533	1
38	38_LF	surface organic	5.9	< 5	23	2	427	< 1
38	38_F/SUB	subsurface organic	6.8	< 5	101	11	45	2
39	39_F/SUB	subsurface organic	6.9	< 5	134	11	42	2
39	39_LF	surface organic	4	< 5	23	5	346	< 1
40	40_B	subsurface mineral	5.6	< 5	266	36	120	2
40	40_F/SUB	subsurface organic	4	< 5	29	1	169	< 1
40	40_LF	surface organic	4.5	< 5	24	2	652	< 1
41	41_B	subsurface mineral	5.5	< 5	272	27	85	2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
41	41_LF	surface organic	5.7	< 5	76	7	866	1
42	42_B	surface mineral	4	< 5	396	30	203	3
43	43_B	subsurface mineral	7.2	< 5	414	37	48	1
43	43_F/SUB	subsurface organic	6.5	< 5	70	9	410	1
43	43_LF	surface organic	5.8	< 5	22	2	847	< 1
44	44_B/SUB	subsurface mineral	3.9	< 5	496	32	309	4
44	44_L/B	surface mineral	4.4	< 5	385	28	301	5
45	45_B	subsurface mineral	6.9	< 5	318	27	62	2
45	45_F/SUB	subsurface organic	6.8	< 5	89	6	32	1
45	45_LF	surface organic	5.8	< 5	59	5	1070	2
46	46_B	subsurface mineral	7.1	< 5	88	4	3	< 1
46	46_LF	surface organic	6.9	< 5	47	4	862	2
47	47_B	subsurface mineral	5.9	< 5	677	43	89	3
47	47_F/SUB	subsurface organic	4.6	< 5	100	6	87	< 1
47	47_LF	surface organic	4.7	< 5	40	3	1060	1
48	48_B	subsurface mineral	6.1	< 5	291	22	63	2
48	48_LF	surface organic	4.4	< 5	72	6	574	1
49	49_LF	surface organic	6.6	< 5	28	3	975	< 1
50	50_F/H	subsurface organic	6.1	< 5	175	34	65	4
50	50_F	surface organic	4.8	< 5	31	3	1550	1
51	51_F/H	subsurface organic	6.5	< 5	151	13	50	2
51	51_F	surface organic	4.5	< 5	38	3	1370	1
52	52_F/H	subsurface organic	6.3	< 5	303	25	65	2
52	52_F	surface organic	5.5	< 5	22	2	798	< 1
53	53_F/H	subsurface organic	6.1	< 5	353	22	78	1
53	53_F	surface organic	5.6	< 5	29	8	175	< 1
54	54_F/SUB	subsurface organic	6.4	< 5	72	9	25	2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
54	54_LF	surface organic	5.7	< 5	48	3.5	409	2.5
55	55_F/SUB	subsurface organic	5.9	< 5	40	4	351	< 1
55	55_LF	surface organic	5.3	< 5	54	5	1150	2
56	56_F/SUB	subsurface organic	5	< 5	91	5	199	< 1
56	56_LF	surface organic	5.5	< 5	39	4	3050	2
58	58_F/HA	subsurface organic	4.9	< 5	345	46	108	2
58	58_F/HB	subsurface organic	6	< 5	439	40	64	2
58	58_F	surface organic	4.8	< 5	77	7	355	< 1
61	61_B	subsurface mineral	6.35	< 5	746.5	51.5	117	4
61	61_LF	surface organic	3.9	< 5	140	11	553	7
64	64_F/H	subsurface organic	6.5	< 5	524	35	89	3
64	64_F	surface organic	5.5	< 5	57	5	1380	2
72	72_B	subsurface mineral	5.1	< 5	290	50	77	1
72	72_LF	surface organic	4.2	< 5	33	2	294	< 1
73	73_B	subsurface mineral	5.9	< 5	488	34	70	1
73	73_LF	surface organic	5.3	< 5	59	4	298	1
76	76_B	subsurface mineral	5	< 5	383	38	17	< 1
76	76_LF	surface organic	4.6	< 5	48	4	168	< 1
80	80_B	subsurface mineral	5.1	< 5	312	24	45	< 1
80	80 Sheeplick	surface mineral	5.3	< 5	125	19	47	< 1
80	80_LF	surface organic	5.1	5	211	18	61	< 1
90	90_AH horizon	subsurface mineral	6.2	6	87	15	10	3
90	90_F/SUB	subsurface organic	6.8	9	24	2	156	< 1
90	90_LF	surface organic	5.6	7	8	< 1	169	< 1
100	100_F/SUB	subsurface organic	6.2	< 5	38	4	94	1
100	100_LF	surface organic	5.3	< 5	36	3	902	< 1
111	111_B	subsurface mineral	7.2	< 5	208	16	50	2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
111	111_LF	surface organic	7	< 5	131	12	119	< 1
114	114_F/SUB	subsurface organic	4.2	6	8	< 1	27	< 1
114	114_LF	surface organic	4.5	6	10	< 1	56	< 1
116	116_F/SUB	subsurface organic	4.6	6	13	1	21	< 1
116	116_LF	surface organic	4.3	7	27	2	110	< 1
120	120_F/SUB	subsurface organic	4.7	< 5	21	1	117	< 1
120	120_LF	surface organic	5	< 5	18	2	419	< 1
121	121_B	subsurface mineral	7.7	< 5	174	29	96	3
121	121_F/SUB	subsurface organic	6.6	< 5	37	6	391	2
121	121_LF	surface organic	5.4	< 5	20	2	468	< 1
128	128_B	subsurface mineral	5.3	< 5	45	42	134	< 1
128	128_LF	surface organic	5.6	5	56	5	103	< 1
131	131_B	subsurface mineral	5	< 5	264	21	11	< 1
131	131_LF	surface organic	4.7	< 5	77	5	86	< 1
139	139_B	subsurface mineral	5.9	< 5	429	42	65	5
139	139_LF	surface organic	4.1	< 5	80	4	175	< 1
160	160_B	subsurface mineral	7.1	< 5	381	36	130	3
161	161_B	subsurface mineral	6.5	< 5	381	43	97	3
161	161_F/SUB	subsurface organic	4.5	< 5	278	33	266	5
161	161_LF	surface organic	5.2	< 5	31	2	666	< 1
199	199_B	subsurface mineral	7.3	< 5	570	54	73	3
199	199_LF	surface organic	6	< 5	73	6	76	< 1
200	200_B	subsurface mineral	6.1	< 5	285	36	82	3
200	200_LF	surface organic	6.2	< 5	58	5	281	< 1
300	300_B	subsurface mineral	6	< 5	86	37	80	2
300	300_F	surface organic	5.6	< 5	77	7	233	< 1
301	301_B	subsurface mineral	6.1	< 5	161	37	123	2

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
301	301_F	surface organic	6.3	< 5	88	7	143	< 1
307	307_B	surface mineral	6	< 5	409	33	334	2
308	308_F	surface organic	4.5	6	95	5	522	< 1
309	309_B	surface mineral	7.3	5	560	40	112	3
311	311_B	surface mineral	8.1	< 5	279	23	106	2
313	313_B	subsurface mineral	5.3	< 5	150	36	54	2
313	313_F	surface organic	4.7	7	71	5	363	< 1
315	315_ash subsurface	ash	8.2	< 5	99	7	6	< 1
315	315 Sheeplick	subsurface mineral	8.4	< 5	183	31	128	6
315	315_B (sandy red dust)	subsurface mineral	8.4	< 5	102	36	112	3
315	315_F surface	surface organic	7.8	< 5	130	20	99	2
319	319_B	subsurface mineral	4.9	< 5	117	32	36	< 1
319	319_LF	surface organic	5.8	7	33	6	406	2
329	329_F/SUB	subsurface organic	4.5	7	13	< 1	135	< 1
329	329_LF	surface organic	4.9	8	18	1	400	< 1
25a	25a_F/H	subsurface organic	6.6	< 5	142	21	88	2
25a	25a_F	surface organic	5.7	< 5	13	1	32	< 1
26a	26a_F/H	subsurface organic	4.4	< 5	103	11	41	3
26a	26a_F	surface organic	6.3	< 5	7	< 1	346	< 1
27a	27a_F/H	subsurface organic	6.9	< 5	34	5	10	2
27a	27a_F	surface organic	6.1	< 5	10	4	30	< 1
27b	27b_B	subsurface mineral	6.7	< 5	201	36	60	2
27b	27b_F/SUB	subsurface organic	6.5	< 5	114	23	49	2
27b	27b_LF	surface organic	4.9	< 5	24	2	206	< 1
28a	28a_B	subsurface mineral	7.7	< 5	323	26	62	4
28a	28a_F/H	subsurface organic	6.6	< 5	11	3	25	1
28a	28a_F	surface organic	6.1	< 5	8	< 1	83	< 1

Table C2a. Soil Raw Data: elements and pH

Site_ID	Sample_ID	classification	pH	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
29a	29a_B	subsurface mineral	4.8	< 5	116	31	89	1
29a	29a_F	surface organic	4.2	< 5	41	3	44	< 1
29b	29b_F/SUB	subsurface organic	6.2	< 5	58	4	51	1
29b	29b_LF	surface organic	5.2	< 5	41	4	959	1

Table C2b. Soil Raw Data: cyanide

Site_ID	Sample_ID	classification	Total_cyanide
44	44_L/B	surface mineral	< 0.4
44	44_B/SUB	subsurface mineral	< 0.4

Table C2c. Soil Raw Data: sequential analyses

Site_ID	Sample_ID	classification	Al mg/L Step 1	Al mg/L Step 2	Al mg/L Step 3	Sb mg/L Step 1	Sb mg/L Step 2	Sb mg/L Step 3	As mg/L Step 1	As mg/L Step 2	As mg/L Step 3	Ba mg/L Step 1	Ba mg/L Step 2	Ba mg/L Step 3
13	13 LF	surface organic	0.38	1.12	3.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	3.5	0.98	0.28
13	13 F/SUB	subsurface organic	3.93	6.24	10	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.23	0.46	0.27
13	13 B	subsurface mineral	14.2	31.4	107	<0.05	<0.05	<0.05	0.03	0.06	0.09	4.7	0.96	0.88
18	18 LF	surface organic	5.08	5.01	2.09	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.14	0.3	0.14
18	18 F/SUB	subsurface organic	28.5	24.6	14.1	<0.05	<0.05	<0.05	<0.03	<0.03	0.04	4.1	0.46	0.6
18	18 B	subsurface mineral	11.2	13.3	141	<0.05	<0.05	<0.05	<0.03	0.04	0.16	0.94	0.049	0.27
28a	28a F	surface organic	0.54	1.85	1.9	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	1.43	0.27	0.16
28a	28a F/H	subsurface organic	0.5	2.29	3.36	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	0.89	0.31	0.32
31	31 F	surface organic	2.86	2.58	1.63	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	0.57	0.022	0.015
31	31 F/H	subsurface organic	14.7	39.4	13.9	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.87	0.63	0.61
31	31 B	subsurface mineral	10.6	6.05	8.18	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	0.77	0.027	0.049
42	42 B	subsurface mineral	19.7	7.72	89.1	<0.05	<0.05	<0.05	<0.03	0.1	0.24	1.53	0.2	6.27
43	43 LF	surface organic	2.29	3.24	4.18	<0.05	<0.05	<0.05	<0.03	<0.03	0.07	8.11	1.13	1.31
43	43 F/SUB	subsurface organic	3.61	7.49	18.3	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.27	0.75	0.43
43	43 B	subsurface mineral	12.3	26.2	209	<0.05	<0.05	<0.05	<0.03	<0.03	0.06	2.3	0.36	0.61
44	44 L/B	surface mineral	10.2	7.46	80.5	<0.05	<0.05	<0.05	<0.03	0.11	0.6	1.56	0.38	10.8
44	44 B/SUB	subsurface mineral	13.1	8.28	92.7	<0.05	<0.05	<0.05	<0.03	0.1	0.34	1.22	0.25	7.75
44	44 B/SUB dup	subsurface mineral	13.1	8.36	94.6	<0.05	<0.05	<0.05	<0.03	0.11	0.36	1.2	0.23	6.98
50	50 F/H	subsurface organic	14.4	34.1	118	<0.05	<0.05	<0.05	<0.03	<0.03	0.05	1.09	0.28	0.42
51	51 F	surface organic	6.71	6.85	5.18	<0.05	<0.05	<0.05	0.04	0.04	0.1	7.55	1.5	3.92
51	51 F/H	subsurface organic	13.1	55.8	70	<0.05	<0.05	<0.05	<0.03	0.04	<0.03	1.46	0.48	0.3
52	52 F	surface organic	2.27	2.9	4.43	<0.05	<0.05	<0.05	<0.03	<0.03	0.07	5.81	0.89	2.42
52	52 F/H	subsurface organic	20	21.3	141	<0.05	<0.05	<0.05	<0.03	0.04	0.03	1.29	0.14	0.26
53	53 F	surface organic	5.99	9.763	6.21	<0.05	<0.05	<0.05	<0.03	<0.03	0.04	1.29	0.23	0.31
53	53 F/H	subsurface organic	25.3	41.8	99.2	<0.05	<0.05	<0.05	<0.03	0.03	0.05	1.62	0.25	0.24

Site_ID	Sample_ID	classification	Al mg/L Step 1	Al mg/L Step 2	Al mg/L Step 3	Sb mg/L Step 1	Sb mg/L Step 2	Sb mg/L Step 3	As mg/L Step 1	As mg/L Step 2	As mg/L Step 3	Ba mg/L Step 1	Ba mg/L Step 2	Ba mg/L Step 3
55	55 LF	surface organic	8.66	6.87	9.53	<0.05	<0.05	<0.05	0.21	0.07	0.17	3.65	1.18	6.89
55	55 F/SUB	subsurface organic	3.54	9.78	7.49	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	1.66	0.43	0.55
56	56 LF	surface organic	6.61	3.69	6.34	<0.05	<0.05	<0.05	0.18	<0.03	0.15	3.72	0.95	4.17
56	56 F/SUB	subsurface organic	10.3	19.7	13.1	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.17	0.41	0.37
61	61 LF	surface organic	40.7	17.4	14.5	0.2	<0.05	0.06	0.12	0.13	0.11	2.96	1.66	15.7
61	61 B	subsurface mineral	50.9	16.1	340	<0.05	<0.05	<0.05	<0.03	<0.03	0.04	3.84	0.16	1.33
64	64 F	surface organic	8.21	11.7	10	<0.05	<0.05	<0.05	0.07	<0.03	0.08	4.47	0.78	4.18
64	64 F/H	subsurface organic	26.6	33.1	203	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.42	0.26	0.46
121	121 LF	surface organic	2.99	3.32	5.4	<0.05	<0.05	<0.05	<0.03	<0.03	0.06	5.36	0.75	0.51
121	121 F/SUB	subsurface organic	1.34	6.17	18.4	<0.05	<0.05	<0.05	<0.03	<0.03	0.03	1.56	0.75	0.61
160	160 B	subsurface mineral	13.5	7.12	101	<0.05	<0.05	<0.05	0.03	<0.03	0.12	1.66	0.047	0.82
160	160 B dup	subsurface mineral	29.5	46.5	188	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	2.36	0.34	0.37

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Be mg/L Step 1	Be mg/L Step 2	Be mg/L Step 3	B mg/L Step 1	B mg/L Step 2	B mg/L Step 3	Cd mg/L Step 1	Cd mg/L Step 2	Cd mg/L Step 3	Ca mg/L Step 1	Ca mg/L Step 2	Ca mg/L Step 3
13	13 LF	surface organic	<0.003	<0.003	<0.003	0.26	0.01	0.06	0.05	0.02	<0.01	598	53.8	7.58
13	13 F/SUB	subsurface organic	<0.003	<0.003	<0.003	0.07	<0.01	0.04	0.09	0.02	<0.01	429	70.2	3.34
13	13 B	subsurface mineral	0.005	<0.003	<0.003	0.02	<0.01	<0.01	0.04	<0.01	<0.01	342	40.8	5.57
18	18 LF	surface organic	<0.003	<0.003	<0.003	0.07	<0.01	0.03	0.06	0.01	<0.01	358	51.3	2.27
18	18 F/SUB	subsurface organic	0.006	<0.003	<0.003	0.03	<0.01	0.01	0.09	0.01	<0.01	223	21.7	2.23
18	18 B	subsurface mineral	<0.003	<0.003	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	27.3	1.48	3.53
28a	28a F	surface organic	<0.003	<0.003	<0.003	0.26	<0.01	0.05	<0.01	<0.01	<0.01	430	76.2	6.87
28a	28a F/H	subsurface organic	<0.003	<0.003	<0.003	0.25	0.01	0.08	<0.01	<0.01	<0.01	510	33.2	47.5
31	31 F	surface organic	<0.003	<0.003	<0.003	0.02	<0.01	0.01	0.01	<0.01	<0.01	87.3	4.89	0.62
31	31 F/H	subsurface organic	<0.003	<0.003	<0.003	0.02	<0.01	0.02	0.11	0.05	0.02	390	56.9	5.86
31	31 B	subsurface mineral	<0.003	<0.003	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	21	1.34	2.26
42	42 B	subsurface mineral	<0.003	<0.003	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	30.6	1.39	6.71
43	43 LF	surface organic	<0.003	<0.003	<0.003	0.11	<0.01	0.04	0.03	<0.01	<0.01	375	41.6	2.83
43	43 F/SUB	subsurface organic	<0.003	<0.003	<0.003	0.07	<0.01	0.04	0.02	<0.01	<0.01	570	46.1	34.5
43	43 B	subsurface mineral	0.003	<0.003	<0.003	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	279	29.2	18.3
44	44 L/B	surface mineral	<0.003	<0.003	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	44.6	1.67	4.43
44	44 B/SUB	subsurface mineral	<0.003	<0.003	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	36.9	1.47	5.16
44	44 B/SUB dup	subsurface mineral	<0.003	<0.003	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	34.2	1.43	4.79
50	50 F/H	subsurface organic	0.003	<0.003	<0.003	0.02	<0.01	<0.01	0.02	<0.01	<0.01	411	70.5	12.9
51	51 F	surface organic	<0.003	<0.003	<0.003	0.05	<0.01	0.02	0.06	<0.01	<0.01	245	23.1	1.52
51	51 F/H	subsurface organic	<0.003	<0.003	<0.003	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	510	86.5	8.04
52	52 F	surface organic	<0.003	<0.003	<0.003	0.28	<0.01	0.05	0.03	<0.01	<0.01	401	59	3.01
52	52 F/H	subsurface organic	0.004	<0.003	<0.003	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	276	22.3	21.3
53	53 F	surface organic	<0.003	<0.003	<0.003	0.09	<0.01	0.04	0.11	0.03	<0.01	508	79	8.09
53	53 F/H	subsurface organic	0.004	<0.003	<0.003	0.02	<0.01	<0.01	0.03	<0.01	<0.01	305	30.7	12.2

Site_ID	Sample_ID	classification	Be mg/L Step 1	Be mg/L Step 2	Be mg/L Step 3	B mg/L Step 1	B mg/L Step 2	B mg/L Step 3	Cd mg/L Step 1	Cd mg/L Step 2	Cd mg/L Step 3	Ca mg/L Step 1	Ca mg/L Step 2	Ca mg/L Step 3
55	55 LF	surface organic	<0.003	<0.003	<0.003	0.11	<0.01	0.03	0.06	<0.01	<0.01	286	29.2	9.33
55	55 F/SUB	subsurface organic	<0.003	<0.003	<0.003	0.09	<0.01	0.04	0.04	0.02	<0.01	712	36.1	43.8
56	56 LF	surface organic	<0.003	<0.003	<0.003	0.21	<0.01	0.04	0.07	<0.01	0.01	289	72.5	17.5
56	56 F/SUB	subsurface organic	<0.003	<0.003	<0.003	0.07	<0.01	0.03	0.01	<0.01	<0.01	377	50.6	3.18
61	61 LF	surface organic	<0.003	<0.003	<0.003	0.01	<0.01	0.03	0.03	<0.01	<0.01	20.1	1.67	2.68
61	61 B	subsurface mineral	0.004	<0.003	0.006	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	80.4	4.38	44.9
64	64 F	surface organic	<0.003	<0.003	<0.003	0.07	<0.01	0.03	0.09	0.01	<0.01	398	59	4.8
64	64 F/H	subsurface organic	0.005	<0.003	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	267	21.7	23.7
121	121 LF	surface organic	<0.003	<0.003	<0.003	0.05	<0.01	0.02	0.02	<0.01	<0.01	290	29.2	1.88
121	121 F/SUB	subsurface organic	<0.003	<0.003	<0.003	0.04	<0.01	0.03	0.03	0.02	<0.01	596	54.1	30.3
160	160 B	subsurface mineral	0.005	<0.003	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	65.3	2.03	13
160	160 B dup	subsurface mineral	0.005	<0.003	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	254	25.4	23.4

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Cr mg/L Step 1	Cr mg/L Step 2	Cr mg/L Step 3	Co mg/L Step 1	Co mg/L Step 2	Co mg/L Step 3	Cu mg/L Step 1	Cu mg/L Step 2	Cu mg/L Step 3	Fe mg/L Step 1	Fe mg/L Step 2	Fe mg/L Step 3
13	13 LF	surface organic	<0.01	1.04	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.04	0.51	5.18
13	13 F/SUB	subsurface organic	<0.01	1.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.07	3.05	2.99	19.9
13	13 B	subsurface mineral	<0.01	1.09	0.17	0.03	0.03	0.06	<0.02	0.17	0.21	19.4	49.9	183
18	18 LF	surface organic	<0.01	1.04	<0.01	<0.02	<0.02	0.02	<0.02	0.03	0.18	0.96	1.02	4.71
18	18 F/SUB	subsurface organic	<0.01	1.02	0.02	0.88	0.09	0.17	<0.02	0.25	0.54	45.8	41.6	31
18	18 B	subsurface mineral	<0.01	1.11	0.18	<0.02	<0.02	0.08	0.05	0.06	0.29	15.9	12.4	303
28a	28a F	surface organic	<0.01	1	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.2	0.3	4.01
28a	28a F/H	subsurface organic	<0.01	0.59	<0.01	<0.02	<0.02	<0.02	<0.02	0.02	0.1	0.12	1.02	7.41
31	31 F	surface organic	<0.01	1.03	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	3.31	0.34	3.55
31	31 F/H	subsurface organic	<0.01	0.63	0.02	<0.02	<0.02	<0.02	<0.02	0.28	0.34	11.6	28.2	21.9
31	31 B	subsurface mineral	<0.01	1.08	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	6.42	4.67	21.8
42	42 B	subsurface mineral	0.03	1.1	0.29	0.07	<0.02	0.07	0.14	0.05	0.52	54.7	22.8	281
43	43 LF	surface organic	<0.01	0.99	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.27	7	2.52	19.6
43	43 F/SUB	subsurface organic	<0.01	1.01	0.06	<0.02	<0.02	<0.02	<0.02	0.02	0.23	1.43	2.72	27.7
43	43 B	subsurface mineral	<0.01	1.1	0.59	0.04	<0.02	0.11	<0.02	0.18	0.26	21.3	32.3	230
44	44 L/B	surface mineral	0.02	1.08	0.22	<0.02	<0.02	0.08	0.1	0.08	0.96	46.7	22.8	368
44	44 B/SUB	subsurface mineral	0.03	1.09	0.26	<0.02	<0.02	0.09	0.15	0.06	0.81	79.6	23.4	324
44	44 B/SUB dup	subsurface mineral	0.03	1.09	0.26	<0.02	<0.02	0.09	0.15	0.07	0.84	79.4	24.2	328
50	50 F/H	subsurface organic	<0.01	0.63	0.25	<0.02	<0.02	0.08	<0.02	0.06	0.2	7.8	23.7	172
51	51 F	surface organic	<0.01	1.03	0.02	0.02	<0.02	<0.02	<0.02	0.05	0.48	32.4	19.3	35.8
51	51 F/H	subsurface organic	<0.01	0.62	0.14	<0.02	<0.02	0.03	<0.02	0.22	0.22	5.58	20.7	81.4
52	52 F	surface organic	<0.01	1.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.26	8.17	2.55	24.9
52	52 F/H	subsurface organic	0.01	0.65	0.44	0.02	<0.02	0.08	<0.02	0.1	0.16	15.9	22.8	162
53	53 F	surface organic	<0.01	1.04	0.01	<0.02	<0.02	<0.02	<0.02	0.03	0.3	3.18	3.22	20.7
53	53 F/H	subsurface organic	<0.01	0.63	0.24	<0.02	<0.02	0.05	<0.02	0.22	0.28	10.9	24.4	115

Site_ID	Sample_ID	classification	Cr mg/L Step 1	Cr mg/L Step 2	Cr mg/L Step 3	Co mg/L Step 1	Co mg/L Step 2	Co mg/L Step 3	Cu mg/L Step 1	Cu mg/L Step 2	Cu mg/L Step 3	Fe mg/L Step 1	Fe mg/L Step 2	Fe mg/L Step 3
55	55 LF	surface organic	<0.01	1	0.03	0.02	<0.02	<0.02	<0.02	0.18	0.79	56.9	39.3	61.3
55	55 F/SUB	subsurface organic	<0.01	1	0.01	<0.02	<0.02	<0.02	<0.02	0.02	0.18	0.27	1.38	12.8
56	56 LF	surface organic	<0.01	1.05	0.02	<0.02	<0.02	<0.02	<0.02	0.08	0.71	35.2	9.23	58
56	56 F/SUB	subsurface organic	<0.01	1.03	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	0.07	10.1	10.5	26.3
61	61 LF	surface organic	<0.01	1.06	0.05	<0.02	<0.02	<0.02	0.17	0.95	1.6	147	60.9	62.2
61	61 B	subsurface mineral	0.03	1.08	0.5	0.09	<0.02	0.14	<0.02	0.03	0.22	35.7	20.3	309
64	64 F	surface organic	<0.01	1.03	0.03	<0.02	<0.02	<0.02	<0.02	0.1	0.6	12.5	12.5	43.1
64	64 F/H	subsurface organic	<0.01	0.63	0.35	0.02	<0.02	0.08	<0.02	0.12	0.14	18.7	30.7	194
121	121 LF	surface organic	<0.01	0.98	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.18	8.15	2.36	19
121	121 F/SUB	subsurface organic	<0.01	1.01	0.07	<0.02	<0.02	0.03	<0.02	0.03	0.23	1.03	8.63	46.1
160	160 B	subsurface mineral	0.03	1.09	0.37	0.07	<0.02	0.08	0.08	0.03	0.23	28.7	7.17	207
160	160 B dup	subsurface mineral	<0.01	1.09	0.32	0.03	<0.02	0.08	<0.02	0.14	0.13	19.6	41.3	180

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Pb mg/L Step 1	Pb mg/L Step 2	Pb mg/L Step 3	Mg mg/L Step 1	Mg mg/L Step 2	Mg mg/L Step 3	Mn mg/L Step 1	Mn mg/L Step 2	Mn mg/L Step 3	Hg ug/L Step 1	Hg ug/L Step 2	Hg ug/L Step 3
13	13 LF	surface organic	<0.03	0.03	<0.03	43.1	3.89	1.17	6.76	0.93	0.071	0.03	0.1	1.56
13	13 F/SUB	subsurface organic	<0.03	<0.03	<0.03	35.5	3.33	2.74	0.48	0.058	0.083	<0.02	0.02	0.73
13	13 B	subsurface mineral	<0.03	0.07	0.08	27.3	3.45	45.9	8.81	0.75	1.63	<0.02	0.14	0.71
18	18 LF	surface organic	<0.03	0.09	0.05	55.5	3.93	0.58	42	3.24	0.12	<0.02	0.02	0.67
18	18 F/SUB	subsurface organic	0.52	1.46	0.44	29.3	1.6	4.33	48.4	2.45	0.34	<0.02	0.18	0.9
18	18 B	subsurface mineral	0.54	0.05	0.3	3.99	1.4	63.6	2.08	0.14	5.31	<0.02	<0.02	0.14
28a	28a F	surface organic	<0.03	0.07	0.08	82.2	8.18	0.92	3.27	0.43	0.038	<0.02	0.05	1.12
28a	28a F/H	subsurface organic	<0.03	0.04	<0.03	158	18.2	2.05	1.95	0.37	0.12	<0.02	0.09	1.22
31	31 F	surface organic	<0.03	<0.03	<0.03	7.79	0.53	0.31	1.7	0.095	0.035	<0.02	0.03	1.33
31	31 F/H	subsurface organic	<0.03	0.05	<0.03	40.9	3	2.16	1	0.097	0.092	<0.02	0.04	0.39
31	31 B	subsurface mineral	<0.03	<0.03	<0.03	1.95	0.46	1.71	0.65	0.095	0.12	<0.02	<0.02	0.08
42	42 B	subsurface mineral	1.06	0.06	2.87	3.87	1.31	49.6	8.47	0.21	1.56	<0.02	1.62	1.88
43	43 LF	surface organic	2.21	5.86	2.22	27.1	2.01	2.11	5.84	0.4	0.088	0.04	0.62	5.68
43	43 F/SUB	subsurface organic	0.31	2.59	1.06	38.5	4.42	13.2	4.83	0.66	0.24	<0.02	0.19	2.43
43	43 B	subsurface mineral	0.04	0.05	0.09	12.6	3.44	159	7.83	0.66	1.83	<0.02	<0.02	0.2
44	44 L/B	surface mineral	5.35	0.27	9.26	2.81	0.91	36.1	0.88	0.067	1.51	<0.02	4.85	5.51
44	44 B/SUB	subsurface mineral	0.87	0.08	11.2	2.3	1.06	42.3	0.35	0.057	1.6	<0.02	4	5.46
44	44 B/SUB dup	subsurface mineral	0.94	0.09	11.5	2.21	1.07	42.5	0.33	0.061	1.61	<0.02	4.47	5.05
50	50 F/H	subsurface organic	<0.03	0.11	0.09	52.1	4.3	62.7	4.57	0.51	1.18	<0.02	0.06	0.48
51	51 F	surface organic	6.31	8.91	2.6	13.4	0.94	2.24	3.14	0.18	0.099	0.03	1.57	8.44
51	51 F/H	subsurface organic	<0.03	0.05	0.04	13.4	1.29	30.5	3.41	0.4	0.54	<0.02	0.13	0.41
52	52 F	surface organic	2.08	4.52	1.61	20.5	1.32	2.12	7.96	0.47	0.098	<0.02	0.32	5.64
52	52 F/H	subsurface organic	<0.03	0.12	0.1	9.89	0.83	77.5	3.42	0.31	1.16	<0.02	0.03	0.29
53	53 F	surface organic	0.19	1.15	0.63	21.8	2.02	2.17	2.33	0.24	0.082	<0.02	0.22	3.24
53	53 F/H	subsurface organic	<0.03	0.12	0.09	10.1	0.88	48.5	2.58	0.35	0.99	<0.02	0.07	0.36

Site_ID	Sample_ID	classification	Pb mg/L Step 1	Pb mg/L Step 2	Pb mg/L Step 3	Mg mg/L Step 1	Mg mg/L Step 2	Mg mg/L Step 3	Mn mg/L Step 1	Mn mg/L Step 2	Mn mg/L Step 3	Hg ug/L Step 1	Hg ug/L Step 2	Hg ug/L Step 3
55	55 LF	surface organic	13.8	16.2	3.79	18.3	1.07	5.02	4.94	0.25	0.29	0.52	8.83	11.4
55	55 F/SUB	subsurface organic	0.04	0.42	0.4	43.2	4.84	2.34	5.28	0.7	0.22	<0.02	0.5	0.99
56	56 LF	surface organic	12	11.4	2.69	13.5	0.75	3.14	15.8	0.62	0.29	0.09	2.65	11.4
56	56 F/SUB	subsurface organic	0.07	0.26	0.11	19.1	1.79	5.81	0.27	0.032	0.12	<0.02	0.18	1.13
61	61 LF	surface organic	77.3	27.4	6.39	1.9	0.33	5.65	0.55	0.035	0.28	0.98	27	13.3
61	61 B	subsurface mineral	0.3	0.05	0.21	12.1	2.06	152	4	0.37	2.26	<0.02	0.06	0.19
64	64 F	surface organic	5.83	14.9	4.94	25.8	1.99	4.1	3.97	0.32	0.2	0.76	6.48	5.86
64	64 F/H	subsurface organic	<0.03	0.1	0.11	14.8	1.52	87.5	3.22	0.42	1.44	<0.02	0.06	0.25
121	121 LF	surface organic	0.92	3.32	1.23	40.1	2.87	2.9	1.96	0.14	0.078	<0.02	0.31	3.99
121	121 F/SUB	subsurface organic	0.09	1.93	0.81	97.1	14.5	11.4	11	2.41	0.42	0.04	0.25	2.15
160	160 B	subsurface mineral	2.17	0.04	0.53	9.63	1.48	57.1	4.2	0.11	1.45	<0.02	0.03	1.24
160	160 B dup	subsurface mineral	<0.03	0.09	0.11	14.6	3.4	81	3.72	0.63	1.32	<0.02	0.11	0.19

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Mo mg/L Step 1	Mo mg/L Step 2	Mo mg/L Step 3	Ni mg/L Step 1	Ni mg/L Step 2	Ni mg/L Step 3	P mg/L Step 1	P mg/L Step 2	P mg/L Step 3	K mg/L Step 1	K mg/L Step 2	K mg/L Step 3
13	13 LF	surface organic	<0.02	0.07	0.03	<0.02	<0.02	<0.02	10	7570	8.1	31.2	0.9	0.5
13	13 F/SUB	subsurface organic	<0.02	0.03	0.07	<0.02	<0.02	0.02	5.7	7740	5	33.3	1.8	1.7
13	13 B	subsurface mineral	<0.02	0.04	0.04	0.03	0.07	0.25	8.3	7830	2.9	3.4	1.9	12.4
18	18 LF	surface organic	<0.02	0.02	<0.02	0.03	<0.02	0.06	16.4	7610	6.4	42.7	1	<0.25
18	18 F/SUB	subsurface organic	<0.02	<0.02	<0.02	0.17	0.06	0.12	5.3	7640	8.8	20.1	0.9	1.3
18	18 B	subsurface mineral	<0.02	0.02	<0.02	0.03	0.02	0.15	6.4	8030	2.7	1.6	2.2	3.2
28a	28a F	surface organic	<0.02	0.03	<0.02	0.02	<0.02	<0.02	11.4	7420	10.2	35.4	1.2	0.3
28a	28a F/H	subsurface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	11.5	7590	29	27.7	1.9	0.4
31	31 F	surface organic	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	4.7	7610	5.1	25.4	1.1	<0.25
31	31 F/H	subsurface organic	<0.02	<0.02	<0.02	0.03	0.09	0.14	1.7	7850	6.2	5.5	1.9	2
31	31 B	subsurface mineral	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.4	7960	0.2	2.6	1.6	2.2
42	42 B	subsurface mineral	<0.02	<0.02	0.02	0.02	<0.02	0.24	6.2	7990	5.2	1.4	1.8	13.7
43	43 LF	surface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	7	7350	16.6	36.1	1	0.6
43	43 F/SUB	subsurface organic	<0.02	0.02	<0.02	<0.02	<0.02	0.08	5.8	7390	11.8	22.5	1.5	1.6
43	43 B	subsurface mineral	<0.02	<0.02	<0.02	0.03	0.05	0.43	5.1	7770	2.9	2.8	3.5	19.2
44	44 L/B	surface mineral	<0.02	0.02	<0.02	<0.02	<0.02	0.21	3.7	7840	7.7	3.1	2	22.1
44	44 B/SUB	subsurface mineral	<0.02	0.02	<0.02	<0.02	<0.02	0.25	5.7	7860	5.6	1.1	2.1	24.6
44	44 B/SUB dup	subsurface mineral	<0.02	0.03	<0.02	<0.02	<0.02	0.24	4.6	7890	5.6	1	2.2	25.6
50	50 F/H	subsurface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.21	1.7	7830	3.9	2.7	2.1	7.1
51	51 F	surface organic	<0.02	0.03	<0.02	0.03	<0.02	0.02	4.5	7610	7	19.1	1	0.8
51	51 F/H	subsurface organic	<0.02	<0.02	<0.02	<0.02	0.04	0.12	0.9	7780	3.3	1.6	2	4.3
52	52 F	surface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	9.2	7600	6.7	48	1.3	0.7
52	52 F/H	subsurface organic	<0.02	<0.02	<0.02	<0.02	0.03	0.33	2.9	7830	2.4	4.2	2.4	10.1
53	53 F	surface organic	<0.02	0.02	<0.02	<0.02	<0.02	0.03	8.5	7600	7.7	37.2	1.4	0.6
53	53 F/H	subsurface organic	<0.02	0.02	<0.02	<0.02	<0.02	0.19	0.8	7770	2.7	1.8	1.6	6.5

			Mo	Mo	Mo	Ni	Ni	Ni	P	P	P	K	K	K
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Site_ID	Sample_ID	classification	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
55	55 LF	surface organic	<0.02	<0.02	<0.02	0.03	0.02	0.03	6	7420	11.1	22	1	1.6
55	55 F/SUB	subsurface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	6.6	7420	20.9	16.7	1.1	0.5
56	56 LF	surface organic	<0.02	<0.02	<0.02	0.03	<0.02	0.03	6.6	7660	5.7	25.3	1.2	1.2
56	56 F/SUB	subsurface organic	<0.02	0.03	<0.02	<0.02	<0.02	0.03	2.6	7620	6	14.3	1.1	1.8
61	61 LF	surface organic	<0.02	<0.02	<0.02	0.03	<0.02	0.04	2.5	7660	7.5	10.5	1	2.1
61	61 B	subsurface mineral	<0.02	0.02	0.02	<0.02	<0.02	0.41	2	7860	1.9	2.7	3	35.7
64	64 F	surface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	5.5	7640	7	23.3	1.2	1.5
64	64 F/H	subsurface organic	<0.02	<0.02	<0.02	<0.02	0.03	0.25	0.9	7820	2.3	1.5	1.8	14.2
121	121 LF	surface organic	<0.02	0.02	<0.02	0.02	<0.02	0.02	5.3	7300	25.2	37.4	1.2	0.6
121	121 F/SUB	subsurface organic	<0.02	<0.02	<0.02	<0.02	<0.02	0.09	7.4	7470	29	22.7	1.3	1.7
160	160 B	subsurface mineral	<0.02	<0.02	<0.02	0.12	<0.02	0.35	12.3	7950	2.8	1.9	2.8	15.8
160	160 B dup	subsurface mineral	<0.02	<0.02	<0.02	0.02	0.03	0.23	1	7760	2	1.4	1.6	13.2

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Se mg/L Step 1	Se mg/L Step 2	Se mg/L Step 3	Si mg/L Step 1	Si mg/L Step 2	Si mg/L Step 3	Ag mg/L Step 1	Ag mg/L Step 2	Ag mg/L Step 3	Na mg/L Step 1	Na mg/L Step 2	Na mg/L Step 3
13	13 LF	surface organic	<0.002	<0.002	<0.004	1.62	85.3	0.99	<0.01	<0.01	<0.01	<0.1	1420	226
13	13 F/SUB	subsurface organic	<0.002	<0.002	0.008	2.17	21	1	<0.01	<0.01	<0.01	0.1	1410	290
13	13 B	subsurface mineral	<0.002	0.004	0.007	14.5	28.6	1.75	<0.01	<0.01	<0.01	0.6	1430	65.7
18	18 LF	surface organic	<0.002	<0.002	<0.004	1.54	43.7	0.88	<0.01	<0.01	<0.01	0.6	1410	209
18	18 F/SUB	subsurface organic	<0.002	<0.002	<0.004	2.67	33.8	1.06	<0.01	<0.01	<0.01	1	1400	180
18	18 B	subsurface mineral	<0.002	<0.002	<0.004	4.85	30.3	3.96	<0.01	<0.01	<0.01	0.4	1420	6.7
28a	28a F	surface organic	<0.002	<0.002	0.004	1.65	26.5	1.22	<0.01	<0.01	<0.01	0.8	1410	248
28a	28a F/H	subsurface organic	0.003	0.002	0.028	1.01	13.4	0.57	<0.01	<0.01	<0.01	1.5	1610	293
31	31 F	surface organic	<0.002	<0.002	<0.004	0.5	33.4	1.51	<0.01	<0.01	<0.01	<0.1	1410	229
31	31 F/H	subsurface organic	<0.002	<0.002	<0.004	1.94	42.9	1.48	<0.01	<0.01	<0.01	1.2	1590	252
31	31 B	subsurface mineral	<0.002	<0.002	<0.004	2.13	32.7	0.87	<0.01	<0.01	<0.01	2.2	1440	8.6
42	42 B	subsurface mineral	<0.002	<0.002	<0.004	7.71	29.5	2.28	<0.01	<0.01	<0.01	0.3	1430	13.8
43	43 LF	surface organic	<0.002	<0.002	<0.004	1.79	28.8	0.92	<0.01	<0.01	<0.01	0.4	1410	250
43	43 F/SUB	subsurface organic	<0.002	<0.002	<0.004	2.32	17.7	0.76	<0.01	<0.01	<0.01	0.5	1410	273
43	43 B	subsurface mineral	<0.002	<0.002	<0.004	9.85	30.6	1.28	<0.01	<0.01	<0.01	0.5	1420	65.5
44	44 L/B	surface mineral	<0.002	<0.002	<0.004	5.99	24.7	1.7	<0.01	0.01	<0.01	0.4	1430	16.3
44	44 B/SUB	subsurface mineral	<0.002	<0.002	<0.004	5.91	30.4	1.49	<0.01	<0.01	0.01	0.3	1410	15.4
44	44 B/SUB dup	subsurface mineral	<0.002	<0.002	<0.004	5.7	30.5	2.03	<0.01	<0.01	0.01	0.3	1440	16.3
50	50 F/H	subsurface organic	<0.002	<0.002	<0.004	3.31	17.3	1.25	<0.01	<0.01	<0.01	0.9	1580	157
51	51 F	surface organic	<0.002	<0.002	<0.004	1.36	26.6	1.33	<0.01	<0.01	0.01	<0.1	1400	232
51	51 F/H	subsurface organic	<0.002	<0.002	<0.004	3.7	24.4	0.98	<0.01	<0.01	<0.01	1.5	1630	126
52	52 F	surface organic	<0.002	<0.002	<0.004	1.5	42.6	1.42	<0.01	<0.01	<0.01	<0.1	1420	224
52	52 F/H	subsurface organic	<0.002	<0.002	<0.004	9.76	18	1.54	<0.01	<0.01	<0.01	0.6	1620	67.3
53	53 F	surface organic	<0.002	<0.002	<0.004	1.19	18.7	1.21	<0.01	<0.01	<0.01	0.2	1420	270
53	53 F/H	subsurface organic	<0.002	<0.002	<0.004	5.88	20.6	0.89	<0.01	<0.01	<0.01	1.5	1600	76.8

			Se	Se	Se	Si	Si	Si	Ag	Ag	Ag	Na	Na	Na
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Site_ID	Sample_ID	classification	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
55	55 LF	surface organic	<0.002	<0.002	<0.004	3.4	44.4	0.87	<0.01	0.02	0.02	<0.1	1430	173
55	55 F/SUB	subsurface organic	<0.002	<0.002	<0.004	0.76	15.6	0.63	<0.01	<0.01	<0.01	0.1	1410	341
56	56 LF	surface organic	<0.002	<0.002	<0.004	2.85	39.7	1.18	<0.01	<0.01	0.02	<0.1	1430	132
56	56 F/SUB	subsurface organic	<0.002	<0.002	<0.004	1.38	26.2	0.75	<0.01	<0.01	<0.01	<0.1	1410	277
61	61 LF	surface organic	<0.002	<0.002	0.005	2.13	37.8	1.4	<0.01	0.05	0.03	0.2	1410	159
61	61 B	subsurface mineral	<0.002	<0.002	<0.004	25	24.8	1.86	<0.01	<0.01	<0.01	0.6	1450	44.1
64	64 F	surface organic	<0.002	<0.002	<0.004	1.72	19.1	0.93	<0.01	<0.01	0.01	<0.1	1400	247
64	64 F/H	subsurface organic	<0.002	<0.002	<0.004	12.9	20.4	1.44	<0.01	<0.01	<0.01	1.2	1600	55.9
121	121 LF	surface organic	<0.002	<0.002	<0.004	1.28	22.3	1.02	<0.01	<0.01	<0.01	1.3	1430	250
121	121 F/SUB	subsurface organic	<0.002	<0.002	<0.004	1.59	16.3	0.63	<0.01	<0.01	<0.01	0.6	1390	354
160	160 B	subsurface mineral	<0.002	<0.002	<0.004	10.3	24.4	1.9	<0.01	<0.01	<0.01	0.3	1420	10.9
160	160 B dup	subsurface mineral	<0.002	<0.002	<0.004	14.2	35.7	1.5	<0.01	<0.01	<0.01	1	1420	52.1

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Sr mg/L Step 1	Sr mg/L Step 2	Sr mg/L Step 3	Sn mg/L Step 1	Sn mg/L Step 2	Sn mg/L Step 3	Ti mg/L Step 1	Ti mg/L Step 2	Ti mg/L Step 3	V mg/L Step 1	V mg/L Step 2	V mg/L Step 3
13	13 LF	surface organic	1.3	0.19	0.038	<0.03	0.07	<0.03	<0.005	0.081	0.09	<0.01	<0.01	<0.01
13	13 F/SUB	subsurface organic	1.25	0.15	0.047	<0.03	<0.03	<0.03	0.015	0.047	0.18	<0.01	0.01	0.04
13	13 B	subsurface mineral	0.97	0.1	0.068	<0.03	0.09	<0.03	0.018	0.42	1.45	0.02	0.09	0.29
18	18 LF	surface organic	1.16	0.11	0.032	<0.03	0.07	<0.03	<0.005	0.021	0.043	<0.01	<0.01	<0.01
18	18 F/SUB	subsurface organic	1	0.064	0.033	<0.03	<0.03	<0.03	0.006	0.19	0.19	<0.01	<0.01	0.03
18	18 B	subsurface mineral	0.12	0.01	0.057	<0.03	0.07	<0.03	0.008	0.21	1.06	0.02	0.02	0.16
28a	28a F	surface organic	1.23	0.16	0.066	<0.03	<0.03	<0.03	0.009	0.008	0.059	<0.01	<0.01	<0.01
28a	28a F/H	subsurface organic	1.65	0.27	0.18	<0.03	<0.03	<0.03	<0.005	0.021	0.11	<0.01	<0.01	0.02
31	31 F	surface organic	0.26	0.016	0.006	<0.03	<0.03	<0.03	<0.005	0.018	0.1	<0.01	<0.01	<0.01
31	31 F/H	subsurface organic	1.76	0.18	0.089	<0.03	0.04	<0.03	0.009	0.97	0.46	<0.01	0.02	0.05
31	31 B	subsurface mineral	0.12	0.011	0.048	<0.03	<0.03	<0.03	0.048	0.38	1.13	0.01	<0.01	0.07
42	42 B	subsurface mineral	0.13	0.011	0.14	<0.03	0.04	0.03	0.014	0.44	3.67	0.04	0.01	0.25
43	43 LF	surface organic	1.18	0.095	0.029	<0.03	<0.03	<0.03	<0.005	0.031	0.14	<0.01	<0.01	<0.01
43	43 F/SUB	subsurface organic	1.5	0.24	0.081	<0.03	<0.03	<0.03	0.011	0.055	0.46	<0.01	0.02	0.05
43	43 B	subsurface mineral	0.82	0.066	0.13	<0.03	<0.03	<0.03	0.022	0.52	5.88	0.02	0.07	0.43
44	44 L/B	surface mineral	0.19	0.012	0.15	<0.03	<0.03	<0.03	0.012	0.39	4.09	0.03	0.01	0.26
44	44 B/SUB	subsurface mineral	0.17	0.014	0.16	<0.03	0.03	<0.03	0.012	0.4	5.04	0.05	0.02	0.28
44	44 B/SUB dup	subsurface mineral	0.16	0.014	0.16	<0.03	<0.03	<0.03	0.012	0.41	5.26	0.05	0.02	0.28
50	50 F/H	subsurface organic	1.48	0.18	0.14	<0.03	0.04	<0.03	0.025	0.39	1.35	<0.01	0.03	0.24
51	51 F	surface organic	0.87	0.064	0.035	<0.03	0.05	<0.03	<0.005	0.14	0.23	<0.01	<0.01	0.02
51	51 F/H	subsurface organic	1.8	0.24	0.09	<0.03	<0.03	<0.03	0.027	0.63	0.96	<0.01	0.02	0.11
52	52 F	surface organic	1.02	0.092	0.032	<0.03	<0.03	<0.03	<0.005	0.025	0.15	<0.01	<0.01	<0.01
52	52 F/H	subsurface organic	0.75	0.048	0.2	<0.03	<0.03	<0.03	0.026	0.48	3.44	<0.01	0.04	0.23
53	53 F	surface organic	1.44	0.15	0.07	<0.03	<0.03	<0.03	<0.005	0.036	0.19	<0.01	0.02	0.04
53	53 F/H	subsurface organic	0.93	0.076	0.12	<0.03	<0.03	<0.03	0.03	0.96	3.67	<0.01	0.04	0.2

Site_ID	Sample_ID	classification	Sr mg/L Step 1	Sr mg/L Step 2	Sr mg/L Step 3	Sn mg/L Step 1	Sn mg/L Step 2	Sn mg/L Step 3	Ti mg/L Step 1	Ti mg/L Step 2	Ti mg/L Step 3	V mg/L Step 1	V mg/L Step 2	V mg/L Step 3
55	55 LF	surface organic	1.06	0.079	0.083	<0.03	0.05	<0.03	0.012	0.17	0.28	<0.01	<0.01	0.03
55	55 F/SUB	subsurface organic	2.13	0.3	0.23	<0.03	<0.03	<0.03	<0.005	0.049	0.26	<0.01	<0.01	0.02
56	56 LF	surface organic	1.17	0.13	0.11	<0.03	<0.03	<0.03	0.006	0.054	0.2	<0.01	<0.01	0.02
56	56 F/SUB	subsurface organic	1.37	0.15	0.047	<0.03	<0.03	0.04	<0.005	0.44	0.59	<0.01	<0.01	0.03
61	61 LF	surface organic	0.18	0.03	0.13	<0.03	0.05	<0.03	0.028	0.6	0.71	0.03	0.02	0.06
61	61 B	subsurface mineral	0.4	0.02	0.44	<0.03	<0.03	<0.03	0.016	0.45	7.57	0.06	0.03	0.44
64	64 F	surface organic	1.37	0.12	0.079	<0.03	<0.03	<0.03	0.008	0.12	0.36	<0.01	<0.01	0.03
64	64 F/H	subsurface organic	1.03	0.065	0.33	<0.03	<0.03	<0.03	0.031	0.6	5.02	0.01	0.04	0.29
121	121 LF	surface organic	0.77	0.058	0.019	<0.03	<0.03	<0.03	<0.005	0.034	0.13	<0.01	<0.01	0.01
121	121 F/SUB	subsurface organic	1.31	0.3	0.11	<0.03	0.05	<0.03	<0.005	0.066	0.26	<0.01	0.01	0.04
160	160 B	subsurface mineral	0.2	0.01	0.18	<0.03	<0.03	<0.03	0.012	0.19	3.26	0.06	<0.01	0.29
160	160 B dup	subsurface mineral	0.96	0.078	0.27	<0.03	0.03	<0.03	0.053	0.91	4.5	0.02	0.07	0.27

Table C2c. Soil Raw Data: sequential ana

Site_ID	Sample_ID	classification	Zn mg/L Step 1	Zn mg/L Step 2	Zn mg/L Step 3	Zr mg/L Step 1	Zr mg/L Step 2	Zr mg/L Step 3
13	13 LF	surface organic	2.51	2.45	0.16	<0.02	0.03	<0.02
13	13 F/SUB	subsurface organic	1.08	0.39	0.17	<0.02	0.03	<0.02
13	13 B	subsurface mineral	0.47	0.38	1.28	<0.02	0.13	0.05
18	18 LF	surface organic	8.92	2.54	0.17	<0.02	0.03	<0.02
18	18 F/SUB	subsurface organic	7.32	0.95	0.33	<0.02	0.07	<0.02
18	18 B	subsurface mineral	0.66	0.19	1.86	<0.02	0.06	0.05
28a	28a F	surface organic	1.5	0.55	0.14	<0.02	0.02	<0.02
28a	28a F/H	subsurface organic	0.067	0.21	0.062	<0.02	<0.02	<0.02
31	31 F	surface organic	0.97	0.098	0.027	<0.02	0.02	<0.02
31	31 F/H	subsurface organic	0.91	0.41	0.14	<0.02	0.08	<0.02
31	31 B	subsurface mineral	0.021	0.024	0.041	<0.02	0.06	<0.02
42	42 B	subsurface mineral	0.3	0.064	1.73	<0.02	0.05	0.03
43	43 LF	surface organic	12.4	2.19	3.14	<0.02	0.03	<0.02
43	43 F/SUB	subsurface organic	4.01	3.5	0.47	<0.02	0.03	<0.02
43	43 B	subsurface mineral	0.06	0.047	0.54	<0.02	0.08	0.03
44	44 L/B	surface mineral	0.46	0.075	2.65	<0.02	0.04	0.05
44	44 B/SUB	subsurface mineral	0.35	0.074	2.73	<0.02	0.04	0.05
44	44 B/SUB dup	subsurface mineral	0.35	0.076	2.78	<0.02	0.03	0.04
50	50 F/H	subsurface organic	0.082	0.067	0.51	<0.02	0.04	0.03
51	51 F	surface organic	27.2	3.03	3.56	<0.02	0.04	<0.02
51	51 F/H	subsurface organic	0.083	0.08	0.4	<0.02	0.06	<0.02
52	52 F	surface organic	11	1.86	3.01	<0.02	0.03	<0.02
52	52 F/H	subsurface organic	0.15	0.044	0.6	<0.02	0.04	<0.02
53	53 F	surface organic	1.76	0.71	0.68	<0.02	0.03	<0.02
53	53 F/H	subsurface organic	0.19	0.074	0.81	<0.02	0.08	<0.02

Site_ID	Sample_ID	classification	Zn mg/L Step 1	Zn mg/L Step 2	Zn mg/L Step 3	Zr mg/L Step 1	Zr mg/L Step 2	Zr mg/L Step 3
55	55 LF	surface organic	23.7	2.52	3.48	<0.02	0.03	<0.02
55	55 F/SUB	subsurface organic	2.73	3.52	0.21	<0.02	0.02	<0.02
56	56 LF	surface organic	43.6	3.72	9.51	<0.02	0.04	<0.02
56	56 F/SUB	subsurface organic	4.59	1.01	0.19	<0.02	0.02	<0.02
61	61 LF	surface organic	11.8	0.74	0.95	<0.02	0.07	0.03
61	61 B	subsurface mineral	0.16	0.042	0.96	<0.02	0.05	0.04
64	64 F	surface organic	27.5	5.77	1.12	<0.02	0.03	<0.02
64	64 F/H	subsurface organic	0.071	0.044	0.78	<0.02	0.06	0.02
121	121 LF	surface organic	7.34	1.14	1.96	<0.02	0.03	<0.02
121	121 F/SUB	subsurface organic	2.06	3.97	0.56	<0.02	0.04	<0.02
160	160 B	subsurface mineral	0.94	0.069	0.79	<0.02	0.04	0.02
160	160 B dup	subsurface mineral	0.079	0.081	0.73	<0.02	0.08	0.02

Table C2d. Soil Raw Data: loss on ignition

Site_ID	Sample ID	% Organic Matter (LOI)	% Estimated Organic Carbon
13	13 LF	88.01	44.0
13	13 F/SUB	88.87	44.4
13	13 B	20.36	10.2
18	18 LF	92.69	46.3
18	18 F/SUB	85.58	42.8
18	18 B	0.91	0.5
28a	28a F	92.96	46.5
28a	28a F/H	89.75	44.9
31	31 F	97.11	48.6
31	31 F/H	67.31	33.7
31	31 B	2.65	1.3
42	42 B	1.65	0.8
43	43 LF	92.50	46.2
43	43 F/SUB	85.04	42.5
43	43 B	11.22	5.6
44	44 L/B	4.72	2.4
44	44 B/SUB	1.82	0.9
51	51 F	91.05	45.5
51	51 F/H	39.96	20.0
52	52 F	91.85	45.9
52	52 F/H	16.94	8.5
53	53 F	91.50	45.7
53	53 F/H	20.20	10.1
55	55 LF	87.01	43.5
55	55 F/SUB	85.92	43.0
56	56 LF	87.72	43.9
56	56 F/SUB	80.32	40.2
61	61 LF	84.17	42.1
61	61 B	2.22	1.1
64	64 F	88.24	44.1
64	64 F/H	15.44	7.7
121	121 LF	92.94	46.5
121	121 F/SUB	83.56	41.8
160	160 B	0.71	0.4

Table C3a. Pre-exposure Moss Raw Data: elements

Site ID	Sample ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
NA	moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	46	< 0.1	0.5	18	< 0.02
NA	moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	66.6	< 0.1	0.6	21.1	< 0.02
NA	moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	41.9	< 0.1	0.4	17.5	< 0.02
NA	moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	51.1	< 0.1	0.5	17.8	< 0.02
NA	moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	44.1	< 0.1	0.5	17.6	< 0.02
NA	moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	48.6	< 0.1	0.5	19	< 0.02
NA	moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	39.4	< 0.1	0.4	17.2	< 0.02
NA	moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	58.9	< 0.1	0.5	20.4	< 0.02
NA	moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	45.7	< 0.1	0.6	18.5	< 0.02
NA	moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	43.5	< 0.1	0.9	17.6	< 0.02
NA	moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	50.8	< 0.1	0.5	19.4	< 0.02
NA	moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	51.7	< 0.1	0.6	18.9	< 0.02

C3a. Pre-exposure Moss Raw Data: elements

Sample ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	23	0.13	16100	< 0.1	0.2	2.6
moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	37	0.19	17300	< 0.1	0.3	3.8
moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	24	0.14	15700	< 0.1	0.2	2.3
moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	22	0.15	15100	< 0.1	0.2	2.7
moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	21	0.14	14900	< 0.1	0.2	2.9
moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	22	0.15	16000	< 0.1	0.2	3.3
moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	24	0.14	14500	< 0.1	0.2	2.3
moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	36	0.16	16600	< 0.1	0.3	3.1
moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	24	0.12	15900	< 0.1	0.2	2.9
moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	18	0.09	15100	< 0.1	0.2	3.4
moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	22	0.12	16000	0.4	0.2	3.3
moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	23	0.1	16600	< 0.1	0.2	2.9

C3a. Pre-exposure Moss Raw Data: elements

Sample ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	140	0.4	2300	39.9	0.018
moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	193	0.6	2200	70.2	0.024
moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	135	0.5	2160	36.8	0.018
moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	140	0.6	2070	44.3	0.02
moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	138	0.5	2070	47.4	0.02
moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	153	0.6	2150	52.1	0.024
moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	125	0.4	2010	38.3	0.018
moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	159	0.6	2320	58	0.023
moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	137	0.5	2060	50.1	0.022
moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	125	0.5	2090	36.4	0.02
moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	262	0.6	2070	51.6	0.022
moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	140	0.5	2270	44.1	0.022

C3a. Pre-exposure Moss Raw Data: elements

Sample ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	1960	3080	< 0.2
moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2.6	2930	2960	< 0.2
moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.7	1990	2800	< 0.2
moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	2060	2600	< 0.2
moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2200	2960	< 0.2
moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.1	2130	2540	< 0.2
moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2100	2960	< 0.2
moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.5	2230	2420	< 0.2
moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2040	2250	< 0.2
moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	1960	2250	< 0.2
moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	0.3	3	2140	2600	< 0.2
moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.7	2290	2870	< 0.2

C3a. Pre-exposure Moss Raw Data: elements

Sample ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	669	< 0.01	93	48.6	< 0.1	< 0.02
moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	762	< 0.01	91	52	< 0.1	< 0.02
moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	610	< 0.01	68	46.8	< 0.1	< 0.02
moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	518	< 0.01	74	46.5	< 0.1	< 0.02
moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	671	< 0.01	55	47.8	< 0.1	< 0.02
moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	507	< 0.01	65	49.2	< 0.1	< 0.02
moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	774	< 0.01	60	44	< 0.1	< 0.02
moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	439	< 0.01	53	49.3	< 0.1	< 0.02
moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	519	< 0.01	66	48.3	< 0.1	< 0.02
moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	428	< 0.01	61	46.9	< 0.1	< 0.02
moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	553	< 0.01	63	49.7	< 0.1	< 0.02
moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	769	< 0.01	68	49.2	< 0.1	< 0.02

C3a. Pre-exposure Moss Raw Data: elements

Sample ID	Matrix	Species	Year	Units	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
moss_replicate_1	Moss	Tomenthypnum nitens	2004	ug/g	1.3	1.7	1.39	0.7	24.6	< 3
moss_replicate_2	Moss	Tomenthypnum nitens	2004	ug/g	9.5	2.1	2.42	1.1	38.3	< 3
moss_replicate_3	Moss	Tomenthypnum nitens	2004	ug/g	6.3	1.7	1.01	0.6	27	< 3
moss_replicate_4	Moss	Tomenthypnum nitens	2004	ug/g	3.5	1.3	1.22	0.7	28.2	< 3
moss_replicate_5	Moss	Tomenthypnum nitens	2004	ug/g	5.5	1.9	1.33	0.7	27.1	< 3
moss_replicate_6	Moss	Tomenthypnum nitens	2004	ug/g	5.6	1.9	1.28	0.6	34.8	< 3
moss_replicate_7	Moss	Tomenthypnum nitens	2004	ug/g	1.5	1.6	1.16	0.6	26.8	< 3
moss_replicate_8	Moss	Tomenthypnum nitens	2004	ug/g	1.9	1.1	1.9	0.9	35.6	< 3
moss_replicate_9	Moss	Tomenthypnum nitens	2004	ug/g	0.9	1.3	1.13	0.6	30.3	< 3
moss_replicate_10	Moss	Tomenthypnum nitens	2004	ug/g	2.2	1.1	0.99	0.5	29	< 3
moss_replicate_11	Moss	Tomenthypnum nitens	2004	ug/g	1.6	1.1	1.71	0.8	61.2	< 3
moss_replicate_12	Moss	Tomenthypnum nitens	2004	ug/g	2.9	2.1	1.07	0.6	28	< 3

Table C3b. 10 Week Post-exposure Moss Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
M01	M01	Moss	Tomenthypnum nitens	2004	ug/g	57.3	< 0.1	0.3	16.3	< 0.02
M02	M02	Moss	Tomenthypnum nitens	2004	ug/g	50.8	< 0.1	0.4	24.9	< 0.02
M03	M03	Moss	Tomenthypnum nitens	2004	ug/g	63	< 0.1	0.5	22.2	< 0.02
M04	M04	Moss	Tomenthypnum nitens	2004	ug/g	57.9	< 0.1	0.5	21.6	< 0.02
M05	M05	Moss	Tomenthypnum nitens	2004	ug/g	167	< 0.1	0.5	30.5	< 0.02
M06	M06	Moss	Tomenthypnum nitens	2004	ug/g	49.2	< 0.1	0.3	19.3	< 0.02
M07	M07	Moss	Tomenthypnum nitens	2004	ug/g	48.5	< 0.1	0.4	22.2	< 0.02
M08	M08	Moss	Tomenthypnum nitens	2004	ug/g	62	< 0.1	0.5	21.9	< 0.02
M09	M09	Moss	Tomenthypnum nitens	2004	ug/g	68.5	< 0.1	0.5	23.1	< 0.02
M10	M10	Moss	Tomenthypnum nitens	2004	ug/g	91.5	< 0.1	0.4	25.3	< 0.02
M11	M11	Moss	Tomenthypnum nitens	2004	ug/g	88.2	< 0.1	0.4	28.7	< 0.02
M12	M12	Moss	Tomenthypnum nitens	2004	ug/g	39.5	< 0.1	0.4	19.3	< 0.02
M13	M13	Moss	Tomenthypnum nitens	2004	ug/g	60.7	< 0.1	0.5	21.5	< 0.02
M14	M14	Moss	Tomenthypnum nitens	2004	ug/g	55	< 0.1	0.4	19.4	< 0.02
M15	M15	Moss	Tomenthypnum nitens	2004	ug/g	66.9	< 0.1	0.5	24.8	< 0.02
M16	M16	Moss	Tomenthypnum nitens	2004	ug/g	82.8	< 0.1	0.5	28	< 0.02
M17	M17	Moss	Tomenthypnum nitens	2004	ug/g	69.2	< 0.1	0.5	25.4	< 0.02
M18	M18	Moss	Tomenthypnum nitens	2004	ug/g	96.8	< 0.1	1	49	< 0.02
M19	M19	Moss	Tomenthypnum nitens	2004	ug/g	100	0.2	1	51.2	< 0.02
M20	M20	Moss	Tomenthypnum nitens	2004	ug/g	49	< 0.1	0.5	23	< 0.02
M21	M21	Moss	Tomenthypnum nitens	2004	ug/g	60.7	< 0.1	0.4	23	< 0.02
M22	M22	Moss	Tomenthypnum nitens	2004	ug/g	89.3	< 0.1	1.5	122	< 0.02
M23	M23	Moss	Tomenthypnum nitens	2004	ug/g	51.8	< 0.1	0.5	30.8	< 0.02
M24	M24	Moss	Tomenthypnum nitens	2004	ug/g	81.6	< 0.1	0.5	25	< 0.02
M25	M25	Moss	Tomenthypnum nitens	2004	ug/g	62.4	< 0.1	0.5	28.9	< 0.02
M26	M26	Moss	Tomenthypnum nitens	2004	ug/g	56.4	< 0.1	0.6	38.7	< 0.02
M27	M27	Moss	Tomenthypnum nitens	2004	ug/g	62.5	< 0.1	0.6	30.4	< 0.02

Table C3b. 10 Week Post-exposure Moss Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
M28	M28	Moss	Tomenthypnum nitens	2004	ug/g	71.5	< 0.1	0.5	36.7	< 0.02
M29	M29	Moss	Tomenthypnum nitens	2004	ug/g	72.3	< 0.1	0.6	46.6	< 0.02
M30	M30	Moss	Tomenthypnum nitens	2004	ug/g	130	< 0.1	0.8	79.5	< 0.02
M31	M31	Moss	Tomenthypnum nitens	2004	ug/g	45.3	< 0.1	0.3	16.8	< 0.02
M32	M32	Moss	Tomenthypnum nitens	2004	ug/g	46.6	< 0.1	0.4	20.3	< 0.02
M33	M33	Moss	Tomenthypnum nitens	2004	ug/g	89	< 0.1	0.6	29.4	< 0.02
M34	M34	Moss	Tomenthypnum nitens	2004	ug/g	63.8	< 0.1	0.5	24.8	< 0.02

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
M01	Moss	Tomenthypnum nitens	2004	ug/g	17	0.09	13500	0.1	0.2	15.4
M02	Moss	Tomenthypnum nitens	2004	ug/g	23	0.1	17200	0.1	0.2	6
M03	Moss	Tomenthypnum nitens	2004	ug/g	21	0.09	15900	0.5	0.2	2.8
M04	Moss	Tomenthypnum nitens	2004	ug/g	22	0.1	15200	0.2	0.2	7.2
M05	Moss	Tomenthypnum nitens	2004	ug/g	30	0.29	21100	0.1	0.7	7.1
M06	Moss	Tomenthypnum nitens	2004	ug/g	17	0.09	15600	< 0.1	0.1	3.4
M07	Moss	Tomenthypnum nitens	2004	ug/g	20	0.09	16200	< 0.1	0.2	4.2
M08	Moss	Tomenthypnum nitens	2004	ug/g	23	0.09	16900	0.1	0.2	3.8
M09	Moss	Tomenthypnum nitens	2004	ug/g	23	0.11	17500	< 0.1	0.3	3.7
M10	Moss	Tomenthypnum nitens	2004	ug/g	21	0.11	16100	0.2	0.3	18.5
M11	Moss	Tomenthypnum nitens	2004	ug/g	20	0.11	15200	0.2	0.2	2.9
M12	Moss	Tomenthypnum nitens	2004	ug/g	18	0.07	16100	< 0.1	0.1	2.3
M13	Moss	Tomenthypnum nitens	2004	ug/g	22	0.13	18100	< 0.1	0.2	3.1
M14	Moss	Tomenthypnum nitens	2004	ug/g	17	0.1	16400	0.1	0.2	2.7
M15	Moss	Tomenthypnum nitens	2004	ug/g	19	0.11	14900	0.1	0.2	2.6
M16	Moss	Tomenthypnum nitens	2004	ug/g	16	0.1	17300	0.3	0.2	3
M17	Moss	Tomenthypnum nitens	2004	ug/g	27	0.11	17200	< 0.1	0.2	3.5
M18	Moss	Tomenthypnum nitens	2004	ug/g	20	0.36	17000	0.2	0.3	7.8
M19	Moss	Tomenthypnum nitens	2004	ug/g	20	0.13	18800	0.1	0.3	4.5
M20	Moss	Tomenthypnum nitens	2004	ug/g	18	0.09	14300	< 0.1	0.2	4.3
M21	Moss	Tomenthypnum nitens	2004	ug/g	19	0.09	15300	0.5	0.2	2.4
M22	Moss	Tomenthypnum nitens	2004	ug/g	20	0.14	16800	0.3	0.5	5.1
M23	Moss	Tomenthypnum nitens	2004	ug/g	16	0.09	14300	0.1	0.2	2.4
M24	Moss	Tomenthypnum nitens	2004	ug/g	31	0.11	18400	< 0.1	0.2	3.3
M25	Moss	Tomenthypnum nitens	2004	ug/g	19	0.11	14700	0.1	0.2	2.8
M26	Moss	Tomenthypnum nitens	2004	ug/g	17	0.09	15300	0.2	0.2	2.7
M27	Moss	Tomenthypnum nitens	2004	ug/g	11	0.1	14800	0.4	0.2	10.5

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
M28	Moss	Tomenthypnum nitens	2004	ug/g	22	0.21	16400	0.1	0.3	3.1
M29	Moss	Tomenthypnum nitens	2004	ug/g	21	0.12	17200	< 0.1	0.3	3.4
M30	Moss	Tomenthypnum nitens	2004	ug/g	22	0.19	17200	0.1	0.4	5
M31	Moss	Tomenthypnum nitens	2004	ug/g	16	0.09	15000	< 0.1	0.1	2.5
M32	Moss	Tomenthypnum nitens	2004	ug/g	37	0.15	18700	< 0.1	0.3	2.9
M33	Moss	Tomenthypnum nitens	2004	ug/g	32	0.16	20500	< 0.1	0.5	5.7
M34	Moss	Tomenthypnum nitens	2004	ug/g	32	0.2	18900	< 0.1	0.4	3.8

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
M01	Moss	Tomenthypnum nitens	2004	ug/g	123	0.7	2150	28.8	0.025
M02	Moss	Tomenthypnum nitens	2004	ug/g	117	0.7	2770	53.7	0.019
M03	Moss	Tomenthypnum nitens	2004	ug/g	131	1	2390	42.9	0.017
M04	Moss	Tomenthypnum nitens	2004	ug/g	120	1.7	2500	46.5	0.017
M05	Moss	Tomenthypnum nitens	2004	ug/g	293	0.9	2930	131	0.029
M06	Moss	Tomenthypnum nitens	2004	ug/g	110	0.6	2620	33	0.017
M07	Moss	Tomenthypnum nitens	2004	ug/g	116	0.8	2580	43.5	0.023
M08	Moss	Tomenthypnum nitens	2004	ug/g	124	0.6	2820	33.8	0.017
M09	Moss	Tomenthypnum nitens	2004	ug/g	151	0.8	2870	58.7	0.017
M10	Moss	Tomenthypnum nitens	2004	ug/g	182	3.4	2540	49.2	0.021
M11	Moss	Tomenthypnum nitens	2004	ug/g	161	3.1	2240	47.5	0.022
M12	Moss	Tomenthypnum nitens	2004	ug/g	90	0.8	3050	25.6	0.013
M13	Moss	Tomenthypnum nitens	2004	ug/g	132	1.2	3010	42.4	0.021
M14	Moss	Tomenthypnum nitens	2004	ug/g	123	0.9	2820	34.6	0.017
M15	Moss	Tomenthypnum nitens	2004	ug/g	167	7.1	2520	37.9	0.017
M16	Moss	Tomenthypnum nitens	2004	ug/g	179	4.2	2700	42.5	0.021
M17	Moss	Tomenthypnum nitens	2004	ug/g	161	6.3	2720	52	0.017
M18	Moss	Tomenthypnum nitens	2004	ug/g	311	39.9	2700	47.7	0.037
M19	Moss	Tomenthypnum nitens	2004	ug/g	352	49.1	2650	54.5	0.041
M20	Moss	Tomenthypnum nitens	2004	ug/g	128	6.8	2300	34.3	0.017
M21	Moss	Tomenthypnum nitens	2004	ug/g	128	5.8	2360	48.4	0.017
M22	Moss	Tomenthypnum nitens	2004	ug/g	610	42	2630	44.9	0.036
M23	Moss	Tomenthypnum nitens	2004	ug/g	143	8.4	2090	56.6	0.021
M24	Moss	Tomenthypnum nitens	2004	ug/g	179	2.4	2930	55.2	0.017
M25	Moss	Tomenthypnum nitens	2004	ug/g	170	11.1	2590	38.7	0.017
M26	Moss	Tomenthypnum nitens	2004	ug/g	205	23.9	2320	37.4	0.029
M27	Moss	Tomenthypnum nitens	2004	ug/g	143	11.4	2120	25.6	0.023

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
M28	Moss	Tomenthypnum nitens	2004	ug/g	250	19.3	2520	48.8	0.023
M29	Moss	Tomenthypnum nitens	2004	ug/g	287	26.8	2830	53.9	0.029
M30	Moss	Tomenthypnum nitens	2004	ug/g	507	57.6	2700	58.4	0.029
M31	Moss	Tomenthypnum nitens	2004	ug/g	103	0.6	2420	32.9	0.017
M32	Moss	Tomenthypnum nitens	2004	ug/g	112	0.6	2770	58.1	0.017
M33	Moss	Tomenthypnum nitens	2004	ug/g	201	0.7	2830	130	0.025
M34	Moss	Tomenthypnum nitens	2004	ug/g	151	1	2710	80.8	0.019

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
M01	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.3	2250	2560	0.2
M02	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2.1	2550	3200	0.3
M03	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2	1860	2320	0.6
M04	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.7	2170	3010	0.5
M05	Moss	Tomenthypnum nitens	2004	ug/g	0.4	4.1	2070	1330	0.4
M06	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.8	2410	2780	< 0.2
M07	Moss	Tomenthypnum nitens	2004	ug/g	0.4	1.9	2330	3230	0.2
M08	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2.1	2270	2770	< 0.2
M09	Moss	Tomenthypnum nitens	2004	ug/g	0.3	3	1970	2510	0.2
M10	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	1990	1830	0.3
M11	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.5	2190	2090	0.2
M12	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2120	3080	< 0.2
M13	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2260	2400	< 0.2
M14	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2670	3110	< 0.2
M15	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.6	1860	1530	< 0.2
M16	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.1	1840	1510	< 0.2
M17	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.5	2280	2160	0.3
M18	Moss	Tomenthypnum nitens	2004	ug/g	1	2.2	2740	2510	< 0.2
M19	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.4	1890	1900	0.3
M20	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.4	2320	3250	< 0.2
M21	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.9	2050	1600	< 0.2
M22	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.1	2210	3020	0.2
M23	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.6	1860	1800	< 0.2
M24	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.5	1860	1910	< 0.2
M25	Moss	Tomenthypnum nitens	2004	ug/g	0.1	3.3	1570	1480	< 0.2
M26	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	2210	2930	< 0.2
M27	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.4	1860	1890	< 0.2

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
M28	Moss	Tomenthypnum nitens	2004	ug/g	0.3	12.8	2050	1400	< 0.2
M29	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.4	2330	2530	< 0.2
M30	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.9	2400	2540	< 0.2
M31	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.2	2340	2730	< 0.2
M32	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.3	2410	1760	< 0.2
M33	Moss	Tomenthypnum nitens	2004	ug/g	0.5	3.5	2960	2640	< 0.2
M34	Moss	Tomenthypnum nitens	2004	ug/g	0.5	1.9	2210	1150	< 0.2

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
M01	Moss	Tomenthypnum nitens	2004	ug/g	1510	< 0.01	35	49.6	< 0.1	< 0.02
M02	Moss	Tomenthypnum nitens	2004	ug/g	1020	< 0.01	80	57	< 0.1	< 0.02
M03	Moss	Tomenthypnum nitens	2004	ug/g	756	< 0.01	63	51.5	< 0.1	< 0.02
M04	Moss	Tomenthypnum nitens	2004	ug/g	987	< 0.01	92	53.4	< 0.1	< 0.02
M05	Moss	Tomenthypnum nitens	2004	ug/g	493	0.02	40	66.3	< 0.1	< 0.02
M06	Moss	Tomenthypnum nitens	2004	ug/g	848	< 0.01	50	51.8	< 0.1	< 0.02
M07	Moss	Tomenthypnum nitens	2004	ug/g	661	< 0.01	52	53.4	< 0.1	< 0.02
M08	Moss	Tomenthypnum nitens	2004	ug/g	974	< 0.01	53	56.9	< 0.1	< 0.02
M09	Moss	Tomenthypnum nitens	2004	ug/g	580	< 0.01	113	56.9	< 0.1	< 0.02
M10	Moss	Tomenthypnum nitens	2004	ug/g	898	< 0.01	21	56.5	< 0.1	< 0.02
M11	Moss	Tomenthypnum nitens	2004	ug/g	1570	< 0.01	22	52.5	< 0.1	< 0.02
M12	Moss	Tomenthypnum nitens	2004	ug/g	663	< 0.01	119	51.9	< 0.1	< 0.02
M13	Moss	Tomenthypnum nitens	2004	ug/g	674	< 0.01	88	57.2	< 0.1	< 0.02
M14	Moss	Tomenthypnum nitens	2004	ug/g	1030	< 0.01	89	52	< 0.1	< 0.02
M15	Moss	Tomenthypnum nitens	2004	ug/g	578	< 0.01	13	49.9	< 0.1	< 0.02
M16	Moss	Tomenthypnum nitens	2004	ug/g	792	< 0.01	26	55.9	< 0.1	< 0.02
M17	Moss	Tomenthypnum nitens	2004	ug/g	599	< 0.01	39	53.8	< 0.1	< 0.02
M18	Moss	Tomenthypnum nitens	2004	ug/g	756	0.04	76	54.7	< 0.1	< 0.02
M19	Moss	Tomenthypnum nitens	2004	ug/g	805	0.05	96	64.2	< 0.1	< 0.02
M20	Moss	Tomenthypnum nitens	2004	ug/g	946	< 0.01	79	49.6	< 0.1	< 0.02
M21	Moss	Tomenthypnum nitens	2004	ug/g	1250	< 0.01	8	51.1	< 0.1	< 0.02
M22	Moss	Tomenthypnum nitens	2004	ug/g	838	0.07	18	56.4	< 0.1	< 0.02
M23	Moss	Tomenthypnum nitens	2004	ug/g	1520	< 0.01	14	51.5	< 0.1	< 0.02
M24	Moss	Tomenthypnum nitens	2004	ug/g	544	< 0.01	55	55.5	< 0.1	< 0.02
M25	Moss	Tomenthypnum nitens	2004	ug/g	743	0.01	13	47	< 0.1	< 0.02
M26	Moss	Tomenthypnum nitens	2004	ug/g	1040	0.04	87	50.5	< 0.1	< 0.02
M27	Moss	Tomenthypnum nitens	2004	ug/g	1150	0.02	33	73.9	< 0.1	< 0.02

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
M28	Moss	Tomenthypnum nitens	2004	ug/g	774	0.03	16	52.9	< 0.1	< 0.02
M29	Moss	Tomenthypnum nitens	2004	ug/g	721	0.04	80	55.9	< 0.1	< 0.02
M30	Moss	Tomenthypnum nitens	2004	ug/g	986	0.08	37	57.7	< 0.1	< 0.02
M31	Moss	Tomenthypnum nitens	2004	ug/g	1150	< 0.01	87	48.6	< 0.1	< 0.02
M32	Moss	Tomenthypnum nitens	2004	ug/g	699	< 0.01	76	59.4	< 0.1	< 0.02
M33	Moss	Tomenthypnum nitens	2004	ug/g	606	< 0.01	80	63.5	< 0.1	< 0.02
M34	Moss	Tomenthypnum nitens	2004	ug/g	723	< 0.01	13	60.2	< 0.1	< 0.02

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
M01	Moss	Tomenthypnum nitens	2004	ug/g	0.2	2.2	0.7	< 0.5	28.2	< 3
M02	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.9	1.67	0.6	32.4	< 3
M03	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.8	1.89	0.8	32.4	< 3
M04	Moss	Tomenthypnum nitens	2004	ug/g	0.4	1.9	1.21	0.5	30.9	< 3
M05	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.6	6.8	1.7	65.4	< 3
M06	Moss	Tomenthypnum nitens	2004	ug/g	0.1	1.7	0.82	< 0.5	28	< 3
M07	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.6	1.76	0.6	32.9	< 3
M08	Moss	Tomenthypnum nitens	2004	ug/g	0.1	2.3	1.64	0.6	26.7	< 3
M09	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.9	2.33	0.7	30.9	< 3
M10	Moss	Tomenthypnum nitens	2004	ug/g	0.2	2.8	1.65	0.7	45.2	< 3
M11	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3	0.52	< 0.5	71.6	< 3
M12	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.4	1.23	< 0.5	25.3	< 3
M13	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	1.24	0.5	39.8	< 3
M14	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.75	< 0.5	29.5	< 3
M15	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.3	1.44	< 0.5	30.9	< 3
M16	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3	2.5	0.6	30.8	< 3
M17	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.9	2.32	0.7	35.5	< 3
M18	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3	1.57	0.6	184	< 3
M19	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.3	1.51	0.6	53.6	< 3
M20	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.7	1.13	< 0.5	32.3	< 3
M21	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.85	< 0.5	33.2	< 3
M22	Moss	Tomenthypnum nitens	2004	ug/g	0.4	3	1.64	0.6	47.6	< 3
M23	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.1	0.27	< 0.5	57.4	< 3
M24	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.1	2.99	0.8	34.2	< 3
M25	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	1.69	< 0.5	42.7	< 3
M26	Moss	Tomenthypnum nitens	2004	ug/g	3.9	2	0.94	< 0.5	48.3	< 3
M27	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.35	< 0.5	44.5	< 3

C3b. 10 Week Post-exposure Moss Raw Data: elemer

Sample_ID	Matrix	Species	Year	Units	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
M28	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.1	2.07	0.6	35	< 3
M29	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	1.94	0.7	36.8	< 3
M30	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.5	1.99	0.8	45.2	< 3
M31	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.8	0.83	< 0.5	30.4	< 3
M32	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.6	1.37	0.6	51.2	< 3
M33	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	5.65	1.5	58.4	< 3
M34	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	1.85	0.7	62.3	< 3

Table C3c. 20 Week Post-exposure Moss Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
M01	M01	Moss	Tomenthypnum nitens	2004	ug/g	48.5	< 0.1	0.3	17.4	< 0.02
M02	M02	Moss	Tomenthypnum nitens	2004	ug/g	54.5	< 0.1	0.4	26.3	< 0.02
M03	M03	Moss	Tomenthypnum nitens	2004	ug/g	54.5	< 0.1	0.4	21.5	< 0.02
M04	M04	Moss	Tomenthypnum nitens	2004	ug/g	67.1	< 0.1	0.5	25.1	< 0.02
M05	M05	Moss	Tomenthypnum nitens	2004	ug/g	63.9	< 0.1	0.4	21.1	< 0.02
M06	M06	Moss	Tomenthypnum nitens	2004	ug/g	65.3	< 0.1	0.4	25.5	< 0.02
M07	M07	Moss	Tomenthypnum nitens	2004	ug/g	78.7	< 0.1	0.6	29	< 0.02
M08	M08	Moss	Tomenthypnum nitens	2004	ug/g	59.6	< 0.1	0.4	26.4	< 0.02
M09	M09	Moss	Tomenthypnum nitens	2004	ug/g	62.2	< 0.1	0.5	23.7	< 0.02
M10	M10	Moss	Tomenthypnum nitens	2004	ug/g	118	< 0.1	0.7	27.2	< 0.02
M11	M11	Moss	Tomenthypnum nitens	2004	ug/g	61.5	< 0.1	0.5	23.2	< 0.02
M12	M12	Moss	Tomenthypnum nitens	2004	ug/g	60.7	< 0.1	0.5	23.4	< 0.02
M13	M13	Moss	Tomenthypnum nitens	2004	ug/g	68.2	< 0.1	0.5	22.6	< 0.02
M14	M14	Moss	Tomenthypnum nitens	2004	ug/g	68.3	< 0.1	0.5	23.5	< 0.02
M15	M15	Moss	Tomenthypnum nitens	2004	ug/g	95.8	< 0.1	0.6	33.4	< 0.02
M16	M16	Moss	Tomenthypnum nitens	2004	ug/g	75.3	< 0.1	0.5	24.3	< 0.02
M17	M17	Moss	Tomenthypnum nitens	2004	ug/g	63.4	< 0.1	0.6	39.2	< 0.02
M18	M18	Moss	Tomenthypnum nitens	2004	ug/g	79.2	< 0.1	0.8	39.3	< 0.02
M19	M19	Moss	Tomenthypnum nitens	2004	ug/g	141	< 0.1	1.1	60.1	< 0.02
M20	M20	Moss	Tomenthypnum nitens	2004	ug/g	48.8	< 0.1	0.5	24.7	< 0.02
M21	M21	Moss	Tomenthypnum nitens	2004	ug/g	81.7	< 0.1	0.4	26.6	< 0.02
M22	M22	Moss	Tomenthypnum nitens	2004	ug/g	112	< 0.1	1.1	67.2	< 0.02
M23	M23	Moss	Tomenthypnum nitens	2004	ug/g	57.4	< 0.1	0.6	26.4	< 0.02
M24	M24	Moss	Tomenthypnum nitens	2004	ug/g	78.1	< 0.1	0.6	33.2	< 0.02
M25	M25	Moss	Tomenthypnum nitens	2004	ug/g	7.5	< 0.1	< 0.1	3.8	< 0.02
M26	M26	Moss	Tomenthypnum nitens	2004	ug/g	60.7	< 0.1	0.7	36.2	< 0.02
M27	M27	Moss	Tomenthypnum nitens	2004	ug/g	59.5	< 0.1	0.6	28.5	< 0.02

Table C3c. 20 Week Post-exposure Moss Raw Data: elements

Site_ID	Sample_ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
M28	M28	Moss	Tomenthypnum nitens	2004	ug/g	48.3	< 0.1	0.5	34.2	< 0.02
M29	M29	Moss	Tomenthypnum nitens	2004	ug/g	55	< 0.1	0.6	39.7	< 0.02
M31	M31	Moss	Tomenthypnum nitens	2004	ug/g	53.7	< 0.1	0.4	22.6	< 0.02
M32	M32	Moss	Tomenthypnum nitens	2004	ug/g	55.7	< 0.1	0.4	20.8	< 0.02
M33	M33	Moss	Tomenthypnum nitens	2004	ug/g	58.4	< 0.1	0.4	21.4	< 0.02
M34	M34	Moss	Tomenthypnum nitens	2004	ug/g	66.5	< 0.1	0.4	23.4	< 0.02

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
M01	Moss	Tomenthypnum nitens	2004	ug/g	18	0.07	13000	< 0.1	0.2	10.7
M02	Moss	Tomenthypnum nitens	2004	ug/g	16	0.06	16200	< 0.1	0.2	11.8
M03	Moss	Tomenthypnum nitens	2004	ug/g	24	0.08	15100	0.1	0.2	2.5
M04	Moss	Tomenthypnum nitens	2004	ug/g	30	0.06	15900	< 0.1	0.3	6.2
M05	Moss	Tomenthypnum nitens	2004	ug/g	20	0.1	15700	< 0.1	0.2	10.7
M06	Moss	Tomenthypnum nitens	2004	ug/g	24	0.09	16700	< 0.1	0.2	3.6
M07	Moss	Tomenthypnum nitens	2004	ug/g	26	0.12	18800	< 0.1	0.3	8.8
M08	Moss	Tomenthypnum nitens	2004	ug/g	30	0.06	15600	< 0.1	0.3	3.2
M09	Moss	Tomenthypnum nitens	2004	ug/g	25	0.06	16700	0.1	0.2	2.7
M10	Moss	Tomenthypnum nitens	2004	ug/g	29	0.14	18700	0.2	0.4	4.1
M11	Moss	Tomenthypnum nitens	2004	ug/g	24	0.1	16400	0.1	0.2	4.5
M12	Moss	Tomenthypnum nitens	2004	ug/g	28	0.06	18500	< 0.1	0.2	7.1
M13	Moss	Tomenthypnum nitens	2004	ug/g	26	0.07	17100	0.1	0.2	5.5
M14	Moss	Tomenthypnum nitens	2004	ug/g	27	0.08	16500	0.1	0.2	6.4
M15	Moss	Tomenthypnum nitens	2004	ug/g	22	0.09	17900	0.2	0.3	4.2
M16	Moss	Tomenthypnum nitens	2004	ug/g	30	0.1	16000	< 0.1	0.3	3.3
M17	Moss	Tomenthypnum nitens	2004	ug/g	19	0.07	15900	0.1	0.2	3.4
M18	Moss	Tomenthypnum nitens	2004	ug/g	22	0.13	16000	0.1	0.3	4.1
M19	Moss	Tomenthypnum nitens	2004	ug/g	25	0.21	19400	0.3	0.5	7.6
M20	Moss	Tomenthypnum nitens	2004	ug/g	24	0.06	15500	< 0.1	0.2	8.9
M21	Moss	Tomenthypnum nitens	2004	ug/g	25	0.09	17300	< 0.1	0.3	3.4
M22	Moss	Tomenthypnum nitens	2004	ug/g	34	0.1	16800	0.3	0.4	7.9
M23	Moss	Tomenthypnum nitens	2004	ug/g	24	0.11	14700	< 0.1	0.2	3.1
M24	Moss	Tomenthypnum nitens	2004	ug/g	27	0.11	16900	0.1	0.3	4.2
M25	Moss	Tomenthypnum nitens	2004	ug/g	2	< 0.02	1550	< 0.1	< 0.1	0.6
M26	Moss	Tomenthypnum nitens	2004	ug/g	23	0.1	15400	0.1	0.3	3.5
M27	Moss	Tomenthypnum nitens	2004	ug/g	20	0.07	17500	< 0.1	0.2	2.7

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
M28	Moss	Tomenthypnum nitens	2004	ug/g	20	0.08	15800	< 0.1	0.2	3
M29	Moss	Tomenthypnum nitens	2004	ug/g	23	0.07	16600	< 0.1	0.2	3.2
M31	Moss	Tomenthypnum nitens	2004	ug/g	24	0.14	17800	< 0.1	0.2	3.6
M32	Moss	Tomenthypnum nitens	2004	ug/g	17	0.1	15700	< 0.1	0.2	2.3
M33	Moss	Tomenthypnum nitens	2004	ug/g	21	0.08	17600	0.1	0.2	5.2
M34	Moss	Tomenthypnum nitens	2004	ug/g	27	0.08	17600	0.1	0.2	2.9

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
M01	Moss	Tomenthypnum nitens	2004	ug/g	136	0.5	2250	37	0.024
M02	Moss	Tomenthypnum nitens	2004	ug/g	156	0.9	2670	28.1	0.023
M03	Moss	Tomenthypnum nitens	2004	ug/g	153	1.1	2970	41.3	0.015
M04	Moss	Tomenthypnum nitens	2004	ug/g	171	1.5	2780	62.2	0.021
M05	Moss	Tomenthypnum nitens	2004	ug/g	172	1.4	2860	43.2	0.02
M06	Moss	Tomenthypnum nitens	2004	ug/g	173	1.6	2670	47.6	0.018
M07	Moss	Tomenthypnum nitens	2004	ug/g	210	2.1	3210	60.2	0.023
M08	Moss	Tomenthypnum nitens	2004	ug/g	162	1.5	2820	46.1	0.02
M09	Moss	Tomenthypnum nitens	2004	ug/g	168	0.8	3070	47.1	0.015
M10	Moss	Tomenthypnum nitens	2004	ug/g	264	2.7	3250	60.8	0.026
M11	Moss	Tomenthypnum nitens	2004	ug/g	158	1.1	2840	45.6	0.023
M12	Moss	Tomenthypnum nitens	2004	ug/g	167	1.7	3300	51.4	0.026
M13	Moss	Tomenthypnum nitens	2004	ug/g	170	2.4	3070	49.2	0.023
M14	Moss	Tomenthypnum nitens	2004	ug/g	179	1.7	2840	48.1	0.02
M15	Moss	Tomenthypnum nitens	2004	ug/g	296	8.6	3040	37.4	0.026
M16	Moss	Tomenthypnum nitens	2004	ug/g	198	2.9	2650	51.9	0.019
M17	Moss	Tomenthypnum nitens	2004	ug/g	279	39.9	2750	40.2	0.031
M18	Moss	Tomenthypnum nitens	2004	ug/g	259	19.5	2840	48.9	0.031
M19	Moss	Tomenthypnum nitens	2004	ug/g	511	55.5	3180	64.1	0.052
M20	Moss	Tomenthypnum nitens	2004	ug/g	170	7.8	3100	30.2	0.021
M21	Moss	Tomenthypnum nitens	2004	ug/g	208	3.3	2860	69.6	0.019
M22	Moss	Tomenthypnum nitens	2004	ug/g	469	23.7	2850	55.4	0.034
M23	Moss	Tomenthypnum nitens	2004	ug/g	176	6.1	2710	48	0.02
M24	Moss	Tomenthypnum nitens	2004	ug/g	238	6.7	2930	59.3	0.021
M25	Moss	Tomenthypnum nitens	2004	ug/g	24	1.1	234	4.2	0.028
M26	Moss	Tomenthypnum nitens	2004	ug/g	227	18.3	2740	45.8	0.02
M27	Moss	Tomenthypnum nitens	2004	ug/g	196	6.8	3070	30.2	0.02

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
M28	Moss	Tomenthypnum nitens	2004	ug/g	230	16.4	2850	33.9	0.023
M29	Moss	Tomenthypnum nitens	2004	ug/g	254	17.3	3010	42.2	0.026
M31	Moss	Tomenthypnum nitens	2004	ug/g	153	0.7	2900	47.3	0.02
M32	Moss	Tomenthypnum nitens	2004	ug/g	148	1.3	2850	33.4	0.018
M33	Moss	Tomenthypnum nitens	2004	ug/g	161	0.8	2970	42	0.02
M34	Moss	Tomenthypnum nitens	2004	ug/g	181	1.1	2960	52.2	0.02

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
M01	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.5	2240	2480	< 0.2
M02	Moss	Tomenthypnum nitens	2004	ug/g	0.4	1.6	2090	2370	< 0.2
M03	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2410	3030	< 0.2
M04	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.3	2530	2640	< 0.2
M05	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2150	1980	< 0.2
M06	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2	2110	1700	< 0.2
M07	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2.8	2650	2530	< 0.2
M08	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2	2320	2430	< 0.2
M09	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2	2470	2740	< 0.2
M10	Moss	Tomenthypnum nitens	2004	ug/g	0.4	2.9	2470	2600	< 0.2
M11	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2460	2860	< 0.2
M12	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.2	2700	3260	< 0.2
M13	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	2430	2900	< 0.2
M14	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2	2490	2890	< 0.2
M15	Moss	Tomenthypnum nitens	2004	ug/g	0.5	2	2090	1980	< 0.2
M16	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.3	2270	2070	< 0.2
M17	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2230	2090	< 0.2
M18	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2510	2550	< 0.2
M19	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.7	2160	1730	< 0.2
M20	Moss	Tomenthypnum nitens	2004	ug/g	0.2	1.5	2080	2780	< 0.2
M21	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.6	2020	1180	< 0.2
M22	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.2	2560	2110	< 0.2
M23	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	2230	2560	< 0.2
M24	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.3	2230	1520	< 0.2
M25	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	0.2	192	130	< 0.2
M26	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2770	3050	< 0.2
M27	Moss	Tomenthypnum nitens	2004	ug/g	0.5	1.7	2130	2570	< 0.2

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
M28	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.5	2410	2660	< 0.2
M29	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2530	2870	< 0.2
M31	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.8	2710	2550	< 0.2
M32	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.4	2430	2430	< 0.2
M33	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.6	2740	2980	< 0.2
M34	Moss	Tomenthypnum nitens	2004	ug/g	0.3	1.9	2560	2220	< 0.2

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
M01	Moss	Tomenthypnum nitens	2004	ug/g	443	< 0.01	58	44.3	< 0.1	< 0.02
M02	Moss	Tomenthypnum nitens	2004	ug/g	480	< 0.01	36	57.2	< 0.1	< 0.02
M03	Moss	Tomenthypnum nitens	2004	ug/g	498	< 0.01	88	49.7	< 0.1	< 0.02
M04	Moss	Tomenthypnum nitens	2004	ug/g	488	< 0.01	52	53.6	< 0.1	< 0.02
M05	Moss	Tomenthypnum nitens	2004	ug/g	530	< 0.01	43	51.5	< 0.1	< 0.02
M06	Moss	Tomenthypnum nitens	2004	ug/g	533	< 0.01	24	53.8	< 0.1	< 0.02
M07	Moss	Tomenthypnum nitens	2004	ug/g	438	< 0.01	68	59.7	< 0.1	< 0.02
M08	Moss	Tomenthypnum nitens	2004	ug/g	446	< 0.01	48	50.4	< 0.1	< 0.02
M09	Moss	Tomenthypnum nitens	2004	ug/g	537	< 0.01	101	54.8	< 0.1	< 0.02
M10	Moss	Tomenthypnum nitens	2004	ug/g	490	< 0.01	100	60.4	< 0.1	< 0.02
M11	Moss	Tomenthypnum nitens	2004	ug/g	576	< 0.01	89	53.4	< 0.1	< 0.02
M12	Moss	Tomenthypnum nitens	2004	ug/g	496	< 0.01	95	56.3	< 0.1	< 0.02
M13	Moss	Tomenthypnum nitens	2004	ug/g	572	< 0.01	86	56.4	< 0.1	< 0.02
M14	Moss	Tomenthypnum nitens	2004	ug/g	513	< 0.01	94	53.3	< 0.1	< 0.02
M15	Moss	Tomenthypnum nitens	2004	ug/g	429	< 0.01	77	59.6	< 0.1	< 0.02
M16	Moss	Tomenthypnum nitens	2004	ug/g	459	< 0.01	76	49.6	< 0.1	< 0.02
M17	Moss	Tomenthypnum nitens	2004	ug/g	563	0.05	63	55.9	< 0.1	< 0.02
M18	Moss	Tomenthypnum nitens	2004	ug/g	421	0.03	74	50.8	< 0.1	< 0.02
M19	Moss	Tomenthypnum nitens	2004	ug/g	428	0.08	79	60.8	< 0.1	< 0.02
M20	Moss	Tomenthypnum nitens	2004	ug/g	440	< 0.01	60	48	< 0.1	< 0.02
M21	Moss	Tomenthypnum nitens	2004	ug/g	430	< 0.01	17	53.4	< 0.1	< 0.02
M22	Moss	Tomenthypnum nitens	2004	ug/g	434	0.05	38	53.4	< 0.1	< 0.02
M23	Moss	Tomenthypnum nitens	2004	ug/g	425	0.02	88	48	< 0.1	< 0.02
M24	Moss	Tomenthypnum nitens	2004	ug/g	434	0.02	32	55.5	< 0.1	< 0.02
M25	Moss	Tomenthypnum nitens	2004	ug/g	46	< 0.01	5	5	< 0.1	< 0.02
M26	Moss	Tomenthypnum nitens	2004	ug/g	593	0.03	90	50.4	< 0.1	< 0.02
M27	Moss	Tomenthypnum nitens	2004	ug/g	458	< 0.01	130	56.2	< 0.1	< 0.02

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
M28	Moss	Tomenthypnum nitens	2004	ug/g	566	0.03	93	50.7	< 0.1	< 0.02
M29	Moss	Tomenthypnum nitens	2004	ug/g	521	0.04	110	52.6	< 0.1	< 0.02
M31	Moss	Tomenthypnum nitens	2004	ug/g	525	< 0.01	111	55.4	< 0.1	< 0.02
M32	Moss	Tomenthypnum nitens	2004	ug/g	583	< 0.01	83	56	< 0.1	< 0.02
M33	Moss	Tomenthypnum nitens	2004	ug/g	546	< 0.01	109	55.5	< 0.1	< 0.02
M34	Moss	Tomenthypnum nitens	2004	ug/g	516	< 0.01	32	53.6	< 0.1	< 0.02

Ɔ3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
M01	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.8	0.84	< 0.5	32.5	< 3
M02	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.1	0.55	< 0.5	24.1	< 3
M03	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	1.01	< 0.5	30.3	< 3
M04	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	1.53	0.7	37	< 3
M05	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.74	< 0.5	38.7	< 3
M06	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.1	1.21	0.5	43.8	< 3
M07	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.4	1.9	0.7	44.5	< 3
M08	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.9	1.38	0.6	33.3	< 3
M09	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	1.27	0.6	34.3	< 3
M10	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.5	1.62	0.8	48.5	< 3
M11	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.87	0.5	35.2	< 3
M12	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.1	1.37	0.6	38.1	< 3
M13	Moss	Tomenthypnum nitens	2004	ug/g	0.1	2.5	0.89	< 0.5	43.6	< 3
M14	Moss	Tomenthypnum nitens	2004	ug/g	0.1	2.3	1.29	0.6	38.8	< 3
M15	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.8	0.99	0.6	37.8	< 3
M16	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.3	1.56	0.7	36.2	< 3
M17	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.5	0.63	< 0.5	36.5	< 3
M18	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.9	0.99	0.5	82.8	< 3
M19	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	4.7	1.25	0.7	96.8	< 3
M20	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.8	0.61	< 0.5	37.3	< 3
M21	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	1.91	0.7	46.2	< 3
M22	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	3.8	1.52	0.7	44	< 3
M23	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	1.22	0.6	50.6	< 3
M24	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.4	1.74	0.7	42.9	< 3
M25	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	< 0.3	0.07	< 0.5	7.5	< 3
M26	Moss	Tomenthypnum nitens	2004	ug/g	0.3	2.4	0.82	< 0.5	43.5	< 3
M27	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.4	0.48	< 0.5	27.7	< 3

C3c. 20 Week Post-exposure Moss Raw Data: elemen

Sample_ID	Matrix	Species	Year	Units	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
M28	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.9	0.66	< 0.5	29.6	< 3
M29	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	1.9	1.12	0.5	33.9	< 3
M31	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2	0.98	< 0.5	37.1	< 3
M32	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.3	0.36	< 0.5	32	< 3
M33	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.2	0.86	< 0.5	32.9	< 3
M34	Moss	Tomenthypnum nitens	2004	ug/g	< 0.1	2.4	1.05	0.5	33.7	< 3

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
1	1_rosehip	berry	rosehip	2004	59.8	ug/g	4.3	< 0.1	< 0.1	13.2
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	ug/g	4.1	< 0.1	< 0.1	20.1
2	2_berries	berry	low bush cranberry	2004	84	ug/g	14.2	< 0.1	< 0.1	14.2
4	4_berries	berry	crowberry	2004	82.8	ug/g	12.4	< 0.1	< 0.1	10.2
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	ug/g	1.9	< 0.1	< 0.1	19.3
12	12_shepherdia	berry	shepherdia	2004	71.2	ug/g	5.3	< 0.1	< 0.1	15.2
13	13_berries	berry	rosehip	2004	73.5	ug/g	2.8	< 0.1	< 0.1	15.1
15	15_crowberry	berry	crowberry	2004	81.7	ug/g	4.2	< 0.1	< 0.1	12.3
15	15_low bush cran	berry	low bush cran	2004	80.1	ug/g	10.2	< 0.1	< 0.1	12.2
19	19_berries	berry	crowberry	2004	83	ug/g	2.4	< 0.1	< 0.1	6.8
27a	27a_berries	berry	arcto rubra	2004	85	ug/g	2	< 0.1	< 0.1	5.2
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	ug/g	21.1	< 0.1	< 0.1	22
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	ug/g	13.1	< 0.1	< 0.1	8.1
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	ug/g	3.4	< 0.1	< 0.1	3.2
30	30_arcto rubra	berry	arcto rubra	2004	83.2	ug/g	2.4	< 0.1	< 0.1	1.4
30	30_crowberry	berry	crowberry	2004	81.3	ug/g	4.9	< 0.1	< 0.1	3.2
32	32_arcto rubra	berry	arcto rubra	2004	82.8	ug/g	2.8	< 0.1	< 0.1	3.2
32	32_high bush cran	berry	high bush cran	2004	85	ug/g	5.5	< 0.1	< 0.1	2.4
38	38_crowberry	berry	crowberry	2004	84.4	ug/g	3.3	< 0.1	< 0.1	6.3
45	45_crowberry	berry	crowberry	2004	82.3	ug/g	2.6	< 0.1	< 0.1	6.7
45	45_blueberry	berry	blueberry	2004	78.8	ug/g	5.4	< 0.1	< 0.1	10.2
53	53_berries	berry	crowberry	2004	86.5	ug/g	4.4	< 0.1	< 0.1	7
54	54_crowberry	berry	crowberry	2004	87.1	ug/g	4	< 0.1	< 0.1	8.2
54	54_blueberry	berry	blueberry	2004	79.7	ug/g	11.1	< 0.1	0.1	15.7
64	64_arcto rubra	berry	arcto rubra	2004	86.2	ug/g	3.7	< 0.1	< 0.1	5.7
78	78_berries	berry	low bush cranberry	2004	87	ug/g	41.3	< 0.1	< 0.1	15.1
101	101_crowberry	berry	crowberry	2004	87.8	ug/g	3.3	< 0.1	< 0.1	5

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba
101	101_arcto rubra	berry	arcto rubra	2004	85.6	ug/g	2	< 0.1	< 0.1	2.7
111	111_berries	berry	high bush cranberry	2004	82.6	ug/g	1.3	< 0.1	< 0.1	8.6
114	114_berries	berry	cloudberry	2004	82.8	ug/g	1.7	< 0.1	< 0.1	2
116	116_cloudberry	berry	cloudberry	2004	84.1	ug/g	1.9	< 0.1	< 0.1	4.2
139	139_arcto rubra	berry	arcto rubra	2004	78.9	ug/g	21.1	< 0.1	< 0.1	8.6
154	154_berries	berry	crowberry	2004	87.8	ug/g	4.4	< 0.1	< 0.1	6.9
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	ug/g	-	-	<1	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	ug/g	-	-	<1	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	ug/g	-	-	<1	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	ug/g	-	-	<1	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	ug/g	-	-	<1	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	ug/g	-	-	<1	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	ug/g	-	-	<1	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	ug/g	-	-	<1	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	ug/g	-	-	<1	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	ug/g	-	-	<1	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	ug/g	-	-	<1	-

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca
1	1_rosehip	berry	rosehip	2004	59.8	< 0.02	20	< 0.02	4340
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	< 0.02	23	< 0.02	2110
2	2_berries	berry	low bush cranberry	2004	84	< 0.02	21	< 0.02	1800
4	4_berries	berry	crowberry	2004	82.8	< 0.02	9	< 0.02	785
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	< 0.02	13	< 0.02	2300
12	12_shepherdia	berry	shepherdia	2004	71.2	< 0.02	20	0.06	2200
13	13_berries	berry	rosehip	2004	73.5	< 0.02	20	0.14	11700
15	15_crowberry	berry	crowberry	2004	81.7	< 0.02	7	< 0.02	920
15	15_low bush cran	berry	low bush cran	2004	80.1	< 0.02	10	0.03	1750
19	19_berries	berry	crowberry	2004	83	< 0.02	3	< 0.02	686
27a	27a_berries	berry	arcto rubra	2004	85	< 0.02	12	0.22	1190
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	< 0.02	6	< 0.02	1790
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	< 0.02	4	< 0.02	962
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	< 0.02	10	0.14	955
30	30_arcto rubra	berry	arcto rubra	2004	83.2	< 0.02	10	0.02	937
30	30_crowberry	berry	crowberry	2004	81.3	< 0.02	8	< 0.02	505
32	32_arcto rubra	berry	arcto rubra	2004	82.8	< 0.02	17	< 0.02	4000
32	32_high bush cran	berry	high bush cran	2004	85	< 0.02	9	0.08	1440
38	38_crowberry	berry	crowberry	2004	84.4	< 0.02	7	< 0.02	680
45	45_crowberry	berry	crowberry	2004	82.3	< 0.02	9	0.04	666
45	45_blueberry	berry	blueberry	2004	78.8	< 0.02	13	0.12	1490
53	53_berries	berry	crowberry	2004	86.5	< 0.02	12	0.06	723
54	54_crowberry	berry	crowberry	2004	87.1	< 0.02	9	0.06	718
54	54_blueberry	berry	blueberry	2004	79.7	< 0.02	18	0.19	1160
64	64_arcto rubra	berry	arcto rubra	2004	86.2	< 0.02	14	0.16	1140
78	78_berries	berry	low bush cranberry	2004	87	< 0.02	5	0.09	1830
101	101_crowberry	berry	crowberry	2004	87.8	< 0.02	11	0.06	736

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca
101	101_arcto rubra	berry	arcto rubra	2004	85.6	< 0.02	9	0.09	973
111	111_berries	berry	high bush cranberry	2004	82.6	< 0.02	24	0.12	1840
114	114_berries	berry	cloudberry	2004	82.8	< 0.02	7	0.44	679
116	116_cloudberry	berry	cloudberry	2004	84.1	< 0.02	7	0.56	1050
139	139_arcto rubra	berry	arcto rubra	2004	78.9	< 0.02	3	0.06	1150
154	154_berries	berry	crowberry	2004	87.8	< 0.02	5	0.05	797
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	-	-	0.23	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	-	-	0.21	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	-	-	<0.02	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	-	-	<0.02	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	-	-	<0.02	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	-	-	0.11	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	-	-	0.19	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	-	-	0.12	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	-	-	<0.02	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	-	-	0.37	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	-	-	<0.02	-

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
1	1_rosehip	berry	rosehip	2004	59.8	0.2	< 0.1	3.6	48	< 0.1
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	0.1	< 0.1	4.7	46	< 0.1
2	2_berries	berry	low bush cranberry	2004	84	0.1	< 0.1	4.6	37	< 0.1
4	4_berries	berry	crowberry	2004	82.8	0.1	< 0.1	7.9	50	1.1
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	< 0.1	< 0.1	5	42	< 0.1
12	12_shepherdia	berry	shepherdia	2004	71.2	0.1	< 0.1	5.7	78	0.1
13	13_berries	berry	rosehip	2004	73.5	< 0.1	< 0.1	2.9	61	< 0.1
15	15_crowberry	berry	crowberry	2004	81.7	< 0.1	< 0.1	5.2	31	< 0.1
15	15_low bush cran	berry	low bush cran	2004	80.1	0.1	< 0.1	4.8	55	< 0.1
19	19_berries	berry	crowberry	2004	83	< 0.1	< 0.1	4.7	28	< 0.1
27a	27a_berries	berry	arcto rubra	2004	85	< 0.1	< 0.1	4.2	41	< 0.1
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	0.1	< 0.1	3.1	34	0.2
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	0.1	< 0.1	2.4	35	< 0.1
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	< 0.1	< 0.1	2.2	30	0.2
30	30_arcto rubra	berry	arcto rubra	2004	83.2	< 0.1	< 0.1	2	32	< 0.1
30	30_crowberry	berry	crowberry	2004	81.3	0.1	< 0.1	3.3	36	< 0.1
32	32_arcto rubra	berry	arcto rubra	2004	82.8	0.1	< 0.1	2.3	56	< 0.1
32	32_high bush cran	berry	high bush cran	2004	85	0.2	< 0.1	2	60	< 0.1
38	38_crowberry	berry	crowberry	2004	84.4	< 0.1	< 0.1	4.6	28	0.1
45	45_crowberry	berry	crowberry	2004	82.3	< 0.1	< 0.1	5	24	0.4
45	45_blueberry	berry	blueberry	2004	78.8	0.1	< 0.1	6	54	0.5
53	53_berries	berry	crowberry	2004	86.5	0.6	< 0.1	7.8	20	0.5
54	54_crowberry	berry	crowberry	2004	87.1	0.4	< 0.1	6.7	23	2.9
54	54_blueberry	berry	blueberry	2004	79.7	0.5	< 0.1	5.6	38	3.4
64	64_arcto rubra	berry	arcto rubra	2004	86.2	0.5	< 0.1	5.1	47	1.4
78	78_berries	berry	low bush cranberry	2004	87	< 0.1	< 0.1	5.2	31	0.1
101	101_crowberry	berry	crowberry	2004	87.8	1.1	< 0.1	6.1	15	< 0.1

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
101	101_arcto rubra	berry	arcto rubra	2004	85.6	0.2	< 0.1	3.3	11	< 0.1
111	111_berries	berry	high bush cranberry	2004	82.6	0.3	< 0.1	3.7	20	< 0.1
114	114_berries	berry	cloudberry	2004	82.8	0.2	< 0.1	4.1	22	< 0.1
116	116_cloudberry	berry	cloudberry	2004	84.1	0.4	< 0.1	10.1	32	< 0.1
139	139_arcto rubra	berry	arcto rubra	2004	78.9	< 0.1	< 0.1	3.7	11	< 0.1
154	154_berries	berry	crowberry	2004	87.8	< 0.1	< 0.1	6.6	14	< 0.1
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	0.21	-	3.26		0.1
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	0.20	-	5.63		4.0
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	0.28	-	4.43		0.7
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	<0.05	-	4.71		0.7
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	0.06	-	6.20		2.7
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	0.11	-	4.59		2.3
SW-5	SW-5 BLUE	berry	blueberry	2002	-	<0.05	-	3.76		<0.3
SW-7	SW-7 BLUE	berry	blueberry	2002	-	0.10	-	3.57		<0.3
SW-7	SW-7 CROW	berry	crowberry	2002	-	0.07	-	3.43		<0.3
VB-2	VB-2 BLUE	berry	blueberry	2002	-	0.11	-	3.63		<0.3
VB-2	VB-2 CROW	berry	crowberry	2002	-	<0.05	-	3.29		<0.3

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Magnesium Mg	Manganese Mn	Mercury Hg
1	1_rosehip	berry	rosehip	2004	59.8	4010	43.7	< 0.01
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	2240	5.8	< 0.01
2	2_berries	berry	low bush cranberry	2004	84	907	156	< 0.01
4	4_berries	berry	crowberry	2004	82.8	623	50.4	< 0.01
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	1120	9.5	< 0.01
12	12_shepherdia	berry	shepherdia	2004	71.2	1240	17.9	< 0.01
13	13_berries	berry	rosehip	2004	73.5	4730	45.5	< 0.01
15	15_crowberry	berry	crowberry	2004	81.7	753	140	< 0.01
15	15_low bush cran	berry	low bush cran	2004	80.1	907	384	< 0.01
19	19_berries	berry	crowberry	2004	83	675	35.7	< 0.01
27a	27a_berries	berry	arcto rubra	2004	85	724	5.8	< 0.01
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	824	287	< 0.01
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	666	133	< 0.01
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	561	11.7	< 0.01
30	30_arcto rubra	berry	arcto rubra	2004	83.2	627	5.3	< 0.01
30	30_crowberry	berry	crowberry	2004	81.3	379	5.4	< 0.01
32	32_arcto rubra	berry	arcto rubra	2004	82.8	1320	16.4	< 0.01
32	32_high bush cran	berry	high bush cran	2004	85	789	8.9	< 0.01
38	38_crowberry	berry	crowberry	2004	84.4	483	15.3	< 0.01
45	45_crowberry	berry	crowberry	2004	82.3	393	19.9	< 0.01
45	45_blueberry	berry	blueberry	2004	78.8	739	42.5	< 0.01
53	53_berries	berry	crowberry	2004	86.5	626	51	< 0.01
54	54_crowberry	berry	crowberry	2004	87.1	645	31.2	< 0.01
54	54_blueberry	berry	blueberry	2004	79.7	857	88.1	< 0.01
64	64_arcto rubra	berry	arcto rubra	2004	86.2	847	9.4	< 0.01
78	78_berries	berry	low bush cranberry	2004	87	1040	227	< 0.01
101	101_crowberry	berry	crowberry	2004	87.8	656	21.6	< 0.01

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Magnesium Mg	Manganese Mn	Mercury Hg
101	101_arcto rubra	berry	arcto rubra	2004	85.6	599	6.8	< 0.01
111	111_berries	berry	high bush cranberry	2004	82.6	1360	5.2	< 0.01
114	114_berries	berry	cloudberry	2004	82.8	2390	253	< 0.01
116	116_cloudberry	berry	cloudberry	2004	84.1	3080	156	< 0.01
139	139_arcto rubra	berry	arcto rubra	2004	78.9	609	122	< 0.01
154	154_berries	berry	crowberry	2004	87.8	837	93.8	< 0.01
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	-	-	< 0.01
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	-	-	0.02
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	-	-	0.02
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	-	-	<0.01
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	-	-	0.01
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	-	-	<0.01
SW-5	SW-5 BLUE	berry	blueberry	2002	-	-	-	<0.01
SW-7	SW-7 BLUE	berry	blueberry	2002	-	-	-	<0.01
SW-7	SW-7 CROW	berry	crowberry	2002	-	-	-	<0.01
VB-2	VB-2 BLUE	berry	blueberry	2002	-	-	-	<0.01
VB-2	VB-2 CROW	berry	crowberry	2002	-	-	-	<0.01

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K
1	1_rosehip	berry	rosehip	2004	59.8	0.4	0.7	8510	11800
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	0.3	1	10200	18100
2	2_berries	berry	low bush cranberry	2004	84	1.9	0.3	3960	8190
4	4_berries	berry	crowberry	2004	82.8	< 0.1	0.2	4530	8130
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	< 0.1	1.8	7250	11400
12	12_shepherdia	berry	shepherdia	2004	71.2	2.2	3	11500	14000
13	13_berries	berry	rosehip	2004	73.5	7	0.4	7550	18200
15	15_crowberry	berry	crowberry	2004	81.7	< 0.1	0.2	4900	10000
15	15_low bush cran	berry	low bush cran	2004	80.1	< 0.1	0.3	6490	9340
19	19_berries	berry	crowberry	2004	83	< 0.1	< 0.1	4790	8660
27a	27a_berries	berry	arcto rubra	2004	85	0.1	1.1	4540	11700
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	0.4	0.4	4540	6960
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	0.3	1.4	5060	7970
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	< 0.1	0.2	3560	10300
30	30_arcto rubra	berry	arcto rubra	2004	83.2	< 0.1	0.2	2890	9330
30	30_crowberry	berry	crowberry	2004	81.3	< 0.1	< 0.1	2230	5650
32	32_arcto rubra	berry	arcto rubra	2004	82.8	1.8	< 0.1	10800	15800
32	32_high bush cran	berry	high bush cran	2004	85	0.5	< 0.1	5470	11800
38	38_crowberry	berry	crowberry	2004	84.4	< 0.1	< 0.1	3120	8080
45	45_crowberry	berry	crowberry	2004	82.3	< 0.1	< 0.1	2900	6420
45	45_blueberry	berry	blueberry	2004	78.8	< 0.1	0.3	5490	8240
53	53_berries	berry	crowberry	2004	86.5	0.1	0.6	3280	8940
54	54_crowberry	berry	crowberry	2004	87.1	< 0.1	0.1	2630	9350
54	54_blueberry	berry	blueberry	2004	79.7	< 0.1	0.5	4350	7530
64	64_arcto rubra	berry	arcto rubra	2004	86.2	< 0.1	1	3420	12800
78	78_berries	berry	low bush cranberry	2004	87	< 0.1	0.8	3690	8030
101	101_crowberry	berry	crowberry	2004	87.8	< 0.1	0.3	2670	10800

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K
101	101_arcto rubra	berry	arcto rubra	2004	85.6	< 0.1	0.8	2330	11200
111	111_berries	berry	high bush cranberry	2004	82.6	0.2	1.2	5560	14100
114	114_berries	berry	cloudberry	2004	82.8	0.6	5.2	8960	11900
116	116_cloudberry	berry	cloudberry	2004	84.1	2.5	3.9	10100	13900
139	139_arcto rubra	berry	arcto rubra	2004	78.9	< 0.1	1.1	2620	5900
154	154_berries	berry	crowberry	2004	87.8	0.5	0.3	4100	10500
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	-	1.0	-	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	-	0.7	-	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	-	0.6	-	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	-	0.2	-	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	-	0.2	-	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	-	0.7	-	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	-	0.6	-	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	-	0.4	-	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	-	0.3	-	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	-	1.0	-	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	-	0.3	-	-

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
1	1_rosehip	berry	rosehip	2004	59.8	< 0.2	238	< 0.01	< 1
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	< 0.2	318	< 0.01	< 1
2	2_berries	berry	low bush cranberry	2004	84	< 0.2	425	0.03	< 1
4	4_berries	berry	crowberry	2004	82.8	< 0.2	319	< 0.01	6
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	< 0.2	236	< 0.01	< 1
12	12_shepherdia	berry	shepherdia	2004	71.2	< 0.2	346	0.01	< 1
13	13_berries	berry	rosehip	2004	73.5	3.5	268	< 0.01	< 1
15	15_crowberry	berry	crowberry	2004	81.7	< 0.2	311	0.01	1
15	15_low bush cran	berry	low bush cran	2004	80.1	< 0.2	488	0.01	< 1
19	19_berries	berry	crowberry	2004	83	< 0.2	303	< 0.01	1
27a	27a_berries	berry	arcto rubra	2004	85	< 0.2	310	0.01	< 1
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	< 0.2	436	< 0.01	< 1
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	< 0.2	405	0.01	< 1
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	< 0.2	291	< 0.01	< 1
30	30_arcto rubra	berry	arcto rubra	2004	83.2	< 0.2	238	< 0.01	< 1
30	30_crowberry	berry	crowberry	2004	81.3	< 0.2	267	< 0.01	11
32	32_arcto rubra	berry	arcto rubra	2004	82.8	< 0.2	357	< 0.01	< 1
32	32_high bush cran	berry	high bush cran	2004	85	< 0.2	434	< 0.01	< 1
38	38_crowberry	berry	crowberry	2004	84.4	< 0.2	272	< 0.01	12
45	45_crowberry	berry	crowberry	2004	82.3	< 0.2	228	< 0.01	18
45	45_blueberry	berry	blueberry	2004	78.8	< 0.2	318	< 0.01	4
53	53_berries	berry	crowberry	2004	86.5	< 0.2	176	0.03	15
54	54_crowberry	berry	crowberry	2004	87.1	< 0.2	180	< 0.01	33
54	54_blueberry	berry	blueberry	2004	79.7	< 0.2	194	< 0.01	16
64	64_arcto rubra	berry	arcto rubra	2004	86.2	< 0.2	162	< 0.01	8
78	78_berries	berry	low bush cranberry	2004	87	< 0.2	202	< 0.01	3
101	101_crowberry	berry	crowberry	2004	87.8	< 0.2	199	< 0.01	10

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
101	101_arcto rubra	berry	arcto rubra	2004	85.6	< 0.2	129	< 0.01	3
111	111_berries	berry	high bush cranberry	2004	82.6	< 0.2	106	< 0.01	< 1
114	114_berries	berry	cloudberry	2004	82.8	< 0.2	114	0.04	26
116	116_cloudberry	berry	cloudberry	2004	84.1	< 0.2	122	0.07	31
139	139_arcto rubra	berry	arcto rubra	2004	78.9	< 0.2	154	< 0.01	3
154	154_berries	berry	crowberry	2004	87.8	< 0.2	195	< 0.01	20
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	<1	-	<0.01	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	<1	-	0.01	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	<1	-	0.03	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	<1	-	<0.01	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	<1	-	<0.01	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	<1	-	<0.01	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	<1	-	<0.01	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	<1	-	<0.01	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	1	-	0.10	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	<1	-	<0.01	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	<1	-	<0.01	-

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti
1	1_rosehip	berry	rosehip	2004	59.8	20.9	< 0.1	< 0.02	< 0.1	2.1
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	10.1	< 0.1	< 0.02	< 0.1	2.3
2	2_berries	berry	low bush cranberry	2004	84	2.58	< 0.1	< 0.02	< 0.1	1.1
4	4_berries	berry	crowberry	2004	82.8	1.26	< 0.1	< 0.02	< 0.1	1.2
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	9.01	< 0.1	< 0.02	< 0.1	1.6
12	12_shepherdia	berry	shepherdia	2004	71.2	9.15	< 0.1	< 0.02	< 0.1	2.9
13	13_berries	berry	rosehip	2004	73.5	23	< 0.1	< 0.02	< 0.1	1.7
15	15_crowberry	berry	crowberry	2004	81.7	1.14	< 0.1	< 0.02	< 0.1	1.1
15	15_low bush cran	berry	low bush cran	2004	80.1	1.74	< 0.1	< 0.02	0.2	1.5
19	19_berries	berry	crowberry	2004	83	2.07	< 0.1	< 0.02	< 0.1	1
27a	27a_berries	berry	arcto rubra	2004	85	3.51	< 0.1	< 0.02	< 0.1	1.2
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	3.69	< 0.1	< 0.02	< 0.1	1.1
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	2.15	< 0.1	< 0.02	< 0.1	1.2
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	1.53	< 0.1	< 0.02	< 0.1	0.8
30	30_arcto rubra	berry	arcto rubra	2004	83.2	2.29	< 0.1	< 0.02	< 0.1	0.7
30	30_crowberry	berry	crowberry	2004	81.3	1.14	< 0.1	< 0.02	< 0.1	0.8
32	32_arcto rubra	berry	arcto rubra	2004	82.8	8.05	< 0.1	< 0.02	< 0.1	2.3
32	32_high bush cran	berry	high bush cran	2004	85	3.33	< 0.1	< 0.02	< 0.1	1.4
38	38_crowberry	berry	crowberry	2004	84.4	0.76	< 0.1	< 0.02	< 0.1	0.7
45	45_crowberry	berry	crowberry	2004	82.3	1.24	< 0.1	< 0.02	< 0.1	0.6
45	45_blueberry	berry	blueberry	2004	78.8	3.16	< 0.1	< 0.02	< 0.1	1.3
53	53_berries	berry	crowberry	2004	86.5	1.31	< 0.1	< 0.02	1.7	0.5
54	54_crowberry	berry	crowberry	2004	87.1	1.56	< 0.1	< 0.02	< 0.1	0.5
54	54_blueberry	berry	blueberry	2004	79.7	3.17	< 0.1	< 0.02	0.3	0.9
64	64_arcto rubra	berry	arcto rubra	2004	86.2	3.84	< 0.1	< 0.02	< 0.1	0.6
78	78_berries	berry	low bush cranberry	2004	87	3.59	< 0.1	< 0.02	< 0.1	1.6
101	101_crowberry	berry	crowberry	2004	87.8	1.11	< 0.1	< 0.02	< 0.1	0.5

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti
101	101_arcto rubra	berry	arcto rubra	2004	85.6	3.56	< 0.1	< 0.02	< 0.1	0.4
111	111_berries	berry	high bush cranberry	2004	82.6	5.8	< 0.1	< 0.02	< 0.1	0.8
114	114_berries	berry	cloudberry	2004	82.8	2.03	< 0.1	< 0.02	< 0.1	1
116	116_cloudberry	berry	cloudberry	2004	84.1	2.49	< 0.1	< 0.02	< 0.1	1.1
139	139_arcto rubra	berry	arcto rubra	2004	78.9	2.76	< 0.1	< 0.02	< 0.1	0.4
154	154_berries	berry	crowberry	2004	87.8	1.16	< 0.1	< 0.02	< 0.1	0.6
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	-	-	-	-	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	-	-	-	-	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	-	-	-	-	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	-	-	-	-	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	-	-	-	-	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	-	-	-	-	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	-	-	-	-	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	-	-	-	-	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	-	-	-	-	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	-	-	-	-	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	-	-	-	-	-

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
1	1_rosehip	berry	rosehip	2004	59.8	< 0.04	< 0.5	7.5	< 3
1	1_high bush cranberry	berry	high bush cranberry	2004	80.6	< 0.04	< 0.5	14	< 3
2	2_berries	berry	low bush cranberry	2004	84	< 0.04	< 0.5	11.9	< 3
4	4_berries	berry	crowberry	2004	82.8	< 0.04	< 0.5	10.7	< 3
12	12_arcto uva ursi	berry	arcto uva ursi	2004	65.5	< 0.04	< 0.5	20.4	< 3
12	12_shepherdia	berry	shepherdia	2004	71.2	< 0.04	< 0.5	16	< 3
13	13_berries	berry	rosehip	2004	73.5	< 0.04	< 0.5	12.3	< 3
15	15_crowberry	berry	crowberry	2004	81.7	< 0.04	< 0.5	7.9	< 3
15	15_low bush cran	berry	low bush cran	2004	80.1	< 0.04	< 0.5	12.3	< 3
19	19_berries	berry	crowberry	2004	83	< 0.04	< 0.5	7.6	< 3
27a	27a_berries	berry	arcto rubra	2004	85	< 0.04	< 0.5	11.4	< 3
29a	29a_arcto uva ursi	berry	arcto uva ursi	2004	83.4	< 0.04	< 0.5	10.5	< 3
29a	29a_arcto rubra	berry	arcto rubra	2004	82.3	< 0.04	< 0.5	8.2	< 3
29b	29b_arcto rubra	berry	arcto rubra	2004	84.3	< 0.04	< 0.5	12.4	< 3
30	30_arcto rubra	berry	arcto rubra	2004	83.2	< 0.04	< 0.5	8.4	< 3
30	30_crowberry	berry	crowberry	2004	81.3	< 0.04	< 0.5	3.1	< 3
32	32_arcto rubra	berry	arcto rubra	2004	82.8	< 0.04	< 0.5	6.2	< 3
32	32_high bush cran	berry	high bush cran	2004	85	< 0.04	< 0.5	8.9	< 3
38	38_crowberry	berry	crowberry	2004	84.4	< 0.04	< 0.5	6.3	< 3
45	45_crowberry	berry	crowberry	2004	82.3	< 0.04	< 0.5	9.3	< 3
45	45_blueberry	berry	blueberry	2004	78.8	< 0.04	< 0.5	19.6	< 3
53	53_berries	berry	crowberry	2004	86.5	< 0.04	< 0.5	11.6	< 3
54	54_crowberry	berry	crowberry	2004	87.1	< 0.04	< 0.5	13.3	< 3
54	54_blueberry	berry	blueberry	2004	79.7	< 0.04	< 0.5	31.7	< 3
64	64_arcto rubra	berry	arcto rubra	2004	86.2	< 0.04	< 0.5	23.2	< 3
78	78_berries	berry	low bush cranberry	2004	87	< 0.04	< 0.5	13.3	< 3
101	101_crowberry	berry	crowberry	2004	87.8	< 0.04	< 0.5	8	< 3

Table C4a. Berries Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture (%)	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
101	101_arcto rubra	berry	arcto rubra	2004	85.6	< 0.04	< 0.5	14.2	< 3
111	111_berries	berry	high bush cranberry	2004	82.6	< 0.04	< 0.5	12.6	< 3
114	114_berries	berry	cloudberry	2004	82.8	< 0.04	< 0.5	30.9	< 3
116	116_cloudberry	berry	cloudberry	2004	84.1	< 0.04	< 0.5	38.6	< 3
139	139_arcto rubra	berry	arcto rubra	2004	78.9	< 0.04	< 0.5	8.7	< 3
154	154_berries	berry	crowberry	2004	87.8	< 0.04	< 0.5	9.2	< 3
VAN-4	VAN-4 BLUE	berry	blueberry	2002	-	-	-	18	-
FARO-4	FARO-4 BLUE	berry	blueberry	2002	-	-	-	43	-
VAN-4	VAN-4 CROW	berry	crowberry	2002	-	-	-	7	-
VAN-10	VAN-10 CROW	berry	crowberry	2002	-	-	-	8	-
FARO-1	FARO-1 CROW	berry	crowberry	2002	-	-	-	17	-
6-1	6-1 BLUE unwashed	berry	blueberry	2002	-	-	-	27	-
SW-5	SW-5 BLUE	berry	blueberry	2002	-	-	-	23	-
SW-7	SW-7 BLUE	berry	blueberry	2002	-	-	-	23	-
SW-7	SW-7 CROW	berry	crowberry	2002	-	-	-	8	-
VB-2	VB-2 BLUE	berry	blueberry	2002	-	-	-	18	-
VB-2	VB-2 CROW	berry	crowberry	2002	-	-	-	5	-

Table C4b. Labrador Tea Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
2	2_tea	tea	Ledum groenlandicum	2004	47.8	24.8	< 0.1	< 0.1	93.7	< 0.02	31
4	4_tea	tea	Ledum groenlandicum	2004	54.3	21.5	< 0.1	< 0.1	47.1	< 0.02	22
38	38_tea	tea	Ledum groenlandicum	2004	47	7.9	< 0.1	< 0.1	90	< 0.02	19
53	53_tea	tea	Ledum groenlandicum	2004	51.2	10.2	< 0.1	< 0.1	57.8	< 0.02	29
58	58_tea	tea	Ledum groenlandicum	2004	53	40.6	< 0.1	< 0.1	64.9	< 0.02	16
101	101_tea	tea	Ledum groenlandicum	2004	52	9	< 0.1	< 0.1	63.2	< 0.02	25
154	154_tea	tea	Ledum groenlandicum	2004	48.4	39.8	< 0.1	< 0.1	70.1	< 0.02	5
13	13_tea	tea	Ledum groenlandicum	2004	54.9	10.2	< 0.1	< 0.1	46.1	< 0.02	21
15	15_tea	tea	Ledum groenlandicum	2004	51.7	19.7	< 0.1	< 0.1	62.6	< 0.02	29
19	19_tea	tea	Ledum groenlandicum	2004	49.4	10.3	< 0.1	< 0.1	51.5	< 0.02	9

Table C4b. Labrador Tea Raw Data: elements and moist

Site ID	Sample ID	Matrix	Species	Year	Moisture	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe
2	2_tea	tea	Ledum groenlandicum	2004	47.8	< 0.02	7060	0.2	< 0.1	3.5	87
4	4_tea	tea	Ledum groenlandicum	2004	54.3	< 0.02	5000	0.1	< 0.1	3.7	62
38	38_tea	tea	Ledum groenlandicum	2004	47	< 0.02	7150	< 0.1	< 0.1	2.6	31
53	53_tea	tea	Ledum groenlandicum	2004	51.2	< 0.02	5220	< 0.1	< 0.1	3.7	39
58	58_tea	tea	Ledum groenlandicum	2004	53	0.02	5430	< 0.1	< 0.1	6.5	51
101	101_tea	tea	Ledum groenlandicum	2004	52	0.03	6340	< 0.1	< 0.1	5.7	40
154	154_tea	tea	Ledum groenlandicum	2004	48.4	0.02	5140	< 0.1	< 0.1	4.9	35
13	13_tea	tea	Ledum groenlandicum	2004	54.9	< 0.02	4420	0.1	< 0.1	5.2	60
15	15_tea	tea	Ledum groenlandicum	2004	51.7	< 0.02	5970	< 0.1	< 0.1	3.3	48
19	19_tea	tea	Ledum groenlandicum	2004	49.4	< 0.02	6750	0.1	< 0.1	2.4	32

Table C4b. Labrador Tea Raw Data: elements and moist

Site ID	Sample ID	Matrix	Species	Year	Moisture	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo
2	2_tea	tea	Ledum groenlandicum	2004	47.8	0.2	1860	169	< 0.01	0.6
4	4_tea	tea	Ledum groenlandicum	2004	54.3	0.6	1380	426	< 0.01	< 0.1
38	38_tea	tea	Ledum groenlandicum	2004	47	0.8	1270	126	< 0.01	< 0.1
53	53_tea	tea	Ledum groenlandicum	2004	51.2	0.6	1140	616	< 0.01	< 0.1
58	58_tea	tea	Ledum groenlandicum	2004	53	2.6	1270	578	< 0.01	< 0.1
101	101_tea	tea	Ledum groenlandicum	2004	52	0.4	1180	293	< 0.01	< 0.1
154	154_tea	tea	Ledum groenlandicum	2004	48.4	0.2	1100	678	< 0.01	< 0.1
13	13_tea	tea	Ledum groenlandicum	2004	54.9	< 0.1	2270	48.1	< 0.01	1
15	15_tea	tea	Ledum groenlandicum	2004	51.7	< 0.1	1660	1180	< 0.01	< 0.1
19	19_tea	tea	Ledum groenlandicum	2004	49.4	< 0.1	2400	388	< 0.01	< 0.1

Table C4b. Labrador Tea Raw Data: elements and moist

Site ID	Sample ID	Matrix	Species	Year	Moisture	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se	Silicon SiO2
2	2_tea	tea	Ledum groenlandicum	2004	47.8	0.4	4210	5770	< 0.2	458
4	4_tea	tea	Ledum groenlandicum	2004	54.3	0.3	4570	5350	< 0.2	296
38	38_tea	tea	Ledum groenlandicum	2004	47	< 0.1	2850	4160	< 0.2	343
53	53_tea	tea	Ledum groenlandicum	2004	51.2	0.1	4980	6360	< 0.2	376
58	58_tea	tea	Ledum groenlandicum	2004	53	0.4	5310	6150	< 0.2	222
101	101_tea	tea	Ledum groenlandicum	2004	52	0.2	3480	5750	< 0.2	266
154	154_tea	tea	Ledum groenlandicum	2004	48.4	1.1	3800	4420	< 0.2	248
13	13_tea	tea	Ledum groenlandicum	2004	54.9	< 0.1	5290	6210	< 0.2	312
15	15_tea	tea	Ledum groenlandicum	2004	51.7	0.3	3930	5270	< 0.2	323
19	19_tea	tea	Ledum groenlandicum	2004	49.4	< 0.1	4100	4450	< 0.2	400

Table C4b. Labrador Tea Raw Data: elements and moist

Site ID	Sample ID	Matrix	Species	Year	Moisture	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn
2	2_tea	tea	Ledum groenlandicum	2004	47.8	< 0.01	< 1	12.2	< 0.1	< 0.02	< 0.1
4	4_tea	tea	Ledum groenlandicum	2004	54.3	< 0.01	< 1	5.31	< 0.1	< 0.02	< 0.1
38	38_tea	tea	Ledum groenlandicum	2004	47	< 0.01	< 1	11.8	< 0.1	0.05	< 0.1
53	53_tea	tea	Ledum groenlandicum	2004	51.2	0.01	< 1	6.88	< 0.1	< 0.02	< 0.1
58	58_tea	tea	Ledum groenlandicum	2004	53	< 0.01	2	7.32	< 0.1	0.18	< 0.1
101	101_tea	tea	Ledum groenlandicum	2004	52	< 0.01	3	12	< 0.1	< 0.02	0.2
154	154_tea	tea	Ledum groenlandicum	2004	48.4	< 0.01	3	10.6	< 0.1	0.08	< 0.1
13	13_tea	tea	Ledum groenlandicum	2004	54.9	0.02	5	6	< 0.1	< 0.02	< 0.1
15	15_tea	tea	Ledum groenlandicum	2004	51.7	< 0.01	< 1	5.36	< 0.1	< 0.02	< 0.1
19	19_tea	tea	Ledum groenlandicum	2004	49.4	< 0.01	2	15.4	< 0.1	< 0.02	< 0.1

Table C4b. Labrador Tea Raw Data: elements and moist

Site ID	Sample ID	Matrix	Species	Year	Moisture	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
2	2_tea	tea	Ledum groenlandicum	2004	47.8	1.7	< 0.04	< 0.5	27.7	< 3
4	4_tea	tea	Ledum groenlandicum	2004	54.3	1.5	< 0.04	< 0.5	26.6	< 3
38	38_tea	tea	Ledum groenlandicum	2004	47	1	< 0.04	< 0.5	30.5	< 3
53	53_tea	tea	Ledum groenlandicum	2004	51.2	1.3	< 0.04	< 0.5	26.5	< 3
58	58_tea	tea	Ledum groenlandicum	2004	53	0.9	< 0.04	< 0.5	43	< 3
101	101_tea	tea	Ledum groenlandicum	2004	52	0.7	< 0.04	< 0.5	31.2	< 3
154	154_tea	tea	Ledum groenlandicum	2004	48.4	0.7	< 0.04	< 0.5	15.4	< 3
13	13_tea	tea	Ledum groenlandicum	2004	54.9	1.6	< 0.04	< 0.5	24.2	< 3
15	15_tea	tea	Ledum groenlandicum	2004	51.7	1.2	< 0.04	< 0.5	24.5	< 3
19	19_tea	tea	Ledum groenlandicum	2004	49.4	1.3	< 0.04	< 0.5	25.3	< 3

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
13	13_willow	willow	Salix spp.	2004	67.3	10.1	< 0.1	0.1	8.2	< 0.02
15	15_willow	willow	Salix spp.	2004	55.1	8.3	< 0.1	< 0.1	21.5	< 0.02
19	19_willow	willow	Salix spp.	2004	61.1	8.4	< 0.1	< 0.1	11.9	< 0.02
45	45_willow	willow	Salix spp.	2004	56.9	10.6	< 0.1	< 0.1	15	< 0.02
72	72_willow	willow	Salix spp.	2004	62.7	19.9	< 0.1	< 0.1	10.4	< 0.02
90	90_willow	willow	Salix spp.	2004	57.5	8.2	< 0.1	< 0.1	22.6	< 0.02
95	95_willow	willow	Salix spp.	2004	60.8	10.8	< 0.1	< 0.1	40.3	< 0.02
100	100_willow	willow	Salix spp.	2004	64	11.8	< 0.1	< 0.1	9.8	< 0.02
111	111_willow	willow	Salix spp.	2004	64.3	12.2	< 0.1	< 0.1	87.4	< 0.02
128	128_willow	willow	Salix spp.	2004	61.4	20.5	< 0.1	< 0.1	103	< 0.02
VAN-1	VAN-1W	willow	Salix glauca	2002		-	-	<1	-	-
VAN-4	VAN-4W	willow	Salix glauca	2002		-	-	<1	-	-
VAN-5	VAN-5W	willow	Salix glauca	2002		-	-	<1	-	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		-	-	<1	-	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		-	-	<1	-	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		-	-	<1	-	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		-	-	<1	-	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		-	-	<1	-	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		-	-	2	-	-
FARO-4	FARO-4W	willow	Salix glauca	2002		-	-	11	-	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		-	-	1	-	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		-	-	2	-	-
FARO-7	FARO-7W	willow	Salix glauca	2002		-	-	1	-	-
SW-1	SW-1 W	willow	Salix glauca	2002		-	-	<1	-	-
SW-2	SW-2 W	willow	Salix glauca	2002		-	-	<1	-	-
SW-3	SW-3 W	willow	Salix glauca	2002		-	-	<1	-	-
SW-4	SW-4 W	willow	Salix glauca	2002		-	-	<1	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
SW-5	SW-5 W	willow	Salix glauca	2002		-	-	<1	-	-
SW-6	SW-6 W	willow	Salix glauca	2002		-	-	<1	-	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		-	-	<1	-	-
VB-1	VB-1 W	willow	Salix glauca	2002		-	-	<1	-	-
VB-2	VB-2 W	willow	Salix glauca	2002		-	-	<1	-	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		-	-	<1	-	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		-	-	<1	-	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		-	-	<1	-	-
2-2	2-2 W	willow	Salix glauca	2002		-	-	<1	-	-
2-1	2-1 W	willow	Salix glauca	2002		-	-	<1	-	-
3-1	3-1W	willow	Salix glauca	2002		-	-	2	-	-
3-2	3-2W	willow	Salix glauca	2002		-	-	<1	-	-
3-3	3-3W	willow	Salix glauca	2002		-	-	<1	-	-
3-4	3-4W	willow	Salix glauca	2002		-	-	<1	-	-
4-1	4-1 W	willow	Salix glauca	2002		-	-	2	-	-
4-2	4-2 W	willow	Salix glauca	2002		-	-	1	-	-
4-3	4-3 W	willow	Salix glauca	2002		-	-	<1	-	-
4-4	4-4 W	willow	Salix glauca	2002		-	-	<1	-	-
4-5	4-5 W	willow	Salix glauca	2002		-	-	<1	-	-
4-6	4-6 W	willow	Salix glauca	2002		-	-	<1	-	-
5-1	5-1 W	willow	Salix glauca	2002		-	-	<1	-	-
5-2	5-2 W	willow	Salix glauca	2002		-	-	<1	-	-
5-3	5-3 W	willow	Salix glauca	2002		-	-	<1	-	-
5-4	5-4 W	willow	Salix glauca	2002		-	-	<1	-	-
5-5	5-5 W	willow	Salix glauca	2002		-	-	<1	-	-
6-1	6-1 W	willow	Salix glauca	2002		-	-	1	-	-
6-2	6-2 W	willow	Salix glauca	2002		-	-	<1	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
6-3	6-3 W	willow	Salix glauca	2002		-	-	<1	-	-
6-4	6-4 W	willow	Salix glauca	2002		-	-	<1	-	-
7-1	7-1 W	willow	Salix glauca	2002		-	-	<1	-	-
6-5	6-5 W	willow	Salix glauca	2002		-	-	<1	-	-
7-2	7-2 W	willow	Salix glauca	2002		-	-	<1	-	-
7-3	7-3 W	willow	Salix glauca	2002		-	-	<1	-	-
7-4	7-4 W	willow	Salix glauca	2002		-	-	<1	-	-
8-1	8-1 W	willow	Salix glauca	2002		-	-	<1	-	-
8-2	8-2 W	willow	Salix glauca	2002		-	-	<1	-	-
8-3	8-3 W	willow	Salix glauca	2002		-	-	<1	-	-
8-4	8-4 W	willow	Salix glauca	2002		-	-	<1	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
13	13_willow	willow	Salix spp.	2004	67.3	22	7.99	8940	0.2	0.2
15	15_willow	willow	Salix spp.	2004	55.1	10	8.23	6840	< 0.1	0.4
19	19_willow	willow	Salix spp.	2004	61.1	5	3.27	16300	< 0.1	0.2
45	45_willow	willow	Salix spp.	2004	56.9	13	2.05	11100	0.1	0.3
72	72_willow	willow	Salix spp.	2004	62.7	8	1.34	6870	< 0.1	1.4
90	90_willow	willow	Salix spp.	2004	57.5	8	1.13	9240	< 0.1	0.7
95	95_willow	willow	Salix spp.	2004	60.8	9	1.85	8150	0.1	1.8
100	100_willow	willow	Salix spp.	2004	64	25	1.61	13000	0.1	0.6
111	111_willow	willow	Salix spp.	2004	64.3	32	3.01	20400	20.2	0.5
128	128_willow	willow	Salix spp.	2004	61.4	5	7.01	8160	< 0.1	0.9
VAN-1	VAN-1W	willow	Salix glauca	2002		-	12.26	-	0.68	-
VAN-4	VAN-4W	willow	Salix glauca	2002		-	1.53	-	0.37	-
VAN-5	VAN-5W	willow	Salix glauca	2002		-	3.43	-	0.18	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		-	2.32	-	0.42	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		-	1.13	-	0.57	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		-	2.17	-	0.38	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		-	1.31	-	0.35	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		-	2.42	-	0.35	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		-	5.65	-	0.41	-
FARO-4	FARO-4W	willow	Salix glauca	2002		-	3.62	-	1.27	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		-	2.96	-	0.45	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		-	12.66	-	0.46	-
FARO-7	FARO-7W	willow	Salix glauca	2002		-	10.44	-	0.71	-
SW-1	SW-1 W	willow	Salix glauca	2002		-	5.20	-	0.18	-
SW-2	SW-2 W	willow	Salix glauca	2002		-	1.78	-	0.18	-
SW-3	SW-3 W	willow	Salix glauca	2002		-	1.33	-	0.22	-
SW-4	SW-4 W	willow	Salix glauca	2002		-	1.47	-	0.07	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
SW-5	SW-5 W	willow	Salix glauca	2002		-	1.16	-	<0.05	-
SW-6	SW-6 W	willow	Salix glauca	2002		-	6.13	-	0.06	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		-	2.02	-	<0.05	-
VB-1	VB-1 W	willow	Salix glauca	2002		-	1.31	-	0.16	-
VB-2	VB-2 W	willow	Salix glauca	2002		-	1.74	-	0.09	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		-	0.91	-	0.25	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		-	0.94	-	0.17	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		-	0.31	-	0.17	-
2-2	2-2 W	willow	Salix glauca	2002		-	1.19	-	0.15	-
2-1	2-1 W	willow	Salix glauca	2002		-	1.95	-	0.19	-
3-1	3-1W	willow	Salix glauca	2002		-	2.82	-	0.26	-
3-2	3-2W	willow	Salix glauca	2002		-	3.80	-	0.20	-
3-3	3-3W	willow	Salix glauca	2002		-	4.72	-	0.22	-
3-4	3-4W	willow	Salix glauca	2002		-	4.81	-	0.20	-
4-1	4-1 W	willow	Salix glauca	2002		-	9.92	-	0.51	-
4-2	4-2 W	willow	Salix glauca	2002		-	3.01	-	0.13	-
4-3	4-3 W	willow	Salix glauca	2002		-	1.39	-	<0.05	-
4-4	4-4 W	willow	Salix glauca	2002		-	1.33	-	0.06	-
4-5	4-5 W	willow	Salix glauca	2002		-	0.72	-	0.11	-
4-6	4-6 W	willow	Salix glauca	2002		-	1.47	-	0.11	-
5-1	5-1 W	willow	Salix glauca	2002		-	2.54	-	0.38	-
5-2	5-2 W	willow	Salix glauca	2002		-	0.71	-	0.20	-
5-3	5-3 W	willow	Salix glauca	2002		-	2.54	-	0.19	-
5-4	5-4 W	willow	Salix glauca	2002		-	1.24	-	0.18	-
5-5	5-5 W	willow	Salix glauca	2002		-	2.28	-	0.08	-
6-1	6-1 W	willow	Salix glauca	2002		-	4.93	-	0.39	-
6-2	6-2 W	willow	Salix glauca	2002		-	14.18	-	0.21	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
6-3	6-3 W	willow	Salix glauca	2002		-	7.93	-	0.12	-
6-4	6-4 W	willow	Salix glauca	2002		-	2.24	-	0.09	-
7-1	7-1 W	willow	Salix glauca	2002		-	2.32	-	0.11	-
6-5	6-5 W	willow	Salix glauca	2002		-	17.27	-	0.11	-
7-2	7-2 W	willow	Salix glauca	2002		-	1.95	-	0.15	-
7-3	7-3 W	willow	Salix glauca	2002		-	0.47	-	0.19	-
7-4	7-4 W	willow	Salix glauca	2002		-	1.37	-	0.37	-
8-1	8-1 W	willow	Salix glauca	2002		-	0.53	-	0.15	-
8-2	8-2 W	willow	Salix glauca	2002		-	0.80	-	0.12	-
8-3	8-3 W	willow	Salix glauca	2002		-	0.70	-	3.24	-
8-4	8-4 W	willow	Salix glauca	2002		-	2.03	-	3.69	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
13	13_willow	willow	Salix spp.	2004	67.3	5.2	73	0.1	4280	63
15	15_willow	willow	Salix spp.	2004	55.1	3.9	48	< 0.1	2330	804
19	19_willow	willow	Salix spp.	2004	61.1	2.5	45	0.1	13000	123
45	45_willow	willow	Salix spp.	2004	56.9	3.3	53	0.9	1820	104
72	72_willow	willow	Salix spp.	2004	62.7	5.4	52	0.3	2520	378
90	90_willow	willow	Salix spp.	2004	57.5	5.2	82	0.2	2540	808
95	95_willow	willow	Salix spp.	2004	60.8	5.8	63	0.1	3760	480
100	100_willow	willow	Salix spp.	2004	64	5.9	79	1.2	2710	83.7
111	111_willow	willow	Salix spp.	2004	64.3	7.4	141	0.1	4730	71.8
128	128_willow	willow	Salix spp.	2004	61.4	8.3	48	0.1	4320	908
VAN-1	VAN-1W	willow	Salix glauca	2002		7.73	-	1.3	-	-
VAN-4	VAN-4W	willow	Salix glauca	2002		3.38	-	1.8	-	-
VAN-5	VAN-5W	willow	Salix glauca	2002		2.65	-	1.1	-	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		5.21	-	2.2	-	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		3.34	-	3.6	-	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		5.30	-	2.2	-	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		4.04	-	6.0	-	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		7.08	-	28.1	-	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		6.61	-	14.6	-	-
FARO-4	FARO-4W	willow	Salix glauca	2002		10.94	-	115.0	-	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		6.24	-	63.6	-	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		10.29	-	43.8	-	-
FARO-7	FARO-7W	willow	Salix glauca	2002		7.19	-	28.6	-	-
SW-1	SW-1 W	willow	Salix glauca	2002		3.14	-	0.2	-	-
SW-2	SW-2 W	willow	Salix glauca	2002		3.04	-	<0.3	-	-
SW-3	SW-3 W	willow	Salix glauca	2002		3.09	-	<0.3	-	-
SW-4	SW-4 W	willow	Salix glauca	2002		2.85	-	0.3	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
SW-5	SW-5 W	willow	Salix glauca	2002		2.56	-	<0.3	-	-
SW-6	SW-6 W	willow	Salix glauca	2002		6.00	-	0.4	-	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		2.97	-	0.5	-	-
VB-1	VB-1 W	willow	Salix glauca	2002		3.38	-	0.6	-	-
VB-2	VB-2 W	willow	Salix glauca	2002		4.09	-	0.7	-	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		4.31	-	0.8	-	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		5.08	-	0.6	-	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		2.92	-	0.5	-	-
2-2	2-2 W	willow	Salix glauca	2002		2.07	-	0.5	-	-
2-1	2-1 W	willow	Salix glauca	2002		4.34	-	3.9	-	-
3-1	3-1W	willow	Salix glauca	2002		6.08	-	2.2	-	-
3-2	3-2W	willow	Salix glauca	2002		2.90	-	2.1	-	-
3-3	3-3W	willow	Salix glauca	2002		6.64	-	3.3	-	-
3-4	3-4W	willow	Salix glauca	2002		4.63	-	0.7	-	-
4-1	4-1 W	willow	Salix glauca	2002		8.54	-	8.4	-	-
4-2	4-2 W	willow	Salix glauca	2002		4.93	-	4.5	-	-
4-3	4-3 W	willow	Salix glauca	2002		3.93	-	2.2	-	-
4-4	4-4 W	willow	Salix glauca	2002		4.27	-	1.1	-	-
4-5	4-5 W	willow	Salix glauca	2002		4.53	-	14.2	-	-
4-6	4-6 W	willow	Salix glauca	2002		4.06	-	4.7	-	-
5-1	5-1 W	willow	Salix glauca	2002		6.60	-	21.0	-	-
5-2	5-2 W	willow	Salix glauca	2002		3.74	-	6.3	-	-
5-3	5-3 W	willow	Salix glauca	2002		4.14	-	13.8	-	-
5-4	5-4 W	willow	Salix glauca	2002		2.48	-	3.8	-	-
5-5	5-5 W	willow	Salix glauca	2002		5.07	-	1.6	-	-
6-1	6-1 W	willow	Salix glauca	2002		7.19	-	34.6	-	-
6-2	6-2 W	willow	Salix glauca	2002		7.04	-	6.2	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
6-3	6-3 W	willow	Salix glauca	2002		4.02	-	2.1	-	-
6-4	6-4 W	willow	Salix glauca	2002		4.23	-	1.7	-	-
7-1	7-1 W	willow	Salix glauca	2002		3.30	-	3.0	-	-
6-5	6-5 W	willow	Salix glauca	2002		7.35	-	2.6	-	-
7-2	7-2 W	willow	Salix glauca	2002		4.62	-	1.1	-	-
7-3	7-3 W	willow	Salix glauca	2002		6.97	-	0.9	-	-
7-4	7-4 W	willow	Salix glauca	2002		3.22	-	1.7	-	-
8-1	8-1 W	willow	Salix glauca	2002		3.36	-	1.0	-	-
8-2	8-2 W	willow	Salix glauca	2002		3.45	-	0.6	-	-
8-3	8-3 W	willow	Salix glauca	2002		3.38	-	1.1	-	-
8-4	8-4 W	willow	Salix glauca	2002		3.82	-	0.8	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
13	13_willow	willow	Salix spp.	2004	67.3	< 0.01	2.8	0.5	7470
15	15_willow	willow	Salix spp.	2004	55.1	< 0.01	0.2	0.8	3430
19	19_willow	willow	Salix spp.	2004	61.1	< 0.01	0.1	0.2	4850
45	45_willow	willow	Salix spp.	2004	56.9	< 0.01	0.1	0.7	3840
72	72_willow	willow	Salix spp.	2004	62.7	< 0.01	0.1	1.7	4280
90	90_willow	willow	Salix spp.	2004	57.5	< 0.01	0.3	0.4	4250
95	95_willow	willow	Salix spp.	2004	60.8	< 0.01	1	3.3	7930
100	100_willow	willow	Salix spp.	2004	64	< 0.01	0.3	1	4860
111	111_willow	willow	Salix spp.	2004	64.3	< 0.01	1.5	9.6	6590
128	128_willow	willow	Salix spp.	2004	61.4	< 0.01	0.4	8.8	7770
VAN-1	VAN-1W	willow	Salix glauca	2002		0.02	-	4.3	-
VAN-4	VAN-4W	willow	Salix glauca	2002		<0.01	-	2.8	-
VAN-5	VAN-5W	willow	Salix glauca	2002		0.01	-	3.0	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		<0.01	-	3.4	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		<0.01	-	0.7	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		0.01	-	3.3	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		0.01	-	2.4	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		0.01	-	2.2	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		0.02	-	7.5	-
FARO-4	FARO-4W	willow	Salix glauca	2002		0.07	-	1.9	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		0.04	-	2.7	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		0.03	-	5.3	-
FARO-7	FARO-7W	willow	Salix glauca	2002		0.03	-	4.3	-
SW-1	SW-1 W	willow	Salix glauca	2002		<0.01	-	0.6	-
SW-2	SW-2 W	willow	Salix glauca	2002		<0.01	-	1.1	-
SW-3	SW-3 W	willow	Salix glauca	2002		0.01	-	0.2	-
SW-4	SW-4 W	willow	Salix glauca	2002		<0.01	-	0.5	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
SW-5	SW-5 W	willow	Salix glauca	2002		<0.01	-	2.9	-
SW-6	SW-6 W	willow	Salix glauca	2002		<0.01	-	2.4	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		<0.01	-	0.2	-
VB-1	VB-1 W	willow	Salix glauca	2002		<0.01	-	1.6	-
VB-2	VB-2 W	willow	Salix glauca	2002		<0.01	-	4.7	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		0.01	-	2.0	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		<0.01	-	1.7	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		0.02	-	0.6	-
2-2	2-2 W	willow	Salix glauca	2002		0.02	-	0.7	-
2-1	2-1 W	willow	Salix glauca	2002		<0.01	-	4.0	-
3-1	3-1W	willow	Salix glauca	2002		<0.01	-	1.3	-
3-2	3-2W	willow	Salix glauca	2002		0.01	-	7.5	-
3-3	3-3W	willow	Salix glauca	2002		0.01	-	5.5	-
3-4	3-4W	willow	Salix glauca	2002		0.02	-	4.9	-
4-1	4-1 W	willow	Salix glauca	2002		0.02	-	8.6	-
4-2	4-2 W	willow	Salix glauca	2002		0.02	-	2.4	-
4-3	4-3 W	willow	Salix glauca	2002		0.03	-	1.2	-
4-4	4-4 W	willow	Salix glauca	2002		0.02	-	1.3	-
4-5	4-5 W	willow	Salix glauca	2002		<0.01	-	0.6	-
4-6	4-6 W	willow	Salix glauca	2002		<0.01	-	1.4	-
5-1	5-1 W	willow	Salix glauca	2002		0.02	-	3.1	-
5-2	5-2 W	willow	Salix glauca	2002		0.01	-	1.8	-
5-3	5-3 W	willow	Salix glauca	2002		0.02	-	1.0	-
5-4	5-4 W	willow	Salix glauca	2002		0.03	-	5.5	-
5-5	5-5 W	willow	Salix glauca	2002		0.01	-	1.5	-
6-1	6-1 W	willow	Salix glauca	2002		0.02	-	2.0	-
6-2	6-2 W	willow	Salix glauca	2002		<0.01	-	7.1	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
6-3	6-3 W	willow	Salix glauca	2002		0.01	-	1.3	-
6-4	6-4 W	willow	Salix glauca	2002		<0.01	-	5.6	-
7-1	7-1 W	willow	Salix glauca	2002		0.02	-	0.7	-
6-5	6-5 W	willow	Salix glauca	2002		0.01	-	17.4	-
7-2	7-2 W	willow	Salix glauca	2002		<0.01	-	2.1	-
7-3	7-3 W	willow	Salix glauca	2002		<0.01	-	5.0	-
7-4	7-4 W	willow	Salix glauca	2002		<0.01	-	2.8	-
8-1	8-1 W	willow	Salix glauca	2002		<0.01	-	2.1	-
8-2	8-2 W	willow	Salix glauca	2002		<0.01	-	1.3	-
8-3	8-3 W	willow	Salix glauca	2002		<0.01	-	0.4	-
8-4	8-4 W	willow	Salix glauca	2002		<0.01	-	0.8	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
13	13_willow	willow	Salix spp.	2004	67.3	23900	4.3	226	< 0.01	10
15	15_willow	willow	Salix spp.	2004	55.1	7910	< 0.2	235	< 0.01	2
19	19_willow	willow	Salix spp.	2004	61.1	7070	< 0.2	183	< 0.01	11
45	45_willow	willow	Salix spp.	2004	56.9	14700	< 0.2	191	< 0.01	< 1
72	72_willow	willow	Salix spp.	2004	62.7	6950	< 0.2	264	0.03	30
90	90_willow	willow	Salix spp.	2004	57.5	7030	< 0.2	238	< 0.01	2
95	95_willow	willow	Salix spp.	2004	60.8	5690	< 0.2	169	< 0.01	24
100	100_willow	willow	Salix spp.	2004	64	17900	< 0.2	219	< 0.01	3
111	111_willow	willow	Salix spp.	2004	64.3	12300	< 0.2	257	0.01	13
128	128_willow	willow	Salix spp.	2004	61.4	11200	< 0.2	207	< 0.01	7
VAN-1	VAN-1W	willow	Salix glauca	2002		-	<1	-	0.06	-
VAN-4	VAN-4W	willow	Salix glauca	2002		-	1	-	0.08	-
VAN-5	VAN-5W	willow	Salix glauca	2002		-	<1	-	0.05	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		-	<1	-	<0.01	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		-	<1	-	0.07	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		-	<1	-	0.12	-
FARO-4	FARO-4W	willow	Salix glauca	2002		-	<1	-	0.22	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		-	<1	-	0.12	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		-	<1	-	0.09	-
FARO-7	FARO-7W	willow	Salix glauca	2002		-	<1	-	0.10	-
SW-1	SW-1 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
SW-2	SW-2 W	willow	Salix glauca	2002		-	1	-	<0.01	-
SW-3	SW-3 W	willow	Salix glauca	2002		-	<1	-	0.03	-
SW-4	SW-4 W	willow	Salix glauca	2002		-	<1	-	<0.01	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
SW-5	SW-5 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
SW-6	SW-6 W	willow	Salix glauca	2002		-	2	-	0.01	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		-	<1	-	<0.01	-
VB-1	VB-1 W	willow	Salix glauca	2002		-	1	-	0.05	-
VB-2	VB-2 W	willow	Salix glauca	2002		-	<1	-	0.06	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		-	<1	-	0.05	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		-	3	-	0.03	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		-	<1	-	0.05	-
2-2	2-2 W	willow	Salix glauca	2002		-	<1	-	0.02	-
2-1	2-1 W	willow	Salix glauca	2002		-	<1	-	0.04	-
3-1	3-1W	willow	Salix glauca	2002		-	<1	-	0.04	-
3-2	3-2W	willow	Salix glauca	2002		-	<1	-	0.03	-
3-3	3-3W	willow	Salix glauca	2002		-	1	-	0.05	-
3-4	3-4W	willow	Salix glauca	2002		-	<1	-	0.03	-
4-1	4-1 W	willow	Salix glauca	2002		-	1	-	0.20	-
4-2	4-2 W	willow	Salix glauca	2002		-	<1	-	0.02	-
4-3	4-3 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
4-4	4-4 W	willow	Salix glauca	2002		-	<1	-	0.03	-
4-5	4-5 W	willow	Salix glauca	2002		-	<1	-	0.01	-
4-6	4-6 W	willow	Salix glauca	2002		-	1	-	0.02	-
5-1	5-1 W	willow	Salix glauca	2002		-	2	-	0.10	-
5-2	5-2 W	willow	Salix glauca	2002		-	<1	-	0.04	-
5-3	5-3 W	willow	Salix glauca	2002		-	1	-	0.04	-
5-4	5-4 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
5-5	5-5 W	willow	Salix glauca	2002		-	1	-	<0.01	-
6-1	6-1 W	willow	Salix glauca	2002		-	<1	-	0.08	-
6-2	6-2 W	willow	Salix glauca	2002		-	1	-	0.03	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
6-3	6-3 W	willow	Salix glauca	2002		-	<1	-	0.02	-
6-4	6-4 W	willow	Salix glauca	2002		-	<1	-	0.05	-
7-1	7-1 W	willow	Salix glauca	2002		-	<1	-	0.02	-
6-5	6-5 W	willow	Salix glauca	2002		-	<1	-	0.04	-
7-2	7-2 W	willow	Salix glauca	2002		-	<1	-	0.03	-
7-3	7-3 W	willow	Salix glauca	2002		-	<1	-	0.03	-
7-4	7-4 W	willow	Salix glauca	2002		-	<1	-	0.01	-
8-1	8-1 W	willow	Salix glauca	2002		-	<1	-	0.02	-
8-2	8-2 W	willow	Salix glauca	2002		-	<1	-	<0.01	-
8-3	8-3 W	willow	Salix glauca	2002		-	<1	-	0.01	-
8-4	8-4 W	willow	Salix glauca	2002		-	<1	-	<0.01	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U
13	13_willow	willow	Salix spp.	2004	67.3	19.5	< 0.1	< 0.02	< 0.1	2	< 0.04
15	15_willow	willow	Salix spp.	2004	55.1	29.4	< 0.1	< 0.02	< 0.1	1.1	< 0.04
19	19_willow	willow	Salix spp.	2004	61.1	70.9	< 0.1	< 0.02	< 0.1	1.4	< 0.04
45	45_willow	willow	Salix spp.	2004	56.9	28.5	< 0.1	< 0.02	< 0.1	1.2	< 0.04
72	72_willow	willow	Salix spp.	2004	62.7	27.1	< 0.1	< 0.02	< 0.1	0.7	< 0.04
90	90_willow	willow	Salix spp.	2004	57.5	56.8	< 0.1	< 0.02	< 0.1	0.8	< 0.04
95	95_willow	willow	Salix spp.	2004	60.8	41.8	< 0.1	< 0.02	< 0.1	1	< 0.04
100	100_willow	willow	Salix spp.	2004	64	62.8	< 0.1	< 0.02	< 0.1	1.1	< 0.04
111	111_willow	willow	Salix spp.	2004	64.3	86.7	< 0.1	< 0.02	0.3	1.3	< 0.04
128	128_willow	willow	Salix spp.	2004	61.4	45.9	< 0.1	< 0.02	0.2	1.1	< 0.04
VAN-1	VAN-1W	willow	Salix glauca	2002		-	-	-	-	-	-
VAN-4	VAN-4W	willow	Salix glauca	2002		-	-	-	-	-	-
VAN-5	VAN-5W	willow	Salix glauca	2002		-	-	-	-	-	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		-	-	-	-	-	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		-	-	-	-	-	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-4	FARO-4W	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
FARO-7	FARO-7W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-1	SW-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-2	SW-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-3	SW-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-4	SW-4 W	willow	Salix glauca	2002		-	-	-	-	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U
SW-5	SW-5 W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-6	SW-6 W	willow	Salix glauca	2002		-	-	-	-	-	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
VB-1	VB-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
VB-2	VB-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		-	-	-	-	-	-
2-2	2-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
2-1	2-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
3-1	3-1W	willow	Salix glauca	2002		-	-	-	-	-	-
3-2	3-2W	willow	Salix glauca	2002		-	-	-	-	-	-
3-3	3-3W	willow	Salix glauca	2002		-	-	-	-	-	-
3-4	3-4W	willow	Salix glauca	2002		-	-	-	-	-	-
4-1	4-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
4-2	4-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
4-3	4-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
4-4	4-4 W	willow	Salix glauca	2002		-	-	-	-	-	-
4-5	4-5 W	willow	Salix glauca	2002		-	-	-	-	-	-
4-6	4-6 W	willow	Salix glauca	2002		-	-	-	-	-	-
5-1	5-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
5-2	5-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
5-3	5-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
5-4	5-4 W	willow	Salix glauca	2002		-	-	-	-	-	-
5-5	5-5 W	willow	Salix glauca	2002		-	-	-	-	-	-
6-1	6-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
6-2	6-2 W	willow	Salix glauca	2002		-	-	-	-	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U
6-3	6-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
6-4	6-4 W	willow	Salix glauca	2002		-	-	-	-	-	-
7-1	7-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
6-5	6-5 W	willow	Salix glauca	2002		-	-	-	-	-	-
7-2	7-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
7-3	7-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
7-4	7-4 W	willow	Salix glauca	2002		-	-	-	-	-	-
8-1	8-1 W	willow	Salix glauca	2002		-	-	-	-	-	-
8-2	8-2 W	willow	Salix glauca	2002		-	-	-	-	-	-
8-3	8-3 W	willow	Salix glauca	2002		-	-	-	-	-	-
8-4	8-4 W	willow	Salix glauca	2002		-	-	-	-	-	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
13	13_willow	willow	Salix spp.	2004	67.3	< 0.5	157	< 3
15	15_willow	willow	Salix spp.	2004	55.1	< 0.5	396	< 3
19	19_willow	willow	Salix spp.	2004	61.1	< 0.5	230	< 3
45	45_willow	willow	Salix spp.	2004	56.9	< 0.5	183	< 3
72	72_willow	willow	Salix spp.	2004	62.7	< 0.5	42.7	< 3
90	90_willow	willow	Salix spp.	2004	57.5	< 0.5	299	< 3
95	95_willow	willow	Salix spp.	2004	60.8	< 0.5	104	< 3
100	100_willow	willow	Salix spp.	2004	64	< 0.5	140	< 3
111	111_willow	willow	Salix spp.	2004	64.3	< 0.5	227	< 3
128	128_willow	willow	Salix spp.	2004	61.4	< 0.5	138	< 3
VAN-1	VAN-1W	willow	Salix glauca	2002		-	402	-
VAN-4	VAN-4W	willow	Salix glauca	2002		-	43	-
VAN-5	VAN-5W	willow	Salix glauca	2002		-	70	-
VAN- 9	VAN- 9W	willow	Salix glauca	2002		-	139	-
VAN-10	VAN-10 W	willow	Salix glauca	2002		-	74	-
VAN-11	VAN-11 W	willow	Salix glauca	2002		-	135	-
FARO-1	FARO-1 W	willow	Salix glauca	2002		-	85	-
FARO-2	FARO-2 W	willow	Salix glauca	2002		-	1340	-
FARO-3	FARO-3 W unwashed	willow	Salix glauca	2002		-	270	-
FARO-4	FARO-4W	willow	Salix glauca	2002		-	623	-
FARO-5	FARO-5 W	willow	Salix glauca	2002		-	1290	-
FARO-6	FARO-6 W unwashed	willow	Salix glauca	2002		-	2350	-
FARO-7	FARO-7W	willow	Salix glauca	2002		-	601	-
SW-1	SW-1 W	willow	Salix glauca	2002		-	133	-
SW-2	SW-2 W	willow	Salix glauca	2002		-	122	-
SW-3	SW-3 W	willow	Salix glauca	2002		-	159	-
SW-4	SW-4 W	willow	Salix glauca	2002		-	243	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
SW-5	SW-5 W	willow	Salix glauca	2002		-	27	-
SW-6	SW-6 W	willow	Salix glauca	2002		-	170	-
SW-7	SW-7 W unwashed	willow	Salix glauca	2002		-	225	-
VB-1	VB-1 W	willow	Salix glauca	2002		-	75	-
VB-2	VB-2 W	willow	Salix glauca	2002		-	68	-
1-1	1-1 W unwashed	willow	Salix glauca	2002		-	97	-
1-2	1-2 W unwashed	willow	Salix glauca	2002		-	116	-
1-3	1-3 W unwashed	willow	Salix glauca	2002		-	90	-
2-2	2-2 W	willow	Salix glauca	2002		-	116	-
2-1	2-1 W	willow	Salix glauca	2002		-	219	-
3-1	3-1W	willow	Salix glauca	2002		-	216	-
3-2	3-2W	willow	Salix glauca	2002		-	113	-
3-3	3-3W	willow	Salix glauca	2002		-	828	-
3-4	3-4W	willow	Salix glauca	2002		-	397	-
4-1	4-1 W	willow	Salix glauca	2002		-	165	-
4-2	4-2 W	willow	Salix glauca	2002		-	201	-
4-3	4-3 W	willow	Salix glauca	2002		-	161	-
4-4	4-4 W	willow	Salix glauca	2002		-	84	-
4-5	4-5 W	willow	Salix glauca	2002		-	189	-
4-6	4-6 W	willow	Salix glauca	2002		-	174	-
5-1	5-1 W	willow	Salix glauca	2002		-	389	-
5-2	5-2 W	willow	Salix glauca	2002		-	285	-
5-3	5-3 W	willow	Salix glauca	2002		-	663	-
5-4	5-4 W	willow	Salix glauca	2002		-	52	-
5-5	5-5 W	willow	Salix glauca	2002		-	88	-
6-1	6-1 W	willow	Salix glauca	2002		-	616	-
6-2	6-2 W	willow	Salix glauca	2002		-	446	-

Table C4c. Willow Raw Data: elements and moisture

Site_ID	Sample ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
6-3	6-3 W	willow	Salix glauca	2002		-	172	-
6-4	6-4 W	willow	Salix glauca	2002		-	67	-
7-1	7-1 W	willow	Salix glauca	2002		-	272	-
6-5	6-5 W	willow	Salix glauca	2002		-	545	-
7-2	7-2 W	willow	Salix glauca	2002		-	212	-
7-3	7-3 W	willow	Salix glauca	2002		-	235	-
7-4	7-4 W	willow	Salix glauca	2002		-	190	-
8-1	8-1 W	willow	Salix glauca	2002		-	87	-
8-2	8-2 W	willow	Salix glauca	2002		-	94	-
8-3	8-3 W	willow	Salix glauca	2002		-	116	-
8-4	8-4 W	willow	Salix glauca	2002		-	140	-

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
40	40_forbs	forb	Petasites frigidus	2004	82.8	12.2	< 0.1	< 0.1	93.1	< 0.02
58	58_forbs	forb	Petasites frigidus	2004	81.4	16.3	< 0.1	0.1	83.7	< 0.02
84	84_forbs	forb	Petasites frigidus	2004	79	10.2	< 0.1	< 0.1	26.4	< 0.02
88	88_forbs	forb	Petasites frigidus	2004	84.3	35.6	< 0.1	< 0.1	161	0.08
90	90_forbs	forb	Petasites frigidus	2004	80.8	14.1	< 0.1	< 0.1	44.4	< 0.02
123	123_forbs	forb	Petasites frigidus	2004	77.8	49.6	< 0.1	< 0.1	269	< 0.02
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	10.5	< 0.1	< 0.1	106	< 0.02
13	13_forbs	forb	Petasites frigidus	2004	85.8	12.1	< 0.1	0.2	55.9	< 0.02
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	33.1	< 0.1	< 0.1	123	< 0.02
15	15_forbs	forb	Petasites frigidus	2004	81.9	10.4	< 0.1	< 0.1	65.6	< 0.02

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
40	40_forbs	forb	Petasites frigidus	2004	82.8	21	0.4	26400	0.2	0.6
58	58_forbs	forb	Petasites frigidus	2004	81.4	30	0.66	25600	0.2	1.1
84	84_forbs	forb	Petasites frigidus	2004	79	12	0.71	21600	0.2	0.1
88	88_forbs	forb	Petasites frigidus	2004	84.3	11	0.36	21400	0.2	1.1
90	90_forbs	forb	Petasites frigidus	2004	80.8	31	0.16	21500	0.2	0.7
123	123_forbs	forb	Petasites frigidus	2004	77.8	9	0.45	20000	0.1	5.4
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	14	0.51	15700	0.6	0.2
13	13_forbs	forb	Petasites frigidus	2004	85.8	29	1.03	33500	0.2	0.3
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	14	0.03	14600	0.4	< 0.1
15	15_forbs	forb	Petasites frigidus	2004	81.9	15	0.48	22900	0.2	0.8

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
40	40_forbs	forb	Petasites frigidus	2004	82.8	7.5	90	0.8	5910	262
58	58_forbs	forb	Petasites frigidus	2004	81.4	11.7	100	4.3	3480	253
84	84_forbs	forb	Petasites frigidus	2004	79	6.6	78	0.5	3920	111
88	88_forbs	forb	Petasites frigidus	2004	84.3	7.4	91	0.4	6830	223
90	90_forbs	forb	Petasites frigidus	2004	80.8	10.6	144	0.3	5620	312
123	123_forbs	forb	Petasites frigidus	2004	77.8	8.1	94	0.2	10300	280
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	6.3	80	0.3	7720	133
13	13_forbs	forb	Petasites frigidus	2004	85.8	5.7	92	0.2	7820	109
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	4	85	< 0.1	4460	90.6
15	15_forbs	forb	Petasites frigidus	2004	81.9	9.9	84	0.1	6440	617

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
40	40_forbs	forb	Petasites frigidus	2004	82.8	< 0.01	0.8	4.1	6540
58	58_forbs	forb	Petasites frigidus	2004	81.4	< 0.01	0.2	6.2	6330
84	84_forbs	forb	Petasites frigidus	2004	79	< 0.01	0.1	1.4	6350
88	88_forbs	forb	Petasites frigidus	2004	84.3	0.019	0.2	17.6	5500
90	90_forbs	forb	Petasites frigidus	2004	80.8	0.011	3.7	0.9	4720
123	123_forbs	forb	Petasites frigidus	2004	77.8	< 0.01	0.6	21.6	5890
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	0.011	1.2	4.6	6380
13	13_forbs	forb	Petasites frigidus	2004	85.8	< 0.01	9.9	0.5	9350
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	< 0.01	6.7	1.4	13400
15	15_forbs	forb	Petasites frigidus	2004	81.9	< 0.01	0.4	2.4	4600

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
40	40_forbs	forb	Petasites frigidus	2004	82.8	47900	< 0.2	454	< 0.01	4
58	58_forbs	forb	Petasites frigidus	2004	81.4	47100	< 0.2	869	0.01	12
84	84_forbs	forb	Petasites frigidus	2004	79	35000	< 0.2	703	< 0.01	14
88	88_forbs	forb	Petasites frigidus	2004	84.3	46500	< 0.2	1080	< 0.01	26
90	90_forbs	forb	Petasites frigidus	2004	80.8	42300	< 0.2	1160	0.02	24
123	123_forbs	forb	Petasites frigidus	2004	77.8	16600	< 0.2	543	0.01	8
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	23200	1.2	545	< 0.01	10
13	13_forbs	forb	Petasites frigidus	2004	85.8	53100	4.2	875	< 0.01	33
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	18000	0.2	367	< 0.01	24
15	15_forbs	forb	Petasites frigidus	2004	81.9	54300	< 0.2	605	0.01	49

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U
40	40_forbs	forb	Petasites frigidus	2004	82.8	106	< 0.1	< 0.02	0.1	1.7	< 0.04
58	58_forbs	forb	Petasites frigidus	2004	81.4	95.6	< 0.1	< 0.02	0.1	1.6	< 0.04
84	84_forbs	forb	Petasites frigidus	2004	79	102	< 0.1	< 0.02	< 0.1	1.2	< 0.04
88	88_forbs	forb	Petasites frigidus	2004	84.3	176	< 0.1	< 0.02	0.2	1.1	< 0.04
90	90_forbs	forb	Petasites frigidus	2004	80.8	103	< 0.1	< 0.02	0.1	1.1	< 0.04
123	123_forbs	forb	Petasites frigidus	2004	77.8	126	< 0.1	< 0.02	0.2	0.9	< 0.04
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	56.9	< 0.1	< 0.02	< 0.1	1	< 0.04
13	13_forbs	forb	Petasites frigidus	2004	85.8	69.4	< 0.1	< 0.02	0.2	2.4	< 0.04
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	77.3	< 0.1	< 0.02	0.1	2.9	< 0.04
15	15_forbs	forb	Petasites frigidus	2004	81.9	85.7	< 0.1	< 0.02	0.6	1.5	< 0.04

Table C4d. Forbs Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
40	40_forbs	forb	Petasites frigidus	2004	82.8	< 0.5	72.4	< 3
58	58_forbs	forb	Petasites frigidus	2004	81.4	< 0.5	648	< 3
84	84_forbs	forb	Petasites frigidus	2004	79	< 0.5	30	< 3
88	88_forbs	forb	Petasites frigidus	2004	84.3	< 0.5	31.6	< 3
90	90_forbs	forb	Petasites frigidus	2004	80.8	< 0.5	30.5	< 3
123	123_forbs	forb	Petasites frigidus	2004	77.8	< 0.5	28.8	< 3
128	128_forbs	forb	composite (0.5 Petasites frigidus + 0.5 Epilobium angustifolium)	2004	79.5	< 0.5	24.3	< 3
13	13_forbs	forb	Petasites frigidus	2004	85.8	< 0.5	46.8	< 3
14	14_forbs	forb	Epilobium angustifolium	2004	77.3	< 0.5	19.7	< 3
15	15_forbs	forb	Petasites frigidus	2004	81.9	< 0.5	31.5	< 3

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	6.9	< 0.1	0.1	33.3	< 0.02
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	7.6	< 0.1	0.1	77.7	< 0.02
56_grass	56_grass	grass	Bromus spp.	2004	63.6	18	< 0.1	0.4	49	< 0.02
73_grass	73_grass	grass	Festuca altaica	2004	65.3	13.6	< 0.1	< 0.1	19.1	< 0.02
76_grass	76_grass	grass	Carex spp.	2004	61.4	26.4	< 0.1	< 0.1	50.4	0.06
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	27.3	< 0.1	< 0.1	44.2	0.02
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	5.5	< 0.1	< 0.1	30	< 0.02
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	26.7	< 0.1	< 0.1	57.7	0.13
90_grass	90_grass	grass	Carex spp.	2004	63	4.3	< 0.1	< 0.1	36.1	< 0.02
95_grass	95_grass	grass	Bromus spp.	2004	66.4	3	< 0.1	< 0.1	48.2	< 0.02
101_grass	101_grass	grass	Carex spp.	2004	68.4	8	< 0.1	< 0.1	32.1	< 0.02
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	8.6	< 0.1	< 0.1	94.6	< 0.02
VAN-2	VAN-2G	grass	Festuca altaica	2002		-	-	<1	-	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		-	-	<1	-	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		-	-	<1	-	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		-	-	<1	-	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		-	-	<1	-	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		-	-	<1	-	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		-	-	<1	-	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		-	-	3	-	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		-	-	<1	-	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		-	-	<1	-	-
VB-1	VB-1 G	grass	Festuca altaica	2002		-	-	<1	-	-
VB-2	VB-2 G	grass	Festuca altaica	2002		-	-	<1	-	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
1-3	1-3 G	grass	Festuca altaica	2002		-	-	<1	-	-
3-2	3-2G	grass	Festuca altaica	2002		-	-	<1	-	-
3-3	3-3G	grass	Festuca altaica	2002		-	-	<1	-	-
3-4	3-4G	grass	Festuca altaica	2002		-	-	<1	-	-
4-2	4-2 G	grass	Festuca altaica	2002		-	-	<1	-	-
4-4	4-4 G	grass	Festuca altaica	2002		-	-	<1	-	-
5-2	5-2 G	grass	Festuca altaica	2002		-	-	<1	-	-
5-5	5-5 G	grass	Festuca altaica	2002		-	-	<1	-	-
6-1	6-1 G	grass	Festuca altaica	2002		-	-	1	-	-
6-2	6-2 G	grass	Festuca altaica	2002		-	-	<1	-	-
6-3	6-3 G	grass	Festuca altaica	2002		-	-	<1	-	-
7-1	7-1 G	grass	Festuca altaica	2002		-	-	<1	-	-
7-4	7-4 G	grass	Festuca altaica	2002		-	-	<1	-	-
8-4	8-4 G	grass	Festuca altaica	2002		-	-	<1	-	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	27.4	< 0.1	0.2	63.7	< 0.02
14_grass	14_grass	grass	Festuca altaica	2004	68	8	< 0.1	< 0.1	31	< 0.02
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	3.3	< 0.1	< 0.1	28.1	< 0.02

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	12	0.05	5830	0.2	0.1
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	12	0.03	7190	0.3	0.1
56_grass	56_grass	grass	Bromus spp.	2004	63.6	14	0.08	9250	0.3	< 0.1
73_grass	73_grass	grass	Festuca altaica	2004	65.3	9	0.21	8720	0.5	< 0.1
76_grass	76_grass	grass	Carex spp.	2004	61.4	4	0.14	5420	0.3	< 0.1
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	5	0.09	4850	0.3	< 0.1
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	5	0.46	9750	0.2	< 0.1
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	4	0.16	6370	0.2	< 0.1
90_grass	90_grass	grass	Carex spp.	2004	63	9	0.04	5940	0.2	< 0.1
95_grass	95_grass	grass	Bromus spp.	2004	66.4	7	0.04	7870	0.2	< 0.1
101_grass	101_grass	grass	Carex spp.	2004	68.4	12	0.08	9080	0.3	< 0.1
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	3	0.17	3260	0.3	< 0.1
VAN-2	VAN-2G	grass	Festuca altaica	2002		-	0.17	-	0.75	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		-	0.32	-	0.66	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		-	<0.02	-	0.30	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		-	0.25	-	0.26	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		-	0.02	-	0.19	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		-	<0.02	-	0.20	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		-	<0.02	-	0.38	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		-	0.18	-	0.64	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		-	0.24	-	0.34	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		-	0.30	-	0.80	-
VB-1	VB-1 G	grass	Festuca altaica	2002		-	<0.02	-	0.15	-
VB-2	VB-2 G	grass	Festuca altaica	2002		-	<0.02	-	0.23	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
1-3	1-3 G	grass	Festuca altaica	2002		-	<0.02	-	0.23	-
3-2	3-2G	grass	Festuca altaica	2002		-	0.17	-	0.46	-
3-3	3-3G	grass	Festuca altaica	2002		-	0.11	-	0.25	-
3-4	3-4G	grass	Festuca altaica	2002		-	0.43	-	0.34	-
4-2	4-2 G	grass	Festuca altaica	2002		-	0.33	-	0.25	-
4-4	4-4 G	grass	Festuca altaica	2002		-	0.06	-	0.01	-
5-2	5-2 G	grass	Festuca altaica	2002		-	0.07	-	0.19	-
5-5	5-5 G	grass	Festuca altaica	2002		-	0.02	-	0.22	-
6-1	6-1 G	grass	Festuca altaica	2002		-	0.19	-	0.36	-
6-2	6-2 G	grass	Festuca altaica	2002		-	<0.02	-	0.18	-
6-3	6-3 G	grass	Festuca altaica	2002		-	0.19	-	0.11	-
7-1	7-1 G	grass	Festuca altaica	2002		-	0.05	-	0.09	-
7-4	7-4 G	grass	Festuca altaica	2002		-	<0.02	-	0.48	-
8-4	8-4 G	grass	Festuca altaica	2002		-	0.06	-	2.11	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	12	0.48	14800	0.5	< 0.1
14_grass	14_grass	grass	Festuca altaica	2004	68	5	0.05	5430	0.4	< 0.1
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	< 2	0.02	5460	0.4	< 0.1

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	5.7	92	0.2	2310	1530
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	5	81	0.2	1960	1820
56_grass	56_grass	grass	Bromus spp.	2004	63.6	5.2	98	5	1000	35.3
73_grass	73_grass	grass	Festuca altaica	2004	65.3	4.3	51	0.5	1340	247
76_grass	76_grass	grass	Carex spp.	2004	61.4	4.6	63	0.3	1120	211
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	4.3	53	0.4	1610	361
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	5.3	58	0.2	1040	228
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	5.1	50	0.3	1500	355
90_grass	90_grass	grass	Carex spp.	2004	63	6.4	149	< 0.1	2570	267
95_grass	95_grass	grass	Bromus spp.	2004	66.4	2.2	92	< 0.1	4690	156
101_grass	101_grass	grass	Carex spp.	2004	68.4	6.2	85	0.3	1280	109
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	3.4	34	0.2	1180	1510
VAN-2	VAN-2G	grass	Festuca altaica	2002		3.52	-	2.3	-	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		4.89	-	1.7	-	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		2.47	-	1.8	-	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		3.06	-	7.9	-	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		3.15	-	0.4	-	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		2.08	-	0.4	-	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		2.23	-	2.0	-	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		4.96	-	69.7	-	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		5.17	-	85.5	-	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		4.74	-	53.5	-	-
VB-1	VB-1 G	grass	Festuca altaica	2002		2.39	-	<0.3	-	-
VB-2	VB-2 G	grass	Festuca altaica	2002		1.99	-	<0.3	-	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn
1-3	1-3 G	grass	Festuca altaica	2002		2.26	-	0.8	-	-
3-2	3-2G	grass	Festuca altaica	2002		2.20	-	9.1	-	-
3-3	3-3G	grass	Festuca altaica	2002		2.69	-	3.6	-	-
3-4	3-4G	grass	Festuca altaica	2002		3.10	-	4.1	-	-
4-2	4-2 G	grass	Festuca altaica	2002		2.46	-	8.9	-	-
4-4	4-4 G	grass	Festuca altaica	2002		2.43	-	0.9	-	-
5-2	5-2 G	grass	Festuca altaica	2002		1.99	-	21.4	-	-
5-5	5-5 G	grass	Festuca altaica	2002		2.21	-	1.4	-	-
6-1	6-1 G	grass	Festuca altaica	2002		4.30	-	30.0	-	-
6-2	6-2 G	grass	Festuca altaica	2002		2.54	-	2.6	-	-
6-3	6-3 G	grass	Festuca altaica	2002		2.14	-	0.9	-	-
7-1	7-1 G	grass	Festuca altaica	2002		2.42	-	1.2	-	-
7-4	7-4 G	grass	Festuca altaica	2002		3.00	-	3.1	-	-
8-4	8-4 G	grass	Festuca altaica	2002		2.29	-	1.5	-	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	9.9	106	0.3	2520	254
14_grass	14_grass	grass	Festuca altaica	2004	68	3.6	39	0.1	1500	254
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	2.1	44	< 0.1	3860	31.9

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	< 0.01	0.4	2.7	8150
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	< 0.01	2.5	0.4	9230
56_grass	56_grass	grass	Bromus spp.	2004	63.6	< 0.01	0.8	0.3	3240
73_grass	73_grass	grass	Festuca altaica	2004	65.3	0.011	0.7	0.5	4270
76_grass	76_grass	grass	Carex spp.	2004	61.4	< 0.01	0.4	2.4	4020
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	< 0.01	0.2	1.9	4660
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	< 0.01	0.4	1.3	4250
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	< 0.01	0.3	2.6	3590
90_grass	90_grass	grass	Carex spp.	2004	63	< 0.01	1.4	1.2	4070
95_grass	95_grass	grass	Bromus spp.	2004	66.4	< 0.01	0.4	0.4	7190
101_grass	101_grass	grass	Carex spp.	2004	68.4	< 0.01	1.2	0.3	3030
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	< 0.01	2.2	1.4	3930
VAN-2	VAN-2G	grass	Festuca altaica	2002		0.03	-	2.1	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		0.02	-	3.6	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		0.01	-	2.0	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		<0.01	-	0.7	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		<0.01	-	0.9	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		0.02	-	0.9	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		<0.01	-	0.6	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		0.05	-	1.1	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		0.06	-	1.3	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		0.04	-	1.2	-
VB-1	VB-1 G	grass	Festuca altaica	2002		0.01	-	0.5	-
VB-2	VB-2 G	grass	Festuca altaica	2002		0.02	-	1.2	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
1-3	1-3 G	grass	Festuca altaica	2002		0.03	-	0.4	-
3-2	3-2G	grass	Festuca altaica	2002		0.02	-	2.5	-
3-3	3-3G	grass	Festuca altaica	2002		0.03	-	2.2	-
3-4	3-4G	grass	Festuca altaica	2002		0.03	-	2.7	-
4-2	4-2 G	grass	Festuca altaica	2002		0.02	-	0.9	-
4-4	4-4 G	grass	Festuca altaica	2002		0.04	-	1.5	-
5-2	5-2 G	grass	Festuca altaica	2002		0.02	-	1.0	-
5-5	5-5 G	grass	Festuca altaica	2002		0.03	-	0.4	-
6-1	6-1 G	grass	Festuca altaica	2002		0.03	-	1.1	-
6-2	6-2 G	grass	Festuca altaica	2002		0.03	-	2.1	-
6-3	6-3 G	grass	Festuca altaica	2002		0.02	-	0.9	-
7-1	7-1 G	grass	Festuca altaica	2002		0.02	-	0.9	-
7-4	7-4 G	grass	Festuca altaica	2002		0.01	-	1.4	-
8-4	8-4 G	grass	Festuca altaica	2002		<0.01	-	0.5	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	< 0.01	26.3	1.3	10400
14_grass	14_grass	grass	Festuca altaica	2004	68	< 0.01	13.8	1.4	12400
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	< 0.01	0.2	0.3	3390

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	22300	< 0.2	1650	0.04	2
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	19400	< 0.2	1130	0.01	19
56_grass	56_grass	grass	Bromus spp.	2004	63.6	19700	< 0.2	1500	0.01	8
73_grass	73_grass	grass	Festuca altaica	2004	65.3	17400	< 0.2	1900	< 0.01	5
76_grass	76_grass	grass	Carex spp.	2004	61.4	18200	< 0.2	1080	0.03	4
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	15900	< 0.2	1820	< 0.01	4
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	20100	< 0.2	1060	0.04	5
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	25900	< 0.2	1230	0.04	3
90_grass	90_grass	grass	Carex spp.	2004	63	17300	< 0.2	1210	< 0.01	13
95_grass	95_grass	grass	Bromus spp.	2004	66.4	14300	< 0.2	966	< 0.01	5
101_grass	101_grass	grass	Carex spp.	2004	68.4	22200	< 0.2	1150	< 0.01	5
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	10400	0.4	1390	< 0.01	5
VAN-2	VAN-2G	grass	Festuca altaica	2002		-	<1	-	0.05	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		-	<1	-	0.05	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		-	1	-	0.07	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		-	<1	-	<0.01	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		-	1	-	<0.01	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		-	<1	-	0.09	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		-	<1	-	0.04	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		-	<1	-	0.03	-
VB-1	VB-1 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
VB-2	VB-2 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
1-3	1-3 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
3-2	3-2G	grass	Festuca altaica	2002		-	<1	-	0.12	-
3-3	3-3G	grass	Festuca altaica	2002		-	<1	-	0.02	-
3-4	3-4G	grass	Festuca altaica	2002		-	<1	-	0.34	-
4-2	4-2 G	grass	Festuca altaica	2002		-	1	-	0.07	-
4-4	4-4 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
5-2	5-2 G	grass	Festuca altaica	2002		-	<1	-	0.02	-
5-5	5-5 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
6-1	6-1 G	grass	Festuca altaica	2002		-	<1	-	0.02	-
6-2	6-2 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
6-3	6-3 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
7-1	7-1 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
7-4	7-4 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
8-4	8-4 G	grass	Festuca altaica	2002		-	<1	-	<0.01	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	40200	4.1	1930	0.01	36
14_grass	14_grass	grass	Festuca altaica	2004	68	25900	0.2	2550	< 0.01	36
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	20200	< 0.2	847	< 0.01	28

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	20.7	< 0.1	< 0.02	< 0.1	1.8
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	32.9	< 0.1	< 0.02	0.3	2
56_grass	56_grass	grass	Bromus spp.	2004	63.6	27.6	< 0.1	< 0.02	< 0.1	1
73_grass	73_grass	grass	Festuca altaica	2004	65.3	18.7	< 0.1	< 0.02	< 0.1	0.7
76_grass	76_grass	grass	Carex spp.	2004	61.4	37.6	< 0.1	< 0.02	0.1	0.6
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	40.1	< 0.1	< 0.02	0.1	0.8
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	54.3	< 0.1	< 0.02	< 0.1	0.6
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	52.5	< 0.1	< 0.02	< 0.1	0.5
90_grass	90_grass	grass	Carex spp.	2004	63	30.2	< 0.1	< 0.02	< 0.1	0.6
95_grass	95_grass	grass	Bromus spp.	2004	66.4	34.2	< 0.1	< 0.02	< 0.1	0.9
101_grass	101_grass	grass	Carex spp.	2004	68.4	42.9	< 0.1	< 0.02	0.4	0.7
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	16.6	< 0.1	0.07	0.1	0.6
VAN-2	VAN-2G	grass	Festuca altaica	2002		-	-	-	-	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		-	-	-	-	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		-	-	-	-	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		-	-	-	-	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		-	-	-	-	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		-	-	-	-	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		-	-	-	-	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		-	-	-	-	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		-	-	-	-	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		-	-	-	-	-
VB-1	VB-1 G	grass	Festuca altaica	2002		-	-	-	-	-
VB-2	VB-2 G	grass	Festuca altaica	2002		-	-	-	-	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti
1-3	1-3 G	grass	Festuca altaica	2002		-	-	-	-	-
3-2	3-2G	grass	Festuca altaica	2002		-	-	-	-	-
3-3	3-3G	grass	Festuca altaica	2002		-	-	-	-	-
3-4	3-4G	grass	Festuca altaica	2002		-	-	-	-	-
4-2	4-2 G	grass	Festuca altaica	2002		-	-	-	-	-
4-4	4-4 G	grass	Festuca altaica	2002		-	-	-	-	-
5-2	5-2 G	grass	Festuca altaica	2002		-	-	-	-	-
5-5	5-5 G	grass	Festuca altaica	2002		-	-	-	-	-
6-1	6-1 G	grass	Festuca altaica	2002		-	-	-	-	-
6-2	6-2 G	grass	Festuca altaica	2002		-	-	-	-	-
6-3	6-3 G	grass	Festuca altaica	2002		-	-	-	-	-
7-1	7-1 G	grass	Festuca altaica	2002		-	-	-	-	-
7-4	7-4 G	grass	Festuca altaica	2002		-	-	-	-	-
8-4	8-4 G	grass	Festuca altaica	2002		-	-	-	-	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	32.5	< 0.1	< 0.02	1.3	3.3
14_grass	14_grass	grass	Festuca altaica	2004	68	23	< 0.1	< 0.02	0.2	2.5
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	28.6	< 0.1	< 0.02	< 0.1	0.8

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
37_grass	37_grass	grass	Calamagrostis spp.	2004	63.7	< 0.04	< 0.5	129	< 3
44_grass	44_grass	grass	Calamagrostis spp.	2004	65.6	< 0.04	< 0.5	44.5	< 3
56_grass	56_grass	grass	Bromus spp.	2004	63.6	< 0.04	< 0.5	77.2	< 3
73_grass	73_grass	grass	Festuca altaica	2004	65.3	< 0.04	< 0.5	51	< 3
76_grass	76_grass	grass	Carex spp.	2004	61.4	< 0.04	< 0.5	61.8	< 3
80_grass	80_grass	grass	0.5 Festuca altaica + 0.5 Bromus spp.	2004	64.9	< 0.04	< 0.5	74.7	< 3
84_grass	84_grass	grass	0.5 Festuca altaica + 0.5 Carex spp.	2004	67.2	< 0.04	< 0.5	75	< 3
88_grass	88_grass	grass	Calamagrostis spp.	2004	65.8	< 0.04	< 0.5	81.5	< 3
90_grass	90_grass	grass	Carex spp.	2004	63	< 0.04	< 0.5	57.2	< 3
95_grass	95_grass	grass	Bromus spp.	2004	66.4	< 0.04	< 0.5	22.7	< 3
101_grass	101_grass	grass	Carex spp.	2004	68.4	< 0.04	< 0.5	36.7	< 3
128_grass	128_grass	grass	0.5 Festuca altaica + 0.5 Calamagrostis spp.	2004	60.9	< 0.04	< 0.5	29.7	< 3
VAN-2	VAN-2G	grass	Festuca altaica	2002		-	-	45	-
VAN-3	VAN-3G	grass	Festuca altaica	2002		-	-	1040	-
VAN-5	VAN-5G	grass	Festuca altaica	2002		-	-	10	-
VAN-6	VAN-6 CRF	grass	Festuca rubra	2002		-	-	38	-
VAN-7	VAN-7 CRF	grass	Festuca rubra	2002		-	-	12	-
VAN-8	VAN-8 G	grass	Festuca altaica	2002		-	-	11	-
VAN-10	VAN-10 G	grass	Festuca altaica	2002		-	-	19	-
FARO-4	FARO-4G	grass	Festuca altaica	2002		-	-	139	-
FARO-5	FARO-5 G	grass	Festuca altaica	2002		-	-	317	-
FARO-7	FARO-7G	grass	Festuca altaica	2002		-	-	214	-
VB-1	VB-1 G	grass	Festuca altaica	2002		-	-	14	-
VB-2	VB-2 G	grass	Festuca altaica	2002		-	-	27	-

Table C4e. Grasses Raw Data: elements and moisture

Site ID	Sample ID	Type	Species	Year	Moisture	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
1-3	1-3 G	grass	Festuca altaica	2002		-	-	11	-
3-2	3-2G	grass	Festuca altaica	2002		-	-	46	-
3-3	3-3G	grass	Festuca altaica	2002		-	-	139	-
3-4	3-4G	grass	Festuca altaica	2002		-	-	143	-
4-2	4-2 G	grass	Festuca altaica	2002		-	-	107	-
4-4	4-4 G	grass	Festuca altaica	2002		-	-	54	-
5-2	5-2 G	grass	Festuca altaica	2002		-	-	101	-
5-5	5-5 G	grass	Festuca altaica	2002		-	-	42	-
6-1	6-1 G	grass	Festuca altaica	2002		-	-	143	-
6-2	6-2 G	grass	Festuca altaica	2002		-	-	98	-
6-3	6-3 G	grass	Festuca altaica	2002		-	-	65.8	-
7-1	7-1 G	grass	Festuca altaica	2002		-	-	49	-
7-4	7-4 G	grass	Festuca altaica	2002		-	-	48	-
8-4	8-4 G	grass	Festuca altaica	2002		-	-	40	-
13_grass	13_grass	grass	Festuca altaica	2004	78.6	< 0.04	< 0.5	179	< 3
14_grass	14_grass	grass	Festuca altaica	2004	68	< 0.04	< 0.5	12.5	< 3
19_grass	19_grass	grass	Calamagrostis spp.	2004	72.7	< 0.04	< 0.5	21.4	< 3

Table C4f. Horsetails Raw Data: elements and moisture

Site ID	Sample ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
38	38_horsetails	horsetail	Equisetum spp.	2004	75	4.8	< 0.1	< 0.1	62.2	< 0.02	21
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	5.7	< 0.1	< 0.1	42.4	< 0.02	20
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	8.2	< 0.1	0.2	71.6	< 0.02	22
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	5.6	< 0.1	0.1	53.7	< 0.02	20
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	9.2	< 0.1	0.2	71	< 0.02	22
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	12	< 0.1	0.4	53.6	< 0.02	37
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	9.1	< 0.1	0.3	31.5	< 0.02	29
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	8.2	< 0.1	< 0.1	29.6	< 0.02	17
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	13	< 0.1	< 0.1	122	< 0.02	24
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	7.6	< 0.1	0.4	103	< 0.02	34

Table C4f. Horsetails Raw Data: elements and moistu

Site ID	Sample ID	Matrix	Species	Year	Moisture	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe
38	38_horsetails	horsetail	Equisetum spp.	2004	75	0.22	24200	0.3	0.1	4.7	48
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	0.39	29800	0.4	0.2	5.9	63
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	0.35	30100	0.5	0.2	6.5	68
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	0.89	39800	0.4	0.2	6.1	65
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	0.51	32100	0.6	0.3	7.2	94
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	0.34	34900	0.6	0.2	5.1	113
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	0.46	30700	0.6	0.2	6.3	109
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	0.78	29400	0.7	0.5	4.6	105
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	0.12	28400	1.1	1.3	5	156
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	1.53	28200	0.7	0.1	6.5	70

Table C4f. Horsetails Raw Data: elements and moistu

Site ID	Sample ID	Matrix	Species	Year	Moisture	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo
38	38_horsetails	horsetail	Equisetum spp.	2004	75	0.3	5670	79.1	< 0.01	0.8
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	0.2	6120	210	< 0.01	1.9
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	1	8770	153	< 0.01	1.3
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	0.4	9430	87.8	< 0.01	1.7
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	2	8700	92.9	< 0.01	0.3
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	2.3	4560	52.7	< 0.01	0.4
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	2.7	8670	63.4	< 0.01	0.5
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	0.2	5990	134	< 0.01	0.2
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	0.2	5870	286	0.012	1.5
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	< 0.1	12300	69.7	< 0.01	9.4

Table C4f. Horsetails Raw Data: elements and moistu

Site ID	Sample ID	Matrix	Species	Year	Moisture	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se	Silicon SiO2	Silver Ag
38	38_horsetails	horsetail	Equisetum spp.	2004	75	0.3	4700	41200	< 0.2	1250	0.02
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	0.3	8270	47700	< 0.2	1330	0.01
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	0.3	7800	26000	< 0.2	1840	0.01
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	0.4	5300	19000	0.4	1160	0.07
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	1.2	4460	26800	< 0.2	1380	0.02
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	0.5	3580	29200	0.2	1740	0.02
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	0.5	4860	36900	< 0.2	1660	0.03
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	0.4	5200	33700	< 0.2	1660	0.02
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	0.9	6020	26400	< 0.2	1320	0.01
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	0.3	7610	28400	7.4	1900	0.04

Table C4f. Horsetails Raw Data: elements and moistu

Site ID	Sample ID	Matrix	Species	Year	Moisture	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti
38	38_horsetails	horsetail	Equisetum spp.	2004	75	32	75.4	< 0.1	< 0.02	0.2	1.2
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	76	127	< 0.1	< 0.02	0.2	1.9
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	45	122	< 0.1	< 0.02	0.2	1.9
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	48	131	< 0.1	< 0.02	0.4	1.2
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	37	134	< 0.1	0.03	0.1	0.7
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	47	96.9	< 0.1	< 0.02	< 0.1	0.8
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	37	106	< 0.1	< 0.02	< 0.1	0.9
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	52	148	< 0.1	< 0.02	0.1	0.9
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	312	174	< 0.1	0.08	0.2	1
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	28	109	< 0.1	< 0.02	0.2	1.9

Table C4f. Horsetails Raw Data: elements and moistu

Site ID	Sample ID	Matrix	Species	Year	Moisture	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
38	38_horsetails	horsetail	Equisetum spp.	2004	75	< 0.04	< 0.5	28.7	< 3
39	39_horsetails	horsetail	Equisetum spp.	2004	78.3	< 0.04	< 0.5	28.3	< 3
43	43_horsetails	horsetail	Equisetum spp.	2004	76.2	< 0.04	< 0.5	29.4	< 3
53	53_horsetails	horsetail	Equisetum spp.	2004	73.2	< 0.04	< 0.5	56.2	< 3
54	54_horsetails	horsetail	Equisetum spp.	2004	73.8	< 0.04	< 0.5	55.3	< 3
56	56_horsetails	horsetail	Equisetum spp.	2004	75.7	< 0.04	< 0.5	30.2	< 3
64	64_horsetails	horsetail	Equisetum spp.	2004	76.9	< 0.04	< 0.5	61.9	< 3
84	84_horsetails	horsetail	Equisetum spp.	2004	76.6	< 0.04	< 0.5	37.3	< 3
90	90_horsetails	horsetail	Equisetum spp.	2004	75.5	< 0.04	< 0.5	30.7	< 3
13	13_horsetails	horsetail	Equisetum spp.	2004	77.7	< 0.04	< 0.5	75.9	< 3

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	432	< 0.1	0.6	42.1	< 0.02
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	4.6	< 0.1	3.9	0.3	< 0.02
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	230	< 0.1	0.7	45.7	< 0.02
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	70.3	< 0.1	0.6	7.9	< 0.02
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	15.8	< 0.1	0.2	1.6	< 0.02
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	9.5	< 0.1	0.3	0.8	< 0.02
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	482	< 0.1	1.4	23.2	< 0.02
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	72.7	< 0.1	0.3	5.9	< 0.02
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	115	< 0.1	0.4	9.7	< 0.02
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	322	< 0.1	1.3	8	< 0.02

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.29	1440	1.6	0.5	10.1
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	< 2	5.82	40	0.2	7.2	141
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	2.63	243	0.4	0.3	36.9
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.54	185	0.2	0.3	36.6
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	0.18	58	0.6	< 0.1	22
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.62	49	< 0.1	< 0.1	32.5
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.83	577	2.2	0.8	29.3
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.93	98	< 0.1	< 0.1	44.9
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	0.73	122	0.3	0.4	36.4
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 2	1.53	143	0.8	0.3	10.3

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	926	18.4	1050	120	0.038
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	24	0.4	1810	8.6	4.42
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	608	120	763	12.9	0.299
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	148	6.8	760	19.7	0.111
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	37	1.1	639	6.4	0.078
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	23	0.7	728	9.2	0.032
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	1140	22.1	970	47.8	0.126
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	54	7.8	667	17.4	0.62
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	239	17.7	648	41.6	0.1
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	564	11.8	962	15	0.073

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K	Selenium Se
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.9	2.1	13600	21500	2.4
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	< 0.1	1	52600	40300	3.3
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	0.6	12800	17700	1.5
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	0.5	12300	19300	1.4
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.2	0.3	10100	18100	2
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	0.2	14100	19200	1.1
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	2.2	12000	17800	0.4
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	0.2	17600	25900	0.6
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.2	0.5	12000	17100	0.7
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.3	0.7	15700	18300	0.3

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	520	0.73	261	6.07	< 0.1
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	114	25.8	< 1	0.13	< 0.1
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	208	1.23	201	3.78	< 0.1
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	190	1.37	104	1.13	< 0.1
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	166	1.42	< 1	0.29	< 0.1
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	156	1.01	< 1	0.13	< 0.1
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	390	0.63	174	2.81	< 0.1
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	139	2.13	27	0.67	< 0.1
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	314	1.41	60	1.02	< 0.1
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	265	0.64	1050	0.94	< 0.1

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	< 0.1	15.5	0.04	1.5	100
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	< 0.02	0.7	6	< 0.04	< 0.5	79
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	0.3	9.7	< 0.04	0.5	202
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	0.2	3.3	< 0.04	< 0.5	72.3
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	< 0.1	1.8	< 0.04	< 0.5	59
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	< 0.1	2.2	< 0.04	< 0.5	61.6
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.02	0.9	5.2	0.05	0.9	85.3
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	1.5	2.4	< 0.04	< 0.5	112
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 0.02	< 0.1	5.5	< 0.04	< 0.5	99
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	0.05	< 0.1	13.1	< 0.04	0.8	110

Table C4g. Mushroom Raw Data: elements

Site_ID	Sample ID	Matrix	Species	Year	Units	Zirconium Zr
300	300_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
301	301_mushroom	mushroom	Agaricus silvicola	2004	ug/g	< 3
308	308_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
313	313_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
317	317_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
318	318_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
319	319_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
320	320_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
321	321_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3
322	322_mushroom	mushroom	Leccinum boreale	2004	ug/g	< 3

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B
160	160_root	root	Hedysarum boreale	2004	866	0.1	1.7	74	0.08	13
161	161_root	root	Hedysarum boreale	2004	3180	0.2	2.7	60.4	0.19	16
306	306_root	root	Hedysarum boreale	2004	722	< 0.1	1.4	40.6	0.05	24
307	307_root	root	Hedysarum boreale	2004	2500	0.2	3.2	123	0.13	10
309	309_root	root	Hedysarum boreale	2004	2950	< 0.1	1.9	31.4	0.18	10
311	311_root	root	Hedysarum alpinum	2004	2120	0.1	2.4	56.3	0.11	4
312	312_root	root	Hedysarum alpinum	2004	2080	< 0.1	0.7	29.7	0.06	13
316	316_root	root	Hedysarum alpinum	2004	155	< 0.1	0.1	74.1	< 0.02	19
315	315_root	root	Hedysarum alpinum	2004	573	< 0.1	0.7	104	0.04	26
111	111_root	root	Hedysarum boreale	2004	760	< 0.1	0.8	74.2	0.05	19

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
160	160_root	root	Hedysarum boreale	2004	0.23	7240	3.7	1.2	10	1960	74.6
161	161_root	root	Hedysarum boreale	2004	0.29	7080	7.5	2.5	17.2	5250	44.6
306	306_root	root	Hedysarum boreale	2004	0.09	7110	2.8	1	9.6	1520	4.1
307	307_root	root	Hedysarum boreale	2004	0.27	6370	7.6	2.7	17	5050	58.8
309	309_root	root	Hedysarum boreale	2004	0.17	6690	7.5	3.3	12.5	5260	12.1
311	311_root	root	Hedysarum alpinum	2004	0.11	7180	6.3	2.4	12.3	4230	6
312	312_root	root	Hedysarum alpinum	2004	0.04	5680	3	1.3	9.3	2640	4.6
316	316_root	root	Hedysarum alpinum	2004	0.11	15900	0.2	0.1	2.7	231	0.4
315	315_root	root	Hedysarum alpinum	2004	0.32	3930	1.6	0.7	12.3	1440	1.1
111	111_root	root	Hedysarum boreale	2004	0.21	7740	1.5	0.8	7.3	1490	2.4

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni
160	160_root	root	Hedysarum boreale	2004	2550	73.2	0.026	1.1	14.3
161	161_root	root	Hedysarum boreale	2004	2640	62.8	0.024	6.2	12.3
306	306_root	root	Hedysarum boreale	2004	2510	83.4	< 0.01	0.6	6.6
307	307_root	root	Hedysarum boreale	2004	2100	124	0.033	0.2	9.8
309	309_root	root	Hedysarum boreale	2004	2970	99.5	0.013	4.6	12.5
311	311_root	root	Hedysarum alpinum	2004	2340	73.8	0.011	2.8	12.9
312	312_root	root	Hedysarum alpinum	2004	2300	51.5	< 0.01	0.1	6.7
316	316_root	root	Hedysarum alpinum	2004	2220	64	< 0.01	2.9	0.7
315	315_root	root	Hedysarum alpinum	2004	1940	79.3	< 0.01	4.8	9.5
111	111_root	root	Hedysarum boreale	2004	2100	120	< 0.01	1.3	6.9

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Phosphorus PO4	Potassium K	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na
160	160_root	root	Hedysarum boreale	2004	5240	8610	< 0.2	434	0.09	2
161	161_root	root	Hedysarum boreale	2004	5230	8860	< 0.2	1200	0.08	29
306	306_root	root	Hedysarum boreale	2004	4770	6950	< 0.2	531	< 0.01	31
307	307_root	root	Hedysarum boreale	2004	4060	7980	< 0.2	1000	0.11	53
309	309_root	root	Hedysarum boreale	2004	6450	9990	< 0.2	1070	< 0.01	76
311	311_root	root	Hedysarum alpinum	2004	8470	7140	< 0.2	853	< 0.01	61
312	312_root	root	Hedysarum alpinum	2004	7560	8270	< 0.2	782	< 0.01	55
316	316_root	root	Hedysarum alpinum	2004	13500	5950	< 0.2	325	< 0.01	< 1
315	315_root	root	Hedysarum alpinum	2004	5640	6740	0.5	490	< 0.01	< 1
111	111_root	root	Hedysarum boreale	2004	5680	9530	< 0.2	1880	< 0.01	48

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Strontium Sr	Tellurium Te	Thallium Tl	Tin Sn	Titanium Ti	Uranium U	Vanadium V
160	160_root	root	Hedysarum boreale	2004	46.8	< 0.1	0.04	0.1	37.8	0.21	3.5
161	161_root	root	Hedysarum boreale	2004	61.1	< 0.1	0.09	0.1	140	0.49	8.2
306	306_root	root	Hedysarum boreale	2004	44.4	< 0.1	< 0.02	< 0.1	26	0.12	2.3
307	307_root	root	Hedysarum boreale	2004	42.4	< 0.1	0.07	< 0.1	92.7	0.37	6.1
309	309_root	root	Hedysarum boreale	2004	39.2	< 0.1	0.05	0.9	98.2	1.63	6.8
311	311_root	root	Hedysarum alpinum	2004	34.3	< 0.1	0.04	1	54.6	0.13	4.9
312	312_root	root	Hedysarum alpinum	2004	29.3	< 0.1	< 0.02	< 0.1	64.6	0.13	3.1
316	316_root	root	Hedysarum alpinum	2004	123	< 0.1	< 0.02	< 0.1	5.4	< 0.04	0.5
315	315_root	root	Hedysarum alpinum	2004	23.3	< 0.1	< 0.02	< 0.1	19.4	0.1	2.8
111	111_root	root	Hedysarum boreale	2004	60.3	< 0.1	< 0.02	0.1	36.9	0.42	2.4

Table C4h. Bear Root Raw Data: elements

Site ID	Sample_ID	Matrix	Species	Year	Zinc Zn	Zirconium Zr
160	160_root	root	Hedysarum boreale	2004	41.8	< 3
161	161_root	root	Hedysarum boreale	2004	130	< 3
306	306_root	root	Hedysarum boreale	2004	18.6	< 3
307	307_root	root	Hedysarum boreale	2004	68.9	< 3
309	309_root	root	Hedysarum boreale	2004	36.4	< 3
311	311_root	root	Hedysarum alpinum	2004	33.7	< 3
312	312_root	root	Hedysarum alpinum	2004	25.9	< 3
316	316_root	root	Hedysarum alpinum	2004	25.7	< 3
315	315_root	root	Hedysarum alpinum	2004	24.6	< 3
111	111_root	root	Hedysarum boreale	2004	21.5	< 3

Table C4i. Tree Sap Raw Data: elements

Site ID	Sample_ID	Type	Species	Year	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd
326	326_sap	SAP	Pinus glauca	2004	15.1	< 0.02	0.02	9.8	< 0.004	0.7	0.071
327	327_sap	SAP	Abies lasciocarpa	2004	2.5	< 0.02	< 0.02	4.43	< 0.004	0.6	0.005
328	328_sap	SAP	Abies lasciocarpa	2004	1.2	< 0.02	< 0.02	1.05	< 0.004	< 0.4	0.004
319	319_sap	SAP	Abies lasciocarpa	2004	19.8	< 0.02	0.12	20.9	< 0.004	0.5	0.025
329	329_sap	SAP	Pinus glauca	2004	21.1	0.06	0.21	50.8	< 0.004	1	0.05
330	330_sap	SAP	Pinus glauca	2004	7.9	< 0.02	< 0.02	3.68	< 0.004	< 0.4	0.013
331	331_sap	SAP	Abies lasciocarpa	2004	29.3	< 0.02	0.04	11.1	< 0.004	1.1	0.023
323	323_sap	SAP	Pinus glauca	2004	1.4	< 0.02	< 0.02	7.57	< 0.004	1.1	0.007
324	324_sap	SAP	Pinus glauca	2004	5.5	< 0.02	< 0.02	12.8	< 0.004	0.8	0.22
325	325_sap	SAP	Abies lasciocarpa	2004	5	< 0.02	< 0.02	4.22	< 0.004	0.4	0.21

Table C4i. Tree Sap Raw Data: elements

Site ID	Sample_ID	Type	Species	Year	Calcium Ca	Chromium Cr	Cobalt Co	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg
326	326_sap	SAP	Pinus glauca	2004	603	0.05	0.03	1.09	29	1.53	64.7
327	327_sap	SAP	Abies lasciocarpa	2004	509	< 0.02	< 0.02	0.53	6	0.31	35.4
328	328_sap	SAP	Abies lasciocarpa	2004	76.3	0.04	< 0.02	0.42	3	0.05	14.3
319	319_sap	SAP	Abies lasciocarpa	2004	1480	0.36	0.03	2.11	69	11.1	75.4
329	329_sap	SAP	Pinus glauca	2004	798	0.1	0.08	2.95	137	24.6	71.5
330	330_sap	SAP	Pinus glauca	2004	278	0.02	< 0.02	0.48	9	3.55	27.8
331	331_sap	SAP	Abies lasciocarpa	2004	698	0.1	0.05	1.37	42	1.57	108
323	323_sap	SAP	Pinus glauca	2004	535	< 0.02	< 0.02	0.86	4	0.05	64.5
324	324_sap	SAP	Pinus glauca	2004	624	0.04	0.06	0.86	6	0.11	46.4
325	325_sap	SAP	Abies lasciocarpa	2004	240	< 0.02	< 0.02	0.52	2	< 0.02	36.1

Table C4i. Tree Sap Raw Data: elements

Site ID	Sample_ID	Type	Species	Year	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4	Potassium K
326	326_sap	SAP	Pinus glauca	2004	50	< 0.01	< 0.02	0.06	129	228
327	327_sap	SAP	Abies lasciocarpa	2004	3.84	< 0.01	< 0.02	< 0.02	52.6	89.6
328	328_sap	SAP	Abies lasciocarpa	2004	4.96	< 0.01	< 0.02	0.02	51.4	59
319	319_sap	SAP	Abies lasciocarpa	2004	4.13	< 0.01	0.02	0.12	40.7	86.6
329	329_sap	SAP	Pinus glauca	2004	18.1	< 0.01	0.03	0.19	113	132
330	330_sap	SAP	Pinus glauca	2004	10.4	< 0.01	< 0.02	0.04	175	141
331	331_sap	SAP	Abies lasciocarpa	2004	36.2	< 0.01	0.02	0.11	273	405
323	323_sap	SAP	Pinus glauca	2004	15.8	< 0.01	< 0.02	< 0.02	155	263
324	324_sap	SAP	Pinus glauca	2004	49.6	< 0.01	< 0.02	0.02	185	197
325	325_sap	SAP	Abies lasciocarpa	2004	17.5	< 0.01	< 0.02	0.02	86.3	177

Table C4i. Tree Sap Raw Data: elements

Site ID	Sample_ID	Type	Species	Year	Selenium Se	Silicon SiO2	Silver Ag	Sodium Na	Strontium Sr	Tellurium Te	Thallium Tl
326	326_sap	SAP	Pinus glauca	2004	< 0.04	52	< 0.002	29.3	2.31	< 0.02	0.008
327	327_sap	SAP	Abies lasciocarpa	2004	< 0.04	38	< 0.002	14.5	1.54	< 0.02	< 0.004
328	328_sap	SAP	Abies lasciocarpa	2004	< 0.04	17	< 0.002	10.5	0.34	< 0.02	< 0.004
319	319_sap	SAP	Abies lasciocarpa	2004	< 0.04	318	0.01	49	7.81	< 0.02	< 0.004
329	329_sap	SAP	Pinus glauca	2004	< 0.04	165	0.023	32.5	4.25	< 0.02	0.009
330	330_sap	SAP	Pinus glauca	2004	< 0.04	34	< 0.002	8.5	1.09	< 0.02	0.009
331	331_sap	SAP	Abies lasciocarpa	2004	< 0.04	80	< 0.002	30.6	4.65	< 0.02	0.012
323	323_sap	SAP	Pinus glauca	2004	< 0.04	47	< 0.002	14.2	2.05	< 0.02	< 0.004
324	324_sap	SAP	Pinus glauca	2004	< 0.04	63	< 0.002	13.3	2	< 0.02	< 0.004
325	325_sap	SAP	Abies lasciocarpa	2004	< 0.04	36	< 0.002	11.7	0.93	< 0.02	< 0.004

Table C4i. Tree Sap Raw Data: elements

Site ID	Sample_ID	Type	Species	Year	Tin Sn	Titanium Ti	Uranium U	Vanadium V	Zinc Zn	Zirconium Zr
326	326_sap	SAP	Pinus glauca	2004	1.66	0.42	< 0.008	0.06	4	< 0.6
327	327_sap	SAP	Abies lasciocarpa	2004	0.93	0.08	< 0.008	0.02	2.8	< 0.6
328	328_sap	SAP	Abies lasciocarpa	2004	0.31	< 0.06	< 0.008	< 0.02	1.1	< 0.6
319	319_sap	SAP	Abies lasciocarpa	2004	3.27	0.35	0.014	0.29	19.3	< 0.6
329	329_sap	SAP	Pinus glauca	2004	1.71	0.51	0.027	0.16	27.7	< 0.6
330	330_sap	SAP	Pinus glauca	2004	0.36	0.1	< 0.008	0.02	4.2	< 0.6
331	331_sap	SAP	Abies lasciocarpa	2004	1.15	0.27	0.01	0.09	6	< 0.6
323	323_sap	SAP	Pinus glauca	2004	0.78	0.08	< 0.008	0.03	4.8	< 0.6
324	324_sap	SAP	Pinus glauca	2004	0.72	0.14	< 0.008	0.04	4.2	< 0.6
325	325_sap	SAP	Abies lasciocarpa	2004	0.54	< 0.06	< 0.008	0.02	1.6	< 0.6

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	11.6	< 0.2	0.5
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	8.6	< 0.2	< 0.2
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	14.4	< 0.2	< 0.2
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	8.8	< 0.2	< 0.2
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	12.6	< 0.2	< 0.2
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	5.8	< 0.1	0.1
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	287	< 0.2	< 0.2
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	10.1	< 0.2	< 0.2
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	19.9	< 0.2	< 0.2
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	7.9	< 0.2	< 0.2
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	20.9	< 0.2	< 0.2
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	13.4	< 0.2	< 0.2
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	32.6	< 0.2	0.4
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	11.8	< 0.2	< 0.2
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	19.3	< 0.3	< 0.3
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	11.8	< 0.2	< 0.2
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	21.9	< 0.3	< 0.3
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	19.4	< 0.3	< 0.3
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	8.9	< 0.4	< 0.4
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	12.5	< 0.4	< 0.4
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	29.9	< 1.2	< 1.2
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	12.7	< 0.3	< 0.3
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	12.4	< 0.3	< 0.3
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	34.2	< 0.6	< 0.6
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	2.9	< 0.3	< 0.3
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	8.6	< 0.5	< 0.5

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Aluminum Al	Antimony Sb	Arsenic As
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	3	< 0.2	< 0.2
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	4.3	< 0.2	< 0.2
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	8.5	< 0.2	< 0.2
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	4.9	< 0.3	0.7
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	5.6	< 0.2	< 0.2
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	4.6	< 0.3	< 0.3

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Barium Ba	Beryllium Be	Boron B
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	7.8	< 0.04	< 4
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	7.9	< 0.04	< 4
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	2.2	< 0.04	< 4
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	4.9	< 0.04	< 4
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	3.7	< 0.04	< 4
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	2.6	< 0.02	< 2
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	1.3	< 0.04	< 4
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	1.6	< 0.04	< 4
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	6.9	< 0.04	< 4
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	3.5	< 0.04	< 4
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	2.6	< 0.04	< 4
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	3.5	< 0.04	< 4
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	0.3	< 0.04	< 4
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	0.5	< 0.04	< 4
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	0.6	< 0.06	< 6
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	0.7	< 0.04	< 4
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	< 0.3	< 0.06	< 6
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	< 0.3	< 0.06	< 6
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	< 0.4	< 0.08	< 8
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	< 0.4	< 0.08	< 8
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	< 1.2	< 0.24	< 24
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	< 0.3	< 0.06	< 6
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	< 0.3	< 0.06	< 6
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	< 0.6	< 0.12	< 12
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	0.4	< 0.06	< 6
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	< 0.5	< 0.1	< 10

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Barium Ba	Beryllium Be	Boron B
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	< 0.2	< 0.04	< 4
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	< 0.2	< 0.04	< 4
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	< 0.2	< 0.04	< 4
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	1.3	< 0.06	< 6
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	0.6	< 0.04	< 4
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	< 0.3	< 0.06	< 6

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Cadmium Cd	Calcium Ca	Chromium Cr
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	0.15	7680	0.9
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	0.22	5040	0.7
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	0.1	3530	0.9
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	0.14	4870	0.5
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	0.24	3860	0.7
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	0.12	6420	0.4
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	0.06	2930	2.6
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	0.08	2340	0.6
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	0.05	6180	0.7
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	0.17	5600	0.6
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	0.18	4210	0.8
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	0.08	6060	0.7
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	5.09	378	0.6
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	6.48	520	0.4
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	8.47	397	0.5
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	9.09	448	0.4
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	2.77	413	0.5
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	6.27	386	0.5
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	7.82	306	0.7
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	7.78	310	0.6
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	6.79	687	< 1.2
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	4.94	314	0.5
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	2.68	322	0.4
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	2.94	550	1
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	0.64	461	0.4
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	4.28	1850	0.7

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Cadmium Cd	Calcium Ca	Chromium Cr
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	3.49	252	0.4
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	7.69	363	0.4
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	3.71	568	0.4
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	22.7	569	0.8
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	12.4	365	0.6
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	11.5	397	0.6

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	< 0.2	11.4	179	0.3
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	< 0.2	12.1	187	< 0.2
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	< 0.2	10.8	155	< 0.2
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	< 0.2	9.5	145	1.5
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	< 0.2	9.5	131	0.4
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	< 0.1	8.7	115	0.2
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	< 0.2	9.4	150	0.3
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	< 0.2	10.2	112	0.6
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	< 0.2	11.3	181	1.8
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	< 0.2	9.2	142	4.6
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	< 0.2	9.6	153	3.4
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	< 0.2	11.1	153	3.2
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	< 0.2	18.4	488	< 0.2
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	< 0.2	13.5	461	< 0.2
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	< 0.3	15.1	457	< 0.3
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	< 0.2	13.3	512	< 0.2
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	< 0.3	16.2	465	< 0.3
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	< 0.3	16.2	631	0.5
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	< 0.4	16.9	550	< 0.4
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	< 0.4	17.1	643	< 0.4
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	< 1.2	16.7	683	< 1.2
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	< 0.3	19.5	719	< 0.3
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	< 0.3	16.4	481	< 0.3
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	< 0.6	17.9	532	2.5
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	< 0.3	17.2	606	2.1
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	< 0.5	14.8	438	4.3

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Cobalt Co	Copper Cu	Iron Fe	Lead Pb
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	< 0.2	15.6	678	7.7
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	< 0.2	18.9	451	2.5
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	< 0.2	17	708	2
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	< 0.3	16.6	383	0.8
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	< 0.2	18.8	397	3
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	< 0.3	20.4	485	30.4

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Magnesium Mg	Manganese Mn
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	1410	4.6
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	1340	4.6
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	1180	3.9
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	1160	2.7
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	1340	2.3
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	1230	1.6
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	1100	3
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	1190	3
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	1450	4
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	1310	1.9
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	1320	2.3
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	1520	1.9
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	934	15.3
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	879	12.8
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	953	12.8
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	867	12.2
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	908	13.1
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	881	13.7
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	890	14.5
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	867	12.8
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	976	12.6
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	995	13.1
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	888	10.5
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	949	16
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	949	15.2
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	766	10.1

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Magnesium Mg	Manganese Mn
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	810	11.6
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	927	14
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	881	11.7
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	941	10.5
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	847	9.2
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	918	8.5

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	0.08	< 0.2	0.4
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	0.191	< 0.2	0.5
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	0.033	< 0.2	0.4
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	0.055	< 0.2	0.3
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	0.043	< 0.2	< 0.2
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	0.036	< 0.1	0.2
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	< 0.05	< 0.2	3.1
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	0.062	< 0.2	< 0.2
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	0.054	< 0.2	0.4
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	0.053	< 0.2	< 0.2
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	0.058	< 0.2	0.4
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	< 0.05	< 0.2	0.6
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	0.232	3.6	< 0.2
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	0.439	3.3	0.3
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	0.574	4.2	< 0.3
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	0.506	3.2	0.4
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	0.1	3.7	0.4
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	0.126	3.7	< 0.3
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	0.126	3.9	< 0.4
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	0.159	4	< 0.4
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	< 0.05	3.7	< 1.2
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	0.128	3.8	< 0.3
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	0.065	3.5	0.4
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	0.27	2.9	< 0.6
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	0.214	2.7	0.4
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	0.135	1.9	1.5

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Mercury Hg	Molybdenum Mo	Nickel Ni
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	0.141	2.8	< 0.2
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	0.185	3.2	0.4
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	0.127	2.5	0.5
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	2.94	1.9	< 0.3
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	0.489	2	< 0.2
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	0.475	1.4	1.7

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Phosphorus PO4	Potassium K	Selenium Se
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	38100	16500	1.5
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	37000	17500	1.1
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	30800	15300	0.5
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	31400	14100	1.1
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	34200	15800	1.5
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	35000	15300	1.5
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	28500	14700	0.6
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	30200	16000	< 0.4
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	39300	18600	0.5
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	36600	16300	< 0.4
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	33500	16300	0.6
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	39100	18900	0.7
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	32800	12000	2.6
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	30700	12300	1.8
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	33700	11800	2.3
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	30400	12100	1.7
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	36800	11200	1.5
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	29800	11300	2.7
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	32700	12300	3
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	32000	11700	2.6
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	34700	13100	2.5
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	35700	12200	3.9
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	30600	11000	2
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	35300	12300	1.4
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	34100	12600	1.3
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	28200	10100	1.6

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Phosphorus PO4	Potassium K	Selenium Se
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	29300	10400	1.4
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	35300	12500	2
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	33700	11800	2.2
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	37600	13700	3.8
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	34400	13100	3.1
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	36900	13800	2.8

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Silicon SiO2	Silver Ag	Sodium Na
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	180	< 0.02	4390
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	205	< 0.02	5340
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	173	< 0.02	4940
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	148	< 0.02	4290
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	159	< 0.02	4710
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	120	0.01	3690
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	181	< 0.02	4010
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	170	< 0.02	4290
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	180	< 0.02	4330
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	153	< 0.02	4530
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	180	< 0.02	4600
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	180	< 0.02	4220
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	203	< 0.02	4340
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	152	< 0.02	4260
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	189	< 0.03	4290
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	137	< 0.02	4360
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	149	< 0.03	4390
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	143	0.08	4330
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	142	< 0.04	4210
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	159	< 0.04	4600
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	429	< 0.12	4240
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	156	< 0.03	4220
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	150	< 0.03	4190
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	356	< 0.06	4510
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	138	< 0.03	3880
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	187	< 0.05	3690

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Silicon SiO2	Silver Ag	Sodium Na
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	138	< 0.02	4310
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	151	0.04	4270
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	122	< 0.02	4150
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	125	< 0.03	5070
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	116	0.07	4800
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	161	< 0.03	4970

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	5.98	< 0.2	< 0.04
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	3.74	< 0.2	< 0.04
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	2.48	< 0.2	< 0.04
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	3.93	< 0.2	< 0.04
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	3.41	< 0.2	< 0.04
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	4	< 0.1	< 0.02
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	1.98	< 0.2	< 0.04
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	2.15	< 0.2	< 0.04
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	5.92	< 0.2	< 0.04
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	3.32	< 0.2	< 0.04
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	2.44	< 0.2	< 0.04
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	3.34	< 0.2	< 0.04
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	0.36	< 0.2	< 0.04
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	0.37	< 0.2	< 0.04
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	0.43	< 0.3	< 0.06
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	0.42	< 0.2	< 0.04
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	0.38	< 0.3	< 0.06
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	0.35	< 0.3	< 0.06
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	0.26	< 0.4	< 0.08
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	0.2	< 0.4	< 0.08
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	< 0.6	< 1.2	< 0.24
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	0.25	< 0.3	< 0.06
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	0.36	< 0.3	< 0.06
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	0.44	< 0.6	< 0.12
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	0.38	< 0.3	< 0.06
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	0.93	< 0.5	< 0.1

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Strontium Sr	Tellurium Te	Thallium Tl
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	0.2	< 0.2	< 0.04
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	0.27	< 0.2	< 0.04
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	0.39	< 0.2	< 0.04
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	0.68	< 0.3	< 0.06
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	0.48	< 0.2	0.06
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	0.49	< 0.3	0.15

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Tin Sn	Titanium Ti	Uranium U
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	< 0.2	5.4	< 0.08
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	< 0.2	5.2	< 0.08
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	< 0.2	4.7	< 0.08
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	< 0.2	4	< 0.08
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	< 0.2	4.4	< 0.08
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	0.2	4.8	< 0.04
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	< 0.2	5	< 0.08
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	< 0.2	4.6	< 0.08
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	< 0.2	5.5	< 0.08
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	< 0.2	4.8	< 0.08
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	0.5	5.6	< 0.08
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	< 0.2	6.3	< 0.08
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	< 0.2	6.1	< 0.08
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	< 0.2	4.8	< 0.08
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	0.6	5.4	< 0.12
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	0.6	4.7	< 0.08
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	< 0.3	5.9	< 0.12
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	< 0.3	4.8	< 0.12
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	< 0.4	4.7	< 0.16
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	< 0.4	4.9	< 0.16
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	27.6	8.8	< 0.48
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	< 0.3	5.3	< 0.12
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	< 0.3	4.5	< 0.12
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	< 0.6	7.1	< 0.24
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	< 0.3	3.4	< 0.12
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	< 0.5	3.8	< 0.2

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Tin Sn	Titanium Ti	Uranium U
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	0.5	3.2	< 0.08
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	< 0.2	3.4	< 0.08
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	< 0.2	3.4	< 0.08
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	< 0.3	4.8	< 0.12
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	< 0.2	3.9	< 0.08
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	< 0.3	3.9	< 0.12

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
1	Composite_1_Muscle	Composite_1	muscle	Clethrionomys rutilus	2004	75.8	< 1	54.7	< 6
1	Composite_2_Muscle	Composite_2	muscle	Clethrionomys rutilus	2004	73.5	< 1	51	< 6
3	Composite_3_Muscle	Composite_3	muscle	Clethrionomys rutilus	2004	75.1	< 1	51.3	< 6
3	Composite_4_Muscle	Composite_4	muscle	Clethrionomys rutilus	2004	75.9	< 1	44.9	< 6
3	Composite_5_Muscle	Composite_5	muscle	Clethrionomys rutilus	2004	75.8	< 1	48.7	< 6
3	Composite_6_Muscle	Composite_6	muscle	Clethrionomys rutilus	2004	73.7	< 0.5	41.6	< 3
3	Composite_7_Muscle	Composite_7	muscle	Clethrionomys rutilus	2004	75.6	< 1	41.5	< 6
4	Composite_8_Muscle	Composite_8	muscle	Clethrionomys rutilus	2004	74.9	< 1	43.4	< 6
4	Composite_9_Muscle	Composite_9	muscle	Clethrionomys rutilus	2004	75.4	< 1	51.8	< 6
5-6	Composite_10_Muscle	Composite_10	muscle	Clethrionomys rutilus	2004	76	< 1	47.4	< 6
5-6	Composite_11_Muscle	Composite_11	muscle	Clethrionomys rutilus	2004	75.1	< 1	52.6	< 6
5-6	Composite_12_Muscle	Composite_12	muscle	Clethrionomys rutilus	2004	77.8	< 1	49.1	< 6
1	Composite_1_Liver	Composite_1	liver	Clethrionomys rutilus	2004	68.9	< 1	90.8	< 6
1	Composite_2_Liver	Composite_2	liver	Clethrionomys rutilus	2004	68.8	< 1	72.5	< 6
1	Composite_3_Liver	Composite_3	liver	Clethrionomys rutilus	2004	70.6	< 1.5	92.4	< 9
1	Composite_4_Liver	Composite_4	liver	Clethrionomys rutilus	2004	70.5	< 1	90.2	< 6
3	Composite_5_Liver	Composite_5	liver	Clethrionomys rutilus	2004	71.0	< 1.5	80.4	< 9
3	Composite_6_Liver	Composite_6	liver	Clethrionomys rutilus	2004	70.9	< 1.5	85.7	< 9
3	Composite_7_Liver	Composite_7	liver	Clethrionomys rutilus	2004	70	< 2	95.1	< 12
3	Composite_8_Liver	Composite_8	liver	Clethrionomys rutilus	2004	70.2	< 2	85.3	< 12
3	Composite_9_Liver	Composite_9	liver	Clethrionomys rutilus	2004	71	< 6	91.3	< 36
3	Composite_10_Liver	Composite_10	liver	Clethrionomys rutilus	2004	70.2	< 1.5	96.6	< 9
3	Composite_11_Liver	Composite_11	liver	Clethrionomys rutilus	2004	70.1	< 1.5	81.8	< 9
4	Composite_12_Liver	Composite_12	liver	Clethrionomys rutilus	2004	71.5	< 3	95.3	< 18
4	Composite_13_Liver	Composite_13	liver	Clethrionomys rutilus	2004	69.7	< 1.5	83.7	< 9
5-6	Composite_14_Liver	Composite_14	liver	Clethrionomys rutilus	2004	68.8	< 2.5	86.3	< 15

Table C5. Northern Red-backed Vole Raw Data: elements and moisture

Lead lichen zone	Sample_ID	Specimen_ID	Matrix	Species	Year	Moisture	Vanadium V	Zinc Zn	Zirconium Zr
5-6	Composite_15_Liver	Composite_15	liver	Clethrionomys rutilus	2004	70.1	< 1	73.5	< 6
5-6	Composite_16_Liver	Composite_16	liver	Clethrionomys rutilus	2004	71.0	< 1	97.3	< 6
5-6	Composite_17_Liver	Composite_17	liver	Clethrionomys rutilus	2004	69.4	< 1	90.6	< 6
1	Composite_1_Kidney	Composite_1	kidney	Clethrionomys rutilus	2004	70.6	< 1.5	90.1	< 9
3	Composite_2_Kidney	Composite_2	kidney	Clethrionomys rutilus	2004	72.2	< 1	85.3	< 6
5-6	Composite_4_Kidney	Composite_4	kidney	Clethrionomys rutilus	2004	71.7	< 1.5	85	< 9

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Beryllium	Boron	Magnesium	Aluminium
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	<0.01	0.6	715	0.8
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	<0.01	1.2	736	0.9
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	<0.01	1.0	590	1.1
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	<0.01	0.8	845	2.7
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	<0.01	1.0	688	0.8
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	<0.01	0.8	596	<0.5
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	<0.01	<0.5	699	1.0
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	<0.01	1.3	664	21.6
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	<0.01	1.1	611	1.1
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	<0.01	<0.5	698	1.5
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	<0.01	1.0	679	2.4
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	<0.01	0.7	481	<0.5
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	<0.01	0.6	677	0.8
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	<0.01	1.5	759	0.6
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	<0.01	1.2	575	<0.5
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	<0.01	0.9	811	1.7
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	<0.01	0.8	410	<0.5
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	<0.01	1.3	682	0.8
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	<0.01	0.6	727	<0.5
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	<0.01	1.2	706	0.7
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	<0.01	0.8	287	<0.5
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	<0.01	1.8	686	1.5
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	<0.01	0.9	573	<0.5

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Calcium	Vanadium	Chromium	Manganese
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	185	0.06	<0.2	0.77
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	430	0.19	0.5	6.59
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	173	0.08	0.2	13.5
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	213	<0.05	<0.2	0.56
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	337	0.14	0.7	6.59
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	138	0.08	<0.2	13.0
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	184	0.11	0.4	0.77
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	275	0.16	0.6	8.67
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	152	<0.05	<0.2	14.6
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	181	0.06	<0.2	2.79
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	453	0.17	0.7	8.57
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	124	0.08	0.2	9.12
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	167	<0.05	<0.2	0.44
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	428	0.16	0.4	12.2
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	170	0.10	0.2	7.74
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	159	0.09	2.3	0.80
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	93	<0.05	<0.2	3.98
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	329	0.12	0.5	4.78
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	140	<0.05	<0.2	0.45
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	348	0.19	0.6	3.86
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	69	0.06	0.2	2.93
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	366	0.14	1.2	6.75
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	166	0.09	0.3	9.11

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Iron	Nickel	Cobalt	Copper	Zinc	Arsenic
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	129	<0.05	<0.01	8.74	153	<0.01
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	172	0.09	0.21	19.2	79.3	0.05
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	360	0.09	0.24	59.5	59.6	0.03
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	211	<0.05	<0.01	7.35	245	<0.01
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	134	0.10	0.20	24.2	83.4	0.04
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	182	0.09	0.28	23.1	56.4	<0.01
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	197	<0.05	0.02	9.18	215	0.04
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	149	0.22	0.47	24.9	131	0.05
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	363	0.16	0.39	70.2	70.8	0.02
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	162	0.05	0.01	8.08	138	0.02
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	180	0.10	0.28	22.2	101	0.06
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	586	0.07	0.23	27.1	41.8	<0.01
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	154	<0.05	0.01	3.80	222	<0.01
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	225	0.88	0.26	16.5	128	<0.01
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	353	0.12	0.38	66.2	49.3	<0.01
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	183	<0.05	0.01	3.72	257	<0.01
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	310	0.09	0.15	47.7	22.1	<0.01
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	270	0.23	0.30	11.8	107	0.01
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	186	<0.05	0.01	5.02	236	<0.01
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	234	0.25	0.25	13.4	122	0.03
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	248	0.06	0.06	41.1	48.5	<0.01
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	384	0.29	0.18	14.4	72.3	<0.01
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	216	0.08	0.18	116	59.5	<0.01

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Selenium	Strontium	Molybdenum	Silver
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	0.8	0.23	<0.01	0.108
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	4.5	0.59	1.00	0.044
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	1.2	0.19	2.55	2.21
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	0.6	0.30	<0.01	0.149
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	5.1	0.55	0.44	0.095
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	1.4	0.12	1.72	0.935
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	0.5	0.19	<0.01	0.037
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	4.3	0.51	0.43	0.205
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	0.9	0.15	2.17	3.21
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	0.7	0.38	<0.01	0.025
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	5.6	0.78	0.64	0.041
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	1.0	0.13	1.47	2.35
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	0.7	0.11	<0.01	0.393
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	4.9	0.61	1.42	0.068
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	2.4	0.21	3.23	0.270
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	0.7	0.18	0.03	0.090
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	1.6	0.11	1.75	0.128
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	4.7	0.48	0.84	0.080
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	1.4	0.17	0.02	0.073
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	5.1	0.49	1.07	0.120
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	3.1	0.07	1.26	0.051
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	7.1	0.41	2.60	0.159
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	2.2	0.11	3.99	5.32

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Cadmium	Tin	Antimony	Barium	Mercury
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	<0.01	<0.01	<0.01	0.16	<0.05
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	5.20	<0.01	<0.01	2.42	0.72
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	0.92	<0.01	<0.01	0.70	0.11
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	<0.01	<0.01	<0.01	0.16	<0.05
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	15.5	<0.01	<0.01	1.13	0.38
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	2.55	<0.01	0.02	0.15	0.08
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	0.03	<0.01	0.02	0.20	<0.05
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	46.1	<0.01	<0.01	2.27	1.37
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	3.33	<0.01	<0.01	0.22	0.26
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	0.02	0.02	<0.01	0.28	<0.05
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	84.0	<0.01	<0.01	2.32	0.80
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	6.58	<0.01	<0.01	0.25	<0.05
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	0.06	<0.01	<0.01	0.13	<0.05
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	148	<0.01	<0.01	0.90	<0.05
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	16.3	<0.01	<0.01	0.43	<0.05
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	0.02	<0.01	<0.01	0.16	<0.05
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	4.60	0.02	<0.01	0.44	<0.05
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	166	<0.01	<0.01	2.07	<0.05
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	0.08	<0.01	<0.01	0.11	<0.05
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	182	<0.01	<0.01	1.00	<0.05
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	10.3	<0.01	<0.01	0.33	<0.05
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	9.18	<0.01	<0.01	1.58	0.25
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	1.13	<0.01	<0.01	0.28	<0.05

Table C6. Ungulate Raw Data: elements and moisture

Site_ID	Sample_ID	Specimen_ID	Matrix	Species	Sex	Age	Year	% Moisture	Thallium	Lead	Uranium
I16	22713_Muscle	22713	muscle	caribou	M	2	2004	72.2	<0.01	0.06	<0.005
I16	22713_Caribou_Kidney	22713	kidney	caribou	M	2	2004	77.5	0.09	2.82	<0.005
I16	22713_Liver	22713	liver	caribou	M	2	2004	67.7	<0.01	2.38	<0.005
G19	23127_Muscle	23127	muscle	caribou	M	1	2004	69.9	<0.01	0.03	<0.005
G19	23127_Caribou_Kidney	23127	kidney	caribou	M	1	2004	78.7	0.10	3.22	<0.005
G19	23127_Liver	23127	liver	caribou	M	1	2004	67.8	<0.01	1.82	<0.005
Q37	23238_Muscle	23238	muscle	caribou	M	5	2004	72.7	<0.01	0.10	<0.005
Q37	23238_Caribou_Kidney	23238	kidney	caribou	M	5	2004	79.4	0.07	2.18	<0.005
Q37	23238_Liver	23238	liver	caribou	M	5	2004	68.6	<0.01	1.44	<0.005
U36	04-503_Muscle	04-503	muscle	caribou	M	4	2004	69.4	<0.01	0.03	<0.005
U36	04-503_Caribou_Kidney	04-503	kidney	caribou	M	4	2004	76.2	0.09	1.75	<0.005
U36	04-503_Liver	04-503	liver	caribou	M	4	2004	67.7	<0.01	1.01	<0.005
K23	22691_Muscle	22691	muscle	moose	M	4	2004	72.8	<0.01	0.02	<0.005
K23	22691_Moose_Kidney	22691	kidney	moose	M	4	2004	77.5	0.01	0.13	<0.005
K23	22691_Liver	22691	liver	moose	M	4	2004	70.8	<0.01	0.09	<0.005
L22	22704_Muscle	22704	muscle	moose	M	2	2004	69.0	<0.01	0.05	<0.005
L22	22704_Liver	22704	liver	moose	M	2	2004	57.7	<0.01	0.07	<0.005
U30	22711_Moose_Kidney	22711	kidney	moose	M	U	2004	77.4	0.01	0.08	<0.005
F29	22714_Muscle	22714	muscle	moose	M	6	2004	74.7	<0.01	<0.01	<0.005
F29	22714_Moose_Kidney	22714	kidney	moose	M	6	2004	79.2	<0.01	0.04	<0.005
F29	22714_Liver	22714	liver	moose	M	6	2004	50.7	<0.01	0.02	<0.005
B35	21939_Sheep_Kidney	21939	kidney	sheep	M	9	2004	78.0	0.02	0.41	0.009
B35	21940_Liver	21940	liver	sheep	M	10	2004	65.6	<0.01	0.72	<0.005

Table D1. Maximum Elemental Concentrations in Lichen in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	63.1	11	704.0	121
Antimony	< 0.1	11	0.7	121
Arsenic	<1	17	23.6	153
Barium	37.3	11	317.0	121
Beryllium	0.02	11	0.1	121
Boron	3.0	11	3.0	121
Cadmium	0.28	17	2.52	153
Calcium	3560	11	7490	121
Chromium	0.27	17	4.60	153
Cobalt	0.1	11	1	121
Copper	1.30	17	35.4	153
Iron	135	11	1950	121
Lead	1.6	17	747.7	153
Magnesium	629	11	613	121
Manganese	253.0	11	417.0	121
Mercury	0.072	17	0.510	153
Molybdenum	0.4	11	0.3	121
Nickel	0.5	17	4.6	153
Phosphorus	1880	11	2280	121
Potassium	1580	11	1810	121
Selenium	<1	17	4.5	153
Silicon	418	11	881	121
Silver	0.05	17	1.83	153
Sodium	48	11	196	121
Strontium	17.00	11	22.50	121
Tellurium	0.1	11	0.1	121
Thallium	< 0.02	11	1.52	121
Tin	0.3	11	35.1	121
Titanium	3.0	11	13.0	121
Uranium	< 0.04	11	0.04	121
Vanadium	< 0.5	11	1.2	121
Zinc	29.7	17	1043.4	153
Zirconium	< 3	11	< 3	121

Table D2. Maximum Elemental Concentrations in Surface Organic Soil in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	1650	247	9210	53
Antimony	-	<10	-	53
Arsenic	4.3	0.5	36.3	53
Barium	323	46	961	53
Beryllium	-	<1	-	53
Boron	4	<1	18	53
Cadmium	1.4	<0.5	12.4	53
Calcium	11400	848	36600	53
Chromium	3	<2	16	53
Cobalt	2	<1	9	53
Copper	26	5	272	53
Iron	4740	533	17400	53
Lead	269	<5	5930	53
Magnesium	1090	374	5010	53
Manganese	309	37	4360	53
Mercury	0.34	0.06	4.30	53
Molybdenum	-	<4	6	53
Nickel	5	<2	24	53
Phosphorus	877	618	2360	53
Potassium	969	397	1910	53
Selenium	0.5	<0.2	2	53
Silicon	-	-	-	-
Silver	-	<2	6	53
Sodium	25	<5	135	53
Strontium	48	5	169	53
Tellurium	-	-	-	-
Thallium	-	-	-	-
Tin	-	<5	8	53
Titanium	47	8	211	53
Uranium	-	-	-	-
Vanadium	5	<1	20	53
Zinc	355	45	3050	53
Zirconium	-	<1	7	53

Table D3. Maximum Elemental Concentrations in Subsurface Organic Soil in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	10700	13	27800	29
Antimony	-	13	-	29
Arsenic	14.5	13	13.9	29
Barium	733	13	507	29
Beryllium	-	13	-	29
Boron	21	13	10	29
Cadmium	8.3	13	3.0	29
Calcium	53800	13	49400	29
Chromium	17	13	57	29
Cobalt	69	13	13	29
Copper	84	13	78	29
Iron	19100	13	25500	29
Lead	193	13	362	29
Magnesium	6670	13	8870	29
Manganese	1850	13	2770	29
Mercury	0.35	13	0.50	29
Molybdenum	10	13	4	29
Nickel	34	13	45	29
Phosphorus	1640	13	1170	29
Potassium	1500	13	1720	29
Selenium	16.4	13	1.1	29
Silicon	-	-	-	-
Silver	-	13	-	29
Sodium	166	13	469	29
Strontium	175	13	175	29
Tellurium	-	-	-	-
Thallium	-	-	-	-
Tin	6	13	9	29
Titanium	142	13	524	29
Uranium	-	-	-	-
Vanadium	21	13	46	29
Zinc	337	13	427	29
Zirconium	3	13	5	29

Table D4. Maximum Elemental Concentrations in Subsurface Mineral Soil in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	18600	10	37750	34
Antimony	-	10	-	34
Arsenic	17.4	10	43.3	34
Barium	362	10	685	34
Beryllium	-	10	-	34
Boron	2	10	1.0	34
Cadmium	2.6	10	2.5	34
Calcium	13900	10	37100	34
Chromium	24	10	71	34
Cobalt	14	10	19	34
Copper	46	10	96	34
Iron	32000	10	34800	34
Lead	61	10	1330	34
Magnesium	9090	10	14450	34
Manganese	680	10	937	34
Mercury	0.08	10	1.53	34
Molybdenum	6	10	11	34
Nickel	40	10	53	34
Phosphorus	890	10	1410	34
Potassium	1840	10	3360	34
Selenium	2	10	1.3	34
Silicon	-	-	-	-
Silver	-	10	-	34
Sodium	434	10	1035	34
Strontium	51	10	87	34
Tellurium	-	-	-	-
Thallium	-	-	-	-
Tin	-	10	6	34
Titanium	323	10	747	34
Uranium	-	-	-	-
Vanadium	51	10	55	34
Zinc	270	10	309	34
Zirconium	6	10	6	34

Table D5. Maximum Elemental Concentrations in Ash in ug / g (ppm)

Element	Anvil Range Mine	sample size (n)
Aluminum	1670	2
Antimony	-	2
Arsenic	0.7	2
Barium	100	2
Beryllium	-	2
Boron	-	2
Cadmium	-	2
Calcium	6300	2
Chromium	-	2
Cobalt	1	2
Copper	7	2
Iron	2630	2
Lead	-	2
Magnesium	530	2
Manganese	32	2
Mercury	0.02	2
Molybdenum	-	2
Nickel	3	2
Phosphorus	336	2
Potassium	522	2
Selenium	0.2	2
Silicon	-	-
Silver	-	2
Sodium	378	2
Strontium	22	2
Tellurium	-	-
Thallium	-	-
Tin	-	2
Titanium	111	2
Uranium	-	-
Vanadium	7	2
Zinc	7	2
Zirconium	-	2

Table D6. Elemental Concentrations in Pre-Exposed Moss and Moss exposed on the Anvil Range Mine for 10 and 20 weeks

Element	Pre-exposure moss	sample size (n)	10 week post-exposure moss	sample size (n)	20 week post-exposure moss	sample size (n)
Aluminum	66.6	12	167.0	34	141	33
Antimony	< 0.1	12	0.2	34	< 0.1	33
Arsenic	0.9	12	1.5	34	1.1	33
Barium	21.1	12	122.0	34	67.2	33
Beryllium	< 0.02	12	< 0.02	34	< 0.02	33
Boron	37	12	37	34	34	33
Cadmium	0.19	12	0.36	34	0.21	33
Calcium	17300	12	21100	34	19400	33
Chromium	0.4	12	0.5	34	0.3	33
Cobalt	0.3	12	0.7	34	0.5	33
Copper	3.8	12	18.5	34	11.8	33
Iron	262	12	610	34	511	33
Lead	0.6	12	57.6	34	55.5	33
Magnesium	2320	12	3050	34	3300	33
Manganese	70.2	12	131.0	34	69.6	33
Mercury	0.024	12	0.041	34	0.052	33
Molybdenum	0.4	12	1.0	34	0.5	33
Nickel	3.0	12	12.8	34	2.9	33
Phosphorus	2930	12	2960	34	2770	33
Potassium	3080	12	3250	34	3260	33
Selenium	< 0.2	12	0.6	34	< 0.2	33
Silicon	774	12	1570	34	593	33
Silver	< 0.01	12	0.08	34	0.08	33
Sodium	93	12	119	34	130	33
Strontium	52	12	73.9	34	60.8	33
Tellurium	< 0.1	12	< 0.1	34	< 0.1	33
Thallium	< 0.02	12	< 0.02	34	< 0.02	33
Tin	9.5	12	< 0.1	34	0.3	33
Titanium	2.1	12	3.6	34	4.7	33
Uranium	2.42	12	6.8	34	1.91	33
Vanadium	1.1	12	1.7	34	0.8	33
Zinc	61.2	12	184.0	34	96.8	33
Zirconium	< 3	12	< 3	34	< 3	33

Table D7. Maximum Elemental Concentrations in Berries in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	21.1	12	41.3	21
Antimony	< 0.1	12	< 0.1	21
Arsenic	<1	15	<1	29
Barium	22.0	12	20.1	21
Beryllium	< 0.02	12	< 0.02	21
Boron	20	12	24.0	21
Cadmium	0.22	15	0.56	29
Calcium	11700	12	4340	21
Chromium	0.2	15	1.10	29
Cobalt	< 0.1	12	< 0.1	21
Copper	5.2	15	10.10	29
Iron	61	12	78	21
Lead	0.2	15	4.0	29
Magnesium	4730	12	4010	21
Manganese	384.0	12	253.0	21
Mercury	< 0.01	15	0.02	29
Molybdenum	7	12	2.5	21
Nickel	1.4	15	5.2	29
Phosphorus	10800	12	11500	21
Potassium	18200	12	18100	21
Selenium	3.5	15	<1	29
Silicon	488	12	425	21
Silver	0.10	15	0.07	
Sodium	11	12	33	21
Strontium	23	12	20.90	21
Tellurium	< 0.1	12	< 0.1	21
Thallium	< 0.02	12	< 0.02	21
Tin	0.2	12	1.7	21
Titanium	2.3	12	2.9	21
Uranium	< 0.04	12	< 0.04	21
Vanadium	< 0.5	12	< 0.5	21
Zinc	22.7	15	43.31	29
Zirconium	< 3	12	< 3	21

Table D8. Maximum Elemental Concentrations in Labrador Tea in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	19.7	3	40.6	7
Antimony	< 0.1	3	< 0.1	7
Arsenic	< 0.1	3	< 0.1	7
Barium	62.6	3	93.7	7
Beryllium	< 0.02	3	< 0.02	7
Boron	29	3	31	7
Cadmium	< 0.02	3	0.03	7
Calcium	6750	3	7150	7
Chromium	0.1	3	0.20	7
Cobalt	< 0.1	3	<0.1	7
Copper	5.2	3	6.5	7
Iron	60	3	87	7
Lead	< 0.1	3	2.6	7
Magnesium	2400	3	1860	7
Manganese	1180	3	678	7
Mercury	< 0.01	3	< 0.01	7
Molybdenum	1	3	0.6	7
Nickel	0.3	3	1.1	7
Phosphorus	5290	3	5310	7
Potassium	6210	3	6360	7
Selenium	< 0.2	3	< 0.2	7
Silicon	400	3	458	7
Silver	0.02	3	0.01	7
Sodium	5	3	3	7
Strontium	15	3	12.2	7
Tellurium	< 0.1	3	< 0.1	7
Thallium	< 0.02	3	0.18	7
Tin	< 0.1	3	0.2	7
Titanium	1.6	3	1.7	7
Uranium	< 0.04	3	< 0.04	7
Vanadium	< 0.5	3	< 0.5	7
Zinc	25.3	3	43.0	7
Zirconium	< 3	3	< 3	7

Table D9. Maximum Elemental Concentrations in Willow in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	10.1	3	20.5	7
Antimony	< 0.1	3	< 0.1	7
Arsenic	<1	10	11	55
Barium	21.5	3	103.0	7
Beryllium	< 0.02	3	< 0.02	7
Boron	22	3	32	7
Cadmium	8.23	10	17.3	55
Calcium	16300	3	20400	7
Chromium	0.2	10	20.2	55
Cobalt	0.4	3	1.8	7
Copper	6.00	10	10.9	55
Iron	73	3	141	7
Lead	0.5	10	115.0	55
Magnesium	13000	3	4730	7
Manganese	804	3	908	7
Mercury	0.01	10	0.07	55
Molybdenum	2.8	3	1.5	7
Nickel	2.9	10	17.4	55
Phosphorus	7470	3	7930	7
Potassium	23900	3	17900	7
Selenium	4.3	10	3	55
Silicon	235	3	264	7
Silver	0.03	10	0.22	55
Sodium	11	3	30	7
Strontium	71	3	86.7	7
Tellurium	< 0.1	3	< 0.1	7
Thallium	< 0.02	3	< 0.02	7
Tin	< 0.1	3	0.3	7
Titanium	2.0	3	1.3	7
Uranium	< 0.04	3	< 0.04	7
Vanadium	< 0.5	3	< 0.5	7
Zinc	396	10	2350.0	55
Zirconium	< 3	3	< 3	7

Table D10. Maximum Elemental Concentrations in Forbs in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	33.1	3	49.6	7
Antimony	< 0.1	3	< 0.1	7
Arsenic	0.2	3	0.1	7
Barium	123.0	3	269.0	7
Beryllium	< 0.02	3	0.08	7
Boron	29	3	31	7
Cadmium	1.03	3	0.71	7
Calcium	33500	3	26400	7
Chromium	0.4	3	0.60	7
Cobalt	0.8	3	5.4	7
Copper	9.9	3	11.7	7
Iron	92	3	144	7
Lead	0.2	3	4.3	7
Magnesium	4460	3	10300	7
Manganese	617.0	3	312.0	7
Mercury	< 0.01	3	0.019	7
Molybdenum	9.9	3	3.7	7
Nickel	2.4	3	21.6	7
Phosphorus	13400	3	6540	7
Potassium	54300	3	47900	7
Selenium	4.2	3	1.2	7
Silicon	875	3	1160	7
Silver	0.01	3	0.02	7
Sodium	49	3	26	7
Strontium	86	3	176	7
Tellurium	< 0.1	3	< 0.1	7
Thallium	< 0.02	3	< 0.02	7
Tin	0.6	3	0.2	7
Titanium	2.9	3	1.7	7
Uranium	< 0.04	3	< 0.04	7
Vanadium	< 0.5	3	< 0.5	7
Zinc	46.8	3	648.0	7
Zirconium	< 3	3	< 3	7

Table D11. Maximum Elemental Concentrations in Grass in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	27.4	3	27.3	12
Antimony	< 0.1	3	< 0.1	12
Arsenic	0.2	3	3	38
Barium	63.7	3	94.6	12
Beryllium	< 0.02	3	0.13	12
Boron	12	3	14	12
Cadmium	0.48	3	0.5	38
Calcium	14800	3	9750	12
Chromium	0.5	3	2.11	38
Cobalt	< 0.1	3	0.1	12
Copper	9.9	3	6.4	38
Iron	106	3	149	12
Lead	0.3	3	85.5	38
Magnesium	3860	3	4690	12
Manganese	254	3	1820	12
Mercury	< 0.01	3	0.06	38
Molybdenum	26.3	3	2.5	12
Nickel	1.4	3	3.6	38
Phosphorus	12400	3	9230	12
Potassium	40200	3	25900	12
Selenium	4.1	3	1	38
Silicon	2550	3	1900	12
Silver	0.01	3	0.34	38
Sodium	36	3	19	12
Strontium	33	3	54.3	12
Tellurium	< 0.1	3	< 0.1	12
Thallium	< 0.02	3	0.07	12
Tin	1.3	3	0.4	12
Titanium	3.3	3	2.0	12
Uranium	< 0.04	3	< 0.04	12
Vanadium	< 0.5	3	< 0.5	12
Zinc	179	3	1040	38
Zirconium	< 3	3	< 3	12

Table D12. Maximum Elemental Concentrations in Horsetails in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	7.6	1	13.0	9
Antimony	< 0.1	1	< 0.1	9
Arsenic	0.4	1	0.4	9
Barium	103.0	1	122.0	9
Beryllium	< 0.02	1	< 0.02	9
Boron	34	1	37.0	9
Cadmium	1.53	1	0.89	9
Calcium	28200	1	39800	9
Chromium	0.7	1	1.10	9
Cobalt	0.1	1	1.3	9
Copper	6.5	1	7.2	9
Iron	70	1	156	9
Lead	< 0.1	1	2.7	9
Magnesium	12300	1	9430	9
Manganese	70	1	286	9
Mercury	< 0.01	1	0.012	9
Molybdenum	9.4	1	1.9	9
Nickel	0.3	1	1.2	9
Phosphorus	7610	1	8270	9
Potassium	28400	1	47700	9
Selenium	7.4	1	0.4	9
Silicon	1900	1	1840	9
Silver	0.04	1	0.07	9
Sodium	28	1	312	9
Strontium	109	1	174	9
Tellurium	< 0.1	1	< 0.1	9
Thallium	< 0.02	1	0.08	9
Tin	0.2	1	0.4	9
Titanium	1.9	1	1.9	9
Uranium	< 0.04	1	< 0.04	9
Vanadium	< 0.5	1	< 0.5	9
Zinc	75.9	1	61.9	9
Zirconium	< 3	1	< 3	9

Table D13. Maximum Elemental Concentrations in Mushrooms in ug / g (ppm)

Element	Yukon reference concentration in Bolete (ppm)	sample size (n)	Maximum ARM concentration in Lecciunium (ppm)	sample size (n)
Aluminum	369	1	482	8
Antimony	0.040	1	< 0.1	8
Arsenic	0.0700	1	1.4	8
Barium	9.1	1	45.7	8
Beryllium	< 0.01	1	< 0.02	8
Boron	2.5	1	< 2	8
Cadmium	0.080	1	2.63	8
Calcium	758	1	577	8
Chromium	1.7	1	2.2	8
Cobalt	0.359	1	0.8	8
Copper	22.8	1	44.9	8
Iron	523	1	1140	8
Lead	0.530	1	120	8
Magnesium	663	1	970	8
Manganese	33.2	1	47.8	8
Mercury	0.1000	1	0.62	8
Molybdenum	0.4600	1	0.3	8
Nickel	0.840	1	2.2	8
Phosphorus	-		17600	8
Potassium	-		25900	8
Selenium	1.940	1	2	8
Silicon	-		390	8
Silver	2.1400	1	2.13	8
Sodium	-		1050	8
Strontium	2.8	1	3.78	8
Tellurium	-		< 0.1	8
Thallium	<0.005	1	0.05	8
Tin	<0.01	1	1.5	8
Titanium	-	1	13.1	8
Uranium	0.02	1	0.05	8
Vanadium	1.2400	1	0.9	8
Zinc	39.9	1	202	8
Zirconium	-	1	< 3	8

Table D14. Maximum Elemental Concentrations in Bear Root in ug / g (ppm)

Element	Yukon reference concentration in Bear root (ppm)	sample size (n)	Maximum ARM concentration in Bear root (ppm)	sample size (n)
Aluminum	341 - 2020	3	3180	8
Antimony	<1.0	3	0.2	8
Arsenic	<2.0	3	3.2	8
Barium	85.0 - 426.0	3	123	8
Beryllium	<0.2	3	0.19	8
Boron	-	3	24	8
Cadmium	<0.20	3	0.29	8
Calcium	4450 - 17100	3	7240	8
Chromium	13.50 - 56.40	3	7.6	8
Cobalt	<0.72 - 2.20	3	3.3	8
Copper	9.7 - 18.0	3	17.2	8
Iron	787 - 3100	3	5260	8
Lead	<0.72 - 6.40	3	74.6	8
Magnesium	1960 - 2410	3	2970	8
Manganese	60.7 - 108.0	3	124	8
Mercury	-	3	0.033	8
Molybdenum	3.00 - 8.00	3	6.2	8
Nickel	19.0 - 36.0	3	14.3	8
Phosphorus	-	3	8470	8
Potassium	-	3	9990	8
Selenium	<4	3	< 0.2	8
Silicon	-	3	1880	8
Silver	-	3	0.11	8
Sodium	-	3	76	8
Strontium	20.6 - 84.9	3	61.1	8
Tellurium	-	3	< 0.1	8
Thallium	-	3	0.09	8
Tin	-	3	1	8
Titanium	-	3	140.0	8
Uranium	-	3	1.63	8
Vanadium	1.30 - 5.60	3	8.2	8
Zinc	35.5 - 45.9	3	130.0	8
Zirconium	-	3	< 3	8

Table D15. Maximum Elemental Concentrations in Tree Sap in ug / g (ppm)

Element	Swim Lakes	sample size (n)	Anvil Range Mine	sample size (n)
Aluminum	5.5	3	29.3	7
Antimony	< 0.02	3	0.06	7
Arsenic	< 0.02	3	0.21	7
Barium	12.8	3	50.8	7
Beryllium	< 0.004	3	< 0.004	7
Boron	1.1	3	1.1	7
Cadmium	0.22	3	0.07	7
Calcium	624	3	1480	7
Chromium	0.04	3	0.36	7
Cobalt	0.06	3	0.08	7
Copper	0.86	3	2.95	7
Iron	6	3	137	7
Lead	0.1	3	24.6	7
Magnesium	64.5	3	108	7
Manganese	49.6	3	50	7
Mercury	< 0.01	3	< 0.01	7
Molybdenum	< 0.02	3	0.03	7
Nickel	0.02	3	0.19	7
Phosphorus	185	3	273	7
Potassium	263	3	405	7
Selenium	< 0.04	3	< 0.04	7
Silicon	63	3	318	7
Silver	< 0.002	3	0.023	7
Sodium	14.2	3	49	7
Strontium	2.05	3	7.81	7
Tellurium	< 0.02	3	< 0.02	7
Thallium	< 0.004	3	0.012	7
Tin	0.78	3	3.27	7
Titanium	0.14	3	0.51	7
Uranium	< 0.008	3	0.027	7
Vanadium	0.04	3	0.29	7
Zinc	4.8	3	27.7	7
Zirconium	< 0.6	3	< 0.6	7

Table D16. Maximum Elemental Concentrations in Soils from Mineral Lick Sites in ug / g (ppm)

	Swim Lakes	Mineral Lick Site 1	Mineral Lick Site 2
Aluminum	18600	10700	9720
Antimony	< 10	< 10	< 10
Arsenic	17.4	12.4	4.7
Barium	362	685	47
Beryllium	<1	< 1	< 1
Boron	2	< 1	< 1
Cadmium	2.6	1.5	< 0.5
Calcium	13900	37100	1020
Chromium	24	23	10
Cobalt	14	10	3
Copper	46	35	10
Iron	32000	22500	12700
Lead	61	16	18
Magnesium	9090	11200	2060
Manganese	680	497	159
Mercury	0.08	0.15	0.03
Molybdenum	6	< 4	< 4
Nickel	40	35	6
Phosphorus	890	940	618
Potassium	1840	890	671
Selenium	2	0.9	< 0.2
Silver	<2	< 2	< 2
Sodium	434	116	104
Strontium	51	87	8
Tin	<5	< 5	< 5
Titanium	323	183	125
Vanadium	51	31	19
Zinc	270	128	47
Zirconium	6	6	< 1

Table D17. Maximum Elemental Concentrations in Muscle of Northern Red-backed Voles by Lichen Lead Kriging Zone

	uneffected	increasingly effected		
	Zone 1	Zone 3	Zone 4	Zones 5 and 6
n	2	5	2	3
Aluminum	11.6	287	19.9	20.9
Antimony	< 0.2	< 0.2	< 0.2	< 0.2
Arsenic	0.5	< 0.2	< 0.2	< 0.2
Barium	7.9	4.9	6.9	3.5
Beryllium	< 0.04	< 0.04	< 0.04	< 0.04
Boron	< 4	< 4	< 4	< 4
Cadmium	0.22	0.24	0.18	0.17
Calcium	7680	6420	6180	6060
Chromium	0.9	2.6	0.7	0.8
Cobalt	< 0.2	< 0.2	< 0.2	< 0.2
Copper	12.1	10.8	11.3	11.1
Iron	187	155	181	153
Lead	0.3	1.5	4.6	3.4
Magnesium	1410	1340	1450	1520
Manganese	4.6	3.9	4	2.3
Mercury	0.191	0.055	0.062	0.058
Molybdenum	< 0.2	< 0.2	< 0.2	< 0.2
Nickel	0.5	3.1	0.4	0.6
Phosphorus	38100	35000	39300	39100
Potassium	17500	15800	18600	18900
Selenium	1.5	1.5	0.5	0.7
Silicon	205	181	180	180
Silver	< 0.02	< 0.02	< 0.02	< 0.02
Sodium	5340	4940	4530	4600
Strontium	5.98	4.00	5.92	3.34
Tellurium	< 0.2	< 0.2	< 0.2	< 0.2
Thallium	< 0.04	< 0.04	< 0.04	< 0.04
Tin	< 0.2	0.2	< 0.2	0.5
Titanium	5.4	5.0	5.5	6.3
Uranium	< 0.08	< 0.08	< 0.08	< 0.08
Vanadium	< 1	< 1	< 1	< 1
Zinc	54.7	51.3	51.8	52.6
Zirconium	< 6	< 6	< 6	< 6

Table D18. Maximum Elemental Concentrations in Liver of Northern Red-backed Voles by Lichen Lead Kriging Zones

	uneffected	increasingly effected		
	Zone 1	Zone 3	Zone 4	Zones 5 and 6
n	4	7	4	2
Aluminum	32.6	29.9	34.2	8.6
Antimony	< 0.3	< 1.2	< 0.6	< 0.5
Arsenic	0.4	< 1.2	<0.6	< 0.5
Barium	0.7	< 1.2	0.4	< 0.5
Beryllium	< 0.06	< 0.24	<0.12	< 0.1
Boron	< 6	< 24	< 12	< 10
Cadmium	9.09	7.8	2.94	7.69
Calcium	520	687	550	1850
Chromium	0.6	0.7	1	0.7
Cobalt	< 0.3	< 1.2	<0.6	< 0.5
Copper	18.4	19.5	17.9	18.9
Iron	512	719	606	708
Lead	< 0.3	0.5	2.5	7.7
Magnesium	953	995	949	927
Manganese	15.3	14.5	16	14
Mercury	0.574	0.159	0.27	0.185
Molybdenum	4.2	4.0	2.9	3.2
Nickel	0.4	0.4	0.4	1.5
Phosphorus	33700	36800	35300	35300
Potassium	12300	13100	12600	12500
Selenium	2.6	3.9	1.4	2.2
Silicon	203	429	356	187
Silver	< 0.03	0.08	<0.06	0.04
Sodium	4360	4600	4510	4310
Strontium	0.43	0.38	0.44	0.93
Tellurium	< 0.3	< 1.2	< 0.6	< 0.5
Thallium	< 0.06	< 0.24	< 0.12	< 0.1
Tin	0.6	27.6	<0.6	0.5
Titanium	6.1	8.8	7.1	3.8
Uranium	< 0.12	< 0.48	< 0.24	< 0.2
Vanadium	< 1.5	< 6	< 3	< 2.5
Zinc	92.4	96.6	95.3	97.3
Zirconium	<9	< 36	< 18	< 15

Table D19. Maximum Elemental Concentrations in Kidney of Northern Red-backed Voles by Zone of Mine Influence

	uneffected	increasingly effected		
	Zone 1	Zone 3	Zone 4	Zones 5 and 6
n	1	1	0	1
Aluminum	4.9	5.6	-	4.6
Antimony	< 0.3	< 0.2	-	< 0.3
Arsenic	0.7	< 0.2	-	< 0.3
Barium	1.3	0.6	-	< 0.3
Beryllium	< 0.06	< 0.04	-	< 0.06
Boron	< 6	< 4	-	< 6
Cadmium	22.7	12.4	-	11.5
Calcium	569	365	-	397
Chromium	0.8	0.6	-	0.6
Cobalt	< 0.3	< 0.2	-	< 0.3
Copper	16.6	18.8	-	20.4
Iron	383	397	-	485
Lead	0.8	3	-	30.4
Magnesium	941	847	-	918
Manganese	10.5	9.2	-	8.5
Mercury	2.94	0.489	-	0.475
Molybdenum	1.9	2	-	1.4
Nickel	< 0.3	< 0.2	-	1.7
Phosphorus	37600	34400	-	36900
Potassium	13700	13100	-	13800
Selenium	3.8	3.1	-	2.8
Silicon	125	116	-	161
Silver	< 0.03	0.07	-	< 0.03
Sodium	5070	4800	-	4970
Strontium	0.68	0.48	-	0.49
Tellurium	< 0.3	< 0.2	-	< 0.3
Thallium	< 0.06	0.06	-	0.15
Tin	< 0.3	< 0.2	-	< 0.3
Titanium	4.8	3.9	-	3.9
Uranium	< 0.12	< 0.08	-	< 0.12
Vanadium	< 1.5	< 1	-	< 1.5
Zinc	90.1	85.3	-	85
Zirconium	< 9	< 6	-	< 9

Table D20. Maximum Elemental Concentrations in Tissues of Woodland Caribou Harvested in Areas near the Anvil Range Mine

Element	Muscle	sample size (n)	Liver	sample size (n)	Kidney	sample size (n)
Aluminum	2.7	4	1.1	4	21.6	4
Antimony	0.02	4	0.02	4	<0.01	4
Arsenic	0.04	4	0.03	4	0.06	4
Barium	0.28	4	0.70	4	2.42	4
Beryllium	<0.01	4	<0.01	4	<0.01	4
Boron	0.8	4	1.1	4	1.3	4
Cadmium	0.03	4	6.58	4	84.0	4
Calcium	213	4	173	4	453	4
Chromium	0.4	4	0.2	4	0.7	4
Cobalt	0.02	4	0.39	4	0.47	4
Copper	9.18	4	70.2	4	24.9	4
Iron	211	4	586	4	180	4
Lead	0.10	4	2.38	4	3.22	4
Magnesium	845	4	611	4	736	4
Manganese	2.79	4	14.6	4	8.67	4
Mercury	<0.05	4	0.26	4	1.37	4
Molybdenum	<0.01	4	2.55	4	1.00	4
Nickel	0.05	4	0.16	4	0.22	4
Selenium	0.8	4	1.4	4	5.6	4
Silver	0.149	4	3.21	4	0.205	4
Strontium	0.38	4	0.19	4	0.78	4
Thallium	<0.01	4	<0.01	4	0.10	4
Tin	0.02	4	<0.01	4	<0.01	4
Uranium	<0.005	4	<0.005	4	<0.005	4
Vanadium	0.11	4	0.1	4	0.19	4
Zinc	245	4	70.8	4	131	4

Table D21. Maximum Elemental Concentrations in Tissues of Moose Harvested in Areas near the Anvil Range Mine

Element	Muscle	sample size (n)	Liver	sample size (n)	Kidney	sample size (n)
Aluminum	1.7	3	<0.5	3	0.8	3
Antimony	<0.01	3	<0.01	3	<0.01	3
Arsenic	<0.01	3	<0.01	3	0.03	3
Barium	0.16	3	0.44	3	2.07	3
Beryllium	<0.01	3	<0.01	3	<0.01	3
Boron	0.9	3	1.2	3	1.5	3
Cadmium	0.08	3	16.3	3	182	3
Calcium	167	3	170	3	428	3
Chromium	2.3	3	0.2	3	0.6	3
Cobalt	0.01	3	0.38	3	0.30	3
Copper	5.02	3	66.2	3	16.5	3
Iron	186	3	353	3	270	3
Lead	0.05	3	0.09	3	0.13	3
Magnesium	811	3	575	3	759	3
Manganese	0.80	3	7.74	3	12.2	3
Mercury	<0.05	3	<0.05	3	<0.05	3
Molybdenum	0.0	3	3.23	3	1.42	3
Nickel	<0.05	3	0.12	3	0.88	3
Selenium	1.4	3	3.1	3	5.1	3
Silver	0.393	3	0.270	3	0.120	3
Strontium	0.18	3	0.21	3	0.61	3
Thallium	<0.01	3	<0.01	3	0.01	3
Tin	<0.01	3	0.02	3	<0.01	3
Uranium	<0.005	3	<0.005	3	<0.005	3
Vanadium	0.09	3	0.10	3	0.19	3
Zinc	257	3	49.3	3	128	3

Table D22. Maximum Elemental Concentrations in Tissues of Sheep Harvested in Areas near the Anvil Range Mine

Element	Muscle	sample size (n)	Liver	sample size (n)	Kidney	sample size (n)
Aluminum	-	-	<0.5	1	1.5	1
Antimony	-	-	<0.01	1	<0.01	1
Arsenic	-	-	<0.01	1	<0.01	1
Barium	-	-	0.28	1	1.58	1
Beryllium	-	-	<0.01	1	<0.01	1
Boron	-	-	0.9	1	1.8	1
Cadmium	-	-	1.13	1	9.18	1
Calcium	-	-	166	1	366	1
Chromium	-	-	0.3	1	1.2	1
Cobalt	-	-	0.18	1	0.18	1
Copper	-	-	116	1	14.4	1
Iron	-	-	216	1	384	1
Lead	-	-	0.72	1	0.41	1
Magnesium	-	-	573	1	686	1
Manganese	-	-	9.11	1	6.75	1
Mercury	-	-	<0.05	1	0.25	1
Molybdenum	-	-	3.99	1	2.60	1
Nickel	-	-	0.08	1	0.29	1
Selenium	-	-	2.2	1	7.1	1
Silver	-	-	5.32	1	0.159	1
Strontium	-	-	0.11	1	0.41	1
Thallium	-	-	<0.01	1	0.02	1
Tin	-	-	<0.01	1	<0.01	1
Uranium	-	-	<0.005	1	0.009	1
Vanadium	-	-	0.09	1	0.14	1
Zinc	-	-	59.5	1	72.3	1

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56047)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 408190200	Duplicate Limits	Duplicate (R.P.D.) 408190225	Duplicate Limits
Aluminum	Al	< 0.5	0.2	7.3	20	1.6	20
Antimony	Sb	< 0.1	0.001	PASS	20	NC	20
Arsenic	As	< 0.1	0.002	0	20	PASS	20
Barium	Ba	< 0.1	0.001	0.3	20	1.8	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	NC	20	NC	20
Cadmium	Cd	< 0.02	0.0004	7.4	20	PASS	20
Calcium	Ca	< 1	0.3	2.7	20	4	20
Chromium	Cr	< 0.1	0.001	0	20	NC	20
Cobalt	Co	< 0.1	0.001	PASS	20	NC	20
Copper	Cu	< 0.1	0.001	0	20	9.5	20
Iron	Fe	< 5	0.05	4.5	20	0	20
Lead	Pb	< 0.1	0.002	2.9	20	0	20
Magnesium	Mg	< 0.5	0.2	1.7	20	0.8	20
Manganese	Mn	< 0.1	0.01	5.1	20	1	20
Molybdenum	Mo	< 0.1	0.002	NC	20	NC	20
Nickel	Ni	< 0.1	0.003	0	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	3.9	20	0.6	20
Potassium	K	< 1	0.3	0	20	0.7	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	14.3	20	PASS	20
Sodium	Na	< 1	0.5	7.4	20	0	20
Strontium	Sr	< 0.05	0.002	0.4	20	3.5	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	NC	20	NC	20
Titanium	Ti	< 0.3	0.01	2.2	20	0	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	PASS	20	NC	20
Zinc	Zn	< 0.5	0.04	5.2	20	4.2	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56047)

Parameter		Duplicate (R.P.D.) 408190290	Duplicate Limits	Duplicate (R.P.D.) 408190300	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits
Aluminum	Al	4.2	20	0.8	20	31	17 - 93
Antimony	Sb	PASS	20	PASS	20	-	-
Arsenic	As	14	20	0	20	-	-
Barium	Ba	5.9	20	1.7	20	-	-
Beryllium	Be	NC	20	NC	20	-	-
Boron	B	NC	20	NC	20	96	63 - 143
Cadmium	Cd	3.1	20	5.7	20	69	39 - 114
Calcium	Ca	0.5	20	3.3	20	92	60 - 120
Chromium	Cr	PASS	20	PASS	20	-	-
Cobalt	Co	PASS	20	PASS	20	103	50 - 150
Copper	Cu	12.8	20	1.4	20	93	62 - 124
Iron	Fe	9.3	20	5.4	20	-	-
Lead	Pb	4.6	20	1.2	20	-	-
Magnesium	Mg	0.5	20	5.1	20	-	-
Manganese	Mn	7.1	20	0.8	20	106	53 - 134
Molybdenum	Mo	NC	20	NC	20	-	-
Nickel	Ni	PASS	20	18.2	20	84	58 - 126
Phosphorus	PO4	1.8	20	2	20	87	60 - 120
Potassium	K	3.9	20	0	20	91	60 - 120
Selenium	Se	NC	20	NC	20	-	-
Silver	Ag	5.9	20	0	20	-	-
Sodium	Na	15.4	20	11.8	20	90	60 - 120
Strontium	Sr	3.9	20	1.6	20	89	60 - 120
Tellurium	Te	NC	20	NC	20	-	-
Thallium	Tl	PASS	20	PASS	20	-	-
Tin	Sn	NC	20	PASS	20	-	-
Titanium	Ti	9.2	20	1.9	20	-	-
Uranium	U	NC	20	NC	20	-	-
Vanadium	V	NC	20	PASS	20	123	50 - 150
Zinc	Zn	6.2	20	0.8	20	74	48 - 110
Zirconium	Zr	NC	20	NC	20	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56047)

Parameter		NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	27	7 - 91
Arsenic	As	179	80 - 283
Boron	B	84	62 - 142
Cadmium	Cd	76	30 - 124
Calcium	Ca	92	60 - 120
Chromium	Cr	45	28 - 97
Cobalt	Co	105	50 - 150
Copper	Cu	94	59 - 125
Iron	Fe	132	52 - 167
Manganese	Mn	98	62 - 131
Nickel	Ni	82	28 - 143
Phosphorus	PO4	89	60 - 120
Potassium	K	92	60 - 120
Sodium	Na	87	60 - 120
Vanadium	V	72	50 - 150
Zinc	Zn	71	49 - 109

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56180)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 408190301	Duplicate Limits	Duplicate (R.P.D.) 408190322	Duplicate Limits
Aluminum	Al	< 0.5	0.2	1.9	20	0	20
Antimony	Sb	< 0.1	0.001	PASS	20	NC	20
Arsenic	As	< 0.1	0.002	11.8	20	PASS	20
Barium	Ba	< 0.1	0.001	7.3	20	0	20
Beryllium	Be	< 0.02	0.001	NC	20	PASS	20
Boron	B	< 2	0.02	NC	20	NC	20
Cadmium	Cd	< 0.02	0.0004	1.7	20	0	20
Calcium	Ca	< 1	0.3	2.9	20	0.5	20
Chromium	Cr	< 0.1	0.001	0	20	PASS	20
Cobalt	Co	< 0.1	0.001	PASS	20	PASS	20
Copper	Cu	< 0.1	0.001	4.9	20	4.7	20
Iron	Fe	< 5	0.05	9.2	20	1.9	20
Lead	Pb	< 0.1	0.002	6.7	20	1.6	20
Magnesium	Mg	< 0.5	0.2	4	20	4.5	20
Manganese	Mn	< 0.1	0.01	9.5	20	2.7	20
Molybdenum	Mo	< 0.1	0.002	NC	20	NC	20
Nickel	Ni	< 0.1	0.003	18.2	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	4.6	20	2	20
Potassium	K	< 1	0.3	3.3	20	5.7	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	4.3	20	0	20
Sodium	Na	< 1	0.5	PASS	20	(*)	20
Strontium	Sr	< 0.05	0.002	4.6	20	0	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	4.6	20	0	20
Tin	Sn	< 0.1	0.01	PASS	20	NC	20
Titanium	Ti	< 0.3	0.01	0	20	1.7	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	PASS	20	PASS	20
Zinc	Zn	< 0.5	0.04	5.5	20	0.2	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.
(*) = Quality Control results exceeded internally set limits; after review by Quality Assurance Unit, non-conformance overridden and batch sample analysis results released for reporting

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56180)

Parameter		Duplicate (R.P.D.) 408190340	Duplicate Limits	Duplicate (R.P.D.) 408190350	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits
Aluminum	Al	0.5	20	4.5	20	30	17 - 93
Antimony	Sb	NC	20	NC	20	-	-
Arsenic	As	PASS	20	PASS	20	-	-
Barium	Ba	3.3	20	2	20	-	-
Beryllium	Be	NC	20	NC	20	-	-
Boron	B	NC	20	NC	20	98	63 - 143
Cadmium	Cd	PASS	20	PASS	20	89	39 - 114
Calcium	Ca	1.1	20	5	20	94	60 - 120
Chromium	Cr	PASS	20	PASS	20	-	-
Cobalt	Co	NC	20	NC	20	103	50 - 150
Copper	Cu	9.5	20	8.7	20	102	62 - 124
Iron	Fe	6.9	20	2.2	20	-	-
Lead	Pb	0	20	4.9	20	-	-
Magnesium	Mg	0	20	4.1	20	-	-
Manganese	Mn	2.1	20	3.8	20	108	53 - 134
Molybdenum	Mo	NC	20	NC	20	-	-
Nickel	Ni	PASS	20	PASS	20	89	58 - 126
Phosphorus	PO4	3.7	20	3.2	20	102	60 - 120
Potassium	K	2.7	20	4.6	20	94	60 - 120
Selenium	Se	NC	20	NC	20	-	-
Silver	Ag	PASS	20	18.2	20	-	-
Sodium	Na	NC	20	NC	20	86	60 - 120
Strontium	Sr	1.2	20	3.4	20	90	60 - 120
Tellurium	Te	NC	20	NC	20	-	-
Thallium	Tl	PASS	20	8.7	20	-	-
Tin	Sn	NC	20	NC	20	-	-
Titanium	Ti	0	20	2.7	20	-	-
Uranium	U	NC	20	NC	20	-	-
Vanadium	V	NC	20	NC	20	123	50 - 150
Zinc	Zn	3.9	20	5.9	20	82	48 - 110
Zirconium	Zr	NC	20	NC	20	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56180)

Parameter		NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	24	7 - 91
Arsenic	As	179	80 - 283
Boron	B	87	62 - 142
Cadmium	Cd	89	30 - 124
Calcium	Ca	87	60 - 120
Chromium	Cr	45	28 - 97
Cobalt	Co	88	50 - 150
Copper	Cu	91	59 - 125
Iron	Fe	114	52 - 167
Manganese	Mn	95	62 - 131
Nickel	Ni	69	28 - 143
Phosphorus	PO4	95	60 - 120
Potassium	K	101	60 - 120
Sodium	Na	69	60 - 120
Vanadium	V	72	50 - 150
Zinc	Zn	75	49 - 109

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56236)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 408190361	Duplicate Limits	Duplicate (R.P.D.) 408190371	Duplicate Limits
Aluminum	Al	< 0.5	0.2	2	20	2.5	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	PASS	20	PASS	20
Barium	Ba	< 0.1	0.001	1.8	20	2.3	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	NC	20	NC	20
Cadmium	Cd	< 0.02	0.0004	0	20	9.5	20
Calcium	Ca	< 1	0.3	9	20	0.6	20
Chromium	Cr	< 0.1	0.001	PASS	20	PASS	20
Cobalt	Co	< 0.1	0.001	NC	20	PASS	20
Copper	Cu	< 0.1	0.001	0	20	0	20
Iron	Fe	< 5	0.05	2	20	0.7	20
Lead	Pb	< 0.1	0.002	0	20	3.2	20
Magnesium	Mg	< 0.5	0.2	7.7	20	2.2	20
Manganese	Mn	< 0.1	0.01	2.7	20	2.7	20
Molybdenum	Mo	< 0.1	0.002	NC	20	NC	20
Nickel	Ni	< 0.1	0.003	PASS	20	0	20
Phosphorus	PO4	< 0.5	0.1	2.3	20	0.8	20
Potassium	K	< 1	0.3	8.8	20	0.8	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	PASS	20	PASS	20
Sodium	Na	< 1	0.5	PASS	20	PASS	20
Strontium	Sr	< 0.05	0.002	4.9	20	1.8	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	NC	20	NC	20
Titanium	Ti	< 0.3	0.01	9.8	20	0	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	NC	20	NC	20
Zinc	Zn	< 0.5	0.04	1.9	20	0	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56236)

Parameter		Duplicate (R.P.D.) 408190381	Duplicate Limits	Duplicate (R.P.D.) 408190391	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits
Aluminum	Al	1.7	20	5.5	20	30	17 - 93
Antimony	Sb	NC	20	NC	20	-	-
Arsenic	As	0	20	NC	20	-	-
Barium	Ba	0.3	20	4.3	20	-	-
Beryllium	Be	NC	20	NC	20	-	-
Boron	B	NC	20	NC	20	114	63 - 143
Cadmium	Cd	7.4	20	PASS	20	72	39 - 114
Calcium	Ca	1.4	20	2.9	20	86	60 - 120
Chromium	Cr	0	20	NC	20	-	-
Cobalt	Co	PASS	20	NC	20	103	50 - 150
Copper	Cu	0	20	9.5	20	93	62 - 124
Iron	Fe	0.2	20	1.8	20	-	-
Lead	Pb	3.4	20	15.4	20	-	-
Magnesium	Mg	1.1	20	2	20	-	-
Manganese	Mn	0.9	20	3.5	20	97	53 - 134
Molybdenum	Mo	NC	20	NC	20	-	-
Nickel	Ni	13.3	20	PASS	20	84	58 - 126
Phosphorus	PO4	0.7	20	1.9	20	97	60 - 120
Potassium	K	1	20	2.4	20	95	60 - 120
Selenium	Se	NC	20	NC	20	-	-
Silver	Ag	0	20	PASS	20	-	-
Sodium	Na	PASS	20	PASS	20	83	60 - 120
Strontium	Sr	1	20	3.1	20	85	60 - 120
Tellurium	Te	NC	20	NC	20	-	-
Thallium	Tl	NC	20	NC	20	-	-
Tin	Sn	NC	20	NC	20	-	-
Titanium	Ti	1.7	20	5.4	20	-	-
Uranium	U	NC	20	NC	20	-	-
Vanadium	V	PASS	20	NC	20	105	50 - 150
Zinc	Zn	6.3	20	5	20	73	48 - 110
Zirconium	Zr	NC	20	NC	20	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: September 28, 2004

GROUP NUMBER: 50819053

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 56236)

Parameter		NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	29	7 - 91
Arsenic	As	179	80 - 283
Boron	B	102	62 - 142
Cadmium	Cd	86	30 - 124
Calcium	Ca	93	60 - 120
Chromium	Cr	55	28 - 97
Cobalt	Co	105	50 - 150
Copper	Cu	98	59 - 125
Iron	Fe	120	52 - 167
Manganese	Mn	103	62 - 131
Nickel	Ni	82	28 - 143
Phosphorus	PO4	103	60 - 120
Potassium	K	98	60 - 120
Sodium	Na	73	60 - 120
Vanadium	V	72	50 - 150
Zinc	Zn	77	49 - 109

ug/g = micrograms per gram, dry basis

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 56047)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4

Metals Plant Tissue Digestion (Batch# 56180)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	5

Metals Plant Tissue Digestion (Batch# 56236)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4

Metals Plant Tissue Digestion (Batch# 56047)

QC Type	No. Samples
Batch Size	45

(Continued on next page)

CANTEST

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 56180)

QC Type	No. Samples
Batch Size	43

Metals Plant Tissue Digestion (Batch# 56236)

QC Type	No. Samples
Batch Size	45

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 22, 2004

GROUP NUMBER: 51117060

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59195)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 411170311	Duplicate Limits	Duplicate (R.P.D.) 411170335	Duplicate Limits
Antimony	Sb	-	-	NC	30	NC	30
Arsenic	As	-	-	11.8	30	0.8	30
Barium	Ba	< 1	1	0	30	2.4	30
Beryllium	Be	-	-	NC	30	NC	30
Chromium	Cr	-	-	NC	30	11.3	30
Cobalt	Co	-	-	NC	30	0	30
Copper	Cu	< 1	1	8.7	30	1.4	30
Lead	Pb	< 5	5	NC	30	PASS	30
Mercury	Hg	(*)	0.001	0	30	28.6	30
Molybdenum	Mo	-	-	NC	30	NC	30
Nickel	Ni	< 2	2	PASS	30	7.5	30
Selenium	Se	< 0.2	0.2	4.9	30	PASS	30
Tin	Sn	-	-	PASS	30	NC	30
Vanadium	V	-	-	PASS	30	2.7	30
Zinc	Zn	< 1	1	0	30	5	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.
(*) = Quality Control results exceeded internally set limits; after review by Quality Assurance Unit, non-conformance overridden and batch sample analysis results released for reporting

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 22, 2004

GROUP NUMBER: 51117060

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59195)

Parameter		Duplicate (R.P.D.) 411170357	Duplicate Limits	Duplicate (R.P.D.) 411170376	Duplicate Limits	Duplicate (R.P.D.) 411170399	Duplicate Limits
Antimony	Sb	NC	30	NC	30	NC	30
Arsenic	As	6.5	30	PASS	30	4.8	30
Barium	Ba	1.6	30	4.1	30	2.2	30
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	PASS	30	NC	30	5.7	30
Cobalt	Co	PASS	30	NC	30	0	30
Copper	Cu	3.4	30	PASS	30	4.1	30
Lead	Pb	NC	30	NC	30	PASS	30
Mercury	Hg	0	30	-	-	0	30
Molybdenum	Mo	NC	30	NC	30	NC	30
Nickel	Ni	0	30	NC	30	0	30
Selenium	Se	PASS	30	NC	30	PASS	30
Tin	Sn	NC	30	NC	30	NC	30
Vanadium	V	8.7	30	PASS	30	2.5	30
Zinc	Zn	2.2	30	PASS	30	1.6	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 22, 2004

GROUP NUMBER: 51117060

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59195)

Parameter		Duplicate (R.P.D.) 411170422	Duplicate Limits	Duplicate (R.P.D.) 411220029	Duplicate Limits	Duplicate (R.P.D.) 411220278	Duplicate Limits
Antimony	Sb	NC	30	1.4	30	NC	30
Arsenic	As	9.5	30	-	-	-	-
Barium	Ba	3.1	30	1.1	30	22.8	30
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	10.8	30	PASS	30	10.9	30
Cobalt	Co	8.7	30	0	30	PASS	30
Copper	Cu	3.2	30	1.7	30	0	30
Lead	Pb	1.1	30	1.4	30	15.9	30
Mercury	Hg	0	30	0	30	0	30
Molybdenum	Mo	NC	30	PASS	30	NC	30
Nickel	Ni	5.3	30	0	30	PASS	30
Selenium	Se	PASS	30	PASS	30	NC	30
Tin	Sn	NC	30	8.9	30	NC	30
Vanadium	V	11.1	30	0	30	PASS	30
Zinc	Zn	3.1	30	2.2	30	3.5	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59195)

Parameter		NIST 2711 Montana Soil-SALM (% Recovery)	NIST 2711 Montana Soil-SALM Limits
Cadmium	Cd	101	80 - 120
Lead	Pb	95	77 - 115
Mercury	Hg	119	84 - 122
Nickel	Ni	73	41 - 120
Selenium	Se	86	56 - 134
Zinc	Zn	89	80 - 110
Calcium	Ca	71	67 - 85
Iron	Fe	69	68 - 102
Magnesium	Mg	66	59 - 89
Manganese	Mn	74	74 - 98
Sodium	Na	2	1 - 6
Strontium	Sr	15	10 - 34

ug/g = micrograms per gram

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 22, 2004

GROUP NUMBER: 51117060

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59254)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 411220290	Duplicate Limits	Duplicate (R.P.D.) 411230162	Duplicate Limits
Antimony	Sb	-	-	NC	30	-	-
Barium	Ba	< 1	1	5.1	30	-	-
Beryllium	Be	-	-	NC	30	-	-
Chromium	Cr	-	-	0	30	4.2	30
Cobalt	Co	-	-	0	30	-	-
Copper	Cu	< 1	1	0	30	-	-
Lead	Pb	< 5	5	PASS	30	-	-
Molybdenum	Mo	-	-	NC	30	-	-
Nickel	Ni	< 2	2	PASS	30	-	-
Selenium	Se	< 0.2	0.2	NC	30	-	-
Tin	Sn	-	-	NC	30	-	-
Vanadium	V	-	-	0	30	-	-
Zinc	Zn	< 1	1	6.5	30	-	-

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 59254)

Parameter		NIST 2711 Montana Soil-SALM (% Recovery)	NIST 2711 Montana Soil-SALM Limits
Cadmium	Cd	101	80 - 120
Lead	Pb	96	77 - 115
Mercury	Hg	89	84 - 122
Nickel	Ni	73	41 - 120
Selenium	Se	112	56 - 134
Zinc	Zn	90	80 - 110
Calcium	Ca	71	67 - 85
Iron	Fe	68	68 - 102
Magnesium	Mg	65	59 - 89
Sodium	Na	2	1 - 6
Strontium	Sr	15	10 - 34

ug/g = micrograms per gram

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 4, 2005

GROUP NUMBER: 60223050

CANTEST

Batch Quality Control for Conventional Parameters in Soil

Parameter	QC Type	QC Result	Units	Lower Limit	Upper Limit
Total Cyanide	Blank	< 0.15	ug/g	0	0.01
	Spike	100.0	% Recovery	80	120
	Spike	102.0	% Recovery	80	120
	Duplicate	2.0	R.P.D.	0	25
	Duplicate	5.1	R.P.D.	0	25

ug/g = micrograms per gram, on a dry weight basis.
< = Less than detection limit
R.P.D. = Relative Percent Difference

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 31, 2004

GROUP NUMBER: 51216039

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 60182)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 412160184	Duplicate Limits	Duplicate (R.P.D.) 412160196	Duplicate Limits
Antimony	Sb	-	-	NC	30	NC	30
Arsenic	As	-	-	11.8	30	4.7	30
Barium	Ba	< 1	1	1.4	30	3	30
Beryllium	Be	-	-	NC	30	NC	30
Chromium	Cr	-	-	NC	30	NC	30
Cobalt	Co	-	-	NC	30	PASS	30
Copper	Cu	< 1	1	PASS	30	0	30
Lead	Pb	< 5	5	NC	30	4.5	30
Mercury	Hg	NC	0.001	15.4	30	3.8	30
Molybdenum	Mo	-	-	NC	30	NC	30
Nickel	Ni	< 2	2	PASS	30	PASS	30
Selenium	Se	< 0.2	0.2	PASS	30	PASS	30
Tin	Sn	-	-	NC	30	NC	30
Vanadium	V	-	-	NC	30	PASS	30
Zinc	Zn	< 1	1	0	30	1	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 31, 2004

GROUP NUMBER: 51216039

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 60182)

Parameter		Duplicate (R.P.D.) 412160209	Duplicate Limits	Duplicate (R.P.D.) 412160220	Duplicate Limits	Duplicate (R.P.D.) 412160232	Duplicate Limits
Antimony	Sb	NC	30	NC	30	NC	30
Arsenic	As	8.7	30	19.9	30	1.7	30
Barium	Ba	3.6	30	0.9	30	-	-
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	NC	30	PASS	30	PASS	30
Cobalt	Co	NC	30	PASS	30	PASS	30
Copper	Cu	0	30	0	30	4.5	30
Lead	Pb	PASS	30	2.7	30	5.7	30
Mercury	Hg	9.5	30	0	30	0.7	30
Molybdenum	Mo	NC	30	NC	30	NC	30
Nickel	Ni	PASS	30	PASS	30	PASS	30
Selenium	Se	PASS	30	PASS	30	PASS	30
Tin	Sn	NC	30	NC	30	NC	30
Vanadium	V	PASS	30	PASS	30	0	30
Zinc	Zn	1.1	30	3.7	30	16.6	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 31, 2004

GROUP NUMBER: 51216039

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 60182)

Parameter		Duplicate (R.P.D.) 412160243	Duplicate Limits	Duplicate (R.P.D.) 412160254	Duplicate Limits	NIST 2711 Montana Soil-SALM (% Recovery)	NIST 2711 Montana Soil-SALM Limits
Antimony	Sb	NC	30	NC	30	-	-
Arsenic	As	0	30	11.8	30	-	-
Barium	Ba	4.3	30	1.8	30	-	-
Beryllium	Be	NC	30	NC	30	-	-
Cadmium	Cd	-	-	-	-	99	80 - 120
Chromium	Cr	NC	30	NC	30	-	-
Cobalt	Co	PASS	30	PASS	30	-	-
Copper	Cu	0	30	9.5	30	-	-
Lead	Pb	NC	30	NC	30	90	77 - 115
Mercury	Hg	NC	30	26.1	30	89	84 - 122
Molybdenum	Mo	NC	30	NC	30	-	-
Nickel	Ni	NC	30	PASS	30	73	41 - 120
Selenium	Se	PASS	30	PASS	30	92	56 - 134
Tin	Sn	NC	30	NC	30	-	-
Vanadium	V	PASS	30	PASS	30	-	-
Zinc	Zn	1.7	30	4.8	30	88	80 - 110
Calcium	Ca	-	-	-	-	69	67 - 85
Magnesium	Mg	-	-	-	-	64	59 - 89
Manganese	Mn	-	-	-	-	76	74 - 98
Sodium	Na	-	-	-	-	2	1 - 6
Strontium	Sr	-	-	-	-	18	10 - 34

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

Batch Quality Control Frequency Summary

SALM in Soil Digestion (Batch# 60182)

QC Type	No. Samples
NIST 2711 Montana Soil-SALM	1
Blank	3
Duplicate	7

SALM Metals in Soil Sieve (Batch# 60160)

QC Type	No. Samples
Batch Size	72

SALM in Soil Digestion (Batch# 60182)

QC Type	No. Samples
Batch Size	72

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: February 22, 2005

GROUP NUMBER: 60216042

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 62123)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 502160145	Duplicate Limits	Duplicate (R.P.D.) 502160155	Duplicate Limits
Antimony	Sb	-	-	NC	30	NC	30
Arsenic	As	< 10	10	NC	30	NC	30
Barium	Ba	< 1	1	4.1	30	1.9	30
Beryllium	Be	-	-	NC	30	NC	30
Chromium	Cr	-	-	0	30	PASS	30
Cobalt	Co	-	-	6.5	30	PASS	30
Copper	Cu	< 1	1	0	30	0	30
Lead	Pb	< 5	5	PASS	30	PASS	30
Mercury	Hg	< 0.01	0.001	0	30	0	30
Molybdenum	Mo	-	-	NC	30	NC	30
Nickel	Ni	< 2	2	5.9	30	PASS	30
Selenium	Se	< 0.2	0.2	NC	30	NC	30
Tin	Sn	-	-	NC	30	NC	30
Vanadium	V	-	-	3.2	30	0	30
Zinc	Zn	< 1	1	2.4	30	1.7	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: February 22, 2005

GROUP NUMBER: 60216042

CANTEST

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 62123)

Parameter		Duplicate (R.P.D.) 502160165	Duplicate Limits	Duplicate (R.P.D.) 502160175	Duplicate Limits	Duplicate (R.P.D.) 502160195	Duplicate Limits
Antimony	Sb	NC	30	NC	30	NC	30
Arsenic	As	NC	30	PASS	30	NC	30
Barium	Ba	3.9	30	6.1	30	20.2	30
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	NC	30	8.7	30	PASS	30
Cobalt	Co	NC	30	0	30	15.4	30
Copper	Cu	0	30	3.9	30	0	30
Lead	Pb	NC	30	10.9	30	NC	30
Mercury	Hg	0	30	0	30	0	30
Molybdenum	Mo	NC	30	NC	30	PASS	30
Nickel	Ni	PASS	30	7.4	30	PASS	30
Selenium	Se	NC	30	NC	30	NC	30
Tin	Sn	PASS	30	NC	30	NC	30
Vanadium	V	PASS	30	8.7	30	8	30
Zinc	Zn	4.9	30	1.9	30	0	30

ug/g = micrograms per gram
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: February 22, 2005

GROUP NUMBER: 60216042

Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 62123)

Parameter		NIST 2711 Montana Soil-SALM (% Recovery)	NIST 2711 Montana Soil-SALM Limits
Arsenic	As	94	79 - 100
Cadmium	Cd	100	80 - 120
Lead	Pb	98	77 - 115
Mercury	Hg	114	84 - 122
Nickel	Ni	78	41 - 120
Selenium	Se	92	56 - 134
Zinc	Zn	94	80 - 110
Calcium	Ca	73	67 - 85
Iron	Fe	75	68 - 102
Magnesium	Mg	75	59 - 89
Manganese	Mn	75	74 - 98
Sodium	Na	4	1 - 6
Strontium	Sr	17	10 - 34

ug/g = micrograms per gram

Batch Quality Control Frequency Summary

SALM in Soil Digestion (Batch# 62123)

QC Type	No. Samples
NIST 2711 Montana Soil-SALM	1
Blank	3
Duplicate	5

SALM Metals in Soil Sieve (Batch# 62122)

QC Type	No. Samples
Batch Size	50

SALM in Soil Digestion (Batch# 62123)

QC Type	No. Samples
Batch Size	50

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: August 20, 2004

GROUP NUMBER: 50811030

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 55381)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 408110199	Duplicate Limits	Duplicate (R.P.D.) 408110215	Duplicate Limits
Aluminum	Al	< 0.5	0.2	5	20	1.8	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	PASS	20	0	20
Barium	Ba	< 0.1	0.001	2.2	20	1.1	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	12.8	20	4.1	20
Cadmium	Cd	< 0.02	0.0004	8.7	20	0	20
Calcium	Ca	< 1	0.3	3.1	20	1.3	20
Chromium	Cr	< 0.1	0.001	NC	20	NC	20
Cobalt	Co	< 0.1	0.001	PASS	20	PASS	20
Copper	Cu	< 0.1	0.001	7.7	20	0	20
Iron	Fe	< 5	0.05	3.6	20	0	20
Lead	Pb	< 0.1	0.002	PASS	20	0	20
Magnesium	Mg	< 0.5	0.2	3.1	20	2.9	20
Manganese	Mn	< 0.1	0.01	8.8	20	3.2	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	PASS	20
Nickel	Ni	< 0.1	0.003	5.1	20	6.1	20
Phosphorus	PO4	< 0.5	0.1	3.1	20	2.9	20
Potassium	K	< 1	0.3	6.8	20	4.4	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	NC	20	NC	20
Sodium	Na	< 1	0.5	17.2	20	1.5	20
Strontium	Sr	< 0.05	0.002	3.9	20	2.5	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	PASS	20	18.2	20
Titanium	Ti	< 0.3	0.01	11.8	20	PASS	20
Uranium	U	< 0.04	0.002	19.5	20	5.3	20
Vanadium	V	< 0.5	0.002	PASS	20	PASS	20
Zinc	Zn	< 0.5	0.04	13.8	20	4	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20
Mercury	Hg	-	-	11.1	20	0	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: August 20, 2004

GROUP NUMBER: 50811030

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 55381)

Parameter		NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits
Aluminum	Al	37	17 - 93
Boron	B	138	63 - 143
Cadmium	Cd	104	39 - 114
Calcium	Ca	97	60 - 120
Cobalt	Co	96	50 - 150
Copper	Cu	98	62 - 124
Manganese	Mn	96	53 - 134
Nickel	Ni	93	58 - 126
Phosphorus	PO4	113	60 - 120
Potassium	K	102	60 - 120
Sodium	Na	90	60 - 120
Strontium	Sr	90	60 - 120
Vanadium	V	96	50 - 150
Zinc	Zn	94	48 - 110
Mercury	Hg	87	59 - 119

ug/g = micrograms per gram, dry basis

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 55381)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
Blank	2
Duplicate	2
Batch Size	12

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 3, 2004

GROUP NUMBER: 51111024

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 58980)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 411110137	Duplicate Limits	Duplicate (R.P.D.) 411110147	Duplicate Limits
Aluminum	Al	< 0.5	0.2	0.9	20	0.3	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	PASS	20	PASS	20
Barium	Ba	< 0.1	0.001	11	20	3.1	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	6.5	20	10	20
Cadmium	Cd	< 0.02	0.0004	11.8	20	9.5	20
Calcium	Ca	< 1	0.3	3.7	20	5.3	20
Chromium	Cr	< 0.1	0.001	PASS	20	PASS	20
Cobalt	Co	< 0.1	0.001	PASS	20	PASS	20
Copper	Cu	< 0.1	0.001	3.4	20	6.9	20
Iron	Fe	< 5	0.05	2.4	20	1.9	20
Lead	Pb	< 0.1	0.002	15.4	20	8	20
Magnesium	Mg	< 0.5	0.2	7.9	20	4.5	20
Manganese	Mn	< 0.1	0.01	4.2	20	6.7	20
Mercury	Hg	-	-	0	20	9.1	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	PASS	20
Nickel	Ni	< 0.1	0.003	0	20	7.4	20
Phosphorus	PO4	< 0.5	0.1	9.3	20	2.7	20
Potassium	K	< 1	0.3	14.1	20	5.7	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	NC	20	NC	20
Sodium	Na	< 1	0.5	8.7	20	13.3	20
Strontium	Sr	< 0.05	0.002	8.1	20	0.4	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	NC	20	NC	20
Titanium	Ti	< 0.3	0.01	4.7	20	3.4	20
Uranium	U	< 0.04	0.002	3.3	20	10.9	20
Vanadium	V	< 0.5	0.002	NC	20	NC	20
Zinc	Zn	< 0.5	0.04	18.8	20	7.3	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 3, 2004

GROUP NUMBER: 51111024

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 58980)

Parameter		Duplicate (R.P.D.) 411110157	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	4.3	20	38	17 - 93	37	7 - 91
Antimony	Sb	NC	20	-	-	-	-
Arsenic	As	PASS	20	-	-	134	80 - 283
Barium	Ba	1.7	20	-	-	-	-
Beryllium	Be	NC	20	-	-	-	-
Boron	B	0	20	104	63 - 143	102	62 - 142
Cadmium	Cd	PASS	20	69	39 - 114	118	30 - 124
Calcium	Ca	7.8	20	96	60 - 120	100	60 - 120
Chromium	Cr	PASS	20	-	-	41	28 - 97
Cobalt	Co	PASS	20	83	50 - 150	96	50 - 150
Copper	Cu	0	20	90	62 - 124	106	59 - 125
Iron	Fe	3.1	20	-	-	106	52 - 167
Lead	Pb	6.9	20	-	-	-	-
Magnesium	Mg	1.3	20	-	-	-	-
Manganese	Mn	6.6	20	95	53 - 134	98	62 - 131
Mercury	Hg	0	20	77	59 - 119	85	66 - 110
Molybdenum	Mo	PASS	20	-	-	-	-
Nickel	Ni	6.5	20	93	58 - 126	63	28 - 143
Phosphorus	PO4	7.8	20	97	60 - 120	103	60 - 120
Potassium	K	1.2	20	94	60 - 120	98	60 - 120
Selenium	Se	NC	20	-	-	-	-
Silver	Ag	NC	20	-	-	-	-
Sodium	Na	0	20	88	60 - 120	93	60 - 120
Strontium	Sr	1.8	20	90	60 - 120	-	-
Tellurium	Te	NC	20	-	-	-	-
Thallium	Tl	NC	20	-	-	-	-
Tin	Sn	NC	20	-	-	-	-
Titanium	Ti	0	20	-	-	-	-
Uranium	U	17.5	20	-	-	-	-
Vanadium	V	NC	20	99	50 - 150	67	50 - 150
Zinc	Zn	3	20	89	48 - 110	104	49 - 109
Zirconium	Zr	NC	20	-	-	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 58980)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	3
Batch Size	34

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 1, 2005

GROUP NUMBER: 60202011

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 61833)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 502020028	Duplicate Limits	Duplicate (R.P.D.) 502020044	Duplicate Limits
Aluminum	Al	< 0.5	0.2	0.6	20	1.8	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	PASS	20	PASS	20
Barium	Ba	< 0.1	0.001	2.3	20	2.6	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	5.4	20	8.3	20
Cadmium	Cd	< 0.02	0.0004	PASS	20	PASS	20
Calcium	Ca	< 1	0.3	3.1	20	4.9	20
Chromium	Cr	< 0.1	0.001	NC	20	PASS	20
Cobalt	Co	< 0.1	0.001	PASS	20	PASS	20
Copper	Cu	< 0.1	0.001	10.2	20	4.4	20
Iron	Fe	< 5	0.05	5.2	20	5.7	20
Lead	Pb	< 0.1	0.002	0	20	9.5	20
Magnesium	Mg	< 0.5	0.2	8.5	20	4.6	20
Manganese	Mn	< 0.1	0.01	5.7	20	6.8	20
Mercury	Hg	-	-	(*)	20	0	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	PASS	20
Nickel	Ni	< 0.1	0.003	0	20	11.1	20
Phosphorus	PO4	< 0.5	0.1	2.2	20	6.5	20
Potassium	K	< 1	0.3	7.7	20	2.8	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	NC	20	NC	20
Sodium	Na	< 1	0.5	1.7	20	0	20
Strontium	Sr	< 0.05	0.002	6.3	20	3.7	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	NC	20	NC	20
Titanium	Ti	< 0.3	0.01	0	20	9.1	20
Uranium	U	< 0.04	0.002	6	20	8	20
Vanadium	V	< 0.5	0.002	NC	20	PASS	20
Zinc	Zn	< 0.5	0.04	4.3	20	4.8	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.
(*) = Quality Control results exceeded internally set limits; after review by Quality Assurance Unit, non-conformance overridden and batch sample analysis results released for reporting

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 1, 2005

GROUP NUMBER: 60202011

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 61833)

Parameter		Duplicate (R.P.D.) 502020054	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	10.3	20	32	17 - 93	29	7 - 91
Antimony	Sb	NC	20	-	-	-	-
Arsenic	As	PASS	20	-	-	179	80 - 283
Barium	Ba	7.2	20	-	-	-	-
Beryllium	Be	NC	20	-	-	-	-
Boron	B	4.1	20	98	63 - 143	90	62 - 142
Cadmium	Cd	PASS	20	63	39 - 114	68	30 - 124
Calcium	Ca	1.7	20	79	60 - 120	83	60 - 120
Chromium	Cr	NC	20	-	-	40	28 - 97
Cobalt	Co	PASS	20	103	50 - 150	105	50 - 150
Copper	Cu	9	20	96	62 - 124	102	59 - 125
Iron	Fe	6.3	20	-	-	112	52 - 167
Lead	Pb	3.4	20	-	-	-	-
Magnesium	Mg	3.2	20	-	-	-	-
Manganese	Mn	4.3	20	82	53 - 134	81	62 - 131
Mercury	Hg	10.5	20	97	59 - 119	91	66 - 110
Molybdenum	Mo	PASS	20	-	-	-	-
Nickel	Ni	7.7	20	93	58 - 126	88	28 - 143
Phosphorus	PO4	1	20	84	60 - 120	89	60 - 120
Potassium	K	0.8	20	84	60 - 120	86	60 - 120
Selenium	Se	NC	20	-	-	-	-
Silver	Ag	PASS	20	-	-	-	-
Sodium	Na	5.7	20	89	60 - 120	81	60 - 120
Strontium	Sr	4.9	20	81	60 - 120	-	-
Tellurium	Te	NC	20	-	-	-	-
Thallium	Tl	NC	20	-	-	-	-
Tin	Sn	NC	20	-	-	-	-
Titanium	Ti	4.4	20	-	-	-	-
Uranium	U	6.8	20	-	-	-	-
Vanadium	V	PASS	20	88	50 - 150	50	50 - 150
Zinc	Zn	9.5	20	80	48 - 110	81	49 - 109
Zirconium	Zr	NC	20	-	-	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 1, 2005

GROUP NUMBER: 60202011

CANTEST

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 61833)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	3
Batch Size	33

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59556)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 411220163	Duplicate Limits	Duplicate (R.P.D.) 411220173	Duplicate Limits
Aluminum	Al	< 0.5	0.2	18.6	20	1.7	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	NC	20	PASS	20
Barium	Ba	< 0.1	0.001	6.1	20	2.3	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	10	20	10.2	20
Cadmium	Cd	< 0.02	0.0004	NC	20	9.7	20
Calcium	Ca	< 1	0.3	5.8	20	2.4	20
Chromium	Cr	< 0.1	0.001	PASS	20	PASS	20
Cobalt	Co	< 0.1	0.001	NC	20	PASS	20
Copper	Cu	< 0.1	0.001	0	20	8.7	20
Iron	Fe	< 5	0.05	8.3	20	12	20
Lead	Pb	< 0.1	0.002	NC	20	PASS	20
Magnesium	Mg	< 0.5	0.2	4.7	20	7.7	20
Manganese	Mn	< 0.1	0.01	5.9	20	0.9	20
Mercury	Hg	-	-	NC	20	NC	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	14.1	20
Nickel	Ni	< 0.1	0.003	0	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	10.7	20	4.6	20
Potassium	K	< 1	0.3	7.6	20	0.2	20
Selenium	Se	< 0.2	0.004	PASS	20	9.5	20
Silver	Ag	< 0.01	0.001	NC	20	NC	20
Sodium	Na	< 1	0.5	NC	20	6.1	20
Strontium	Sr	< 0.05	0.002	0.5	20	5.2	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	NC	20	PASS	20
Titanium	Ti	< 0.3	0.01	4.9	20	8.3	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	NC	20	NC	20
Zinc	Zn	< 0.5	0.04	4	20	2.6	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59556)

Parameter		Duplicate (R.P.D.) 411220183	Duplicate Limits	Duplicate (R.P.D.) 411220193	Duplicate Limits	Duplicate (R.P.D.) 411220203	Duplicate Limits
Aluminum	Al	7.2	20	6.1	20	2.6	20
Antimony	Sb	NC	20	NC	20	NC	20
Arsenic	As	NC	20	NC	20	PASS	20
Barium	Ba	14.9	20	9.2	20	3.1	20
Beryllium	Be	NC	20	NC	20	NC	20
Boron	B	PASS	20	PASS	20	0	20
Cadmium	Cd	11.9	20	NC	20	PASS	20
Calcium	Ca	9.1	20	7.9	20	11.8	20
Chromium	Cr	NC	20	NC	20	PASS	20
Cobalt	Co	PASS	20	NC	20	PASS	20
Copper	Cu	12.7	20	0	20	0	20
Iron	Fe	8.3	20	2.8	20	3.7	20
Lead	Pb	NC	20	NC	20	PASS	20
Magnesium	Mg	10.7	20	6.1	20	1	20
Manganese	Mn	4.2	20	7.4	20	2.8	20
Mercury	Hg	NC	20	NC	20	NC	20
Molybdenum	Mo	PASS	20	NC	20	8	20
Nickel	Ni	0	20	NC	20	PASS	20
Phosphorus	PO4	14.6	20	4	20	2.1	20
Potassium	K	11.6	20	8.7	20	5.7	20
Selenium	Se	NC	20	NC	20	NC	20
Silver	Ag	NC	20	NC	20	NC	20
Sodium	Na	PASS	20	18.2	20	5.1	20
Strontium	Sr	10.9	20	10.5	20	10	20
Tellurium	Te	NC	20	NC	20	NC	20
Thallium	Tl	NC	20	NC	20	NC	20
Tin	Sn	NC	20	NC	20	PASS	20
Titanium	Ti	PASS	20	PASS	20	4.9	20
Uranium	U	NC	20	NC	20	NC	20
Vanadium	V	NC	20	NC	20	NC	20
Zinc	Zn	2	20	9.5	20	0.4	20
Zirconium	Zr	NC	20	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59556)

Parameter		NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	34	17 - 93	35	7 - 91
Arsenic	As	-	-	268	80 - 283
Boron	B	106	63 - 143	99	62 - 142
Cadmium	Cd	91	39 - 114	99	30 - 124
Calcium	Ca	87	60 - 120	94	60 - 120
Chromium	Cr	-	-	55	28 - 97
Cobalt	Co	128	50 - 150	123	50 - 150
Copper	Cu	98	62 - 124	102	59 - 125
Iron	Fe	-	-	99	52 - 167
Manganese	Mn	90	53 - 134	96	62 - 131
Mercury	Hg	77	59 - 119	88	66 - 110
Nickel	Ni	89	58 - 126	94	28 - 143
Phosphorus	PO4	107	60 - 120	110	60 - 120
Potassium	K	93	60 - 120	98	60 - 120
Sodium	Na	99	60 - 120	106	60 - 120
Strontium	Sr	87	60 - 120	-	-
Vanadium	V	105	50 - 150	60	50 - 150
Zinc	Zn	84	48 - 110	78	49 - 109

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59557)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 411220209	Duplicate Limits	Duplicate (R.P.D.) 411220219	Duplicate Limits
Aluminum	Al	< 0.5	0.2	5	20	5.5	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	NC	20	NC	20
Barium	Ba	< 0.1	0.001	0	20	12.4	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	8.7	20	PASS	20
Cadmium	Cd	< 0.02	0.0004	PASS	20	14.9	20
Calcium	Ca	< 1	0.3	0.7	20	1	20
Chromium	Cr	< 0.1	0.001	0	20	NC	20
Cobalt	Co	< 0.1	0.001	NC	20	0	20
Copper	Cu	< 0.1	0.001	15.4	20	7.4	20
Iron	Fe	< 5	0.05	PASS	20	3.8	20
Lead	Pb	< 0.1	0.002	PASS	20	PASS	20
Magnesium	Mg	< 0.5	0.2	1.6	20	4.4	20
Manganese	Mn	< 0.1	0.01	8.8	20	1.1	20
Mercury	Hg	-	-	NC	20	NC	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	PASS	20
Nickel	Ni	< 0.1	0.003	0	20	5.7	20
Phosphorus	PO4	< 0.5	0.1	8.8	20	7.7	20
Potassium	K	< 1	0.3	4	20	4.9	20
Selenium	Se	< 0.2	0.004	NC	20	NC	20
Silver	Ag	< 0.01	0.001	0	20	0	20
Sodium	Na	< 1	0.5	7.4	20	13.3	20
Strontium	Sr	< 0.05	0.002	8.4	20	5.2	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	0	20	NC	20
Titanium	Ti	< 0.3	0.01	PASS	20	PASS	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	NC	20	NC	20
Zinc	Zn	< 0.5	0.04	1.7	20	1.4	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59557)

Parameter		Duplicate (R.P.D.) 411220229	Duplicate Limits	Duplicate (R.P.D.) 411220239	Duplicate Limits	NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits
Aluminum	Al	11.5	20	PASS	20	41	17 - 93
Antimony	Sb	NC	20	NC	20	-	-
Arsenic	As	NC	20	NC	20	-	-
Barium	Ba	4.4	20	4.3	20	-	-
Beryllium	Be	NC	20	NC	20	-	-
Boron	B	PASS	20	PASS	20	112	63 - 143
Cadmium	Cd	PASS	20	PASS	20	104	39 - 114
Calcium	Ca	3.2	20	8	20	88	60 - 120
Chromium	Cr	PASS	20	PASS	20	-	-
Cobalt	Co	NC	20	NC	20	97	50 - 150
Copper	Cu	3.1	20	3.4	20	98	62 - 124
Iron	Fe	0.7	20	PASS	20	-	-
Lead	Pb	NC	20	NC	20	-	-
Magnesium	Mg	7	20	7.8	20	-	-
Manganese	Mn	6.7	20	1.7	20	88	53 - 134
Mercury	Hg	NC	20	NC	20	77	59 - 119
Molybdenum	Mo	14.3	20	NC	20	-	-
Nickel	Ni	16.7	20	0	20	93	58 - 126
Phosphorus	PO4	0.7	20	0.4	20	96	60 - 120
Potassium	K	4	20	8.1	20	92	60 - 120
Selenium	Se	NC	20	NC	20	-	-
Silver	Ag	NC	20	NC	20	-	-
Sodium	Na	0	20	0	20	103	60 - 120
Strontium	Sr	5.3	20	1.3	20	90	60 - 120
Tellurium	Te	NC	20	NC	20	-	-
Thallium	Tl	NC	20	NC	20	-	-
Tin	Sn	NC	20	NC	20	-	-
Titanium	Ti	PASS	20	PASS	20	-	-
Uranium	U	NC	20	NC	20	-	-
Vanadium	V	NC	20	NC	20	86	50 - 150
Zinc	Zn	4.2	20	1.6	20	89	48 - 110
Zirconium	Zr	NC	20	NC	20	-	-

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: December 21, 2004

GROUP NUMBER: 51122042

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 59557)

Parameter		NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	42	7 - 91
Arsenic	As	112	80 - 283
Boron	B	141	62 - 142
Cadmium	Cd	118	30 - 124
Calcium	Ca	96	60 - 120
Chromium	Cr	44	28 - 97
Cobalt	Co	124	50 - 150
Copper	Cu	106	59 - 125
Iron	Fe	99	52 - 167
Manganese	Mn	91	62 - 131
Mercury	Hg	79	66 - 110
Nickel	Ni	126	28 - 143
Phosphorus	PO4	111	60 - 120
Potassium	K	99	60 - 120
Sodium	Na	120	60 - 120
Vanadium	V	52	50 - 150
Zinc	Zn	104	49 - 109

ug/g = micrograms per gram, dry basis

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 59556)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	5

Metals Plant Tissue Digestion (Batch# 59557)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4

Metals Plant Tissue Digestion (Batch# 59556)

QC Type	No. Samples
Batch Size	46

Metals Plant Tissue Digestion (Batch# 59557)

QC Type	No. Samples
Batch Size	46

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902062

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 409020295	Duplicate Limits	Duplicate (R.P.D.) 409020308	Duplicate Limits
Aluminum	Al	< 0.5	0.2	3.8	20	6.9	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	0	20	PASS	20
Barium	Ba	< 0.1	0.001	10.4	20	12.5	20
Beryllium	Be	< 0.02	0.001	PASS	20	NC	20
Boron	B	< 2	0.02	5.4	20	NC	20
Cadmium	Cd	< 0.02	0.0004	4.7	20	0	20
Calcium	Ca	< 1	0.3	3	20	5.1	20
Chromium	Cr	< 0.1	0.001	0	20	NC	20
Cobalt	Co	< 0.1	0.001	0	20	NC	20
Copper	Cu	< 0.1	0.001	11	20	5.5	20
Iron	Fe	< 5	0.05	2	20	5.4	20
Lead	Pb	< 0.1	0.002	4.3	20	0	20
Magnesium	Mg	< 0.5	0.2	1.4	20	2.5	20
Manganese	Mn	< 0.1	0.01	2.5	20	12.5	20
Mercury	Hg	-	-	NC	20	0	20
Molybdenum	Mo	< 0.1	0.002	0	20	PASS	20
Nickel	Ni	< 0.1	0.003	5.8	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	1.2	20	4.5	20
Potassium	K	< 1	0.3	3	20	1.1	20
Selenium	Se	< 0.2	0.004	PASS	20	4.9	20
Silver	Ag	< 0.01	0.001	PASS	20	7	20
Sodium	Na	< 1	0.5	14.4	20	NC	20
Strontium	Sr	< 0.05	0.002	4.8	20	6.9	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	PASS	20	NC	20
Tin	Sn	< 0.1	0.01	PASS	20	NC	20
Titanium	Ti	< 0.3	0.01	4.9	20	11.1	20
Uranium	U	< 0.04	0.002	7.2	20	NC	20
Vanadium	V	< 0.5	0.002	PASS	20	NC	20
Zinc	Zn	< 0.5	0.04	3.3	20	2	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902062

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	45	17 - 93	41	7 - 91
Arsenic	As	-	-	179	80 - 283
Boron	B	125	63 - 143	102	62 - 142
Cadmium	Cd	92	39 - 114	92	30 - 124
Calcium	Ca	103	60 - 120	88	60 - 120
Chromium	Cr	-	-	55	28 - 97
Cobalt	Co	103	50 - 150	105	50 - 150
Copper	Cu	102	62 - 124	91	59 - 125
Iron	Fe	-	-	90	52 - 167
Manganese	Mn	106	53 - 134	98	62 - 131
Mercury	Hg	83	59 - 119	91	66 - 110
Nickel	Ni	93	58 - 126	75	28 - 143
Phosphorus	PO4	98	60 - 120	106	60 - 120
Potassium	K	89	60 - 120	90	60 - 120
Sodium	Na	96	60 - 120	90	60 - 120
Strontium	Sr	99	60 - 120	-	-
Vanadium	V	88	50 - 150	60	50 - 150
Zinc	Zn	94	48 - 110	86	49 - 109

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902062

CANTEST

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 57048)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4
Batch Size	32

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902059

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 409020295	Duplicate Limits	Duplicate (R.P.D.) 409020308	Duplicate Limits
Aluminum	Al	< 0.5	0.2	3.8	20	6.9	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	0	20	PASS	20
Barium	Ba	< 0.1	0.001	10.4	20	12.5	20
Beryllium	Be	< 0.02	0.001	PASS	20	NC	20
Boron	B	< 2	0.02	5.4	20	NC	20
Cadmium	Cd	< 0.02	0.0004	4.7	20	0	20
Calcium	Ca	< 1	0.3	3	20	5.1	20
Chromium	Cr	< 0.1	0.001	0	20	NC	20
Cobalt	Co	< 0.1	0.001	0	20	NC	20
Copper	Cu	< 0.1	0.001	11	20	5.5	20
Iron	Fe	< 5	0.05	2	20	5.4	20
Lead	Pb	< 0.1	0.002	4.3	20	0	20
Magnesium	Mg	< 0.5	0.2	1.4	20	2.5	20
Manganese	Mn	< 0.1	0.01	2.5	20	12.5	20
Mercury	Hg	-	-	NC	20	0	20
Molybdenum	Mo	< 0.1	0.002	0	20	PASS	20
Nickel	Ni	< 0.1	0.003	5.8	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	1.2	20	4.5	20
Potassium	K	< 1	0.3	3	20	1.1	20
Selenium	Se	< 0.2	0.004	PASS	20	4.9	20
Silver	Ag	< 0.01	0.001	PASS	20	7	20
Sodium	Na	< 1	0.5	14.4	20	NC	20
Strontium	Sr	< 0.05	0.002	4.8	20	6.9	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	PASS	20	NC	20
Tin	Sn	< 0.1	0.01	PASS	20	NC	20
Titanium	Ti	< 0.3	0.01	4.9	20	11.1	20
Uranium	U	< 0.04	0.002	7.2	20	NC	20
Vanadium	V	< 0.5	0.002	PASS	20	NC	20
Zinc	Zn	< 0.5	0.04	3.3	20	2	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902059

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	45	17 - 93	41	7 - 91
Arsenic	As	-	-	179	80 - 283
Boron	B	125	63 - 143	102	62 - 142
Cadmium	Cd	92	39 - 114	92	30 - 124
Calcium	Ca	103	60 - 120	88	60 - 120
Chromium	Cr	-	-	55	28 - 97
Cobalt	Co	103	50 - 150	105	50 - 150
Copper	Cu	102	62 - 124	91	59 - 125
Iron	Fe	-	-	90	52 - 167
Manganese	Mn	106	53 - 134	98	62 - 131
Mercury	Hg	83	59 - 119	91	66 - 110
Nickel	Ni	93	58 - 126	75	28 - 143
Phosphorus	PO4	98	60 - 120	106	60 - 120
Potassium	K	89	60 - 120	90	60 - 120
Sodium	Na	96	60 - 120	90	60 - 120
Strontium	Sr	99	60 - 120	-	-
Vanadium	V	88	50 - 150	60	50 - 150
Zinc	Zn	94	48 - 110	86	49 - 109

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902059

CANTEST

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 57048)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4
Batch Size	32

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902056

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 409020283	Duplicate Limits	Duplicate (R.P.D.) 409280038	Duplicate Limits
Aluminum	Al	< 0.1	0.2	14.3	20	-	-
Antimony	Sb	< 0.02	0.001	NC	20	-	-
Arsenic	As	< 0.02	0.002	NC	20	-	-
Barium	Ba	< 0.02	0.001	14.9	20	-	-
Beryllium	Be	< 0.004	0.001	NC	20	-	-
Boron	B	< 0.4	0.02	PASS	20	-	-
Cadmium	Cd	< 0.004	0.0004	PASS	20	-	-
Calcium	Ca	< 0.2	0.3	6.4	20	-	-
Chromium	Cr	< 0.02	0.001	NC	20	-	-
Cobalt	Co	< 0.02	0.001	NC	20	-	-
Copper	Cu	< 0.02	0.001	16.3	20	-	-
Iron	Fe	< 1	0.05	PASS	20	-	-
Lead	Pb	< 0.02	0.002	PASS	20	-	-
Magnesium	Mg	< 0.1	0.2	9.5	20	-	-
Manganese	Mn	< 0.02	0.01	9.5	20	-	-
Mercury	Hg	-	-	NC	20	2.9	20
Molybdenum	Mo	< 0.02	0.002	NC	20	-	-
Nickel	Ni	< 0.02	0.003	NC	20	-	-
Phosphorus	PO4	0.1	0.1	10.9	20	-	-
Potassium	K	< 0.2	0.3	14	20	-	-
Selenium	Se	< 0.04	0.004	NC	20	-	-
Silver	Ag	< 0.002	0.001	NC	20	-	-
Sodium	Na	< 0.2	0.5	7.8	20	-	-
Strontium	Sr	< 0.01	0.002	11.2	20	-	-
Tellurium	Te	< 0.02	0.002	NC	20	-	-
Thallium	Tl	< 0.004	0.002	NC	20	-	-
Tin	Sn	< 0.02	0.01	12.8	20	-	-
Titanium	Ti	< 0.06	0.01	PASS	20	-	-
Uranium	U	< 0.008	0.002	NC	20	-	-
Vanadium	V	< 0.02	0.002	PASS	20	-	-
Zinc	Zn	< 0.1	0.04	10.3	20	-	-
Zirconium	Zr	< 0.6	0.04	NC	20	-	-

ug/g = micrograms/gram as received
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: October 25, 2004

GROUP NUMBER: 50902056

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 57048)

Parameter		NIST1570a Spinach Leaves (% Recovery)	NIST1570a Spinach Leaves Limits	NIST1573a Tomato Leaves (% Recovery)	NIST1573a Tomato Leaves Limits
Aluminum	Al	45	17 - 93	41	7 - 91
Arsenic	As	-	-	188	80 - 283
Boron	B	124	63 - 143	103	62 - 142
Cadmium	Cd	92	39 - 114	92	30 - 124
Calcium	Ca	103	60 - 120	88	60 - 120
Chromium	Cr	-	-	56	28 - 97
Cobalt	Co	97	50 - 150	98	50 - 150
Copper	Cu	102	62 - 124	92	59 - 125
Iron	Fe	-	-	90	52 - 167
Manganese	Mn	106	53 - 134	98	62 - 131
Mercury	Hg	83	59 - 119	91	66 - 110
Nickel	Ni	94	58 - 126	76	28 - 143
Phosphorus	PO4	98	60 - 120	106	60 - 120
Potassium	K	89	60 - 120	90	60 - 120
Sodium	Na	96	60 - 120	90	60 - 120
Strontium	Sr	99	60 - 120	-	-
Vanadium	V	95	50 - 150	56	50 - 150
Zinc	Zn	94	48 - 110	86	49 - 109

ug/g = micrograms/gram as received

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 57048)

QC Type	No. Samples
NIST1570a Spinach Leaves	1
NIST1573a Tomato Leaves	1
Blank	2
Duplicate	4
Batch Size	32

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 10, 2005

GROUP NUMBER: 60111009

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 61078)

Parameter		Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 501110223	Duplicate Limits	Duplicate (R.P.D.) 501110228	Duplicate Limits
Aluminum	Al	< 0.5	0.2	10.5	20	1.8	20
Antimony	Sb	< 0.1	0.001	NC	20	NC	20
Arsenic	As	< 0.1	0.002	NC	20	NC	20
Barium	Ba	< 0.1	0.001	3.7	20	9.5	20
Beryllium	Be	< 0.02	0.001	NC	20	NC	20
Boron	B	< 2	0.02	NC	20	NC	20
Cadmium	Cd	< 0.02	0.0004	10.5	20	PASS	20
Calcium	Ca	< 1	0.3	3.5	20	2.8	20
Chromium	Cr	< 0.1	0.001	15.4	20	13.3	20
Cobalt	Co	< 0.1	0.001	NC	20	NC	20
Copper	Cu	< 0.1	0.001	1.7	20	3.7	20
Iron	Fe	< 5	0.05	11.2	20	7.8	20
Lead	Pb	< 0.1	0.002	PASS	20	PASS	20
Magnesium	Mg	< 0.5	0.2	16.4	20	18.2	20
Manganese	Mn	< 0.1	0.01	4.9	20	6.9	20
Mercury	Hg	-	-	0.5	20	NC	20
Molybdenum	Mo	< 0.1	0.002	PASS	20	NC	20
Nickel	Ni	< 0.1	0.003	0	20	PASS	20
Phosphorus	PO4	< 0.5	0.1	13.8	20	1.2	20
Potassium	K	< 1	0.3	5.7	20	0.8	20
Selenium	Se	< 0.2	0.004	8.7	20	PASS	20
Silver	Ag	< 0.01	0.001	NC	20	NC	20
Sodium	Na	< 1	0.5	5.8	20	18.2	20
Strontium	Sr	< 0.05	0.002	3.5	20	5.9	20
Tellurium	Te	< 0.1	0.002	NC	20	NC	20
Thallium	Tl	< 0.02	0.002	NC	20	NC	20
Tin	Sn	< 0.1	0.01	0	20	PASS	20
Titanium	Ti	< 0.3	0.01	9.7	20	10.1	20
Uranium	U	< 0.04	0.002	NC	20	NC	20
Vanadium	V	< 0.5	0.002	NC	20	NC	20
Zinc	Zn	< 0.5	0.04	2.4	20	3.3	20
Zirconium	Zr	< 3	0.04	NC	20	NC	20

ug/g = micrograms per gram, dry basis
R.P.D. = Relative Percent Difference
PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.
NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 10, 2005

GROUP NUMBER: 60111009

CANTEST

Batch Quality Control for Dissolved Metals Analysis in Tissue (QC# 61078)

Parameter		NRC TORT-2, "Lobster Tissue" (% Recovery)	NRC TORT-2, "Lobster Tissue" Limits
Arsenic	As	85	66 - 113
Cadmium	Cd	99	63 - 118
Chromium	Cr	65	60 - 120
Cobalt	Co	98	60 - 120
Copper	Cu	86	60 - 120
Iron	Fe	80	60 - 120
Lead	Pb	114	39 - 150
Manganese	Mn	83	60 - 120
Mercury	Hg	100	85 - 115
Molybdenum	Mo	95	60 - 120
Nickel	Ni	88	50 - 122
Selenium	Se	87	67 - 118
Strontium	Sr	86	60 - 120
Vanadium	V	110	60 - 120
Zinc	Zn	80	53 - 125

ug/g = micrograms per gram, dry basis

REPORTED TO: Gartner Lee Ltd.

REPORT DATE: March 10, 2005

GROUP NUMBER: 60111009

CANTEST

Batch Quality Control Frequency Summary

Metals Plant Tissue Digestion (Batch# 61078)

QC Type	No. Samples
Batch Size	39

Table E1. Calculation of Relative Percent Difference (RPD) between Soil Duplicates at CanTest Laboratories

Duplicates	pH	Aluminum Al	Antimony Sb	Arsenic As	Barium Ba	Beryllium Be	Boron B	Cadmium Cd	Calcium Ca	Chromium Cr	Cobalt Co
Detection Limit (CanTest)		**10**	**10**	**0.1**	**1**	**1**	**1**	**0.5**	**1**	**2**	**1**
1_F	7.2	3120	< 10	2.2	704	< 1	15	2.1	31200	10	4
401_F	7.3	3270	< 10	2.2	792	< 1	18	2	33200	10	3
RPD (%)	-1.4	-4.8	*	0.0	-12.5	*	-20	*	-6.4	*	*
15_LF	4.5	323	< 10	0.6	108	< 1	4	2.1	5990	< 2	< 1
415_F	4.6	312	< 10	0.6	96	< 1	3	1.3	5060	< 2	< 1
RPD (%)	-2.2	3.4	*	0.0	11.1	*	*	*	15.5	*	*
15_F/SUB	4.7	1240	< 10	0.8	184	< 1	3	5.5	9890	< 2	< 1
415_F/H	4.8	1100	< 10	0.8	163	< 1	3	5.1	8750	< 2	1
RPD (%)	-2.1	11.3	*	0.0	11.4	*	*	7.3	11.5	*	*
18_B	5.2	15300	< 10	17.8	78	< 1	< 1	0.7	1270	21	15
418_B	5.6	16500	< 10	17	66	< 1	< 1	0.7	1340	22	12
RPD (%)	-7.7	-7.8	*	4.5	15.4	*	*	*	-5.5	-4.8	20.0
30_F/H	7.1	4590	< 10	5.1	165	< 1	17	0.6	52100	2	7
430_F/H	7.5	2380	< 10	2.2	124	< 1	18	1.5	44700	2	2
RPD (%)	-5.6	48.1	*	56.9	24.8	*	-5.9	*	14.2	*	*
30_F	7	1450	< 10	1.2	84	< 1	28	< 0.5	29900	< 2	< 1
430_F	7	1360	< 10	1	77	< 1	25	< 0.5	29300	< 2	< 1
RPD (%)	0.0	6.2	*	16.7	8.3	*	10.7	*	2.0	*	*
54_LF	5.7	1220	< 10	16.8	380	< 1	7	1.1	19700	3	3
454_F	5.7	1520	< 10	24.1	318	< 1	7	1.3	18800	4	4
RPD (%)	0.0	-24.6	*	-43.5	16.3	*	0.0	*	4.6	*	*
61_B	6.4	37100	< 10	6.6	262	< 1	< 1	< 0.5	7750	54	18
461_B	6.3	38400	< 10	6.5	270	< 1	< 1	< 0.5	7880	56	19
RPD (%)	1.6	-3.5	*	1.5	-3.1	*	*	*	-1.7	-3.7	-5.6
Total Average	**-2**	**4**	*****	**5**	**9**	*****	**-4**	*****	**4**	*****	*****

** values below 5 x detection*

Table E1. Calculation of F

Duplicates	pH	Copper Cu	Iron Fe	Lead Pb	Magnesium Mg	Manganese Mn	Mercury Hg	Molybdenum Mo	Nickel Ni	Phosphorus PO4
Detection Limit (CanTest)		**1**	**2**	**5**	**0.1**	**1**	**0.01**	**4**	**2**	**20**
1_F	7.2	22	5590	51	5170	1920	0.1	< 4	18	1680
401_F	7.3	22	5050	45	4850	1990	0.1	< 4	18	1680
RPD (%)	-1.4	0.0	9.7	11.8	6.2	-3.6	*	*	0.0	0.0
15_LF	4.5	7	716	17	789	548	0.17	< 4	< 2	778
415_F	4.6	6	659	18	814	567	0.18	< 4	< 2	708
RPD (%)	-2.2	14.3	8.0	*	-3.2	-3.5	-5.9	*	*	9.0
15_F/SUB	4.7	12	1560	< 5	1270	69	0.11	< 4	7	656
415_F/H	4.8	11	1360	< 5	1170	60	0.13	< 4	7	617
RPD (%)	-2.1	8.3	12.8	*	7.9	13.0	-18.2	*	*	5.9
18_B	5.2	38	31500	61	6480	711	0.04	< 4	19	447
418_B	5.6	43	32500	60	6910	649	0.02	< 4	20	458
RPD (%)	-7.7	-13.2	-3.2	1.6	-6.6	8.7	*	*	-5.3	-2.5
30_F/H	7.1	34	4500	< 5	4410	1610	0.06	< 4	7	1020
430_F/H	7.5	32	2460	< 5	3860	641	0.05	< 4	8	732
RPD (%)	-5.6	5.9	45.3	*	12.5	60.2	*	*	*	28.2
30_F	7	14	757	< 5	3590	137	0.08	< 4	3	611
430_F	7	13	705	< 5	3460	110	0.08	< 4	3	563
RPD (%)	0.0	7.1	6.9	*	3.6	19.7	*	*	*	7.9
54_LF	5.7	49	7820	404	1850	170	1.34	< 4	4	740
454_F	5.7	65	10400	534	1870	173	1.81	< 4	6	774
RPD (%)	0.0	-32.7	-33.0	-32.2	-1.1	-1.8	-35.1	*	*	-4.6
61_B	6.4	28	31400	34	14300	420	0.02	< 4	42	260
461_B	6.3	28	31600	36	14600	479	0.02	< 4	44	271
RPD (%)	1.6	0.0	-0.6	-5.9	-2.1	-14.0	*	*	-4.8	-4.2
Total Average	**-2**	**-1**	**6**	**-6**	**2**	**10**	**-20**	*****	*****	**5**

** values below 5 x detection*

Table E1. Calculation of F

Duplicates	pH	Potassium K	Selenium Se	Silver Ag	Sodium Na	Strontium Sr	Tin Sn	Titanium Ti	Vanadium V	Zinc Zn	Zirconium Zr
Detection Limit (CanTest)		**10**	**0.2**	**2**	**5**	**1**	**5**	**1**	**1**	**1**	**1**
1_F	7.2	955	0.4	< 2	87	143	< 5	98	8	323	1
401_F	7.3	983	0.6	< 2	105	148	< 5	87	8	334	1
RPD (%)	-1.4	-2.9	*	*	-20.7	-3.5	*	11.2	0.0	-3.4	*
15_LF	4.5	1300	< 0.2	< 2	< 5	24	< 5	16	1	121	< 1
415_F	4.6	982	0.3	< 2	< 5	21	< 5	14	1	103	< 1
RPD (%)	-2.2	24.5	*	*	*	12.5	*	12.5	*	14.9	*
15_F/SUB	4.7	1110	0.4	< 2	12	62	< 5	13	2	70	< 1
415_F/H	4.8	1100	0.6	< 2	11	55	< 5	16	2	63	< 1
RPD (%)	-2.1	0.9	*	*	*	11.3	*	-23.1	*	10.0	*
18_B	5.2	304	< 0.2	< 2	71	10	< 5	92	18	253	3
418_B	5.6	372	< 0.2	< 2	84	11	< 5	121	19	286	3
RPD (%)	-7.7	-22.4	*	*	-18.3	-10.0	*	-31.5	-5.6	-13.0	*
30_F/H	7.1	301	1.2	< 2	73	170	< 5	60	5	57	2
430_F/H	7.5	398	0.7	< 2	83	133	< 5	59	5	109	1
RPD (%)	-5.6	-32.2	*	*	-13.7	21.8	*	1.7	*	-91.2	*
30_F	7	1050	0.5	< 2	44	118	< 5	9	3	104	< 1
430_F	7	778	0.6	< 2	69	110	< 5	9	2	90	< 1
RPD (%)	0.0	25.9	*	*	-56.8	6.8	*	0.0	33.3	13.5	*
54_LF	5.7	1200	0.6	< 2	36	107	< 5	43	3	352	2
454_F	5.7	1180	0.7	2	233	103	< 5	53	4	466	3
RPD (%)	0.0	1.7	*	*	-547.2	3.7	*	-23.3	*	-32.4	*
61_B	6.4	3270	0.3	< 2	1020	53	< 5	743	51	116	4
461_B	6.3	3450	0.3	< 2	1050	56	< 5	750	52	118	4
RPD (%)	1.6	-5.5	*	*	-2.9	-5.7	*	-0.9	-2.0	-1.7	*
Total Average	**-2**	**-1**	*****	*****	**-110**	**5**	*****	**-7**	**6**	**-13**	*****

** values below 5 x detection*

Table E2. Calculation of Relative Percent Difference (RPD) between Preparation Blanks and Detection Limits at Elemental Research Inc.

Batch	Blanks	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel
	ERI Preparation Blank	<0.5	<0.01	<0.01	0.04	<0.01	0.7	<0.01	1	<0.2	<0.01	0.13	<0.5	<0.01	0.4	<0.01	<0.05	<0.02	<0.05
K784, K785	ERI Detection Limit	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.01	<1	<0.2	<0.01	<0.05	<0.5	<0.01	<0.1	<0.01	<0.05	<0.01	<0.05
& K787	**RPD (%)**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**
	ERI Preparation Blank	<0.5	<0.01	<0.01	0.10	<0.01	<0.5	<0.01	3	<0.2	<0.05	<0.05	<0.5	<0.01	1.8	<0.1	<0.05	<0.01	<0.01
K786, K787	ERI Detection Limit	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.01	<1	<0.2	<0.01	<0.05	<0.5	<0.01	<0.1	<0.01	<0.05	<0.01	<0.05
& K826	**RPD (%)**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**
	ERI Preparation Blank	<0.5	<0.01	0.05	<0.01	<0.01	0.7	<0.01	3	<0.9	<0.01	0.08	<0.5	<0.01	0.3	<0.01	<0.05	<0.01	<0.05
	ERI Detection Limit	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.01	<1	<0.2	<0.01	<0.05	<0.5	<0.01	<0.1	<0.01	<0.05	<0.01	<0.05
K845	**RPD (%)**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**	**pass**

Table E2. Calculation of Rela

Batch	Blanks	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc	Zirconium
	ERI Preparation Blank	-	-	<0.1	-	0.014	-	<0.01	-	<0.01	<0.01	-	<0.005	<0.05	<0.1	-
K784, K785	ERI Detection Limit	-	-	<0.1	-	<0.005	-	<0.01	-	<0.01	<0.01	-	<0.005	<0.05	<0.1	-
& K787	**RPD (%)**	-	-	**pass**	-	**pass**	-	**pass**	-	**pass**	**pass**	-	**pass**	**pass**	**pass**	-
	ERI Preparation Blank	-	-	<0.1	-	0.083	-	0.03	-	<0.01	<0.01	-	<0.005	<0.05	<0.1	-
K786, K787	ERI Detection Limit	-	-	<0.1		<0.005		<0.01		<0.01	<0.01		<0.005	<0.05	<0.1	
& K826	**RPD (%)**	-	-	**pass**	-	**pass**	-	**pass**	-	**pass**	**pass**	-	**pass**	**pass**	**pass**	-
	ERI Preparation Blank	-	-	0.1	-	<0.005	-	<0.01	-	<0.01	<0.01	-	<0.005	<0.2	0.3	-
	ERI Detection Limit	-	-	<0.1		<0.005		<0.01		<0.01	<0.01		<0.005	<0.05	<0.1	
K845	**RPD (%)**	-	-	**pass**	-	**pass**	-	**pass**	-	**pass**	**pass**	-	**pass**	**pass**	**pass**	-

Table E3. Calculation of Percent Recovery from Certified Standard Materials at Elemental Research Inc. and CanTest Laboratories

Batch	Standards	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
	Detection limit	**0.5**	**0.01**	**0.01**	**0.01**	**0.01**	**0.5**	**0.01**	**1**	**0.2**	**0.01**	**0.05**	**0.5**	**0.01**	**0.1**
Certified values	**Fish Liver**			**10**				**2.2**		**0.9**		**18**	**320**	**7**	
Certified values	**Fish muscle**	**8.4**		**117**				**0.034**		**6.5**		**3.2**	**42**	**0.4**	
Certified values	**CRM DOLT-2**	**25.2**		**16.6**				**20.8**		**0.4**	**0.24**	**25.8**	**1103**	**0.22**	
K784, K785 & K787	CRM DOLT-2	22.5	<0.01	14.3	0.56	<0.01	1.0	15.6	526	0.4	0.19	23.8	987	0.20	688
	% Recovery	89		86				75			79	92	89	91	
K786, K787 & K826	CRM DOLT-2	22.5	<0.01	12.0	0.72	<0.01	0.5	19.5	617	0.3	0.09	25.7	938	0.21	633
	% Recovery	89		72				94				100	85	95	
K784, K785 & K787	SRM GL-001 Liver	3.2	0.04	8.64	14.3	<0.01	2.0	1.70	226	0.6	0.28	15.2	266	4.56	474
	% Recovery			86				77				84	83	65	
K786, K787 & K826	SRM GL-001 Liver	4.4	0.04	8.66	11.7	0.01	1.7	1.82	358	0.3	<0.05	16.3	311	4.95	458
	% Recovery			87				83				91	97	71	
K784, K785 & K787	SRM GL-002 Muscle	4.6	0.38	97.7	0.39	<0.01	2.5	0.03	1370	2.5	0.04	2.63	32.4	0.38	1040
	% Recovery			84						38		82	77	95	
K786, K787 & K826	SRM GL-002 Muscle	4.6	0.26	122	0.19	<0.01	2.4	0.02	1620	2.0	1.10	2.77	80.5	0.35	824
	% Recovery			104								87	192	88	
K845	SRM GL-003 Liver	2.5	0.04	10.2	10.3	<0.01	0.9	1.69	213	<0.2	0.40	14.2	257	4.87	430
	% Recovery			102				77				79	80	70	
K845	SRM GL-003 Liver dup	3.7	0.04	10.1	9.37	<0.01	0.8	1.70	233	<0.2	0.49	14.8	241	5.56	431
	% Recovery			101				77				82	75	79	
K845	SRM GL-003 Liver trp.	3.4	0.04	10.4	8.03	<0.01	0.6	1.75	224	<0.2	0.48	14.7	236	4.57	434
	% Recovery			104				80				82	74	65	
K845	SRM GL-003 Liver run dup.	3.5	0.04	10.0	10.1	<0.01	0.7	1.71	212	<0.2	0.39	14.2	251	4.85	429
	% Recovery			100				78				79	78	69	
K845	SRM GL-004 Muscle	4.5	0.23	124	<0.01	<0.01	1.3	0.04	946	3.1	0.04	2.77	27.4	0.42	840
	% Recovery			106						48		87	65	105	
K845	SRM GL-004 Muscle dup	4.3	0.26	127	<0.01	<0.01	1.3	0.04	1090	2.8	0.04	2.69	27.6	0.32	863
	% Recovery			109						43		84	66	80	
K845	SRM GL-004 Muscle trp	4.7	0.31	126	<0.01	<0.01	1.3	0.04	1150	3.9	0.03	2.72	25.4	0.33	852
	% Recovery			108						60		85	60	83	

Table E3. Calculation of Percent Recovery from Cer

Batch	Standards	Manganese	Mercury	Molybdenum	Nickel	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium
	Detection limit	**0.01**	**0.05**	**0.01**	**0.05**	**-**	**-**	**0.1**	**-**	**0.005**	**-**	**0.01**	**-**
Certified values	**Fish Liver**	**5.8**	**0.4**		**0.4**			**4.3**					
Certified values	**Fish muscle**		**0.3**		**3.4**			**5.1**		**0.45**			
Certified values	**CRM DOLT-2**	**6.88**	**2.14**		**0.20**			**6.1**					
K784, K785 & K787	CRM DOLT-2	5.57	2.00	0.80	0.17	-	-	6.4		0.650	-	3.89	-
	% Recovery	81	93					106					
K786, K787 & K826	CRM DOLT-2	5.64	2.23	0.87	0.18	-	-	6.2		0.603	-	4.54	-
	% Recovery	82	104					102					
K784, K785 & K787	SRM GL-001 Liver	4.62	0.38	0.55	0.25	-	-	4.1		1.36	-	9.02	-
	% Recovery	80						95					
K786, K787 & K826	SRM GL-001 Liver	5.77	0.35	0.53	0.22	-	-	4.3		1.11	-	11.4	-
	% Recovery	99						100					
K784, K785 & K787	SRM GL-002 Muscle	0.80	0.25	0.04	1.54	-	-	5.6		0.376	-	9.27	-
	% Recovery				45			110		84			
K786, K787 & K826	SRM GL-002 Muscle	0.66	0.31	0.06	0.03	-	-	6.1		0.324	-	11.1	-
	% Recovery							120		72			
K845	SRM GL-003 Liver	4.07	0.34	0.50	0.25	-	-	3.4		1.50	-	8.39	-
	% Recovery	70						79					
K845	SRM GL-003 Liver dup	4.23	0.38	0.52	0.19	-	-	3.9		1.29	-	8.11	-
	% Recovery	73						91					
K845	SRM GL-003 Liver trp.	4.33	0.37	0.48	0.19	-	-	3.8		1.50	-	8.18	-
	% Recovery	75						88					
K845	SRM GL-003 Liver run dup.	4.07	0.33	0.49	0.21	-	-	3.8		1.50	-	8.37	-
	% Recovery	70						88					
K845	SRM GL-004 Muscle	0.78	0.28	0.06	2.14	-	-	5.4		0.350	-	7.31	-
	% Recovery				63			106		78			
K845	SRM GL-004 Muscle dup	0.84	0.29	0.06	1.80	-	-	6.8		0.311	-	8.70	-
	% Recovery				53			133		69			
K845	SRM GL-004 Muscle trp	0.79	0.28	0.05	1.80	-	-	7.2		0.314	-	8.84	-
	% Recovery				53			141		70			

Table E3. Calculation of Percent Recovery from Cer

Batch	Standards	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc	Zirconium
	Detection limit	**0.01**	**0.01**	**-**	**0.005**	**0.05**	**0.1**	**-**
Certified values	**Fish Liver**						**58**	
Certified values	**Fish muscle**						**22**	
Certified values	**CRM DOLT-2**		**0.13**				**85.8**	
K784, K785 & K787	CRM DOLT-2	<0.01	0.13	-	0.044	0.35	63.5	-
	% Recovery		100				74	
K786, K787 & K826	CRM DOLT-2	<0.01	0.13	-	0.037	0.36	78.9	-
	% Recovery		100				92	
K784, K785 & K787	SRM GL-001 Liver	<0.01	0.33	-	0.060	0.20	47.7	-
	% Recovery						82	
K786, K787 & K826	SRM GL-001 Liver	<0.01	0.32	-	0.048	0.10	51.9	-
	% Recovery						89	
K784, K785 & K787	SRM GL-002 Muscle	<0.01	0.03	-	<0.005	0.27	18.7	-
	% Recovery						85	
K786, K787 & K826	SRM GL-002 Muscle	<0.01	0.05	-	<0.005	0.31	20.7	-
	% Recovery						94	
K845	SRM GL-003 Liver	<0.01	0.31	-	0.040	0.38	45.9	-
	% Recovery						79	
K845	SRM GL-003 Liver dup	<0.01	0.36	-	0.041	0.52	47.9	-
	% Recovery						83	
K845	SRM GL-003 Liver trp.	<0.01	0.40	-	0.037	0.41	47.7	-
	% Recovery						82	
K845	SRM GL-003 Liver run dup.	<0.01	0.32	-	0.039	0.34	45.9	-
	% Recovery						79	
K845	SRM GL-004 Muscle	<0.01	0.19	-	<0.005	0.63	17.0	-
	% Recovery						77	
K845	SRM GL-004 Muscle dup	<0.01	0.07	-	<0.005	1.06	17.8	-
	% Recovery						81	
K845	SRM GL-004 Muscle trp	<0.01	0.07	-	<0.005	0.66	17.4	-
	% Recovery						79	

Table E3. Calculation of Percent Recovery from Certified Standard Materials at Elemental Research Inc. and CanTest Laboratories

Batch	Standards	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium
	Detection limit	**0.5**	**0.01**	**0.01**	**0.01**	**0.01**	**0.5**	**0.01**	**1**	**0.2**	**0.01**	**0.05**	**0.5**	**0.01**	**0.1**
Certified values	**Fish Liver**			**10**				**2.2**		**0.9**		**18**	**320**	**7**	
Certified values	**Fish muscle**	**8.4**		**117**				**0.034**		**6.5**		**3.2**	**42**	**0.4**	
Certified values	**CRM DOLT-2**	**25.2**		**16.6**				**20.8**		**0.4**	**0.24**	**25.8**	**1103**	**0.22**	
r60111009	GL-REF 1 (liver)	4.9	< 0.1	9.7	11	< 0.02	< 2	2.08	282	0.5	0.5	17.6	287	6.6	592
	% Recovery			97				95				98	90	94	
r60111009	GL-REF 2 (liver)	5.4	< 0.1	9.3	14	< 0.02	< 2	1.95	268	0.4	0.4	16.4	281	8.8	584
	% Recovery			93				89				91	88	126	
r60111009	GL-REF 3 (liver)	4.4	< 0.1	8.9	9.7	< 0.02	< 2	1.92	255	0.5	0.5	15.8	266	6.7	542
	% Recovery			89				87				88	83	96	
r60111009	GL-REF 4 (muscle)	7	0.3	104	0.3	< 0.02	< 2	0.05	1520	4.2	< 0.1	6.6	41	0.6	1270
	% Recovery	83		89						65		206	98	150	
r60111009	GL-REF 5 (muscle)	10.5	0.3	106	0.2	< 0.02	3	0.04	1680	4.8	< 0.1	3	39	0.5	1330
	% Recovery	125		91						74		94	93	125	
r60111009	GL-REF 6 (muscle)	5	0.3	106	0.2	< 0.02	2	0.03	1670	2.8	< 0.1	2.9	29	0.4	1300
	% Recovery			91						43		91	69	100	
Elemental Research Inc.	Average	89		96				80		47	79	86	86	81	
CanTest	Average	104		92				90		61		111	87	115	
Total	**Average**	**97**		**95**				**83**		**53**	**79**	**94**	**86**	**92**	

Table E3. Calculation of Percent Recovery from Cer

Batch	Standards	Manganese	Mercury	Molybdenum	Nickel	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium
	Detection limit	**0.01**	**0.05**	**0.01**	**0.05**	**-**	**-**	**0.1**	**-**	**0.005**	**-**	**0.01**	**-**
Certified values	**Fish Liver**	**5.8**	**0.4**		**0.4**			**4.3**					
Certified values	**Fish muscle**		**0.3**		**3.4**			**5.1**		**0.45**			
Certified values	**CRM DOLT-2**	**6.88**	**2.14**		**0.20**			**6.1**					
r60111009	GL-REF 1 (liver)	5.4	0.337	0.6	0.2	22100	6730	3.7	82	4.27	3580	9.75	< 0.1
	% Recovery	93						86					
r60111009	GL-REF 2 (liver)	5.1	0.306	0.6	0.2	20400	6260	3.6	82	2.57	3450	13.1	< 0.1
	% Recovery	88						84					
r60111009	GL-REF 3 (liver)	4.9	0.307	0.6	0.2	19900	6300	3.5	75	1.79	3230	7.94	< 0.1
	% Recovery	84						81					
r60111009	GL-REF 4 (muscle)	1.1	0.279	< 0.1	2.4	24400	17400	4.2	210	0.42	11400	8.98	< 0.1
	% Recovery				71			82		93			
r60111009	GL-REF 5 (muscle)	1.2	0.214	0.1	2.8	24400	17500	4.2	214	0.45	11700	9.63	< 0.1
	% Recovery				82			82		100			
r60111009	GL-REF 6 (muscle)	1	0.236	< 0.1	1.8	24700	16700	4.2	159	0.39	11800	9.51	< 0.1
	% Recovery				53			82		87			
Elemental Research Inc.	Average	79	99		54			105		74			
CanTest	Average	89			69			83		93			
Total	**Average**	**81**	**99**		**60**			**98**		**82**			

Table E3. Calculation of Percent Recovery from Cer

Batch	Standards	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc	Zirconium
	Detection limit	**0.01**	**0.01**	**-**	**0.005**	**0.05**	**0.1**	**-**
Certified values	**Fish Liver**						**58**	
Certified values	**Fish muscle**						**22**	
Certified values	**CRM DOLT-2**		**0.13**				**85.8**	
r60111009	GL-REF 1 (liver)	< 0.02	0.6	2.5	0.07	< 0.5	50.4	< 3
	% Recovery						87	
r60111009	GL-REF 2 (liver)	< 0.02	0.5	2.4	0.07	< 0.5	48.4	< 3
	% Recovery						83	
r60111009	GL-REF 3 (liver)	< 0.02	0.9	2.2	0.06	< 0.5	46.4	< 3
	% Recovery						80	
r60111009	GL-REF 4 (muscle)	< 0.02	0.2	2.8	< 0.04	< 0.5	18.8	< 3
	% Recovery						85	
r60111009	GL-REF 5 (muscle)	< 0.02	< 0.1	3.6	< 0.04	< 0.5	17.7	< 3
	% Recovery						80	
r60111009	GL-REF 6 (muscle)	< 0.02	< 0.1	2.2	< 0.04	< 0.5	17.9	< 3
	% Recovery						81	
Elemental Research Inc.	Average		100				83	
CanTest	Average						83	
Total	**Average**		**100**				**83**	

Table E4. Calculation of Relative Percent Difference (RPD) between Wildlife Tissue Duplicates at Elemental Research Inc. and CanTest Laboratories

Batch	Duplicates	Aluminium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum
	Detection Limit	**0.5**	**0.01**	**0.01**	**0.01**	**0.01**	**0.5**	**0.01**	**1**	**0.2**	**0.01**	**0.05**	**0.5**	**0.01**	**0.1**	**0.01**	**0.05**	**0.01**
K784, K785 & K787	21939 Sheep Kidney	1.6	<0.01	<0.01	1.56	<0.01	1.9	9.04	365	1.3	0.18	14.5	388	0.39	684	6.73	0.25	2.59
	21939 Sheep Kidney Dup.	1.4	<0.01	<0.01	1.60	<0.01	1.6	9.31	366	1.1	0.17	14.3	379	0.42	688	6.77	0.25	2.61
	RPD (%)	*	*	*	3	*	*	3	0	*	6	1	2	7	1	1	*	1
K784, K785 & K787	22711 Moose Kidney	<0.5	<0.01	0.01	1.58	<0.01	1.5	163	346	0.7	0.31	11.8	219	0.08	659	4.85	<0.05	0.86
	04-005 Moose Kidney	1.1	<0.01	<0.01	2.56	<0.01	1.0	169	311	0.2	0.29	11.8	321	0.08	704	4.71	<0.05	0.82
	RPD (%)	*	*	*	47	*	*	4	11	*	7	0	38	*	7	3	*	5
K784, K785 & K787	04-503 Liver	<0.5	<0.01	<0.01	0.26	<0.01	0.7	6.68	127	<0.2	0.23	27.6	599	1.05	488	9.25	<0.05	1.47
	04-503 Liver Dup.	<0.5	<0.01	<0.01	0.23	<0.01	0.7	6.48	121	0.2	0.22	26.5	573	0.97	473	8.98	<0.05	1.46
	RPD (%)	*	*	*	12	*	*	3	5	*	4	4	4	8	3	3	*	1
K786, K787 & K826	04-503 Muscle	1.0	<0.01	0.02	0.22	<0.01	<0.5	0.02	174	<0.2	0.05	8.19	158	0.02	686	2.39	<0.05	<0.01
	04-503 Muscle Dup.	1.9	<0.01	0.02	0.34	<0.01	<0.5	0.02	187	<0.2	<0.05	7.96	165	0.03	709	3.18	<0.05	<0.01
	RPD (%)	*	*	*	43	*	*	*	7	*	*	3	4	*	3	28	*	*
K786, K787 & K826	Composite #11 Muscle	11.8	<0.01	0.04	4.43	<0.01	<0.5	0.21	5740	0.3	0.12	10.1	189	3.91	800	2.05	0.06	0.05
	Composite #11 Muscle Dup.	11.9	<0.01	0.04	4.61	<0.01	<0.5	0.19	5730	0.2	0.17	10.2	185	3.93	784	2.03	<0.05	0.05
	RPD (%)	1	*	*	4	*	*	10	0	*	34	1	2	1	2	1	*	*
K786, K787 & K826	Composite #11 Muscle	11.8	<0.01	0.04	4.43	<0.01	<0.5	0.21	5740	0.3	0.12	10.1	189	3.91	800	2.05	0.06	0.05
r60111009	Composite #11 - Muscle	20.9	< 0.2	<0.2	2.6	<0.04	<4	0.18	4210	0.8	<0.2	9.6	153	3.4	1320	2.3	0.058	<0.2
	RPD (%)	56	*	*	52	*	*	15	31	*	*	5	21	14	49	11	*	*

** values below 10 x detection*

Table E4. Calculation of Relative P

Batch	Duplicates	Nickel	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Tin	Titanium	Uranium	Vanadium	Zinc	Zirconium
	Detection Limit	**0.05**	-	-	**0.1**	-	**0.005**	-	**0.01**	-	**0.01**	**0.01**	-	**0.005**	**0.05**	**0.1**	-
K784, K785 & K787	21939 Sheep Kidney	0.28	-	-	7.3	-	0.147	-	0.40	-	0.02	<0.01	-	0.009	0.14	72.9	-
	21939 Sheep Kidney Dup.	0.30	-	-	6.9	-	0.170	-	0.41	-	0.02	<0.01	-	0.008	0.13	71.7	-
	RPD (%)	*	-	-	6		15	-	2	-	*	*	-	*	*	2	-
K784, K785 & K787	22711 Moose Kidney	0.22	-	-	5.1	-	0.112	-	0.50	-	<0.01	<0.01	-	<0.005	0.13	106	-
	04-005 Moose Kidney	0.24	-	-	4.2	-	0.047	-	0.45	-	0.01	<0.01	-	<0.005	0.10	107	-
	RPD (%)	*	-	-	19	-	82	-	11	-	*	*	-	*	*	1	-
K784, K785 & K787	04-503 Liver	0.07	-	-	0.9	-	2.37	-	0.13	-	<0.01	<0.01	-	<0.005	<0.05	42.7	-
	04-503 Liver Dup.	0.06	-	-	1.1	-	2.32	-	0.13	-	<0.01	<0.01	-	<0.005	0.08	40.9	-
	RPD (%)	*	-	-	20	-	2	-	0	-	*	*	-	*	*	4	-
K786, K787 & K826	04-503 Muscle	0.01	-	-	0.7	-	0.013	-	0.34	-	<0.01	<0.01	-	<0.005	<0.05	136	-
	04-503 Muscle Dup.	<0.01	-	-	0.7	-	0.036	-	0.41	-	<0.01	0.02	-	<0.005	0.06	139	-
	RPD (%)	*	-	-	*	-	*	-	19	-	*	*	-	*	*	2	-
K786, K787 & K826	Composite #11 Muscle	0.03	-	-	1.0	-	0.067	-	3.83	-	<0.01	0.02	-	<0.005	0.07	54.2	-
	Composite #11 Muscle Dup.	0.03	-	-	1.0	-	0.071	-	3.99	-	<0.01	0.02	-	<0.005	0.07	54.3	-
	RPD (%)	*	-	-	0	-	6	-	4	-	*	*	-	*	*	0	-
K786, K787 & K826	Composite #11 Muscle	0.03	-	-	1.0	-	0.067	-	3.83	-	<0.01	0.02	-	<0.005	0.07	54.2	-
r60111009	Composite #11 - Muscle	0.4	-	-	0.6	-	<0.02	-	2.44	-	<0.04	0.5	-	<0.08	<1	52.6	-
	RPD (%)	*	-	-	*	-	*	-	44	-	*	185	-	*	*	3	-

** values below 10 x detection*

Table F1. Statistical Comparison between Elemental Concentrations in Berries by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			below detection limits			P = 0.382		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	<0.1	-	-	8.355	6.414	a
2	<0.1	-	-	<0.1	-	-	14.367	5.398	a
3	<0.1	-	-	<0.1	-	-	5.983	4.791	a
4	<0.1	-	-	<0.1	-	-	7.250	2.999	a
5	<0.1	-	-	<0.1	-	-	9.420	3.830	a
6	<0.1	-	-	<0.1	-	-	5.700	-	a
	Cadmium			Chromium			Cobalt		
	P = 0.247			P = 0.199			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	0.067	0.071	a	0.101	0.032	a	<0.1	-	-
2	0.117	0.145	a	0.132	0.097	a	<0.1	-	-
3	0.193	0.202	a	0.324	0.328	a	<0.1	-	-
4	0.060	0.049	a	<0.1	-	-	<0.1	-	-
5	0.086	0.069	a	0.240	0.195	a	<0.1	-	-
6	0.126	0.081	a	0.216	0.198	a	<0.1	-	-
	Copper			Iron			Lead		
	P = 0.014			P = 0.067			P = 0.000		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey	mean	stdev	tukey
1	3.405	1.044	a	42.636	12.699	a	<0.1	-	-
2	4.263	1.034	ab	46.667	29.280	ab	<0.3	-	-
3	5.387	2.257	b	20.833	9.020	b	<0.1	-	-
4	5.263	2.526	ab	27.750	16.741	b	0.515	0.400	a
5	5.580	0.826	b	33.400	12.954	ab	1.460	1.560	ab
6	5.380	0.691	ab	47.000	-	ab	2.602	1.092	b
	Mercury			Nickel			Selenium		
	below detection limits			P = 0.003			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey
1	<0.01	-	-	0.404	0.390	a	<0.2	-	-
2	<0.01	-	-	1.456	1.013	b	<0.2	-	-
3	<0.01	-	-	1.613	1.863	b	<0.2	-	-
4	<0.01	-	-	0.457	0.400	ab	<0.2	-	-
5	<0.01	-	-	0.220	0.179	a	<0.2	-	-
6	<0.01	-	-	0.653	0.319	ab	<0.2	-	-

Table F1. Statistical Comparison between Elemental Concentrations in Berries by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P = 0.677			below detection limits			P = 0.014		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	0.016	0.023	a	<0.02	-	-	10.706	5.620	a
2	<0.01	-	-	<0.02	-	-	14.534	5.819	ab
3	0.024	0.022	a	<0.02	-	-	17.485	11.432	ab
4	0.014	0.009	a	<0.02	-	-	10.232	1.953	a
5	<0.01	-	-	<0.02	-	-	16.040	10.071	ab
6	0.011	0.002	a	<0.02	-	-	27.753	11.182	b

Table F2. Statistical Comparison between Elemental Concentrations in Labrador Tea by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			below detection limits			p = 0.115		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	<0.1	-	-	53.400	8.412	a
2	-	-	-	-	-	-	-	-	-
3	<0.1	-	-	<0.1	-	-	66.650	4.879	a
4	<0.1	-	-	<0.1	-	-	52.450	7.566	a
5	<0.1	-	-	<0.1	-	-	90.000	-	a
6	<0.1	-	-	<0.1	-	-	64.900	-	a
	Cadmium			Chromium			Cobalt		
	P = 0.593			P = 1.000			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.02	-	a	0.100	0.000	a	<0.1	-	-
2	-	-	-	-	-	-	-	-	-
3	0.025	0.007	a	<0.1	-	-	<0.1	-	-
4	<0.02	-	a	0.100	0.000	a	<0.1	-	-
5	<0.02	-	a	<0.1	-	-	<0.1	-	-
6	0.020	-	a	<0.1	-	-	<0.1	-	-
	Copper			Iron			Lead		
	P = 0.247			P = 0.640			P = 0.002		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	3.633	1.429	a	46.667	14.048	a	<0.1	-	a
2	-	-	-	-	-	-	-	-	-
3	5.300	0.566	a	37.500	3.536	a	0.300	0.141	b
4	3.700	-	a	50.500	16.263	a	0.600	-	b
5	2.600	-	a	31.000	-	a	0.800	-	bc
6	6.500	-	a	51.000	-	a	2.600	-	c
	Mercury			Nickel			Selenium		
	below detection limits			P = 0.576			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.10	-	-	0.167	0.115	a	<0.2	-	-
2	-	-	-	-	-	-	-	-	-
3	<0.10	-	-	0.650	0.636	a	<0.2	-	-
4	<0.10	-	-	0.200	0.141	a	<0.2	-	-
5	<0.10	-	-	0.100	-	a	<0.2	-	-
6	<0.10	-	-	0.400	-	a	<0.2	-	-

Table F2. Statistical Comparison between Elemental Concentrations in Labrador Tea by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P < 0.10			P = 0.017			P = 0.385		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.01	-	-	<0.02	-	-	24.667	0.569	a
2	-	-	-	-	-	-	-	-	-
3	<0.01	-	-	0.050	0.042	a	23.300	11.172	a
4	0.010	0.000	-	<0.02	-	-	26.550	0.071	a
5	<0.01	-	-	0.050	-	a	30.500	-	a
6	<0.01	-	-	0.180	-	b	43.000	-	a

Table F3. Statistical Comparison between Elemental Concentrations in Willows by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			below detection limits			P = 0.047		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	<1	-	-	13.867	6.865	a
2	<0.1	-	-	<1	-	-	50.100	33.493	ab
3	<0.1	-	-	<1	-	-	103.000	-	b
4	<0.1	-	-	<1	-	-	10.100	0.424	a
5	<0.1	-	-	<1	-	-	15.000	-	ab
6	<0.1	-	-	2.077	2.977	-	-	-	-
	Cadmium			Chromium			Cobalt		
	P = 0.231			P = 0.051			P = 0.141		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey	mean	stdev	tukey (log)
1	3.858	2.799	a	0.121	0.067	a	0.267	0.115	a
2	1.932	0.785	a	5.122	10.052	ab	1.000	0.700	a
3	4.076	4.650	a	0.863	1.402	ab	0.900	-	a
4	1.630	0.822	a	0.419	0.825	ab	1.000	0.566	a
5	4.023	4.229	a	0.204	0.159	ab	0.300	-	a
6	4.055	3.584	a	0.411	0.296	b	-	-	-
	Copper			Iron			Lead		
	P = 0.003			P = 0.405			P = 0.000		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey (log)	mean	stdev	tukey
1	3.523	1.174	a	55.333	15.373	a	0.266	0.137	a
2	5.622	1.381	ab	95.333	40.673	a	0.271	0.278	a
3	4.920	2.420	ab	48.000	-	a	0.867	0.618	a
4	4.418	1.250	a	65.500	19.092	a	1.479	0.930	a
5	4.486	1.624	a	53.000	-	a	5.263	7.589	a
6	6.614	2.381	b	-	-	-	28.943	32.924	b
	Mercury			Nickel			Selenium		
	P = 0.003			P = 0.005			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey
1	<0.01	-	-	0.952	0.958	a	<1	-	-
2	<0.01	-	-	4.499	3.843	b	<0.2	-	-
3	<0.01	-	-	3.161	3.085	ab	<1	-	-
4	<0.01	-	-	2.208	1.575	b	<1	-	-
5	0.017	0.008	a	3.838	3.276	b	<1	-	-
6	0.023	0.016	a	2.846	2.102	b	<1	-	-

Table F3. Statistical Comparison between Elemental Concentrations in Willows by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P = 0.000			below detection limits			P = 0.001		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.01	-	-	<0.02	-	-	186.282	97.082	a
2	0.022	0.024	a	<0.02	-	-	174.591	107.225	ab
3	0.043	0.027	ab	<0.02	-	-	148.002	129.882	a
4	0.023	0.015	a	<0.02	-	-	132.379	69.823	a
5	0.036	0.031	a	<0.02	-	-	253.987	218.502	a
6	0.087	0.067	b	-	-	-	684.127	668.930	b

Table F4. Statistical Comparison between Elemental Concentrations in Forbs by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			below detection limits			P = 0.815		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	<0.1	-	-	81.500	36.266	a
2	<0.1	-	-	<0.1	-	-	158.133	112.327	a
3	<0.1	-	-	<0.1	-	-	66.200	56.286	a
4	-	-	-	-	-	-	-	-	-
5	<0.1	-	-	<0.1	-	-	93.100	-	a
6	<0.1	-	-	0.100	-	-	83.700	-	a
	Cadmium			Chromium			Cobalt		
	P = 0.847			P = 0.578			P = 0.187		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	0.513	0.501	a	0.267	0.115	a	0.400	0.361	a
2	0.323	0.148	a	0.167	0.058	a	2.400	2.606	a
3	0.610	0.141	a	0.400	0.283	a	0.150	0.071	a
4	-	-	-	-	-	-	-	-	-
5	0.400	-	a	0.200	-	a	0.600	-	a
6	0.660	-	a	0.200	-	a	1.100	-	a
	Copper			Iron			Lead		
	P = 0.367			P = 0.504			P = 0.003		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	6.533	3.037	a	87.000	4.359	a	0.133	0.058	a
2	8.700	1.682	a	109.667	29.771	a	0.300	0.100	ab
3	6.450	0.212	a	79.000	1.414	a	0.400	0.141	b
4	-	-	-	-	-	-	-	-	-
5	7.500	-	a	90.000	-	a	0.800	-	bc
6	11.700	-	a	100.000	-	a	4.300	-	c
	Mercury			Nickel			Selenium		
	P = 0.707			P = 0.569			P = 0.820		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey
1	<0.01	-	-	1.433	0.950	a	1.533	2.309	a
2	0.013	0.005	a	13.367	10.980	a	<0.2	-	-
3	0.010	0.001	a	3.000	2.263	a	0.700	0.707	a
4	-	-	-	-	-	-	-	-	-
5	<0.01	-	-	4.100	-	a	<0.2	-	a
6	<0.01	-	-	6.200	-	a	<0.2	-	a

Table F4. Statistical Comparison between Elemental Concentrations in Forbs by Lichen Lead Zone

	Silver			Thallium			Zinc		
	below detection limits			below detection limits			P = 0.000		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.01	-	-	<0.02	-	-	32.667	13.588	a
2	0.013	0.060	-	<0.02	-	-	30.300	1.411	a
3	<0.01	-	-	<0.02	-	-	27.150	4.031	a
4	-	-	-	-	-	-	-	-	-
5	<0.01	-	-	<0.02	-	-	72.400	-	b
6	0.010	-	-	<0.02	-	-	648.000	-	c

Table F5. Statistical Comparison between Elemental Concentrations in Grasses by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			below detection limits			P = 0.546		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	<0.1	-	-	40.933	19.770	a
2	<0.1	-	-	<0.1	-	-	46.550	8.977	a
3	<0.1	-	-	<0.1	-	-	51.775	29.984	a
4	<0.1	-	-	<0.1	-	-	19.100	-	a
5	<0.1	-	-	<0.1	-	-	55.500	31.396	a
6	<0.1	-	-	<0.1	-	-	49.000	-	a
	Cadmium			Chromium			Cobalt		
	P = 0.626			P = 0.696			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	0.183	0.257	a	0.433	0.058	a	<0.1	-	-
2	0.070	0.057	a	0.226	0.043	a	<0.1	-	-
3	0.135	0.143	a	0.490	0.573	a	<0.1	-	-
4	0.084	0.102	a	0.319	0.147	a	<0.1	-	-
5	0.151	0.139	a	0.294	0.231	a	<0.1	-	-
6	0.181	0.096	a	0.347	0.156	a	<0.1	-	-
	Copper			Iron			Lead		
	P = 0.422			P = 0.695			P = 0.001		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey
1	5.200	4.139	a	63.000	37.323	a	0.167	0.115	a
2	3.998	1.894	a	86.000	46.152	a	<0.3	-	a
3	3.645	1.408	a	60.000	20.928	a	0.770	0.732	a
4	2.812	0.741	a	51.000	-	a	2.568	2.478	a
5	3.396	1.366	a	86.500	7.778	a	8.346	17.167	a
6	4.010	1.431	a	98.000	-	a	36.760	33.254	b
	Mercury			Nickel			Selenium		
	P = 0.002			P = 0.411			P < 0.10		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey
1	<0.01	-	-	1.000	0.608	a	1.500	2.252	-
2	<0.01	-	-	1.451	0.833	a	<0.2	-	-
3	<0.01	-	-	1.311	1.031	a	<1	-	-
4	0.015	0.008	a	0.933	0.585	a	<1	-	-
5	0.026	0.011	ab	1.796	0.838	a	<1	-	-
6	0.033	0.018	b	0.949	0.337	a	<1	-	-

Table F5. Statistical Comparison between Elemental Concentrations in Grasses by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P = 0.410			below detection limits			P = 0.035		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.01	-	-	<0.02	-	-	70.967	93.665	ab
2	<0.01	-	-	<0.02	-	-	52.534	27.001	ab
3	<0.01	-	-	0.033	0.025	-	125.138	304.173	a
4	<0.01	-	-	<0.02	-	-	36.626	15.780	a
5	0.066	0.108	a	<0.02	-	-	103.601	57.520	ab
6	0.039	0.032	a	<0.02	-	-	147.475	86.711	b

Table F6. Statistical Comparison between Elemental Concentrations in Horsetail by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			P = 0.012			P = 0.709		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.1	-	-	0.400	-	a	103.000	-	a
2	<0.1	-	-	<0.1	-	-	75.800	65.337	a
3									
4	<0.1	-	-	0.100	-	b	53.700	-	a
5	<0.1	-	-	0.150	0.058	b	61.800	13.628	a
6	<0.1	-	-	0.350	0.071	a	42.550	15.627	a
	Cadmium			Chromium			Cobalt		
	P = 0.338			P = 0.125			P = 0.128		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey	mean	stdev	tukey
1	1.530	-	a	0.700	-	a	0.100	-	a
2	0.450	0.467	a	0.900	0.283	a	0.900	0.566	a
3									
4	0.890	-	a	0.400	-	a	0.200	-	a
5	0.367	0.120	a	0.450	0.129	a	0.200	0.082	a
6	0.400	0.085	a	0.600	-	a	0.200	-	a
	Copper			Iron			Lead		
	P = 0.541			P = 0.107			P = 0.100		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	6.500	-	a	70.000	-	a	<0.1	-	-
2	4.800	0.283	a	130.500	36.062	a	0.200	-	a
3									
4	6.100	-	a	65.000	-	a	0.400	-	a
5	6.075	1.059	a	68.250	19.155	a	0.875	0.830	a
6	5.700	0.849	a	111.000	2.828	a	2.500	0.283	a
	Mercury			Nickel			Selenium		
	P = 0.486			P = 0.947			P = 1.000		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.01	-	-	0.300	-	a	7.400	-	
2	0.011	0.001	-	0.650	0.354	a	<0.2	-	-
3									
4	<0.01	-	-	0.400	-	a	0.400	-	a
5	<0.01	-	-	0.525	0.450	a	<0.2	-	-
6	<0.01	-	-	0.500	-	a	0.200	0.000	a

Table F6. Statistical Comparison between Elemental Concentrations in Horsetail by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P = 0.067			below detection limits			P = 0.236		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey	mean	stdev	tukey
1	0.040	-	ab	<0.02	-	-	75.900	-	a
2	0.015	0.007	ab	0.050	0.042	-	34.000	4.667	a
3									
4	0.070	-	a	<0.02	-	-	56.200	-	a
5	0.015	0.006	b	<0.02	-	-	35.425	13.258	a
6	0.025	0.007	ab	<0.02	-	-	46.050	22.415	a

Table F7. Statistical Comparison between Elemental Concentrations in Mushrooms by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			P = 0.767			P = 0.186		
Zone	mean	stdev	tukey	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	<0.1	-	-	0.300	-	a	0.800	-	a
3	<0.1	-	-	0.733	0.611	a	10.900	11.108	a
4	-	-	-	-	-	-	-	-	-
5	<0.1	-	-	0.675	0.450	a	17.325	19.890	a
6	-	-	-	-	-	-	-	-	-
	Cadmium			Chromium			Cobalt		
	P = 0.635			P = 0.345			P = 0.589		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey (log)	mean	stdev	tukey
1	-	-	-	-	-	-	-	-	-
2	1.620	-	a	<0.1	-	-	<0.1	-	-
3	1.183	0.881	a	1.000	1.058	a	0.400	0.361	a
4	-	-	-	-	-	-	-	-	-
5	1.705	0.793	a	0.400	0.294	a	0.275	0.126	a
6	-	-	-	-	-	-	-	-	-
	Copper			Iron			Lead		
	P 0.972			P = 0.373			P = 0.152		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	32.500	-	a	23.000	-	a	0.700	-	a
3	29.300	7.300	a	441.667	607.316	a	10.000	10.860	a
4	-	-	-	-	-	-	-	-	-
5	32.125	15.062	a	366.250	265.356	a	39.325	53.937	a
6	-	-	-	-	-	-	-	-	-
	Mercury			Nickel			Selenium		
	P = 0.206			P = 0.446			P = 0.688		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	0.032	-	a	0.200	-	a	1.100	-	a
3	0.105	0.025	a	1.000	1.044	a	1.267	0.808	a
4	-	-	-	-	-	-	-	-	-
5	0.273	0.252	a	0.500	0.216	a	0.775	0.512	a
6	-	-	-	-	-	-	-	-	-

Table F7. Statistical Comparison between Elemental Concentrations in Mushrooms by Lichen Lead Zone

	Silver			Thallium			Zinc		
	P = 0.811			below detection limits			P = 0.068		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	1.010	-	a	<0.02	-	-	61.600	-	ab
3	1.140	0.442	a	<0.02	-	-	72.200	13.150	a
4	-	-	-	-	-	-	-	-	-
5	1.352	0.614	a	0.028	0.015	-	130.750	47.843	b
6	-	-	-	-	-	-	-	-	

Table F8. Statistical Comparison between Elemental Concentrations in Bear Root by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			P = 0.482			P = 0.241		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	<0.1	-	-	0.800	-	a	74.500	-	a
3	-	-	-	-	-	-	-	-	-
4	<0.1	-	-	1.767	1.007	a	40.500	17.255	a
5	0.133	0.058	-	2.433	0.751	a	84.433	34.552	a
6	<0.1	-	-	1.400	-	a	40.600	-	a
	Cadmium			Chromium			Cobalt		
	P = 0.808			P = 0.367			P = 0.436		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	-	-	-	-	-	-	-	-	-
2	0.210	-	a	1.500	-	a	0.800	-	a
3	-	-	-	-	-	-	-	-	-
4	0.167	0.125	a	6.000	2.598	a	2.367	1.007	a
5	0.203	0.083	a	5.867	1.986	a	2.100	0.794	a
6	0.090	-	a	2.800	-	a	1.000	-	a
	Copper			Iron			Lead		
	P = 0.553			P = 0.357			P = 0.393		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	-	-	-	-	-	-	-	-	-
2	7.300	-	a	1490.000	-	a	2.400	-	a
3	-	-	-	-	-	-	-	-	-
4	13.000	3.974	a	4383.333	1509.779	a	20.433	21.262	a
5	13.100	3.568	a	3746.667	1600.698	a	46.467	35.925	a
6	9.600	-	a	1520.000	-	a	4.100	-	a
	Mercury			Nickel			Selenium		
	P = 0.545			P = 0.331			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	-	-	-	-	-	-	-	-	-
2	<0.01	-	-	6.900	-	a	<0.2	-	-
3	-	-	-	-	-	-	-	-	-
4	0.016	0.007	a	10.500	3.292	a	<0.2	-	-
5	0.023	0.011	a	12.333	2.303	a	<0.2	-	-
6	<0.01	-	-	6.600	-	a	<0.2	-	-

Table F8. Statistical Comparison between Elemental Concentrations in Bear Root by Lichen Lead Zone

	Silver			Thallium			Zinc		
	below detection limits			P = 0.618			P = 0.515		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	-	-	-	-	-	-	-	-	-
2	<0.01	-	-	<0.02	-	-	21.500	-	a
3	-	-	-	-	-	-	-	-	-
4	<0.01	-	-	0.053	0.035	a	64.100	57.312	a
5	0.070	0.053	-	0.050	0.017	a	48.133	18.435	a
6	<0.01	-	-	<0.2	-	-	18.600	-	a

Table F9. Statistical Comparison between Elemental Concentrations in Sap by Lichen Lead Zone

	Antimony			Arsenic			Barium		
	below detection limits			P = 0.018			P = 0.351		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.02	-	-	<0.02	-	-	8.197	4.324	a
2	-	-	-	-	-	-	-	-	-
3	<0.02	-	-	0.045	0.050	a	9.045	8.686	a
4	0.06	-	-	0.210	-	b	50.800	-	a
5	<0.2	-	-	0.030	0.014	a	7.390	5.247	a
6	-	-	-	-	-	-	-	-	-
	Cadmium			Chromium			Cobalt		
	P = 0.552			P = 0.777			P = 0.116		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey	mean	stdev	tukey
1	0.146	0.120	a	<0.02	-	-	<0.02	-	-
2	-	-	-	-	-	-	-	-	-
3	0.026	0.031	a	0.117	0.162	a	0.025	0.006	a
4	0.050	-	a	0.100	-	a	0.080	-	b
5	0.018	0.007	a	0.060	0.057	a	0.035	0.021	ab
6	-	-	-	-	-	-	-	-	-
	Copper			Iron			Lead		
	P = 0.342			P = 0.139			P = 0.065		
Zone	mean	stdev	tukey (log)	mean	stdev	tukey (log)	mean	stdev	tukey (log)
1	0.747	0.196	a	4.000	2.000	a	0.060	0.046	a
2	-	-	-	-	-	-	-	-	-
3	1.038	0.773	a	26.750	30.467	a	3.247	5.275	ab
4	2.950	-	a	137.000	-	a	24.600	-	b
5	0.925	0.629	a	25.500	23.335	a	2.560	1.400	ab
6	-	-	-	-	-	-	-	-	
	Mercury			Nickel			Selenium		
	below detection limits			P = 0.048			below detection limits		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	<0.01	-	-	0.020	0.000	a	<0.04	-	-
2	-	-	-	-	-	-	-	-	-
3	<0.01	-	-	0.055	0.047	a	<0.04	-	-
4	<0.01	-	-	0.190	-	b	<0.04	-	-
5	<0.01	-	-	0.075	0.049	a	<0.04	-	-
6	-	-	-	-	-	-	-	-	-

Table F9. Statistical Comparison between Elemental Concentrations in Sap by Lichen Lead Zone

	Silver			Thallium			Zinc		
	below detection limits			P = 0.017			P = 0.312		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.002	-	-	<0.004	-	-	3.533	1.701	a
2	-	-	-	-	-	-	-	-	-
3	<0.002	-	-	<0.004	-	-	6.800	8.418	a
4	0.023	-	-	0.009	-	a	27.700	-	a
5	<0.002	-	-	0.010	0.002	a	5.100	1.273	a
6	-	-	-	-	-	-	-	-	-

Table F10. Statistical Comparison between Elemental Concentrations in Muscle of Northern Red-backed Voles between Lichen Lead Kriging Zones

	Antimony			Arsenic			Barium		
	Values below detection			Values below detection			no signficant difference		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	< 0.2		-	0.35	0.212	-	7.9	0.07	a
2	-	-	-	-	-	-	-	-	-
3	< 0.2		-	< 0.2		-	2.9	1.39	a
4	< 0.2		-	< 0.2		-	4	2.69	a
5									
6	< 0.2	-	-	<0.2	-	-	3.1	0.64	a
	Cadmium			Chromium			Cobalt		
	No significant difference			No significant difference			Values below detection		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	0.19	0.049	a	0.8	0.14	a	< 0.2		-
2	-	-	-	-	-	-	-	-	-
3	0.13	0.067	a	1.0	0.90	a	< 0.2		-
4	0.1	0.062	a	0.6	0.06	a	< 0.2		-
5									-
6	0.13	0.071	a	0.8	0.07	a	< 0.2	-	-
	Copper			Iron			Lead		
	P = < 0.10			no significant difference			P < 0.10		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	11.8	0.49	a	183	5.7	a	0.3	0.07	a
2	-	-	-	-	-	-	-	-	-
3	9.6	0.76	b	139	16.2	a	0.5	0.55	a
4	10.2	1.05	ab	145	34.6	a	2.3	2.05	a
5									
6	10.4	1.06	ab	153	0.00	a	3.3	0.14	b

Table F10. Statistical Comparison between Elemental Concentrations in Muscle of Northern Red-backed Voles between Lichen Lead Kriging Zones

	Mercury			Nickel			Selenium		
	P < 0.10			No significant difference			No significant difference		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	0.14	0.078	a	0.5	0.07	a	1.3	0.28	a
2	-	-	-	-	-	-	-	-	-
3	0.04	0.009	b	0.8	1.27	a	1.0	0.48	a
4	0.06	0.005	b	<0.2	-	-	<0.4	-	-
5									
6	0.05	0.006	b	0.5	0.14	a	0.7	0.07	a
	Silver			Thallium			Zinc		
	Values below detection			Values below detection			No significant difference		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	< 0.02	-	-	< 0.04	-	-	52.9	2.62	a
2	-	-	-	-	-	-	-	-	-
3	< 0.02	-	-	< 0.04	-	-	45.6	4.34	a
4	< 0.02	-	-	< 0.04	-	-	47.5	4.2	a
5									
6	< 0.02	-	-	< 0.04	-	-	50.9	2.48	a

Table F11. Statistical Comparison between Elemental Concentrations in Liver of Northern Red-backed Voles between Lichen Lead Kriging Zones

	Antimony			Arsenic			Barium		
	Values below detection			Values below detection			No significant difference		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey (log)
1	<0.3	-	-	< 0.3	-	-	0.5	0.17	a
2	-	-	-	-	-	-	-	-	-
3	< 1.2	-	-	< 1.2	-	-	<0.4	-	-
4	<0.5	-	-	<0.5	-	-	0.5	0.33	a
5									
6	<0.6	-	-	<0.3	-	-	<0.5	-	-
	Cadmium			Chromium			Cobalt		
	P < 0.10			No significant difference			Values below detection		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	7.28	1.837	a	0.5	0.10	a	< 0.3	-	-
2	-	-	-	-	-	-	-	-	-
3	5.58	2.180	ab	0.6	0.27	a	< 1.2	-	-
4	1.79	1.626	b	0.7	0.42	a	<0.5	-	-
5									
6	4.79	1.960	ab	0.5	0.15	a	<0.3	-	-
	Copper			Iron			Lead		
	No significant difference			No significant difference			P < 0.10		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	15.1	2.36	a	480	25.7	a	< 0.3	-	a
2	-	-	-	-	-	-	-	-	-
3	17.0	1.15	a	596	98.9	a	< 1.2	-	a
4	17.6	0.5	a	569	52.3	a	2.3	0.28	ab
5									
6	16.6	1.80	a	569	144.1	a	4.1	2.58	b

Table F11. Statistical Comparison between Elemental Concentrations in Liver of Northern Red-backed Voles between Lichen Lead Kriging Zones

	Mercury			Nickel			Selenium		
	P < 0.10			No significant difference			P < 0.10		
Zone	mean	stdev	tukey (log	mean	stdev	tukey	mean	stdev	tukey
1	0.438	0.1478	a	0.3	0.08	a	2.1	0.42	ab
2	-	-	-	-	-	-	-	-	-
3	0.108	0.0390	b	< 1.2		a	2.6	0.76	a
4	0.147	0.026	ac	0.7	0.58	a	1.4	0.07	b
5									
6	0.242	0.0400	bc	0.5	0.14	a	1.8	0.37	ab
	Silver			Thallium			Zinc		
	Values below detection			Values below detection			No significant difference		
Zone	mean	stdev	tukey	mean	stdev	tukey	mean	stdev	tukey
1	< 0.02	-	-	< 0.06	-	-	86.5	9.36	a
2	-	-	-	-	-	-	-	-	-
3	< 0.12	-	-	< 0.24	-	-	88.0	6.38	a
4	<0.05	-	-	<0.1	-	-	89.5	8.2	a
5									
6	<0.04	-	-	<0.12	-	-	86.9	10.03	a

Table F12. Statistical Comparison between Elemental Concentrations in Muscle of Finlayson Woodland Caribou and Woodland Caribou Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	P < 0.10			P < 0.10			No significant difference		
	age factor = not determined			age factor = not determined			age factor = not determined		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.164	0.351	+	0.340	0.695	+	0.41	0.33	0
Anvil Range	<0.01	-	0	0.020	0.014	0	0.20	0.06	0
	Cadmium			Chromium			Cobalt		
	P < 0.10			P < 0.10			P < 0.10		
	age factor = not determined			age factor = not determined			age factor = not determined		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.12	0.05	+	0.50	0.33	+	0.20	0.34	+
Anvil Range	0.02	0.01	0	<0.2	-	0	0.01	0.01	0
	Copper			Iron			Lead		
	P < 0.10			No significant difference			P < 0.10		
	age factor = not determined			age factor = not determined			age factor = not determined		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	10.94	0.97	+	162	28	0	0.20	0.34	+
Anvil Range	8.34	0.80	0	175	37	0	0.05	0.03	0
	Mercury			Nickel			Selenium		
	Values below detection			P < 0.10			P < 0.10		
	age factor = not determined			age factor = not determined			age factor = not determined		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.050	-	-	0.45	0.67	+	1.28	1.12	+
Anvil Range	<0.05	-	-	<0.05	-	0	0.65	0.13	0
	Silver			Thallium			Zinc		
	No significant difference			P < 0.10			No significant difference		
	age factor = not determined			age factor = not determined			age factor = not determined		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.01	0.01	0			+	171.2	21.2	0
Anvil Range	0.08	0.06	0	<0.01	-	0	187.6	50.8	0

Table F13. Statistical Comparison between Elemental Concentrations in Liver of Finlayson Woodland Caribou and Woodland Caribou Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	No significant difference			No significant difference			P < 0.10		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.060	0.186	0	0.142	0.373	0	0.45	0.22	+
Anvil Range	<0.01	-	0	0.018	0.010	0	0.33	0.25	0
	Cadmium			Chromium			Cobalt		
	P < 0.10			P < 0.10			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	10.69	9.18	+	0.78	0.36	+	0.384	0.207	0
Anvil Range	3.35	2.38	0	0.20	0.00	0	0.284	0.075	0
	Copper			Iron			Lead		
	No significant difference			P < 0.10			P < 0.10		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	73.64	51.66	0	946.7	390.4	+	0.59	0.29	0
Anvil Range	44.96	23.43	0	372.8	165.4	0	1.66	0.58	+
	Mercury			Nickel			Selenium		
	P < 0.10			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.595	0.238	+	0.19	0.41	0	1.40	0.72	0
Anvil Range	0.125	0.093	0	0.10	0.04	0	1.13	0.22	0
	Silver			Thallium			Zinc		
	No significant difference			P < 0.10			P < 0.10		
	age factor = 0			age factor = not determined			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	1.87	1.24	0			+	87.2	26.9	+
Anvil Range	2.18	0.94	0	<0.01	-	0	57.2	12.0	0

Table F14. Statistical Comparison between Elemental Concentrations in Kidney of Finlayson Woodland Caribou and Woodland Caribou Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.083	0.287	0	0.254	0.602	0	3.85	3.35	0
Anvil Range	<0.01	-	0	0.050	0.008	0	2.04	0.61	0
	Cadmium			Chromium			Cobalt		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = +			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	148.46	150.03	0	0.80	0.48	0	0.31	0.31	0
Anvil Range	37.70	35.42	0	0.63	0.10	0	0.29	0.13	0
	Copper			Iron			Lead		
	No significant difference			No significant difference			P < 0.10		
	age factor = +			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	23.31	6.40	0	177.16	47.37	0	0.67	0.46	0
Anvil Range	22.63	2.55	0	158.75	21.09	0	2.49	0.65	+
	Mercury			Nickel			Selenium		
	P < 0.10			No significant difference			No significant difference		
	age factor = +			age factor = +			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	3.488	1.256	+	0.45	0.95	0	5.779	1.950	0
Anvil Range	0.818	0.411	0	0.13	0.06	0	4.875	0.591	0
	Silver			Thallium			Zinc		
	No significant difference			No significant difference			P < 0.10		
	age factor = 0			age factor = not determined			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.036	0.071	0			0	135.9	26.0	+
Anvil Range	0.096	0.077	0	0.088	0.013	0	98.7	23.5	0

Table F15. Statistical Comparison between Elemental Concentrations in Muscle of Yukon Moose and Moose Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.066	0.211	0	0.169	0.494	0	0.150	0.130	0
Anvil Range	<0.01	-	0	<0.01	-	0	0.13	0.03	0
	Cadmium			Chromium			Cobalt		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.11	0.10	0	1.03	0.36	0	0.08	0.21	0
Anvil Range	0.05	0.03	0	<0.2	-	0	0.01	0.00	0
	Copper			Iron			Lead		
	No significant difference			P < 0.10			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	5.74	2.16	0	130	39	0	0.16	0.42	0
Anvil Range	4.18	0.73	0	174	18	+	0.03	0.02	0
	Mercury			Nickel			Selenium		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.089	0.053	0	0.19	0.42	0	1.066	1.514	0
Anvil Range	<0.05	-	0	<0.05	-	0	0.93	0.40	0
	Silver			Thallium			Zinc		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = not determined			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.09	0.33	0	0.054	0.207	0	210.3	108.5	0
Anvil Range	0.19	0.18	0	<0.01	-	0	238.3	17.6	0

Table F16. Statistical Comparison between Elemental Concentrations in Liver of Yukon Moose and Moose Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	No significant difference			No significant difference			No significant difference		
	age factor = +			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.012	0.016	0	0.081	0.102	0	0.688	1.046	0
Anvil Range	<0.01	-	0	<0.01	-	0	0.400	0.061	0
	Cadmium			Chromium			Cobalt		
	No significant difference			P < 0.10			No significant difference		
	age factor = 0			age factor = +			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	14.63	11.19	0	1.48	0.63	+	0.36	0.23	0
Anvil Range	10.40	5.85	0	0.20	0.00	0	0.20	0.17	0
	Copper			Iron			Lead		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	105.26	118.77	0	497	868	0	0.07	0.09	0
Anvil Range	51.67	13.01	0	304	53	0	0.06	0.04	0
	Mercury			Nickel			Selenium		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.063	0.033	0	0.11	0.12	0	4.574	4.395	0
Anvil Range	<0.05	-	0	0.09	0.03	0	2.367	0.751	0
	Silver			Thallium			Zinc		
	No significant difference			P < 0.10			No significant difference		
	age factor = 0			age factor = not determined			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.33	0.40	0	0.007	0.005	0	98.7	100.6	0
Anvil Range	0.15	0.11	0	<0.01	-	+	40.0	15.5	0

Table F17. Statistical Comparison between Elemental Concentrations in Kidney of Yukon Moose and Moose Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	No significant difference			P < 0.10			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.016	0.046	0	0.309	0.280	+	1.190	0.929	0
Anvil Range	<0.01	-	0	0.017	0.012	0	1.323	0.649	0
	Cadmium			Chromium			Cobalt		
	No significant difference			No significant difference			No significant difference		
	age factor = +			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	136.03	98.83	0	1.05	0.70	0	0.47	0.25	0
Anvil Range	165.33	17.01	0	0.48	0.10	0	0.27	0.03	0
	Copper			Iron			Lead		
	No significant difference			No significant difference			No significant difference		
	age factor = +			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	17.09	6.80	0	242	107	0	0.10	0.25	0
Anvil Range	13.90	2.39	0	243	24	0	0.08	0.05	0
	Mercury			Nickel			Selenium		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.134	0.152	0	0.53	0.72	0	4.977	2.568	0
Anvil Range	<0.05	-	0	0.45	0.37	0	4.883	0.225	0
	Silver			Thallium			Zinc		
	P < 0.10			P < 0.10			No significant difference		
	age factor = 0			age factor = not determined			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.01	0.01	0	0.024	0.026	+	140.6	46.0	0
Anvil Range	0.09	0.03	+	0.010	0.000	0	118.8	11.1	0

Table F18. Statistical Comparison between Elemental Concentrations in Liver of Yukon Sheep and Sheep Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	P < 0.10			P < 0.10			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	<0.890	-	+	<1.779	-	+	0.32	0.20	0
Anvil Range	<0.01	-	0	<0.01	-	0	0.28	-	0
	Cadmium			Chromium			Cobalt		
	No significant difference			P < 0.10			P < 0.10		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	1.26	1.09	0	<0.890	-	+	<0.890	-	+
Anvil Range	1.13	-	0	0.3	-	0	0.18	-	0
	Copper			Iron			Lead		
	No significant difference			No significant difference			No significant difference		
	age factor = 0			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	130.2	122.5	0	252	104	0	<0.890	-	0
Anvil Range	116.0	-	0	216	-	0	0.72	-	0
	Mercury			Nickel			Selenium		
	Insufficient data			P < 0.10			P < 0.10		
	age factor = not determined			age factor = 0			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	-	-	-	<1.779	-	+	<3.560	-	+
Anvil Range	<0.05	-	-	0.08	-	0	2.2	-	0
	Silver			Thallium			Zinc		
	Insufficient data			P < 0.10			No significant difference		
	age factor = not determined			age factor = not determined			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	-	-	-	0.833	0.054	+	157	132	0
Anvil Range	5.32	-	-	<0.01	-	0	59.5	-	0

Table F19. Statistical Comparison between Elemental Concentrations in Kidney of Yukon Sheep and Sheep Hunted Close to Anvil Range Mine

	Antimony			Arsenic			Barium		
	P < 0.10			P < 0.10			No significant difference		
	age factor = +			age factor = +			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	<1.3	-	+	<3	-	+	1.059	0.816	0
Anvil Range	<0.01	-	0	<0.01	-	0	1.58	-	0
	Cadmium			Chromium			Cobalt		
	No significant difference			No significant difference			P < 0.10		
	age factor = 0			age factor = +			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	11.46	10.44	0	<1.3	-	0	<1.3	-	+
Anvil Range	9.18	-	0	1.2	-	0	0.18	-	0
	Copper			Iron			Lead		
	No significant difference			P < 0.10			P < 0.10		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	23.3	7.0	0	245	53	0	1.14	0.64	+
Anvil Range	14.4	-	0	384	-	+	0.41	-	0
	Mercury			Nickel			Selenium		
	No significant difference			No significant difference			P < 0.10		
	age factor = 0			age factor = 0			age factor = +		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	0.673	0.566	0	<3	-	0	<5	-	0
Anvil Range	0.250	-	0	0.29	-	0	7.1	-	+
	Silver			Thallium			Zinc		
	Insufficient data			P < 0.10			No significant difference		
	age factor = not determined			age factor = not determined			age factor = 0		
Area	mean	stdev	t-test	mean	stdev	t-test	mean	stdev	t-test
Yukon	-	-	-	1.027	0.572	+	118.2	33.9	0
Anvil Range	0.159	-	-	0.02	-	0	72.3	-	0

Yukon
Department of Renewable Resources

FORM 17
WILDLIFE RESEARCH PERMIT

№ 082

SUBJECT TO THE PROVISIONS OF THE WILDLIFE ACT AND REGULATIONS:

Marie Gallager of Gartner Lee Limited
(NAME)

OF 2251 2nd Ave. Whitehorse, Y.T. Y1A 5W1
(ADDRESS) POSTAL CODE

IS HEREBY AUTHORIZED TO ENGAGE IN WILDLIFE RESEARCH RESPECTING

Voles, mice, shrews, Big Game Animals, Fur bearing and Small Game Animals
Hoary Marmot
(SPECIES)

IN the Faro Area as well as in the Blind Creek/Swim Lakes Area
(LOCATION)

FROM 2004 (YEAR) 09 (MONTH) 04 (DAY) TO 2005 (YEAR) 03 (MONTH) 31 (DAY)

EMPLOYING
- Collection of furbearer carcasses and small game
- Small mammal trapping
- Collection of organs (liver and kidney) and tissue (muscle) samples from hunter killed Big Game.
(METHODS)

CONDITIONS OF PERMIT As per attached conditions

For LICENSEE SIGNATURE

ISSUER SIGNATURE

YG(2405) NC3

Conditions of Wildlife Research Permit #082 issued to Marie GALLAGER of Gartner Lee Ltd. On September 4, 2004 for research and related activities in regard to the Anvil Range Mine Complex Terrestrial Effects Study: Investigation into Metal Concentration in Vegetation, Wildlife and Soils.

---

1. Local First Nation must be advised of research.

2. Small mammal trapping to be completed by the permittee or assistant(s).

3. Small game hunting to be completed by the Department of Environment staff in Faro. (Grouse, Ptarmigan, Ground Squirrel, Hoary Marmot and Beaver)

4. Purchase of carcasses of furbearing animals must be from legally harvested furbearing animals trapped by licenced trappers on their registered trapping concession. Purchase of carcasses is authorized by Wildlife Act Permit #1193.

5. Collection of organs (liver and kidney) and tissue (muscle) is to be a joint effort between the permittee, Mary Gamberg and the Department of Environment staff in Faro. Purchase of organs or tissue is not allowed or authorized.

6. Employ of a local hunter to collect grouse, ptarmigan, ground squirrel, hoary marmot or beaver is not allowed or authorized.

7. Samples sent out of the Yukon for analysis must be accompanied by a Wildlife Export Permit.

8. A person who obtains a wildlife research permit shall furnish a conservation officer, upon completion of the research, a report that fully discloses the results of the research and the conclusions derived from it.

9. A Wildlife Research Permit does not authorize the holder or any person named in the permit, to do any act that is prohibited under the Act except to the extent provided in the permit in respect of sections 15 and 60, subsections 17(1), 21(2), 24(3), 31(1) and 91(1), paragraphs 96(2)(a) and 97(2)(a) and subsections 27(3) in respect of the use of drugs only.

Yukon
Environment
Environnement

1193

WILDLIFE ACT PERMIT

subject to the provisions of the *Wildlife Act* and regulations

PERMIS DÉLIVRÉ EN VERTU DE LA LOI SUR LA FAUNE

sous réserve des dispositions de la Loi et de ses règlements d'application

Last name • *Nom de famille*: GALLAGER

First name and initials • *Prénom usuel et autres prénoms*: Marie of Gartner Lee Limited

Address–number and street or box number • *Adresse–numéro civique ou casier postal*: 2251 2nd Avenue

Town, city • *Ville, village*: WHITEHORSE

Territory, province, state • *Territoire, province, État*: Y.T.

Postal code • *Code postal*: Y1A5W1

Other (e.g. country, etc.) • *Autre (ex: pays, etc.)*:

is hereby authorized to offer to
est par la présente autorisé(e) à purchase and purchase carcasses of fur bearing animals legally harvested by licenced Trappers on their Registered Trapping Concessions, re: Wildlife Research Permit #082.

from / *du*: 2004 (Y•A) 09 (M•M) 04 (D•J)

to / *au*: 2005 (Y•A) 03 (M•M) 31 (D•J)

pursuant to section / *conformément à l'article*: 102 Wildlife Act

Issued at / *Délivré à*: WHITEHORSE, Yukon / *au Yukon*

☐ Subject to attached conditions / *Sous réserve des conditions ci-jointes*

on / *le*: 2004 (Y•A) 09 (M•M) 04 (D•J)

ISSUER • *DÉLIVRÉ PAR*

For PERMITTEE • *TITULAIRE*

Personal information contained on this form is collected under the *Wildlife Act* and associated Regulations and will be used by the Department of Environment for research, statistical and enforcement purposes. For further information, contact the Department of Environment at (867)667-5652 or 1-800-661-0408 within the Yukon.

Les renseignements personnels contenus dans le présent formulaire sont recueillis en vertu de la Loi sur la faune et des règlements d'application, et ils seront utilisés par le ministère de l'Environnement à des fins de recherche, de compilation de statistiques et d'exécution de la Loi. Pour obtenir de plus amples renseignements, communiquez avec le ministère de l'Environnement, au (867) 667-5652 ou au 1-800-661-0408 (à l'intérieur du Yukon).

YG (646)NC4 Rev. 02/2002

Yukon
Environment
Conservation, Protection and Public Education Branch

PO Box 98, Faro, Yukon Y0B 1K0
Telephone (867) 994-2862 FAX (867) 994-3433

March 1, 2005

Gartner Lee, Ltd
2251 2nd Ave.
Whitehorse, YT
Y1A 5W1

Attention: Marie Gallagher

Dear Marie:

RE: Amendment to Wildlife Research Permit # 082.

Please be advised that this letter is to amend Yukon Wildlife Act Research Permit # 082, issued to your company on September 4, 2004, expiring March 31, 2005. Note that this letter of amendment is not intended to change any of the content or conditions of the original permit, but is intended to add the following element to the Conditions attached to Permit #082, as follows:

"The permittee may trap Marten, to a maximum of six (6), for the purposes of this research, in the designated research area. This trapping is to be conducted prior to March 31, 2005. As has been agreed upon with the Ross River Dena Council, the pelts of the trapped Marten will be given to elder Annie Ladue. The permittee may designate any qualified person(s) to collect the Marten, in accordance with this permit."

It should be noted that as of this date, the permittee has designated the Conservation Officers in Faro and Ross River to do the collection of these Marten.

If you have any questions or concerns, please do not hesitate to call.

Sincerely,

Kirby Meister
Faro District Conservation Officer

Cc Ross River Dena Council
TJ Grantham, Ross River District Conservation Officer
Ken Knutson, Regional Manager, North

Anvil Range Mine 2004 Metals Study

Background

Some of you may already be aware through public meetings and word of mouth of Gartner Lee's activities in and around the Anvil Range Mine this year. For those of you who may not be aware of the work we are doing, we have put together a brief summary of our activities to date as well as some information on the context of this study and an outline of ways in which you can contribute to the study if you would like to.

The Anvil Range Mine 2004 Metals Study was initiated following the findings of a previous metals study conducted by Gartner Lee and CE Jones and Associates in 2003. The 2003 study investigated metal levels in the immediate vicinity of the Anvil Range Mine and found that metal levels in plants and soils were higher in the Anvil Range Mine area compared to reference areas in Swim Lakes and that high metal levels were observed at least 2 to 3 km from the mine site. To better understand the possible impacts of metals on the terrestrial environment (wildlife, plants and soils) of this area a commitment was made by the receiver of the Anvil Range Mine, Deloitte and Touche Inc., to conduct a more detailed study and this formed the basis of the 2004 Metals Study. The findings of this 2004 Metals Study will feed into on site care and maintenance activities and into the development of the Final Closure and Reclamation Plan for the Anvil Range Mine Complex.

Field Sampling Program

For the past few months, field ecologists and technicians from Gartner Lee and CE Jones have been active in the vicinity of the Anvil Range Mine and in our reference areas of Swim Lakes collecting samples of soils, vegetation and small mammals for the purposes of the 2004 Metals Study. The sections below describe the specific objectives of the 2004 Metals Study and how we have aimed to meet the objectives of this study through sample collection and analysis.

How far from the mine are metal levels elevated?

Soils and vegetation samples have been collected from approximately 160 sites in the vicinity of the Anvil Range Mine. Sample sites were located as far away as the confluence of Anvil Creek and the Pelly River but were mostly concentrated within 10 km of the mine site. Sampling focused around the footprint of the mine but was also conducted around the Town of Faro and the connector road between the mine and Faro. With this method of sampling we have attempted to not only sample much farther from the mine than in 2003 but also with a greater density of sample points. As a result we hope to better understand the relationship between metal concentrations and distance.

Since reindeer lichen was shown in the 2003 study and other studies to be particularly sensitive to air borne contamination, this species has been selected to determine how far metal levels are elevated from the mine. Reindeer lichen was common within the study area and was found at 117 of the sites sampled. All 117 samples have been sent to Soilcon laboratories for metals analysis.

What are the Natural Metal Levels in Soil and Vegetation?

Near-surface ore bodies mined by open-pit methods are frequently associated with more widespread mineralization of surficial materials and soils. This can lead to naturally occurring elevated metal concentrations in both soils and vegetation in areas surrounding a mineral deposit. It is therefore important that such concentrations not be mistaken as evidence of contamination resulting from mining operations. For this reason, reference sampling locations were carefully chosen to be located in areas of natural mineralization that would be free from additional mine site impacts. Geological reports on the Anvil Range Mine area indicate a zone of mineralization trending from north west of the Faro pit, through the mined deposits and to the southeast as far as the Swim Lake basin. This information suggests the Swim Lake basin as the most representative reference sampling location. Soils and vegetation samples were therefore collected from over 20 sites in the reference areas of Swim Lakes (in addition to the existing seven sample points reported in 2003). Reindeer lichen was found at 13 of the 2004 sites sampled and all 13 samples have been sent to Soilcon laboratories for metals analysis. Soil samples and other vegetation samples (see below) are also available for analysis and will be sent to Soilcon laboratories once the first round of analysis (from lichen) is complete. All fieldwork described above was conducted by Justin Straker (CE Jones and Associates), Jason Acklack (Ross River Dena Council), George Magrum (Selkirk First Nation) and Marie Gallagher (Gartner Lee Limited).

Jason, Marie and Justin collecting soil and vegetation samples

Is Metal Deposition Ongoing?

Moss bag analysis is a standard low-technology method for assessing both dry and wet (*e.g.*, dust and precipitation-based) deposition of airborne contaminants. Moss was collected from the Ross River area in early summer this year and sent to Soilcon laboratories for preparation and pre-exposure testing. In August, 34 moss bags were deployed on the project area in the vicinity of the Anvil Range Mine, the Town of Faro and the Swim Lakes reference area. Three bags were deployed at each site and will be collected at intervals over the fall and winter seasons. The first pick up is scheduled for late October and aims to sample potential ongoing airborne deposition between mid-August and late October to represent the fall season. The second pick up is scheduled for mid-January and aims to sample a period representative of early winter. The third pick up in March will aim to sample late winter. These samples will be sent to Soilcon laboratories for analysis. Any detected increases in metal concentrations in moss from pre-exposure concentrations are indicative of airborne deposition. All moss bags were created by George Magrum and Marie Gallagher and deployed by Jason Acklack and Marie Gallagher.

Moss bags deployed on trees on the project area.

What are the present metal levels in plants important to people and wildlife?

In order to investigate potential element uptake by vegetation species of importance to wildlife (*i.e.,* forage species) and / or humans (*e.g.,* species used for medicinal use and / or consumption) selected vegetation species were sampled. Soil samples were also collected at known mineral lick sites. These data can be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future terrestrial risk analysis.

Vegetation species identified through literature review, traditional and local knowledge to be important to people and wildlife were sampled whenever encountered during fieldwork activities. Vegetation collected includes samples of grasses and sedges; horsetails; forbs (*e.g.,* coltsfoot); Labrador tea; berries; willow; roots (bear root); tree sap and mushrooms. Over 300 samples of vegetation species of importance to people and / or wildlife were collected from the vicinity of the mine site, the Town of Faro and the Swim Lakes reference area. Soils were also collected wherever these vegetation species were sampled to assist in the interpretation of the resulting analysis, *i.e.,* enabling interpretations of sources of any elevated metal concentrations in vascular (rooting) plants as being from either surface deposition or derived from subsurface mineral soil geochemistry. Soil samples were also collected from two mineral lick sites near the mine site that were identified to be important to sheep and caribou.

Mineral lick site in the vicinity of the Anvil Range Mine

What are the present metal levels in wildlife tissues?

In order to investigate potential metal uptake by wildlife (including wildlife species of importance to humans), selected wildlife species will be sampled and analyzed. These data can then be used to investigate the extent of elevated metal concentrations in the food chain by feeding into a future terrestrial risk analysis. We have considered three main groups of animals to be important in this evaluation: small mammals such as voles and shrews (given their significance as a food species of many other animals such as marten and foxes), furbearers such as snow shoe hare and marten (given their significance as a food species of people and wildlife and their position in the food chain as consumers of other animal species) and hunted animals such as moose and grouse (given their significance as a food species of people and wildlife).

Small Mammals

Small mammal trapping was conducted during September of this year for the purposes of metals analysis. This type of analysis requires that liver, kidneys and muscle tissue be sampled and therefore requires that the animal be sacrificed. In an attempt to reduce the impact of mortality on the overall population, sampling was conducted in the fall since small mammal populations are known to be highest then. Populations fluctuate annually with low populations occurring in winter and high populations occurring after the breeding season, typically in fall.

Trap lines were laid out in the immediate vicinity of the mine site and in the Swim Lake reference areas. A combination of standard snap traps and pit fall traps were placed in areas where small mammals were anticipated to be found, *e.g.,* outside tunnel entrances, under logs and near the base of trees with low, over-hanging branches. Traps were left undisturbed for an average of 48 hours and then checked for specimens, removed and placed elsewhere. Specimens were weighed, sexed, aged and identified to species and then stored for analysis. Dean Gill (Selkirk First Nation) and Marie Gallagher conducted all aspects of the small mammal trapping program. Small mammal carcasses will be sent to Mary Gamberg of the Northern Contaminants Country Foods Program for processing and then sent to Soilcon and Elemental Research laboratories for metals analysis.

Furbearers

It is hoped that the carcasses of furbearers (*e.g.*, snow shoe hare and marten) will be collected from members and associates of the Ross River Trapping Group active in the vicinity of the Anvil Range Mine and the Swim Lakes reference areas during this fall and coming winter (see below ***How You Can Help***). Carcasses will be collected by the Conservation Officer Service in Faro and Ross River and then sent to Mary Gamberg of the Northern Contaminants Country Foods Program for processing and then sent to Soilcon and Elemental Research laboratories for metals analysis.

Since beaver are currently not trapped in this area a special permit was obtained from Yukon Government Department of Environment to allow the Conservation Officer Service in Faro to collect specimens of beaver for the purposes of this study.

Hunted Animals

It is hoped that tissues from hunter killed animals (*e.g.*, moose, caribou, sheep, black and grizzly bears) will be collected from hunters active in the vicinity of the Anvil Range Mine and the Swim Lakes reference areas during this fall (see below ***How You Can Help***). Liver, kidneys, muscle tissue and the lower jaw of hunted animals can be submitted to the Conservation Officer Service in Faro and Ross River and then sent to Mary Gamberg of the Northern Contaminants Country Foods Program for processing and then sent to Soilcon and Elemental Research laboratories for metals analysis.

Since specimens of grouse, ptarmigan, ground squirrels and hoary marmots would require the complete carcass for analysis, a special permit was obtained from Yukon Government Department of Environment to allow the Conservation Officer Service in Faro to collect specimens of grouse, ptarmigan, ground squirrels and hoary marmots for the purposes of this study. Although the hunting of small game would typically require a small game hunting license, in this situation where complete carcasses of small game are required for processing (and therefore cannot be consumed) a special permit is required.

How You Can Help

Trappers

If you are a trapper who traps in the vicinity of the Anvil Range Mine or the Swim Lakes area, you could contribute to this study by submitting your furbearer carcasses for metal analysis. A financial reimbursement of $20 is offered for each carcass submitted to this study. Carcasses must be of animals trapped from the immediate vicinity of the Anvil Range Mine or the Swim Lakes reference area and must have been stored within a sealed (tied or taped) clean plastic bag, frozen as soon as possible and kept frozen until submission. While the location of where the animal was trapped is important for our analysis it is also recognized that this information is private. Therefore we have asked that trappers identify the location of where their animal was trapped by 1 km grid cell rather than exact location. Furthermore, the location to grid cell will also remain confidential and will not be displayed on any published or publicly available maps. Carcasses can be submitted to the Conservation Officer Service in Faro and Ross River.

Hunters

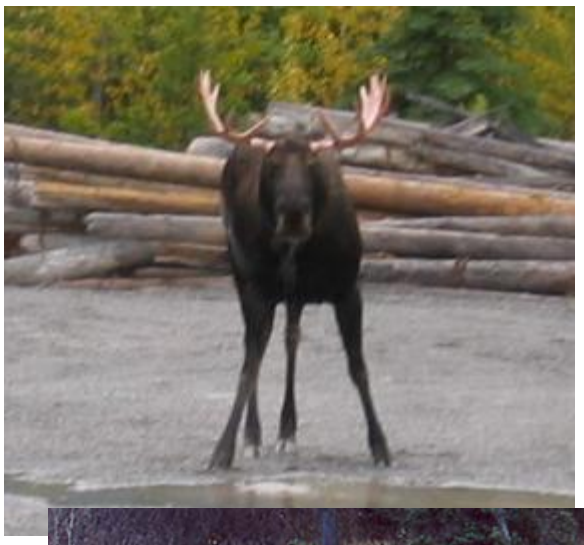
If you are a hunter who hunts in the vicinity of the Anvil Range Mine or the Swim Lakes area you could contribute to this study by submitting liver, kidney, muscle and lower jaw from your moose, sheep, caribou or bear for metal analysis. Since it is unlawful for us to exchange funds for the donation of tissues from hunted animals (ungulates and bears), we have proposed that instead you can enter you name into a draw for a custom made hunting knife made by Larry Durand of Tagish Lake.

Custom Made Hunting Knife

Tissues must be of animals hunted from the immediate vicinity of the Anvil Range Mine or the Swim Lakes reference area and must have been stored within a sealed (tied or taped) clean plastic bag, frozen as soon as possible and kept frozen until submission. While the location of where the animal was hunted is important for our analysis it is also recognized that this information is private. Therefore we have asked that hunters identify the location of where their animal was hunted by 1 km grid cell rather than exact location. Furthermore, the location to grid cell will also remain confidential and will not be displayed on any published or publicly available maps. Wildlife tissues can be submitted to the Conservation Officer Service in Faro and Ross River.

If you are interested in this study, look out for advertisements of our upcoming Open Houses in Faro, Pelly Crossing and Ross River during February / March this winter. If you have any questions or comments regarding this project, please do not hesitate to contact Marie Gallagher at Gartner Lee Whitehorse at (867) 633 6474 ex 32.

Attention Hunters



Would you like to contribute to the Anvil Range Mine 2004 Metals Study by donating wildlife tissues (liver, kidney and muscle) for analysis?

We are particularly interested in the tissues of caribou, sheep, moose, black and grizzly bears hunted in the vicinity of the Anvil Range Mine and from the Swim Lakes area. For each set of tissues donated, your name will be entered into a draw to win a custom made hunting knife.

For more information visit or call your local Conservation Officer in Faro (994 2862) or Ross River (969 2202).

Anvil Range Mine Complex Terrestrial Effects Study:
Investigation into Metal Concentrations in Vegetation, Wildlife and Soils

Background:

As part of a larger study investigating metal concentrations in the terrestrial environment in the vicinity of the Anvil Range Mine, wildlife tissues will be collected and analyzed to investigate the extent of elevated metal concentrations in the food chain. The collection of carcasses of furbearers and small game and of muscle and organs (kidney and liver) from ungulates and bears from around the Anvil Range Mine (with focus on the north side of the Pelly River, see attached map) will provide the samples necessary for this investigation. Your contribution is greatly appreciated.

Please note that completion of this data form does not substitute for the completion of standard submission forms when applicable e.g., Yukon Government Department of Environment Kill Report / Biological Submission Form or the Yukon Furbearer Sealing Certificate. Furthermore, the submission of tissue samples from hunter killed ungulates and bears will also contribute to the ongoing Hunter Survey Program.

It should be noted that not all samples are appropriate for metal analysis. If your tissue samples or carcasses have been improperly handled or stored they may not be suitable for metal analysis. For example, if your sample has come into direct contact with any potentially contaminated surfaces (e.g., truck bed or snow machine), the sample will not be suitable. For this reason, it is important to protect the sample by containing it within a sealed (e.g., tied or taped) clean plastic bag, freezing it as soon as possible and keeping it frozen until submission. For muscle and liver tissue analysis a sample at least the size of a grapefruit is required. For kidney analysis, a whole kidney is required.

Information about the animal you hunted or trapped:

Please provide as much of the following information as you can about the animal you trapped or hunted. Please complete one form for each sample you provide.

Species (e.g., moose, marten) _____
Gender (male, female or unknown) _____
Estimated age (e.g., 4 year old, adult) _____
Confidence in estimate of age (e.g., low, moderate or high) _____
Date animal hunted or trapped (e.g., August 20th, 2004) _____

Information about the location you hunted or trapped:

Please use the gridded map provided to identify the general area where you trapped or hunted the animal you have donated. For example, grid cell K27 would refer an area within the north fork of the Rose Creek drainage.

Grid cell _____

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Information about the sample you donated:

Please tick the following boxes to record which tissues you have donated:

Whole carcass	☐	Kidney	☐
Muscle	☐	Liver	☐
Incisor tooth / lower jaw	☐		

Date sample donated (e.g., August 21st, 2004) _____

Please provide your signature below to acknowledge receipt of your financial reimbursement of $20 (for furbearer carcasses only):

_____

Please note that it is not lawful for us to exchange funds for the donation of tissues from hunted animals (ungulates and bears). Instead, if you donate tissues from these animals you're name will be entered into a draw for a custom made hunting knife (to enter draw please provide contact information below).

Tracking Information:

Please complete the relevant information below for tracking purposes:

Serial No. (from Yukon Kill Report / Biological Submission Form) _____
Serial No. (from Yukon Furbearer Sealing Certificate) _____

Your contact information:

Please provide as much of the following information as you are willing:

Name: _____
Contact phone number, email or address: _____
_____

Thank you very much for contributing to this project. We would be happy to receive any comments or questions you may have with regards to this project (see below). If you would like to contact us directly or would just like an update on the project please do not hesitate to call Marie Gallagher at Gartner Lee Ltd. (Whitehorse) at 867 633 6474 (ex 32).

Comments:

Please use the following space provided for any comments or questions you may have with regards to this project or the samples you provided:

_____
_____
_____

Thank you.

Gartner Lee