Reconnaissance-scale till survey in the New Liskeard-Temagami region, Ontario: kimberlite indicator minerals and geochemistry

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ABSTRACT

This report describes results of a reconnaissance-scale kimberlite indicator mineral (KIM) till survey in the area south of the known Lake Timiskaming kimberlite field, between New Liskeard and Marten River. The survey provides information on the regional background content of KIM in till, the nature of KIM signatures in till just down-ice of known kimberlites, and, the distribution of KIM anomalies that warrant further investigation.

Three phases of flow are associated with erosion, transportation and deposition of till in the region. The main carriers of glacial debris, however, were the two oldest ice flows to the southwest and south. A large dispersal train of Paleozoic limestone derived from upper Lake Timiskaming trends south-southwest across the area, but has been truncated in its proximal part (Latchford area) by the last southeast ice flow indicating that in this area, southeast ice flow was a major carrier of debris. These situations have to be taken into consideration in the interpretation of dispersal trains formed by the three major ice flows.

Mg-ilmenite is the most abundant and widespread KIM in the till in the study area. Chromite occurs in approximately the same till samples that contain Mg-ilmenite, but is generally present in lower abundances. Pyrope in till is approximately half as abundant as Mg-ilmenite. Cr-diopside is similar in abundance to pyrope and is present in almost every sample. Elevated Cr-diopside abundances that are not accompanied by other KIMs likely are not from kimberlite. Anomalous concentrations of kimberlite indicator minerals in till occur: on the Red Squirrel Road; near Temagami; along Highway 11 in the central part of the study area; on the east side of Lake Timiskaming; and on the Rabbit Lake forest access road. Some of these anomalies coincide with anomalies identified by the OGS in their recent stream sediment survey (Allan, 2001). Additional till sampling combined with geophysics should be conducted to determine the extent of the KIM anomalies and trace them to their bedrock source, with a sample spacing that is much smaller (<500 m) than used in this reconnaissance survey.

INTRODUCTION

The Geological Survey of Canada (GSC), in collaboration with the Ontario Geological Survey (Operation Treasure Hunt), conducted a regional kimberlite indicator mineral (KIM) till survey in the area south of the Lake Timiskaming kimberlites, between New Liskeard and Marten River. This area is thought to be prospective for kimberlites because of its proximity to and similar bedrock structural features with that of the Lake Timiskaming and Kirkland Lake kimberlite fields further north (Allan, 2001). The Ontario Geological Survey (OGS) recently released the results of a KIM regional stream sediment survey for the Temagami-Marten River area (Fig. 1) (Allan, 2001). The GSC collected widely spaced till samples over a slightly larger area, extending further north to the known kimberlite field near New Liskeard (Fig. 1). These new data complement the OGS stream sediment data, and provide geological information to further aid in the interpretation of indicator mineral anomalies identified by the OGS survey.

Till sampling was carried out in 2000 at a reconaissance-scale. Results from the sampling: 1) provide information on the regional ice flow patterns that may have dispersed indicator minerals; 2) document the glacial dispersal of Paleozoic carbonate rocks from the New Liskeard area; 3) provide information on the distribution and extent of glacial dispersal of kimberlite indicator minerals from the known kimberlites near New Liskeard; and, 4) identify indicator mineral anomalies in till warrant further investigation.

Location and access

Samples were collected over a 2400 km^2 area between 47°38′ and 46°48′N and 78°19′ and 80°08′W (Fig. 2 and 3), which cover parts of six NTS map sheets: 31M/12, 31M/5, 31M/4, 31L/3, 31L/14, 41P/1. The area is bisected north to south by Highway 11 and east to west by several forest access roads and includes the towns of New Liskeard, Cobalt, Latchford and Temagami. Lake Temagami forms the western boundary and Lake Timiskaming trends southeast along the east side of the study area.

Previous kimberlite exploration

In the Lake Timiskaming region, the search for diamonds dates back to the early 1900's (e.g. The Mining Journal, 1906). Exploration activities on the east side of Lake Timiskaming continued in the 1960's (Brummer et al., 1992a,b). Monopros Ltd. discovered the first kimberlite in the region, the Bucke pipe, in 1984 (Brummer et al., 1992a,b). Since the initial discovery, three kimberlites have been discovered northeast of Lake Timiskaming in Quebec and nine additional kimberlites have been discovered west of Lake Timiskaming in Ontario (Figs. 2 and 3). The most recent discoveries are the three kimberlites northwest of New Liskeard, found by Sudbury Contact Mines Ltd. in 1995 (Zalnieriunas and Sage, 1996; Sage, 1998). Kimberlite boulders have been found in eskers near Cobalt and Lac Baby (Fig. 2). Sage (1996, 2000) has published descriptions and mineral chemistry for all of the Lake Timiskaming kimberlites except the three kimberlites discovered by Sudbury Contact Mines Ltd.; as yet, there are no published mineral chemistry or abundance data for these three kimberlites.

Figure 1. Location of areas covered by this study (grey shaded box) and the OGS stream sediment heavy mineral survey (dashed line) in northeastern Ontario.

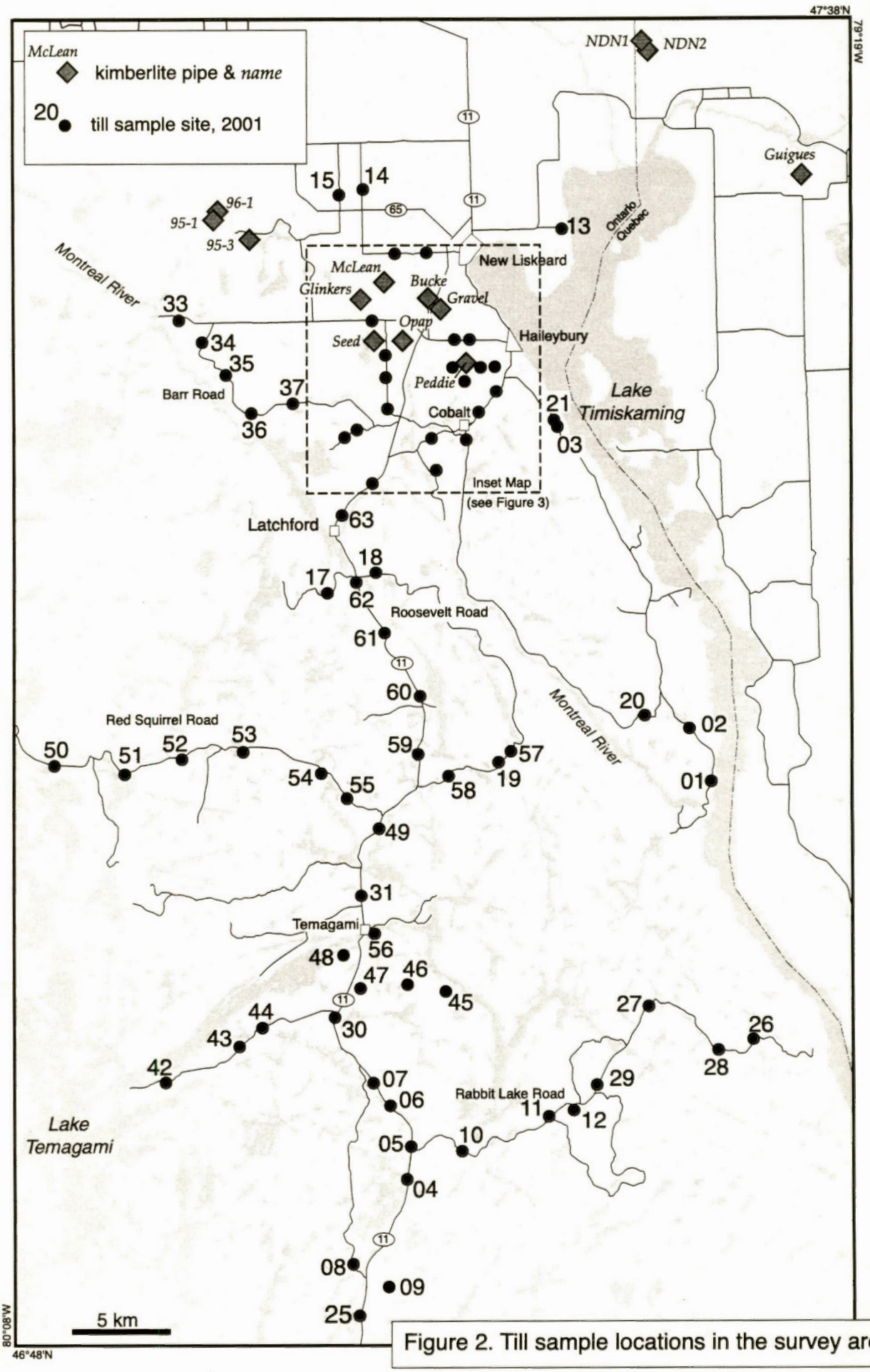

Figure 2. Till sample locations in the survey area.

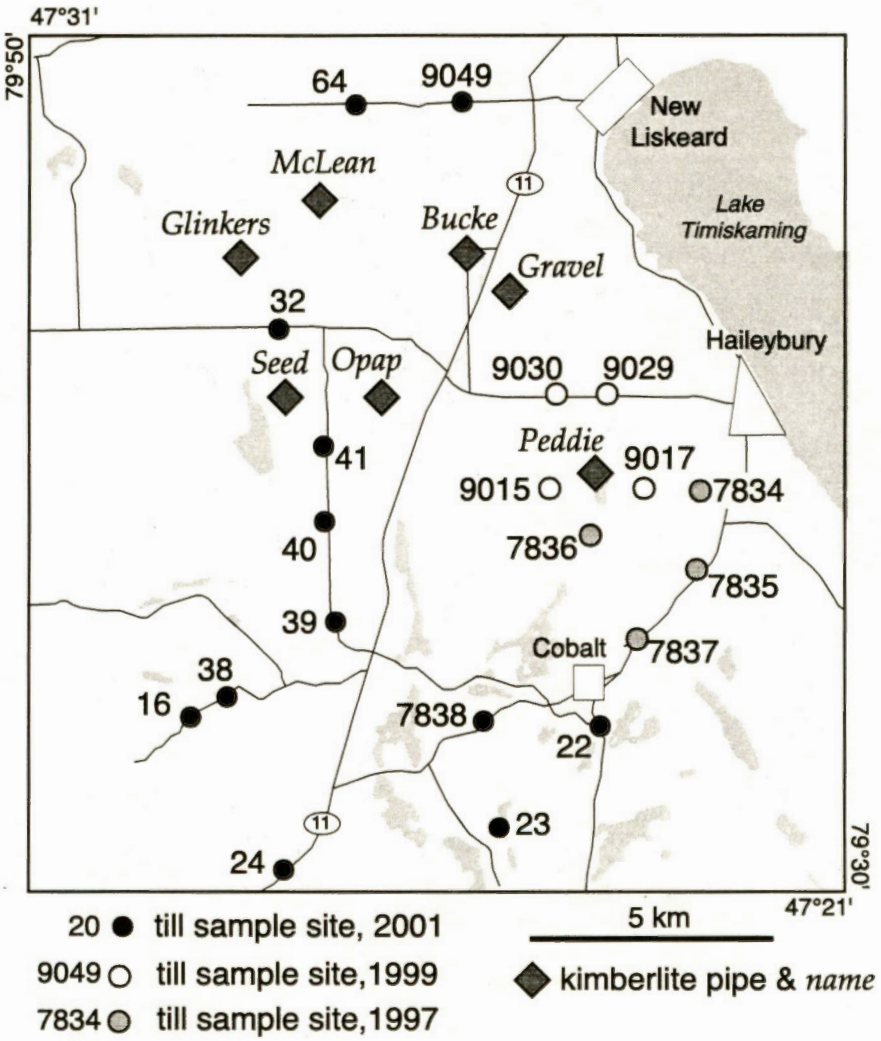

Figure 3. Inset map from Figure 2: location of known kimberlites and till sample locations near New Liskeard and Cobalt.

Quaternary geology

During the Wisconsinan, the Lake Timiskaming region was covered by the Laurentide Ice Sheet which deposited a silty sand till. Till thickness varies from <1m to occasionally >5m (Photo 1). Where the till is thin, it is generally more locally derived (Photo 2). Striated bedrock records ice flow patterns across the region record evidence of three major ice flow phases (Fig. 4). The oldest flow (Phase 1) was towards the southwest. This flow likely was associated with the main phase of the Laurentide ice sheet. During deglaciation, ice flow shifted southward (Phase 2). During final deglaciation of the area, local ice tongues from the main ice sheet occupied the structural depressions of the Montreal River and Lake Timiskaming, giving rise to ice flow towards the southeast (Phase 3). All three phases of ice flow are associated with erosion, and transportation and deposition of till in the region. The main carriers of glacial debris, however, were the two oldest ice flows.

A large dispersal train of Paleozoic limestone derived from upper Lake Timiskaming trends south-southwest across the area (Veillette, 1996), but has been truncated in its proximal part by the last southeast ice flow (Veillette, 1989; 1996). Discontinuous patches of carbonate-rich till occur up to 35 km south of the outlier (Fig. 4). Bedrock outcrops exposed along forest access roads and in the town of Temagami provide excellent sites to examine striated bedrock (Photos 3 and 4) and evidence of the three phases of ice flow (Photo 5). Locations of sites in Photos 1 to 5 are indicated on Figure 4.

Glaciofluvial deposits, generally in the form of eskers, consist of sand and gravel and were deposited along bedrock valleys (Boissoneau, 1968; Veillette, 1986a, 1996). In the southeast part of the area, the Lake McConnell recessional moraine trends northeast. As the glacier retreated northward approximately 9500 years ago, glacial Lake Barlow ponded in front of the ice sheet and thick sequences of fine grained glaciolacustrine sediments were deposited (Vincent and Hardy, 1979; Veillette, 1988, 1989, 1996). Glacial Lake Barlow receded from the New Liskeard area approximately 8000 years ago (Veillette, 1994) and surficial sediments, including till, have been exposed to normal postglacial weathering and soil forming processes since that time.

METHODS

Field methods

A total of 64 sites (Appendix A) were sampled in the summer of 2000 from roadcuts or hand dug pits along Highway 11 or forest access roads between New Liskeard and Marten River (Figs. 2 and 3). At each site, a 10 to12 kg till sample was collected for kimberlite indicator mineral analysis and a 2 kg till sample was collected for geochemical analysis of the fine till fraction. In addition to the 64 till samples, information for 9 till samples (9015, 9017, 9029, 9030, 7834, 7835, 7836, 7837, 7838) collected by the GSC in earlier sampling programs in the New Liskeard are included in this data release to provide a broader sample coverage across the survey area, especially around the known kimberlites (Appendix A). The 73 till samples in this study were collected for several purposes: 1) to demonstrate the nature of anomalous kimberlite indicator minerals signatures in till mmediately down-ice of known kimberlites; 2) to provide information on

Photo 1. Thick silty sand till exposed on the east side of Highway 11 during during construction in the summer of 2000, near North Milne Lake (NTS 31L/13). Till samples were collected from several of these fresh roadcuts as part of the regional till sampling program.

Photo 2. Small hummock of locally derived stony sandy till near Portage Bay on Bay Lake (NTS 31M/5). Till samples were collected from many sites such as these as part of the regional till sampling program.

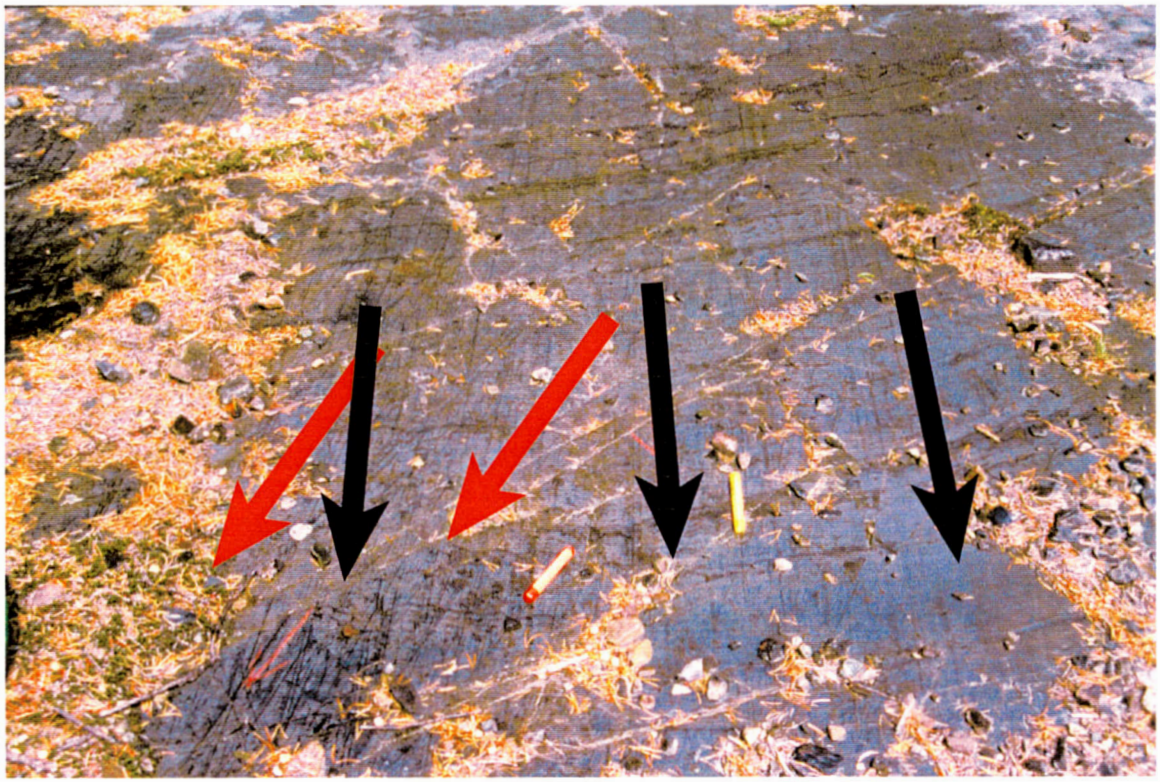

Photo 3. Cross-striated outcrop of metasedimentary rocks on the Barr Forest Access Road, north of the Montreal River showing evidence of two phases of ice flow: 1) older flow towards 230 (red arrows); and, 2) younger flow towards 205 (black arrows) (NTS 31M/5).

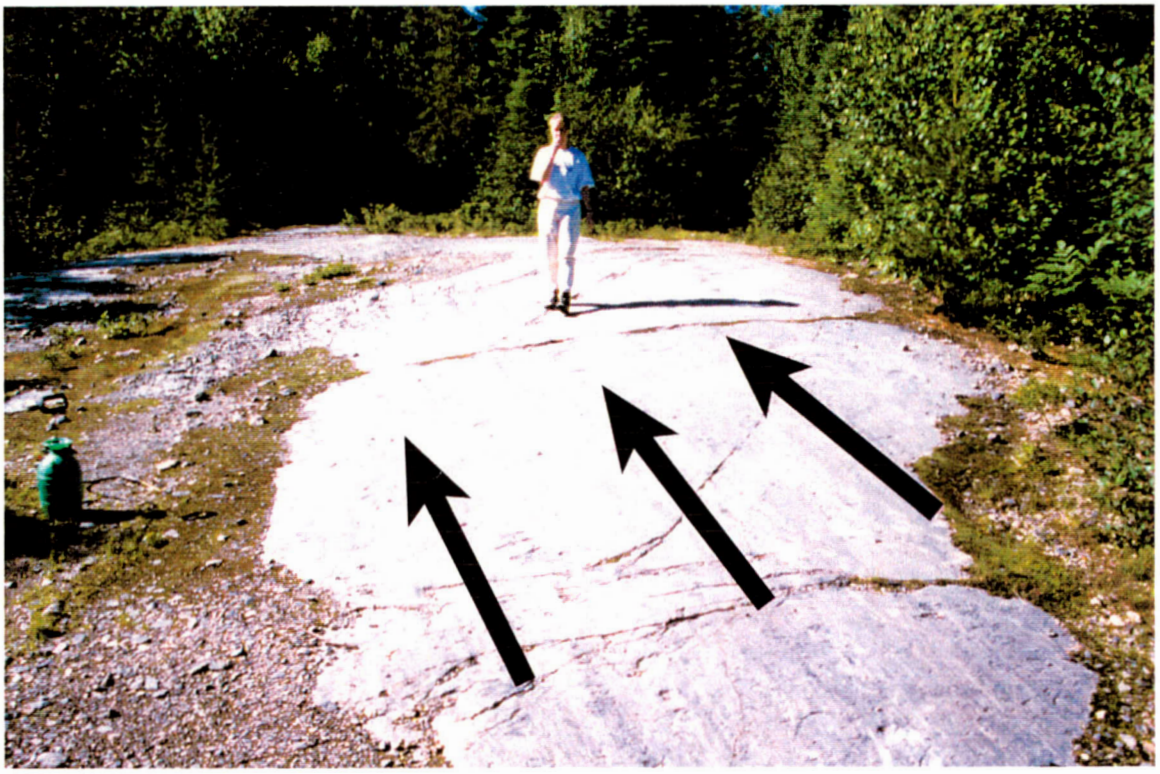

Photo 4. Broad flat expanses of striated metasedimentary rocks are well exposed on the Roosevelt Forest Access Road, east of Highway 11. Bedrock at this site is striated at 165 (black arrows) (NTS 31M/5).

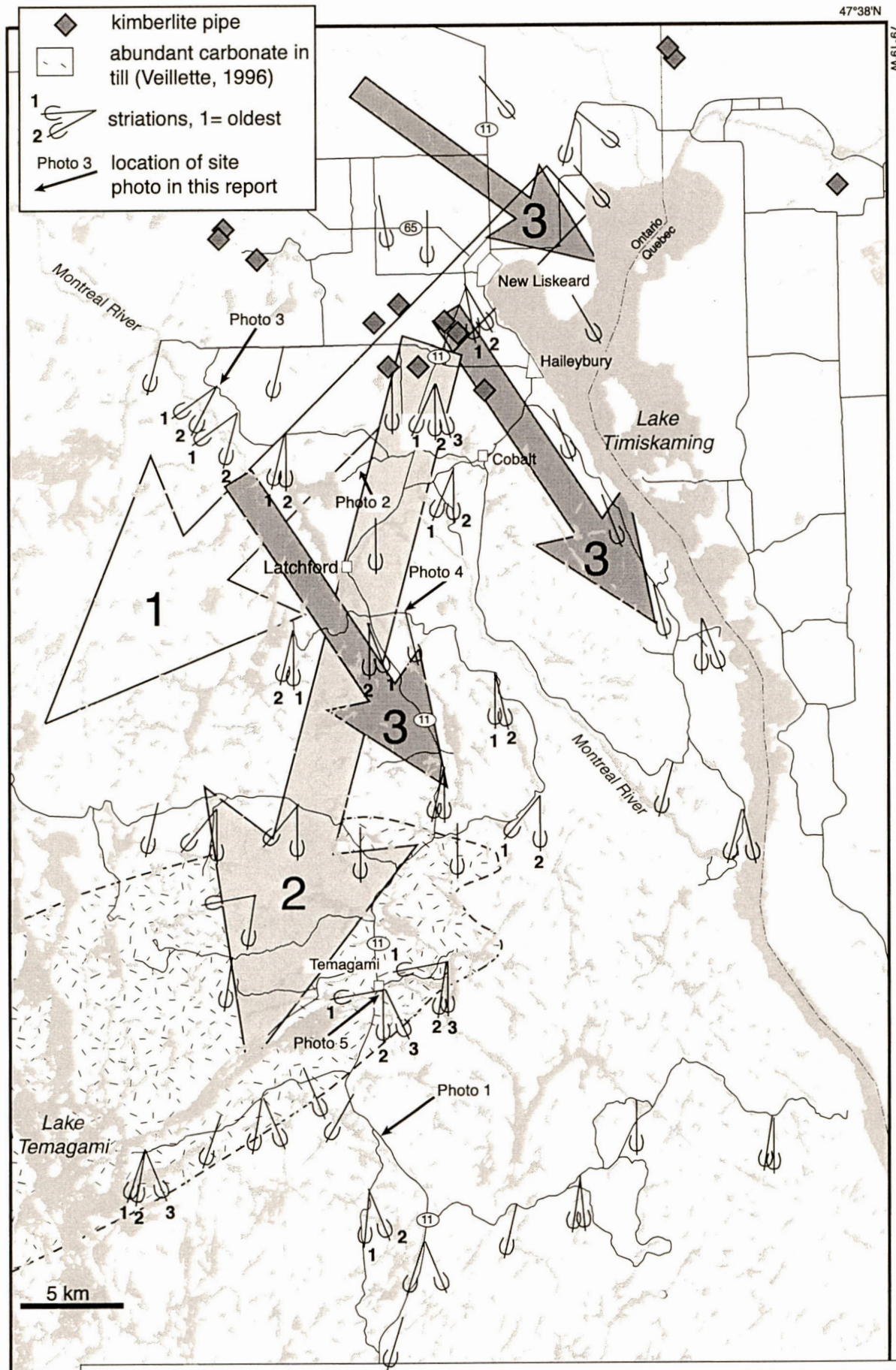

Figure 4. Selected striations in the study area and locations of Photos 1 to 5. Large arrows indicate the 3 main phases of ice flow (1 = oldest). Ice flow sequence from Veillette (1996).

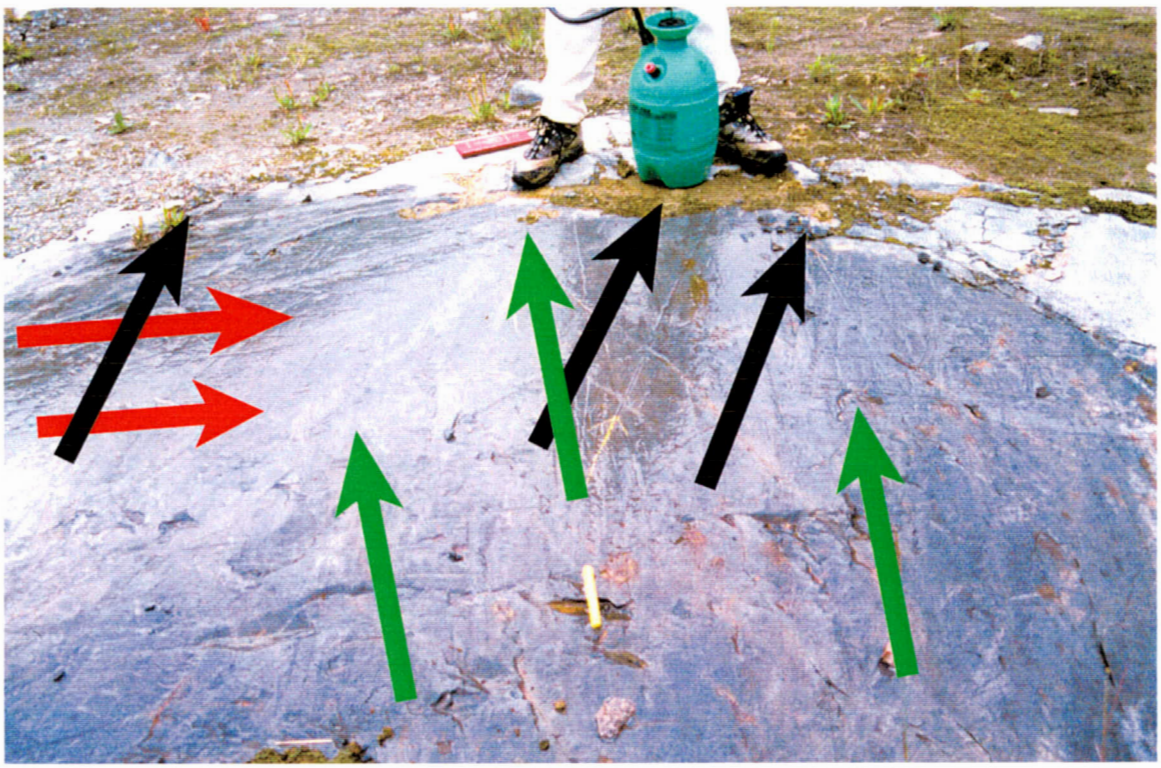

Photo 5. Cross-striated bedrock showing evidence of three phases of ice flow is well exposed on the access road to the Temagami Fire Tower, from oldest to youngest: 1) 255 (red arrows); 2) 180 (black arrows); and, 3) 155 (green arrows)(NTS 31M/4).

background concentrations of KIMs; 3) to identify anomalous KIM concentrations further down-ice and in areas that do not contain known kimberlites that warrant further investigation; and 4) to document the glacial dispersal of carbonate-rich till from the New Liskeard outlier. Striations were measured on fresh, well polished bedrock outcrops exposed mainly along forest access roads between New Liskeard and Marten River. These new striation data were combined with those of Veillette (1986b; unpublished data) to provide an overview of local and regional ice flow patterns that could have dispersed indicator minerals. Striation data for approximately 350 sites across the study area have recently been released as GSC Open File 3385 (McClenaghan and Veillette, 2001) and are summarized in Figure 4.

Sample preparation

Sample preparation and processing is summarized in Figure 5. The 10 to 12 kg till samples were processed by Overburden Drilling Management Ltd., Nepean, Ontario, to recover heavy mineral concentrates for examination of kimberlite indicator minerals as well as gold grains (sample A- Fig. 5). Weights for all sample fractions produced during the processing procedure are reported in Appendix B. The >2 mm (+10 mesh) material was screened and retained for pebble lithology classification. The <2 mm (-10 mesh) fraction was screened to obtain the <1.0 mm fraction, which was then processed using a combination of tabling and heavy liquid separation.

The <1.0 mm material was passed over a shaking table twice to obtain a preconcentrate, which was then panned to recover and count gold grains. The preconcentrate was then further refined using heavy liquid separation in methylene iodide (MI) diluted with acetone to a specific gravity (S.G.) of 3.2 to separate the light and heavy mineral fractions. Methylene iodide was diluted from full strength (S.G. 3.3) to maximize the recovery of Cr-diopside (S.G.≥3.2), the kimberlite indicator mineral with the lowest specific gravity. The ferromagnetic heavy minerals were removed using a hand magnet leaving a <1.0 mm non-ferromagnetic heavy mineral fraction for picking. This combination of tabling and heavy liquid separation was used to recover kimberlite indicator minerals because it also allows for the recovery of gold and sulphide grains, an important consideration in parts of the study area. The <1.0 mm non-ferromagnetic heavy mineral concentrates were then sieved into three fractions: <0.25 mm (-60 mesh), 0.25 to 0.5 mm (-35+60 mesh) and 0.5 to 1.0 mm (-18+35 mesh), of which only the 0.25 to 0.5 mm fraction was picked for KIMs.

The 2 kg till samples (sample B-Fig. 5) were freeze dried and sieved through stainless steel sieves at the GSC Sedimentology Lab to recover the <0.063 mm fraction for geochemical analysis at commercial labs. Samples were analyzed in the GSC Sedimentology Lab to determine grain size characteristics (% clay, silt and sand) and to determine carbonate content of the <0.063 mm fraction using the Leco method.

Kimberlite indicator mineral identification

The 0.25 to 0.5 mm fraction of each till sample was examined by I. & M. Morrison Geological Services, Delta, B.C., using stereoscopic and petrographic microscopes

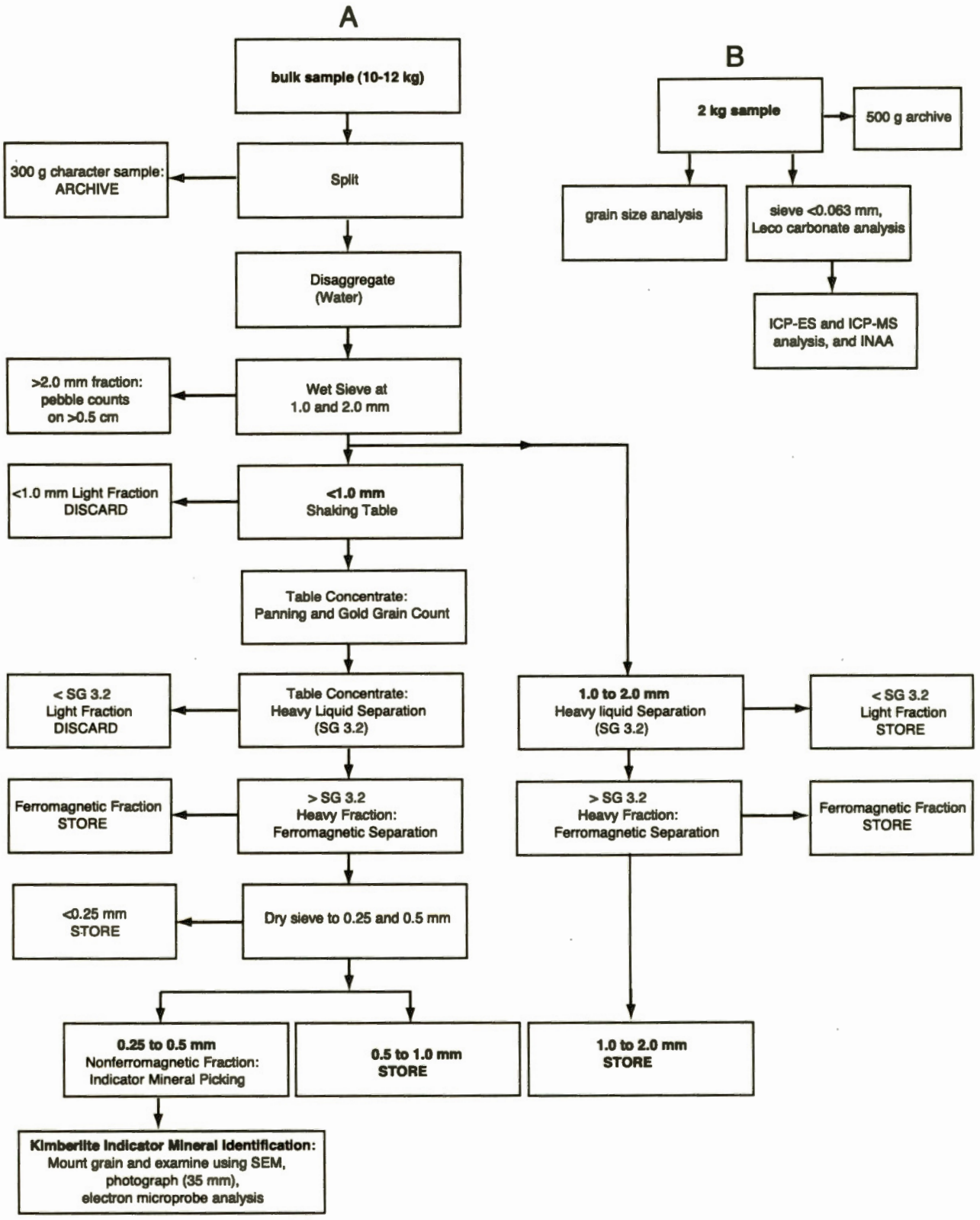

Figure 5.Sample processing flow diagram for: a) 10 to 12 kg till samples, for preparation of non-ferromagnetic heavy mineral concentrates and picking of kimberlite indicator minerals from the 0.25 to 0.5 mm fraction; and, b) 2 kg till samples for geochemical analysis of the <0.063 mm till fraction.

and potential KIM were selected. Indicator minerals were identified on the basis of visual properties, such as colour, grain morphology and/or the presence of adhering kimberlite matrix material. Visually distinguishing characteristics of each indicator mineral are summarized in Table 1. Minerals picked included: Cr-pyrope; pyrope; Cr-diopside; Mg-ilmenite; chromite; and, olivine. All picked grains were mounted in 25 mm epoxy mounts and polished by Lakefield Research in preparation for electron microprobe analysis to confirm their identity.

Electron microprobe analyses were carried out at the GSC using operating conditions similar to those described by McClenaghan et al. (1999). Analyses were completed using a four spectrometer Cameca SX50 electron microprobe and all grains were analyzed using what is referred to internally as the "DIAMOND" routine for silicates (garnets, clinopyroxene, olivine) and the "SPINEL" routine for the oxides. These routines were developed by the GSC to analyze for the major elements required to identify the potential mineral species using a minimum of probe time. Microprobe analyses are included in Appendix C.1 (digital data file only, on CD-ROM accompanying this report). Microprobe analyses for those minerals identified as kimberlite indicator minerals are listed in Appendix C.2 to C.5.

Microprobe data were sorted by chemical composition and the grains were labeled with mineral names. For minerals and mineral groups that form solid solution series, theoretical endmembers compositions (LeMaitre, 1982, Table A13) were used to calculate threshold values (at approximately 50:50 mol %) for individual members of binary solid solution series. These threshold values are shown in Table 2. For minerals that contain substantial amounts of more than two endmembers (which is the case for most garnets and spinels), the threshold values were lowered accordingly (<50 mol % of one endmember). In equivocal cases, molar fractions of the critical oxides were calculated in order to assess the endmember with the highest (name giving) proportion. Other minerals were identified by comparing wt. % oxides to published analyses (e.g. Deer et al., 1978, 1982). Mineral names of grains with low totals were set in brackets. Prefixes were added to some of the indicator mineral names to emphasize elevated contents of petrogenetically critical elements such as Mg, Cr, and Ti which are important in distinguishing between potential kimberlite minerals and those from other bedrock sources. Threshold values for these prefixes (see Table 2) were chosen arbitrarily and might differ from those used by other authors. Readers are encouraged to examine the microprobe data and reclassify indicator minerals using their own criteria.

Table 1. Summary of distinguishing characteristics used to visually identify kimberlite indicator minerals in heavy mineral concentrates.

Mineral	Colour	Other distinguishing characteristics
Cr-pyrope	purple	kelyphite rims, adhering kimberlite matrix
Cr, Ti- pyrope	orange-red to deep red	kelyphite rims, adhering kimberlite matrix
Cr-diopside	emerald green	cleavage
Mg-ilmenite	black	unbroken grains appear as irregular to round shaped black grains with grey/white coatings, perovskite overgrowths; metallic black with conchoidal fractures on broken surfaces
chromite	black, reddish brown around grain edges	octahedral crystal shape to irregular shaped grains
olivine	colourless to pale yellow	conchoidal fracture

Table 2. Classification criteria for identifying minerals.

	Criteria	Mineral name
Al-garnet	> 21 wt.% MnO =	Spessartine
Al-garnet	> 13 wt.% MgO =	Pyrope
Al-garnet	> 17 wt.% CaO =	Grossular
Garnet	< 11 wt.% Al_2O_3 & >13 wt.% CaO =	Andradite
Garnet	> 15 wt.% Cr_2O_3 &>17 wt.% CaO =	Uvarovite
Andradite	> 2 wt.% Cr_2O_3 =	Cr-Andradite
Andradite	> 5 wt.% MgO =	Serpentinized (Cr-) andradite
Pyrope	> 2 wt.% Cr_2O_3 =	Cr-Pyrope
Diopside	>0.5 wt.% Cr_2O_3 =	Cr-Diopside
Cr-Diopside	> 1.5 wt.% Cr_2O_3 =	HiCr-Diopside
Chromite	Cr_2O_3/Al_2O_3 < 1.5 =	Cr-Spinel
Chromite	> 3 wt.% TiO_2 =	Ti-Chromite
Rutile	> 15 wt.% FeOtot =	Fe-Rutile
Ilmenite	> 4 wt.% MgO =	Mg-Ilmenite
Ilmenite	> 53 wt.% FeOtot =	Ilmenite (altered)
Ilmenite	< 30 wt.% TiO_2 =	FeTi-Oxide
Pyrope-Almandine-Grossular	< 22 wt.% FeO & 5wt.% < MgO < 15wt.% & > 4 wt.% CaO & > 0.07 wt.% Na_2O =	diamond inclusion (Group I) eclogitic garnet
Olivine	Mg-number (mol% forsterite) > 84	Olivine

Enlarged color prints and scanning electron microprobe (SEM) backscatter images of the grain mounts were used to aid mineral identification and to recognize possible inhomogeneities, intergrowths or exsolutions within individual grains. Grain colour was also used to confirm mineral identification. Minerals were identified and named using criteria similar to those of McClenaghan et al. (1998, 1999) and are outlined above. A few grains could not be identified because their totals were too low. This was due to insufficient material on the surface of the grain mount, inhomogeneity, strong alteration of the grains or compositions which contained elements not analyzed (e.g. S in sulfides). Grains that did not yield analyses with totals high enough to be unequivocally identified were labeled "unknown".

The target KIM in diamond exploration are: black Mg-ilmenite with ≥ 4 wt.% MgO (also called magnesian- or picro-ilmenites); red-brown pyrope garnet; purple Cr-pyrope garnet (in particular those with low CaO, i.e. from subcalcic harzburgite or dunite peridotite assemblages); orange pyrope-almandine garnet with moderate MgO and high CaO from eclogite xenoliths, including garnets that may contain significant trace amounts of Na_2O and TiO_2 (i.e. diamond-inclusion eclogitic garnet); spinels with high chrome contents (>25 wt.% Cr_2O_3), specifically black magnesio-chromite with >62 wt.% Cr_2O_3 and >12 wt.% MgO; emerald green Cr-diopside with high (≥ 1.0 wt.%) Cr_2O_3; and forsteritic olivine (100*Mg/(Mg+Fe) >84).

Gold grains

Gold grains were recovered from the 64 till samples collected in 2000 because of the study area includes the Cobalt and Temagami mining camps. Gold grains in till were examined by Overburden Drilling Management Ltd. as part of the sample processing procedure (Fig. 5). Gold grains recovered from the <1.0 mm fraction during tabling and subsequent panning were counted, their size estimated and then returned to the sample in preparation for geochemical analysis. Grains were classified using the three morphologic categories of DiLabio (1990) that reflect increasing distance of glacial transport: pristine, modified and reshaped (Appendix D). Pristine grains retain primary shapes and surface textures and appear not to have been damaged in glacial transport. Modified grains retain some primary surface textures but all edges and protrusions have been damaged during transport. Reshaped grains have undergone enough transport that all primary surface textures have been destroyed and the original grain shape is no longer discernible. The progression from pristine to reshaped grains is interpreted to represent increasing distance of glacial transport of grains as discrete particles in till. The abundance, size and shape of visible gold grains recovered from the till samples and the estimated gold assays for each sample, calculated by Overburden Drilling Management Ltd. based on the abundance and size of the gold grains recovered, are reported in Appendix D.

Till geochemical analysis

The <0.063 mm fraction of till was analyzed at ACME Labs, Vancouver, B.C. Major elements were determined by ICP-ES. C and S were determined by Leco. REE were determined using ICP-MS. Sample preparation for ICP-ES and ICP-MS analysis comprised fusion of a 0.2 g aliquot with $LiBO_2$ and subsequent acid dissolution. Base metals were determined using a 0.5 g aliquot digested in a 2-2-2 solution of HCl-HNO_3-H_20/ICP-ES followed by ICP-ES. A separate 25 to 30 g split was analyzed using INAA by Activation Labs, Ancaster, Ontario. Analytical accuracy was monitored by analyzing GSC reference standards. Analytical precision was monitored by comparing duplicate analyses of selected samples and results are reported in Appendix E along with a complete data listings for all analytical methods.

Pebble lithology

The 0.5 to 5 cm (pebble) fraction was screened from the >2.0 mm (+10 mesh) fraction of till samples (Fig. 5) collected in 2000. Approximately 200 clasts were examined by Consorminex, Gatineau, Quebec, and classified into categories that reflect the major rocks types in the region: felsic to intermediate intrusive; mafic intrusive; ultramafic intrusive; metavolcanic; metasedimentary; iron formation; Huronian sediments; Paleozoic carbonate; kimberlite; and other or unknown rock types. Pebble lithology abundances are listed in Appendix F.

RESULTS

Indicator mineral chemistry

Mg-ilmenite

A total of 252 grains out of 591 possible Mg-ilmenite grains picked were confirmed to be Mg-ilmenites, containing >5 wt.% MgO. Mg-ilmenites are exclusively derived from kimberlite and do not occur in any other rock type in the region. A MgO versus Cr_2O_3 plot for Mg-ilmenite grains in till shows a wide range of MgO contents (5 to >16 wt.%) with 0 to 6 wt.% Cr_2O_3 (Fig. 6.) Till samples that display compositional trends similar to Mg-ilmenite from the Peddie (McClenaghan et al., 1999; Sage, 2000) and Gravel (Sage, 1996) kimberlites are plotted in Figure 6a and display a clearly defined pattern of MgO-Cr_2O_3 composition. A similar pattern is also shown by Mg-ilmenite grains from till samples along Highway 11 near Latchford, the Red Squirrel Road and near Temagami (Fig. 6b). However, the concentration of Cr_2O_3 is considerably less (<3 wt.% Cr_2O_3) and there is a flat trend of low Cr-poor ilmenites at low MgO (4 to 8 wt.%) which is not exhibited by Mg-ilmenite in the Peddie or Gravel kimberlites. The chemistry of Mg-ilmenite from these till samples is similar to Mg-ilmenite grains recovered from stream sediments in the Temagami to Marten River area (Fig. 31 in Allan, 2001).

Mg-ilmenite grains in till samples 34 to 37 (south of 95-1, 95-3, 96-1 kimberlites), 13, 14, (north of all known kimberlites), 16, 32, and 38 to 41 (south of Seed and Opap kimberlites), and samples 4 to 10 and 25 (south of Temagami) display a chemical signature (Fig. 6c) that is different from the rest of the regional till samples. These Mg-ilmenite grains are characterized by lower MgO (6 to 14 wt.%) and increasing Cr_2O_3 content with decreasing MgO.

Chromite

The Cr_2O_3 versus MgO content of chromite grains in till was plotted along with the chromite compositions for the Peddie kimberlite (Fig. 7a). Chromite grains in the till samples show a broad compositional range. Chromite grains with low MgO (up to 7 wt.%) and high Cr_2O_3 (40 to 50 wt.%) contents could be from other ultramafic rocks in the region because there is no apparent equivalent to these compositions among chromites from known kimberlites in the region (Sage, 1996, 2000, McClenaghan et al., 1999; Kjarsgaard et al., in prep.). A closer inspection of the distribution of the MgO-poor chromite grains reveals that they are not contained in any given till sample (Fig. 7b), but are dispersed over the study area supporting the assumption that they may be from regionally widespread ultramafic rocks (e.g. Nipissing diabase sills and dikes). Chromite compositions for the till samples are similar those reported by Allan for stream sediments in the Temagami to Marten River area (Fig. 22, in Allan, 2001).

Garnet

The composition of the pyropes in till range from Cr-poor Ti-bearing megacryst pyropes to Cr-pyropes with >8 wt.% Cr_2O_3 (Fig. 8). The majority of the Cr-pyropes are of lherzolitic origin, however, 18 grains are G10 pyropes. Three grains from till samples 48 and 63, on Highway 11, plot in the subcalcic field of Sobolev et al. (1977). The only known kimberlite in the Cobalt/New Liskeard

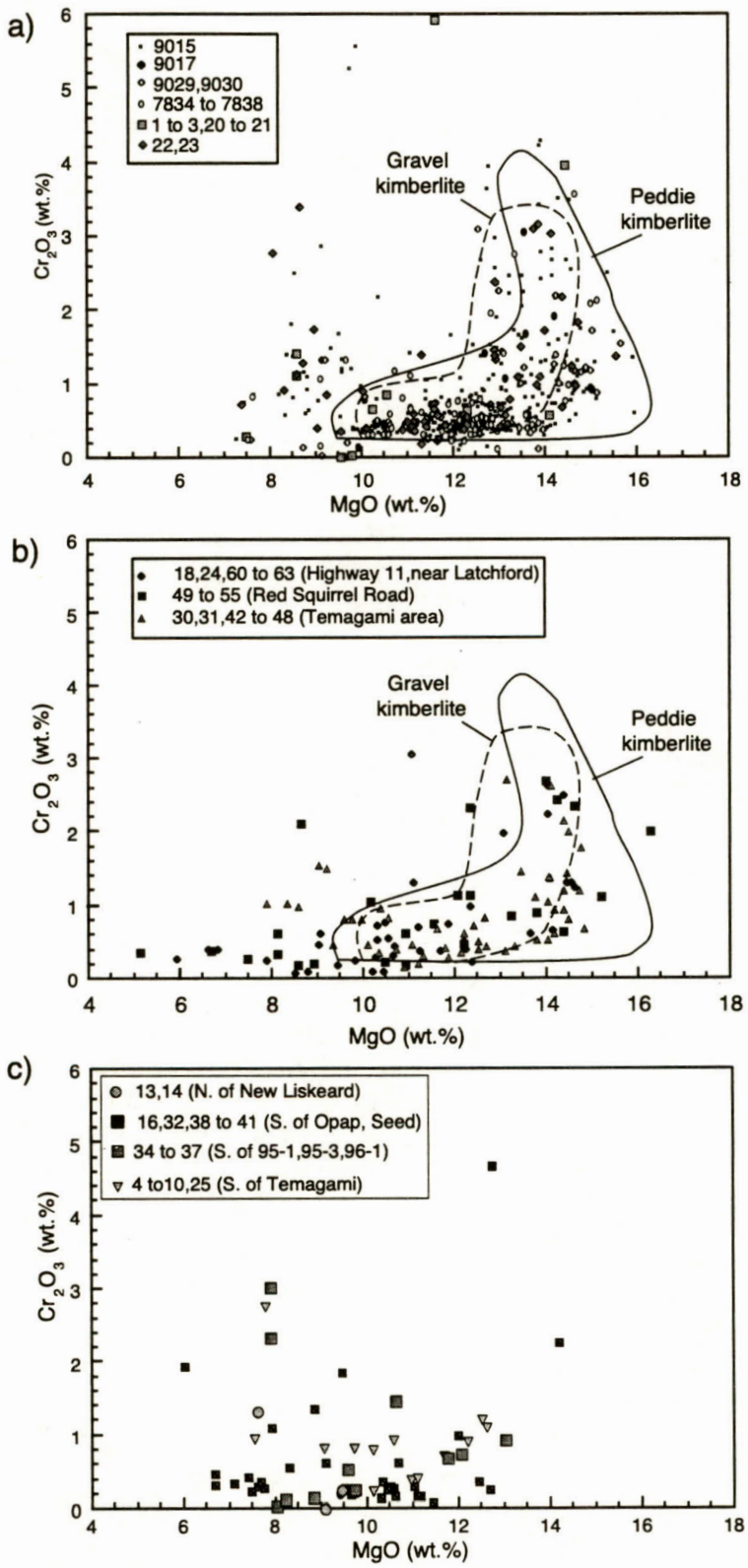

Figure 6. Cr_2O_3 versus MgO content of Mg-ilmenite grains in the 0.25 to 0.5 mm fraction of regional till samples: a) samples near the Peddie kimberlite; b) samples along Highway 11; and, c) samples with a different composition.

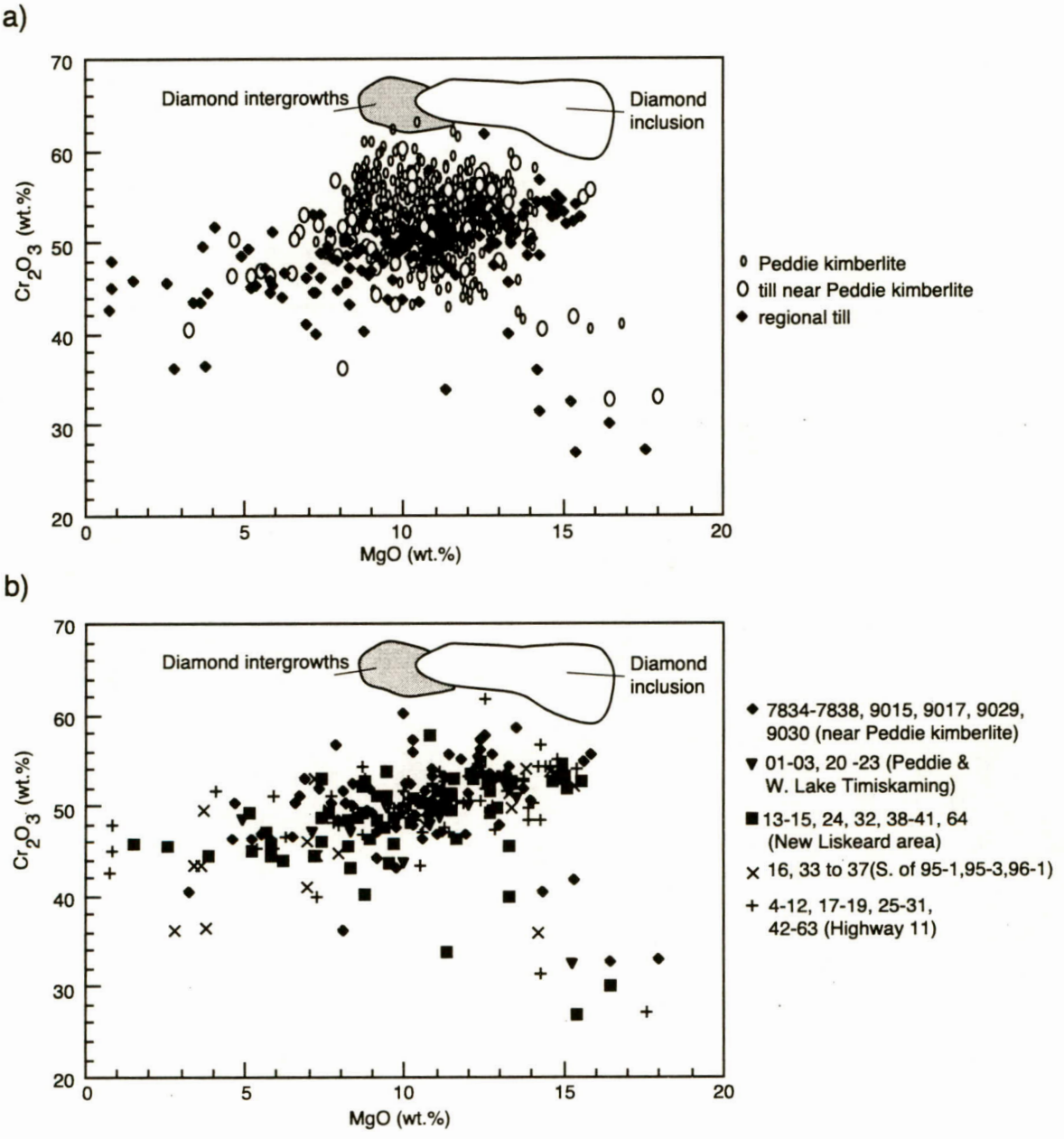

Figure 7. Cr_2O_3 versus MgO content of chromites grains in the 0.25 to 0.5 mm fraction of regional till samples: a) all till samples compared to the Peddie kimberlite; b) samples subdivided by location. Chromite compositons from the Peddie kimberlite are from McClenaghan et al. (1999). Diamond inclusion and intergrowth fields are from Fipke et al. (1995).

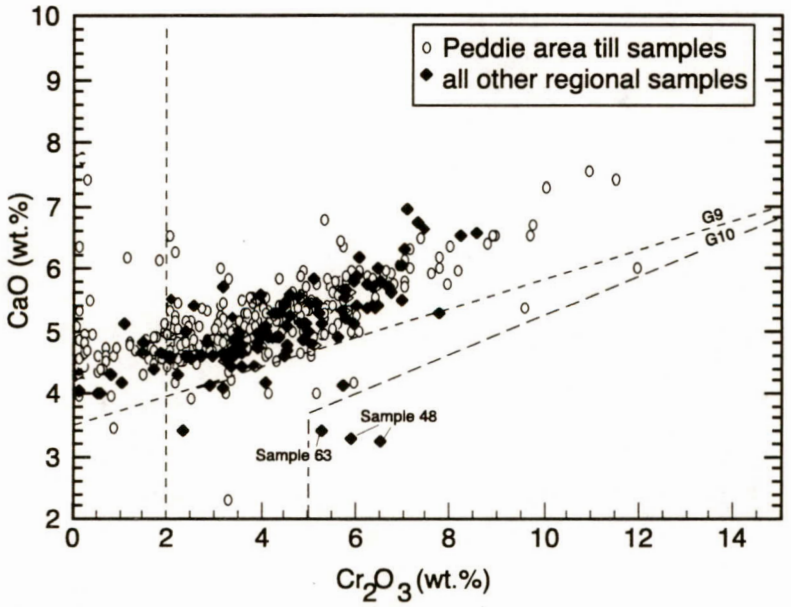

Figure 8. Cr_2O_3 versus CaO content for pyrope from regional till samples near the Peddie kimberlite and all other regional samples. Field below the lower dashed line is the composition of subcalcic garnets from the diamond stability field (Sobolev 1977; Sobolev et al.,1993). Dashed diagonal line separating G9 and G10 garnets is from Gurney (1984). Dashed vertical line at 2 wt. %Cr_2O_3 is from Fipke et al. (1995).

field that contains similar subcalcic garnets is Opap, however, Opap also contains a considerable proportion of Cr-rich harzburgitic to dunitic garnets (Sage, 2000; Kjarsgaard et al., in prep.) which do not appear in the till samples. It is possible that these three grains are from one of the western most kimberlites (95-1, 95-3, or 96-1), which are situated up-ice from the sample locations.

Comparison of till samples just south of the Peddie pipe with those from the entire study area reveal that the till down-ice of Peddie contains a higher number of Cr-rich pyropes and pyroxenitic/megacrystic Cr-poor pyropes, but less subcalcic garnets (Fig. 8). A total of 55 almandine garnets found in the regional till samples are deemed to be from regional metamorphic rocks. No eclogitic garnets were identified.

Cr-diopside

A large number of Cr-diopsides were recovered from the regional till samples. Only seven grains were Cr-poor (<0.5 wt.% Cr_2O_3) diopsides. The rest were Cr-diopside containing 0.5 to1.5 wt.% Cr_2O_3 or HiCr-diopside with >1.5 wt.% Cr_2O_3. A Cr_2O_3 versus Mg-number plot (Fig. 9a) shows that a high percentage of the Cr-diopsides have a very restricted composition around 1 wt.% Cr_2O_3 and Mg-numbers between 84 and 87. Cr-diopsides with similar compositions to these reported here have been encountered in till samples from the Kirkland Lake and Lake Timiskaming areas (e.g. McClenaghan et al., 1993, 1999) but not in kimberlite. These grains are likely from ultramafic rocks and not from kimberlite.

Figure 9b displays the broad range in Cr-Al-Na content of Cr-diopside and HiCr-diospide from the regional till samples. Many of the grains plot inside the kimberlite composition field identifed by Morris et al. (1999). Allan (Fig. 28, 2001) reported Cr-diopsides with a similar range in Cr, Al and Na content from stream sediments collected in the Temagami to Marten River area.

HiCr-diopsides are exclusively found in mantle peridotites and are therefore kimberlite-derived. In this study, they occur in several till samples that also contain Cr-pyrope.

Kimberlite indicator mineral distribution

KIM abundances in individual till samples are listed in Table 3, and have been normalized to 10 kg of <2 mm till in order to compare counts between samples of widely variable sample weight. Pyrope and Cr-pyrope abundances have been combined in Table 3 and are discussed together as "pyrope" below. Several sites contain anomalous KIM counts and the locations of these sites, summarized in Figure 10, are described briefly below.

Several anomalous till samples are just down-ice from known kimberlites near New Liskeard and Cobalt. Anomalous concentrations of Mg-ilmenite and pyrope in till from site 23 are not unexpected since the site is 3-5 km down-ice of several kimberlites (Fig. 10). Samples 9015, 9030, 7836 and 23 contain anomalous concentrations of Mg-ilmenite, pyrope, chromite and Cr-diopside. Although these three sites are closest to the Peddie kimberlite, it is probably not the source

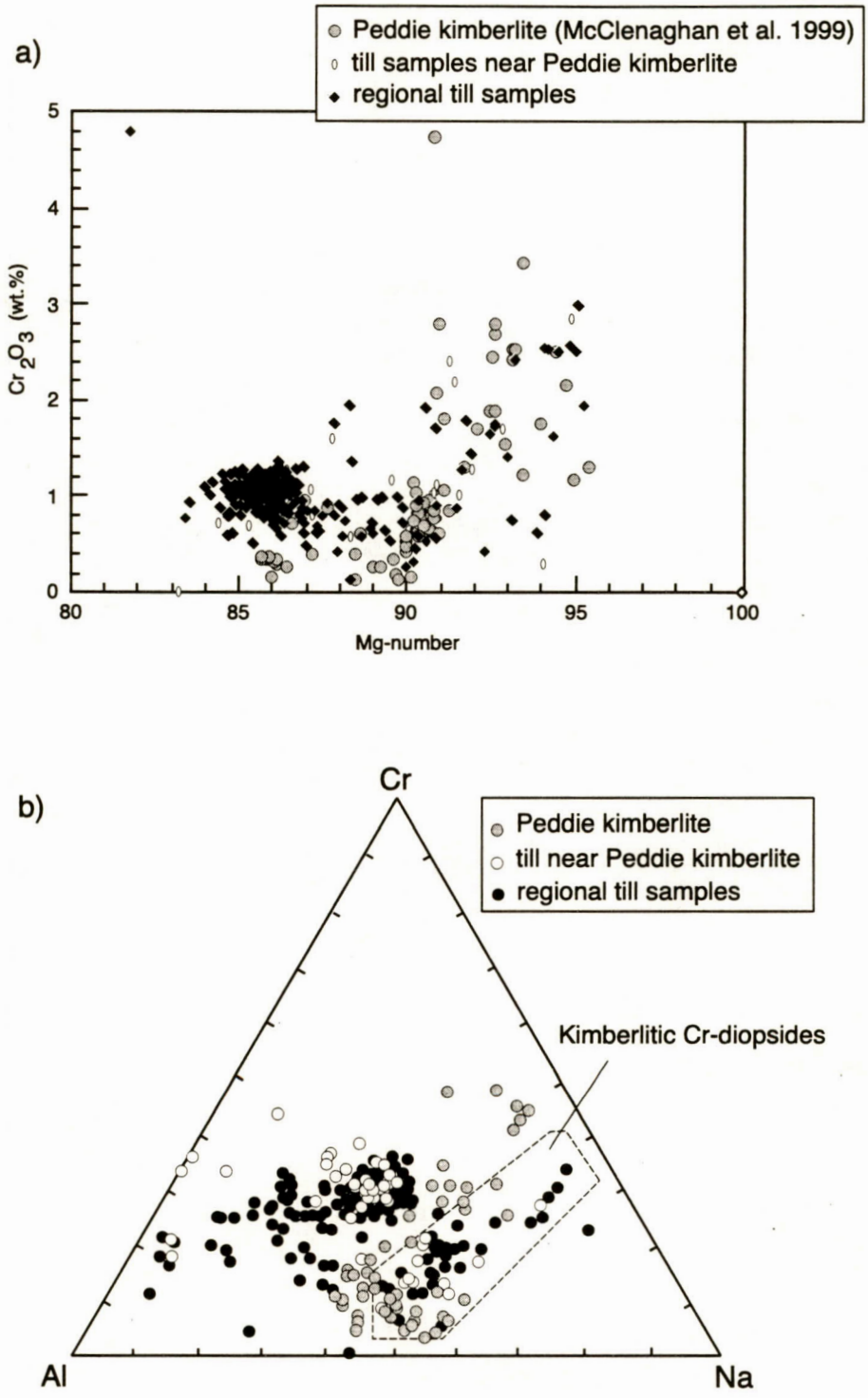

Figure 9. Cr-diopside in the 0.25 to 0.5 mm fraction of regional till samples: a) Cr_2O_3 versus Mg-number for till and the Peddie kimberlite; b) ternary plot of Cr-Al-Na (field of kimberlitic Cr-diopsides from Morris et al., 2000).

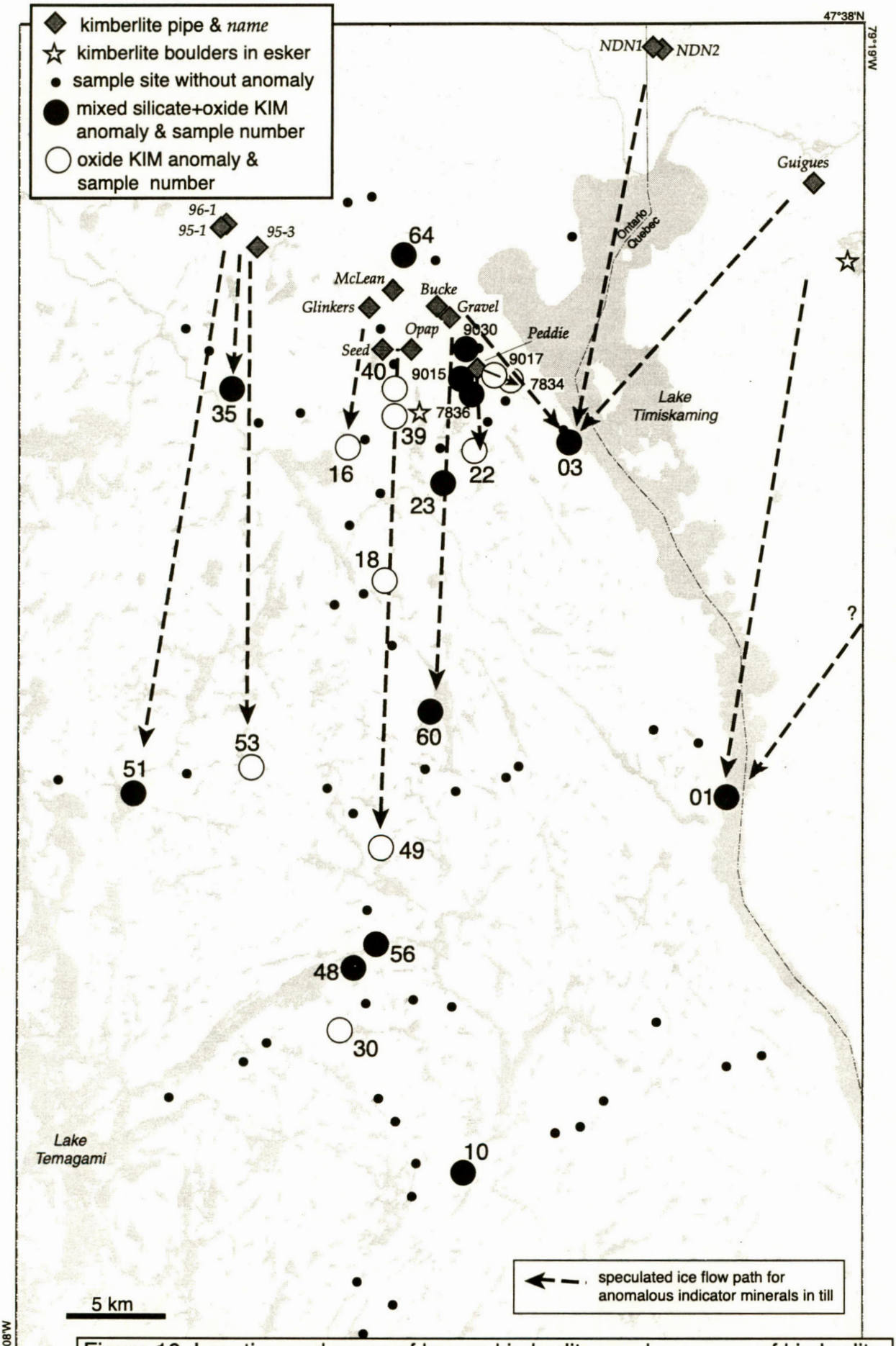

Figure 10. Location and name of known kimberlites and summary of kimberlite indicator mineral anomalies in regional till samples.

Table 3. Kimberlite indicator mineral abundance in the 0.25 to 0.5 mm fraction of till

Sample	Weight	Raw Counts					Normalized to 10 kg <2mm table feed				
	<2 mm table feed	chromite	Mg-ilmenite	pyrope + Cr-pyrope	Cr-diopside	HiCr-diopside	chromite	Mg-ilmenite	pyrope + Cr-pyrope	Cr-diopside	HiCr-diopside
TM-MPB01	6.9	0	1	7	5	0	0	1	10	7	0
TM-MPB02	6.2	0	0	2	10	0	0	0	3	16	0
TM-MPB03	6.9	2	5	4	29	2	3	7	6	42	3
TM-MPB04	6.4	2	4	4	2	0	3	6	6	3	0
TM-MPB05	6.7	2	3	1	8	0	3	4	1	12	0
TM-MPB06	5.1	0	0	2	6	0	0	0	4	12	0
TM-MPB07	7.2	0	0	0	4	0	0	0	0	6	0
TM-MPB08	6.1	0	1	0	5	0	0	2	0	8	0
TM-MPB09	5.4	1	0	4	10	0	2	0	7	19	0
TM-MPB10	4.2	2	4	2	5	0	5	10	5	12	0
TM-MPB11	7.6	1	0	4	2	2	1	0	5	3	3
TM-MPB12	7.3	0	0	2	0	0	0	0	3	0	0
TM-MPB13	7.2	2	1	3	6	0	3	1	4	8	0
TM-MPB14	6.3	5	2	2	5	0	8	3	3	8	0
TM-MPB15	6.3	4	0	1	6	2	6	0	2	10	3
TM-MPB16	6.1	5	8	1	1	1	8	13	2	2	2
TM-MPB17	3.2	1	0	0	1	0	3	0	0	3	0
TM-MPB18	5.3	2	6	0	5	0	4	11	0	9	0
TM-MPB19	7.8	3	0	1	12	0	4	0	1	15	0
TM-MPB20	5.7	1	2	2	1	0	2	4	4	2	0
TM-MPB21	7.2	1	4	2	6	0	1	6	3	8	0
TM-MPB22	6.9	6	14	1	2	0	9	20	1	3	0
TM-MPB23	3.7	2	46	7	1	0	5	124	19	3	0
TM-MPB24	4.0	5	3	0	1	0	13	8	0	3	0
TM-MPB25	7.4	1	1	0	4	0	1	1	0	5	0
TM-MPB26	7.8	3	0	0	0	0	4	0	0	0	0
TM-MPB27	7.7	0	0	1	0	1	0	0	1	0	1
TM-MPB28	7.2	0	3	0	4	0	0	4	0	6	0
TM-MPB29	4.4	2	0	1	1	1	5	0	2	2	2
TM-MPB30	7.3	2	17	5	0	0	3	23	7	0	0
TM-MPB31	5.7	0	4	0	6	1	0	7	0	11	2
TM-MPB32	6.8	1	3	2	2	1	1	4	3	3	1
TM-MPB33	7.5	0	0	4	9	0	0	0	5	12	0
TM-MPB34	5.1	0	1	1	2	0	0	2	2	4	0
TM-MPB35	6.7	6	5	18	17	3	9	7	27	25	4
TM-MPB36	6.4	6	3	2	0	1	9	5	3	0	2
TM-MPB37	6.4	6	2	4	13	0	9	3	6	20	0
TM-MPB38	6.4	1	1	0	2	0	2	2	0	3	0
TM-MPB39	4.7	5	4	1	3	0	11	9	2	6	0
TM-MPB40	5.5	16	17	0	2	0	29	31	0	4	0
TM-MPB41	7.9	6	4	0	2	0	8	5	0	3	0
TM-MPB42	5.1	1	1	2	3	1	2	2	4	6	2
TM-MPB43	5.5	8	2	0	0	0	15	4	0	0	0
TM-MPB44	5.2	0	2	0	4	0	0	4	0	8	0
TM-MPB45	5.7	0	2	1	3	0	0	4	2	5	0
TM-MPB46	6.4	3	0	0	3	0	5	0	0	5	0
TM-MPB47	6.7	2	3	0	0	0	3	4	0	0	0
TM-MPB48	6.3	1	18	8	1	1	2	29	13	2	2
TM-MPB49	5.8	2	14	0	1	0	3	24	0	2	0
TM-MPB50	3.2	0	3	2	9	0	0	9	6	28	0
TM-MPB51	4.2	9	12	4	5	0	21	29	10	12	0
TM-MPB52	6.4	6	1	0	5	0	9	2	0	8	0
TM-MPB53	5.0	6	5	1	2	0	12	10	2	4	0

Table 3. Kimberlite indicator mineral abundance in the 0.25 to 0.5 mm fraction of till

Sample	Weight	Raw Counts					Normalized to 10 kg <2mm table feed				
	<2 mm table feed	chromite	Mg-ilmenite	pyrope + Cr-pyrope	Cr-diopside	HiCr-diopside	chromite	Mg-ilmenite	pyrope + Cr-pyrope	Cr-diopside	HiCr-diopside
TM-MPB54	7.3	0	1	0	0	0	0	1	0	0	0
TM-MPB55	7.0	3	3	0	1	0	4	4	0	1	0
TM-MPB56	2.9	0	0	4	1	0	0	0	14	3	0
TM-MPB57	6.4	1	0	4	4	1	2	0	6	6	2
TM-MPB58	5.9	0	0	0	0	0	0	0	0	0	0
TM-MPB59	5.9	1	0	1	0	0	2	0	2	0	0
TM-MPB60	4.9	4	9	4	4	0	8	18	8	8	0
TM-MPB61	4.4	2	0	0	2	0	5	0	0	5	0
TM-MPB62	5.8	3	4	4	4	0	5	7	7	7	0
TM-MPB63	6.4	2	3	1	7	0	3	5	2	11	0
TM-MPB64	8.2	18	0	1	8	0	22	0	1	10	0
7834*	6.2	28	14	2	6	0	45	23	3	10	0
7835*	7.3	1	4	2	2	0	1	6	3	3	0
7836*	6.8	2	39	11	4	1	3	57	16	6	1
7837*	9.2	1	2	3	1	0	1	2	3	1	0
7838*	9.3	1	0	2	0	1	1	0	2	0	1
9015	8.1	27	319	283	12	3	33	394	349	15	4
9017	8.6	4	15	1	4	0	5	17	1	5	0
9029	5.0	2	2	0	0	0	4	4	0	0	0
9030	4.4	7	55	8	9	0	16	126	18	21	0

* Data from GSC Open File 3775 (McClenaghan et al., 1999)

of the KIMs as the Peddie kimberlite contains very little pyrope and Cr-diopside relative to Mg-ilmenite (McClenaghan et al., 1999). Instead the KIMs in these three samples are likely derived from the Gravel or Bucke kimberlites further north which are known to contain a full suite of indicator minerals. Elevated counts of Mg-ilmenite and chromite in samples till 22, 7834 and 9017 are likely from the Mg-ilmenite-rich Peddie kimberlite. Till from sites 16, 39 and 40 contains similar elevated concentrations of chromite and Mg-ilmenite with very little or no pyrope. This relative abundance pattern in the till is most similar to that for the Glinkers kimberlite (Sage, 2000), 5 km to the north. Kimberlite 95-3 is the most likely source of the elevated counts of pyrope and Cr-diopside in the till at site 35, approximately 6 km to the south.

Further south from the known kimberlites, several till samples contain elevated concentrations of KIM that are noteworthy: a) on the Red Squirrel forest access road, sample 51 contains elevated concentrations of chromite, Mg-ilmenite, pyrope and Cr-diopside and sample 53 contains elevated concentrations of Mg-ilmenite and chromite; b) samples 49, 60, and 18 along highway 11 in the central part of the study area contain elevated concentrations of Mg-ilmenite and chromite; c) samples 03 and 01 near Lake Timiskaming contains elevated concentrations of pyrope and Cr-diopside; d) near Temagami, till samples 48, 56, and 30 have elevated counts of Mg-ilmenite and pyrope; e) on the Rabbit Lake forest access road southeast of Temagami, sample 10 contains elevated counts of Mg-ilmenite, pyrope and Cr-diopside; f) site 64, north of the known kimberlites, contains elevated concentrations of chromite and Cr-diopside.

Gold grains

Gold grain data for the 64 till samples collected in 2000 are listed in Appendix D. Thirty-four of the 64 till samples collected in 2000 do not contain visible gold grains. The other 30 till samples contain background concentrations, between 1 and 11 gold grains. All gold grains recovered are small (<100 μm) and most are modified or reshaped.

Till geochemistry

Geochemical data for the <0.063 mm fraction of till samples collected in 2000 are listed in Appendix E. Sample 23 contains elevated concentrations of Cu, Pb, Zn, Ni, As, Co, Cd and Fe. Sample 10 contains elevated concentrations of Cu, Co and Fe, and sample 59 is slightly elevated in Cu and Cr. Using 15 ppb as a threshold between background and anomalous Au concentrations in till (e.g. McClenaghan, 1992), six sites are considered to be anomalous: 10, 11, 16, 40, 42 and 60.

Several till samples contain elevated contents of both CaO and MgO (Appendix E.1) and have elevated matrix carbonate contents (>2 %) as determined by Leco (Appendix A), indicating the presence of abundant calcite and dolomite in the till matrix. In general, the matrix carbonate content of till is highest just south of the Paleozoic outlier, is low through the Latchford area and is higher in the Temagami area and to the south (Fig. 11).

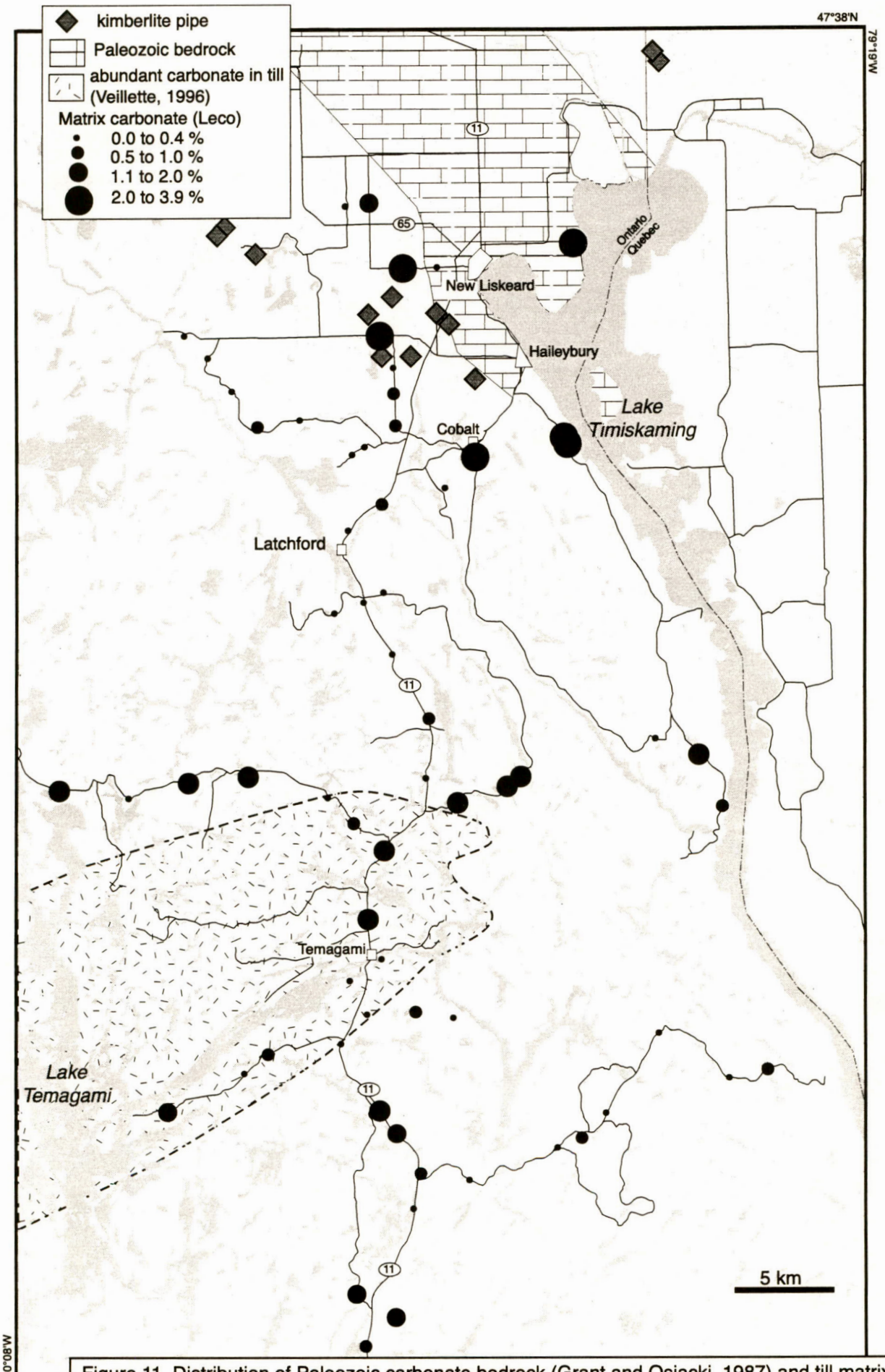

Figure 11. Distribution of Paleozoic carbonate bedrock (Grant and Osiacki, 1987) and till matrix (<0.063 mm fraction) carbonate determined by Leco.

Pebble lithology

Pebble lithology data for the 0.5 to 5.0 cm fraction of till samples collected in 2000 are listed in Appendix F. Till overlying and just south of the New Liskeard Paleozoic outlier contains the most carbonate clasts (Fig. 12). Carbonate clast content decreases significantly to 0 to 5 % between Latchford and Temagami and then increases around Temagami and further south, most notably for samples 19, at 20 km south of the outlier, and samples 5, 6, 7 and 11, 40 km south of the outlier. The carbonate distribution patterns for pebbles and the matrix documented in this study are broadly similar to those reported by Veillette (1996) for surface till in the region. Ice flowing southwest (Phase 1) and south (Phase 2) across the New Liskeard region dispersed Paleozoic carbonate rocks more the 50 km down-ice from upper Lake Timiskaming. Carbonate-rich till near Temagami (Figs. 11 and 12) was deposited by these older ice flows (Veillette, 1996). The younger southeast (Phase 3) ice flow removed the carbonate-rich till in the proximal part of the dispersal train near Latchford (Veillette, 1996). Most till samples that do not contain abundant carbonate pebbles, are dominated by Huronian metasedimentary pebbles. Sample 23 is noteworthy because contains 90% local mafic metavolcanic bedrock and no kimberlite clasts, yet it contains anomalous KIM concentrations.

DISCUSSION AND CONCLUSIONS

Mg-ilmenite is the most abundant and widespread KIM in the till in the study area. Chromite occurs in approximately the same till samples that contain Mg-ilmenite, but is generally present in lower abundances than Mg-ilmenite, except immediately south of the 95-1, 95-3 and 96-1 kimberlites (samples 35 to 37) and south of the Seed and Opap kimberlites (samples 39, 40, 41). In general, pyrope in till is approximately half as abundant as Mg-ilmenite. The reasons for this pattern may be that: 1) KIM sources in the area have a high concentration of megacryst ilmenite versus pyrope; 2) garnet is not as well preserved during glacial transport as ilmenites and chromites; or, 3) garnet, due to their larger grain sizes (megacrysts) exceed the size range of the fraction picked (0.25 to 0.5 mm). Elevated counts of Cr-diopside in till samples that are not accompanied by other KIMs are suggested to not be from kimberlite but from some other ultramafic rocks in the region.

Anomalous concentrations of Mg-ilmenite and chromite in till samples 51 and 53 on the Red Squirrel Road are close to anomalous OGS stream sediment samples 23, 33, 27 and 423 that contain various combinations of elevated counts of Mg-ilmenite, chromite and pyrope. The KIMs in these anomalous till and stream sediment samples may be the distal part of a dispersal train from kimberlite 95-1, 95-3 or 96-1, or they may be from more local, unknown kimberlites. Anomalous counts in till samples 48 and 56 near Temagami, are very close to OGS stream sediment sample 11, which contains elevated abundances of Mg-ilmenite grains, chromite, and pyrope. The bedrock source of these KIMs is not known. Samples 03 and 01 near Lake Timiskaming contain elevated concentrations of pyrope and Cr-diopside, which could have been transported southeast by Phase 3 ice flow from the kimberlites near Cobalt or southwest from kimberlites in Quebec by Phase 1 ice flow. Site 64, north of the known kimberlites, contains elevated concentrations of chromite and Cr-diopside, however, the absence of Mg-

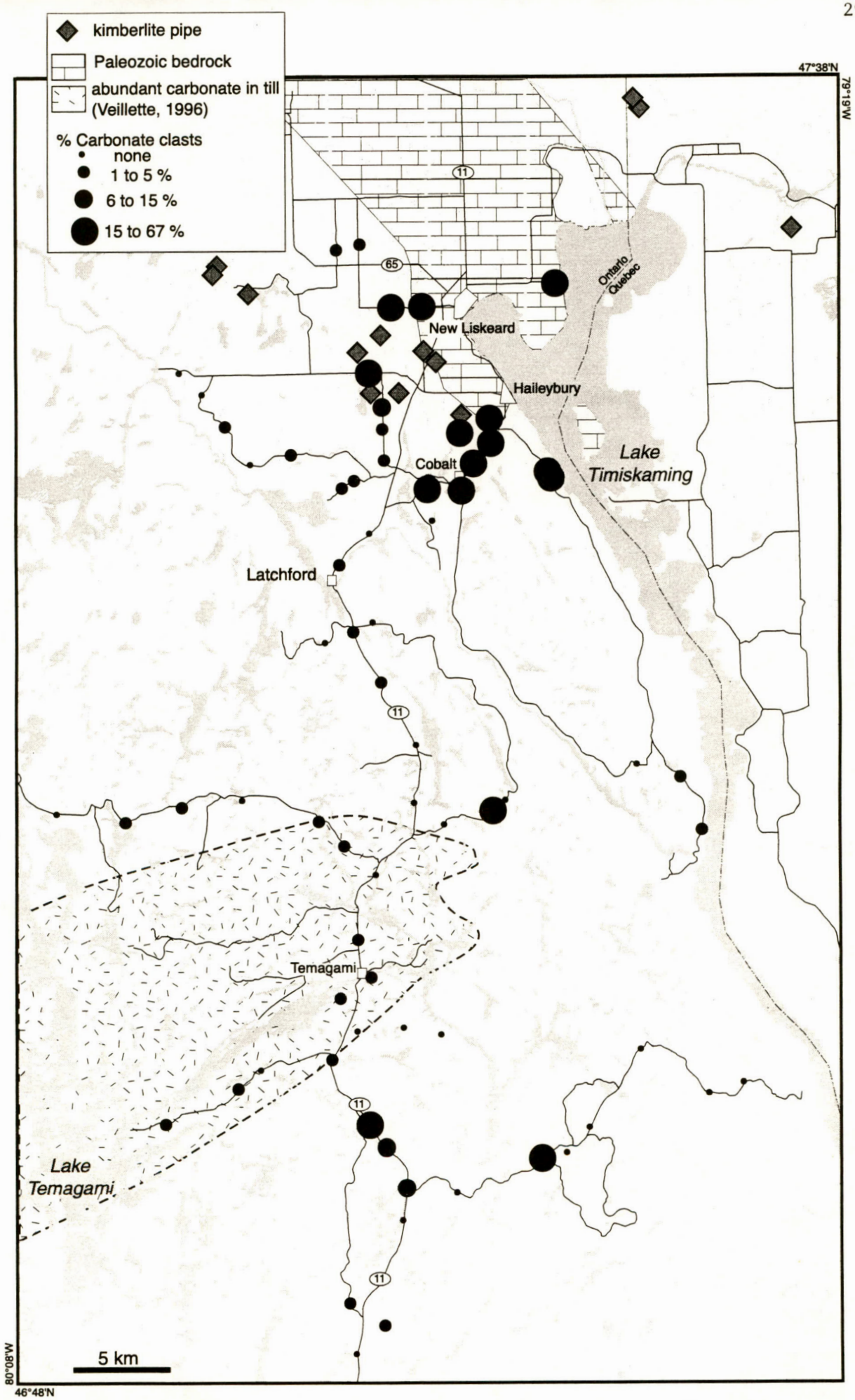

Figure 12. Distribution of Paleozoic carbonate bedrock (Grant and Osiacki, 1987) and till containing carbonate pebbles.

ilmenite and pyrope combined with the sample location north of the known kimberlites suggests these grains are not from the known kimberlites. Instead, they may be derived from Nipissing diabase, which also contains Cr-diopside and chromite (Edgar, 1986).

Till in the region contains carbonate pebbles and calcite and dolomite in the matrix that are derived from the Paleozoic outlier at New Liskeard. Carbonate-rich debris has been dispersed southward for at least 50 km, in some cases. Carbonate concentration in till varies across the area (Figs. 11 and 12). In general, it is highest just down-ice of the outlier (near Cobalt), is very low near Latchford, and then increases further south near Temagami. Further sampling of till will be conducted to reconcile carbonate distribution patterns reported here with those reported by Veillette (1996). The distribution of carbonate pebbles down-ice of the Paleozoic outlier at New Liskeard may provide some insight into the source of KIM anomalies further south. Till just down-ice of the Peddie, Gravel, Bucke, Seed and Opap kimberlites is carbonate- and KIM-rich. This positive correlation would be expected in till further south if the KIM anomalies further south were derived from the known kimberlites near New Liskeard.

This reconnaissance-scale till sampling survey in the New Liskeard to Marten River area, provides information on: the regional background content of KIMs in till; the nature of KIM signatures in till just down-ice of known kimberlites; and, the presence of several KIM anomalies that warrant further investigation. Suggested ice flows paths for the various KIM anomalies are presented in Figure 10, based on the relative abundance of the various KIM in the till samples and the trends of the three phases of ice flow. However, these interpretations are speculative because the relative abundance of KIM in most of the known kimberlites is not known. Some of these anomalies coincide with anomalies identified by the OGS in their recent stream sediment survey (Allan, 2001). Detailed examination of the pebble lithology data for these anomalous till samples (Appendix F), combined with additional till sampling and geophysical surveys should be conducted to determine the extent of the KIM anomalies and trace them to their bedrock source. Till sample spacing should be much smaller (<500 m) than that used in this reconnaissance survey.

All three phases of ice flow are associated with erosion, transportation and deposition of till in the region. The main carriers of glacial debris, however, were the two oldest ice flows. A large dispersal train of Paleozoic limestone derived from upper Lake Timiskaming trends south-southwest across the area, but has been truncated in its proximal part (Latchford area) by the last southeast ice flow (Veillette, 1989; 1996), indicating that in this area, southeast ice flow was a major carrier of debris. These situations have to be taken into consideration in the interpretation of dispersal trains formed by the three major ice flows.

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Appendix A. Till sample locations, texture and matrix carbonate content

Appendix A. Till sample locations and descriptive data

Sample Number	UTM Zone 17 Easting	UTM Zone 17 Northing	NTS Sheet	Year collected	Geologist	Drift thickness at site (m)	Sample depth (m) from original land surface	Distance to nearest outcrop	Striations at or near site, 1= older set, 2 = younger set	Paleozoic carbonate clasts in till?	Till Munsell colour (moist)
TM-MPB-0001	617250	5223900	31 M/3	2000	McClenaghan	<1	2.0	on bedrock		yes	5Y 5/3
TM-MPB-0002	615650	5227800	31 M/3	2000	McClenaghan	>5	2.0	>1 km		no	5Y 5.5/2
TM-MPB-0003	606000	5250100	31 M/5	2000	McClenaghan	1-2	1.8	on bedrock	160°	yes	2.5Y 5.5/4
TM-MPB-0004	594900	5194900	31 L/13	2000	McClenaghan	>5	2.0	6		no	2.5Y 4.5/4
TM-MPB-0005	595200	5197300	31 L/13	2000	McClenaghan	>5	2.5	10		yes	5Y 5.5/3
TM-MPB-0006	593700	5200300	31 L/13	2000	McClenaghan	>5	3.0	50		yes	5Y 4.5/2
TM-MPB-0007	592475	5201950	31 L/13	2000	McClenaghan	10	8.0	5		no	5Y 4.5/2
TM-MPB-0008	590950	5188750	31 L/13	2000	McClenaghan	4	2.0	3	190°	no	2.5Y 4.5/2
TM-MPB-0009	593550	5187100	31 L/13	2000	McClenaghan	<1	0.5	on bedrock		yes	2.5Y 4.5/4
TM-MPB-0010	598950	5196950	31 L/13	2000	McClenaghan	2-5	2.0	unknown		no	2.5Y 6/4
TM-MPB-0011	605300	5199500	31 L/13	2000	McClenaghan	1-2	0.6	unknown		yes	2.5Y 5/4
TM-MPB-0012	607125	5200000	31 L/13	2000	McClenaghan	<1	0.3	on bedrock	191°	no	2.5Y 5/4
TM-MPB-0013	606400	5264200	31 M/12	2000	McClenaghan	>5	1.0	unknown		yes	2.5Y 6/4
TM-MPB-0014	591850	5267100	31 M/12	2000	McClenaghan	1-2	2.5	5		yes	2.5Y 5.5/4
TM-MPB-0015	590100	5266700	31 M/12	2000	McClenaghan	1-2	1.8	30 m		yes	5Y 5/3
TM-MPB-0016	590475	5249100	31 M/5	2000	McClenaghan	2-5	2.5	unknown		yes	5Y 5/3
TM-MPB-0017	589200	5237750	31 M/5	2000	McClenaghan	3	2.5	unknown		no	5Y 3.5/2
TM-MPB-0018	592750	5239250	31 M/5	2000	McClenaghan	1-2	1.5	100		no	10YR 4.5/3
TM-MPB-0019	601500	5224800	31 M/4	2000	McClenaghan	2-5	1.5	10	165°	yes	5Y 4.5/3
TM-MPB-0020	612400	5228750	31 M/4	2000	Knowles	<1	0.4-0.65	> 25 m	195°	no	2.5YR 5/4
TM-MPB-0021	605810	5250300	31 M/5	2000	Knowles	2-5	0.2-0.5	< 1 m	148-158°	yes	2.5YR 5/4
TM-MPB-0022	599400	5248900	31 M/5	2000	Knowles	> 5	0.5-0.73	unknown	180°	yes	2.5YR 5/4
TM-MPB-0023	597200	5246700	31 M/5	2000	Knowles	2-5	1.2-1.7	< 1 m	170°	no	2.5YR 5/4
TM-MPB-0024	592525	5245775	31 M/5	2000	Knowles	unknown	0.2-0.6	± 50-100 m		no	2.5YR 5/4
TM-MPB-0025	591425	5185000	31 L/13	2000	Knowles	2-5	± 2.6-3.0	< 1 m		no	2.5YR 5/4
TM-MPB-0026	620280	5205090	31 L/14	2000	Knowles	1-2	0.4-0.7	on bedrock		no	2.5YR 5/4
TM-MPB-0027	612625	5207525	31 M/4	2000	Knowles	< 1	0.25-0.45	2 m		no	2.5YR 7/4
TM-MPB-0028	617700	5204300	31 L/14	2000	Knowles	2-5	0.05-0.4	unknown		no	2.5 YR 5/2
TM-MPB-0029	608820	5201775	31 L/13	2000	Knowles	1-2	0.4-0.6	unknown		no	10YR 6/6
TM-MPB-0030	589650	5206750	31 M/4	2000	Knowles	1-2	0.85-1.2	0.5 m		no	2.5Y 6/4
TM-MPB-0031	591630	5215675	31 M/4	2000	Knowles	1-2	0.2	on bedrock		no	2.5YR 6/6
TM-MPB-0032	592522	5257590	31 M/5	2000	Knowles	1-2	1.55-2.0	on bedrock	150°	yes	5Y 5/2
TM-MPB-0033	578361	5257662	31 M/5	2000	Knowles	> 5	1.6-2.0	2.0-2.5 m		no	5Y 5.5/2
TM-MPB-0034	580046	5256059	31 M/5	2000	Knowles	> 5	0.25-0.65	unknown		no	2.5YR 6/4
TM-MPB-0035	581773	5253664	31 M/5	2000	Knowles	> 5	0.35-.50	unknown	190°	no	2.5YR 5/4
TM-MPB-0036	583649	5250888	31 M/5	2000	Knowles	< 1	0.4-0.8	1 m	190-200°	no	10YR 4/6
TM-MPB-0037	586688	5251587	31 M/5	2000	Knowles	< 1	0.1-0.4	on bedrock	192-195°	no	2.5YR 4/4
TM-MPB-0038	591384	5249646	31 M/5	2000	Knowles	< 1	0.75-0.9	< 1 m	175°	no	5Y 5/3
TM-MPB-0039	593631	5251147	31 M/5	2000	Knowles	< 1	0.2-0.4	1 m	1. 170° 2. 195	no	2.5YR 6/4

Appendix A. Till sample locations and descriptive data

Sample Number	UTM Zone 17 Easting	UTM Zone 17 Northing	NTS Sheet	Year collected	Geologist	Drift thickness at site (m)	Sample depth (m) from original land surface	Distance to nearest outcrop	Striations at or near site, 1= older set, 2 = younger set	Paleozoic carbonate clasts in till?	Till Munsell colour (moist)
TM-MPB-0040	593513	5253431	31 M/5	2000	Knowles	< 1	0.4-0.7	on bedrock	1. 174° 2. 180-	no	2.5YR 6/4
TM-MPB-0041	593496	5255076	31 M/5	2000	Knowles	> 5	0.7-1.0	30-40 m	180°-181°	no	2.5YR 6/2
TM-MPB-0042	577282	5202018	31 L/13	2000	Knowles	< 1	0.3-0.6	on bedrock	175°	no	7.5YR 5/6
TM-MPB-0043	582679	5204626	31 L/13	2000	Knowles	< 1	0.5-0.8	on bedrock	201°	no	2.5YR 6/4
TM-MPB-0044	584351	5205992	31 M/4	2000	Knowles	2-5	0.4-0.7	< 1 m	190-200°	no	2.5YR 5/4
TM-MPB-0045	597793	5208649	31 M/4	2000	Knowles	> 5	0.7-1.0	unknown		no	2.5 YR 5/4
TM-MPB-0046	594985	5209140	31 M/4	2000	Knowles	< 1	0.2-0.4	< 1 m	1. 182°; 2. 162°	no	2.5YR 5/4
TM-MPB-0047	591551	5208870	31 M/4	2000	Knowles	1-2	0.6-0.9	5 m		no	2.5YR 6/4
TM-MPB-0048	590292	5211310	31 M/4	2000	Knowles	unknown	0.7-1.0	100 m		no	2.5YR 6/4
TM-MPB-0049	592937	5220549	31 M/4	2000	Knowles	< 1	0.25-0.3	on bedrock		no	2.5YR 4/4
TM-MPB-0050	569162	5225141	41 P/1	2000	Knowles	> 5	0.6-0.9	unknown		no	2.5YR 6/4
TM-MPB-0051	574303	5224503	41 P/1	2000	Knowles	> 5	1.1-1.5	unknown		no	2.5YR 5/4
TM-MPB-0052	578507	5225592	31 M/4	2000	Knowles	< 1	0.15-0.25	on bedrock	192°	no	2.5YR 4/4
TM-MPB-0053	582992	5226120	31 M/4	2000	Knowles	< 1	0.2-0.4	1.5 m		no	2.5YR 5/4
TM-MPB-0054	588712	5224538	31 M/4	2000	Knowles	< 1	0.1-0.2	on bedrock	178°	no	2.5YR 5/4
TM-MPB-0055	590583	5222718	31 M/4	2000	Knowles	< 1	0.3-0.5	3 m	151°	no	2.5YR 5/4
TM-MPB-0056	592606	5212878	31 M/4	2000	Knowles	< 1	0.5-1.0	on bedrock		no	2.5 YR 6/4
TM-MPB-0057	602535	5226151	31 M/4	2000	Knowles	unknown	1.50-6.3	on bedrock	182°, 190°, 205°	no	10YR 4/4
TM-MPB-0058	598031	5224322	31 M/4	2000	Knowles	< 1	0.1-0.4	on bedrock	174-178°	no	2.5YR 5/4
TM-MPB-0059	595823	5225937	31 M/4	2000	Knowles	1-2	0.4-0.8	1-2 m		no	2.5YR 5/4
TM-MPB-0060	595958	5230194	31 M/4	2000	Knowles	1-2	0.8-1.2	0.5 m	172°	no	2.5Y 4/4
TM-MPB-0061	593374	5234820	31 M/5	2000	Knowles	1-2	0.6-1.0	1 m		no	5Y 5/3
TM-MPB-0062	591305	5238540	31 M/5	2000	Knowles	2-5	0.4-0.9	75 m	1. 163°; 2. 190	no	2.5Y 4/2
TM-MPB-0063	590265	5243473	31 M/5	2000	Knowles	> 5	0.4-0.7	unknown		no	2.5Y 4/4
TM-MPB-0064	594181	5262448	31 M/12	2000	Knowles	2-5	0.4-0.8	15 m		no	2.5Y 4/2
99MPB9015	598395	5254150	31 M/5	1999	McClenaghan	1-2	0.3-0.65	2 m		not examined	10YR 4/4
99MPB9017	600450	5254155	31 M/5	1999	McClenaghan	2-5	0.4-0.8	unknown		not examined	10YR 6/4
99MPB9029	599650	5256200	31 M/5	1999	McClenaghan	1-2	1.0	unknown		not examined	10YR 5/4
99MPB9030	598550	5256200	31 M/5	1999	McClenaghan	2-5	2.0	0.5		not examined	10YR 5/4
97MPB7834	601500	5254200	31 M/5	1997	McClenaghan	1	0.6	on bedrock		yes	not analyzed
97MPB7835	601600	5252400	31 M/5	1997	McClenaghan	2	2.0	unknown		yes	not analyzed
97MPB7836	599300	5253150	31 M/5	1997	McClenaghan	unknown	0.9	unknown		yes	not analyzed
97MPB7837	600300	5250900	31 M/5	1997	McClenaghan	2-5	2.0	unknown		yes	not analyzed
97MPB7838	596850	5249025	31 M/5	1997	McClenaghan	2-5	2.0	on bedrock		yes	not analyzed

Appendix A. Till sample locations and descriptive data

Sample Number	Till Munsell colour (moist)	% Clay	% Silt	% Sand	Degree of visible oxidation	% carbonate in matrix (LECO)
TM-MPB-0001	olive	1.3	19.1	79.5	moderate	1.0
TM-MPB-0002	light olive gray	2.4	39.3	58.2	low	1.4
TM-MPB-0003	light yellowish brown	5.3	35.7	59.0	high	3.9
TM-MPB-0004	light olive brown	3.9	41.5	54.6	moderate	0.1
TM-MPB-0005	pale olive	2.9	41.0	56.1	moderate	0.8
TM-MPB-0006	olive gray	1.5	20.8	77.7	moderate	1.9
TM-MPB-0007	olive gray	11.2	44.9	43.9	low	1.9
TM-MPB-0008	grayish brown	1.1	34.0	64.8	high	1.3
TM-MPB-0009	light olive brown	0.9	28.1	71.0	high	1.1
TM-MPB-0010	light yellowish brown	1.0	18.7	80.3	moderate	0.3
TM-MPB-0011	light olive brown	3.4	54.9	41.8	moderate	1.9
TM-MPB-0012	light olive brown	1.9	49.0	49.2	high	0.7
TM-MPB-0013	light yellowish brown	7.6	44.4	47.9	high	3.4
TM-MPB-0014	light yellowish brown	4.2	21.1	74.7	high	1.7
TM-MPB-0015	olive	9.4	51.3	39.3	high	0.2
TM-MPB-0016	olive	8.1	44.3	47.6	moderate	0.1
TM-MPB-0017	olive gray	2.4	29.8	67.8	low	0.0
TM-MPB-0018	brown	4.3	33.5	62.3	moderate	0.3
TM-MPB-0019	olive	3.0	40.4	56.5	moderate	1.5
TM-MPB-0020	light olive brown	0.8	29.2	70.0	low -moderate	0.5
TM-MPB-0021	light olive brown	3.9	35.9	60.2	none, low	3.6
TM-MPB-0022	light olive brown	1.4	38.4	60.1	low -moderate	3.1
TM-MPB-0023	light olive brown	2.8	43.6	53.6	low -moderate	0.3
TM-MPB-0024	light olive brown	1.0	34.9	64.1	moderate	1.0
TM-MPB-0025	light olive brown	0.0	27.0	73.0	moderate	0.9
TM-MPB-0026	light olive brown	0.5	26.1	73.4	low -moderate	1.0
TM-MPB-0027	pale yellow	0.6	42.7	56.7	low -moderate	0.4
TM-MPB-0028	greyish brown	4.5	46.4	49.0	low	0.2
TM-MPB-0029	brownish yellow	0.0	33.8	66.2	moderate	1.5
TM-MPB-0030	light yellowish brown	1.0	37.4	61.7	low	0.4
TM-MPB-0031	brownish yellow	0.2	45.4	54.4	low	1.3
TM-MPB-0032	olive grey	4.6	48.3	47.2	low	2.2
TM-MPB-0033	light olive brown	0.5	22.0	77.4	low	0.0
TM-MPB-0034	light yellowish brown	1.6	49.1	49.3	low	0.5
TM-MPB-0035	light olive brown	2.0	53.6	44.4	low	0.4
TM-MPB-0036	dark yellowish brown	0.7	46.1	53.2	low	0.8
TM-MPB-0037	olive brown	4.6	41.1	54.3	low	0.5
TM-MPB-0038	olive	6.3	42.6	51.2	none-low	0.2
TM-MPB-0039	light yellowish brown	2.5	32.6	64.9	none-low	0.6

Appendix A. Till sample locations and descriptive data

Sample Number	Till Munsell colour (moist)	% Clay	% Silt	% Sand	Degree of visible oxidation	% carbonate in matrix (LECO)
TM-MPB-0040	light yellowish brown	2.2	29.7	68.1	none-low	0.6
TM-MPB-0041	light brownish grey	4.7	68.3	27.0	low	0.2
TM-MPB-0042	strong brown	0.3	34.6	65.1	moderate	1.8
TM-MPB-0043	light yellowish brown	1.8	31.2	67.0	none-low	0.3
TM-MPB-0044	light olive brown	2.2	42.8	55.0	none-low	0.7
TM-MPB-0045	light yellowish brown	1.2	27.8	71.0	none-low	0.5
TM-MPB-0046	light olive brown	2.3	42.7	55.0	none-low	0.8
TM-MPB-0047	light yellowish brown	3.0	50.3	46.8	none-low	0.5
TM-MPB-0048	light yellowish brown	4.5	39.9	55.7	none-low	0.2
TM-MPB-0049	olive brown	0.6	33.2	66.2	low	1.1
TM-MPB-0050	light yellowish brown	1.0	29.4	69.5	none-low	1.2
TM-MPB-0051	light olive brown	1.8	24.9	73.2	none-low	0.1
TM-MPB-0052	olive brown	1.2	34.5	64.3	none-low	1.1
TM-MPB-0053	light olive brown	1.2	31.0	67.9	none-low	1.6
TM-MPB-0054	light olive brown	1.0	52.9	46.1	none-low	0.4
TM-MPB-0055	light olive brown	3.1	50.4	46.5	none-low	0.9
TM-MPB-0056	light yellowish brown	2.7	25.7	71.6	none-low	0.5
TM-MPB-0057	dark yellowish brown	0.9	31.3	67.8	low	1.9
TM-MPB-0058	light olive brown	0.9	58.6	40.5	low, moderate	1.3
TM-MPB-0059	light olive brown	0.6	32.9	66.5	low	0.3
TM-MPB-0060	olive brown	1.1	28.4	70.5	none-low	0.6
TM-MPB-0061	olive	4.0	43.0	53.0	none-low	0.3
TM-MPB-0062	dark grayish brown	5.4	42.8	51.8	none-low	0.1
TM-MPB-0063	olive brown	1.7	34.4	63.8	none-low	0.2
TM-MPB-0064	dark grayish brown	1.7	27.7	70.5	low	2.1
99MPB9015	dark yellowish brown	NA	NA	NA	low	not analyzed
99MPB9017	light yellowish brown	NA	NA	NA	low/moderate	not analyzed
99MPB9029	yellowish brown	NA	NA	NA	low/moderate	not analyzed
99MPB9030	yellowish brown	NA	NA	NA	low/moderate	not analyzed
97MPB7834	light brown	NA	NA	NA	moderate	not analyzed
97MPB7835	light brown	NA	NA	NA	moderate	not analyzed
97MPB7836	organgey-brown	NA	NA	NA	high	not analyzed
97MPB7837	light brown	NA	NA	NA	moderate	not analyzed
97MPB7838	brown	NA	NA	NA	low	not analyzed

Appendix B. Heavy mineral fraction weight data

Appendix B Weight data for sample processing and preparing heavy mineral concentrates

	WEIGHT (kg)						<1.0 mm TABLE CONCENTRATE Heavy Liquid Separations S.G 3.20								HEAVY LIQUID SEPARATE
												Nonferromagnetic Fraction			
SAMPLE NUMBER	Bulk	Table Split	+2 mm Clasts	1-2 mm Clasts	total <2 mm	Table Feed	TOTAL	Heavy Liquid Lights	Total Mag	Total	<0.25 mm (wash)	<0.25 mm	0.25 to 0.5 mm	0.5 to 1.0 mm	*1.0 to 2.0 mm
TM-MPB-01	10.8	10.0	2.1	1.0	7.9	6.9	729.5	686.1	9.0	34.4	3.9	21.0	6.3	3.2	3.0
TM-MPB-02	12.5	10.0	3.0	0.8	7.0	6.2	573.6	522.8	6.7	44.1	2.8	32.1	6.7	2.5	1.9
TM-MPB-03	12.2	10.0	2.5	0.6	7.5	6.9	1395.7	1356.6	5.4	33.7	1.7	24.6	5.4	2.0	0.8
TM-MPB-04	11.0	10.0	2.9	0.7	7.1	6.4	978.5	940.1	5.5	32.9	3.4	20.8	6.0	2.7	1.2
TM-MPB-05	10.0	9.0	1.8	0.5	7.2	6.7	60.3	9.5.7	7.7	52.6	2.8	36.5	8.6	4.7	0.9
TM-MPB-06	11.9	10.0	3.4	1.5	6.6	5.1	459.6	395.5	9.9	54.2	4.8	34.4	8.7	6.3	3.4
TM-MPB-07	11.1	10.0	2.2	0.6	7.8	7.2	325.6	282.2	4.8	38.6	3.1	28.2	4.8	2.5	2.0
TM-MPB-08	11.3	10.0	3.1	0.8	6.9	6.1	829.9	768.1	11.9	49.9	4.6	33.4	7.6	4.3	1.8
TM-MPB-09	10.0	9.0	2.8	0.8	6.2	5.4	412.4	354.4	9.8	48.2	3.6	32.0	8.0	4.6	1.4
TM-MPB-10	10.0	9.0	3.9	0.9	5.1	4.2	462.4	389.0	9.8	63.6	3.8	45.8	9.1	4.9	2.5
TM-MPB-11	11.9	10.0	1.8	0.6	8.2	7.6	349.8	313.4	4.5	31.9	2.6	22.6	4.9	1.8	1.3
TM-MPB-12	12.7	10.0	2.0	0.7	8.0	7.3	466.7	444.5	0.9	21.3	2.3	15.5	2.5	1.0	0.8
TM-MPB-13	11.1	10.0	2.2	0.6	7.8	7.2	398.5	361.1	4.3	33.1	1.1	26.1	4.2	1.7	0.6
TM-MPB-14	10.3	9.5	2.3	0.9	7.2	6.3	438.0	407.2	1.5	29.3	2.4	20.8	4.4	1.7	0.9
TM-MPB-15	10.2	9.4	2.7	0.4	6.7	6.3	437.4	406.4	5.0	26.0	1.8	17.7	4.4	2.1	1.0
TM-MPB-16	11.9	10.0	3.2	0.7	6.8	6.1	1107.3	1083.3	3.9	20.1	1.5	13.4	3.6	1.6	0.8
TM-MPB-17	9.3	8.4	4.2	1.0	4.2	3.2	510.4	484.3	3.9	22.2	1.9	13.8	4.4	2.1	0.8
TM-MPB-18	10.4	9.5	3.3	0.9	6.2	5.3	716.2	666.1	9.5	40.6	3.8	24.8	7.6	4.4	1.9
TM-MPB-19	10.8	9.8	1.6	0.4	8.2	7.8	851.3	796.4	6.5	48.4	2.7	36.6	6.1	3.0	1.5
TM-MPB-20	13.8	10.0	3.6	0.7	6.4	5.7	1027.2	982.0	12.8	32.4	2.5	23.7	4.5	1.7	1.3
TM-MPB-21	11.9	10.0	2.3	0.5	7.7	7.2	760.8	708.6	7.4	44.8	0.9	37.6	4.9	1.4	1.3
TM-MPB-22	10.9	9.9	2.4	0.6	7.5	6.9	779.9	739.0	6.4	34.5	0.5	27.4	4.4	2.2	1.0
TM-MPB-23	13.3	10.0	5.7	0.6	4.3	3.7	345.0	323.1	3.3	18.6	0.7	14.7	2.2	1.0	1.1
TM-MPB-24	14.2	10.0	5.6	0.4	4.4	4.0	454.3	426.6	8.8	18.9	1.2	13.4	3.1	1.2	1.8
TM-MPB-25	15.4	10.0	2.0	0.6	8.0	7.4	809.5	742.2	2.2	65.1	1.7	58.1	4.2	1.1	0.6
TM-MPB-26	12.8	10.0	1.7	0.5	8.3	7.8	707.0	638.0	5.4	63.6	2.3	53.0	6.0	2.3	0.7
TM-MPB-27	13.3	10.0	1.7	0.6	8.3	7.7	783.3	694.4	26.7	62.2	3.6	41.2	10.6	6.8	3.8
TM-MPB-28	12.9	10.0	2.2	0.6	7.8	7.2	382.5	327.8	8.1	46.6	1.9	35.1	7.0	2.6	2.5
TM-MPB-29	12.6	10.0	4.9	0.7	5.1	4.4	495.8	458.7	10.0	27.1	2.4	18.9	4.0	1.8	2.8
TM-MPB-30	15.2	10.0	2.0	0.7	8.0	7.3	630.0	588.9	1.2	39.9	0.9	34.4	3.1	1.5	1.0
TM-MPB-31	13.0	10.0	3.7	0.6	6.3	5.7	609.9	576.4	6.2	27.3	0.9	23.0	2.2	1.2	1.4
TM-MPB-32	16.6	10.0	2.6	0.6	7.4	6.8	362.8	319.9	7.8	35.1	0.6	27.9	4.6	2.0	1.7
TM-MPB-33	15.7	10.0	2.0	0.5	8.0	7.5	520.9	423.0	14.0	83.9	0.9	74.6	6.3	2.1	0.5
TM-MPB-34	15.0	10.0	4.3	0.6	5.7	5.1	614.9	584.7	5.5	24.7	1.2	19.3	3.0	1.2	2.6
TM-MPB-35	13.3	10.0	2.7	0.6	7.3	6.7	623.0	578.9	4.9	39.2	1.0	31.8	4.7	1.7	1.5
TM-MPB-36	13.5	10.0	3.1	0.5	6.9	6.4	464.4	430.2	5.6	28.6	1.4	21.5	4.0	1.7	1.4
TM-MPB-37	12.6	10.0	3.1	0.5	6.9	6.4	675.2	637.1	5.2	32.9	2.1	22.4	5.6	2.8	1.5
TM-MPB-38	15.8	9.8	2.8	0.6	7.0	6.4	474.9	434.9	6.7	33.3	1.5	26.4	4.0	1.4	0.9
TM-MPB-39	15.0	10.0	4.5	0.8	5.5	4.7	542.4	507.2	6.1	29.1	1.9	19.7	5.1	2.4	1.0
TM-MPB-40	14.6	10.0	3.6	0.9	6.4	5.5	536.8	483.2	8.2	45.4	2.1	30.7	7.5	5.1	2.4
TM-MPB-41	12.7	10.0	1.7	0.4	8.3	7.9	399.7	377.8	2.7	19.2	0.7	13.9	3.4	1.2	0.9
TM-MPB-42	13.9	10.0	3.9	1.0	6.1	5.1	571.4	531.9	11.2	28.3	1.7	21.5	3.4	1.7	0.8
TM-MPB-43	15.5	10.0	3.4	1.1	6.6	5.5	618.4	559.1	7.9	51.4	0.9	40.4	6.5	3.6	1.7
TM-MPB-44	13.1	10.0	3.9	0.9	6.1	5.2	488.7	456.9	5.5	26.3	0.8	21.7	2.5	1.3	1.3
TM-MPB-45	13.5	10.0	3.5	0.8	6.5	5.7	770.1	658.9	29.2	82.0	2.7	52.1	16.7	10.5	3.0
TM-MPB-46	11.7	10.0	3.0	0.6	7.0	6.4	619.0	565.3	10.9	42.8	1.5	30.4	6.9	4.0	1.0
TM-MPB-47	13.5	10.0	2.6	0.7	7.4	6.7	520.3	477.0	3.2	40.1	0.9	30.0	5.7	3.5	1.3
TM-MPB-48	14.0	10.0	2.9	0.8	7.1	6.3	513.7	460.5	8.6	44.6	1.1	31.1	7.5	4.9	1.3
TM-MPB-49	13.8	10.0	3.2	1.0	6.8	5.8	529.9	492.2	6.6	31.1	0.6	26.1	3.3	1.1	0.9
TM-MPB-50	16.6	10.0	5.7	1.1	4.3	3.2	425.0	394.6	6.1	24.3	0.8	18.7	3.5	1.3	0.5
TM-MPB-51	15.7	10.0	4.7	1.1	5.3	4.2	656.6	605.3	10.8	40.5	1.0	27.9	8.1	3.5	1.6
TM-MPB-52	14.1	10.0	2.8	0.8	7.2	6.4	720.7	672.3	9.8	38.6	1.5	28.5	6.3	2.3	1.5
TM-MPB-53	13.2	10.0	4.0	1.0	6.0	5.0	523.3	482.8	10.0	30.5	1.8	24.3	3.3	1.1	1.2
TM-MPB-54	14.2	10.0	2.2	0.5	7.8	7.3	334.6	286.2	1.3	47.1	0.9	41.3	3.6	1.3	1.2
TM-MPB-55	11.5	10.0	2.5	0.5	7.5	7.0	529.3	509.3	3.9	16.1	0.6	13.5	1.4	0.6	0.5
TM-MPB-56	15.0	10.0	5.7	1.4	4.3	2.9	324.9	277.6	22.4	24.9	2.1	16.8	4.1	1.9	2.5

Appendix B Weight data for sample processing and preparing heavy mineral concentrates

	WEIGHT (kg)						<1.0 mm TABLE CONCENTRATE Heavy Liquid Separations S.G 3.20								HEAVY LIQUID SEPARATE
												Nonferromagnetic Fraction			
SAMPLE NUMBER	Bulk	Table Split	+2 mm Clasts	1-2 mm Clasts	total <2 mm	Table Feed	TOTAL	Heavy Liquid Lights	Total Mag	Total	<0.25 mm (wash)	<0.25 mm	0.25 to 0.5 mm	0.5 to 1.0 mm	*1.0 to 2.0 mm
TM-MPB-57	12.8	10.0	2.6	1.0	7.4	6.4	725.7	679.1 **	6.7	39.9	1.8	30.3	5.4	2.4	1.4
TM-MPB-58	14.4	10.0	3.6	0.5	6.4	5.9	19.0	**	3.9	15.1	0.8	12.9	1.2	0.2	0.5
TM-MPB-59	13.9	10.0	3.4	0.7	6.6	5.9	374.3	312.3	7.2	54.8	1.4	45.9	5.0	2.5	2.2
TM-MPB-60	14.9	10.0	3.7	1.4	6.3	4.9	722.0	670.6	10.8	40.6	1.5	30.7	6.0	2.4	0.6
TM-MPB-61	12.8	10.0	4.7	0.9	5.3	4.4	611.7	583.8	6.20	21.7	0.9	15.4	3.7	1.7	1.3
TM-MPB-62	14.5	10.0	3.3	0.9	6.7	5.8	687.0	652.8	7.40	26.8	0.6	20.4	4.1	1.7	1.1
TM-MPB-63	12.8	10.0	2.9	0.7	7.1	6.4	1073.2	1028.2	8.70	36.3	0.8	30.1	4.0	1.4	1.2
TM-MPB-64	15.2	10.0	1.1	0.7	8.9	8.2	1074.9	982.2	11.20	81.5	1.6	59.8	11.8	8.3	2.9

* 1.0-2.0 mm HMC fraction obtained from heavy liquid separation S.G 3.20 of the bulk 1.0-2.0 mm very coarse sand fraction.

** M.I. Lights from Samples MPB-58 accidentally combined with M.I.Lights from Sample MPB-57.

Appendix C. GSC electron microprobe data for heavy minerals

Appendix C.2 Microprobe data for Mg-ilmenite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10314	88	TM-MPB01	0.25-0.5	black	Mg-ilmenite	0.31	0.00	53.45	0.51	0.63	0.42	30.94	0.20	0.00	0.13	0.05	12.32	0.01	0.13	0.00	98.77
10314	92	TM-MPB03	0.25-0.5	black	Mg-ilmenite	0.15	0.01	55.48	0.50	0.57	0.39	28.19	0.30	0.00	0.07	0.03	14.11	0.04	0.30	0.01	100.00
10314	94	TM-MPB03	0.25-0.5	black	Mg-ilmenite	0.00	0.04	55.19	0.48	0.41	0.30	30.61	0.29	0.07	0.13	0.01	13.12	0.03	0.27	0.00	100.97
10314	98	TM-MPB03	0.25-0.5	black	Mg-ilmenite	0.00	0.06	49.05	0.36	1.40	0.43	38.39	0.33	0.11	0.08	0.06	8.58	0.05	0.18	0.02	99.07
10314	99	TM-MPB03	0.25-0.5	black	Mg-ilmenite	0.00	0.02	50.02	0.68	0.66	0.55	36.70	0.22	0.11	0.09	0.05	10.25	0.00	0.24	0.01	99.58
10319	3	TM-MPB03	0.25-0.5	black	Mg-ilmenite	0.00	0.10	54.15	0.85	3.96	0.43	26.34	0.30	0.04	0.15	0.01	14.44	0.10	0.23	0.00	101.10
10315	1	TM-MPB04	0.25-0.5	black	Mg-ilmenite	0.03	0.03	53.72	0.59	1.08	0.48	30.47	0.26	0.06	0.10	0.03	12.64	0.03	0.08	0.04	99.58
10315	4	TM-MPB04	0.25-0.5	black	Mg-ilmenite	0.11	0.10	53.44	0.58	1.18	0.50	31.06	0.30	0.05	0.14	0.07	12.51	0.05	0.23	0.01	100.21
10315	5	TM-MPB04	0.25-0.5	black	Mg-ilmenite	0.11	0.09	53.87	0.60	0.89	0.41	30.48	0.31	0.03	0.02	0.03	12.20	0.00	0.16	0.00	99.08
10315	6	TM-MPB04	0.25-0.5	black	Mg-ilmenite	0.00	0.06	52.36	0.26	0.91	0.54	34.38	0.33	0.08	0.04	0.00	10.58	0.01	0.23	0.00	99.78
10315	8	TM-MPB05	0.25-0.5	black	Mg-ilmenite	0.00	0.04	52.01	0.75	0.21	0.51	35.06	0.27	0.08	0.05	0.08	10.14	0.01	0.14	0.08	99.35
10315	10	TM-MPB05	0.25-0.5	black	Mg-ilmenite	0.07	0.05	52.95	0.43	0.38	0.27	33.98	0.35	0.13	0.06	0.04	10.96	0.03	0.22	0.02	99.84
10315	11	TM-MPB05	0.25-0.5	black	Mg-ilmenite	0.37	0.07	46.53	0.15	2.74	0.85	39.75	0.38	0.09	0.13	0.03	7.79	0.00	0.25	0.02	98.76
10315	15	TM-MPB08	0.25-0.5	black	Mg-ilmenite	0.19	0.11	50.65	0.32	0.81	0.55	36.78	0.30	0.00	0.07	0.10	9.74	0.03	0.19	0.00	99.63
10315	18	TM-MPB10	0.25-0.5	black	Mg-ilmenite	0.07	0.08	51.36	0.36	0.78	0.46	35.62	0.38	0.13	0.00	0.06	10.14	0.00	0.01	0.03	99.38
10315	19	TM-MPB10	0.25-0.5	black	Mg-ilmenite	0.00	0.02	48.11	0.15	0.93	0.38	41.36	0.33	0.05	0.01	0.00	7.57	0.01	0.04	0.00	98.95
10315	22	TM-MPB10	0.25-0.5	black	Mg-ilmenite	0.20	0.01	52.46	0.59	0.39	0.39	34.29	0.21	0.04	0.06	0.05	11.11	0.01	0.06	0.04	99.68
10315	24	TM-MPB10	0.25-0.5	black	Mg-ilmenite	0.27	0.09	50.24	0.22	0.80	0.48	37.13	0.30	0.04	0.09	0.06	9.06	0.01	0.05	0.06	98.57
10315	28	TM-MPB13	0.25-0.5	black	Mg-ilmenite	0.33	0.04	48.19	0.22	1.30	0.45	40.10	0.36	0.10	0.14	0.05	7.63	0.02	0.11	0.01	98.69
10319	31	TM-MPB14	0.25-0.5	black	Mg-ilmenite	0.03	0.05	51.48	0.36	0.20	0.43	38.47	0.27	0.10	0.08	0.05	9.40	0.03	0.13	0.03	101.06
10319	32	TM-MPB14	0.25-0.5	black	Mg-ilmenite	0.00	0.07	51.16	0.59	0.00	0.38	38.05	0.27	0.04	0.08	0.02	9.10	0.04	0.12	0.09	99.93
10315	40	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.31	0.04	52.28	0.21	0.60	0.48	35.16	0.29	0.12	0.09	0.04	10.69	0.07	0.15	0.02	100.23
10315	43	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.00	0.09	54.98	0.51	2.24	0.34	26.03	0.37	0.12	0.15	0.00	14.22	0.02	0.20	0.03	99.27
10315	45	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.09	0.05	54.08	0.28	0.97	0.55	31.89	0.27	0.05	0.16	0.00	11.99	0.01	0.21	0.00	100.50
10319	44	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.28	0.10	51.40	0.31	0.45	0.45	36.82	0.35	0.09	0.13	0.08	10.21	0.04	0.08	0.00	100.50
10319	46	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.11	0.08	53.41	0.22	0.49	0.21	34.33	0.33	0.08	0.05	0.06	10.55	0.02	0.16	0.00	99.99
10319	48	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.24	0.04	51.84	0.23	0.56	0.39	35.63	0.40	0.05	0.05	0.00	10.53	0.04	0.13	0.06	99.87
10319	52	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.29	0.04	46.68	0.26	0.23	0.59	42.69	0.30	0.05	0.11	0.02	7.17	0.07	0.07	0.06	98.28
10319	53	TM-MPB16	0.25-0.5	black	Mg-ilmenite	0.44	0.02	52.98	0.23	0.57	0.45	34.84	0.36	0.09	0.01	0.02	10.73	0.04	0.12	0.00	100.45
10315	48	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.09	0.13	48.46	0.36	0.26	0.45	40.74	0.36	0.08	0.00	0.06	7.50	0.00	0.14	0.00	98.52
10315	49	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.08	0.08	47.13	0.48	0.35	0.23	45.11	0.24	0.05	0.11	0.03	5.12	0.03	0.08	0.07	99.05
10315	50	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.05	0.00	52.67	0.60	0.17	0.26	33.93	0.24	0.10	0.12	0.00	10.94	0.00	0.11	0.02	99.15
10315	51	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.03	0.08	49.89	0.52	0.17	0.42	39.41	0.36	0.03	0.12	0.05	8.58	0.00	0.17	0.00	99.80
10315	56	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.19	0.00	46.03	0.28	0.37	0.57	43.55	0.30	0.04	0.08	0.06	6.69	0.01	0.03	0.00	98.02
10315	57	TM-MPB18	0.25-0.5	black	Mg-ilmenite	0.23	0.08	56.08	0.45	1.99	0.31	24.02	0.48	0.03	0.02	0.12	16.28	0.11	0.29	0.00	100.27
10315	62	TM-MPB20	0.25-0.5	black	Mg-ilmenite	0.11	0.05	49.41	0.22	1.11	0.57	38.66	0.36	0.06	0.08	0.04	8.60	0.01	0.11	0.04	99.26
10315	63	TM-MPB20	0.25-0.5	black	Mg-ilmenite	0.08	0.01	49.82	0.51	5.92	0.47	30.40	0.30	0.11	0.19	0.03	11.62	0.04	0.25	0.00	99.68
10315	64	TM-MPB21	0.25-0.5	black	Mg-ilmenite	0.16	0.03	52.23	0.33	0.85	0.52	35.62	0.25	0.08	0.05	0.03	10.56	0.05	0.12	0.01	100.71
10315	65	TM-MPB21	0.25-0.5	black	Mg-ilmenite	0.09	0.03	51.55	0.53	0.03	0.37	37.19	0.25	0.11	0.00	0.06	9.79	0.01	0.00	0.03	99.92
10315	66	TM-MPB21	0.25-0.5	black	Mg-ilmenite	0.13	0.10	50.86	0.55	0.00	0.32	36.84	0.26	0.07	0.07	0.04	9.56	0.01	0.08	0.00	98.74
10315	69	TM-MPB21	0.25-0.5	black	Mg-ilmenite	0.00	0.08	47.56	0.42	0.28	0.43	41.81	0.29	0.03	0.08	0.00	7.49	0.03	0.03	0.00	98.52
10315	71	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.00	0.05	54.19	0.30	0.57	0.40	32.36	0.33	0.10	0.05	0.00	12.26	0.04	0.21	0.03	100.85
10315	72	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.04	0.07	56.46	0.49	0.95	0.30	27.27	0.33	0.09	0.14	0.02	14.69	0.04	0.30	0.00	101.15
10315	74	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.00	0.09	53.49	0.74	3.09	0.34	27.49	0.24	0.01	0.29	0.03	13.76	0.01	0.19	0.02	99.76
10319	68	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.29	0.10	49.80	0.13	1.73	0.56	38.13	0.28	0.10	0.09	0.00	8.97	0.01	0.05	0.00	99.96
10319	69	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.00	0.08	56.07	0.47	0.42	0.38	30.30	0.34	0.03	0.09	0.10	13.21	0.00	0.11	0.00	101.60
10319	70	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.23	0.09	47.33	0.11	3.38	0.42	39.08	0.33	0.08	0.09	0.04	8.65	0.01	0.16	0.00	99.76
10319	73	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.27	0.08	53.42	0.26	0.47	0.53	34.07	0.36	0.10	0.14	0.04	11.14	0.04	0.14	0.01	100.80
10319	74	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.08	0.10	53.89	0.24	0.58	0.55	33.55	0.23	0.00	0.11	0.01	11.15	0.03	0.19	0.02	100.64
10319	76	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.21	0.03	53.22	0.31	0.42	0.41	34.24	0.44	0.00	0.05	0.07	11.10	0.00	0.02	0.03	100.32

Appendix C.2 Microprobe data for Mg-ilmenite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10319	77	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.23	0.11	53.37	0.56	2.35	0.31	30.61	0.25	0.15	0.12	0.04	12.93	0.03	0.18	0.00	101.00
10319	78	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.05	0.08	53.74	0.32	0.25	0.51	33.89	0.30	0.05	0.02	0.00	11.68	0.01	0.19	0.06	101.04
10319	80	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.25	0.09	54.30	0.29	0.72	0.47	33.70	0.25	0.07	0.07	0.00	11.58	0.05	0.12	0.01	101.71
10319	82	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.28	0.08	55.12	0.50	0.98	0.31	29.32	0.20	0.07	0.18	0.00	13.84	0.02	0.15	0.00	100.77
10319	84	TM-MPB22	0.25-0.5	black	Mg-ilmenite	0.31	0.08	54.15	0.58	0.17	0.35	33.35	0.34	0.06	0.19	0.00	11.31	0.03	0.13	0.03	100.74
10315	75	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.09	54.52	0.33	0.54	0.35	31.87	0.34	0.03	0.01	0.00	11.71	0.01	0.21	0.06	100.00
10315	76	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.36	0.04	55.51	0.74	0.68	0.55	28.18	0.33	0.07	0.08	0.02	14.39	0.04	0.16	0.06	100.79
10315	77	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.40	0.02	45.04	0.16	2.76	0.70	39.30	0.24	0.04	0.03	0.07	8.08	0.01	0.03	0.01	96.48
10315	78	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.13	0.05	52.42	0.27	0.40	0.56	35.46	0.35	0.02	0.00	0.01	10.11	0.00	0.08	0.04	99.72
10315	79	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.04	0.11	53.90	0.65	0.57	0.44	32.01	0.22	0.12	0.13	0.00	11.65	0.03	0.21	0.00	100.06
10315	80	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.21	0.02	53.42	0.25	0.35	0.34	34.05	0.42	0.11	0.05	0.02	11.17	0.03	0.18	0.00	100.41
10315	81	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.08	0.03	54.87	0.39	0.44	0.41	30.94	0.24	0.10	0.06	0.05	12.32	0.03	0.17	0.00	100.04
10315	82	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.06	55.44	0.46	0.78	0.44	28.84	0.30	0.05	0.11	0.02	13.24	0.04	0.32	0.00	100.11
10315	83	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.17	0.02	55.39	0.40	0.66	0.43	29.36	0.32	0.02	0.06	0.00	13.02	0.05	0.08	0.04	99.81
10315	84	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.20	0.03	54.48	0.60	3.16	0.49	26.44	0.36	0.08	0.22	0.00	13.87	0.03	0.25	0.00	100.01
10315	85	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.01	0.02	55.22	0.61	1.82	0.38	26.48	0.37	0.07	0.18	0.04	14.74	0.02	0.20	0.00	100.16
10315	86	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.07	51.10	0.27	0.88	0.33	35.94	0.34	0.11	0.11	0.03	10.05	0.00	0.15	0.04	99.38
10315	87	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.01	54.94	0.58	2.17	0.38	26.31	0.35	0.07	0.17	0.06	14.37	0.00	0.17	0.02	99.57
10315	88	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.15	0.05	54.64	0.61	0.22	0.35	31.54	0.27	0.08	0.10	0.06	11.65	0.10	0.10	0.00	99.77
10315	89	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.36	0.01	49.54	0.67	1.38	0.54	33.93	0.19	0.14	0.09	0.05	11.30	0.01	0.26	0.00	98.13
10315	90	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.16	0.08	54.97	0.48	0.57	0.44	29.70	0.29	0.07	0.14	0.00	13.13	0.07	0.16	0.01	100.10
10315	91	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.04	49.68	0.16	1.11	0.43	38.73	0.29	0.00	0.00	0.03	8.58	0.02	0.06	0.00	99.15
10315	92	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.09	0.04	55.02	0.48	1.71	0.33	28.16	0.32	0.12	0.23	0.06	13.99	0.00	0.19	0.00	100.67
10315	93	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.12	0.04	54.68	0.47	1.08	0.18	28.62	0.33	0.00	0.17	0.04	13.91	0.07	0.18	0.07	99.77
10315	94	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.07	54.51	0.58	1.09	0.60	28.83	0.21	0.00	0.08	0.00	13.43	0.04	0.07	0.04	99.51
10315	97	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.03	0.03	54.76	0.40	0.37	0.27	31.05	0.41	0.00	0.17	0.06	12.24	0.05	0.08	0.09	99.88
10315	98	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.20	0.03	54.21	0.37	0.42	0.50	30.05	0.29	0.02	0.00	0.00	13.03	0.02	0.06	0.09	99.00
10315	99	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.08	0.05	52.85	0.28	0.37	0.60	33.40	0.26	0.04	0.05	0.06	10.89	0.02	0.13	0.02	98.99
10315	100	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.13	0.03	54.75	0.56	1.49	0.28	28.12	0.22	0.07	0.11	0.00	13.48	0.03	0.27	0.00	99.41
10315	101	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.11	0.07	53.93	0.61	3.02	0.40	27.63	0.29	0.00	0.18	0.00	14.12	0.04	0.15	0.00	100.45
10315	102	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.33	0.07	54.35	0.31	0.39	0.39	30.84	0.34	0.08	0.14	0.08	12.61	0.05	0.15	0.04	99.80
10315	103	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.21	0.06	50.22	0.14	0.84	0.40	37.53	0.40	0.00	0.03	0.00	9.24	0.02	0.10	0.03	98.99
10315	104	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.21	0.03	54.41	0.34	0.72	0.41	30.56	0.39	0.04	0.04	0.03	12.84	0.09	0.27	0.00	100.17
10315	105	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.01	0.07	56.42	0.63	1.35	0.52	24.74	0.45	0.07	0.14	0.04	15.55	0.05	0.18	0.00	100.22
10315	106	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.03	0.06	52.99	0.26	0.48	0.44	32.98	0.40	0.04	0.00	0.00	11.39	0.03	0.13	0.03	99.20
10315	107	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.11	0.08	55.19	0.48	1.45	0.40	29.07	0.71	0.07	0.17	0.05	12.89	0.02	0.20	0.04	100.79
10315	108	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.24	0.08	48.75	0.16	0.92	0.47	39.04	0.18	0.04	0.06	0.07	8.31	0.02	0.06	0.00	98.16
10315	109	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.35	0.09	49.07	0.13	1.28	0.54	38.14	0.22	0.12	0.06	0.09	8.73	0.03	0.08	0.00	98.58
10319	86	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.49	0.05	53.50	0.32	0.41	0.39	32.59	0.35	0.05	0.02	0.01	11.40	0.05	0.16	0.01	99.32
10319	87	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.06	53.73	0.30	0.48	0.46	33.79	0.31	0.06	0.08	0.04	11.02	0.01	0.19	0.00	100.53
10319	90	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.04	0.07	54.73	0.65	1.31	0.40	30.13	0.31	0.13	0.11	0.13	12.95	0.02	0.16	0.01	101.10
10319	91	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.08	54.85	0.45	1.37	0.48	30.24	0.28	0.01	0.10	0.03	12.93	0.04	0.29	0.05	101.14
10319	92	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.28	0.05	54.94	0.24	0.53	0.40	31.77	0.27	0.03	0.13	0.00	12.31	0.02	0.13	0.00	100.83
10319	93	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.36	0.07	48.75	0.17	0.71	0.44	41.60	0.38	0.09	0.00	0.02	7.37	0.02	0.23	0.00	99.85
10319	94	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.27	0.09	51.86	0.25	0.35	0.43	37.48	0.36	0.11	0.03	0.06	9.56	0.04	0.15	0.03	100.77
10319	95	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.52	0.05	49.75	0.19	0.39	0.46	39.29	0.40	0.06	0.01	0.00	9.05	0.01	0.14	0.08	99.80
10319	97	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.04	56.87	0.53	1.24	0.29	27.54	0.32	0.06	0.07	0.09	14.60	0.06	0.18	0.06	101.88
10319	98	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.06	53.84	0.42	0.66	0.45	32.93	0.30	0.10	0.14	0.00	11.57	0.02	0.22	0.00	100.72
10319	99	TM-MPB23	0.25-0.5	black	Mg-ilmenite	0.00	0.08	54.26	0.35	0.42	0.40	32.53	0.33	0.06	0.10	0.06	11.83	0.04	0.11	0.07	100.59
10315	114	TM-MPB24	0.25-0.5	black	Mg-ilmenite	0.00	0.05	50.14	0.66	0.19	0.44	37.80	0.31	0.02	0.05	0.00	8.94	0.04	0.10	0.06	98.74

Appendix C.2 Microprobe data for Mg-ilmenite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10315	115	TM-MPB24	0.25-0.5	black	Mg-ilmenite	0.21	0.01	49.48	0.42	0.33	0.55	40.42	0.27	0.07	0.00	0.05	8.13	0.03	0.16	0.00	99.93
10315	116	TM-MPB24	0.25-0.5	black	Mg-ilmenite	0.00	0.05	52.85	0.62	2.32	0.53	30.31	0.26	0.02	0.11	0.00	12.35	0.00	0.14	0.00	99.55
10315	128	TM-MPB25	0.25-0.5	black	Mg-ilmenite	0.00	0.05	53.30	0.52	0.68	0.43	32.63	0.31	0.06	0.03	0.00	11.69	0.01	0.27	0.00	100.01
10316	9	TM-MPB29	0.25-0.5	black	Mg-ilmenite	0.03	0.08	48.21	0.21	4.61	0.52	35.57	0.29	0.16	0.18	0.00	9.41	0.00	0.24	0.04	99.49
10316	10	TM-MPB29	0.25-0.5	black	Mg-ilmenite	0.17	0.05	47.98	0.17	1.55	0.35	41.26	0.31	0.13	0.03	0.09	7.80	0.01	0.14	0.00	99.87
10316	13	TM-MPB29	0.25-0.5	black	Mg-ilmenite	0.16	0.07	51.02	0.26	1.64	0.41	35.46	0.41	0.12	0.16	0.03	10.26	0.02	0.06	0.02	99.93
10316	16	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.11	0.08	54.87	0.87	2.14	0.49	27.24	0.34	0.00	0.15	0.02	14.39	0.05	0.31	0.07	100.94
10316	17	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.09	0.07	54.57	0.59	1.45	0.33	29.15	0.32	0.08	0.15	0.03	13.46	0.03	0.24	0.00	100.46
10316	18	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.33	0.05	49.81	0.11	0.93	0.34	38.56	0.24	0.01	0.13	0.06	8.64	0.00	0.15	0.00	99.03
10316	19	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.23	0.04	56.67	0.44	0.80	0.15	27.46	0.27	0.08	0.10	0.05	14.50	0.03	0.24	0.03	100.82
10316	20	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.25	0.07	55.11	0.29	0.36	0.41	30.11	0.29	0.06	0.05	0.00	13.09	0.03	0.28	0.03	100.14
10316	21	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.36	0.04	56.23	0.50	1.20	0.34	27.38	0.25	0.05	0.15	0.04	14.38	0.00	0.18	0.00	100.72
10316	23	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.28	0.04	55.29	0.36	0.44	0.40	31.33	0.30	0.00	0.00	0.03	13.30	0.00	0.18	0.09	101.68
10316	26	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.04	0.02	50.83	0.31	1.49	0.37	36.32	0.21	0.08	0.06	0.01	9.12	0.00	0.09	0.00	98.91
10316	28	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.12	0.07	54.31	0.59	2.61	0.39	27.37	0.25	0.03	0.16	0.02	14.12	0.03	0.12	0.05	100.08
10316	29	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.15	0.06	56.27	0.43	0.94	0.33	27.53	0.20	0.03	0.13	0.01	14.18	0.05	0.18	0.02	100.34
10316	30	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.05	0.04	51.23	0.22	1.45	0.38	36.96	0.32	0.10	0.08	0.04	9.27	0.01	0.14	0.07	100.22
10316	31	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.15	0.00	54.65	0.74	0.52	0.40	28.23	0.23	0.12	0.09	0.02	14.05	0.03	0.19	0.03	99.27
10316	33	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.00	0.04	51.12	0.28	0.80	0.32	36.52	0.17	0.05	0.00	0.07	9.76	0.00	0.00	0.00	99.13
10320	10	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.41	0.08	52.25	0.22	0.45	0.24	35.63	0.26	0.00	0.11	0.00	10.11	0.00	0.11	0.07	99.47
10320	11	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.00	0.01	55.24	0.26	0.34	0.38	31.88	0.35	0.07	0.03	0.10	12.15	0.00	0.09	0.00	100.90
10320	12	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.13	0.04	55.62	0.54	1.37	0.40	28.05	0.28	0.01	0.19	0.00	14.06	0.03	0.06	0.06	100.67
10320	14	TM-MPB30	0.25-0.5	black	Mg-ilmenite	0.32	0.00	53.34	0.28	0.45	0.42	34.36	0.30	0.04	0.05	0.03	11.06	0.02	0.00	0.07	100.35
10320	18	TM-MPB31	0.25-0.5	black	Mg-ilmenite	0.13	0.05	52.56	0.67	0.20	0.48	34.91	0.22	0.07	0.12	0.12	11.22	0.04	0.23	0.00	100.88
10320	19	TM-MPB31	0.25-0.5	black	Mg-ilmenite	0.00	0.02	54.36	0.36	0.50	0.35	31.82	0.53	0.02	0.06	0.00	12.52	0.02	0.23	0.03	100.80
10320	20	TM-MPB31	0.25-0.5	black	Mg-ilmenite	0.00	0.06	51.94	0.35	0.95	0.61	35.58	0.38	0.02	0.03	0.00	10.39	0.01	0.04	0.00	100.37
10320	21	TM-MPB31	0.25-0.5	black	Mg-ilmenite	0.21	0.08	55.72	0.47	0.61	0.48	28.21	0.35	0.06	0.11	0.12	14.16	0.04	0.22	0.00	100.62
10316	39	TM-MPB32	0.25-0.5	black	Mg-ilmenite	0.09	0.05	44.13	0.19	1.93	0.50	44.35	0.19	0.09	0.02	0.05	6.05	0.01	0.01	0.08	97.56
10316	41	TM-MPB32	0.25-0.5	black	Mg-ilmenite	0.60	0.08	48.07	0.19	1.07	0.55	40.62	0.31	0.00	0.12	0.00	7.92	0.04	0.14	0.00	99.11
10316	42	TM-MPB32	0.25-0.5	black	Mg-ilmenite	0.09	0.09	48.03	0.32	0.32	0.35	42.61	0.21	0.10	0.00	0.00	7.11	0.02	0.15	0.00	99.30
10316	57	TM-MPB34	0.25-0.5	black	Mg-ilmenite	0.00	0.09	53.74	0.70	0.72	0.30	31.94	0.18	0.08	0.20	0.09	12.07	0.02	0.13	0.00	100.28
10316	65	TM-MPB35	0.25-0.5	black	Mg-ilmenite	0.25	0.08	49.78	0.44	0.06	0.48	40.50	0.30	0.04	0.03	0.04	8.22	0.00	0.00	0.00	99.95
10316	67	TM-MPB35	0.25-0.5	black	Mg-ilmenite	0.36	0.09	47.72	0.10	2.30	0.46	39.34	0.39	0.06	0.06	0.10	7.91	0.02	0.20	0.03	98.77
10316	70	TM-MPB35	0.25-0.5	black	Mg-ilmenite	0.07	0.09	51.12	0.57	0.14	0.39	37.59	0.28	0.08	0.10	0.04	8.87	0.00	0.09	0.00	99.36
10316	80	TM-MPB35	0.25-0.5	black	Mg-ilmenite	0.37	0.05	45.71	0.09	3.01	0.38	40.80	0.28	0.05	0.07	0.07	7.90	0.03	0.07	0.00	98.51
10320	45	TM-MPB35	0.25-0.5	black	Mg-ilmenite	0.00	0.08	49.86	0.54	0.00	0.47	39.75	0.83	0.05	0.08	0.08	8.02	0.00	0.12	0.00	99.89
10316	83	TM-MPB36	0.25-0.5	black	Mg-ilmenite	0.17	0.09	51.21	0.58	0.20	0.52	36.86	0.15	0.12	0.09	0.00	9.73	0.00	0.20	0.00	99.76
10316	84	TM-MPB36	0.25-0.5	black	Mg-ilmenite	0.27	0.06	50.68	0.38	0.52	0.58	38.15	0.31	0.10	0.13	0.00	9.58	0.01	0.12	0.08	100.61
10316	87	TM-MPB36	0.25-0.5	black	Mg-ilmenite	0.17	0.01	53.47	0.49	0.66	0.37	32.20	0.23	0.07	0.09	0.11	11.79	0.01	0.11	0.03	99.61
10316	99	TM-MPB37	0.25-0.5	black	Mg-ilmenite	0.09	0.08	54.39	0.35	0.91	0.32	30.28	0.24	0.07	0.11	0.04	13.04	0.06	0.13	0.06	100.02
10320	60	TM-MPB37	0.25-0.5	black	Mg-ilmenite	0.12	0.07	50.46	0.27	1.45	0.38	35.80	0.32	0.06	0.14	0.13	10.64	0.00	0.16	0.00	99.88
10316	102	TM-MPB38	0.25-0.5	black	Mg-ilmenite	0.16	0.07	48.65	0.31	0.27	0.42	37.29	0.36	0.13	0.01	0.03	9.54	0.11	0.17	0.00	97.34
10316	104	TM-MPB39	0.25-0.5	black	Mg-ilmenite	0.05	0.04	52.95	0.62	0.16	0.34	34.21	0.20	0.04	0.04	0.01	10.61	0.02	0.21	0.00	99.46
10320	62	TM-MPB39	0.25-0.5	black	Mg-ilmenite	0.20	0.03	53.33	0.72	0.24	0.49	32.23	0.29	0.04	0.20	0.00	12.68	0.03	0.17	0.02	100.45
10320	64	TM-MPB39	0.25-0.5	black	Mg-ilmenite	0.00	0.05	52.92	0.48	0.14	0.50	34.25	0.15	0.07	0.06	0.00	11.16	0.04	0.12	0.06	99.92
10320	68	TM-MPB39	0.25-0.5	black	Mg-ilmenite	0.25	0.06	49.89	0.71	0.36	0.66	36.92	0.24	0.06	0.07	0.15	10.35	0.01	0.20	0.04	99.67
10316	109	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.24	0.07	47.83	0.25	0.29	0.48	41.19	0.18	0.08	0.05	0.00	7.63	0.00	0.13	0.00	98.17
10316	110	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.15	0.07	48.81	0.19	0.53	0.42	39.86	0.33	0.10	0.07	0.06	8.31	0.00	0.32	0.04	99.07
10316	112	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.11	0.12	51.57	0.52	0.07	0.43	35.16	0.24	0.12	0.14	0.00	11.45	0.00	0.12	0.00	99.94
10316	117	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.03	0.05	53.07	0.61	0.34	0.40	32.04	0.32	0.02	0.21	0.10	12.46	0.04	0.16	0.03	99.82

Appendix C.2 Microprobe data for Mg-ilmenite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10316	118	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.11	0.06	50.19	0.29	1.84	0.44	37.28	0.37	0.04	0.11	0.02	9.46	0.00	0.13	0.02	100.23
10316	119	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.57	0.10	51.92	0.51	4.67	0.39	28.37	0.36	0.11	0.31	0.06	12.77	0.06	0.26	0.00	99.88
10316	121	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.01	0.05	52.61	0.58	0.26	0.39	34.72	0.37	0.09	0.05	0.08	10.60	0.02	0.22	0.04	100.01
10316	125	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.11	0.05	47.18	0.27	0.25	0.79	41.63	0.29	0.05	0.03	0.09	7.75	0.00	0.13	0.00	98.51
10316	127	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.00	0.09	46.48	0.37	0.30	0.46	42.61	0.24	0.10	0.08	0.09	6.70	0.00	0.13	0.03	97.66
10317	6	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.21	0.04	51.84	0.38	0.28	0.52	35.54	0.36	0.00	0.04	0.00	10.54	0.02	0.14	0.04	99.69
10317	7	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.03	0.02	52.89	0.41	0.28	0.43	33.83	0.27	0.08	0.10	0.02	11.04	0.03	0.13	0.00	99.53
10317	8	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.12	0.03	48.48	0.35	0.22	0.46	40.44	0.27	0.11	0.01	0.00	7.47	0.03	0.06	0.02	97.92
10317	11	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.24	0.04	51.79	0.50	0.14	0.67	35.52	0.35	0.02	0.08	0.01	10.32	0.03	0.23	0.00	99.70
10317	17	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.35	0.03	53.56	0.38	0.16	0.38	33.70	0.29	0.00	0.00	0.01	11.11	0.10	0.22	0.09	99.93
10317	19	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.13	0.09	52.63	0.47	0.23	0.38	35.20	0.37	0.00	0.00	0.03	10.44	0.03	0.10	0.13	99.97
10317	20	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.31	0.06	51.41	0.40	0.61	0.34	38.34	0.29	0.11	0.02	0.00	9.11	0.03	0.14	0.01	100.85
10320	82	TM-MPB40	0.25-0.5	black	Mg-ilmenite	0.00	0.07	51.34	0.52	0.18	0.28	37.88	0.28	0.07	0.05	0.00	9.66	0.03	0.09	0.11	100.46
10317	24	TM-MPB41	0.25-0.5	black	Mg-ilmenite	0.00	0.07	48.14	0.27	0.41	0.63	41.50	0.39	0.13	0.09	0.00	7.43	0.02	0.04	0.03	99.13
10317	26	TM-MPB41	0.25-0.5	black	Mg-ilmenite	0.36	0.02	48.25	0.24	0.35	0.80	40.48	0.23	0.02	0.03	0.06	7.69	0.00	0.14	0.00	98.30
10317	27	TM-MPB41	0.25-0.5	black	Mg-ilmenite	0.15	0.03	45.12	0.26	0.46	0.64	43.88	0.25	0.06	0.04	0.00	6.71	0.01	0.08	0.08	97.54
10317	28	TM-MPB41	0.25-0.5	black	Mg-ilmenite	0.21	0.10	49.17	0.22	1.33	0.52	38.21	0.34	0.02	0.09	0.07	8.86	0.03	0.09	0.00	99.04
10317	33	TM-MPB42	0.25-0.5	black	Mg-ilmenite	0.36	0.00	54.35	0.28	0.43	0.40	31.64	0.31	0.03	0.00	0.02	12.68	0.06	0.02	0.08	100.22
10317	38	TM-MPB43	0.25-0.5	black	Mg-ilmenite	0.00	0.07	52.64	0.57	0.14	0.39	34.39	0.34	0.04	0.09	0.07	10.89	0.03	0.14	0.00	99.80
10317	45	TM-MPB43	0.25-0.5	black	Mg-ilmenite	0.15	0.04	55.57	0.54	0.92	0.21	26.96	0.29	0.05	0.09	0.08	14.38	0.01	0.29	0.01	99.41
10317	51	TM-MPB44	0.25-0.5	black	Mg-ilmenite	0.00	0.13	51.92	0.64	0.34	0.24	33.84	0.25	0.08	0.03	0.02	10.35	0.05	0.09	0.00	97.99
10317	52	TM-MPB44	0.25-0.5	black	Mg-ilmenite	0.21	0.09	52.98	0.63	2.69	0.43	28.76	0.31	0.00	0.22	0.00	13.13	0.04	0.20	0.05	99.48
10317	56	TM-MPB45	0.25-0.5	black	Mg-ilmenite	0.19	0.09	51.04	0.26	0.80	0.44	36.73	0.37	0.06	0.05	0.07	9.95	0.01	0.07	0.04	99.92
10317	58	TM-MPB45	0.25-0.5	black	Mg-ilmenite	0.01	0.04	52.10	0.32	0.83	0.46	35.19	0.24	0.01	0.11	0.02	10.57	0.04	0.20	0.03	100.14
10317	61	TM-MPB47	0.25-0.5	black	Mg-ilmenite	0.17	0.04	53.80	0.34	0.68	0.49	32.79	0.22	0.07	0.13	0.00	11.63	0.02	0.05	0.11	100.26
10317	65	TM-MPB47	0.25-0.5	black	Mg-ilmenite	0.40	0.04	52.51	0.23	0.30	0.47	34.57	0.37	0.14	0.00	0.06	11.30	0.00	0.00	0.00	99.99
10317	67	TM-MPB47	0.25-0.5	black	Mg-ilmenite	0.00	0.05	55.62	0.55	0.51	0.36	29.18	0.50	0.00	0.07	0.04	13.80	0.03	0.03	0.12	100.74
10317	69	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.11	0.07	55.60	0.48	1.76	0.63	26.58	0.31	0.07	0.08	0.03	14.75	0.02	0.23	0.00	100.60
10317	70	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.05	0.04	55.38	0.58	1.43	0.60	26.76	0.35	0.04	0.15	0.00	14.44	0.02	0.20	0.04	99.98
10317	71	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.05	0.09	54.44	0.31	0.39	0.48	31.60	0.28	0.14	0.12	0.07	12.52	0.00	0.23	0.08	100.66
10317	74	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.29	0.05	49.93	0.22	1.01	0.36	39.50	0.33	0.10	0.04	0.01	7.90	0.03	0.14	0.00	99.65
10317	75	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.33	0.08	56.62	0.51	0.67	0.35	27.04	0.25	0.10	0.09	0.05	14.84	0.07	0.14	0.00	100.82
10317	76	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.00	0.03	52.38	0.18	0.40	0.30	34.39	0.36	0.08	0.03	0.06	10.74	0.05	0.14	0.00	99.14
10317	77	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.11	0.05	50.80	0.20	0.45	0.71	37.55	0.33	0.00	0.02	0.04	9.36	0.02	0.19	0.00	99.71
10317	78	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.21	0.07	55.38	0.53	1.98	0.44	27.07	0.28	0.01	0.18	0.02	14.50	0.00	0.05	0.00	100.52
10317	79	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.19	0.06	54.37	0.39	0.60	0.41	31.71	0.29	0.09	0.10	0.04	12.21	0.01	0.17	0.04	100.44
10317	80	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.47	0.08	53.32	0.21	0.27	0.40	33.29	0.42	0.07	0.11	0.10	11.86	0.04	0.01	0.00	100.18
10317	81	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.00	0.05	50.41	0.19	1.01	0.49	38.40	0.26	0.07	0.06	0.05	8.34	0.03	0.16	0.08	99.52
10317	82	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.27	0.09	55.36	0.51	1.11	0.37	28.75	0.20	0.16	0.15	0.04	13.77	0.00	0.22	0.07	100.73
10317	83	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.45	0.00	51.23	0.26	0.81	0.65	36.65	0.30	0.01	0.05	0.00	9.59	0.06	0.28	0.00	99.88
10317	84	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.17	0.05	55.99	0.34	1.03	0.34	29.12	0.25	0.09	0.09	0.06	14.04	0.03	0.09	0.00	101.52
10317	85	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.31	0.00	53.47	0.32	0.41	0.38	32.81	0.35	0.08	0.12	0.03	11.78	0.00	0.15	0.07	99.90
10317	86	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.21	0.06	56.96	0.59	1.18	0.30	26.68	0.30	0.01	0.18	0.07	14.72	0.01	0.13	0.08	101.21
10317	88	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.07	0.08	54.30	0.38	0.83	0.43	31.10	0.34	0.02	0.04	0.04	12.66	0.04	0.16	0.03	100.43
10317	90	TM-MPB48	0.25-0.5	black	Mg-ilmenite	0.24	0.02	54.30	0.38	0.71	0.29	30.38	0.28	0.14	0.00	0.05	12.43	0.01	0.19	0.00	99.19
10317	92	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.28	0.00	54.53	0.52	0.22	0.31	31.52	0.22	0.08	0.00	0.00	12.39	0.06	0.11	0.03	99.96
10317	94	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.51	0.05	50.35	0.20	3.04	0.56	33.37	0.34	0.04	0.11	0.00	11.07	0.00	0.17	0.07	99.31
10317	95	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.00	0.05	55.39	0.50	1.24	0.28	26.86	0.26	0.00	0.20	0.05	14.63	0.04	0.20	0.05	99.71
10317	97	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.12	0.05	53.36	0.56	1.96	0.47	28.99	0.29	0.04	0.06	0.06	13.06	0.02	0.16	0.01	99.09
10317	99	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.00	0.03	52.24	0.21	0.24	0.42	36.28	0.37	0.02	0.04	0.03	9.83	0.03	0.22	0.02	99.97

Appendix C.2 Microprobe data for Mg-ilmenite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10317	102	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.08	0.06	56.01	0.61	1.30	0.50	27.14	0.32	0.05	0.10	0.07	14.46	0.00	0.12	0.02	100.72
10317	103	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.23	0.07	52.80	0.20	0.30	0.48	34.32	0.31	0.00	0.00	0.00	10.67	0.00	0.11	0.06	99.27
10317	105	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.17	0.07	55.01	0.55	2.61	0.38	27.10	0.38	0.06	0.18	0.05	14.05	0.04	0.23	0.10	100.73
10317	106	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.19	0.10	55.19	0.56	2.49	0.44	27.32	0.28	0.06	0.10	0.02	14.39	0.01	0.24	0.09	101.20
10317	109	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.09	0.06	56.13	0.38	0.66	0.25	28.34	0.33	0.01	0.07	0.05	14.13	0.03	0.18	0.00	100.60
10317	111	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.31	0.04	54.38	0.33	0.36	0.29	33.15	0.37	0.06	0.06	0.04	11.24	0.06	0.14	0.00	100.54
10317	112	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.00	0.03	54.50	0.33	0.40	0.37	31.30	0.38	0.07	0.07	0.05	12.25	0.06	0.19	0.00	99.99
10317	113	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.08	0.01	52.17	0.28	0.71	0.67	35.36	0.29	0.00	0.06	0.00	10.33	0.01	0.09	0.02	99.98
10320	121	TM-MPB49	0.25-0.5	black	Mg-ilmenite	0.05	0.09	55.70	0.52	1.31	0.49	27.00	0.32	0.08	0.05	0.02	14.55	0.03	0.21	0.03	100.36
10317	114	TM-MPB50	0.25-0.5	black	Mg-ilmenite	0.07	0.05	54.50	0.36	0.49	0.51	30.77	0.28	0.04	0.00	0.06	12.22	0.02	0.17	0.00	99.47
10317	115	TM-MPB50	0.25-0.5	black	Mg-ilmenite	0.24	0.04	50.81	0.39	1.31	0.35	35.19	0.34	0.17	0.08	0.00	11.12	0.02	0.05	0.04	99.88
10317	116	TM-MPB50	0.25-0.5	black	Mg-ilmenite	0.00	0.05	49.51	0.43	0.23	0.44	40.48	0.30	0.09	0.08	0.02	7.89	0.01	0.08	0.05	99.61
10317	121	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.13	0.02	49.91	0.60	0.06	0.48	38.91	0.27	0.09	0.00	0.04	8.53	0.00	0.18	0.00	99.07
10317	123	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.27	0.10	52.00	0.20	0.52	0.36	35.41	0.20	0.08	0.08	0.00	10.31	0.06	0.05	0.00	99.37
10317	129	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.08	0.11	52.99	0.22	0.43	0.38	34.21	0.30	0.07	0.00	0.04	10.70	0.05	0.08	0.00	99.56
10317	130	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.20	0.07	54.56	0.36	0.60	0.48	29.75	0.43	0.00	0.07	0.00	13.65	0.04	0.07	0.01	100.09
10318	1	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.15	0.07	47.70	0.26	0.40	0.49	43.17	0.28	0.08	0.05	0.00	6.64	0.04	0.00	0.04	99.16
10318	5	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.33	0.11	53.82	0.27	0.73	0.48	32.38	0.36	0.02	0.05	0.03	11.85	0.08	0.13	0.00	100.31
10318	9	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.00	0.06	53.23	0.37	0.70	0.37	33.29	0.32	0.17	0.12	0.06	11.21	0.00	0.13	0.02	100.04
10318	10	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.13	0.02	46.55	0.21	0.39	0.49	44.10	0.28	0.06	0.00	0.02	6.84	0.01	0.12	0.00	99.08
10318	16	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.03	0.06	51.27	0.32	0.61	0.31	37.31	0.30	0.07	0.06	0.07	9.08	0.03	0.11	0.00	99.60
10318	20	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.31	0.06	44.73	0.29	0.26	0.53	46.19	0.33	0.08	0.17	0.06	5.92	0.03	0.00	0.00	98.64
10321	3	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.15	0.00	53.65	0.18	0.54	0.35	35.10	0.34	0.09	0.08	0.00	10.57	0.03	0.18	0.08	101.11
10321	9	TM-MPB51	0.25-0.5	black	Mg-ilmenite	0.00	0.02	51.17	0.63	0.17	0.41	38.85	0.30	0.02	0.06	0.03	9.45	0.02	0.18	0.04	101.31
10318	32	TM-MPB52	0.25-0.5	black	Mg-ilmenite	0.25	0.11	52.97	0.55	0.09	0.34	35.57	0.25	0.05	0.06	0.00	10.23	0.00	0.28	0.10	100.48
10318	33	TM-MPB53	0.25-0.5	black	Mg-ilmenite	0.00	0.09	53.68	0.47	0.36	0.52	33.74	0.30	0.00	0.03	0.00	11.68	0.03	0.11	0.13	101.02
10318	34	TM-MPB53	0.25-0.5	black	Mg-ilmenite	0.17	0.10	50.58	0.21	0.46	0.50	38.34	0.28	0.11	0.01	0.03	9.03	0.02	0.09	0.00	99.78
10318	37	TM-MPB53	0.25-0.5	black	Mg-ilmenite	0.11	0.10	54.61	0.38	0.97	0.42	31.09	0.39	0.05	0.10	0.03	12.36	0.03	0.06	0.04	100.59
10318	38	TM-MPB53	0.25-0.5	black	Mg-ilmenite	0.03	0.07	51.23	0.49	0.09	0.34	38.79	0.42	0.07	0.07	0.10	8.79	0.05	0.10	0.04	100.61
10318	42	TM-MPB53	0.25-0.5	black	Mg-ilmenite	0.00	0.03	54.49	0.56	0.37	0.56	32.35	0.29	0.06	0.05	0.01	11.68	0.05	0.10	0.00	100.59
10318	57	TM-MPB54	0.25-0.5	black	Mg-ilmenite	0.23	0.10	52.61	0.23	0.29	0.45	35.38	0.30	0.06	0.01	0.04	10.28	0.00	0.07	0.00	99.84
10318	59	TM-MPB55	0.25-0.5	black	Mg-ilmenite	0.00	0.01	51.74	0.31	0.75	0.52	35.98	0.28	0.09	0.00	0.04	10.47	0.05	0.01	0.04	100.26
10318	62	TM-MPB55	0.25-0.5	black	Mg-ilmenite	0.09	0.07	52.04	0.56	0.09	0.45	36.12	0.28	0.06	0.07	0.00	10.46	0.03	0.15	0.01	100.38
10318	63	TM-MPB55	0.25-0.5	black	Mg-ilmenite	0.12	0.07	55.41	0.54	2.22	0.39	27.94	0.23	0.00	0.22	0.10	14.05	0.02	0.15	0.06	101.35
10318	69	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.00	0.09	54.83	0.56	2.41	0.44	27.20	0.26	0.09	0.22	0.00	14.23	0.00	0.15	0.01	100.49
10318	70	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.13	0.05	56.63	0.57	1.10	0.47	26.97	0.27	0.11	0.08	0.05	15.22	0.03	0.14	0.03	101.69
10318	71	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.27	0.06	55.57	0.41	0.84	0.37	29.86	0.29	0.07	0.10	0.00	13.25	0.00	0.15	0.04	100.97
10318	72	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.21	0.07	52.30	0.33	1.04	0.51	35.63	0.33	0.00	0.12	0.02	10.17	0.02	0.11	0.05	100.65
10318	74	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.00	0.13	55.35	0.53	0.89	0.32	29.35	0.39	0.06	0.16	0.07	13.78	0.04	0.11	0.04	101.18
10318	75	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.03	0.06	54.47	0.51	0.73	0.23	32.64	0.25	0.05	0.11	0.06	11.56	0.03	0.04	0.00	100.72
10318	76	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.28	0.05	49.94	0.13	2.10	0.42	38.08	0.31	0.06	0.15	0.03	8.65	0.05	0.14	0.00	100.10
10318	77	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.15	0.08	55.11	0.86	2.34	0.47	27.04	0.28	0.09	0.30	0.01	14.61	0.03	0.23	0.01	101.45
10321	28	TM-MPB60	0.25-0.5	black	Mg-ilmenite	0.20	0.04	55.79	0.49	0.64	0.41	28.91	0.30	0.04	0.08	0.09	14.38	0.00	0.26	0.06	101.42
10318	84	TM-MPB62	0.25-0.5	black	Mg-ilmenite	0.01	0.10	54.27	0.64	2.67	0.36	27.56	0.36	0.04	0.11	0.06	14.00	0.07	0.22	0.00	100.46
10318	85	TM-MPB62	0.25-0.5	black	Mg-ilmenite	0.11	0.06	54.12	0.29	1.12	0.36	31.57	0.35	0.05	0.09	0.00	12.34	0.04	0.18	0.00	100.57
10318	86	TM-MPB62	0.25-0.5	black	Mg-ilmenite	0.19	0.02	54.08	0.31	1.12	0.54	32.51	0.25	0.01	0.14	0.02	12.06	0.03	0.23	0.04	101.31
10318	90	TM-MPB62	0.25-0.5	black	Mg-ilmenite	0.04	0.07	52.61	0.47	0.21	0.45	35.44	0.24	0.09	0.00	0.00	10.50	0.03	0.08	0.04	100.17
10318	92	TM-MPB63	0.25-0.5	black	Mg-ilmenite	0.17	0.14	53.45	0.29	0.60	0.39	33.45	0.34	0.03	0.06	0.06	10.92	0.02	0.09	0.06	99.85
10318	94	TM-MPB63	0.25-0.5	black	Mg-ilmenite	0.00	0.06	49.00	0.40	0.60	0.61	40.62	0.25	0.06	0.12	0.07	8.13	0.05	0.20	0.04	100.17
10318	96	TM-MPB63	0.25-0.5	black	Mg-ilmenite	0.12	0.08	54.88	0.57	0.46	0.40	31.49	0.25	0.01	0.13	0.05	12.21	0.04	0.16	0.00	100.71

Appendix C.3 Microprobe data for chromite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10319	4	TM-MPB03	0.25-0.5	black	chromite	0.08	0.09	1.17	11.73	49.44	0.30	24.75	0.27	0.03	0.08	0.14	9.88	0.00	0.10	0.06	97.97
10314	96	TM-MPB03	0.25-0.5	black	chromite	0.04	0.09	0.86	8.72	48.83	0.03	25.63	0.33	0.13	0.10	0.01	11.06	0.00	0.24	0.00	96.02
10315	2	TM-MPB04	0.25-0.5	black	chromite	0.10	0.04	0.67	9.67	49.00	0.35	18.95	0.21	0.02	0.09	0.17	9.92	0.00	0.18	0.00	89.28
10315	3	TM-MPB04	0.25-0.5	black	chromite	0.00	0.04	0.04	19.81	47.48	0.09	15.82	0.26	0.06	0.02	0.24	12.84	0.04	0.27	0.03	97.01
10315	9	TM-MPB05	0.25-0.5	black	chromite	0.07	0.07	0.77	10.93	48.63	0.34	24.18	0.32	0.06	0.13	0.18	9.82	0.04	0.09	0.06	95.56
10319	6	TM-MPB05	0.25-0.5	black	chromite	0.00	0.13	1.18	13.22	46.71	0.30	29.84	0.45	0.09	0.11	0.29	6.29	0.06	0.22	0.00	98.88
10319	11	TM-MPB09	0.25-0.5	black	chromite	0.00	0.08	2.01	1.90	50.28	0.68	32.78	0.64	0.04	0.12	0.21	8.15	0.04	0.05	0.00	96.99
10315	21	TM-MPB10	0.25-0.5	black	chromite	0.03	0.07	0.11	15.74	49.95	0.31	17.52	0.29	0.06	0.05	0.20	12.73	0.00	0.27	0.00	97.30
10319	18	TM-MPB10	0.25-0.5	black	chromite	0.04	0.11	0.85	12.18	49.07	0.26	24.17	0.29	0.13	0.23	0.08	10.62	0.01	0.13	0.09	98.13
10315	23	TM-MPB10	0.25-0.5	black	chromite	0.08	0.09	1.62	9.28	47.90	0.47	28.48	0.31	0.18	0.23	0.14	7.91	0.00	0.17	0.06	96.80
10315	25	TM-MPB11	0.25-0.5	black	chromite	0.08	0.08	0.25	5.96	61.74	0.17	15.20	0.30	0.07	0.09	0.09	12.53	0.01	0.12	0.00	96.61
10319	26	TM-MPB13	0.25-0.5	black	chromite	0.07	0.13	0.43	14.89	52.61	0.14	15.19	0.20	0.04	0.22	0.04	15.55	0.01	0.24	0.05	99.70
10319	27	TM-MPB13	0.25-0.5	black	chromite	0.08	0.07	1.46	13.31	46.27	0.32	23.84	0.20	0.15	0.15	0.13	11.64	0.00	0.27	0.00	97.82
10319	33	TM-MPB14	0.25-0.5	black	chromite	0.08	0.11	0.32	13.77	51.32	0.04	19.92	0.44	0.02	0.19	0.15	11.45	0.02	0.19	0.05	97.94
10319	38	TM-MPB14	0.25-0.5	black	chromite	0.00	0.08	1.13	12.30	49.86	0.30	22.18	0.30	0.13	0.08	0.13	11.16	0.01	0.19	0.05	97.83
10319	39	TM-MPB14	0.25-0.5	black	chromite	0.01	0.34	0.45	13.84	49.55	0.20	21.43	0.19	0.05	0.08	0.01	11.44	0.03	0.20	0.00	97.81
10319	35	TM-MPB14	0.25-0.5	black	chromite	0.00	0.10	0.82	12.32	48.15	0.35	24.79	0.33	0.10	0.11	0.11	10.18	0.00	0.21	0.00	97.56
10319	37	TM-MPB14	0.25-0.5	black	chromite	0.04	0.06	1.94	12.13	45.74	0.32	27.38	0.38	0.12	0.15	0.13	9.66	0.00	0.19	0.08	98.18
10315	39	TM-MPB15	0.25-0.5	black	chromite	0.00	0.12	0.45	16.39	49.72	0.00	16.33	0.22	0.01	0.12	0.10	12.88	0.01	0.14	0.00	96.48
10319	42	TM-MPB15	0.25-0.5	black	chromite	0.00	0.08	1.09	12.34	45.81	0.25	30.72	0.45	0.12	0.20	0.30	5.82	0.02	0.10	0.00	97.30
10319	43	TM-MPB15	0.25-0.5	black	chromite	0.00	0.01	1.01	14.08	44.43	0.42	30.34	0.43	0.13	0.10	0.30	5.84	0.02	0.10	0.09	97.22
10319	40	TM-MPB15	0.25-0.5	black	Cr-spinel	0.00	0.14	0.51	25.76	33.71	0.24	26.10	0.46	0.10	0.22	0.15	11.31	0.03	0.17	0.00	98.92
10319	50	TM-MPB16	0.25-0.5	black	chromite	0.11	0.18	0.36	12.30	54.15	0.18	16.69	0.20	0.00	0.26	0.04	13.82	0.02	0.15	0.09	98.35
10319	45	TM-MPB16	0.25-0.5	black	chromite	0.08	0.07	1.38	14.00	46.16	0.21	29.25	0.37	0.12	0.13	0.20	6.96	0.02	0.13	0.06	99.00
10319	49	TM-MPB16	0.25-0.5	black	chromite	0.06	0.03	0.89	15.82	44.39	0.12	28.99	0.48	0.06	0.13	0.14	7.22	0.00	0.16	0.01	98.45
10319	47	TM-MPB16	0.25-0.5	black	chromite	0.01	0.09	2.07	10.00	43.30	0.52	36.26	0.67	0.08	0.10	0.36	3.40	0.00	0.14	0.03	97.00
10319	54	TM-MPB16	0.25-0.5	black	chromite	0.00	0.52	1.01	19.35	36.59	0.39	35.24	0.43	0.10	0.04	0.08	3.77	0.01	0.00	0.05	97.53
10319	55	TM-MPB17	0.25-0.5	black	chromite	0.07	0.22	0.66	11.30	49.85	0.19	25.00	0.35	0.03	0.07	0.17	9.68	0.00	0.17	0.00	97.70
10319	59	TM-MPB18	0.25-0.5	black	chromite	0.00	0.14	0.33	14.13	50.68	0.22	20.30	0.21	0.03	0.14	0.14	11.64	0.03	0.24	0.05	98.26
10319	58	TM-MPB18	0.25-0.5	black	chromite	0.01	0.17	0.33	13.71	49.62	0.18	23.06	0.29	0.13	0.22	0.04	10.11	0.03	0.11	0.02	97.98
10319	65	TM-MPB19	0.25-0.5	black	chromite	0.00	0.09	0.35	14.03	51.83	0.17	18.80	0.22	0.05	0.18	0.19	12.52	0.01	0.20	0.00	98.62
10319	64	TM-MPB19	0.25-0.5	black	chromite	0.06	0.15	2.62	12.71	43.48	0.38	27.03	0.37	0.10	0.23	0.09	10.48	0.00	0.26	0.00	97.87
10315	59	TM-MPB19	0.25-0.5	black	chromite	0.00	0.08	0.51	13.70	42.64	0.10	34.17	2.03	0.17	0.13	1.58	0.77	0.00	0.00	0.04	95.87
10319	66	TM-MPB20	0.25-0.5	black	chromite	0.00	0.20	0.30	13.37	52.57	0.20	17.37	0.23	0.08	0.21	0.00	13.14	0.02	0.15	0.05	97.83
10319	67	TM-MPB21	0.25-0.5	black	chromite	0.13	0.09	2.49	12.07	43.71	0.39	28.01	0.31	0.09	0.10	0.16	9.99	0.00	0.15	0.03	97.56
10319	83	TM-MPB22	0.25-0.5	black	chromite	0.14	0.16	0.35	14.70	50.84	0.27	17.38	0.17	0.10	0.21	0.03	13.48	0.00	0.26	0.06	97.95
10319	71	TM-MPB22	0.25-0.5	black	chromite	0.03	0.27	0.57	14.13	49.99	0.09	19.97	0.27	0.09	0.15	0.10	11.99	0.00	0.10	0.05	97.73
10319	85	TM-MPB22	0.25-0.5	black	chromite	0.00	0.12	0.42	12.87	49.88	0.32	24.70	0.27	0.07	0.06	0.15	9.46	0.00	0.15	0.06	98.46
10319	75	TM-MPB22	0.25-0.5	black	chromite	0.04	0.08	0.78	15.18	47.87	0.24	21.85	0.41	0.15	0.17	0.11	10.82	0.02	0.16	0.00	97.84
10319	79	TM-MPB22	0.25-0.5	black	chromite	0.00	0.11	1.62	11.74	47.26	0.23	28.22	0.46	0.07	0.04	0.25	7.13	0.01	0.11	0.06	97.27
10319	81	TM-MPB22	0.25-0.5	black	Cr-spinel	0.00	0.15	2.12	26.07	32.51	0.14	21.34	0.22	0.01	0.14	0.24	15.28	0.00	0.12	0.00	98.35
10319	88	TM-MPB23	0.25-0.5	black	chromite	0.08	0.13	0.41	12.98	48.34	0.28	29.79	0.38	0.12	0.21	0.11	4.93	0.00	0.15	0.00	97.83
10319	96	TM-MPB23	0.25-0.5	black	chromite	0.22	0.12	0.51	13.88	47.09	0.17	26.14	0.62	0.13	0.13	0.11	8.31	0.00	0.05	0.02	97.27
10319	102	TM-MPB24	0.25-0.5	black	chromite	0.06	0.14	0.25	14.30	53.13	0.13	14.22	0.41	0.04	0.25	0.14	15.03	0.02	0.16	0.08	98.22
10319	100	TM-MPB24	0.25-0.5	black	chromite	0.00	0.09	0.49	8.44	52.29	0.24	26.45	0.47	0.07	0.05	0.19	8.65	0.00	0.24	0.00	97.67
10319	106	TM-MPB24	0.25-0.5	black	chromite	0.13	0.05	0.40	14.89	48.68	0.16	23.63	0.38	0.11	0.16	0.21	8.52	0.03	0.28	0.00	97.50
10319	103	TM-MPB24	0.25-0.5	black	chromite	0.00	0.37	0.86	14.88	46.32	0.24	24.66	0.37	0.17	0.13	0.24	8.91	0.00	0.11	0.02	97.27
10315	122	TM-MPB24	0.25-0.5	black	Cr-spinel	0.23	0.06	1.83	30.54	27.03	0.23	21.50	0.20	0.08	0.23	0.14	15.37	0.01	0.14	0.00	97.35

Appendix C.3 Microprobe data for chromite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10315	127	TM-MPB25	0.25-0.5	black	chromite	0.01	0.14	0.36	12.66	49.80	0.19	21.59	0.27	0.16	0.10	0.07	10.98	0.02	0.12	0.06	96.46
10316	2	TM-MPB26	0.25-0.5	black	chromite	0.14	0.00	0.43	13.66	49.29	0.00	21.87	0.38	0.11	0.09	0.11	9.86	0.04	0.22	0.00	96.03
10316	3	TM-MPB26	0.25-0.5	black	chromite	0.11	0.10	0.45	13.65	47.10	0.19	22.29	0.35	0.04	0.13	0.15	10.56	0.00	0.13	0.00	95.15
10319	109	TM-MPB26	0.25-0.5	black	chromite	0.08	0.07	2.13	10.90	46.81	0.27	27.07	0.65	0.02	0.10	0.09	8.98	0.00	0.16	0.02	97.25
10320	1	TM-MPB29	0.25-0.5	black	chromite	0.11	0.11	0.55	10.56	52.89	0.14	23.95	0.32	0.04	0.12	0.25	8.79	0.01	0.07	0.02	97.80
10320	3	TM-MPB29	0.25-0.5	black	chromite	0.00	0.09	0.40	9.34	51.72	0.04	30.35	0.68	0.06	0.09	0.60	4.07	0.01	0.09	0.00	97.54
10320	13	TM-MPB30	0.25-0.5	black	chromite	0.10	0.06	0.50	12.70	45.10	0.17	35.28	1.34	0.12	0.10	0.93	0.85	0.01	0.00	0.00	97.14
10316	35	TM-MPB30	0.25-0.5	black	Cr-spinel	0.00	0.11	2.51	31.87	27.29	0.14	16.72	0.10	0.01	0.27	0.09	17.57	0.00	0.16	0.08	96.84
10316	43	TM-MPB32	0.25-0.5	black	chromite	0.08	0.17	0.27	13.65	52.73	0.12	14.47	0.21	0.02	0.19	0.09	14.63	0.00	0.28	0.03	96.84
10320	24	TM-MPB35	0.25-0.5	black	chromite	0.00	0.17	0.28	13.58	53.68	0.00	15.67	0.14	0.11	0.13	0.00	14.54	0.01	0.22	0.01	98.53
10320	31	TM-MPB35	0.25-0.5	black	chromite	0.00	0.21	0.29	11.81	52.98	0.06	24.22	1.21	0.09	0.12	0.41	7.17	0.04	0.13	0.07	98.75
10316	79	TM-MPB35	0.25-0.5	black	chromite	0.00	0.18	0.29	13.52	52.20	0.19	13.61	0.18	0.07	0.31	0.08	15.35	0.00	0.10	0.00	96.08
10320	32	TM-MPB35	0.25-0.5	black	chromite	0.00	0.09	0.07	16.29	51.52	0.19	15.16	0.22	0.10	0.09	0.17	13.28	0.00	0.20	0.04	97.38
10320	27	TM-MPB35	0.25-0.5	black	chromite	0.00	0.12	0.32	14.13	50.00	0.12	20.89	0.30	0.13	0.06	0.11	10.83	0.02	0.18	0.02	97.20
10320	41	TM-MPB35	0.25-0.5	black	chromite	0.01	0.09	0.40	15.00	49.71	0.14	17.93	0.16	0.06	0.12	0.08	13.37	0.00	0.24	0.00	97.31
10320	40	TM-MPB35	0.25-0.5	black	chromite	0.00	0.10	1.89	22.51	36.07	0.08	22.06	0.15	0.04	0.25	0.06	14.20	0.00	0.25	0.00	97.67
10316	86	TM-MPB36	0.25-0.5	black	chromite	0.00	0.07	0.25	10.64	51.82	0.19	21.06	0.26	0.03	0.07	0.13	11.03	0.00	0.10	0.06	95.66
10320	54	TM-MPB36	0.25-0.5	black	chromite	0.00	0.00	0.49	11.34	50.75	0.24	24.72	0.38	0.09	0.16	0.11	10.06	0.00	0.18	0.00	98.51
10320	52	TM-MPB36	0.25-0.5	black	chromite	0.00	0.13	0.41	13.34	50.38	0.13	22.74	0.28	0.07	0.18	0.05	10.61	0.01	0.12	0.06	98.46
10316	89	TM-MPB36	0.25-0.5	black	chromite	0.10	0.03	0.88	12.10	47.90	0.27	23.48	0.35	0.07	0.19	0.08	10.61	0.00	0.15	0.05	96.10
10320	50	TM-MPB36	0.25-0.5	black	chromite	0.00	0.04	1.05	12.86	43.41	0.25	34.98	0.65	0.18	0.13	0.55	3.62	0.00	0.08	0.01	97.80
10320	51	TM-MPB36	0.25-0.5	black	chromite	0.00	0.07	2.15	12.69	40.93	0.52	31.63	1.01	0.04	0.26	0.05	6.93	0.00	0.11	0.00	96.40
10320	59	TM-MPB37	0.25-0.5	black	chromite	0.08	0.08	0.07	13.64	53.28	0.28	17.69	0.19	0.02	0.16	0.23	12.35	0.02	0.19	0.02	98.21
10320	57	TM-MPB37	0.25-0.5	black	chromite	0.11	0.08	0.31	12.51	51.88	0.17	21.42	0.35	0.08	0.17	0.14	11.11	0.02	0.24	0.05	98.46
10320	58	TM-MPB37	0.25-0.5	black	chromite	0.12	0.08	0.28	13.51	49.62	0.29	29.66	0.33	0.17	0.00	0.39	3.73	0.00	0.00	0.12	98.06
10320	56	TM-MPB37	0.25-0.5	black	chromite	0.00	0.01	2.17	2.40	49.56	0.28	34.19	0.53	0.10	0.15	0.00	7.62	0.03	0.09	0.06	97.15
10316	91	TM-MPB37	0.25-0.5	black	chromite	0.00	0.06	0.78	14.73	44.82	0.11	26.80	0.52	0.13	0.18	0.20	7.95	0.02	0.13	0.00	96.43
10320	61	TM-MPB37	0.25-0.5	black	chromite	0.06	0.09	0.43	18.31	36.19	0.37	38.77	0.53	0.02	0.13	0.07	2.82	0.01	0.07	0.08	97.81
10316	101	TM-MPB38	0.25-0.5	black	chromite	0.00	0.13	0.36	12.63	51.73	0.14	17.75	0.33	0.00	0.10	0.06	12.67	0.00	0.16	0.00	96.05
10320	69	TM-MPB39	0.25-0.5	black	chromite	0.03	0.06	0.27	9.44	54.81	0.16	19.83	0.34	0.12	0.04	0.11	12.35	0.00	0.18	0.00	97.70
10320	66	TM-MPB39	0.25-0.5	black	chromite	0.00	0.23	0.33	13.20	54.63	0.16	13.44	0.15	0.05	0.26	0.00	14.97	0.00	0.26	0.01	97.68
10320	63	TM-MPB39	0.25-0.5	black	chromite	0.01	0.12	0.84	14.17	48.81	0.22	23.68	0.38	0.07	0.16	0.11	9.65	0.00	0.22	0.00	98.44
10316	105	TM-MPB39	0.25-0.5	black	chromite	0.00	0.08	1.88	10.83	45.06	0.25	31.00	0.54	0.12	0.13	0.49	5.23	0.00	0.01	0.00	95.62
10320	67	TM-MPB39	0.25-0.5	black	chromite	0.17	0.00	2.74	11.88	43.58	0.46	29.87	0.24	0.03	0.10	0.17	9.48	0.02	0.08	0.04	98.65
10317	9	TM-MPB40	0.25-0.5	black	chromite	0.00	0.06	1.38	2.50	57.80	0.27	22.54	0.30	0.01	0.16	0.11	10.79	0.01	0.18	0.00	96.12
10320	79	TM-MPB40	0.25-0.5	black	chromite	0.00	0.11	0.40	10.47	53.83	0.08	22.76	0.29	0.01	0.11	0.09	9.43	0.03	0.09	0.06	97.69
10320	77	TM-MPB40	0.25-0.5	black	chromite	0.01	0.08	0.38	12.49	52.95	0.25	19.96	0.37	0.00	0.11	0.09	12.13	0.00	0.09	0.05	98.90
10320	75	TM-MPB40	0.25-0.5	black	chromite	0.01	0.09	3.20	1.99	52.07	0.50	31.63	0.44	0.03	0.21	0.11	8.69	0.00	0.05	0.00	99.01
10316	111	TM-MPB40	0.25-0.5	black	chromite	0.00	0.10	1.66	9.30	51.62	0.26	20.12	0.34	0.07	0.18	0.04	12.67	0.00	0.23	0.08	96.58
10320	73	TM-MPB40	0.25-0.5	black	chromite	0.04	0.05	0.45	13.80	51.13	0.17	21.89	0.49	0.08	0.08	0.23	9.10	0.01	0.02	0.00	97.50
10320	80	TM-MPB40	0.25-0.5	black	chromite	0.10	0.03	0.68	12.94	50.84	0.19	21.65	0.31	0.01	0.12	0.21	10.27	0.00	0.16	0.08	97.42
10320	81	TM-MPB40	0.25-0.5	black	chromite	0.03	0.13	0.33	12.94	49.28	0.16	28.98	0.57	0.12	0.10	0.41	5.12	0.03	0.01	0.06	98.19
10320	71	TM-MPB40	0.25-0.5	black	chromite	0.03	0.21	1.46	11.15	47.72	0.28	26.40	0.37	0.06	0.09	0.13	9.35	0.02	0.14	0.03	97.39
10317	5	TM-MPB40	0.25-0.5	black	chromite	0.15	0.13	1.09	12.59	47.14	0.16	28.50	0.55	0.14	0.09	0.39	5.69	0.00	0.03	0.00	96.50
10320	78	TM-MPB40	0.25-0.5	black	chromite	0.24	0.02	0.79	13.16	45.75	0.32	34.07	0.83	0.10	0.08	0.32	1.49	0.01	0.07	0.05	97.00
10320	76	TM-MPB40	0.25-0.5	black	chromite	0.00	0.10	0.59	11.80	45.61	0.31	35.53	0.79	0.07	0.03	0.34	2.55	0.03	0.00	0.08	97.78
10316	126	TM-MPB40	0.25-0.5	black	chromite	0.00	0.11	0.44	19.35	45.51	0.23	17.16	0.41	0.10	0.12	0.12	13.31	0.00	0.14	0.01	97.01
10317	14	TM-MPB40	0.25-0.5	black	chromite	0.08	0.00	0.75	14.62	45.45	0.20	25.84	0.40	0.03	0.11	0.12	8.25	0.00	0.17	0.00	95.94

Appendix C.3 Microprobe data for chromite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10316	108	TM-MPB40	0.25-0.5	black	chromite	0.17	0.19	0.98	14.07	44.53	0.11	27.11	0.38	0.03	0.16	0.24	7.16	0.01	0.07	0.00	95.04
10320	72	TM-MPB40	0.25-0.5	black	chromite	0.00	0.06	1.19	15.67	43.18	0.28	27.24	0.39	0.04	0.16	0.26	8.33	0.00	0.17	0.04	96.96
10320	88	TM-MPB41	0.25-0.5	black	chromite	0.20	0.15	0.36	13.69	52.90	0.06	15.24	0.20	0.05	0.06	0.06	14.79	0.00	0.21	0.02	97.76
10320	89	TM-MPB41	0.25-0.5	black	chromite	0.00	0.12	0.37	12.34	51.79	0.19	21.77	0.26	0.10	0.11	0.00	11.12	0.03	0.17	0.00	98.38
10320	85	TM-MPB41	0.25-0.5	black	chromite	0.00	0.07	0.51	13.79	49.36	0.23	24.47	0.36	0.05	0.09	0.10	8.65	0.02	0.11	0.01	97.81
10320	87	TM-MPB41	0.25-0.5	black	chromite	0.00	0.11	0.93	14.83	46.17	0.31	26.89	0.38	0.09	0.09	0.26	7.43	0.00	0.09	0.00	97.58
10320	84	TM-MPB41	0.25-0.5	black	chromite	0.00	0.11	1.70	9.98	44.53	0.34	35.27	0.57	0.07	0.13	0.46	3.87	0.04	0.08	0.00	97.14
10317	23	TM-MPB41	0.25-0.5	black	chromite	0.00	0.07	0.73	8.38	40.10	0.21	35.43	0.46	0.07	0.22	0.15	8.77	0.00	0.13	0.10	94.73
10317	25	TM-MPB41	0.25-0.5	black	Cr-spinel	0.09	0.16	1.02	30.83	30.23	0.06	17.48	0.13	0.00	0.20	0.09	16.47	0.02	0.18	0.00	96.89
10320	90	TM-MPB42	0.25-0.5	black	chromite	0.00	0.08	0.55	13.38	49.77	0.16	23.58	0.32	0.00	0.16	0.07	9.49	0.01	0.11	0.02	97.69
10320	100	TM-MPB43	0.25-0.5	black	chromite	0.00	0.07	0.23	10.89	56.67	0.14	15.96	0.15	0.04	0.11	0.10	14.27	0.02	0.18	0.06	98.84
10320	97	TM-MPB43	0.25-0.5	black	chromite	0.00	0.15	0.33	14.13	51.70	0.12	17.48	0.26	0.00	0.20	0.09	13.19	0.03	0.18	0.00	97.87
10320	99	TM-MPB43	0.25-0.5	black	chromite	0.00	0.09	0.35	14.22	50.62	0.18	19.45	0.28	0.07	0.14	0.00	12.06	0.00	0.25	0.05	97.71
10320	93	TM-MPB43	0.25-0.5	black	chromite	0.10	0.15	0.39	12.62	50.55	0.20	24.28	0.39	0.09	0.01	0.26	9.46	0.01	0.15	0.00	98.55
10320	91	TM-MPB43	0.25-0.5	black	chromite	0.00	0.16	0.32	13.59	50.52	0.19	20.90	0.29	0.02	0.13	0.07	11.37	0.00	0.20	0.12	97.75
10320	95	TM-MPB43	0.25-0.5	black	chromite	0.00	0.08	0.51	12.89	50.40	0.17	22.07	0.40	0.05	0.18	0.09	10.54	0.00	0.04	0.00	97.40
10320	96	TM-MPB43	0.25-0.5	black	chromite	0.00	0.06	0.60	12.28	49.97	0.30	25.15	0.35	0.09	0.04	0.00	8.30	0.00	0.18	0.14	97.31
10320	94	TM-MPB43	0.25-0.5	black	chromite	0.00	0.18	0.52	15.06	48.58	0.10	18.69	0.23	0.04	0.32	0.07	13.87	0.04	0.19	0.04	97.87
10320	109	TM-MPB46	0.25-0.5	black	chromite	0.00	0.06	0.43	11.51	52.29	0.21	22.42	0.30	0.00	0.16	0.15	10.91	0.00	0.16	0.00	98.60
10320	112	TM-MPB46	0.25-0.5	black	chromite	0.00	0.08	0.82	11.22	50.31	0.27	24.23	0.28	0.02	0.16	0.17	10.18	0.03	0.17	0.09	97.94
10320	111	TM-MPB46	0.25-0.5	black	chromite	0.00	0.08	1.21	10.84	46.78	0.30	27.87	0.36	0.09	0.04	0.12	8.68	0.01	0.22	0.08	96.60
10320	116	TM-MPB47	0.25-0.5	black	chromite	0.00	0.14	0.23	13.31	54.13	0.05	14.16	0.26	0.02	0.22	0.14	15.36	0.02	0.12	0.00	98.16
10317	64	TM-MPB47	0.25-0.5	black	chromite	0.03	0.07	1.81	7.82	53.30	0.25	21.01	0.34	0.09	0.13	0.19	11.98	0.00	0.15	0.00	97.14
10317	72	TM-MPB48	0.25-0.5	black	chromite	0.03	0.02	0.12	17.38	50.41	0.22	14.42	0.24	0.05	0.14	0.11	14.02	0.00	0.24	0.05	97.37
10317	101	TM-MPB49	0.25-0.5	black	chromite	0.00	0.11	0.37	12.85	52.89	0.13	17.02	0.21	0.07	0.22	0.10	13.74	0.04	0.23	0.00	97.98
10320	122	TM-MPB49	0.25-0.5	black	chromite	0.10	0.15	0.30	16.13	49.84	0.15	17.00	0.35	0.07	0.25	0.02	13.88	0.01	0.12	0.00	98.27
10321	14	TM-MPB51	0.25-0.5	black	chromite	0.05	0.09	0.28	4.88	54.77	0.05	14.64	0.14	0.04	0.21	0.00	4.16	0.01	0.07	0.00	79.33
10321	2	TM-MPB51	0.25-0.5	black	chromite	0.14	0.17	0.32	13.41	54.31	0.10	14.78	0.17	0.07	0.15	0.00	14.60	0.01	0.18	0.00	98.28
10321	5	TM-MPB51	0.25-0.5	black	chromite	0.07	0.21	0.31	13.95	53.83	0.07	15.63	0.35	0.05	0.18	0.00	14.83	0.01	0.20	0.08	99.61
10321	6	TM-MPB51	0.25-0.5	black	chromite	0.00	0.11	0.32	12.69	53.26	0.09	17.96	0.21	0.09	0.18	0.09	12.92	0.00	0.23	0.00	98.14
10318	19	TM-MPB51	0.25-0.5	black	chromite	0.00	0.09	0.21	12.40	52.84	0.05	20.82	0.57	0.18	0.12	0.34	10.12	0.00	0.13	0.02	97.89
10318	26	TM-MPB51	0.25-0.5	black	chromite	0.14	0.19	0.35	13.67	51.42	0.10	21.30	0.30	0.00	0.08	0.07	11.26	0.00	0.15	0.00	98.90
10318	6	TM-MPB51	0.25-0.5	black	chromite	0.00	0.09	0.75	11.00	49.50	0.26	23.70	0.32	0.05	0.16	0.17	11.35	0.02	0.25	0.00	97.62
10321	13	TM-MPB51	0.25-0.5	black	chromite	0.00	0.08	1.63	12.83	45.30	0.38	32.28	0.56	0.15	0.13	0.36	5.35	0.02	0.06	0.12	99.14
10321	10	TM-MPB51	0.25-0.5	black	chromite	0.18	0.07	0.67	3.56	39.86	0.19	43.93	0.52	0.07	0.24	0.02	7.23	0.02	0.15	0.00	96.51
10318	29	TM-MPB52	0.25-0.5	black	chromite	0.22	0.12	0.28	13.54	54.30	0.14	15.29	0.22	0.07	0.23	0.07	14.20	0.02	0.20	0.01	98.68
10321	15	TM-MPB52	0.25-0.5	black	chromite	0.10	0.04	0.03	14.78	53.35	0.26	16.46	0.26	0.02	0.02	0.27	12.99	0.00	0.20	0.03	98.66
10321	16	TM-MPB52	0.25-0.5	black	chromite	0.00	0.10	0.34	15.70	51.54	0.06	19.89	0.28	0.01	0.02	0.09	9.93	0.00	0.18	0.01	98.14
10318	30	TM-MPB52	0.25-0.5	black	chromite	0.08	0.09	0.72	13.30	50.60	0.29	21.36	0.27	0.00	0.18	0.09	11.23	0.00	0.16	0.00	98.29
10321	17	TM-MPB52	0.25-0.5	black	chromite	0.20	0.07	0.45	12.04	50.27	0.23	23.31	0.28	0.05	0.13	0.12	10.68	0.01	0.18	0.02	97.83
10321	18	TM-MPB52	0.25-0.5	black	chromite	0.00	0.08	1.67	12.35	47.11	0.33	24.34	0.33	0.15	0.11	0.01	11.43	0.02	0.22	0.00	98.15
10318	47	TM-MPB53	0.25-0.5	black	chromite	0.01	0.08	0.51	10.76	53.68	0.27	21.28	0.26	0.07	0.14	0.16	11.12	0.03	0.13	0.00	98.49
10321	19	TM-MPB53	0.25-0.5	black	chromite	0.06	0.08	0.39	14.31	50.70	0.17	20.13	0.39	0.12	0.01	0.16	12.37	0.00	0.21	0.00	99.05
10318	39	TM-MPB53	0.25-0.5	black	chromite	0.10	0.12	0.34	14.31	50.40	0.12	19.64	0.27	0.07	0.14	0.19	11.89	0.00	0.08	0.02	97.58
10318	46	TM-MPB53	0.25-0.5	black	chromite	0.00	0.06	0.03	20.43	48.48	0.16	14.51	0.20	0.06	0.10	0.22	14.30	0.00	0.23	0.00	98.78
10321	20	TM-MPB53	0.25-0.5	black	chromite	0.00	0.14	1.40	12.31	45.27	0.40	31.60	0.49	0.04	0.09	0.39	5.90	0.00	0.00	0.00	98.03
10318	35	TM-MPB53	0.25-0.5	black	Cr-spinel	0.00	0.20	2.82	22.62	31.48	0.30	24.88	0.23	0.00	0.14	0.08	14.24	0.01	0.24	0.00	97.25
10321	23	TM-MPB55	0.25-0.5	black	chromite	0.15	0.14	0.30	12.19	51.11	0.02	25.89	1.55	0.09	0.19	0.40	5.86	0.00	0.07	0.03	97.81

Appendix C.3 Microprobe data for chromite grains from till

Mount	Grain	sample	size	color	Mineral	NB2O5	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	COO	NIO	ZNO	MGO	CAO	AS2O3	SO3	TOTAL
10321	24	TM-MPB55	0.25-0.5	black	chromite	0.04	0.12	1.55	11.42	48.34	0.43	25.52	0.33	0.05	0.14	0.17	10.37	0.00	0.21	0.00	98.64
10321	22	TM-MPB55	0.25-0.5	black	chromite	0.12	0.16	0.53	7.98	47.93	0.23	35.69	1.98	0.14	0.08	1.72	0.80	0.00	0.00	0.01	97.24
10318	65	TM-MPB57	0.25-0.5	black	chromite	0.13	0.09	0.32	13.97	52.05	0.20	18.13	0.33	0.09	0.05	0.04	13.36	0.01	0.17	0.00	98.80
10321	26	TM-MPB59	0.25-0.5	black	chromite	0.14	0.19	0.28	13.09	54.25	0.03	15.67	0.20	0.04	0.12	0.02	14.45	0.00	0.32	0.00	98.66
10321	29	TM-MPB60	0.25-0.5	black	chromite	0.00	0.11	1.77	6.93	52.51	0.29	23.00	0.37	0.13	0.23	0.15	10.87	0.02	0.15	0.06	96.55
10321	31	TM-MPB60	0.25-0.5	black	chromite	0.00	0.12	0.37	12.60	51.00	0.09	25.17	0.38	0.06	0.15	0.17	7.72	0.00	0.10	0.04	97.92
10321	27	TM-MPB60	0.25-0.5	black	chromite	0.03	0.12	0.38	12.40	50.45	0.10	24.16	0.37	0.07	0.02	0.19	9.93	0.02	0.21	0.08	98.43
10321	30	TM-MPB60	0.25-0.5	black	chromite	0.01	0.19	0.28	15.25	49.42	0.21	21.50	0.22	0.05	0.20	0.05	10.90	0.04	0.23	0.01	98.54
10318	80	TM-MPB61	0.25-0.5	black	chromite	0.25	0.14	0.22	11.43	55.14	0.09	15.76	0.18	0.02	0.24	0.02	14.82	0.00	0.18	0.00	98.22
10318	81	TM-MPB61	0.25-0.5	black	chromite	0.00	0.10	0.37	11.82	52.72	0.12	21.42	0.30	0.06	0.19	0.07	11.23	0.02	0.21	0.00	98.62
10318	88	TM-MPB62	0.25-0.5	black	chromite	0.00	0.10	0.09	13.07	52.62	0.19	17.39	0.24	0.00	0.22	0.04	13.74	0.00	0.28	0.00	97.97
10321	33	TM-MPB62	0.25-0.5	black	chromite	0.00	0.07	0.97	13.24	48.88	0.15	22.85	0.22	0.13	0.06	0.06	10.85	0.03	0.11	0.02	97.62
10321	32	TM-MPB62	0.25-0.5	black	chromite	0.00	0.09	0.66	12.49	48.14	0.33	26.36	0.42	0.10	0.06	0.77	7.77	0.01	0.13	0.00	97.33
10318	95	TM-MPB63	0.25-0.5	black	chromite	0.00	0.11	2.48	1.12	54.20	0.27	29.73	0.44	0.16	0.21	0.15	8.66	0.00	0.21	0.00	97.74
10321	34	TM-MPB63	0.25-0.5	black	chromite	0.08	0.08	0.33	16.25	47.77	0.15	21.53	0.34	0.00	0.14	0.14	11.28	0.00	0.18	0.00	98.21
10318	104	TM-MPB64	0.25-0.5	black	chromite	0.00	0.07	0.40	12.71	54.10	0.13	18.24	0.24	0.00	0.15	0.09	12.27	0.02	0.19	0.08	98.61
10318	120	TM-MPB64	0.25-0.5	black	chromite	0.00	0.18	0.28	12.60	53.55	0.11	18.82	0.23	0.08	0.12	0.04	12.07	0.01	0.19	0.03	98.29
10321	36	TM-MPB64	0.25-0.5	black	chromite	0.00	0.08	0.34	12.41	53.11	0.02	19.86	0.32	0.10	0.05	0.00	11.55	0.01	0.24	0.00	98.08
10321	39	TM-MPB64	0.25-0.5	black	chromite	0.00	0.07	0.34	13.38	52.98	0.12	23.96	0.45	0.12	0.05	0.25	7.42	0.01	0.06	0.04	99.22
10318	107	TM-MPB64	0.25-0.5	black	chromite	0.17	0.06	0.07	15.07	52.75	0.20	16.67	0.31	0.02	0.10	0.17	12.58	0.00	0.17	0.03	98.17
10321	45	TM-MPB64	0.25-0.5	black	chromite	0.01	0.06	0.20	15.99	52.73	0.03	15.05	0.21	0.01	0.06	0.13	13.36	0.01	0.14	0.01	97.99
10321	44	TM-MPB64	0.25-0.5	black	chromite	0.04	0.11	0.27	11.69	52.64	0.07	24.54	0.27	0.03	0.12	0.19	8.74	0.00	0.22	0.00	98.89
10321	38	TM-MPB64	0.25-0.5	black	chromite	0.00	0.14	0.37	14.80	52.00	0.12	15.26	0.21	0.03	0.08	0.11	15.10	0.01	0.14	0.08	98.36
10318	117	TM-MPB64	0.25-0.5	black	chromite	0.24	0.01	0.39	12.43	51.23	0.19	24.26	0.37	0.09	0.13	0.07	9.42	0.00	0.10	0.03	98.70
10321	37	TM-MPB64	0.25-0.5	black	chromite	0.00	0.12	0.39	12.00	50.64	0.23	23.37	0.34	0.17	0.07	0.05	10.49	0.00	0.11	0.00	97.98
10318	122	TM-MPB64	0.25-0.5	black	chromite	0.00	0.11	0.46	12.06	50.21	0.26	22.59	0.32	0.08	0.04	0.12	10.60	0.02	0.17	0.14	97.02
10318	106	TM-MPB64	0.25-0.5	black	chromite	0.06	0.18	0.38	15.68	49.38	0.18	19.49	0.36	0.06	0.20	0.12	12.71	0.02	0.19	0.00	98.96
10318	118	TM-MPB64	0.25-0.5	black	chromite	0.00	0.07	0.61	13.11	49.27	0.16	25.96	0.41	0.13	0.05	0.15	7.65	0.02	0.12	0.00	97.71
10321	40	TM-MPB64	0.25-0.5	black	chromite	0.18	0.11	0.68	14.12	48.81	0.26	26.15	0.88	0.07	0.04	0.25	7.37	0.00	0.14	0.02	98.90
10321	46	TM-MPB64	0.25-0.5	black	chromite	0.00	0.08	0.68	13.83	48.45	0.26	26.15	0.42	0.06	0.14	0.10	8.24	0.00	0.03	0.02	98.45
10321	43	TM-MPB64	0.25-0.5	black	chromite	0.06	0.27	1.06	12.39	48.34	0.35	25.52	0.39	0.09	0.08	0.06	9.14	0.00	0.05	0.08	97.73
10321	42	TM-MPB64	0.25-0.5	black	chromite	0.15	0.06	1.17	14.42	44.06	0.34	29.47	0.48	0.06	0.17	0.29	6.18	0.00	0.05	0.15	96.76
10318	105	TM-MPB64	0.25-0.5	black	chromite	0.14	0.16	2.61	17.17	39.90	0.14	23.64	0.24	0.04	0.18	0.07	13.32	0.01	0.25	0.01	97.72

Appendix C.4 Microprobe data for pyrope grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL
10313	2a	TM-MPB01	0.25-0.5	purple	Cr-pyrope	42.12	0.00	20.42	3.92	0.01	7.25	0.43	0.00	20.33	4.94	0.00	0.02	99.44
10313	2	TM-MPB01	0.25-0.5	purple	Cr-pyrope	41.73	0.02	20.32	4.01	0.06	7.21	0.37	0.00	20.40	4.98	0.00	0.00	99.08
10313	5	TM-MPB01	0.25-0.5	purple	Cr-pyrope	41.61	0.67	18.53	4.83	0.11	6.94	0.25	0.00	20.50	5.52	0.00	0.00	98.96
10313	1	TM-MPB01	0.25-0.5	purple	Cr-pyrope	41.43	0.24	18.56	5.75	0.10	6.97	0.39	0.03	19.64	5.52	0.00	0.00	98.64
10313	1a	TM-MPB01	0.25-0.5	purple	Cr-pyrope	41.27	0.26	18.48	6.00	0.08	7.05	0.46	0.00	19.74	5.41	0.00	0.00	98.74
10313	3	TM-MPB01	0.25-0.5	purple	Cr-pyrope	41.56	0.36	18.16	6.40	0.07	6.62	0.28	0.03	20.12	5.71	0.00	0.00	99.32
10313	4	TM-MPB01	0.25-0.5	purple	Cr-pyrope	40.99	0.12	17.51	7.29	0.12	7.38	0.39	0.01	18.38	6.72	0.00	0.00	98.89
10313	6	TM-MPB02	0.25-0.5	purple	Cr-pyrope	41.53	0.04	20.58	3.55	0.00	8.74	0.58	0.01	19.48	4.44	0.00	0.00	98.96
10314b	36	TM-MPB03	0.25-0.5	orange	pyrope	41.69	0.74	20.85	1.01	0.08	9.67	0.35	0.00	19.76	4.16	0.01	0.00	98.34
10314a	36	TM-MPB03	0.25-0.5	orange	pyrope	42.01	0.76	21.17	1.12	0.04	9.80	0.30	0.01	19.99	4.29	0.00	0.01	99.49
10313	7	TM-MPB03	0.25-0.5	purple	Cr-pyrope	42.28	0.03	20.79	3.86	0.00	7.05	0.46	0.00	20.76	4.44	0.00	0.00	99.68
10313	10	TM-MPB03	0.25-0.5	purple	Cr-pyrope	41.88	0.49	19.79	4.00	0.00	6.99	0.33	0.03	21.21	4.83	0.00	0.00	99.56
10313	9	TM-MPB03	0.25-0.5	purple	Cr-pyrope	42.04	0.06	19.40	5.08	0.00	8.00	0.42	0.04	20.00	4.79	0.00	0.00	99.83
10313	8	TM-MPB03	0.25-0.5	purple	Cr-pyrope	41.63	0.20	17.31	7.05	0.09	6.68	0.34	0.00	19.72	6.29	0.00	0.00	99.30
10314a	42	TM-MPB04	0.25-0.5	orange	Cr-pyrope	41.87	0.79	20.22	2.11	0.10	8.45	0.33	0.01	19.74	5.42	0.00	0.00	99.04
10314b	42	TM-MPB04	0.25-0.5	orange	Cr-pyrope	41.67	0.73	20.32	2.12	0.02	8.72	0.38	0.05	19.57	5.50	0.00	0.00	99.09
10313	14	TM-MPB04	0.25-0.5	red	Cr-pyrope	41.60	0.80	19.18	3.14	0.01	8.22	0.35	0.00	19.81	5.71	0.00	0.01	98.82
10313	12	TM-MPB04	0.25-0.5	purple	Cr-pyrope	41.22	0.04	20.15	4.08	0.01	7.55	0.55	0.03	19.78	4.99	0.00	0.01	98.40
10313	13	TM-MPB04	0.25-0.5	purple	Cr-pyrope	41.54	0.52	19.18	4.98	0.05	6.63	0.28	0.02	20.80	4.97	0.00	0.01	98.99
10313	15	TM-MPB05	0.25-0.5	purple	Cr-pyrope	40.34	0.11	20.47	2.48	0.12	15.57	0.51	0.04	15.11	4.55	0.00	0.00	99.30
10313	18	TM-MPB06	0.25-0.5	red	Cr-pyrope	41.45	0.94	19.36	3.39	0.02	8.21	0.36	0.04	19.92	5.21	0.05	0.00	98.96
10313	16	TM-MPB06	0.25-0.5	purple	Cr-pyrope	41.72	0.00	20.55	3.88	0.03	7.17	0.51	0.03	20.59	4.73	0.00	0.00	99.22
10313	19	TM-MPB09	0.25-0.5	purple	Cr-pyrope	41.67	0.07	19.94	4.49	0.06	6.86	0.48	0.00	19.81	5.45	0.00	0.00	98.81
10313	22	TM-MPB09	0.25-0.5	purple	Cr-pyrope	41.55	0.38	19.05	4.92	0.07	6.86	0.40	0.04	20.57	5.11	0.00	0.00	98.95
10313	21	TM-MPB09	0.25-0.5	purple	Cr-pyrope	41.45	0.03	19.13	5.79	0.00	7.06	0.45	0.02	19.94	5.19	0.00	0.02	99.07
10313	20	TM-MPB09	0.25-0.5	purple	Cr-pyrope	41.45	0.22	18.13	6.49	0.07	6.89	0.39	0.00	19.62	5.81	0.00	0.00	99.08
10313	24	TM-MPB10	0.25-0.5	purple	Cr-pyrope	41.54	0.07	20.68	3.17	0.00	8.45	0.47	0.01	19.59	4.66	0.00	0.00	98.63
10313	23	TM-MPB10	0.25-0.5	purple	Cr-pyrope	41.45	0.10	17.87	6.70	0.00	6.71	0.45	0.03	19.70	5.70	0.00	0.00	98.70
10314a	54	TM-MPB11	0.25-0.5	orange	pyrope	41.54	0.54	21.87	0.51	0.10	10.48	0.37	0.00	19.37	4.21	0.00	0.01	99.00
10314b	54	TM-MPB11	0.25-0.5	orange	pyrope	41.37	0.56	21.84	0.58	0.02	10.59	0.33	0.02	19.27	4.00	0.00	0.01	98.59
10313	26	TM-MPB11	0.25-0.5	purple	Cr-pyrope	41.91	0.10	18.88	5.74	0.01	6.95	0.46	0.03	19.68	5.64	0.00	0.02	99.43
10313	27	TM-MPB11	0.25-0.5	purple	Cr-pyrope	41.47	0.55	17.94	5.82	0.05	7.05	0.39	0.01	19.45	5.63	0.02	0.00	98.38
10313	25	TM-MPB11	0.25-0.5	purple	Cr-pyrope	41.42	0.29	17.40	6.98	0.03	6.26	0.24	0.00	20.11	6.05	0.00	0.00	98.80
10313	29	TM-MPB12	0.25-0.5	purple	Cr-pyrope	42.09	0.01	21.05	3.20	0.01	7.67	0.52	0.01	20.84	4.09	0.00	0.00	99.50
10313	28	TM-MPB12	0.25-0.5	purple	Cr-pyrope	41.77	0.24	19.13	5.58	0.10	6.73	0.44	0.00	20.34	4.90	0.00	0.01	99.24
10313	31	TM-MPB13	0.25-0.5	purple	Cr-pyrope	41.87	0.00	21.34	2.87	0.04	6.72	0.48	0.00	20.65	4.14	0.00	0.00	98.11
10314b	61	TM-MPB13	0.25-0.5	orange	Cr-pyrope	40.86	1.05	18.75	3.90	0.06	8.35	0.30	0.04	19.76	5.48	0.02	0.00	98.56
10313	30	TM-MPB13	0.25-0.5	purple	Cr-pyrope	40.48	0.14	18.60	5.13	0.08	10.92	0.62	0.00	15.98	6.79	0.00	0.00	98.73
10313	33	TM-MPB14	0.25-0.5	purple	Cr-pyrope	41.49	0.02	19.80	4.52	0.01	7.33	0.38	0.04	20.37	4.69	0.00	0.01	98.64
10313	32	TM-MPB14	0.25-0.5	purple	Cr-pyrope	41.45	0.19	19.24	5.12	0.06	6.75	0.41	0.00	19.65	5.82	0.00	0.00	98.70
10313	34	TM-MPB15	0.25-0.5	red	Cr-pyrope	41.77	0.34	20.39	3.22	0.05	7.06	0.25	0.06	21.43	4.50	0.00	0.00	99.07
10313	35	TM-MPB16	0.25-0.5	red	Cr-pyrope	40.63	0.62	15.66	8.21	0.11	7.53	0.32	0.03	18.87	6.51	0.00	0.01	98.50
10313	36	TM-MPB19	0.25-0.5	purple	Cr-pyrope	41.88	0.17	20.18	3.52	0.00	7.49	0.38	0.04	20.47	4.68	0.00	0.00	98.81
10313	38	TM-MPB20	0.25-0.5	red	Cr-pyrope	42.13	0.26	20.53	3.55	0.05	6.55	0.30	0.03	21.02	4.93	0.00	0.00	99.34
10313	37	TM-MPB20	0.25-0.5	purple	Cr-pyrope	41.27	0.20	18.77	5.16	0.01	9.06	0.50	0.01	18.16	5.43	0.00	0.00	98.57
10313	39	TM-MPB21	0.25-0.5	red	Cr-pyrope	41.90	0.45	20.58	3.34	0.02	6.33	0.33	0.00	21.55	4.43	0.00	0.01	98.94
10313	40	TM-MPB21	0.25-0.5	purple	Cr-pyrope	41.50	0.02	18.63	5.97	0.04	6.96	0.37	0.01	19.35	5.81	0.00	0.00	98.66
10313	41	TM-MPB22	0.25-0.5	purple	Cr-pyrope	41.91	0.39	20.07	3.58	0.08	6.59	0.32	0.00	21.28	4.75	0.00	0.00	98.98

Appendix C.4 Microprobe data for pyrope grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL
10314a	57	TM-MPB23	0.25-0.5	orange	pyrope	41.22	0.45	21.82	0.47	0.05	10.24	0.42	0.03	19.30	3.93	0.00	0.02	97.95
10314b	57	TM-MPB23	0.25-0.5	orange	pyrope	41.29	0.44	21.86	0.51	0.06	10.86	0.42	0.04	19.26	4.00	0.01	0.01	98.74
10314a	56	TM-MPB23	0.25-0.5	orange	Cr-pyrope	41.60	0.68	20.39	2.35	0.04	7.57	0.28	0.03	20.71	4.94	0.00	0.02	98.62
10314b	56	TM-MPB23	0.25-0.5	orange	(Cr-pyrope)	33.54	0.70	15.02	2.54	0.02	7.71	0.30	0.05	14.10	4.72	0.00	0.00	78.71
10313	44	TM-MPB23	0.25-0.5	red	Cr-pyrope	42.25	0.84	19.93	3.22	0.11	6.49	0.31	0.03	21.37	4.57	0.00	0.00	99.11
10313	45	TM-MPB23	0.25-0.5	red	Cr-pyrope	41.99	0.53	20.21	3.41	0.00	6.22	0.34	0.03	21.64	4.85	0.00	0.01	99.23
10313	42	TM-MPB23	0.25-0.5	purple	Cr-pyrope	41.88	0.49	19.64	3.97	0.04	6.36	0.26	0.00	21.31	4.90	0.00	0.01	98.85
10313	43	TM-MPB23	0.25-0.5	purple	(Cr-pyrope)	40.11	0.26	18.63	4.07	0.10	6.33	0.26	0.03	19.60	5.05	0.00	0.03	94.47
10313	46	TM-MPB23	0.25-0.5	purple	Cr-pyrope	41.63	0.07	19.50	5.27	0.09	7.07	0.51	0.03	19.86	5.12	0.00	0.00	99.14
10313	47	TM-MPB25	0.25-0.5	purple	Cr-pyrope	41.24	0.17	17.84	6.76	0.06	5.96	0.38	0.04	20.44	5.63	0.00	0.02	98.53
10313	48	TM-MPB27	0.25-0.5	purple	Cr-pyrope	41.50	0.58	18.90	5.03	0.03	7.10	0.36	0.01	19.73	5.43	0.00	0.00	98.66
10313	49	TM-MPB29	0.25-0.5	purple	Cr-pyrope	41.62	0.04	20.34	3.52	0.03	9.02	0.61	0.02	18.97	4.78	0.00	0.02	98.97
10313	54	TM-MPB30	0.25-0.5	red	Cr-pyrope	41.97	0.49	20.54	2.73	0.01	6.36	0.26	0.05	21.62	4.60	0.00	0.02	98.64
10313	50	TM-MPB30	0.25-0.5	purple	Cr-pyrope	42.00	0.02	20.60	3.58	0.13	6.89	0.38	0.00	20.85	4.65	0.00	0.01	99.11
10313	52	TM-MPB30	0.25-0.5	purple	Cr-pyrope	41.60	0.39	19.55	4.20	0.07	6.86	0.32	0.07	20.66	5.01	0.00	0.00	98.72
10313	51	TM-MPB30	0.25-0.5	purple	Cr-pyrope	41.10	0.39	17.78	6.44	0.06	5.92	0.25	0.03	20.70	5.40	0.00	0.01	98.08
10313	53	TM-MPB30	0.25-0.5	purple	Cr-pyrope	41.78	0.48	17.29	6.98	0.07	6.49	0.28	0.00	20.39	5.51	0.00	0.00	99.26
10313	55	TM-MPB32	0.25-0.5	purple	Cr-pyrope	41.58	0.15	19.67	4.54	0.03	7.25	0.50	0.00	20.00	4.77	0.00	0.01	98.50
10313	56	TM-MPB32	0.25-0.5	purple	Cr-pyrope	41.22	0.09	19.35	5.19	0.02	7.46	0.45	0.00	19.67	5.28	0.00	0.01	98.74
10314b	68	TM-MPB33	0.25-0.5	orange	pyrope	41.04	0.88	21.33	0.14	0.08	12.17	0.39	0.04	18.66	4.03	0.02	0.02	98.79
10313	58	TM-MPB33	0.25-0.5	purple	Cr-pyrope	41.77	0.03	21.75	2.40	0.07	7.94	0.66	0.00	19.89	4.96	0.00	0.01	99.48
10313	59	TM-MPB33	0.25-0.5	purple	Cr-pyrope	40.75	0.08	19.81	3.95	0.08	9.92	0.51	0.00	17.41	5.58	0.00	0.01	98.11
10313	57	TM-MPB33	0.25-0.5	purple	Cr-pyrope	41.52	0.03	20.13	4.38	0.09	6.96	0.47	0.04	20.17	4.89	0.00	0.01	98.68
10313	60	TM-MPB34	0.25-0.5	purple	Cr-pyrope	41.60	0.10	20.00	4.29	0.08	7.39	0.55	0.00	19.75	5.30	0.00	0.02	99.08
10314b	73	TM-MPB35	0.25-0.5	orange	pyrope	41.50	0.73	21.19	0.77	0.03	9.82	0.35	0.05	19.80	4.30	0.00	0.03	98.57
10314b	77	TM-MPB35	0.25-0.5	orange	pyrope	41.44	1.02	20.37	1.10	0.13	10.37	0.34	0.00	18.91	5.11	0.07	0.00	98.86
10314b	76	TM-MPB35	0.25-0.5	orange	pyrope	41.29	0.96	20.44	1.49	0.10	9.96	0.37	0.04	19.25	4.83	0.05	0.00	98.77
10313	61	TM-MPB35	0.25-0.5	red	Cr-pyrope	41.98	0.30	21.37	2.19	0.01	8.22	0.40	0.01	20.72	4.29	0.00	0.00	99.49
10313	62	TM-MPB35	0.25-0.5	red	Cr-pyrope	41.91	0.64	20.62	2.82	0.08	6.77	0.32	0.00	21.47	4.73	0.01	0.00	99.38
10313	65	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.28	0.20	20.54	2.92	0.09	10.98	0.44	0.01	17.98	4.61	0.00	0.00	99.07
10313	74	TM-MPB35	0.25-0.5	purple	(Cr-pyrope)	29.91	0.02	15.62	3.27	0.00	5.42	0.34	0.00	16.45	4.24	0.00	0.01	75.29
10313	68	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.66	0.24	20.45	3.40	0.00	7.57	0.33	0.00	20.43	4.67	0.00	0.00	98.75
10313	71	TM-MPB35	0.25-0.5	purple	(Cr-pyrope)	32.57	0.21	15.81	4.45	0.00	5.48	0.37	0.04	17.31	4.74	0.00	0.00	80.99
10313	75	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.37	0.16	19.80	4.60	0.11	8.23	0.56	0.02	18.96	5.56	0.00	0.02	99.39
10313	63	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.45	0.21	19.25	4.61	0.05	6.10	0.28	0.02	20.86	5.22	0.00	0.01	98.07
10313	67	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.24	0.16	19.19	4.82	0.02	9.37	0.45	0.04	18.12	5.52	0.00	0.01	98.95
10313	73	TM-MPB35	0.25-0.5	purple	(Cr-pyrope)	33.12	0.07	15.95	4.83	0.06	5.88	0.36	0.04	16.88	4.70	0.00	0.01	81.89
10313	72	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.47	0.19	19.26	5.04	0.08	7.80	0.42	0.04	19.36	5.40	0.00	0.00	99.07
10313	64	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.46	0.31	18.02	5.95	0.10	7.39	0.41	0.04	19.83	5.10	0.02	0.00	98.62
10313	66	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.14	0.09	18.04	6.07	0.05	8.02	0.46	0.00	18.60	6.19	0.00	0.01	98.68
10313	70	TM-MPB35	0.25-0.5	purple	Cr-pyrope	41.32	0.24	18.02	6.42	0.05	6.81	0.27	0.00	20.12	5.34	0.00	0.00	98.59
10313	69	TM-MPB35	0.25-0.5	purple	Cr-pyrope	40.60	0.06	17.24	7.08	0.05	7.72	0.51	0.00	18.00	6.93	0.00	0.00	98.19
10313	76	TM-MPB36	0.25-0.5	purple	Cr-pyrope	41.56	0.06	20.07	4.39	0.02	7.54	0.47	0.00	19.65	5.30	0.00	0.02	99.08
10313	77	TM-MPB36	0.25-0.5	purple	Cr-pyrope	41.28	0.11	19.66	4.49	0.00	7.38	0.48	0.03	19.36	5.43	0.00	0.01	98.23
10314b	78	TM-MPB37	0.25-0.5	orange	pyrope	41.08	0.98	20.39	1.48	0.02	9.95	0.36	0.06	19.56	4.63	0.06	0.02	98.57
10313	80	TM-MPB37	0.25-0.5	purple	Cr-pyrope	41.06	0.10	21.44	2.06	0.06	11.28	0.58	0.02	17.69	4.57	0.00	0.00	98.87
10313	79	TM-MPB37	0.25-0.5	purple	Cr-pyrope	41.73	0.02	20.71	3.39	0.00	7.13	0.55	0.00	20.67	4.60	0.00	0.00	98.80
10313	78	TM-MPB37	0.25-0.5	purple	Cr-pyrope	40.87	0.22	17.77	6.46	0.08	7.62	0.41	0.00	18.76	5.98	0.00	0.00	98.18

Appendix C.4 Microprobe data for pyrope grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL
10313	81	TM-MPB39	0.25-0.5	red	Cr-pyrope	42.19	0.52	19.59	3.88	0.08	6.30	0.28	0.00	21.76	4.74	0.00	0.01	99.35
10313	82	TM-MPB42	0.25-0.5	red	pyrope	42.19	0.32	21.59	1.72	0.04	8.94	0.40	0.02	20.08	4.37	0.00	0.01	99.68
10313	83	TM-MPB42	0.25-0.5	purple	Cr-pyrope	41.60	0.17	20.86	2.83	0.14	8.38	0.40	0.03	19.90	4.80	0.00	0.00	99.10
10313	84	TM-MPB45	0.25-0.5	purple	(Cr-pyrope)	32.70	0.07	16.29	4.41	0.03	5.61	0.34	0.00	16.68	4.90	0.00	0.00	81.02
10314b	83	TM-MPB48	0.25-0.5	orange	Cr-pyrope	41.36	0.78	20.42	2.05	0.01	7.71	0.33	0.02	21.11	4.62	0.00	0.00	98.41
10313	87	TM-MPB48	0.25-0.5	purple	Cr-pyrope	41.74	0.08	20.59	3.48	0.06	8.28	0.46	0.03	19.64	4.96	0.00	0.00	99.35
10313	88	TM-MPB48	0.25-0.5	purple	Cr-pyrope	41.51	0.04	19.55	4.79	0.02	6.96	0.44	0.00	20.20	5.11	0.00	0.02	98.64
10313	86	TM-MPB48	0.25-0.5	purple	Cr-pyrope	42.10	0.03	19.52	5.26	0.05	6.04	0.41	0.04	21.89	3.42	0.00	0.00	98.77
10313	91	TM-MPB48	0.25-0.5	purple	Cr-pyrope	41.59	0.62	17.68	5.98	0.00	6.70	0.34	0.05	20.23	5.88	0.00	0.00	99.07
10313	85	TM-MPB48	0.25-0.5	purple	Cr-pyrope	41.78	0.63	17.99	6.35	0.06	5.86	0.25	0.02	20.80	5.42	0.00	0.00	99.17
10313	*89*	*TM-MPB48*	*0.25-0.5*	*purple*	*Cr-pyrope*	*41.67*	*0.29*	*17.98*	*6.50*	*0.03*	*6.00*	*0.33*	*0.02*	*22.47*	*3.22*	*0.00*	*0.00*	*98.52*
10313	90	TM-MPB48	0.25-0.5	purple	Cr-pyrope	41.34	0.21	16.12	8.54	0.05	6.08	0.33	0.01	19.64	6.56	0.00	0.00	98.89
10313	92	TM-MPB50	0.25-0.5	purple	Cr-pyrope	41.46	0.11	19.75	4.87	0.00	7.38	0.46	0.02	19.74	5.12	0.00	0.00	98.90
10313	93	TM-MPB50	0.25-0.5	purple	Cr-pyrope	41.48	0.37	17.73	6.24	0.07	6.58	0.29	0.00	20.03	5.73	0.00	0.01	98.52
10313	97	TM-MPB51	0.25-0.5	purple	(Cr-pyrope)	34.96	0.03	17.66	3.41	0.01	6.17	0.41	0.02	17.99	3.72	0.00	0.00	84.37
10313	94	TM-MPB51	0.25-0.5	purple	Cr-pyrope	41.87	0.04	20.21	4.12	0.00	7.31	0.53	0.03	20.17	4.90	0.00	0.00	99.18
10313	95	TM-MPB51	0.25-0.5	purple	Cr-pyrope	41.94	0.26	19.37	4.46	0.02	5.89	0.35	0.04	21.35	4.59	0.00	0.00	98.25
10313	96	TM-MPB51	0.25-0.5	purple	Cr-pyrope	41.82	0.04	20.05	4.54	0.03	7.20	0.51	0.00	20.10	5.08	0.00	0.00	99.39
10313	98	TM-MPB53	0.25-0.5	purple	Cr-pyrope	41.89	0.62	18.97	4.87	0.04	6.17	0.26	0.01	21.22	4.84	0.00	0.01	98.90
10313	101	TM-MPB56	0.25-0.5	purple	Cr-pyrope	41.78	0.09	20.35	4.07	0.03	6.68	0.48	0.02	21.07	4.17	0.00	0.00	98.73
10313	100	TM-MPB56	0.25-0.5	purple	Cr-pyrope	41.71	0.54	19.41	4.24	0.05	6.75	0.34	0.00	20.63	4.86	0.00	0.00	98.54
10313	99	TM-MPB56	0.25-0.5	purple	Cr-pyrope	41.24	0.06	18.52	5.78	0.07	6.97	0.44	0.02	19.45	5.65	0.00	0.00	98.18
10313	102	TM-MPB56	0.25-0.5	purple	Cr-pyrope	41.10	0.15	17.41	7.49	0.01	6.70	0.37	0.00	18.97	6.58	0.00	0.00	98.78
10314a	1	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.80	0.19	21.40	2.32	0.02	7.54	0.35	0.00	20.59	4.72	0.00	0.00	98.92
10314b	4	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.19	0.02	21.32	2.34	0.00	9.80	1.03	0.00	19.65	3.42	0.00	0.03	98.81
10314b	1	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.98	0.23	21.08	2.35	0.00	7.81	0.39	0.00	20.44	4.61	0.00	0.00	98.89
10314a	4	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.42	0.01	21.43	2.39	0.00	9.63	0.90	0.05	19.51	3.45	0.00	0.01	98.80
10314b	3	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.91	0.42	20.17	3.28	0.07	7.20	0.29	0.01	21.21	4.50	0.00	0.01	99.06
10314a	3	TM-MPB57	0.25-0.5	purple	Cr-pyrope	42.11	0.37	20.19	3.29	0.05	6.81	0.31	0.00	21.24	4.70	0.00	0.00	99.08
10314a	2	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.79	0.11	17.06	7.68	0.10	6.06	0.29	0.02	20.76	5.37	0.00	0.01	99.26
10314b	2	TM-MPB57	0.25-0.5	purple	Cr-pyrope	41.47	0.16	16.86	7.78	0.15	6.06	0.26	0.03	20.68	5.27	0.00	0.03	98.75
10314b	5	TM-MPB59	0.25-0.5	purple	Cr-pyrope	41.38	0.00	21.10	2.58	0.01	8.21	0.69	0.00	19.32	5.40	0.00	0.00	98.69
10314a	5	TM-MPB59	0.25-0.5	purple	Cr-pyrope	41.38	0.00	21.18	2.65	0.02	8.20	0.67	0.02	19.25	5.42	0.00	0.00	98.78
10314b	7	TM-MPB60	0.25-0.5	purple	(Cr-pyrope)	21.35	0.51	13.15	3.25	0.04	5.82	0.21	0.01	17.58	3.62	0.00	0.00	65.54
10314a	7	TM-MPB60	0.25-0.5	purple	(Cr-pyrope)	19.50	0.50	12.53	3.69	0.01	6.61	0.33	0.03	17.86	3.63	0.00	0.00	64.70
10314a	9	TM-MPB60	0.25-0.5	purple	Cr-pyrope	41.52	0.35	18.48	5.55	0.09	6.33	0.27	0.00	20.72	5.40	0.00	0.00	98.70
10314a	8	TM-MPB60	0.25-0.5	purple	Cr-pyrope	42.10	0.07	18.95	5.56	0.00	6.28	0.41	0.07	21.22	4.26	0.00	0.00	98.93
10314b	8	TM-MPB60	0.25-0.5	purple	Cr-pyrope	41.91	0.07	19.17	5.73	0.06	6.41	0.46	0.03	21.28	4.13	0.00	0.00	99.25
10314b	9	TM-MPB60	0.25-0.5	purple	Cr-pyrope	41.22	0.38	18.25	5.74	0.03	6.58	0.26	0.00	20.62	5.31	0.00	0.00	98.39
10314a	6	TM-MPB60	0.25-0.5	purple	Cr-pyrope	41.56	0.52	17.88	6.04	0.00	6.36	0.29	0.03	20.48	5.35	0.00	0.00	98.52
10314b	6	TM-MPB60	0.25-0.5	purple	Cr-pyrope	41.39	0.51	17.81	6.24	0.12	6.15	0.29	0.06	20.95	5.35	0.00	0.00	98.87
10314b	86	TM-MPB62	0.25-0.5	orange	pyrope	40.92	0.89	20.35	1.85	0.10	8.88	0.34	0.03	19.98	4.64	0.02	0.01	98.01
10314a	10	TM-MPB62	0.25-0.5	purple	Cr-pyrope	41.55	0.10	20.33	3.70	0.03	8.08	0.52	0.01	19.56	4.94	0.00	0.00	98.83
10314b	10	TM-MPB62	0.25-0.5	purple	Cr-pyrope	41.49	0.07	20.17	3.90	0.02	8.03	0.54	0.01	19.59	4.82	0.00	0.01	98.64
10314b	12	TM-MPB62	0.25-0.5	purple	Cr-pyrope	40.51	0.27	19.17	4.24	0.08	10.61	0.49	0.00	17.78	5.26	0.01	0.02	98.44
10314a	12	TM-MPB62	0.25-0.5	purple	Cr-pyrope	40.77	0.23	19.43	4.43	0.10	10.41	0.44	0.02	17.63	5.24	0.00	0.01	98.72
10314b	11	TM-MPB62	0.25-0.5	purple	(Cr-pyrope)	27.64	0.01	15.59	4.52	0.00	6.37	0.38	0.03	19.06	3.69	0.00	0.00	77.29
10314a	11	TM-MPB62	0.25-0.5	purple	Cr-pyrope	41.73	0.00	19.80	4.70	0.03	7.17	0.44	0.00	20.38	4.45	0.00	0.00	98.69

Appendix C.4 Microprobe data for pyrope grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TI02	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL
10314a	13	TM-MPB63	0.25-0.5	purple	Cr-pyrope	41.53	0.42	18.63	5.71	0.00	6.25	0.35	0.04	21.92	3.30	0.00	0.00	98.14
10314b	*13*	*TM-MPB63*	*0.25-0.5*	*purple*	*Cr-pyrope*	*41.50*	*0.43*	*18.65*	*5.86*	*0.02*	*6.45*	*0.40*	*0.00*	*22.28*	*3.28*	*0.00*	*0.01*	*98.87*
10314a	14	TM-MPB64	0.25-0.5	purple	pyrope	41.03	0.11	20.98	1.69	0.08	12.91	0.54	0.04	16.40	4.94	0.00	0.01	98.72
10314b	14	TM-MPB64	0.25-0.5	purple	pyrope	40.82	0.09	21.19	1.99	0.08	12.88	0.57	0.00	16.45	4.94	0.00	0.01	99.02

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10321	51	TM-MPB01	0.25-0.5	green	Cr-diopside	52.28	0.20	1.21	0.65	0.06	3.69	0.15	0.07	17.38	22.69	0.34	0.00	98.74	89.34
10321	50	TM-MPB01	0.25-0.5	green	Cr-diopside	52.44	0.25	1.33	0.71	0.11	3.72	0.14	0.01	16.85	23.36	0.29	0.00	99.21	88.97
10321	52	TM-MPB01	0.25-0.5	green	Cr-diopside	53.36	0.26	1.80	0.73	0.02	3.76	0.14	0.08	18.84	18.64	1.02	0.04	98.69	89.92
10321	49	TM-MPB01	0.25-0.5	green	Cr-diopside	52.36	0.34	0.89	0.79	0.04	5.15	0.10	0.05	17.70	20.68	0.35	0.00	98.45	85.95
10321	48	TM-MPB01	0.25-0.5	green	Cr-diopside	51.91	0.45	1.33	1.04	0.00	5.18	0.13	0.07	16.92	20.95	0.42	0.00	98.40	85.36
10321	59	TM-MPB02	0.25-0.5	green	Cr-diopside	53.14	0.19	0.85	0.61	0.01	4.69	0.11	0.07	18.11	21.18	0.20	0.00	99.17	87.31
10321	55	TM-MPB02	0.25-0.5	green	Cr-diopside	50.77	0.22	3.50	0.68	0.07	4.96	0.06	0.02	17.21	20.42	0.16	0.02	98.08	86.08
10321	54	TM-MPB02	0.25-0.5	green	Cr-diopside	52.49	0.19	1.02	0.72	0.00	4.72	0.13	0.06	17.67	21.15	0.15	0.00	98.29	86.97
10321	56	TM-MPB02	0.25-0.5	green	Cr-diopside	51.53	0.25	2.67	0.84	0.06	5.04	0.14	0.05	17.89	20.53	0.13	0.00	99.13	86.35
10321	57	TM-MPB02	0.25-0.5	green	Cr-diopside	52.29	0.22	1.01	0.88	0.08	4.37	0.10	0.05	18.13	21.33	0.20	0.00	98.67	88.08
10321	58	TM-MPB02	0.25-0.5	green	Cr-diopside	51.30	0.20	2.78	0.94	0.04	5.28	0.14	0.07	17.27	20.91	0.09	0.01	99.05	85.36
10321	53	TM-MPB02	0.25-0.5	green	Cr-diopside	52.35	0.31	1.09	0.97	0.08	5.18	0.20	0.06	17.35	20.59	0.49	0.00	98.66	85.65
10321	61	TM-MPB02	0.25-0.5	green	Cr-diopside	52.43	0.31	0.89	0.99	0.09	5.17	0.18	0.07	17.50	20.73	0.50	0.00	98.87	85.79
10321	60	TM-MPB02	0.25-0.5	green	Cr-diopside	52.80	0.36	0.79	1.03	0.02	5.18	0.16	0.10	17.81	20.13	0.46	0.00	98.83	85.98
10321	62	TM-MPB02	0.25-0.5	green	Cr-diopside	52.58	0.37	1.15	1.06	0.01	5.01	0.11	0.12	17.49	20.60	0.46	0.02	98.97	86.15
10321	66	TM-MPB03	0.25-0.5	green	diopside	53.53	0.01	0.75	0.31	0.00	3.26	0.10	0.04	16.87	24.58	0.41	0.01	99.85	90.23
10321	85	TM-MPB03	0.25-0.5	green	diopside	53.26	0.06	0.79	0.43	0.03	3.88	0.18	0.03	15.90	24.10	0.50	0.02	99.18	87.96
10321	72	TM-MPB03	0.25-0.5	green	Cr-diopside	53.39	0.04	0.71	0.51	0.00	4.66	0.21	0.07	15.33	23.98	0.55	0.01	99.45	85.42
10321	86	TM-MPB03	0.25-0.5	green	Cr-diopside	53.04	0.19	1.23	0.59	0.00	3.31	0.04	0.00	17.36	22.87	0.38	0.00	99.01	90.32
10321	75	TM-MPB03	0.25-0.5	green	Cr-diopside	53.77	0.19	1.26	0.74	0.04	2.41	0.09	0.07	18.43	23.19	0.15	0.00	100.34	93.15
10321	95	TM-MPB03	0.25-0.5	green	Cr-diopside	52.18	0.58	1.08	0.77	0.04	6.24	0.15	0.04	17.58	19.65	0.49	0.02	98.82	83.40
10321	73	TM-MPB03	0.25-0.5	green	Cr-diopside	53.04	0.31	0.75	0.79	0.00	5.42	0.13	0.09	18.43	19.69	0.35	0.01	99.02	85.84
10321	88	TM-MPB03	0.25-0.5	green	Cr-diopside	52.48	0.31	0.80	0.81	0.03	6.00	0.15	0.07	18.58	18.97	0.37	0.00	98.57	84.67
10321	83	TM-MPB03	0.25-0.5	green	Cr-diopside	53.20	0.30	0.68	0.85	0.00	5.45	0.21	0.06	18.90	19.01	0.47	0.01	99.14	86.09
10321	94	TM-MPB03	0.25-0.5	green	Cr-diopside	52.87	0.31	0.78	0.85	0.04	5.26	0.18	0.09	17.97	20.18	0.36	0.00	98.89	85.89
10321	89	TM-MPB03	0.25-0.5	green	Cr-diopside	52.54	0.42	0.93	0.88	0.01	5.05	0.14	0.05	17.85	20.78	0.36	0.02	99.04	86.31
10321	78	TM-MPB03	0.25-0.5	green	Cr-diopside	52.97	0.37	0.72	0.89	0.05	5.48	0.19	0.07	18.40	19.58	0.37	0.00	99.09	85.68
10321	80	TM-MPB03	0.25-0.5	green	Cr-diopside	52.22	0.41	0.92	0.92	0.00	5.48	0.17	0.08	18.15	19.93	0.45	0.01	98.74	85.51
10321	92	TM-MPB03	0.25-0.5	green	Cr-diopside	52.77	0.35	0.79	0.95	0.02	5.49	0.16	0.04	18.24	19.59	0.44	0.01	98.86	85.55
10321	93	TM-MPB03	0.25-0.5	green	Cr-diopside	52.89	0.33	0.76	1.01	0.06	6.11	0.18	0.05	18.17	18.43	0.40	0.02	98.41	84.14
10321	65	TM-MPB03	0.25-0.5	green	Cr-diopside	52.96	0.33	0.80	1.02	0.03	5.25	0.20	0.06	18.03	20.11	0.47	0.03	99.28	85.97
10321	76	TM-MPB03	0.25-0.5	green	Cr-diopside	52.60	0.37	0.83	1.02	0.05	5.59	0.12	0.10	17.51	19.62	0.41	0.00	98.23	84.82
10321	90	TM-MPB03	0.25-0.5	green	Cr-diopside	52.91	0.36	0.75	1.02	0.03	5.45	0.19	0.11	18.16	19.81	0.39	0.01	99.19	85.58
10321	64	TM-MPB03	0.25-0.5	green	Cr-diopside	52.25	0.35	0.81	1.02	0.10	5.26	0.21	0.04	18.68	18.89	0.46	0.00	98.07	86.36
10321	70	TM-MPB03	0.25-0.5	green	Cr-diopside	52.58	0.37	0.98	1.07	0.06	5.29	0.17	0.08	18.00	19.63	0.42	0.01	98.67	85.84
10321	87	TM-MPB03	0.25-0.5	green	Cr-diopside	52.36	0.42	1.03	1.08	0.07	6.05	0.15	0.09	17.80	19.59	0.49	0.01	99.13	83.99
10321	67	TM-MPB03	0.25-0.5	green	Cr-diopside	52.92	0.33	0.81	1.09	0.02	5.12	0.09	0.11	18.53	19.48	0.43	0.00	98.93	86.57
10321	74	TM-MPB03	0.25-0.5	green	Cr-diopside	52.69	0.32	0.96	1.10	0.04	5.60	0.19	0.07	18.33	19.14	0.44	0.00	98.88	85.38
10321	71	TM-MPB03	0.25-0.5	green	Cr-diopside	52.64	0.36	0.92	1.10	0.01	5.37	0.20	0.09	18.34	19.25	0.48	0.02	98.78	85.88
10321	69	TM-MPB03	0.25-0.5	green	Cr-diopside	52.63	0.40	0.89	1.14	0.03	5.28	0.17	0.07	17.99	19.77	0.49	0.00	98.88	85.86
10321	84	TM-MPB03	0.25-0.5	green	Cr-diopside	52.78	0.29	0.81	1.16	0.01	5.35	0.16	0.06	18.61	19.17	0.45	0.01	98.87	86.11
10321	82	TM-MPB03	0.25-0.5	green	Cr-diopside	52.64	0.36	0.93	1.16	0.00	5.32	0.16	0.06	17.87	19.82	0.46	0.00	98.80	85.69
10321	79	TM-MPB03	0.25-0.5	green	Cr-diopside	52.75	0.32	0.88	1.23	0.00	5.28	0.15	0.04	18.33	19.44	0.44	0.00	98.85	86.09
10321	81	TM-MPB03	0.25-0.5	green	Cr-diopside	52.50	0.32	1.11	1.25	0.03	4.94	0.19	0.10	17.26	20.61	0.50	0.00	98.81	86.16
10321	77	TM-MPB03	0.25-0.5	green	Cr-diopside	52.20	0.32	1.05	1.28	0.02	5.60	0.16	0.04	18.65	18.49	0.50	0.02	98.34	85.58
10321	68	TM-MPB03	0.25-0.5	green	Cr-diopside	53.67	0.13	0.92	1.41	0.05	2.22	0.06	0.00	16.50	22.63	1.27	0.00	98.87	92.98
10321	91	TM-MPB03	0.25-0.5	green	HiCr-diopside	53.82	0.06	0.67	1.65	0.05	2.38	0.13	0.06	16.35	22.36	1.63	0.00	99.18	92.44
10321	63	TM-MPB03	0.25-0.5	green	HiCr-diopside	53.56	0.14	2.16	1.73	0.05	2.24	0.11	0.03	15.84	21.43	1.87	0.01	99.15	92.63
10321	96	TM-MPB04	0.25-0.5	green	Cr-diopside	52.11	0.21	1.25	0.87	0.00	2.88	0.10	0.04	17.28	23.27	0.23	0.02	98.25	91.44
10321	97	TM-MPB04	0.25-0.5	green	Cr-diopside	52.08	0.16	2.25	0.87	0.00	3.53	0.09	0.07	17.65	21.76	0.31	0.00	98.77	89.91
10321	98	TM-MPB05	0.25-0.5	green	Cr-diopside	52.94	0.24	0.97	0.80	0.09	4.63	0.10	0.04	18.12	21.00	0.20	0.00	99.13	87.47

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10321	100	TM-MPB05	0.25-0.5	green	Cr-diopside	52.93	0.38	0.90	0.87	0.00	5.69	0.16	0.14	18.41	19.66	0.40	0.00	99.56	85.23
10321	102	TM-MPB05	0.25-0.5	green	Cr-diopside	52.67	0.37	0.93	0.89	0.00	5.93	0.22	0.06	18.10	19.24	0.43	0.00	98.84	84.47
10321	103	TM-MPB05	0.25-0.5	green	Cr-diopside	52.94	0.36	0.80	0.92	0.00	5.56	0.17	0.08	18.18	19.46	0.42	0.00	98.90	85.35
10321	99	TM-MPB05	0.25-0.5	green	Cr-diopside	53.23	0.38	0.93	1.08	0.07	5.70	0.19	0.08	18.94	18.67	0.52	0.01	99.80	85.56
10321	104	TM-MPB05	0.25-0.5	green	Cr-diopside	52.50	0.39	0.87	1.09	0.00	5.38	0.12	0.10	17.95	20.19	0.47	0.02	99.07	85.61
10321	105	TM-MPB05	0.25-0.5	green	Cr-diopside	53.10	0.36	0.91	1.18	0.03	5.51	0.23	0.01	18.75	18.83	0.47	0.00	99.37	85.85
10321	101	TM-MPB05	0.25-0.5	green	Cr-diopside	52.23	0.44	1.02	1.22	0.05	5.67	0.24	0.08	18.23	19.07	0.44	0.00	98.70	85.14
10321	106	TM-MPB06	0.25-0.5	green	Cr-diopside	52.80	0.23	0.84	0.59	0.05	5.06	0.18	0.07	17.88	21.02	0.20	0.00	98.91	86.30
10321	110	TM-MPB06	0.25-0.5	green	Cr-diopside	52.66	0.22	0.95	0.80	0.04	4.95	0.17	0.05	18.23	20.64	0.21	0.01	98.93	86.78
10321	107	TM-MPB06	0.25-0.5	green	Cr-diopside	52.70	0.31	1.04	0.81	0.03	5.93	0.16	0.05	18.93	18.47	0.34	0.02	98.78	85.04
10321	111	TM-MPB06	0.25-0.5	green	Cr-diopside	52.41	0.22	0.98	0.81	0.07	4.45	0.12	0.03	18.06	21.08	0.21	0.00	98.45	87.85
10321	109	TM-MPB06	0.25-0.5	green	Cr-diopside	52.47	0.32	0.80	0.96	0.01	5.31	0.16	0.06	17.64	20.29	0.44	0.01	98.47	85.55
10321	108	TM-MPB06	0.25-0.5	green	Cr-diopside	52.56	0.33	0.90	1.17	0.08	5.39	0.12	0.08	18.77	18.65	0.46	0.00	98.50	86.12
10321	115	TM-MPB07	0.25-0.5	green	Cr-diopside	53.16	0.33	0.64	0.61	0.00	6.05	0.15	0.11	18.99	18.71	0.37	0.00	99.14	84.84
10321	116	TM-MPB07	0.25-0.5	green	Cr-diopside	52.14	0.33	0.81	0.99	0.00	5.59	0.21	0.07	18.26	19.06	0.44	0.02	97.91	85.34
10321	112	TM-MPB07	0.25-0.5	green	Cr-diopside	52.72	0.38	0.82	1.03	0.02	5.02	0.22	0.06	17.84	20.21	0.43	0.00	98.77	86.38
10321	113	TM-MPB07	0.25-0.5	green	Cr-diopside	51.97	0.43	0.89	1.08	0.07	5.37	0.23	0.08	17.84	19.56	0.47	0.00	97.99	85.56
10321	117	TM-MPB08	0.25-0.5	green	Cr-diopside	52.60	0.22	0.92	0.78	0.02	4.92	0.20	0.03	18.19	20.98	0.19	0.00	99.04	86.84
10321	121	TM-MPB08	0.25-0.5	green	Cr-diopside	52.37	0.19	0.99	0.85	0.00	4.73	0.16	0.04	17.73	21.03	0.20	0.00	98.30	86.99
10321	118	TM-MPB08	0.25-0.5	green	Cr-diopside	52.63	0.34	0.82	0.98	0.00	5.35	0.16	0.12	18.10	19.78	0.50	0.00	98.77	85.78
10321	120	TM-MPB08	0.25-0.5	green	Cr-diopside	52.33	0.34	0.83	1.11	0.00	5.59	0.23	0.11	18.85	18.50	0.45	0.02	98.36	85.73
10321	119	TM-MPB08	0.25-0.5	green	Cr-diopside	52.62	0.39	0.90	1.11	0.04	5.62	0.18	0.05	17.99	19.30	0.43	0.01	98.65	85.08
10322	6	TM-MPB09	0.25-0.33	green	Cr-diopside	52.95	0.35	0.98	0.68	0.04	5.08	0.16	0.10	17.60	20.94	0.35	0.00	99.23	86.07
10322	4	TM-MPB09	0.25-0.33	green	Cr-diopside	53.29	0.40	0.79	0.80	0.02	5.78	0.17	0.11	17.87	20.00	0.38	0.00	99.62	84.65
10322	2	TM-MPB09	0.25-0.33	green	Cr-diopside	53.52	0.38	0.77	0.82	0.04	5.56	0.16	0.08	18.44	19.35	0.42	0.01	99.54	85.53
10322	8	TM-MPB09	0.25-0.33	green	Cr-diopside	52.96	0.31	0.81	0.94	0.00	5.30	0.21	0.05	18.44	19.28	0.44	0.00	98.73	86.11
10322	7	TM-MPB09	0.25-0.33	green	Cr-diopside	52.52	0.34	0.84	0.96	0.00	5.53	0.16	0.09	17.93	19.87	0.45	0.00	98.70	85.25
10322	9	TM-MPB09	0.25-0.33	green	Cr-diopside	51.81	0.20	2.30	0.97	0.02	3.37	0.12	0.09	17.78	22.14	0.28	0.00	99.08	90.38
10322	3	TM-MPB09	0.25-0.33	green	Cr-diopside	52.81	0.33	0.84	0.97	0.01	5.45	0.16	0.05	18.84	18.94	0.45	0.00	98.85	86.05
10322	1	TM-MPB09	0.25-0.33	green	Cr-diopside	53.35	0.32	0.93	1.04	0.00	5.12	0.20	0.02	18.80	19.20	0.41	0.00	99.40	86.75
10322	10	TM-MPB09	0.25-0.33	green	Cr-diopside	52.99	0.31	0.80	1.07	0.02	5.22	0.11	0.08	18.45	19.59	0.47	0.02	99.13	86.30
10322	5	TM-MPB09	0.25-0.33	green	Cr-diopside	52.77	0.36	1.10	1.12	0.00	4.83	0.16	0.06	17.81	20.69	0.46	0.00	99.35	86.80
10322	11	TM-MPB10	0.25-0.33	green	Cr-diopside	52.39	0.34	0.89	0.95	0.01	5.27	0.16	0.06	17.54	20.77	0.48	0.01	98.89	85.56
10322	13	TM-MPB10	0.25-0.33	green	Cr-diopside	53.07	0.30	0.89	1.01	0.03	5.46	0.21	0.06	18.88	18.57	0.48	0.00	98.97	86.05
10322	14	TM-MPB10	0.25-0.33	green	Cr-diopside	52.79	0.36	0.77	1.02	0.13	5.37	0.14	0.08	18.23	19.93	0.46	0.00	99.27	85.82
10322	15	TM-MPB10	0.25-0.33	green	Cr-diopside	52.17	0.40	0.88	1.04	0.00	5.41	0.13	0.11	17.47	20.40	0.44	0.01	98.47	85.20
10322	12	TM-MPB10	0.25-0.33	green	Cr-diopside	52.60	0.37	0.91	1.13	0.02	5.09	0.15	0.04	17.87	19.74	0.44	0.00	98.35	86.23
10322	19	TM-MPB11	0.25-0.33	green	Cr-diopside	52.18	0.25	1.60	0.95	0.03	3.68	0.09	0.00	17.01	22.49	0.36	0.01	98.66	89.16
10322	18	TM-MPB11	0.25-0.33	green	Cr-diopside	53.02	0.24	0.89	1.00	0.09	6.19	0.26	0.12	20.32	16.50	0.42	0.01	99.05	85.40
10322	16	TM-MPB11	0.25-0.33	emerald	HiCr-diopside	53.15	0.33	2.06	1.77	0.07	2.47	0.12	0.10	17.35	19.91	1.56	0.01	98.89	92.61
10322	17	TM-MPB11	0.25-0.33	emerald	HiCr-diopside	53.38	0.16	2.88	2.53	0.09	1.73	0.06	0.05	15.50	20.45	2.38	0.00	99.21	94.11
10322	25	TM-MPB13	0.25-0.33	green	Cr-diopside	52.69	0.19	0.89	0.73	0.07	4.38	0.14	0.03	18.33	21.18	0.20	0.00	98.84	88.18
10322	20	TM-MPB13	0.25-0.33	green	Cr-diopside	52.36	0.35	0.88	1.01	0.00	5.20	0.15	0.10	18.11	19.94	0.49	0.00	98.58	86.12
10322	21	TM-MPB13	0.25-0.33	green	Cr-diopside	53.09	0.33	0.78	1.04	0.05	5.40	0.08	0.08	18.09	19.64	0.40	0.01	98.99	85.66
10322	24	TM-MPB13	0.25-0.33	green	Cr-diopside	52.87	0.32	0.78	1.05	0.09	5.33	0.18	0.10	18.50	19.53	0.41	0.01	99.18	86.08
10322	22	TM-MPB13	0.25-0.33	green	Cr-diopside	52.87	0.33	0.76	1.07	0.00	5.47	0.14	0.08	18.73	18.91	0.44	0.00	98.79	85.92
10322	23	TM-MPB13	0.25-0.33	green	Cr-diopside	52.00	0.44	1.34	1.21	0.01	5.43	0.13	0.07	16.91	20.91	0.54	0.01	99.01	84.73
10322	29	TM-MPB14	0.25-0.33	green	Cr-diopside	52.68	0.27	0.89	0.88	0.02	5.22	0.14	0.05	17.74	20.39	0.45	0.00	98.73	85.83
10322	27	TM-MPB14	0.25-0.33	green	Cr-diopside	53.25	0.29	0.67	0.95	0.03	5.31	0.12	0.08	18.40	19.70	0.41	0.00	99.20	86.06
10322	30	TM-MPB14	0.25-0.33	green	Cr-diopside	52.52	0.40	0.88	1.11	0.01	5.42	0.15	0.15	18.16	19.63	0.47	0.00	98.89	85.64
10322	26	TM-MPB14	0.25-0.33	green	Cr-diopside	52.68	0.35	0.87	1.16	0.00	5.11	0.18	0.05	18.29	19.36	0.46	0.01	98.52	86.45

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10322	28	TM-MPB14	0.25-0.33	green	Cr-diopside	52.06	0.14	1.95	1.44	0.00	2.70	0.08	0.00	17.28	22.95	0.53	0.01	99.13	91.94
10322	32	TM-MPB15	0.25-0.33	green	Cr-diopside	52.80	0.34	0.73	0.83	0.03	5.33	0.10	0.06	18.32	19.27	0.40	0.01	98.23	85.97
10322	31	TM-MPB15	0.25-0.33	green	Cr-diopside	51.97	0.20	2.33	0.99	0.05	3.88	0.13	0.06	19.11	19.90	0.06	0.00	98.68	89.76
10322	37	TM-MPB15	0.25-0.33	green	Cr-diopside	53.12	0.35	0.84	1.05	0.09	4.98	0.15	0.09	18.15	20.00	0.47	0.00	99.28	86.67
10322	38	TM-MPB15	0.25-0.33	green	Cr-diopside	52.41	0.37	1.10	1.20	0.00	5.48	0.16	0.11	17.88	19.38	0.48	0.00	98.57	85.33
10322	36	TM-MPB15	0.25-0.33	green	Cr-diopside	52.32	0.38	0.87	1.21	0.08	5.16	0.18	0.07	17.97	19.70	0.48	0.01	98.43	86.13
10322	33	TM-MPB15	0.25-0.33	green	Cr-diopside	52.68	0.38	0.96	1.22	0.01	5.84	0.17	0.12	18.28	18.59	0.48	0.00	98.74	84.79
10322	34	TM-MPB15	0.25-0.33	emerald	HiCr-diopside	53.70	0.15	2.27	1.61	0.06	1.73	0.11	0.05	16.24	21.11	1.97	0.00	99.01	94.35
10322	35	TM-MPB15	0.25-0.33	emerald	HiCr-diopside	53.36	0.13	3.68	2.99	0.06	1.36	0.10	0.07	14.89	18.96	3.10	0.01	98.70	95.12
10322	39	TM-MPB16	0.25-0.33	green	Cr-diopside	52.60	0.37	0.99	1.14	0.02	5.43	0.17	0.10	18.64	18.97	0.43	0.00	98.85	85.95
10322	40	TM-MPB16	0.25-0.33	green	HiCr-diopside	53.29	0.18	2.16	1.94	0.08	1.42	0.06	0.02	15.97	21.24	2.02	0.01	98.39	95.24
10322	41	TM-MPB17	0.25-0.33	green	Cr-diopside	52.75	0.30	0.95	1.09	0.04	5.68	0.17	0.07	18.24	19.38	0.48	0.01	99.18	85.12
10322	43	TM-MPB18	0.25-0.33	green	diopside	54.10	0.04	1.07	0.44	0.04	2.54	0.05	0.11	17.10	23.41	0.72	0.01	99.63	92.32
10322	44	TM-MPB18	0.25-0.33	green	Cr-diopside	53.04	0.28	0.80	1.06	0.03	5.10	0.15	0.08	18.36	19.71	0.42	0.02	99.05	86.51
10322	42	TM-MPB18	0.25-0.33	green	Cr-diopside	52.58	0.34	0.86	1.06	0.00	5.72	0.13	0.12	18.74	18.65	0.50	0.00	98.70	85.38
10322	46	TM-MPB18	0.25-0.33	green	Cr-diopside	52.46	0.40	0.97	1.11	0.04	5.41	0.13	0.07	17.64	20.16	0.43	0.01	98.85	85.31
10322	47	TM-MPB18	0.25-0.33	green	Cr-diopside	52.07	0.38	0.88	1.29	0.05	5.19	0.16	0.08	18.29	19.00	0.50	0.02	97.91	86.26
10322	45	TM-MPB18	0.25-0.33	green	Cr-diopside	51.94	0.34	1.08	1.35	0.10	4.93	0.16	0.06	17.26	20.67	0.51	0.03	98.44	86.19
10322	59	TM-MPB19	0.25-0.33	green	Cr-diopside	52.55	0.11	1.09	0.62	0.01	2.19	0.07	0.11	19.00	22.49	0.10	0.00	98.34	93.92
10322	51	TM-MPB19	0.25-0.33	green	Cr-diopside	53.44	0.25	0.52	0.76	0.05	5.87	0.22	0.13	19.80	17.83	0.34	0.00	99.21	85.74
10322	50	TM-MPB19	0.25-0.33	green	Cr-diopside	52.94	0.32	0.75	0.89	0.01	5.36	0.17	0.03	18.64	19.44	0.38	0.00	98.95	86.10
10322	54	TM-MPB19	0.25-0.33	green	Cr-diopside	52.70	0.38	0.82	0.94	0.02	5.31	0.16	0.06	18.30	19.96	0.45	0.00	99.09	86.00
10322	53	TM-MPB19	0.25-0.33	green	Cr-diopside	53.05	0.33	0.70	0.96	0.04	5.39	0.14	0.11	18.40	19.60	0.42	0.01	99.16	85.87
10322	48	TM-MPB19	0.25-0.33	green	Cr-diopside	52.97	0.35	0.77	0.97	0.02	5.35	0.19	0.08	18.30	19.38	0.47	0.00	98.86	85.90
10322	55	TM-MPB19	0.25-0.33	green	Cr-diopside	52.44	0.38	0.81	1.02	0.00	5.27	0.12	0.06	18.20	19.79	0.43	0.00	98.51	86.03
10322	52	TM-MPB19	0.25-0.33	green	Cr-diopside	52.63	0.36	0.88	1.02	0.01	5.69	0.15	0.03	18.17	19.13	0.43	0.01	98.50	85.07
10322	57	TM-MPB19	0.25-0.33	green	Cr-diopside	53.14	0.31	0.78	1.06	0.04	5.40	0.14	0.06	18.56	19.02	0.40	0.00	98.92	85.96
10322	58	TM-MPB19	0.25-0.33	green	Cr-diopside	52.83	0.32	0.89	1.13	0.00	4.80	0.13	0.04	17.51	20.68	0.48	0.00	98.80	86.66
10322	49	TM-MPB19	0.25-0.33	green	Cr-diopside	52.57	0.38	0.85	1.15	0.00	5.57	0.17	0.11	18.07	19.54	0.49	0.00	98.91	85.26
10322	56	TM-MPB19	0.25-0.33	green	Cr-diopside	52.10	0.42	1.06	1.22	0.03	5.82	0.16	0.09	17.83	19.16	0.48	0.02	98.40	84.52
10322	62	TM-MPB20	0.25-0.33	green	diopside	52.44	0.07	2.01	0.39	0.09	9.48	0.60	0.25	9.97	22.19	1.63	0.02	99.15	65.22
10322	61	TM-MPB20	0.25-0.33	green	Cr-diopside	54.31	0.31	1.92	0.80	0.10	1.95	0.08	0.04	17.58	21.38	1.36	0.01	99.84	94.14
10322	66	TM-MPB21	0.25-0.33	green	Cr-diopside	53.31	0.23	0.67	0.85	0.04	5.44	0.16	0.14	18.86	18.56	0.40	0.03	98.68	86.06
10322	64	TM-MPB21	0.25-0.33	green	Cr-diopside	52.72	0.25	0.62	0.88	0.00	5.37	0.18	0.07	18.62	19.47	0.41	0.01	98.60	86.08
10322	63	TM-MPB21	0.25-0.33	green	Cr-diopside	52.92	0.35	0.75	0.98	0.00	5.44	0.15	0.03	18.38	19.76	0.44	0.01	99.22	85.77
10322	68	TM-MPB21	0.25-0.33	green	Cr-diopside	52.93	0.29	0.71	1.06	0.07	5.28	0.11	0.12	18.45	19.43	0.41	0.01	98.86	86.17
10322	65	TM-MPB21	0.25-0.33	green	Cr-diopside	52.33	0.41	1.03	1.08	0.06	5.26	0.19	0.06	17.71	19.79	0.52	0.01	98.44	85.72
10322	67	TM-MPB21	0.25-0.33	green	Cr-diopside	52.57	0.30	0.88	1.17	0.04	5.07	0.15	0.07	18.18	19.79	0.48	0.02	98.72	86.48
10322	70	TM-MPB22	0.25-0.33	green	Cr-diopside	51.90	0.23	2.18	0.93	0.03	5.66	0.21	0.04	18.67	18.87	0.21	0.01	98.93	85.47
10322	69	TM-MPB22	0.25-0.33	green	Cr-diopside	52.41	0.36	0.95	1.24	0.00	5.36	0.15	0.06	18.54	18.82	0.52	0.00	98.41	86.05
10322	71	TM-MPB23	0.25-0.33	green	diopside	52.65	0.12	1.23	0.12	0.06	4.14	0.13	0.05	17.48	22.54	0.26	0.01	98.79	88.27
10322	72	TM-MPB23	0.25-0.33	green	Cr-diopside	51.92	0.34	0.85	0.91	0.10	5.35	0.12	0.09	17.83	20.03	0.43	0.00	97.96	85.60
10322	73	TM-MPB24	0.25-0.33	green	Cr-diopside	53.66	0.19	2.86	0.59	0.09	4.42	0.12	0.08	19.25	15.63	1.77	0.03	98.68	88.60
10322	78	TM-MPB25	0.25-0.33	green	Cr-diopside	53.09	0.27	0.88	0.74	0.00	5.37	0.25	0.11	19.86	17.68	0.35	0.00	98.60	86.84
10322	74	TM-MPB25	0.25-0.33	green	Cr-diopside	52.50	0.29	0.93	0.98	0.01	4.98	0.14	0.09	17.44	20.67	0.51	0.01	98.56	86.20
10322	77	TM-MPB25	0.25-0.33	green	Cr-diopside	52.20	0.41	0.88	1.19	0.01	5.46	0.18	0.06	17.68	20.04	0.48	0.02	98.60	85.24
10322	75	TM-MPB25	0.25-0.33	green	Cr-diopside	52.48	0.32	1.33	1.27	0.02	5.11	0.17	0.03	18.75	19.21	0.41	0.00	99.09	86.73
10322	76	TM-MPB25	0.25-0.33	emerald	HiCr-diopside	52.84	0.29	1.79	1.69	0.07	3.10	0.05	0.06	17.34	19.71	1.42	0.02	98.38	90.89
10322	79	TM-MPB28	0.25-0.33	green	Cr-diopside	53.00	0.08	0.47	0.51	0.08	4.62	0.16	0.03	15.18	24.17	0.56	0.00	98.85	85.42
10322	80	TM-MPB28	0.25-0.33	green	Cr-diopside	53.56	0.02	0.81	0.60	0.04	3.53	0.21	0.03	16.04	23.95	0.80	0.03	99.62	89.01
10322	82	TM-MPB28	0.25-0.33	green	Cr-diopside	53.33	0.05	1.00	0.62	0.04	4.15	0.16	0.01	15.53	23.64	0.80	0.00	99.34	86.96

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10322	81	TM-MPB28	0.25-0.33	green	Cr-diopside	52.74	0.27	1.08	1.27	0.03	5.07	0.16	0.09	17.63	20.36	0.57	0.02	99.30	86.11
10322	83	TM-MPB29	0.25-0.33	green	Cr-diopside	52.83	0.33	0.89	1.13	0.06	5.11	0.17	0.10	18.15	19.83	0.48	0.00	99.06	86.37
10322	84	TM-MPB29	0.25-0.33	emerald	HiCr-diopside	53.32	0.29	1.77	1.79	0.11	2.71	0.13	0.09	16.86	19.66	1.82	0.01	98.56	91.74
10322	86	TM-MPB31	0.25-0.33	green	Cr-diopside	52.15	0.20	0.96	0.59	0.04	4.39	0.09	0.05	18.16	21.35	0.19	0.01	98.18	88.06
10322	91	TM-MPB31	0.25-0.33	green	Cr-diopside	52.62	0.26	0.99	0.88	0.00	5.47	0.24	0.11	19.33	18.07	0.36	0.01	98.33	86.30
10322	89	TM-MPB31	0.25-0.33	green	Cr-diopside	52.70	0.21	0.97	0.91	0.00	4.39	0.19	0.06	18.11	21.35	0.19	0.00	99.07	88.03
10322	90	TM-MPB31	0.25-0.33	green	Cr-diopside	53.13	0.03	0.81	0.99	0.01	3.58	0.14	0.04	15.80	23.62	0.69	0.00	98.83	88.72
10322	85	TM-MPB31	0.25-0.33	green	Cr-diopside	52.75	0.30	0.66	0.99	0.05	5.27	0.16	0.01	18.34	19.62	0.41	0.01	98.57	86.11
10322	87	TM-MPB31	0.25-0.33	green	Cr-diopside	52.17	0.33	1.31	1.09	0.04	5.13	0.15	0.12	18.15	19.35	0.37	0.01	98.22	86.32
10322	88	TM-MPB31	0.25-0.33	emerald	HiCr-diopside	52.89	0.24	1.34	4.79	0.01	4.84	0.13	0.05	12.17	18.07	4.07	0.00	98.59	81.76
10322	93	TM-MPB32	0.25-0.33	green	Cr-diopside	52.32	0.44	0.88	1.03	0.08	5.39	0.18	0.10	17.78	19.91	0.45	0.00	98.57	85.45
10322	92	TM-MPB32	0.25-0.33	green	Cr-diopside	52.33	0.33	1.12	1.32	0.08	4.70	0.13	0.07	17.52	20.89	0.52	0.01	99.02	86.93
10322	94	TM-MPB32	0.25-0.33	emerald	HiCr-diopside	53.69	0.13	3.11	2.49	0.00	1.44	0.07	0.00	15.49	19.98	2.67	0.00	99.08	95.05
10322	96	TM-MPB33	0.25-0.33	green	Cr-diopside	52.52	0.25	1.52	0.54	0.00	3.56	0.11	0.07	17.10	22.72	0.45	0.00	98.84	89.53
10322	98	TM-MPB33	0.25-0.33	green	Cr-diopside	52.62	0.33	0.86	0.59	0.06	5.87	0.18	0.06	18.17	19.17	0.28	0.03	98.23	84.67
10322	102	TM-MPB33	0.25-0.33	green	Cr-diopside	52.56	0.23	1.00	0.64	0.11	4.56	0.17	0.08	17.69	21.41	0.15	0.00	98.58	87.36
10322	97	TM-MPB33	0.25-0.33	green	Cr-diopside	52.50	0.38	0.95	0.92	0.03	5.56	0.17	0.03	18.10	19.95	0.45	0.00	99.05	85.30
10322	101	TM-MPB33	0.25-0.33	green	Cr-diopside	52.73	0.29	0.66	0.99	0.02	5.31	0.14	0.12	18.83	19.12	0.38	0.00	98.59	86.33
10322	99	TM-MPB33	0.25-0.33	green	Cr-diopside	52.67	0.29	0.72	0.99	0.00	5.41	0.21	0.08	19.06	18.66	0.42	0.00	98.54	86.26
10322	95	TM-MPB33	0.25-0.33	green	Cr-diopside	52.68	0.37	0.80	1.04	0.00	5.63	0.16	0.10	18.07	19.28	0.46	0.00	98.57	85.13
10322	103	TM-MPB33	0.25-0.33	green	Cr-diopside	52.73	0.37	0.97	1.12	0.03	5.42	0.11	0.05	18.04	19.70	0.44	0.00	98.98	85.56
10322	100	TM-MPB33	0.25-0.33	green	Cr-diopside	52.44	0.33	0.88	1.15	0.07	5.28	0.08	0.05	18.07	19.43	0.43	0.00	98.21	85.91
10322	105	TM-MPB34	0.25-0.33	green	Cr-diopside	53.35	0.30	0.65	0.91	0.03	5.35	0.22	0.12	19.20	18.84	0.43	0.00	99.40	86.47
10322	104	TM-MPB34	0.25-0.33	green	Cr-diopside	53.78	0.10	0.35	1.35	0.00	3.75	0.16	0.10	16.05	21.71	1.64	0.00	98.97	88.41
10322	120	TM-MPB35	0.25-0.33	green	diopside	51.70	0.31	0.96	0.01	0.00	0.02	0.00	0.00	17.81	19.49	0.43	0.00	90.73	99.94
10322	117	TM-MPB35	0.25-0.33	green	Cr-diopside	52.66	0.30	0.71	0.87	0.00	5.43	0.15	0.09	18.13	19.56	0.41	0.00	98.29	85.62
10322	121	TM-MPB35	0.25-0.33	green	Cr-diopside	52.92	0.36	0.88	0.89	0.05	5.03	0.21	0.07	18.63	19.47	0.41	0.02	98.96	86.84
10322	114	TM-MPB35	0.25-0.33	green	Cr-diopside	52.46	0.36	0.77	0.90	0.09	5.83	0.18	0.08	18.63	18.87	0.37	0.01	98.55	85.07
10322	125	TM-MPB35	0.25-0.33	green	Cr-diopside	52.46	0.42	0.92	0.92	0.04	5.62	0.12	0.12	17.71	19.78	0.52	0.01	98.63	84.90
10322	119	TM-MPB35	0.25-0.33	green	Cr-diopside	52.52	0.32	0.71	0.94	0.02	5.37	0.16	0.10	18.51	19.32	0.44	0.00	98.41	86.01
10322	126	TM-MPB35	0.25-0.33	green	Cr-diopside	52.51	0.36	0.81	0.95	0.03	5.48	0.12	0.14	18.03	19.89	0.44	0.00	98.76	85.43
10322	116	TM-MPB35	0.25-0.33	green	Cr-diopside	52.59	0.32	0.88	1.00	0.00	5.56	0.15	0.08	18.27	19.04	0.44	0.00	98.33	85.43
10322	111	TM-MPB35	0.25-0.33	green	Cr-diopside	52.89	0.27	0.84	1.02	0.08	5.01	0.19	0.06	17.97	20.36	0.50	0.01	99.20	86.48
10322	113	TM-MPB35	0.25-0.33	green	Cr-diopside	52.44	0.37	0.86	1.04	0.02	5.32	0.17	0.03	18.22	19.54	0.46	0.00	98.46	85.93
10322	112	TM-MPB35	0.25-0.33	green	Cr-diopside	52.92	0.36	0.86	1.06	0.00	5.44	0.20	0.08	18.14	19.81	0.47	0.00	99.34	85.60
10322	122	TM-MPB35	0.25-0.33	green	Cr-diopside	53.07	0.29	0.81	1.07	0.04	5.82	0.18	0.08	19.41	17.96	0.42	0.00	99.16	85.59
10322	110	TM-MPB35	0.25-0.33	green	Cr-diopside	52.35	0.40	1.02	1.10	0.05	5.52	0.15	0.08	17.88	19.50	0.46	0.00	98.51	85.25
10322	124	TM-MPB35	0.25-0.33	green	Cr-diopside	52.65	0.34	0.85	1.12	0.07	5.42	0.17	0.07	18.31	18.86	0.45	0.00	98.30	85.77
10322	107	TM-MPB35	0.25-0.33	green	Cr-diopside	52.67	0.32	0.92	1.15	0.01	5.52	0.09	0.10	18.54	19.02	0.52	0.00	98.86	85.68
10322	118	TM-MPB35	0.25-0.33	green	Cr-diopside	52.77	0.41	0.87	1.15	0.01	5.05	0.12	0.07	18.00	19.68	0.41	0.00	98.56	86.40
10322	108	TM-MPB35	0.25-0.33	green	Cr-diopside	51.97	0.33	0.90	1.17	0.04	5.11	0.17	0.10	18.44	19.41	0.47	0.04	98.15	86.54
10322	123	TM-MPB35	0.25-0.33	green	Cr-diopside	52.54	0.31	0.94	1.25	0.02	5.43	0.15	0.08	18.62	19.14	0.52	0.00	99.01	85.93
10322	109	TM-MPB35	0.25-0.33	green	HiCr-diopside	50.82	0.33	3.90	1.77	0.02	3.73	0.11	0.00	15.10	21.07	1.35	0.01	98.20	87.82
10322	106	TM-MPB35	0.25-0.33	emerald	HiCr-diopside	53.84	0.14	0.34	2.42	0.07	2.14	0.12	0.03	16.52	22.03	1.73	0.01	99.39	93.21
10322	115	TM-MPB35	0.25-0.33	emerald	HiCr-diopside	53.32	0.12	3.29	2.56	0.10	1.44	0.09	0.00	14.96	19.65	2.87	0.01	98.39	94.88
10323	1	TM-MPB36	0.25-0.33	emerald	HiCr-diopside	52.98	0.19	2.05	2.50	0.03	1.65	0.14	0.07	15.77	21.00	2.08	0.01	98.45	94.46
10323	7	TM-MPB37	0.25-0.33	green	Cr-diopside	52.96	0.36	0.73	0.82	0.11	5.03	0.14	0.05	18.51	19.90	0.41	0.00	99.03	86.77
10323	11	TM-MPB37	0.25-0.33	green	Cr-diopside	52.80	0.37	0.75	0.90	0.00	5.43	0.18	0.09	18.23	19.76	0.43	0.01	98.97	85.69
10323	5	TM-MPB37	0.25-0.33	green	Cr-diopside	52.66	0.30	0.78	0.95	0.08	5.43	0.17	0.10	18.22	19.68	0.45	0.01	98.83	85.67
10323	14	TM-MPB37	0.25-0.33	green	Cr-diopside	52.32	0.39	0.90	1.01	0.00	5.66	0.17	0.10	17.88	20.00	0.42	0.01	98.85	84.91
10323	8	TM-MPB37	0.25-0.33	green	Cr-diopside	52.45	0.37	0.82	1.04	0.00	5.09	0.20	0.06	18.11	19.94	0.39	0.00	98.46	86.38

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10323	12	TM-MPB37	0.25-0.33	green	Cr-diopside	52.19	0.36	0.89	1.05	0.00	5.34	0.16	0.06	17.97	19.63	0.47	0.01	98.13	85.72
10323	10	TM-MPB37	0.25-0.33	green	Cr-diopside	52.92	0.33	0.79	1.06	0.08	5.49	0.19	0.05	18.93	18.93	0.46	0.00	99.22	86.01
10323	2	TM-MPB37	0.25-0.33	green	Cr-diopside	52.71	0.28	0.65	1.06	0.01	5.35	0.14	0.08	19.02	19.40	0.38	0.01	99.09	86.36
10323	4	TM-MPB37	0.25-0.33	green	Cr-diopside	52.52	0.39	0.94	1.06	0.03	5.52	0.15	0.08	17.95	19.60	0.42	0.01	98.68	85.28
10323	6	TM-MPB37	0.25-0.33	green	Cr-diopside	51.76	0.43	0.87	1.10	0.09	5.38	0.14	0.06	17.50	20.12	0.38	0.00	97.82	85.28
10323	9	TM-MPB37	0.25-0.33	green	Cr-diopside	52.58	0.39	0.85	1.11	0.00	5.61	0.17	0.06	17.71	19.98	0.50	0.03	98.98	84.92
10323	3	TM-MPB37	0.25-0.33	green	Cr-diopside	52.58	0.37	1.04	1.15	0.03	6.22	0.26	0.09	18.63	18.08	0.51	0.00	98.96	84.21
10323	13	TM-MPB37	0.25-0.33	green	Cr-diopside	52.55	0.37	0.93	1.16	0.01	5.76	0.18	0.05	18.77	18.42	0.51	0.00	98.70	85.31
10323	17	TM-MPB38	0.25-0.33	green	Cr-diopside	53.15	0.26	0.56	0.83	0.03	5.40	0.14	0.07	19.37	18.96	0.35	0.00	99.12	86.47
10323	16	TM-MPB38	0.25-0.33	green	Cr-diopside	52.08	0.32	0.84	1.12	0.05	5.23	0.11	0.11	17.92	19.84	0.41	0.01	98.04	85.93
10323	18	TM-MPB39	0.25-0.33	green	Cr-diopside	52.20	0.37	0.84	1.12	0.04	5.40	0.13	0.12	17.87	19.42	0.39	0.02	97.93	85.51
10323	20	TM-MPB39	0.25-0.33	green	Cr-diopside	51.85	0.39	0.93	1.23	0.04	5.37	0.12	0.06	17.72	19.80	0.42	0.01	97.94	85.46
10323	19	TM-MPB39	0.25-0.33	green	Cr-diopside	52.07	0.41	0.99	1.24	0.00	5.66	0.16	0.10	17.91	19.36	0.51	0.01	98.42	84.94
10323	22	TM-MPB40	0.25-0.33	green	Cr-diopside	52.66	0.35	0.89	1.15	0.07	5.14	0.13	0.08	17.90	19.93	0.49	0.01	98.79	86.12
10323	21	TM-MPB40	0.25-0.33	green	Cr-diopside	52.44	0.40	0.93	1.22	0.02	5.29	0.11	0.09	17.97	19.80	0.50	0.02	98.79	85.83
10323	26	TM-MPB42	0.25-0.33	green	Cr-diopside	53.06	0.27	0.82	0.78	0.10	5.32	0.12	0.11	17.93	20.49	0.41	0.01	99.41	85.74
10323	24	TM-MPB42	0.25-0.33	green	Cr-diopside	52.01	0.34	0.89	0.96	0.02	5.36	0.11	0.06	18.31	19.42	0.38	0.02	97.88	85.90
10323	25	TM-MPB42	0.25-0.33	green	Cr-diopside	52.82	0.28	0.68	0.97	0.00	4.95	0.11	0.10	18.38	19.99	0.43	0.00	98.72	86.89
10323	23	TM-MPB42	0.25-0.33	emerald	HiCr-diopside	53.21	0.04	2.85	2.54	0.02	1.70	0.03	0.04	15.34	20.30	2.54	0.00	98.60	94.16
10323	31	TM-MPB44	0.25-0.33	green	Cr-diopside	52.70	0.30	0.79	0.93	0.05	5.54	0.18	0.08	18.46	19.56	0.39	0.00	98.97	85.60
10323	32	TM-MPB44	0.25-0.33	green	Cr-diopside	52.18	0.39	1.08	1.10	0.00	4.97	0.17	0.06	17.64	20.50	0.40	0.02	98.51	86.34
10323	30	TM-MPB44	0.25-0.33	green	Cr-diopside	52.50	0.39	0.92	1.16	0.06	5.27	0.16	0.06	18.09	19.85	0.51	0.00	98.97	85.94
10323	29	TM-MPB44	0.25-0.33	green	Cr-diopside	51.93	0.40	1.24	1.17	0.01	5.14	0.13	0.11	16.84	21.34	0.52	0.00	98.84	85.38
10323	33	TM-MPB45	0.25-0.33	green	Cr-diopside	52.61	0.21	0.95	0.86	0.08	4.65	0.14	0.03	17.90	21.29	0.20	0.00	98.90	87.28
10323	35	TM-MPB45	0.25-0.33	green	Cr-diopside	51.99	0.20	1.01	0.95	0.07	4.15	0.14	0.06	17.98	21.35	0.19	0.03	98.09	88.54
10323	34	TM-MPB45	0.25-0.33	green	Cr-diopside	52.16	0.33	0.84	1.09	0.00	5.23	0.13	0.11	17.95	20.07	0.43	0.01	98.36	85.95
10323	37	TM-MPB46	0.25-0.33	green	Cr-diopside	52.53	0.22	0.97	0.69	0.03	4.65	0.14	0.04	18.01	21.34	0.18	0.00	98.82	87.34
10323	38	TM-MPB46	0.25-0.33	green	Cr-diopside	52.30	0.40	1.02	1.00	0.03	5.71	0.23	0.10	17.78	19.83	0.40	0.00	98.80	84.73
10323	36	TM-MPB46	0.25-0.33	green	Cr-diopside	52.60	0.44	0.99	1.02	0.08	5.49	0.17	0.06	17.56	20.29	0.44	0.02	99.15	85.07
10323	39	TM-MPB47	0.25-0.33	green	diopside	52.65	0.06	0.93	0.48	0.08	4.07	0.15	0.08	15.33	24.12	0.73	0.01	98.71	87.04
10323	40	TM-MPB48	0.25-0.33	green	Cr-diopside	53.23	0.02	0.83	0.62	0.06	4.10	0.18	0.00	15.37	24.21	0.65	0.00	99.29	86.98
10323	41	TM-MPB48	0.25-0.33	green	HiCr-diopside	53.20	0.10	0.42	1.92	0.09	3.03	0.10	0.01	16.31	21.99	1.53	0.02	98.71	90.55
10323	42	TM-MPB49	0.25-0.33	green	Cr-diopside	52.50	0.21	0.86	0.61	0.01	4.69	0.09	0.10	18.17	21.54	0.20	0.00	98.99	87.35
10323	44	TM-MPB50	0.25-0.33	green	Cr-diopside	52.18	0.44	0.93	0.91	0.06	5.35	0.18	0.05	17.59	20.20	0.43	0.01	98.33	85.43
10323	43	TM-MPB50	0.25-0.33	green	Cr-diopside	52.08	0.52	1.06	0.93	0.01	6.02	0.20	0.11	17.12	20.15	0.48	0.01	98.71	83.52
10323	50	TM-MPB50	0.25-0.33	green	Cr-diopside	52.61	0.25	0.65	0.98	0.02	5.36	0.25	0.11	19.01	18.77	0.39	0.00	98.41	86.34
10323	47	TM-MPB50	0.25-0.33	green	Cr-diopside	52.67	0.38	0.85	1.05	0.00	5.24	0.12	0.04	18.04	20.14	0.44	0.00	98.96	85.98
10323	49	TM-MPB50	0.25-0.33	green	Cr-diopside	51.96	0.36	0.89	1.05	0.01	5.68	0.19	0.11	17.99	19.43	0.44	0.00	98.12	84.96
10323	48	TM-MPB50	0.25-0.33	green	Cr-diopside	52.30	0.37	0.91	1.07	0.01	5.98	0.21	0.09	18.48	18.47	0.44	0.00	98.32	84.63
10323	45	TM-MPB50	0.25-0.33	green	Cr-diopside	51.99	0.33	0.91	1.10	0.00	5.36	0.15	0.08	17.73	19.91	0.45	0.01	98.02	85.51
10323	51	TM-MPB50	0.25-0.33	green	Cr-diopside	52.02	0.34	0.86	1.13	0.00	5.08	0.16	0.04	17.22	20.46	0.40	0.01	97.73	85.81
10323	46	TM-MPB50	0.25-0.33	green	Cr-diopside	52.29	0.35	0.94	1.26	0.01	5.08	0.17	0.09	18.12	19.59	0.45	0.00	98.35	86.40
10323	53	TM-MPB51	0.25-0.33	green	Cr-diopside	52.68	0.33	0.63	0.84	0.00	5.24	0.13	0.04	18.76	19.35	0.42	0.00	98.42	86.45
10323	52	TM-MPB51	0.25-0.33	green	Cr-diopside	52.58	0.38	0.70	0.91	0.06	4.96	0.11	0.08	17.92	20.44	0.38	0.00	98.51	86.56
10323	56	TM-MPB51	0.25-0.33	green	Cr-diopside	52.65	0.35	0.73	1.00	0.00	5.74	0.12	0.09	18.55	19.03	0.44	0.00	98.70	85.22
10323	54	TM-MPB51	0.25-0.33	green	Cr-diopside	52.47	0.34	0.86	1.09	0.05	5.31	0.21	0.08	18.51	19.04	0.39	0.01	98.36	86.13
10323	55	TM-MPB51	0.25-0.33	green	Cr-diopside	52.77	0.35	0.82	1.17	0.04	5.07	0.14	0.10	18.38	19.58	0.47	0.00	98.89	86.59
10323	60	TM-MPB52	0.25-0.33	green	Cr-diopside	52.13	0.38	0.90	0.91	0.00	5.46	0.13	0.09	17.71	19.87	0.42	0.01	98.02	85.26
10323	61	TM-MPB52	0.25-0.33	green	Cr-diopside	52.39	0.38	0.77	1.03	0.01	5.20	0.14	0.10	18.18	19.66	0.42	0.00	98.27	86.17
10323	63	TM-MPB52	0.25-0.33	green	Cr-diopside	52.58	0.27	0.80	1.06	0.06	5.21	0.13	0.10	18.14	19.71	0.46	0.00	98.52	86.11
10323	58	TM-MPB52	0.25-0.33	green	Cr-diopside	52.91	0.31	0.74	1.07	0.06	5.57	0.16	0.06	19.14	18.65	0.44	0.00	99.11	85.98

Appendix C.5 Microprobe data for diopside and Cr-diopside grains from till

Mount	Grain	Sample	size	color	Mineral	SIO2	TIO2	AL2O3	CR2O3	V2O3	FEO	MNO	NIO	MGO	CAO	NA2O	K2O	TOTAL	Mg-#
10323	59	TM-MPB52	0.25-0.33	green	Cr-diopside	52.45	0.38	0.94	1.28	0.01	5.61	0.18	0.09	17.99	19.21	0.48	0.00	98.63	85.12
10323	65	TM-MPB53	0.25-0.33	green	Cr-diopside	52.79	0.22	0.63	0.96	0.03	5.24	0.20	0.12	19.15	18.56	0.37	0.00	98.27	86.69
10323	64	TM-MPB53	0.25-0.33	green	Cr-diopside	52.50	0.29	0.80	1.02	0.03	5.19	0.17	0.04	18.27	19.33	0.41	0.00	98.06	86.25
10323	67	TM-MPB55	0.25-0.33	green	diopside	53.37	0.17	0.81	0.28	0.00	3.55	0.11	0.04	17.78	22.59	0.29	0.01	98.98	89.94
10323	66	TM-MPB55	0.25-0.33	green	Cr-diopside	52.17	0.38	0.76	1.10	0.00	5.35	0.14	0.08	17.88	20.07	0.45	0.00	98.38	85.62
10323	69	TM-MPB56	0.25-0.33	green	diopside	53.23	0.17	0.93	0.44	0.05	3.41	0.11	0.00	17.78	22.56	0.34	0.01	99.04	90.30
10323	68	TM-MPB56	0.25-0.33	green	Cr-diopside	51.93	0.42	1.37	1.01	0.01	5.48	0.20	0.10	18.00	19.38	0.38	0.02	98.29	85.41
10323	72	TM-MPB57	0.25-0.33	green	Cr-diopside	52.40	0.11	2.00	0.67	0.00	3.63	0.11	0.03	16.28	22.48	0.75	0.00	98.45	88.89
10323	71	TM-MPB57	0.25-0.33	green	Cr-diopside	53.12	0.08	1.06	0.90	0.00	3.35	0.11	0.07	18.78	20.71	0.43	0.00	98.61	90.89
10323	73	TM-MPB57	0.25-0.33	green	Cr-diopside	52.38	0.24	1.00	0.93	0.00	4.51	0.11	0.06	17.86	21.27	0.19	0.00	98.57	87.59
10323	74	TM-MPB57	0.25-0.33	green	Cr-diopside	52.95	0.34	0.73	1.01	0.00	5.56	0.13	0.13	18.91	18.67	0.43	0.00	98.86	85.83
10323	70	TM-MPB57	0.25-0.33	emerald	HiCr-diopside	53.54	0.13	0.92	1.94	0.09	3.73	0.13	0.01	15.75	20.74	1.91	0.03	98.92	88.27
10323	75	TM-MPB60	0.25-0.33	green	Cr-diopside	52.70	0.17	1.23	0.56	0.08	3.15	0.11	0.06	17.61	22.61	0.32	0.00	98.62	90.87
10323	78	TM-MPB60	0.25-0.33	green	Cr-diopside	52.54	0.35	0.76	0.96	0.05	5.31	0.19	0.06	18.04	19.57	0.44	0.02	98.30	85.82
10323	77	TM-MPB60	0.25-0.33	green	Cr-diopside	52.17	0.36	0.91	1.24	0.05	5.10	0.23	0.05	18.04	19.88	0.48	0.01	98.53	86.30
10323	76	TM-MPB60	0.25-0.33	green	Cr-diopside	52.68	0.16	1.04	1.27	0.00	2.87	0.10	0.10	17.62	22.26	0.53	0.00	98.62	91.61
10323	79	TM-MPB61	0.25-0.33	green	Cr-diopside	52.41	0.44	1.00	1.14	0.09	5.75	0.13	0.10	17.75	19.77	0.45	0.00	99.04	84.61
10323	80	TM-MPB61	0.25-0.33	green	Cr-diopside	51.71	0.41	1.25	1.22	0.06	5.32	0.13	0.05	16.89	20.76	0.52	0.00	98.34	84.98
10323	82	TM-MPB62	0.25-0.33	green	Cr-diopside	52.34	0.37	0.74	0.83	0.02	5.67	0.12	0.03	17.69	20.01	0.43	0.00	98.24	84.77
10323	81	TM-MPB62	0.25-0.33	green	Cr-diopside	52.17	0.34	0.79	0.91	0.02	5.40	0.15	0.05	17.79	20.12	0.38	0.00	98.11	85.44
10323	84	TM-MPB62	0.25-0.33	green	Cr-diopside	52.83	0.35	0.79	1.03	0.00	4.99	0.14	0.08	18.20	19.79	0.41	0.00	98.62	86.67
10323	83	TM-MPB62	0.25-0.33	green	Cr-diopside	52.21	0.36	0.83	1.03	0.00	5.16	0.21	0.06	17.75	20.26	0.42	0.02	98.31	85.98
10323	91	TM-MPB63	0.25-0.33	green	Cr-diopside	52.67	0.30	0.79	0.94	0.00	5.14	0.16	0.07	18.49	19.47	0.47	0.00	98.50	86.50
10323	87	TM-MPB63	0.25-0.33	green	Cr-diopside	53.01	0.30	0.79	0.98	0.00	5.57	0.22	0.06	18.54	18.80	0.43	0.01	98.73	85.57
10323	88	TM-MPB63	0.25-0.33	green	Cr-diopside	52.01	0.17	2.38	0.98	0.03	3.83	0.15	0.10	17.90	21.24	0.09	0.01	98.90	89.27
10323	90	TM-MPB63	0.25-0.33	green	Cr-diopside	52.44	0.35	0.81	0.99	0.00	5.48	0.13	0.10	18.48	19.30	0.48	0.00	98.55	85.74
10323	86	TM-MPB63	0.25-0.33	green	Cr-diopside	51.92	0.38	1.19	1.06	0.00	5.44	0.12	0.05	16.94	20.91	0.51	0.01	98.53	84.75
10323	85	TM-MPB63	0.25-0.33	green	Cr-diopside	52.21	0.29	0.84	1.11	0.07	4.91	0.16	0.08	18.06	20.11	0.48	0.00	98.33	86.78
10323	89	TM-MPB63	0.25-0.33	green	Cr-diopside	52.62	0.33	0.91	1.12	0.07	5.17	0.15	0.08	18.19	19.88	0.49	0.00	99.00	86.24
10323	93	TM-MPB64	0.25-0.33	green	Cr-diopside	52.24	0.21	0.91	0.72	0.10	5.05	0.12	0.13	17.91	21.00	0.19	0.01	98.59	86.34
10323	95	TM-MPB64	0.25-0.33	green	Cr-diopside	52.83	0.31	0.72	0.86	0.02	5.28	0.20	0.06	18.67	19.18	0.45	0.01	98.58	86.31
10323	96	TM-MPB64	0.25-0.33	green	Cr-diopside	52.15	0.31	0.88	0.97	0.04	5.45	0.23	0.08	18.20	18.97	0.44	0.01	97.73	85.62
10323	98	TM-MPB64	0.25-0.33	green	Cr-diopside	52.63	0.30	0.57	0.97	0.00	5.33	0.16	0.07	18.69	18.57	0.38	0.00	97.69	86.20
10323	97	TM-MPB64	0.25-0.33	green	Cr-diopside	52.46	0.31	0.78	1.01	0.04	5.19	0.14	0.07	18.37	19.43	0.42	0.00	98.21	86.33
10323	92	TM-MPB64	0.25-0.33	green	Cr-diopside	51.98	0.31	0.76	1.10	0.00	5.18	0.15	0.07	18.30	19.29	0.45	0.00	97.58	86.31
10323	94	TM-MPB64	0.25-0.33	green	Cr-diopside	52.61	0.30	0.89	1.13	0.00	5.49	0.14	0.15	18.92	18.15	0.45	0.00	98.23	86.00
10323	99	TM-MPB64	0.25-0.33	green	Cr-diopside	52.51	0.36	0.82	1.17	0.01	5.21	0.15	0.03	18.08	20.01	0.44	0.02	98.81	86.08

Appendix D. Gold grain data

Appendix D.1 Gold grain summary
Appendix D.2 Visible gold grain shape, size and abundance

Appendix D.1 Gold grain summary

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight	Calculated PPB Visible Gold in HMC				Weight <2 mm table feed	Gold grains count normalized to 10 kg <2 mm table feed
	Total	Reshaped	Modified	Pristine	(g)	Total	Reshaped	Modified	Pristine		
TM-MPB-01	0	0	0	0	34.4	0	0	0	0	6.9	0
TM-MPB-02	0	0	0	0	44.1	0	0	0	0	6.2	0
TM-MPB-03	0	0	0	0	33.7	0	0	0	0	6.9	0
TM-MPB-04	0	0	0	0	32.9	0	0	0	0	6.4	0
TM-MPB-05	0	0	0	0	52.6	0	0	0	0	6.7	0
TM-MPB-06	0	0	0	0	54.2	0	0	0	0	5.1	0
TM-MPB-07	1	1	0	0	38.6	17	17	0	0	7.2	1
TM-MPB-08	1	1	0	0	49.9	13	13	0	0	6.1	2
TM-MPB-09	0	0	0	0	48.2	0	0	0	0	5.4	0
TM-MPB-10	1	0	1	0	63.6	3	0	3	0	4.2	2
TM-MPB-11	0	0	0	0	31.9	0	0	0	0	7.6	0
TM-MPB-12	0	0	0	0	21.3	0	0	0	0	7.3	0
TM-MPB-13	3	2	1	0	33.1	16	14	2	0	7.2	4
TM-MPB-14	0	0	0	0	29.3	0	0	0	0	6.3	0
TM-MPB-15	2	0	1	1	26.0	298	0	240	58	6.3	3
TM-MPB-16	0	0	0	0	20.1	0	0	0	0	6.1	0
TM-MPB-17	0	0	0	0	22.2	0	0	0	0	3.2	0
TM-MPB-18	0	0	0	0	40.6	0	0	0	0	5.3	0
TM-MPB-19	0	0	0	0	48.4	0	0	0	0	7.8	0
TM-MPB-20	0	0	0	0	32.4	0	0	0	0	5.7	0
TM-MPB-21	0	0	0	0	44.8	0	0	0	0	7.2	0
TM-MPB-22	1	1	0	0	34.5	19	19	0	0	6.9	1
TM-MPB-23	1	1	0	0	18.6	10	10	0	0	3.7	3
TM-MPB-24	0	0	0	0	18.9	0	0	0	0	4.0	0
TM-MPB-25	2	2	0	0	65.1	1	1	0	0	7.4	3
TM-MPB-26	6	6	0	0	63.6	232	232	0	0	7.8	8
TM-MPB-27	0	0	0	0	62.2	0	0	0	0	7.7	0
TM-MPB-28	1	1	0	0	46.6	1	1	0	0	7.2	1
TM-MPB-29	1	0	1	0	27.1	14	0	14	0	4.4	2
TM-MPB-30	0	0	0	0	39.9	0	0	0	0	7.3	0
TM-MPB-31	0	0	0	0	27.3	0	0	0	0	5.7	0
TM-MPB-32	1	0	1	0	35.1	11	0	11	0	6.8	1
TM-MPB-33	3	2	1	0	83.9	5	3	2	0	7.5	4
TM-MPB-34	2	1	1	0	24.7	89	86	3	0	5.1	4
TM-MPB-35	1	1	0	0	39.2	5	5	0	0	6.7	1
TM-MPB-36	1	0	1	0	28.6	35	0	35	0	6.4	2
TM-MPB-37	0	0	0	0	32.9	0	0	0	0	6.4	0
TM-MPB-38	0	0	0	0	33.3	0	0	0	0	6.4	0
TM-MPB-39	0	0	0	0	29.1	0	0	0	0	4.7	0
TM-MPB-40	1	1	0	0	45.4	1	1	0	0	5.5	2
TM-MPB-41	0	0	0	0	19.2	0	0	0	0	7.9	0
TM-MPB-42	4	4	0	0	28.3	15	15	0	0	5.1	8
TM-MPB-43	4	4	0	0	51.4	33	33	0	0	5.5	7
TM-MPB-44	0	0	0	0	26.3	0	0	0	0	5.2	0
TM-MPB-45	0	0	0	0	82.0	0	0	0	0	5.7	0
TM-MPB-46	0	0	0	0	42.8	0	0	0	0	6.4	0
TM-MPB-47	1	1	0	0	40.1	2	2	0	0	6.7	1
TM-MPB-48	1	0	1	0	44.6	14	0	14	0	6.3	2
TM-MPB-49	0	0	0	0	31.1	0	0	0	0	5.8	0
TM-MPB-50	1	1	0	0	24.3	42	42	0	0	3.2	3
TM-MPB-51	0	0	0	0	40.5	0	0	0	0	4.2	0
TM-MPB-52	0	0	0	0	38.6	0	0	0	0	6.4	0
TM-MPB-53	4	2	0	2	30.5	8	7	0	1	5.0	8
TM-MPB-54	2	1	1	0	47.1	10	8	2	0	7.3	3
TM-MPB-55	0	0	0	0	16.1	0	0	0	0	7.0	0

Appendix D.1 Gold grain summary

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight	Calculated PPB Visible Gold in HMC				Weight <2 mm table feed	Gold grains count normalized to 10 kg <2 mm table feed
	Total	Reshaped	Modified	Pristine	(g)	Total	Reshaped	Modified	Pristine		
TM-MPB-56	0	0	0	0	24.9	0	0	0	0	2.9	0
TM-MPB-57	1	1	0	0	39.9	9	9	0	0	6.4	2
TM-MPB-58	0	0	0	0	15.1	0	0	0	0	5.9	0
TM-MPB-59	0	0	0	0	54.8	0	0	0	0	5.9	0
TM-MPB-60	2	1	1	0	40.6	283	283	1	0	4.9	4
TM-MPB-61	5	5	0	0	21.7	59	59	0	0	4.4	11
TM-MPB-62	5	5	0	0	26.8	47	47	0	0	5.8	9
TM-MPB-63	3	3	0	0	36.3	2	2	0	0	6.4	5
TM-MPB-64	4	4	0	0	81.5	47	47	0	0	8.2	5

Appendix D.2 Visible gold grain shape, size and abundance

Sample Number	Panned Yes/No	Dimensions (microns)			Number of Visible Gold Grains				Nonmag HMC Weight (g)	Calculated V.G. Assay in HMC (ppb)	Remarks
		Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
TM-MPB-01	No	NO VISIBLE GOLD									
TM-MPB-02	No	NO VISIBLE GOLD									
TM-MPB-03	No	NO VISIBLE GOLD									
TM-MPB-04	No	NO VISIBLE GOLD									
TM-MPB-05	No	NO VISIBLE GOLD									
TM-MPB-06	No	NO VISIBLE GOLD									
TM-MPB-07	No	15 C	75	75	1			1			
								1	38.6	17	
TM-MPB-08	No	15 C	50	100	1			1			
								1	49.9	13	
TM-MPB-09	No	NO VISIBLE GOLD									
TM-MPB-10	No	10 C	25	75		1		1			
								1	63.6	3	
TM-MPB-11	No	NO VISIBLE GOLD									
TM-MPB-12	No	NO VISIBLE GOLD									
TM-MPB-13	No	8 C	25	50	1	1		2			
		13 C	50	75	1			1			
								3	33.1	16	
TM-MPB-14	No	NO VISIBLE GOLD									
TM-MPB-15	No	20 C	75	125			1	1			
		31 C	100	225		1		1			
								2	26.0	298	
TM-MPB-16	No	NO VISIBLE GOLD									
TM-MPB-17	No	NO VISIBLE GOLD									
TM-MPB-18	No	NO VISIBLE GOLD									
TM-MPB-19	No	NO VISIBLE GOLD									
TM-MPB-20	No	NO VISIBLE GOLD									
TM-MPB-21	No	NO VISIBLE GOLD									
TM-MPB-22	No	15 C	50	100	1			1			
								1	34.5	19	
TM-MPB-23	No	10 C	25	75	1			1			
								1	18.6	10	
TM-MPB-24	No	NO VISIBLE GOLD									
TM-MPB-25	No	3 C	15	15	1			1			

Appendix D.2 Visible gold grain shape, size and abundance

Sample Number	Panned Yes/No	Dimensions (microns)			Number of Visible Gold Grains				Nonmag HMC Weight (g)	Calculated V.G. Assay in HMC (ppb)	Remarks
		Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
		8 C	25	50	1			1			
								2	65.1	1	
TM-MPB-26	Yes	8 C	25	50	3			3			No Sulphides
		10 C	25	75	1			1			
		25 C	75	175	1			1			
		38 C	175	225	1			1			
								6	63.6	232	
TM-MPB-27	No	NO VISIBLE GOLD									
TM-MPB-28	No	5 C	25	25	1			1			
								1	46.6	1	
TM-MPB-29	No	13 C	50	75		1		1			
								1	27.1	14	
TM-MPB-30	No	NO VISIBLE GOLD									
TM-MPB-31	No	NO VISIBLE GOLD									
TM-MPB-32	No	13 C	50	75		1		1			
								1	35.1	11	
TM-MPB-33	No	5 C	25	25	1			1			
		10 C	25	75	1	1		2			
								3	83.9	5	
TM-MPB-34	No	8 C	25	50		1		1			
		22 C	100	125	1			1			
								2	24.7	89	
TM-MPB-35	No	10 C	50	50	1			1			
								1	39.2	5	
TM-MPB-36	No	18 C	75	100		1		1			
								1	28.6	35	
TM-MPB-37	No	NO VISIBLE GOLD									
TM-MPB-38	No	NO VISIBLE GOLD									
TM-MPB-39	No	NO VISIBLE GOLD									
TM-MPB-40	No	5 C	25	25	1			1			
								1	45.4	1	
TM-MPB-41	No	NO VISIBLE GOLD									
TM-MPB-42	No	5 C	25	25	2			2			
		10 C	50	50	2			2			
								4	28.3	15	
TM-MPB-43	No	4 C	15	25	1			1			
		5 C	25	25	1			1			
		15 C	75	75	1			1			
		18 C	75	100	1			1			
								4	51.4	33	

Appendix D.2 Visible gold grain shape, size and abundance

Sample Number	Panned Yes/No	Dimensions (microns)			Number of Visible Gold Grains				Nonmag HMC Weight (g)	Calculated V.G. Assay in HMC (ppb)	Remarks
		Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
TM-MPB-44	No	NO VISIBLE GOLD									
TM-MPB-45	No	NO VISIBLE GOLD									
TM-MPB-46	No	NO VISIBLE GOLD									
TM-MPB-47	No	8 C	25	50	1			1			
								1	40.1	2	
TM-MPB-48	No	15 C	50	100		1		1			
								1	44.6	14	
TM-MPB-49	No	NO VISIBLE GOLD									
TM-MPB-50	No	18 C	50	125	1			1			
								1	24.3	42	
TM-MPB-51	No	NO VISIBLE GOLD									
TM-MPB-52	No	NO VISIBLE GOLD									
TM-MPB-53	No	4 C	15	25			2	2			
		5 C	25	25	1			1			
		10 C	25	75	1			1			
								4	30.5	8	
TM-MPB-54	No	8 C	25	50		1		1			
		13 C	50	75	1			1			
								2	47.1	10	
TM-MPB-55	No	NO VISIBLE GOLD									
TM-MPB-56	No	NO VISIBLE GOLD									
TM-MPB-57	No	13 C	50	75	1			1			
								1	39.9	9	
TM-MPB-58	No	NO VISIBLE GOLD									
TM-MPB-59	No	NO VISIBLE GOLD									
TM-MPB-60	No	5 C	25	25		1		1			
		50 M	100	250	1			1			
								2	40.6	283	
TM-MPB-61	No	7 C	15	50	1			1			
		5 C	25	25	1			1			
		10 C	50	50	1			1			
		13 C	50	75	1			1			
		15 C	50	100	1			1			
								5	21.7	59	
TM-MPB-62	No	4 C	15	25	1			1			
		5 C	25	25	2			2			
		10 C	50	50	1			1			
		18 C	75	100	1			1			
								5	26.8	47	
TM-MPB-63	No	5 C	25	25	3			3			

Appendix D.2 Visible gold grain shape, size and abundance

Sample Number	Panned Yes/No	Dimensions (microns)			Number of Visible Gold Grains				Nonmag HMC Weight (g)	Calculated V.G. Assay in HMC (ppb)	Remarks
		Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
								3	36.3	2	
TM-MPB-64	No	5 C	25	25	1			1			
		10 C	25	75	1			1			
		20 C	100	100	1			1			
		22 C	100	125	1			1			
								4	81.5	47	

Appendix E. Till geochemistry of the <0.063 mm fraction

Appendix E.1 ACME whole rock data
Appendix E.2 ACME REE data
Appendix E.3 ACME base metal data
Appendix E.4 ACTLABS INAA data

Appendix E.1 ACME Whole rock data for the <0.063 mm till fraction

Sample	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
TM-MPB0001	64.60	12.10	4.23	3.08	4.71	2.78	2.44	0.59	0.17	0.07	0.013	562	48	12	4.9	1.02	0.01	99.75
TM-MPB0002	63.75	11.41	3.50	3.17	6.64	2.63	2.15	0.53	0.15	0.06	0.010	588	39	10	5.9	1.40	0.08	99.97
TM-MPB0003	48.76	9.21	2.90	5.54	13.54	1.93	1.90	0.40	0.12	0.06	0.006	384	29	8	15.6	3.97	< .01	100.01
TM-MPB0004	68.18	13.41	4.56	2.55	2.20	2.49	2.83	0.63	0.17	0.07	0.014	629	62	12	2.8	0.13	0.04	99.98
TM-MPB0005	67.00	11.64	3.98	2.75	4.50	2.76	2.20	0.55	0.14	0.06	0.013	469	74	11	4.3	0.80	< .01	99.96
TM-MPB0006	60.01	10.81	4.08	4.15	7.40	2.54	1.84	0.57	0.15	0.07	0.010	422	40	11	8.3	1.96	0.01	99.98
TM-MPB0007	56.64	12.10	4.82	4.24	7.88	2.40	2.19	0.54	0.14	0.08	0.012	450	50	12	8.9	1.95	0.09	100.00
TM-MPB0008	65.57	13.42	4.63	1.88	2.35	2.73	1.96	0.61	0.17	0.08	0.010	466	60	12	6.5	1.34	< .01	99.97
TM-MPB0009	63.90	13.86	4.99	2.05	2.23	2.65	1.97	0.63	0.14	0.06	0.012	557	54	12	7.4	1.20	< .01	99.96
TM-MPB0010	67.89	12.46	5.60	2.26	2.78	2.81	2.22	0.66	0.18	0.10	0.012	493	56	15	2.9	0.25	0.01	99.94
TM-MPB0011	60.28	11.10	3.40	3.78	7.84	2.30	2.32	0.47	0.16	0.06	0.010	555	44	10	8.2	1.94	< .01	99.99
TM-MPB0012	69.60	12.94	3.44	1.70	1.95	2.42	2.63	0.55	0.14	0.04	0.008	611	37	10	4.5	0.71	0.01	99.99
TM-MPB0013	50.21	9.90	3.50	5.33	12.17	2.08	1.73	0.44	0.10	0.07	0.008	378	32	9	14.4	3.57	0.01	99.99
TM-MPB0014	58.72	15.45	5.50	2.57	1.89	2.16	2.65	0.66	0.17	0.10	0.014	531	216	14	10.0	1.76	0.01	99.97
TM-MPB0015	64.99	13.93	5.22	2.50	2.49	2.79	2.68	0.63	0.14	0.08	0.011	591	60	14	4.4	0.17	< .01	99.94
TM-MPB0016	69.16	13.18	5.07	2.05	1.82	2.51	2.59	0.66	0.14	0.10	0.009	502	38	13	2.6	0.09	< .01	99.95
TM-MPB0017	69.45	13.20	5.32	1.93	1.81	2.78	2.18	0.68	0.16	0.09	0.011	464	37	14	2.3	0.09	< .01	99.97
TM-MPB0018	66.92	13.75	5.84	2.12	1.89	2.59	2.26	0.70	0.13	0.10	0.009	488	43	15	3.6	0.31	< .01	99.97
TM-MPB0019	59.96	12.05	4.44	3.39	7.13	2.47	2.28	0.57	0.13	0.07	0.014	463	77	12	7.4	1.43	< .01	99.97
TM-MPB0020	71.61	12.41	3.45	1.38	1.82	2.42	2.74	0.53	0.18	0.05	0.008	610	25	9	3.3	0.52	< .01	99.97
TM-MPB0021	49.98	9.59	3.25	5.88	11.70	1.97	2.07	0.42	0.11	0.06	0.007	394	40	9	14.9	3.56	< .01	99.99
TM-MPB0022	56.83	9.04	3.27	5.35	8.08	1.81	2.19	0.42	0.16	0.09	0.005	416	20	8	12.7	3.15	< .01	100.00
TM-MPB0023	67.94	12.39	6.04	2.30	2.38	2.71	1.94	0.67	0.13	0.15	0.011	407	123	17	3.0	0.31	0.02	99.72
TM-MPB0024	67.75	13.34	4.08	1.49	1.94	2.62	1.87	0.58	0.12	0.05	0.006	483	49	9	6.1	0.97	0.02	100.01
TM-MPB0025	69.04	12.62	3.61	1.60	2.62	2.86	1.87	0.55	0.18	0.06	0.008	515	28	10	4.9	0.90	< .01	99.98
TM-MPB0026	67.81	13.25	3.61	2.01	2.70	3.27	1.70	0.56	0.14	0.05	0.013	561	66	10	4.8	0.98	< .01	99.99
TM-MPB0027	69.89	12.79	3.92	1.77	2.45	3.04	1.97	0.60	0.11	0.05	0.012	566	34	11	3.3	0.45	0.01	99.97
TM-MPB0028	65.55	14.18	4.89	2.89	3.06	3.47	1.97	0.62	0.16	0.07	0.016	654	73	14	3.0	0.20	< .01	99.96
TM-MPB0029	64.14	13.29	4.73	1.77	2.10	2.51	1.87	0.60	0.24	0.05	0.010	508	59	10	8.6	1.52	0.03	99.98
TM-MPB0030	71.09	12.32	3.52	1.51	2.34	2.93	1.83	0.59	0.12	0.05	0.009	434	51	11	3.6	0.48	< .01	99.97
TM-MPB0031	68.04	12.50	4.19	1.22	1.96	2.57	1.75	0.61	0.11	0.05	0.006	456	90	10	6.9	1.32	0.01	99.97
TM-MPB0032	58.44	11.01	4.27	4.90	6.76	2.30	1.79	0.54	0.14	0.07	0.006	399	34	11	9.7	2.26	< .01	99.98
TM-MPB0033	74.23	11.35	3.46	1.26	2.41	2.96	2.06	0.58	0.10	0.06	0.006	451	44	10	1.4	0.05	0.01	99.93
TM-MPB0034	70.81	12.46	3.63	1.28	1.87	2.64	2.24	0.57	0.07	0.10	0.007	466	51	11	4.2	0.53	< .01	99.94
TM-MPB0035	71.86	11.96	3.28	1.33	2.20	2.76	2.05	0.53	0.07	0.05	0.013	437	177	10	3.8	0.48	0.04	99.98
TM-MPB0036	69.36	12.53	3.89	1.23	2.12	2.70	1.75	0.56	0.09	0.05	0.011	439	149	10	5.6	0.80	0.02	99.96
TM-MPB0037	69.33	12.81	4.62	1.79	1.92	2.51	2.24	0.60	0.10	0.07	0.011	457	63	12	3.9	0.53	0.01	99.96
TM-MPB0038	69.50	12.62	4.55	1.90	2.23	2.56	2.40	0.64	0.13	0.07	0.011	464	71	14	3.3	0.19	0.01	99.97
TM-MPB0039	67.27	13.16	5.29	1.97	1.79	2.44	2.32	0.67	0.08	0.08	0.007	421	62	13	4.6	0.66	< .01	99.73
TM-MPB0040	68.52	12.96	4.38	1.79	2.15	2.61	2.23	0.63	0.07	0.07	0.008	462	57	12	4.5	0.67	< .01	99.98
TM-MPB0041	71.70	12.40	3.59	1.61	2.48	3.11	2.12	0.55	0.09	0.05	0.004	492	56	11	2.2	0.20	< .01	99.97
TM-MPB0042	64.00	13.55	4.90	1.45	1.92	2.51	1.49	0.61	0.03	0.05	0.007	399	74	10	9.4	1.74	0.03	99.97
TM-MPB0043	70.34	12.43	4.27	1.84	2.26	2.74	1.95	0.65	0.12	0.08	0.010	424	69	14	3.2	0.38	< .01	99.95
TM-MPB0044	68.01	12.98	4.77	1.77	2.03	2.59	2.06	0.66	0.06	0.06	0.012	413	119	12	4.9	0.73	< .01	99.96
TM-MPB0045	67.42	13.36	4.74	1.93	2.16	2.69	2.39	0.61	0.11	0.07	0.013	487	66	12	4.4	0.55	0.01	99.96

Appendix E.1 ACME Whole rock data for the <0.063 mm till fraction

TM-MPB0046	68.36	12.88	4.46	1.65	2.09	2.82	1.85	0.64	0.07	0.06	0.010	448	57	12	4.8	0.87	< .01	99.75
TM-MPB0047	68.78	13.14	4.35	1.88	2.20	2.79	1.97	0.62	0.06	0.06	0.010	469	80	12	4.0	0.54	< .01	99.92
TM-MPB0048	69.65	12.86	4.49	1.97	2.31	2.92	2.17	0.64	0.09	0.08	0.010	437	60	12	2.7	0.19	< .01	99.95
TM-MPB0049	67.96	12.61	4.39	1.60	2.21	2.96	1.90	0.62	0.17	0.08	0.012	419	67	11	5.4	1.06	< .01	99.97
TM-MPB0050	66.94	13.39	4.69	1.63	1.71	2.61	1.87	0.61	0.08	0.06	0.007	455	51	11	6.3	1.20	< .01	99.96
TM-MPB0051	68.15	13.52	5.65	2.10	1.85	2.72	2.23	0.66	0.10	0.10	0.013	468	71	15	2.8	0.12	0.02	99.96
TM-MPB0052	68.23	12.54	4.27	1.61	2.08	2.74	1.75	0.60	0.12	0.06	0.009	413	57	11	5.9	1.26	< .01	99.96
TM-MPB0053	65.91	13.12	4.32	1.64	2.03	2.66	1.86	0.61	0.10	0.06	0.010	405	113	11	7.6	1.48	< .01	99.98
TM-MPB0054	71.23	12.49	3.57	1.58	2.21	2.99	1.77	0.58	0.02	0.05	0.008	410	79	10	3.4	0.41	< .01	99.96
TM-MPB0055	68.36	12.86	4.43	1.74	1.96	2.65	1.95	0.62	0.07	0.06	0.011	446	59	11	5.2	0.91	0.01	99.97
TM-MPB0056	65.72	14.12	5.44	2.06	1.88	2.45	2.03	0.73	0.14	0.08	0.012	597	86	13	5.2	0.48	< .01	99.94
TM-MPB0057	62.01	13.83	4.58	1.85	1.97	2.39	2.03	0.56	0.09	0.05	0.012	437	83	12	10.5	1.96	0.01	99.93
TM-MPB0058	64.34	13.21	4.76	1.51	2.00	2.69	1.63	0.66	0.07	0.05	0.004	401	66	12	9.0	1.37	0.03	99.98
TM-MPB0059	70.89	12.42	4.18	1.64	2.21	2.94	1.94	0.64	0.13	0.06	0.025	419	75	12	2.8	0.28	0.01	99.93
TM-MPB0060	69.18	12.50	4.57	1.73	2.06	2.99	1.87	0.62	0.11	0.07	0.008	396	63	11	4.2	0.58	< .01	99.96
TM-MPB0061	68.77	13.07	5.19	1.90	1.74	2.74	2.11	0.65	0.12	0.07	0.010	449	68	13	3.5	0.30	< .01	99.93
TM-MPB0062	68.48	13.10	5.11	1.97	1.94	2.65	2.44	0.62	0.18	0.08	0.012	467	238	14	3.1	0.12	< .01	99.77
TM-MPB0063	71.20	12.32	4.39	1.61	2.12	2.81	2.05	0.61	0.10	0.08	0.008	440	57	12	2.6	0.21	< .01	99.96
TM-MPB0064	59.73	10.63	3.12	4.61	6.88	2.28	1.96	0.47	0.09	0.05	0.007	386	51	10	10.1	2.42	< .01	99.98

Sample		SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
Lab duplicates																			
TM-MPB0024	original	67.75	13.34	4.08	1.49	1.94	2.62	1.87	0.58	0.12	0.05	0.006	483	49	9	6.1	0.97	0.02	100.01
RE TM-MPB0024	duplicate	67.83	13.25	4.13	1.48	1.94	2.61	1.93	0.58	0.11	0.05	0.009	485	43	10	6.0	0.99	< .01	99.98
TM-MPB0054	original	71.23	12.49	3.57	1.58	2.21	2.99	1.77	0.58	0.02	0.05	0.008	410	79	10	3.4	0.41	< .01	99.96
RE TM-MPB0054	duplicate	69.56	12.42	3.56	1.57	2.18	2.99	1.76	0.58	0.03	0.05	0.010	407	74	10	5.2	0.40	0.01	99.97
GSC Standard TCA8010																			
00IG0141		75.26	11.48	2.94	1.08	2.15	2.88	2.24	0.46	0.12	0.05	0.003	552	52	9	1.4	0.17	< .01	100.13
00IG0145		74.64	11.48	2.99	1.10	2.19	2.91	2.14	0.47	0.12	0.04	0.002	543	< 20	9	1.6	0.16	< .01	99.75
00IG0149		74.88	11.41	2.88	1.09	2.15	2.89	2.34	0.46	0.14	0.04	0.002	541	30	9	1.7	0.17	< .01	100.05
00IG0153		74.97	11.46	2.89	1.09	2.15	2.86	2.19	0.45	0.13	0.04	0.004	550	39	9	1.8	0.17	< .01	100.10

Appendix E.1 ACME Whole rock data for the <0.063 mm till fraction

Sample		SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
Sample prep duplicates																			
TM-MPB0002	original	63.75	11.41	3.50	3.17	6.64	2.63	2.15	0.53	0.15	0.06	0.010	588	39	10	5.9	1.40	0.08	99.97
00IG0139	duplicate	63.54	11.42	3.44	3.22	6.62	2.68	2.22	0.51	0.16	0.06	0.011	552	42	10	5.8	1.38	0.05	99.75
TM-MPB0009	original	63.90	13.86	4.99	2.05	2.23	2.65	1.97	0.63	0.14	0.06	0.012	557	54	12	7.4	1.20	< .01	99.96
00IG0140	duplicate	63.89	14.06	5.06	2.13	2.27	2.69	2.03	0.64	0.13	0.07	0.014	534	69	11	6.9	1.20	0.02	99.95
TM-MPB0020	original	71.61	12.41	3.45	1.38	1.82	2.42	2.74	0.53	0.18	0.05	0.008	610	25	9	3.3	0.52	< .01	99.97
00IG0142	duplicate	71.46	12.46	3.47	1.45	1.87	2.48	2.71	0.55	0.15	0.05	0.012	592	29	9	3.3	0.50	< .01	100.03
TM-MPB0025	original	69.04	12.62	3.61	1.60	2.62	2.86	1.87	0.55	0.18	0.06	0.008	515	28	10	4.9	0.90	< .01	99.98
00IG0143	duplicate	68.73	13.00	3.58	1.67	2.67	2.90	1.91	0.53	0.21	0.06	0.012	484	48	10	4.9	0.86	< .01	100.23
TM-MPB0030	original	71.09	12.32	3.52	1.51	2.34	2.93	1.83	0.59	0.12	0.05	0.009	434	51	11	3.6	0.48	< .01	99.97
00IG0144	duplicate	71.01	12.52	3.55	1.60	2.39	2.98	1.79	0.58	0.14	0.06	0.010	413	57	11	3.5	0.47	< .01	100.18
TM-MPB0035	original	71.86	11.96	3.28	1.33	2.20	2.76	2.05	0.53	0.07	0.05	0.013	437	177	10	3.8	0.48	0.04	99.98
00IG0146	duplicate	72.67	11.80	3.15	1.34	2.24	2.82	2.03	0.52	0.11	0.05	0.012	451	45	10	3.1	0.44	< .01	99.90
TM-MPB0040	original	68.52	12.96	4.38	1.79	2.15	2.61	2.23	0.63	0.07	0.07	0.008	462	57	12	4.5	0.67	< .01	99.98
00IG0147	duplicate	68.59	13.18	4.37	1.84	2.17	2.63	2.16	0.63	0.13	0.07	0.012	473	54	11	4.3	0.69	< .01	100.14
TM-MPB0045	original	67.42	13.36	4.74	1.93	2.16	2.69	2.39	0.61	0.11	0.07	0.013	487	66	12	4.4	0.55	0.01	99.96
00IG0148	duplicate	67.61	13.37	4.76	1.98	2.17	2.70	2.44	0.61	0.12	0.07	0.012	493	63	12	4.1	0.57	< .01	100.01
TM-MPB0050	original	66.94	13.39	4.69	1.63	1.71	2.61	1.87	0.61	0.08	0.06	0.007	455	51	11	6.3	1.20	< .01	99.96
00IG0150	duplicate	66.66	13.45	4.70	1.68	1.70	2.60	1.92	0.60	0.10	0.07	0.011	452	46	11	6.6	1.20	0.01	100.15
TM-MPB0055	original	68.36	12.86	4.43	1.74	1.96	2.65	1.95	0.62	0.07	0.06	0.011	446	59	11	5.2	0.91	0.01	99.97
00IG0151	duplicate	68.65	12.92	4.39	1.82	1.94	2.67	2.04	0.63	0.12	0.06	0.010	452	42	11	5.0	0.96	< .01	100.31
TM-MPB0060	original	69.18	12.50	4.57	1.73	2.06	2.99	1.87	0.62	0.11	0.07	0.008	396	63	11	4.2	0.58	< .01	99.96
00IG0152	duplicate	69.72	12.68	4.41	1.73	2.03	2.96	1.86	0.61	0.18	0.07	0.011	395	50	10	3.5	0.54	< .01	99.81
TM-MPB0064	original	59.73	10.63	3.12	4.61	6.88	2.28	1.96	0.47	0.09	0.05	0.007	386	51	10	10.1	2.42	< .01	99.98
00IG0154	duplicate	59.77	10.77	3.07	4.62	6.89	2.25	1.93	0.48	0.11	0.05	0.008	395	38	9	10.0	2.43	0.01	100.00

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES	Co ppm	Cs ppm	Ga ppm	Hf ppm	Nb ppm	Rb ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	Tl ppm	U ppm	V ppm	W ppm	Zr ppm	Y ppm	La ppm	Ce ppm	Pr ppm	Nd ppm
TM-MPB0001	14.9	2.5	15.0	5.5	7.4	70.1	2	344	0.9	6.0	0.3	1.2	76	< 1	196	18.0	25.5	53.8	6.3	24.2
TM-MPB0002	11.7	2.0	14.1	4.9	6.4	64.5	2	364	0.8	5.2	0.4	1.3	63	< 1	177	17.2	22.5	45.9	5.6	21.6
TM-MPB0003	10.0	1.7	10.7	4.5	6.3	46.6	2	277	0.5	4.0	0.1	0.9	49	< 1	163	12.3	18.0	36.9	4.5	16.6
TM-MPB0004	16.6	3.5	16.3	5.6	7.4	86.7	2	330	0.8	5.7	0.3	1.4	83	< 1	198	15.1	25.0	50.5	5.6	21.5
TM-MPB0005	12.2	1.8	13.9	6.3	6.5	54.5	2	303	0.7	4.8	0.2	1.1	68	< 1	214	18.3	22.6	46.8	5.7	21.7
TM-MPB0006	17.4	1.8	12.5	6.7	6.8	51.2	2	287	0.9	5.9	0.3	1.3	72	1	250	19.0	23.4	50.2	5.8	22.1
TM-MPB0007	17.5	2.7	15.2	4.6	6.4	63.4	2	276	0.7	5.5	0.2	1.6	82	< 1	159	16.7	24.9	50.2	6.0	22.1
TM-MPB0008	20.0	2.0	14.7	6.2	7.1	51.9	3	262	0.7	8.0	0.6	1.9	77	1	212	16.8	28.5	166.8	6.8	25.9
TM-MPB0009	21.7	3.6	16.8	6.3	8.0	64.5	4	304	0.8	7.0	1.3	2.6	82	2	228	15.3	21.0	76.0	4.9	18.6
TM-MPB0010	26.5	2.7	15.7	7.0	7.8	58.3	2	316	0.7	6.9	0.4	1.9	91	< 1	262	26.9	40.4	79.0	10.7	42.1
TM-MPB0011	10.8	2.5	12.5	4.2	5.9	65.0	2	339	0.6	4.6	0.9	1.2	58	< 1	146	14.6	21.6	43.1	5.3	20.4
TM-MPB0012	13.4	2.7	14.4	6.8	7.6	70.0	4	304	0.8	6.5	0.9	1.4	60	1	238	15.8	28.1	52.7	6.3	23.7
TM-MPB0013	11.6	1.8	11.9	4.1	6.5	50.1	4	280	0.6	4.4	0.2	1.0	59	< 1	145	14.2	19.7	40.4	4.7	17.9
TM-MPB0014	29.2	2.8	16.5	4.7	10.7	68.9	3	226	0.9	8.6	0.3	1.8	93	1	162	13.3	22.4	48.3	5.2	19.5
TM-MPB0015	16.0	2.8	16.8	4.5	9.2	73.2	2	282	0.8	8.1	0.5	1.2	81	4	145	18.7	32.2	58.7	7.4	27.9
TM-MPB0016	18.9	2.4	16.2	6.4	8.2	74.4	3	228	0.9	8.4	0.2	1.9	85	1	224	18.2	39.4	80.7	8.9	32.7
TM-MPB0017	19.7	3.1	17.0	6.5	9.4	76.0	3	225	1.0	11.2	0.3	3.0	84	7	227	19.3	45.2	88.7	11.2	41.9
TM-MPB0018	23.3	3.5	17.1	6.1	8.3	73.4	3	225	0.9	9.0	0.4	2.1	96	6	209	20.9	49.8	101.6	11.3	41.1
TM-MPB0019	14.6	2.8	14.5	5.6	6.7	61.0	1	288	0.6	5.2	0.3	1.0	72	4	198	17.5	21.9	43.4	5.4	20.5
TM-MPB0020	10.6	2.8	13.5	6.6	7.6	79.5	3	301	0.8	6.9	< .1	1.6	56	< 1	235	14.4	23.1	80.4	5.4	19.7
TM-MPB0021	12.4	1.7	11.3	4.8	6.4	50.0	3	271	0.6	4.8	0.1	0.9	54	6	173	13.0	19.5	40.7	4.7	17.5
TM-MPB0022	10.4	1.6	10.4	6.1	5.9	50.9	1	220	0.6	5.5	0.2	1.1	47	5	213	16.3	23.6	44.8	5.5	20.8
TM-MPB0023	55.2	1.8	15.3	5.8	7.0	52.1	2	270	0.8	5.9	0.3	1.4	102	7	199	22.4	31.2	60.6	8.3	33.5
TM-MPB0024	16.2	2.0	14.6	6.7	7.7	56.9	4	279	0.7	6.0	0.1	1.4	74	7	240	12.0	17.7	45.8	4.0	15.1
TM-MPB0025	10.4	1.8	13.2	6.2	6.5	49.1	2	339	0.6	4.7	0.2	1.3	62	5	220	14.1	19.1	39.5	4.5	16.8
TM-MPB0026	11.2	2.0	15.8	5.9	6.7	52.9	1	418	0.7	4.9	0.1	1.3	63	5	199	13.0	17.9	53.5	4.4	17.2
TM-MPB0027	12.3	1.9	14.4	6.9	7.7	56.7	1	371	0.8	6.4	0.2	1.6	68	5	234	16.2	21.5	60.8	5.3	19.7
TM-MPB0028	17.2	3.5	17.8	5.4	7.7	72.4	2	427	0.9	5.6	0.3	1.4	82	6	185	15.7	29.2	56.8	7.1	25.8
TM-MPB0029	14.9	3.0	14.3	7.2	8.0	59.5	2	318	0.8	5.7	0.2	2.6	75	8	254	14.0	18.6	41.7	4.5	16.8
TM-MPB0030	11.5	1.4	14.0	6.3	6.9	49.3	2	282	0.7	5.2	0.2	1.3	67	6	226	13.8	16.9	42.1	4.1	15.5
TM-MPB0031	16.6	2.1	14.7	7.3	8.3	56.0	3	277	0.8	6.1	0.2	1.6	77	5	268	14.6	18.0	67.2	4.2	15.0
TM-MPB0032	16.9	2.0	13.5	5.3	7.3	56.4	3	238	0.7	5.9	0.2	1.3	78	6	181	16.8	27.1	53.0	6.2	21.7
TM-MPB0033	9.0	1.2	12.2	10.9	7.0	57.4	3	301	0.7	5.9	0.4	1.6	64	1	395	14.6	24.3	58.3	5.7	22.6
TM-MPB0034	12.7	2.7	13.6	7.3	7.5	59.2	2	265	0.7	6.7	0.4	1.8	61	< 1	271	15.5	28.2	107.9	6.4	24.4
TM-MPB0035	12.3	1.3	12.8	6.8	6.1	48.0	6	279	0.6	5.4	0.2	1.2	60	< 1	257	13.2	19.7	70.2	4.7	19.9
TM-MPB0036	13.5	1.5	13.7	7.8	6.7	48.7	4	301	0.6	4.0	0.4	1.2	66	< 1	289	12.4	14.9	38.4	3.6	14.6
TM-MPB0037	16.1	2.1	14.4	6.9	7.5	65.3	4	252	1.6	6.3	0.3	1.6	78	1	253	14.4	22.2	64.7	4.9	19.8
TM-MPB0038	14.2	2.1	14.5	7.9	7.6	66.4	5	248	0.7	8.2	0.5	1.8	74	1	277	21.8	34.5	59.3	7.8	31.6
TM-MPB0039	21.0	2.3	15.4	6.1	8.8	64.2	3	215	0.9	8.3	0.2	2.3	82	1	218	15.0	25.4	145.8	5.2	20.1
TM-MPB0040	15.8	2.0	14.7	7.8	8.3	61.4	3	266	0.8	6.3	0.4	1.9	76	1	286	16.3	25.7	71.5	6.0	24.4
TM-MPB0041	11.3	1.5	14.0	7.1	6.3	56.6	3	335	0.6	4.4	0.9	1.2	63	< 1	255	14.5	20.0	39.2	4.6	19.3
TM-MPB0042	18.6	1.5	13.3	6.8	6.3	43.3	2	244	0.6	4.1	0.1	1.4	71	< 1	238	12.3	13.3	39.5	3.2	13.7
TM-MPB0043	14.0	1.9	15.1	7.4	7.5	57.3	3	266	0.7	6.0	0.3	1.8	74	1	274	21.8	35.3	84.5	8.4	35.1
TM-MPB0044	17.9	1.9	14.3	6.8	7.8	56.8	5	251	0.9	6.1	0.1	1.6	76	1	235	14.6	17.8	93.7	4.0	16.6
TM-MPB0045	21.3	2.2	15.6	6.4	7.7	69.2	2	265	0.7	7.6	0.1	1.5	79	< 1	232	15.5	19.9	114.0	4.5	18.5

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES	Co ppm	Cs ppm	Ga ppm	Hf ppm	Nb ppm	Rb ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	Tl ppm	U ppm	V ppm	W ppm	Zr ppm	Y ppm	La ppm	Ce ppm	Pr ppm	Nd ppm
TM-MPB0046	14.1	1.8	13.9	7.2	7.4	55.3	2	264	0.8	5.7	0.1	1.6	75	1	257	15.2	19.0	67.0	4.2	17.2
TM-MPB0047	15.4	2.2	15.7	6.7	7.7	58.8	3	277	0.7	6.2	0.2	1.5	75	< 1	235	15.9	22.1	56.9	5.1	20.3
TM-MPB0048	15.5	1.7	15.4	6.0	7.2	56.9	3	273	0.7	5.2	0.1	1.4	78	1	220	15.2	20.5	47.1	4.6	19.0
TM-MPB0049	18.1	2.1	15.3	6.4	7.2	57.0	4	258	0.8	6.9	0.3	2.3	76	3	222	19.7	21.8	127.9	5.4	22.4
TM-MPB0050	18.9	2.8	15.4	6.3	7.2	67.7	3	230	0.7	7.2	0.4	2.1	77	3	218	12.2	18.3	66.7	4.0	16.0
TM-MPB0051	21.6	3.2	16.9	7.4	8.2	71.0	5	218	1.0	9.9	0.3	2.4	91	4	255	18.0	41.3	106.9	8.0	30.7
TM-MPB0052	14.6	1.7	14.1	7.2	6.6	55.2	2	259	0.7	5.6	0.3	1.5	75	5	260	14.1	19.5	58.4	4.4	17.9
TM-MPB0053	16.6	1.7	13.1	6.7	6.7	54.8	3	234	0.7	5.2	0.2	1.5	71	3	243	13.5	18.1	77.5	4.1	16.8
TM-MPB0054	11.5	1.2	13.4	7.1	6.3	47.4	1	273	0.6	5.0	0.2	1.4	65	4	258	13.8	16.5	32.7	3.8	15.6
TM-MPB0055	13.5	1.9	15.0	6.5	7.5	56.6	2	256	0.7	5.3	0.1	1.5	72	12	232	13.6	17.6	57.4	4.0	16.3
TM-MPB0056	25.9	2.6	16.1	6.2	8.8	66.7	4	224	1.0	9.3	0.3	2.2	83	2	217	16.1	33.2	143.6	6.6	26.3
TM-MPB0057	23.3	2.3	14.3	6.0	6.9	53.5	6	231	0.7	5.8	0.2	1.6	70	< 1	219	15.2	19.6	115.1	4.6	18.2
TM-MPB0058	17.5	2.4	14.6	7.1	8.4	50.6	2	270	0.8	6.0	0.1	1.7	89	< 1	250	13.4	17.6	46.9	4.1	17.1
TM-MPB0059	13.8	6.3	15.0	7.3	7.8	52.9	2	265	0.7	6.3	0.9	2.2	76	2	269	17.5	16.4	60.2	3.8	16.0
TM-MPB0060	18.7	2.1	13.7	7.2	7.1	57.2	3	242	0.7	8.3	0.1	2.0	82	1	270	16.5	26.1	80.8	6.1	23.6
TM-MPB0061	21.3	2.6	15.7	6.3	8.2	72.0	3	223	0.8	9.0	0.2	2.2	92	1	231	16.0	23.9	154.3	5.1	20.2
TM-MPB0062	18.7	2.6	16.0	6.6	8.0	74.8	2	259	0.8	8.6	0.1	2.1	93	1	238	22.0	46.8	78.5	10.8	43.9
TM-MPB0063	14.8	1.7	14.1	7.3	7.7	57.7	2	259	1.0	6.8	0.1	1.7	80	< 1	272	16.1	23.5	66.0	5.4	22.0
TM-MPB0064	10.0	1.5	11.6	7.0	6.6	49.9	9	276	0.6	5.6	0.1	1.2	61	< 1	270	15.1	24.0	45.1	5.4	22.4

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES		Co ppm	Cs ppm	Ga ppm	Hf ppm	Nb ppm	Rb ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	Tl ppm	U ppm	V ppm	W ppm	Zr ppm	Y ppm	La ppm	Ce ppm	Pr ppm
Sample Prep Duplicates																				
TM-MPB0002	original	11.7	2.0	14.1	4.9	6.4	64.5	2	364	0.8	5.2	0.4	1.3	63	< 1	177.2	17.2	22.5	45.9	5.6
00IG0139	duplicate	11.1	1.9	12.9	5.2	6.5	61.9	2	372.9	0.7	4.9	0.4	1.2	64	< 1	174.4	16.0	22.0	46.0	5.4
TM-MPB0009	original	21.7	3.6	16.8	6.3	8.0	64.5	4	303.8	0.8	7.0	1.3	2.6	82	2	227.5	15.3	21.0	76.0	4.9
00IG0140	duplicate	20.3	3.2	15.9	5.9	7.7	60.7	4	289.8	0.7	6.2	0.4	2.1	83	< 1	199.6	13.9	19.2	74.5	4.5
TM-MPB0020	original	10.6	2.8	13.5	6.6	7.6	79.5	3	301.4	0.8	6.9	< .1	1.6	56	< 1	234.6	14.4	23.1	80.4	5.4
00IG0142	duplicate	10.9	2.9	13.8	6.7	7.8	79.2	3	311	0.9	6.9	0.5	1.6	57	< 1	236.9	15.1	23.1	83.2	5.3
TM-MPB0025	original	10.4	1.8	13.2	6.2	6.5	49.1	2	338.8	0.6	4.7	0.2	1.3	62	5	219.8	14.1	19.1	39.5	4.5
00IG0143	duplicate	10.5	1.7	14.3	6.3	6.8	49.0	2	360.2	0.7	4.9	0.6	1.4	63	< 1	222.8	14.1	19.4	41.5	4.6
TM-MPB0030	original	11.5	1.4	14.0	6.3	6.9	49.3	2	282.1	0.7	5.2	0.2	1.3	67	6	226	13.8	16.9	42.1	4.1
00IG0144	duplicate	11.5	1.3	14.4	5.8	6.7	48.4	3	294.2	0.7	5.2	1.1	1.7	68	1	202	13.8	16.6	42.6	4.0
TM-MPB0035	original	12.3	1.3	12.8	6.8	6.1	48.0	6	278.6	0.6	5.4	0.2	1.2	60	< 1	257.1	13.2	19.7	70.2	4.7
00IG0146	duplicate	11.6	1.2	12.7	6.8	6.5	47.1	4	297.4	0.6	4.7	1.1	1.2	61	< 1	241.2	12.5	17.5	63.6	4.4
TM-MPB0040	original	15.8	2.0	14.7	7.8	8.3	61.4	3	266.4	0.8	6.3	0.4	1.9	76	1	286.3	16.3	25.7	71.5	6.0
00IG0147	duplicate	14.6	1.9	14.8	6.7	8.8	56.9	2	263.5	0.8	6.1	0.2	1.8	77	1	234.1	15.1	24.2	68.2	5.8
TM-MPB0045	original	21.3	2.2	15.6	6.4	7.7	69.2	2	264.8	0.7	7.6	0.1	1.5	79	< 1	232.2	15.5	19.9	114.0	4.5
00IG0148	duplicate	20.8	2.2	16.3	5.7	7.7	65.3	3	266.9	0.7	7.6	0.2	1.4	83	< 1	196.5	14.9	18.5	112.4	4.4
TM-MPB0050	original	18.9	2.8	15.4	6.3	7.2	67.7	3	230.4	0.7	7.2	0.4	2.1	77	3	218.4	12.2	18.3	66.7	4.0
00IG0150	duplicate	18.5	2.8	15.9	5.8	7.5	67.2	2	230.9	0.7	7.0	0.2	2.0	78	1	204.8	11.8	16.6	65.5	3.7
TM-MPB0055	original	13.5	1.9	15.0	6.5	7.5	56.6	2	256.4	0.7	5.3	0.1	1.5	72	12	231.8	13.6	17.6	57.4	4.0
00IG0151	duplicate	13.0	1.9	15.0	5.8	7.6	56.3	2	255.7	0.7	5.2	0.1	1.4	73	1	203.9	12.7	17.0	56.9	3.9
TM-MPB0060	original	18.7	2.1	13.7	7.2	7.1	57.2	3	242.1	0.7	8.3	0.1	2.0	82	1	269.5	16.5	26.1	80.8	6.1
00IG0152	duplicate	17.9	2.0	14.6	6.6	7.0	56.6	4	241.3	0.7	7.7	0.1	1.8	78	10	235.4	15.6	24.5	77.6	5.6
TM-MPB0064	original	10.0	1.5	11.6	7.0	6.6	49.9	9	275.7	0.6	5.6	0.1	1.2	61	< 1	270.2	15.1	24.0	45.1	5.4
00IG0154	duplicate	9.3	1.5	11.9	6.0	6.7	47.4	11	256.2	0.6	5.2	0.8	1.1	57	< 1	207.7	13.7	22.2	43.8	5.2

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES		Co ppm	Cs ppm	Ga ppm	Hf ppm	Nb ppm	Rb ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	Tl ppm	U ppm	V ppm	W ppm	Zr ppm	Y ppm	La ppm	Ce ppm	Pr ppm
Lab duplicates																				
TM-MPB0024	original	16.2	2.0	14.6	6.7	7.7	56.9	4	279.1	0.7	6.0	0.1	1.4	74	7	240.4	12.0	17.7	45.8	4.0
RE TM-MPB0024	duplicate	16.4	2.0	14.0	7.2	7.9	56.9	4	280.4	0.7	6.3	0.2	1.5	75	6	243.4	12.5	18.0	47.0	4.1
TM-MPB0054	original	11.5	1.2	13.4	7.1	6.3	47.4	1	272.9	0.6	5.0	0.2	1.4	65	4	258.1	13.8	16.5	32.7	3.8
RE TM-MPB0054	duplicate	11.0	1.3	13.7	7.5	6.1	47.4	2	273.8	0.6	4.9	0.2	1.4	63	5	273.5	13.6	16.5	31.9	3.8
GSC Standard TCA8010																				
00IG0141		8.0	1.1	11.8	7.0	6.7	54.0	< 1	306.1	0.6	5.4	0.4	1.1	47	< 1	247.5	15.7	23.8	46.9	5.6
00IG0145		7.9	1.0	12.3	7.8	6.3	54.0	1	308.7	0.6	6.1	0.5	1.1	47	1	280.2	15.6	24.4	47.3	5.7
00IG0149		8.1	1.1	12.8	8.4	6.5	54.0	2	301	0.5	5.0	0.3	1.1	51	< 1	296	15.8	24.7	47.1	5.7
00IG0153		7.8	1.1	12.4	6.6	6.5	53.6	3	291.7	0.8	4.8	0.1	1.1	47	< 1	240.6	14.9	22.7	44.6	5.4

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES	Sm ppm	Eu ppm	Gd ppm	Tb ppm	Dy ppm	Ho ppm	Er ppm	Tm ppm	Yb ppm	Lu ppm
TM-MPB0001	4.5	1.15	3.71	0.52	3.20	0.61	1.94	0.26	1.64	0.26
TM-MPB0002	4.1	1.14	3.47	0.49	3.06	0.57	1.83	0.26	1.55	0.24
TM-MPB0003	3.0	0.82	2.61	0.34	2.21	0.43	1.27	0.18	1.11	0.18
TM-MPB0004	4.0	1.03	3.30	0.45	2.77	0.55	1.67	0.22	1.44	0.23
TM-MPB0005	4.1	1.10	3.63	0.52	3.26	0.62	1.98	0.28	1.71	0.26
TM-MPB0006	4.4	1.08	3.71	0.51	3.27	0.64	2.01	0.27	1.77	0.27
TM-MPB0007	4.1	1.08	3.59	0.49	3.13	0.57	1.82	0.25	1.51	0.24
TM-MPB0008	5.0	1.28	4.51	0.58	3.40	0.63	1.92	0.26	1.66	0.24
TM-MPB0009	3.7	1.01	3.13	0.44	2.85	0.55	1.66	0.26	1.49	0.26
TM-MPB0010	8.2	2.02	6.54	0.86	5.03	0.94	2.94	0.38	2.48	0.38
TM-MPB0011	3.9	1.02	3.17	0.43	2.73	0.51	1.56	0.22	1.37	0.20
TM-MPB0012	4.3	1.11	3.62	0.49	2.91	0.57	1.77	0.24	1.58	0.25
TM-MPB0013	3.2	0.86	2.87	0.40	2.46	0.48	1.48	0.20	1.30	0.20
TM-MPB0014	3.8	0.96	3.17	0.42	2.70	0.50	1.50	0.19	1.26	0.20
TM-MPB0015	5.1	1.22	4.21	0.56	3.41	0.63	2.02	0.27	1.64	0.25
TM-MPB0016	5.8	1.43	4.71	0.60	3.62	0.68	2.05	0.28	1.72	0.26
TM-MPB0017	7.5	1.74	5.67	0.74	4.04	0.73	2.21	0.29	1.79	0.26
TM-MPB0018	7.0	1.62	5.68	0.74	4.34	0.76	2.39	0.32	1.86	0.29
TM-MPB0019	4.1	1.07	3.44	0.49	3.08	0.61	1.93	0.26	1.67	0.26
TM-MPB0020	3.8	1.00	3.24	0.44	2.68	0.51	1.61	0.23	1.38	0.22
TM-MPB0021	3.5	0.87	2.77	0.39	2.38	0.45	1.45	0.20	1.20	0.19
TM-MPB0022	4.0	0.99	3.41	0.48	2.88	0.57	1.73	0.24	1.52	0.23
TM-MPB0023	5.9	1.57	4.84	0.65	4.05	0.80	2.52	0.33	2.09	0.33
TM-MPB0024	2.7	0.79	2.40	0.35	2.20	0.42	1.34	0.19	1.25	0.19
TM-MPB0025	3.5	0.90	2.83	0.40	2.57	0.50	1.57	0.21	1.37	0.22
TM-MPB0026	3.3	0.97	2.82	0.40	2.48	0.45	1.39	0.20	1.28	0.20
TM-MPB0027	4.1	1.12	3.42	0.50	3.07	0.57	1.84	0.26	1.61	0.25
TM-MPB0028	5.0	1.26	3.84	0.53	3.03	0.54	1.68	0.21	1.40	0.22
TM-MPB0029	3.4	0.92	2.79	0.41	2.56	0.49	1.58	0.22	1.40	0.23
TM-MPB0030	3.3	0.93	2.79	0.40	2.56	0.50	1.57	0.22	1.40	0.21
TM-MPB0031	3.1	0.86	2.79	0.44	2.76	0.52	1.70	0.23	1.57	0.23
TM-MPB0032	4.4	1.11	3.60	0.50	2.99	0.57	1.82	0.24	1.53	0.23
TM-MPB0033	4.2	1.11	3.27	0.49	2.68	0.51	1.63	0.20	1.48	0.24
TM-MPB0034	4.8	1.22	3.88	0.55	3.06	0.57	1.80	0.23	1.60	0.25
TM-MPB0035	3.5	0.99	2.99	0.44	2.48	0.47	1.44	0.18	1.29	0.21
TM-MPB0036	2.8	0.85	2.39	0.38	2.22	0.44	1.36	0.18	1.22	0.21
TM-MPB0037	3.5	0.98	3.10	0.48	2.61	0.51	1.60	0.21	1.39	0.24
TM-MPB0038	5.7	1.46	4.62	0.68	3.73	0.74	2.32	0.28	2.02	0.33
TM-MPB0039	3.7	0.95	3.40	0.51	2.94	0.58	1.70	0.25	1.53	0.27
TM-MPB0040	4.3	1.13	3.56	0.51	2.84	0.59	1.75	0.22	1.58	0.28
TM-MPB0041	3.4	0.98	2.95	0.44	2.46	0.50	1.51	0.19	1.36	0.24
TM-MPB0042	2.6	0.81	2.22	0.37	2.12	0.44	1.40	0.18	1.30	0.20
TM-MPB0043	6.0	1.53	5.04	0.71	3.88	0.76	2.30	0.28	2.02	0.33
TM-MPB0044	3.1	0.90	2.74	0.46	2.67	0.51	1.64	0.22	1.49	0.24
TM-MPB0045	3.5	0.95	3.25	0.49	2.85	0.57	1.75	0.21	1.58	0.26

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES	Sm ppm	Eu ppm	Gd ppm	Tb ppm	Dy ppm	Ho ppm	Er ppm	Tm ppm	Yb ppm	Lu ppm
TM-MPB0046	3.1	0.91	2.91	0.45	2.55	0.55	1.65	0.22	1.52	0.24
TM-MPB0047	3.9	1.08	3.17	0.51	2.93	0.60	1.78	0.23	1.60	0.25
TM-MPB0048	3.5	0.96	3.09	0.49	2.76	0.57	1.73	0.21	1.53	0.23
TM-MPB0049	4.6	1.16	4.17	0.65	3.61	0.73	2.15	0.27	1.87	0.30
TM-MPB0050	2.9	0.79	2.46	0.39	2.31	0.44	1.43	0.19	1.30	0.22
TM-MPB0051	5.1	1.33	4.37	0.63	3.50	0.68	2.00	0.26	1.70	0.27
TM-MPB0052	3.4	1.00	2.99	0.45	2.54	0.52	1.58	0.20	1.39	0.23
TM-MPB0053	3.3	0.95	2.83	0.44	2.45	0.50	1.56	0.21	1.42	0.23
TM-MPB0054	2.9	0.89	2.45	0.41	2.35	0.47	1.54	0.19	1.40	0.24
TM-MPB0055	3.1	0.82	2.61	0.41	2.42	0.51	1.56	0.20	1.39	0.23
TM-MPB0056	4.4	1.10	3.97	0.57	2.98	0.59	1.81	0.23	1.59	0.26
TM-MPB0057	3.7	0.96	3.26	0.50	2.81	0.56	1.71	0.21	1.50	0.24
TM-MPB0058	3.3	0.94	2.69	0.44	2.51	0.50	1.49	0.20	1.38	0.22
TM-MPB0059	3.1	0.96	2.81	0.46	2.82	0.60	1.88	0.24	1.72	0.27
TM-MPB0060	4.5	1.18	3.70	0.55	3.08	0.62	1.87	0.24	1.62	0.26
TM-MPB0061	3.7	1.04	3.57	0.55	3.09	0.61	1.82	0.24	1.65	0.26
TM-MPB0062	7.5	1.78	5.76	0.81	4.22	0.82	2.47	0.31	2.11	0.32
TM-MPB0063	4.1	1.09	3.41	0.52	2.91	0.60	1.85	0.25	1.66	0.25
TM-MPB0064	4.0	1.07	3.14	0.49	2.64	0.53	1.61	0.20	1.44	0.22

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES		Nd ppm	Sm ppm	Eu ppm	Gd ppm	Tb ppm	Dy ppm	Ho ppm	Er ppm	Tm ppm	Yb ppm	Lu ppm
Sample Prep Duplicates												
TM-MPB0002	original	21.6	4.1	1.14	3.47	0.49	3.06	0.57	1.83	0.26	1.55	0.24
00IG0139	duplicate	21.0	4.2	1.06	3.47	0.46	2.73	0.53	1.68	0.24	1.56	0.24
TM-MPB0009	original	18.6	3.7	1.01	3.13	0.44	2.85	0.55	1.66	0.26	1.49	0.26
00IG0140	duplicate	17.8	3.5	0.90	3.04	0.43	2.60	0.47	1.47	0.21	1.34	0.22
TM-MPB0020	original	19.7	3.8	1.00	3.24	0.44	2.68	0.51	1.61	0.23	1.38	0.22
00IG0142	duplicate	20.7	3.9	0.97	3.37	0.45	2.63	0.52	1.55	0.23	1.53	0.23
TM-MPB0025	original	16.8	3.5	0.90	2.83	0.40	2.57	0.50	1.57	0.21	1.37	0.22
00IG0143	duplicate	17.8	3.7	0.95	2.97	0.42	2.57	0.48	1.44	0.22	1.36	0.21
TM-MPB0030	original	15.5	3.3	0.93	2.79	0.40	2.56	0.50	1.57	0.22	1.40	0.21
00IG0144	duplicate	15.7	3.3	0.90	2.84	0.43	2.52	0.50	1.49	0.23	1.32	0.24
TM-MPB0035	original	19.9	3.5	0.99	2.99	0.44	2.48	0.47	1.44	0.18	1.29	0.21
00IG0146	duplicate	17.2	3.3	0.93	2.95	0.41	2.39	0.46	1.36	0.20	1.22	0.19
TM-MPB0040	original	24.4	4.3	1.13	3.56	0.51	2.84	0.59	1.75	0.22	1.58	0.28
00IG0147	duplicate	23.0	4.2	0.99	3.54	0.46	2.80	0.52	1.65	0.23	1.47	0.23
TM-MPB0045	original	18.5	3.5	0.95	3.25	0.49	2.85	0.57	1.75	0.21	1.58	0.26
00IG0148	duplicate	16.8	3.3	0.88	3.18	0.44	2.75	0.52	1.63	0.23	1.49	0.24
TM-MPB0050	original	16.0	2.9	0.79	2.46	0.39	2.31	0.44	1.43	0.19	1.30	0.22
00IG0150	duplicate	14.1	2.7	0.75	2.54	0.37	2.22	0.42	1.32	0.18	1.23	0.19
TM-MPB0055	original	16.3	3.1	0.82	2.61	0.41	2.42	0.51	1.56	0.20	1.39	0.23
00IG0151	duplicate	15.4	3.0	0.83	2.69	0.38	2.33	0.45	1.42	0.21	1.29	0.20
TM-MPB0060	original	23.6	4.5	1.18	3.70	0.55	3.08	0.62	1.87	0.24	1.62	0.26
00IG0152	duplicate	21.9	4.2	1.07	3.62	0.48	2.96	0.55	1.69	0.24	1.49	0.24
TM-MPB0064	original	22.4	4.0	1.07	3.14	0.49	2.64	0.53	1.61	0.20	1.44	0.22
00IG0154	duplicate	20.1	4.0	0.94	3.24	0.43	2.66	0.47	1.49	0.21	1.29	0.21

Appendix E.2 ACME Labs REE data for the <0.063 mm till fraction

SAMPLES		Nd ppm	Sm ppm	Eu ppm	Gd ppm	Tb ppm	Dy ppm	Ho ppm	Er ppm	Tm ppm	Yb ppm	Lu ppm
Lab duplicates												
TM-MPB0024	original	15.1	2.7	0.79	2.40	0.35	2.20	0.42	1.34	0.19	1.25	0.19
RE TM-MPB0024	duplicate	14.8	3.0	0.80	2.52	0.36	2.26	0.46	1.44	0.19	1.31	0.20
TM-MPB0054	original	15.6	2.9	0.89	2.45	0.41	2.35	0.47	1.54	0.19	1.40	0.24
RE TM-MPB0054	duplicate	15.2	3.0	0.83	2.49	0.39	2.40	0.49	1.52	0.20	1.39	0.22
GSC Standard TCA8010												
00IG0141		21.9	4.1	1.03	3.43	0.48	2.84	0.53	1.62	0.23	1.46	0.23
00IG0145		21.9	3.9	1.02	3.39	0.48	2.82	0.52	1.63	0.23	1.44	0.23
00IG0149		22.1	4.0	1.02	3.56	0.50	2.85	0.54	1.64	0.24	1.50	0.24
00IG0153		21.3	4.2	1.05	3.37	0.47	2.76	0.51	1.55	0.23	1.38	0.22

Appendix E.3 ACME Labs base metals for the <0.063 mm till fraction

SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	As ppm	Cd ppm	Sb ppm	Bi ppm
TM-MPB0001	< 1	40	7	33	36	3	< .2	< .5	< .5
TM-MPB0002	< 1	20	4	22	25	< 2	< .2	< .5	< .5
TM-MPB0003	< 1	28	5	29	25	3	< .2	0.5	< .5
TM-MPB0004	< 1	23	7	34	46	< 2	< .2	< .5	< .5
TM-MPB0005	< 1	43	6	31	35	2	< .2	< .5	< .5
TM-MPB0006	< 1	62	11	36	33	4	< .2	< .5	< .5
TM-MPB0007	1	40	8	47	54	< 2	< .2	< .5	< .5
TM-MPB0008	1	52	13	34	48	5	< .2	< .5	< .5
TM-MPB0009	1	43	13	44	49	< 2	< .2	< .5	< .5
TM-MPB0010	< 1	106	15	49	50	3	< .2	< .5	< .5
TM-MPB0011	< 1	21	4	26	31	< 2	< .2	< .5	< .5
TM-MPB0012	< 1	26	5	25	36	< 2	< .2	< .5	< .5
TM-MPB0013	< 1	28	8	34	32	< 2	< .2	1.0	< .5
TM-MPB0014	< 1	87	13	56	69	2	< .2	< .5	< .5
TM-MPB0015	< 1	56	8	51	53	< 2	< .2	< .5	< .5
TM-MPB0016	< 1	45	6	35	45	< 2	< .2	< .5	< .5
TM-MPB0017	< 1	97	14	33	42	3	< .2	< .5	< .5
TM-MPB0018	< 1	93	11	40	49	5	< .2	< .5	< .5
TM-MPB0019	< 1	37	8	43	57	< 2	< .2	< .5	< .5
TM-MPB0020	< 1	26	6	17	24	< 2	< .2	< .5	< .5
TM-MPB0021	< 1	37	6	30	27	4	< .2	0.9	< .5
TM-MPB0022	< 1	27	9	17	21	3	< .2	< .5	< .5
TM-MPB0023	1	285	52	305	123	28	0.6	< .5	< .5
TM-MPB0024	< 1	28	8	34	36	3	< .2	< .5	< .5
TM-MPB0025	< 1	19	4	22	24	< 2	< .2	< .5	< .5
TM-MPB0026	< 1	19	4	20	50	< 2	< .2	< .5	< .5
TM-MPB0027	< 1	27	7	20	26	< 2	< .2	< .5	< .5
TM-MPB0028	< 1	46	12	52	53	< 2	< .2	< .5	< .5
TM-MPB0029	4	20	8	39	34	2	< .2	< .5	< .5
TM-MPB0030	< 1	46	5	25	27	2	< .2	< .5	< .5
TM-MPB0031	1	24	10	26	28	8	< .2	< .5	< .5
TM-MPB0032	< 1	51	10	34	33	7	< .2	< .5	< .5
TM-MPB0033	< 1	26	5	15	14	3	< .2	< .5	< .5
TM-MPB0034	< 1	54	14	32	28	7	< .2	< .5	< .5
TM-MPB0035	< 1	34	6	17	27	3	< .2	< .5	< .5
TM-MPB0036	< 1	17	6	21	24	3	< .2	< .5	< .5
TM-MPB0037	< 1	38	7	27	39	2	< .2	< .5	< .5
TM-MPB0038	< 1	35	6	29	35	2	< .2	< .5	< .5
TM-MPB0039	1	70	14	31	44	7	< .2	< .5	< .5
TM-MPB0040	< 1	30	7	28	36	2	< .2	< .5	< .5
TM-MPB0041	< 1	23	5	22	23	< 2	< .2	< .5	< .5
TM-MPB0042	1	28	7	26	47	4	< .2	< .5	< .5
TM-MPB0043	< 1	57	8	31	37	3	< .2	< .5	< .5
TM-MPB0044	1	33	10	29	83	5	< .2	< .5	< .5
TM-MPB0045	< 1	51	10	28	37	7	< .2	0.6	< .5
TM-MPB0046	< 1	29	7	28	34	2	< .2	< .5	< .5
TM-MPB0047	< 1	55	7	30	38	3	< .2	< .5	< .5
TM-MPB0048	< 1	33	9	36	36	4	< .2	< .5	< .5
TM-MPB0049	1	36	11	35	31	5	< .2	< .5	< .5
TM-MPB0050	1	51	11	32	40	4	< .2	< .5	< .5
TM-MPB0051	< 1	81	11	41	46	7	< .2	< .5	< .5
TM-MPB0052	1	34	5	22	31	3	< .2	< .5	< .5
TM-MPB0053	< 1	23	8	21	43	3	< .2	< .5	< .5
TM-MPB0054	< 1	26	4	20	26	2	< .2	< .5	< .5
TM-MPB0055	< 1	23	7	29	33	2	< .2	< .5	< .5
TM-MPB0056	1	92	20	39	46	12	< .2	< .5	< .5
TM-MPB0057	1	34	15	26	56	4	< .2	< .5	< .5
TM-MPB0058	1	77	9	40	30	5	0.2	< .5	< .5
TM-MPB0059	1	148	6	20	34	4	< .2	< .5	0.5
TM-MPB0060	< 1	46	9	27	37	5	< .2	< .5	< .5

Appendix E.3 ACME Labs base metals for the <0.063 mm till fraction

SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	As ppm	Cd ppm	Sb ppm	Bi ppm
TM-MPB0061	< 1	54	10	32	39	6	< .2	< .5	< .5
TM-MPB0062	< 1	86	8	42	47	3	< .2	< .5	< .5
TM-MPB0063	< 1	35	7	24	31	3	< .2	< .5	< .5
TM-MPB0064	1	29	5	21	22	2	< .2	< .5	< .5
Sample Prep Duplicates									
Sample		Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	As ppm	Cd ppm	Sb ppm	Bi ppm
TM-MPB0002	original	< 1	20	4	22	25	< 2	< .2	< .5	< .5
00IG0139	duplicate	< 1	20	3	21	22	< 2	< .2	< .5	< .5
TM-MPB0009	original	1	43	13	44	49	< 2	< .2	< .5	< .5
00IG0140	duplicate	< 1	48	14	48	50	3	0.2	< .5	< .5
TM-MPB0020	original	< 1	26	6	17	24	< 2	< .2	< .5	< .5
00IG0142	duplicate	< 1	29	6	18	23	< 2	< .2	0.9	< .5
TM-MPB0025	original	< 1	19	4	22	24	< 2	< .2	< .5	< .5
00IG0143	duplicate	< 1	22	5	23	24	< 2	< .2	< .5	< .5
TM-MPB0030	original	< 1	46	5	25	27	2	< .2	< .5	< .5
00IG0144	duplicate	< 1	53	6	27	28	< 2	< .2	< .5	< .5
TM-MPB0035	original	< 1	34	6	17	27	3	< .2	< .5	< .5
00IG0146	duplicate	< 1	32	5	15	24	2	< .2	< .5	< .5
TM-MPB0040	original	< 1	30	7	28	36	2	< .2	< .5	< .5
00IG0147	duplicate	< 1	30	8	29	35	3	< .2	0.5	< .5
TM-MPB0045	original	< 1	51	10	28	37	7	< .2	0.6	< .5
00IG0148	duplicate	< 1	56	13	31	39	6	< .2	< .5	< .5
TM-MPB0050	original	1	51	11	32	40	4	< .2	< .5	< .5
00IG0150	duplicate	1	51	11	33	39	4	< .2	0.6	< .5
TM-MPB0055	original	< 1	23	7	29	33	2	< .2	< .5	< .5
00IG0151	duplicate	< 1	23	7	30	33	2	0.2	0.9	< .5
TM-MPB0060	original	< 1	46	9	27	37	5	< .2	< .5	< .5
00IG0152	duplicate	< 1	46	10	28	37	5	< .2	0.7	< .5
TM-MPB0064	original	1	29	5	21	22	2	< .2	< .5	< .5
00IG0154	duplicate	1	30	5	21	24	< 2	< .2	< .5	< .5
Lab duplicates										
TM-MPB0024	original	< 1	28	8	34	36	3	< .2	< .5	< .5
RE TM-MPB0024	duplicate	< 1	27	8	35	37	3	< .2	< .5	< .5
TM-MPB0054	original	< 1	26	4	20	26	2	< .2	< .5	< .5
RE TM-MPB0054	duplicate	< 1	27	4	20	26	2	< .2	< .5	< .5
GSC Standard TCA 8010										
00IG0141		< 1	29	3	25	14	3	< .2	2.6	< .5
00IG0145		< 1	27	3	25	13	3	< .2	2.4	< .5
00IG0149		< 1	28	3	25	13	4	< .2	2.8	< .5
00IG0153		< 1	27	3	24	13	3	< .2	2.3	< .5

Appendix E.4 INAA data for the <0.063 mm till fraction

Sample	Material	Au ppb	Ag ppm	As ppm	Ba ppm	Br ppm	Ca %	Co ppm	Cr ppm	Cs ppm	Fe %	Hf ppm	Hg ppm	Ir ppb	Mo ppm	Na %	Ni ppm	Rb ppm	Sb ppm	Sc ppm	Se ppm	Sn %
TM-MPB0001	till	<2	<5	4.5	520	2	4	16	138	3	3.2	5	<1	<5	<1	2.1	<36	45	0.2	12.6	<3	<0.01
TM-MPB0002	till	<2	<5	2.4	600	<0.5	5	13	110	<1	3.0	5	<1	<5	<1	2.2	<41	57	0.3	12.3	<3	<0.01
TM-MPB0003	till	<2	<5	4.6	330	4	11	11	79	2	2.4	4	<1	<5	<1	1.6	<33	46	<0.1	9.0	<3	<0.01
TM-MPB0004	till	<2	<5	4.1	480	<0.5	2	18	157	5	3.4	4	<1	<5	6	1.9	<38	90	<0.1	12.7	<3	<0.01
TM-MPB0005	till	<2	<5	6.3	530	3	2	13	110	2	2.9	5	<1	<5	<1	2.0	<32	39	<0.1	11.8	<3	<0.01
TM-MPB0006	till	<2	<5	6.6	380	<0.5	5	19	115	2	3.2	6	<1	<5	<1	2.0	<37	52	<0.1	12.6	<3	<0.01
TM-MPB0007	till	7	<5	3.2	300	2.9	6	18	126	3	3.3	4	<1	<5	<1	1.8	<32	70	<0.1	12.6	<3	<0.01
TM-MPB0008	till	<2	<5	6.3	340	13.4	<1	19	120	2	3.4	5	<1	<5	<1	2.0	<36	41	0.4	12.3	<3	<0.01
TM-MPB0009	till	<2	<5	4.4	350	6.9	2	23	126	3	3.8	6	<1	<5	<1	2.0	<37	38	<0.1	12.9	<3	<0.01
TM-MPB0010	till	<2	<5	4.8	450	2	3	26	141	2	4.2	8	<1	<5	<1	2.4	<41	44	<0.1	16.5	<3	<0.01
TM-MPB0011	till	47	<5	2.2	360	<0.5	7	10	120	3	2.8	4	<1	<5	<1	1.8	<34	57	<0.1	10.9	<3	<0.01
TM-MPB0012	till	<2	<5	2.0	530	5.9	<1	14	97	3	2.6	6	<1	<5	<1	1.9	<28	54	0.3	10.8	<3	<0.01
TM-MPB0013	till	<2	<5	3.0	410	3.7	9	13	100	3	2.9	4	<1	<5	<1	1.6	<28	37	0.3	10.2	<3	<0.01
TM-MPB0014	till	<2	<5	4.2	450	18.2	<1	29	140	3	4.0	5	<1	<5	<1	1.7	145	49	0.4	14.5	<3	<0.01
TM-MPB0015	till	<2	<5	2.4	460	3.9	<1	16	123	2	3.9	4	<1	<5	<1	2.1	<34	80	<0.1	14.6	<3	<0.01
TM-MPB0016	till	27	<5	6.3	470	<0.5	<1	19	117	3	3.7	6	<1	<5	<1	1.9	<31	73	0.5	14.1	<3	<0.01
TM-MPB0017	till	10	<5	9.4	540	<0.5	<1	20	124	4	3.9	6	<1	<5	<1	2.2	<33	59	0.6	14.5	<3	<0.01
TM-MPB0018	till	<2	<5	9.3	430	2.3	<1	22	110	3	4.1	5	<1	<5	1	1.9	<31	54	0.3	15.0	<3	<0.01
TM-MPB0019	till	2	<5	3.2	480	<0.5	5	16	152	3	3.3	5	<1	<5	<1	1.9	<31	56	<0.1	12.9	<3	<0.01
TM-MPB0020	till	<2	<5	2.6	580	4.9	2	12	102	2	2.6	6	<1	<5	<1	1.9	203	65	<0.1	9.7	<3	<0.01
TM-MPB0021	till	<2	<5	4.2	440	3.9	9	13	80	2	2.4	4	<1	<5	<1	1.5	<25	42	0.3	9.2	<3	<0.01
TM-MPB0022	till	<2	<5	5.2	430	7.9	4	10	70	<1	2.4	5	<1	<5	<1	1.3	<23	54	0.3	8.2	<3	<0.01
TM-MPB0023	till	<2	<5	28.3	410	2.6	2	56	123	1	4.5	5	<1	<5	<1	2.1	190	41	0.7	18.3	<3	<0.01
TM-MPB0024	till	<2	<5	5.8	520	6.6	2	17	95	2	3.0	6	<1	<5	2	2.0	158	62	<0.1	10.7	<3	<0.01
TM-MPB0025	till	<2	<5	3.3	600	9.7	2	11	107	2	2.8	6	<1	<5	<1	2.2	<27	48	<0.1	11.5	<3	<0.01
TM-MPB0026	till	<2	5	1.8	500	8.9	2	13	142	<1	2.7	5	<1	<5	3	2.5	<26	40	<0.1	11.5	<3	<0.01
TM-MPB0027	till	<2	<5	2.4	540	5.7	3	15	110	2	2.9	6	<1	<5	<1	2.3	<26	59	<0.1	12.5	<3	<0.01
TM-MPB0028	till	<2	<5	2.0	620	<0.5	2	18	160	4	3.6	5	<1	<5	<1	2.7	119	66	<0.1	13.9	<3	<0.01
TM-MPB0029	till	<2	<5	4.3	500	7.8	<1	14	110	3	3.3	6	<1	<5	4	1.9	<24	76	0.2	10.6	<3	<0.01
TM-MPB0030	till	<2	<5	1.7	410	6.2	<1	12	87	2	2.5	5	<1	<5	<1	2.2	<23	36	0.3	11.3	<3	<0.01
TM-MPB0031	till	<2	<5	10.3	410	6.5	<1	16	91	<1	3.1	6	<1	<5	<1	1.9	<23	36	<0.1	10.3	<3	<0.01
TM-MPB0032	till	<2	<5	8.2	340	3.1	5	18	93	2	3.2	5	<1	<5	<1	1.8	<25	55	0.3	12.0	<3	<0.01
TM-MPB0033	till	11	<5	4.4	530	<0.5	2	10	91	<1	2.7	9	<1	<5	<1	2.4	<24	65	0.3	10.5	<3	<0.01
TM-MPB0034	till	9	<5	9.4	530	4.8	3	16	91	2	2.9	7	<1	<5	<1	2.1	<25	48	0.3	12.7	<3	<0.01
TM-MPB0035	till	8	<5	4.2	500	3.4	2	12	100	1	2.3	6	<1	<5	<1	2.2	<22	48	<0.1	10.5	<3	<0.01
TM-MPB0036	till	<2	<5	4.0	380	6.5	2	15	93	2	3.0	6	<1	<5	<1	2.1	<23	38	0.4	11.0	<3	<0.01
TM-MPB0037	till	8	<5	4.3	380	2.7	2	15	108	2	3.3	5	<1	<5	4	1.9	136	34	0.4	11.6	<3	<0.01
TM-MPB0038	till	<2	<5	4.6	490	4.9	2	14	112	3	3.4	6	<1	<5	2	2.0	<27	61	0.5	15.8	<3	<0.01
TM-MPB0039	till	7	<5	6.6	310	5.7	2	22	115	3	4.0	6	<1	<5	<1	1.9	<26	64	0.4	14.3	<3	<0.01
TM-MPB0040	till	42	<5	3.7	360	5.4	2	16	107	2	3.3	6	<1	<5	<1	2.0	<25	48	0.4	12.7	<3	<0.01
TM-MPB0041	till	<2	<5	2.5	440	2.5	2	11	78	2	2.6	5	<1	<5	<1	2.3	121	38	<0.1	10.5	<3	<0.01
TM-MPB0042	till	24	<5	5.1	390	11.7	2	20	114	2	3.6	6	<1	<5	<1	2.0	<23	34	0.3	11.0	<3	<0.01
TM-MPB0043	till	<2	<5	4.6	380	2.6	2	15	116	2	3.1	6	<1	<5	<1	2.1	<24	55	0.4	14.8	<3	<0.01
TM-MPB0044	till	<2	<5	5.5	330	5.5	1	18	116	2	3.3	5	<1	<5	<1	2.0	<22	33	0.2	11.7	<3	<0.01
TM-MPB0045	till	<2	<5	6.9	430	3.7	2	22	118	2	3.6	5	<1	<5	<1	2.1	<23	61	0.2	13.0	<3	<0.01
TM-MPB0046	till	8	<5	4.2	440	5.5	2	15	102	2	3.3	6	<1	<5	1	2.1	<23	40	0.2	12.2	<3	<0.01
TM-MPB0047	till	<2	<5	3.8	390	3.5	2	15	114	2	3.2	5	<1	<5	<1	2.1	<22	72	<0.1	12.5	<3	<0.01
TM-MPB0048	till	13	<5	4.9	390	<0.5	1	16	110	2	3.1	4	<1	<5	<1	2.1	<22	37	0.3	12.2	<3	<0.01
TM-MPB0049	till	<2	<5	7.4	360	9.1	2	18	95	2	3.2	5	<1	<5	<1	2.2	<23	59	0.3	11.8	<3	<0.01
TM-MPB0050	till	<2	<5	5.9	400	7.7	1	20	109	3	3.6	5	<1	<5	1	2.0	<25	52	0.3	12.0	<3	<0.01

Appendix E.4 INAA data for the <0.063 mm till fraction

Sample	Material	Au ppb	Ag ppm	As ppm	Ba ppm	Br ppm	Ca %	Co ppm	Cr ppm	Cs ppm	Fe %	Hf ppm	Hg ppm	Ir ppb	Mo ppm	Na %	Ni ppm	Rb ppm	Sb ppm	Sc ppm	Se ppm	Sn %
TM-MPB0051	till	<2	<5	8.4	390	2.3	2	19	121	3	3.7	6	<1	<5	<1	2.1	<24	54	0.5	15.0	<3	<0.01
TM-MPB0052	till	<2	<5	3.3	390	10.1	<1	14	105	2	2.9	5	<1	<5	<1	2.0	<21	54	0.3	11.0	<3	<0.01
TM-MPB0053	till	6	<5	4.9	290	10.8	1	18	117	2	3.3	5	<1	<5	<1	2.0	116	66	0.3	12.0	<3	<0.01
TM-MPB0054	till	<2	<5	3.0	340	5	1	12	101	1	2.6	6	<1	<5	<1	2.3	91	51	0.2	11.1	<3	<0.01
TM-MPB0055	till	<2	<5	3.1	390	8	<1	13	109	2	3.1	5	<1	<5	<1	1.9	<21	61	0.2	11.5	<3	<0.01
TM-MPB0056	till	10	<5	12.4	580	4.7	<1	26	119	3	3.9	5	<1	<5	<1	2.0	228	64	0.4	13.9	<3	<0.01
TM-MPB0057	till	<2	<5	3.7	370	14.4	1	24	126	2	3.3	5	<1	<5	<1	2.0	<25	59	0.2	12.3	<3	<0.01
TM-MPB0058	till	<2	<5	5.2	410	9.8	<1	19	94	3	3.6	6	<1	<5	<1	2.1	<25	56	0.4	12.1	<3	<0.01
TM-MPB0059	till	19	<5	5.1	330	3.7	3	14	231	6	3.0	6	<1	<5	<1	2.2	123	43	0.3	11.7	<3	<0.01
TM-MPB0060	till	11	<5	8.2	460	7.3	2	22	117	3	3.9	6	<1	<5	<1	2.3	<26	51	0.4	13.2	<3	<0.01
TM-MPB0061	till	<2	<5	6.8	430	5.2	2	21	116	3	3.9	5	<1	<5	<1	2.2	<24	73	<0.1	13.8	<3	<0.01
TM-MPB0062	till	<2	<5	5.8	430	1.9	2	18	122	3	3.8	5	<1	<5	3	2.1	162	41	0.5	14.8	<3	<0.01
TM-MPB0063	till	<2	<5	6.7	480	1.8	2	15	105	2	3.2	6	<1	<5	<1	2.1	<22	70	0.3	11.9	<3	<0.01
TM-MPB0064	till	10	<5	2.8	430	6.6	4	12	93	2	2.8	6	<1	<5	3	1.9	<24	62	<0.1	11.8	<3	<0.01
Sample Prep duplicates																						
TM-MPB0002	original	<2	<5	2.4	600	<0.5	5	13	110	<1	3.0	5	<1	<5	<1	2.2	<41	57	0.3	12.3	<3	<0.01
00IG0123	duplicate	<2	<5	2.2	550	<0.5	5	16	128	2	2.9	5	<1	<5	<1	2.2	<31	69	<0.1	12.8	<3	<0.01
TM-MPB0009	original	<2	<5	4.4	350	6.9	2	23	126	3	3.8	6	<1	<5	<1	2.0	<37	38	<0.1	12.9	<3	<0.01
00IG0124	duplicate	5	<5	4.5	470	8.2	2	25	145	3	4.1	6	<1	<5	2	2.2	<31	59	0.3	14.0	<3	<0.01
TM-MPB0020	original	<2	<5	2.6	580	4.9	2	12	102	2	2.6	6	<1	<5	<1	1.9	203	65	<0.1	9.7	<3	<0.01
00IG0126	duplicate	<2	<5	7.4	700	6.1	1	13	116	4	2.9	7	<1	<5	4	2.1	<25	66	0.1	10.7	<3	<0.01
TM-MPB0025	original	<2	<5	3.3	600	9.7	2	11	107	2	2.8	6	<1	<5	<1	2.2	<27	48	<0.1	11.5	<3	<0.01
00IG0127	duplicate	<2	<5	3.4	560	10.9	2	12	123	2	2.8	8	<1	<5	<1	2.3	<37	44	0.4	11.7	<3	<0.01
TM-MPB0028	original	<2	<5	2.0	620	<0.5	2	18	160	4	3.6	5	<1	<5	<1	2.7	119	66	<0.1	13.9	<3	<0.01
00IG0128	duplicate	<2	<5	4.2	480	7.8	2	13	96	1	2.7	7	<1	<5	7	2.2	134	47	0.4	11.9	<3	<0.01
TM-MPB0035	original	8	<5	4.2	500	3.4	2	12	100	1	2.3	6	<1	<5	<1	2.2	<22	48	<0.1	10.5	<3	<0.01
00IG0130	duplicate	<2	<5	5.8	480	5	1	14	114	1	2.6	8	<1	<5	<1	2.3	<22	61	0.5	11.2	<3	<0.01
TM-MPB0040	original	42	<5	3.7	360	5.4	2	16	107	2	3.3	6	<1	<5	<1	2.0	<25	48	0.4	12.7	<3	<0.01
00IG0131	duplicate	8	<5	4.6	570	6.7	2	17	118	2	3.6	8	<1	<5	<1	2.1	<29	57	0.6	13.2	<3	<0.01
TM-MPB0045	original	<2	<5	6.9	430	3.7	2	22	118	2	3.6	5	<1	<5	<1	2.1	<23	61	0.2	13.0	<3	<0.01
00IG0132	duplicate	<2	<5	8.1	590	4.5	2	23	137	3	3.8	6	<1	<5	<1	2.1	<26	61	0.6	13.6	<3	<0.01
TM-MPB0050	original	<2	<5	5.9	400	7.7	1	20	109	3	3.6	5	<1	<5	1	2.0	<25	52	0.3	12.0	<3	<0.01
00IG0134	duplicate	<2	<5	8.0	520	8.9	<1	23	131	3	4.0	7	<1	<5	<1	2.2	<32	64	1.1	13.4	<3	<0.01
TM-MPB0055	original	<2	<5	3.1	390	8	<1	13	109	2	3.1	5	<1	<5	<1	1.9	<21	61	0.2	11.5	<3	<0.01
00IG0135	duplicate	<2	<5	4.7	580	8.4	1	17	123	2	3.5	7	<1	<5	<1	2.1	<25	55	0.3	12.5	<3	<0.01
TM-MPB0060	original	11	<5	8.2	460	7.3	2	22	117	3	3.9	6	<1	<5	<1	2.3	<26	51	0.4	13.2	<3	<0.01
00IG0136	duplicate	15	<5	8.4	480	7.4	2	23	120	3	3.7	7	<1	<5	4	2.5	<29	71	0.5	12.8	<3	<0.01

Appendix E.4 INAA data for the <0.063 mm till fraction

Sample	Material	Au ppb	Ag ppm	As ppm	Ba ppm	Br ppm	Ca %	Co ppm	Cr ppm	Cs ppm	Fe %	Hf ppm	Hg ppm	Ir ppb	Mo ppm	Na %	Ni ppm	Rb ppm	Sb ppm	Sc ppm	Se ppm	Sn %
TM-MPB0064	original	10	<5	2.8	430	6.6	4	12	93	2	2.8	6	<1	<5	3	1.9	<24	62	<0.1	11.8	<3	<0.01
00IG0138	duplicate	<2	<5	4.5	500	7.9	4	12	106	2	2.8	7	<1	<5	<1	1.8	<26	53	0.5	11.7	<3	<0.01
Lab standard																						
DMMAS-18-360		578	<5	2450	410	3.9	8	68	130	<1	8.4	2	<1	<5	<1	0.7	<28	38	12.5	20.1	<3	<0.01
DMMAS-18-359		568	<5	2550	400	3.6	9	72	132	<1	8.8	2	<1	<5	2	0.8	<31	40	12.1	20.5	<3	<0.02
DMMAS-18-358		563	15	2450	450	3.3	8	71	140	2	8.5	<1	<1	<5	<1	0.8	<31	38	11.9	20.3	<3	<0.02
DMMAS-18-357		572	<5	2420	380	3.2	9	67	142	<1	8.3	1	<1	<5	2	0.8	<34	59	11.8	19.7	5	<0.02
DMMAS-18-356		554	<5	2470	410	3	8	72	146	3	8.7	2	<1	<5	<2	0.8	236	45	12.7	20.3	<3	<0.02

Appendix E.4 INAA data for the <0.063 mm till fraction

Sr %	Sample	Ta ppm	Th ppm	U ppm	W ppm	Zn ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm	Lu ppm	Mass g
<0.05	TM-MPB0001	<0.5	5.8	<0.5	<1	<50	25.6	43	21	4.6	1.1	<0.5	2.0	0.31	23.68
<0.05	TM-MPB0002	<0.5	5.3	<0.5	3	132	24.6	47	15	4.7	1.0	<0.5	1.6	0.24	17.07
<0.05	TM-MPB0003	<0.5	4.3	1.2	<1	<50	18.9	35	12	3.4	0.9	<0.5	1.5	0.24	19.60
<0.05	TM-MPB0004	<0.5	5.3	1.9	<1	119	23.5	43	15	3.7	0.9	<0.5	1.6	0.24	20.36
<0.05	TM-MPB0005	<0.5	4.2	<0.5	<1	100	20.3	38	15	3.8	1.0	0.7	1.8	0.25	25.86
<0.05	TM-MPB0006	<0.5	5.6	1.3	<1	<50	23.7	49	17	4.5	1.0	<0.5	2.1	0.32	21.74
<0.05	TM-MPB0007	<0.5	4.9	1.6	<1	90	21.5	38	14	3.8	0.8	<0.5	1.5	0.23	25.34
<0.05	TM-MPB0008	1.6	6.9	2.2	<1	109	27.0	141	21	4.6	0.9	0.6	1.8	0.27	22.10
<0.05	TM-MPB0009	<0.5	5.8	2.0	<1	170	19.4	68	18	3.6	1.0	<0.5	1.7	0.26	21.51
<0.05	TM-MPB0010	<0.5	6.5	2.4	<1	148	37.5	67	31	8.0	1.7	<0.5	3.0	0.45	20.85
<0.05	TM-MPB0011	<0.5	4.1	1.4	<1	<50	21.5	45	15	4.2	1.1	<0.5	1.6	0.25	22.05
<0.05	TM-MPB0012	<0.5	6.1	1.5	<1	102	27.4	43	23	4.2	1.1	<0.5	1.9	0.28	22.83
<0.05	TM-MPB0013	<0.5	3.9	1.9	<1	124	19.8	39	14	3.5	0.8	<0.5	1.4	0.21	21.45
0.05	TM-MPB0014	<0.5	6.9	2.0	<1	156	21.0	41	15	3.5	0.9	<0.5	1.3	0.20	18.67
<0.05	TM-MPB0015	<0.5	7.1	1.1	<1	85	31.8	54	20	5.0	1.4	<0.5	2.0	0.31	19.58
<0.05	TM-MPB0016	<0.5	7.1	2.3	<1	102	37.1	69	25	5.5	1.3	<0.5	2.0	0.30	23.11
0.05	TM-MPB0017	<0.5	10.6	2.9	<1	66	45.8	76	29	7.3	1.5	<0.5	1.8	0.26	22.78
<0.05	TM-MPB0018	<0.5	7.6	2.2	<1	103	45.2	85	28	6.4	1.5	<0.5	2.0	0.30	24.17
<0.05	TM-MPB0019	<0.5	4.5	<0.5	<1	<50	22.0	37	18	4.0	1.0	<0.5	1.9	0.30	21.35
<0.05	TM-MPB0020	1.2	6.9	1.7	<1	<50	23.5	72	16	3.9	1.0	<0.5	1.6	0.28	23.22
<0.05	TM-MPB0021	1.1	3.7	<0.5	<1	<50	17.8	34	13	3.2	0.9	<0.5	1.4	0.22	24.07
<0.05	TM-MPB0022	<0.5	4.2	1.2	<1	<50	21.8	35	14	3.6	0.9	<0.5	1.7	0.24	28.42
<0.05	TM-MPB0023	<0.5	5.4	2.0	<1	304	29.7	51	24	5.8	1.3	0.6	2.2	0.34	26.49
<0.05	TM-MPB0024	<0.5	5.3	1.4	<1	57	16.9	41	13	2.8	0.7	<0.5	1.3	0.19	25.42
<0.05	TM-MPB0025	<0.5	4.7	1.1	<1	<50	20.5	40	14	3.5	0.9	<0.5	1.7	0.25	22.38
<0.05	TM-MPB0026	<0.5	4.0	2.0	<1	62	16.5	44	12	3.2	1.0	<0.5	1.5	0.24	25.40
<0.05	TM-MPB0027	<0.5	5.6	1.9	<1	<50	20.5	57	18	4.0	1.1	<0.5	1.7	0.25	25.88
<0.05	TM-MPB0028	<0.5	4.8	1.8	<1	109	27.4	47	17	4.6	1.0	0.6	1.8	0.27	25.29
<0.05	TM-MPB0029	<0.5	5.6	3.2	<1	104	17.7	38	9	3.3	1.0	<0.5	1.7	0.25	25.07
<0.05	TM-MPB0030	0.8	4.2	1.7	<1	107	15.2	33	11	2.9	0.8	<0.5	1.4	0.21	27.81
<0.05	TM-MPB0031	1.1	4.9	2.2	<1	99	16.6	57	14	3.0	0.7	<0.5	1.5	0.24	27.92
<0.05	TM-MPB0032	<0.5	5.4	1.7	<1	80	26.1	48	20	4.1	1.0	<0.5	1.9	0.28	25.02
<0.05	TM-MPB0033	<0.5	5.8	2.6	<1	135	24.4	51	17	4.0	0.9	<0.5	1.8	0.26	26.76
<0.05	TM-MPB0034	<0.5	6.7	2.2	<1	115	30.2	97	18	4.8	1.2	<0.5	1.7	0.26	24.53
<0.05	TM-MPB0035	<0.5	4.7	1.4	<1	112	18.4	55	12	3.3	0.8	<0.5	1.4	0.22	28.29
<0.05	TM-MPB0036	<0.5	3.9	1.5	<1	121	15.8	34	9	2.9	0.8	<0.5	1.4	0.22	25.30
<0.05	TM-MPB0037	<0.5	5.6	1.0	<1	65	20.5	49	14	3.4	0.8	<0.5	1.8	0.25	26.36
<0.05	TM-MPB0038	<0.5	7.8	1.9	<1	83	35.0	50	23	5.6	1.3	<0.5	2.2	0.34	22.93
<0.05	TM-MPB0039	0.9	8.1	2.5	<1	74	25.0	131	13	3.7	1.0	<0.5	1.8	0.26	24.51
<0.05	TM-MPB0040	1.0	5.9	2.8	<1	109	24.7	61	18	4.1	1.0	<0.5	1.9	0.28	23.49
<0.05	TM-MPB0041	<0.5	3.9	0.8	<1	55	18.8	32	12	3.3	0.9	<0.5	1.5	0.24	26.64
<0.05	TM-MPB0042	<0.5	4.1	2.2	<1	<50	14.1	37	12	2.7	0.8	<0.5	1.5	0.24	25.83
<0.05	TM-MPB0043	1.2	5.7	2.0	<1	<50	34.3	72	28	5.9	1.4	0.5	2.1	0.32	28.38
<0.05	TM-MPB0044	<0.5	4.8	1.3	<1	72	16.2	79	13	2.9	0.8	<0.5	1.7	0.25	29.46
<0.05	TM-MPB0045	<0.5	7.6	2.2	<1	107	19.5	96	11	3.1	0.8	<0.5	1.7	0.26	25.85
<0.05	TM-MPB0046	<0.5	5.9	1.9	<1	98	19.2	57	14	3.1	0.9	<0.5	1.7	0.26	25.11
<0.05	TM-MPB0047	<0.5	5.6	1.9	<1	75	20.5	44	12	3.5	0.9	<0.5	1.8	0.27	25.98
<0.05	TM-MPB0048	<0.5	4.8	1.7	<1	<50	19.2	40	12	3.3	0.8	<0.5	1.7	0.25	26.50
<0.05	TM-MPB0049	<0.5	6.5	2.5	<1	84	20.9	106	16	4.3	1.0	<0.5	2.0	0.30	24.82
<0.05	TM-MPB0050	1.0	7.3	2.1	<1	88	17.2	60	10	2.8	0.8	<0.5	1.4	0.24	21.23

Appendix E.4 INAA data for the <0.063 mm till fraction

Sr %	Sample	Ta ppm	Th ppm	U ppm	W ppm	Zn ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm	Lu ppm	Mass g
<0.05	TM-MPB0051	<0.5	8.3	2.6	<1	104	37.5	85	14	4.6	1.1	<0.5	1.8	0.27	25.02
<0.05	TM-MPB0052	<0.5	5.1	1.9	<1	61	17.9	44	13	2.9	0.8	<0.5	1.4	0.23	25.97
<0.05	TM-MPB0053	1.0	5.4	1.7	<1	<50	18.1	68	14	3.2	0.9	<0.5	1.6	0.24	24.88
<0.05	TM-MPB0054	<0.5	5.1	1.9	<1	92	16.1	29	11	2.9	0.8	<0.5	1.6	0.24	27.69
<0.05	TM-MPB0055	<0.5	5.0	2.2	<1	73	17.4	47	12	2.8	0.8	<0.5	1.5	0.23	26.11
<0.05	TM-MPB0056	1.0	9.0	2.6	<1	112	33.9	144	17	4.4	1.0	<0.5	1.6	0.25	23.28
<0.05	TM-MPB0057	1.0	5.1	1.4	3	97	17.4	96	12	3.3	0.8	<0.5	1.5	0.26	21.45
<0.05	TM-MPB0058	0.7	5.8	2.8	<1	<50	17.6	39	10	3.1	0.9	0.6	1.4	0.25	21.36
<0.05	TM-MPB0059	<0.5	5.7	2.8	<1	51	15.2	50	10	2.9	0.8	<0.5	1.8	0.29	23.36
<0.05	TM-MPB0060	<0.5	8.9	2.1	<1	<50	27.7	81	15	4.5	1.1	<0.5	1.7	0.25	21.69
<0.05	TM-MPB0061	0.9	8.7	2.0	<1	72	23.0	135	14	3.6	0.9	0.9	1.8	0.26	25.01
<0.05	TM-MPB0062	0.9	7.8	2.1	<1	<50	41.5	67	24	6.6	1.4	0.6	2.1	0.33	22.70
<0.05	TM-MPB0063	<0.5	6.9	2.0	<1	58	22.6	56	13	3.8	0.9	<0.5	1.6	0.25	26.88
<0.05	TM-MPB0064	<0.5	5.9	1.1	<1	70	25.3	44	17	4.1	1.0	<0.5	1.5	0.26	21.80
<0.05	TM-MPB0002	<0.5	5.3	<0.5	3	132	24.6	47	15	4.7	1.0	<0.5	1.6	0.24	17.07
<0.05	00IG0123	<0.5	6.3	2.6	<1	62	26.0	49	22	4.8	1.2	<0.5	1.9	0.30	13.96
<0.05	TM-MPB0009	<0.5	5.8	2.0	<1	170	19.4	68	18	3.6	1.0	<0.5	1.7	0.26	21.51
<0.05	00IG0124	<0.5	7.3	2.8	<1	91	22.3	76	13	3.9	1.0	<0.5	1.7	0.29	15.69
<0.05	TM-MPB0020	1.2	6.9	1.7	<1	<50	23.5	72	16	3.9	1.0	<0.5	1.6	0.28	23.22
<0.05	00IG0126	1.4	7.8	1.7	<1	<50	25.4	83	17	3.8	1.1	<0.5	1.9	0.30	18.85
<0.05	TM-MPB0025	<0.5	4.7	1.1	<1	<50	20.5	40	14	3.5	0.9	<0.5	1.7	0.25	22.38
<0.05	00IG0127	1.2	5.6	2.0	<1	51	21.5	40	14	3.3	1.0	<0.5	1.7	0.25	24.68
<0.05	TM-MPB0028	<0.5	4.8	1.8	<1	109	27.4	47	17	4.6	1.0	0.6	1.8	0.27	25.29
<0.05	00IG0128	0.8	5.3	1.5	<1	<50	16.9	40	14	3.0	0.9	<0.5	1.8	0.24	26.07
<0.05	TM-MPB0035	<0.5	4.7	1.4	<1	112	18.4	55	12	3.3	0.8	<0.5	1.4	0.22	28.29
<0.05	00IG0130	0.7	5.7	1.1	<1	<50	20.2	60	13	3.3	1.0	<0.5	1.8	0.22	27.12
<0.05	TM-MPB0040	1.0	5.9	2.8	<1	109	24.7	61	18	4.1	1.0	<0.5	1.9	0.28	23.49
<0.05	00IG0131	0.8	7.0	2.4	<1	84	26.7	65	20	4.3	1.2	<0.5	1.9	0.31	18.85
<0.05	TM-MPB0045	<0.5	7.6	2.2	<1	107	19.5	96	11	3.1	0.8	<0.5	1.7	0.26	25.85
<0.05	00IG0132	1.3	7.7	1.9	<1	<50	18.9	97	15	3.2	1.0	0.7	1.9	0.25	23.39
<0.05	TM-MPB0050	1.0	7.3	2.1	<1	88	17.2	60	10	2.8	0.8	<0.5	1.4	0.24	21.23
<0.05	00IG0134	<0.5	8.2	2.3	<1	<50	19.3	65	12	2.9	0.9	<0.5	1.6	0.20	15.78
<0.05	TM-MPB0055	<0.5	5.0	2.2	<1	73	17.4	47	12	2.8	0.8	<0.5	1.5	0.23	26.11
<0.05	00IG0135	<0.5	6.0	2.5	<1	<50	19.0	54	13	2.9	0.9	0.7	1.7	0.23	22.61
<0.05	TM-MPB0060	<0.5	8.9	2.1	<1	<50	27.7	81	15	4.5	1.1	<0.5	1.7	0.25	21.69
<0.05	00IG0136	<0.5	9.0	2.3	<1	67	27.5	75	18	4.5	1.1	<0.5	2.1	0.32	20.82

Appendix E.4 INAA data for the <0.063 mm till fraction

Sr %	Sample	Ta ppm	Th ppm	U ppm	W ppm	Zn ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm	Lu ppm	Mass g
<0.05	TM-MPB0064	<0.5	5.9	1.1	<1	70	25.3	44	17	4.1	1.0	<0.5	1.5	0.26	21.80
<0.05	00IG0138	<0.5	6.0	1.8	<1	58	23.5	38	13	4.0	1.0	0.7	1.8	0.26	22.00
<0.05	DMMAS-18-360	<0.5	1.3	<0.5	17	253	12.7	19	12	3.8	1.2	0.8	3.5	0.53	25.88
<0.05	DMMAS-18-359	<0.5	1.4	<0.5	18	277	12.4	21	11	3.9	1.0	<0.5	3.6	0.54	25.42
<0.05	DMMAS-18-358	<0.5	1.2	<0.5	17	269	12.7	20	11	3.9	1.1	0.8	3.6	0.56	25.40
<0.05	DMMAS-18-357	<0.5	1.5	<0.5	17	251	12.2	20	9	3.8	1.2	<0.5	3.6	0.53	25.04
<0.05	DMMAS-18-356	<0.5	1.5	<0.5	17	258	12.3	20	9	3.9	1.0	0.9	3.6	0.53	25.11

Appendix F. Pebble lithology data

Appendix F. Pebble lithology data (frequency %) for the 0.5 to 5.0 mm clast fraction of till

SAMPLE	Felsic - inter. intrusive	Mafic intrusive	Ultramafic intrusive	Gneiss	Meta-sediment	Meta-volcanic	Iron formation	Huronian undifferen-tiated	HURONIAN Arkose	HURONIAN Quartz arenite	HURONIAN Wacke	Palaeozoic carbonate	Kimberlite	Other/ unknown	Total counted
TM-MPB-0001	24.5	16.0			4.5	3.0		2.5		16.0	29.5	2.5		1.5	200
TM-MPB-0002	38.0	11.5	0.5	0.5	8.5	10.5		4.0		19.5	5.0	2.0			200
TM-MPB-0003	5.0	12.0	1.5		4.0	10.0		5.0			2.5	60.0			200
TM-MPB-0004	41.0	8.5			4.0	5.5		15.5	6.0	13.5	6.0				200
TM-MPB-0005	8.5	25.5	1.0		6.5	4.5	0.5	10.0		5.0	32.0	6.5			200
TM-MPB-0006	6.0	11.5	1.0		14.5	2.5		14.0	4.0		37.0	9.0		0.5	200
TM-MPB-0007	10.5	7.0	1.0		5.0	4.0		30.5		4.0	12.5	24.0		1.5	200
TM-MPB-0008	9.0	22.5	0.5		8.0	5.5		6.0		4.0	44.5				200
TM-MPB-0009	22.0	12.5	8.0		15.0	12.5		10.0	3.0	7.5	7.5	1.0		1.0	200
TM-MPB-0010	35.0	31.5	1.5		8.5	8.5		3.0	1.5	3.0	6.5	1.0			200
TM-MPB-0011	19.5	7.0	1.5		8.5	6.5		2.5	4.0	20.0	7.0	23.5			200
TM-MPB-0012	17.5	11.0	0.5		7.0	6.5		8.5		24.0	25.0				200
TM-MPB-0013	5.0	5.0	0.5		9.5	4.0	0.5	2.5	0.5		5.5	67.0			200
TM-MPB-0014	14.5	20.0	1.5		7.5	8.5		20.0		1.5	25.0	1.5			200
TM-MPB-0015	6.0	23.5	1.5		2.5	13.0		35.0	1.5		12.5	4.5			200
TM-MPB-0016		11.0			2.0	4.0		51.5	2.0		27.5	2.0			200
TM-MPB-0017	1.0	7.0			2.0	2.0		82.5	1.0		4.5				200
TM-MPB-0018	1.5	17.5	1.0		5.5	3.0		62.0			9.5				200
TM-MPB-0019	13.7	8.2			13.1	21.9		4.9		1.6	6.0	30.6			183
TM-MPB-0020	19.0	6.5				4.0		37.0	4.0	29.5					200
TM-MPB-0021	4.0	20.5	2.5		4.0	11.5		6.0	0.5		4.0	47.0			200
TM-MPB-0022	0.5	17.0			3.0	2.0		24.5	1.5		15.0	36.5			200
TM-MPB-0023		1.0			1.5	90.5		5.0			2.0				200
TM-MPB-0024	6.3	23.0	1.1		2.3	5.2		48.9	7.5		5.7				200
TM-MPB-0025	6.3	10.1	1.6		47.6	3.2		19.6		10.1	1.6				189
TM-MPB-0026	25.0	11.4	2.1		20.0	4.3		16.4	10.0	5.0	5.7				140
TM-MPB-0027	16.7	19.3			7.8	7.3		18.2	2.1	16.7	12.0				192
TM-MPB-0028	55.5	8.0			17.0	10.5		3.0	3.5		2.5				200
TM-MPB-0029	25.5	13.5			5.0	4.0		37.5	4.0	10.5					200
TM-MPB-0030	12.0	15.5	1.0		5.5	7.5		47.5	4.5		5.5	1.0			200
TM-MPB-0031	6.5	7.5			3.0	14.0		54.5	5.0		7.0	2.5			200
TM-MPB-0032	2.0	20.0				6.0		46.0	2.5		7.5	16.0			200
TM-MPB-0033	5.0	5.0			2.0	5.0		71.0	9.5	2.0	0.5				200
TM-MPB-0034	2.5	3.5			1.0	4.5		79.0	7.0	1.5	1.0				200
TM-MPB-0035	4.0	14.5			1.5	11.5		56.5	10.0			2.0			200
TM-MPB-0036	4.5	21.5			0.5	6.0		66.0	0.5		0.5			0.5	200
TM-MPB-0037	2.0	17.0			0.5	7.0		69.5	2.5			1.5			200
TM-MPB-0038	4.0	7.5	1.5		1.5	5.0		62.0	15.0		2.0	1.5			200
TM-MPB-0039	2.0	16.5			7.5	6.0		52.5	11.0			4.5			200
TM-MPB-0040	2.5	19.5			1.5	4.5	0.5	60.5	4.5		1.0	5.0		0.5	200
TM-MPB-0041	3.5	7.0				2.0		69.0	11.5		0.5	5.5		1.0	200
TM-MPB-0042	19.0	11.5		0.5	9.5	11.0	0.5	43.0	1.5		3.0	0.5			200

Appendix F. Pebble lithology data (frequency %) for the 0.5 to 5.0 mm clast fraction of till

SAMPLE	Felsic - inter. intrusive	Mafic intrusive	Ultramafic intrusive	Gneiss	Meta-sediment	Meta-volcanic	Iron formation	Huronian undifferen-tiated	HURONIAN Arkose	HURONIAN Quartz arenite	HURONIAN Wacke	Palaeozoic carbonate	Kimberlite	Other/ unknown	Total counted
TM-MPB-0043	3.5	29.5			6.0	10.5		42.0	5.5			3.0			200
TM-MPB-0044	4.0	12.0	2.0		7.5	8.0	0.5	52.0	11.5		2.5				200
TM-MPB-0045	6.5	20.5	1.0		4.0	7.0		40.0	5.5	14.0	1.5				200
TM-MPB-0046	10.0	12.5	2.5		7.0	7.5		49.0	6.0	4.0	0.5			1.0	200
TM-MPB-0047	16.0	13.5	0.5		9.5	7.0		37.0	13.0		2.0			1.5	200
TM-MPB-0048	19.5	13.5			17.5	8.5		29.5	9.0		2.0	0.5			200
TM-MPB-0049	48.5	8.0			1.0	5.5		24.5	9.5		0.5			2.5	200
TM-MPB-0050	6.0	10.0			0.5	2.5		77.0	4.0						200
TM-MPB-0051	12.4	12.4			6.5	5.5		49.3	10.9		0.5	0.5		2.0	201
TM-MPB-0052	7.0	12.5	1.0		5.0	7.0		57.5	7.0	0.5	0.5	1.0		1.0	200
TM-MPB-0053	7.0	22.0	1.0		4.5	13.0		45.5	4.0	2.0	1.0				200
TM-MPB-0054	35.0	26.0			5.5	1.0		23.0	5.0	1.0	2.0	1.5			200
TM-MPB-0055	8.0	11.5	0.5		7.0	5.5		55.5	8.5		1.0	2.5			200
TM-MPB-0056	10.0	7.5			5.5	21.0		44.5	9.5	1.0	0.5	0.5			200
TM-MPB-0057	12.5	27.0			17.0	13.0	0.5	20.5	5.0	2.0	2.0			0.5	200
TM-MPB-0058		34.5	2.0		7.0	6.5		42.0	7.5					0.5	200
TM-MPB-0059	27.5	2.0			57.0	6.0		3.5	4.0						200
TM-MPB-0060	3.0	10.5			3.0	6.5		54.0	20.0		1.5			1.5	200
TM-MPB-0061	2.5	12.5			3.0	8.0		59.0	10.5		3.5	1.0			200
TM-MPB-0062	3.0	16.0			3.5	2.5	1.0	66.0	7.0		0.5	0.5			200
TM-MPB-0063	1.5	17.5			2.5	6.5		64.5			6.0	1.5			200
TM-MPB-0064	2.0	11.8			6.6	9.9		34.9	8.6	0.7	1.3	24.3			152
99MPB9015	not counted														
99MPB9017	not counted														
99MPB9029	not counted														
99MPB9030	not counted														
97MPB7834	3.9	0.6	2.4		9.6	6.6						76.7		0.3	335
97MPB7835	6.3	0.4	1.2		31.1	26.1						34.8		0.2	528
97MPB7836	7.4	1.3	3.4		32.8	21.2						33.6		0.3	378
97MPB7837	18.5	1.0	1.0		17.9	17.9						43.6			195
97MPB7838	16.7	1.1	0.6		20.2	31.5						30.0			550