GEOLOGICAL SURVEY OF CANADA

OPEN FILE 3707

Till geochemical signatures associated with gold deposits in the Timmins–Matheson area, Western Abitibi Greenstone Belt, northeastern Ontario

M.B. McClenaghan

1999

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INTRODUCTION

Purpose

The Geological Survey of Canada (GSC) carried out detailed till studies around gold deposits in the Timmins and Matheson areas as part of a regional Quaternary mapping (Paulen and McClenaghan, 1998) and surface till geochemical survey (McClenaghan et al., 1998). Closely-spaced till samples were collected around five Archean lode gold deposits to document their geochemical and mineralogical signatures in till in areas of thin (<3 m) glacial sediments and bedrock outcrop (Davidson-Tisdale, Bell Creek, Hislop Township pit) and areas of thick (>3 m) glacial sediments (Pamour and Night Hawk Lake). The objectives of this study were:

1) to document the nature of gold grain, multielement geochemical and pebble lithological signatures in till associated with the gold deposits;

2) to demonstrate the use of till gold grain and geochemical methods in detecting bedrock gold mineralization in the Timmins area;

3) to compare the effectiveness of different size fractions of till for gold exploration; and

4) to examine the natural geochemical signatures in till around gold deposits from an environmental perspective.

This report contains sample locations and descriptions, geochemical data for the <1.7 mm (-10 mesh) heavy mineral and <0.063 mm (-250 mesh) fractions, gold grain counts, pebble lithology data, textural data and matrix carbonate data for till samples collected around five deposits (Appendices A to F). Data on till mineralogy and from detailed SEM gold grain analysis will be released at a later date.

Location and access

The Timmins area is in northeastern Ontario, centered on latitude 48°28′N and longitude 81°20′W (Fig. 1). The town of Matheson, 60 km to the east, is linked to Timmins by Highway 101. The five gold deposits examined were

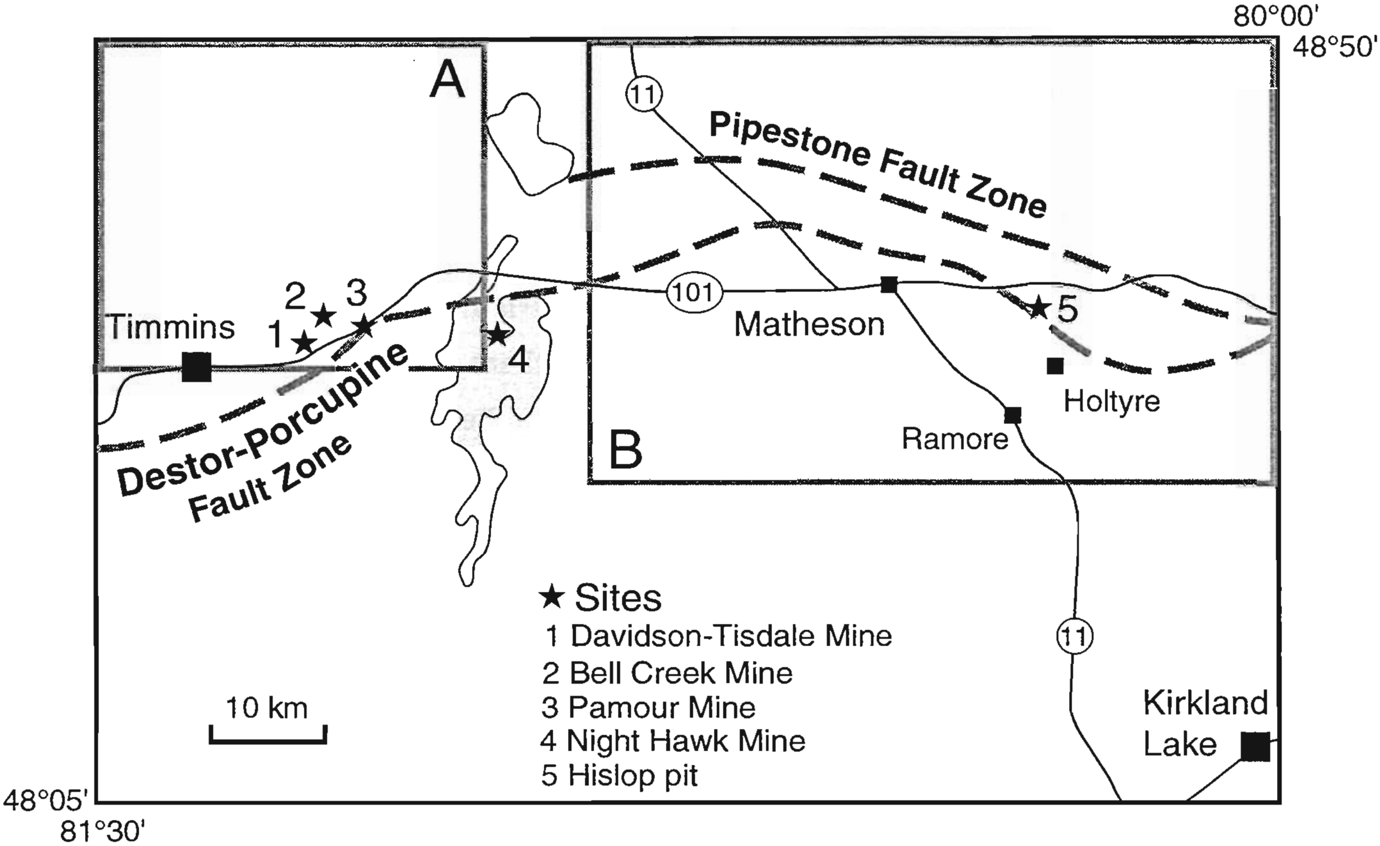

Figure 1. Location of gold deposits studied (sites 1 to 5) and regional till geochemical surveys used to evaluate gold grain and geochemical data: A) Timmins-Kamiskotia, (McClenaghan et al.,1998), and B) Black River-Matheson (McClenaghan,1990).

accessed via roads connected to Highway 101. The Davidson-Tisdale, Bell Creek and Pamour mines are on the east side of Timmins, just north of Highway 101. The Night Hawk Lake Mine is 25 km east of Timmins on the north shore of Night Hawk Lake, and the Hislop pit is 70 km east of Timmins and 15 km southeast of Matheson.

Geology

Bedrock geology

The Timmins and Matheson areas are underlain Archean "granite-greenstone" domain accreted along the southern margin of the Superior Province, referred to as the Abitibi Greenstone Belt (AGB) (Fig. 2). It is dominated by supracrustal and granitoid rocks with a range of ages from 2.75 to 2.67 Ga (Jackson and Fyon, 1991) and include ultramafic, mafic to felsic volcanic rocks, metasedimentary rocks, and ultramafic, mafic to felsic intrusive rocks (Ayer and Trowell, 1998). The Timmins area has been one of the pre-eminent lode gold mining districts in the world for the past 90 years. Gold deposits in the camp are spatially related, in a broad sense, to the east-west trending Destor-Porcupine deformation zone which extends from just west of Timmins towards the Ontario-Quebec border.

Quaternary geology

Regional ice flow patterns

Ice-flow indicators, including striations, grooves, crag and tail features, and flutings indicate a complex sequence of ice flow for the Timmins-Matheson region (Smith, 1992; McClenaghan et al., 1995; Veillette and McClenaghan, 1996). Initially, ice flowed northwest across the area (Phase I in Figure 2) during an early growth phase of the Laurentide Ice Sheet (Veillette, 1995). Ice flow subsequently shifted counterclockwise, to the west-southwest (220° to 240°, Phase II and III) during the main phase of the Laurentide Ice Sheet, and then south (170° to 200°, Phase IV) and finally southeast (160° to 180°, Phase V) and southwest (180 to 200°, Phase V) during the final phases of the ice

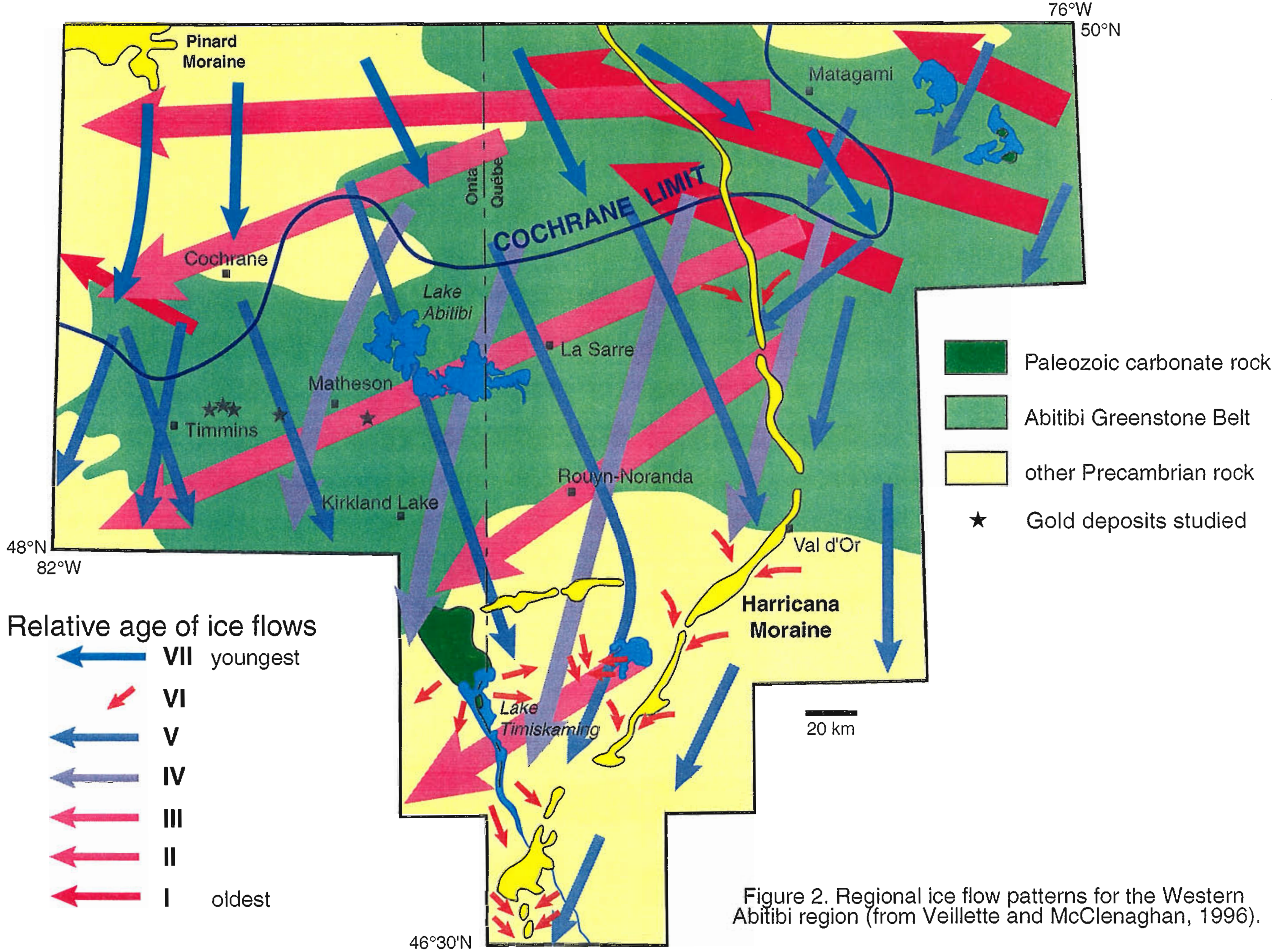

Figure 2. Regional ice flow patterns for the Western Abitibi region (from Veillette and McClenaghan, 1996).

sheet. Surface till sampled in this study was deposited by later stages of ice flow to the south and southeast.

Surficial geology

The initial discovery of gold deposits in the Timmins occurred in areas of abundant bedrock outcrop and thin glacial sediments over bedrock. Much of the region surrounding Timmins has similar bedrock geology and gold potential, but is covered by thick deposits of glacial sediments. Large parts are covered by flat-lying glaciolacustrine silt and clay, deposited in glacial Lake Ojibway near the end of glaciation approximately 8000 years ago (Veillette, 1995). A silty–sand till, known as Matheson Till (Hughes, 1965; McClenaghan, 1992a), occurs in thin pockets around the edges of bedrock outcrops and as thick deposits in isolated patches (Richard, 1983). More commonly, Matheson Till occurs as till sheets beneath the thick deposits of glaciolacustrine clay and silt. It is a carbonate-rich, silty sand till with 15 to 25% carbonate in the matrix (McClenaghan et al., 1998). The pebble fraction is comprised of a mixture of local greenstone belt rocks (Archean metavolcanic, metasedimentary and ultramafic rocks) and more exotic lithologies from immediately north of the greenstone belt (Archean felsic to intermediate intrusive rocks) and from the Hudson Bay Lowlands (Paleozoic carbonate rocks) 200 km to the north. Older tills and associated sediments occur beneath Matheson Till in buried bedrock valleys (Bird and Coker, 1987; DiLabio et al., 1988; McClenaghan and DiLabio, 1995). Only Matheson Till, deposited during the Wisconsinan by ice flowing to the southwest and south-southeast, was collected as part of this study.

Ice-contact and glaciofluvial sand and gravel deposits are contained in north-trending esker ridges. Extensive peat deposits overlie, flat-lying glaciolacustrine sediments in poorly drained areas.

METHODS

Field methods

The GSC collected till samples from five gold deposits in the Timmins and Matheson areas during summer field seasons in 1993 to 1996: 1) Pamour Mine; 2) Davidson-Tisdale Mine; 3) Bell Creek Mine; 4) Night Hawk Lake Mine; and, 5) Hislop Township open pit. Till samples were collected from vertical sections of till exposed in three open pits at the Pamour Mine. Samples were also collected from areas of bedrock outcrop and thin till around the Davidson-Tisdale and Bell Creek mines, from stripped bedrock on the pit floor of the Night Hawk Lake mine during the initial stages of open pit development. The GSC excavated two backhoe trenches north and south of the Hislop Township open pit to collect till samples near the ore subcrop. Sample locations and descriptions are listed in Appendix A. For each sample interval, a 1-kg till sample was collected for geochemistry of the clay+silt fraction and for archiving. Additional 10-kg bulk till samples were collected from selected intervals to recover gold grains and for geochemical analysis of the silt to sand-sized heavy mineral fraction.

Lab methods

Till samples were processed and analyzed geochemically using size fractions and analytical methods that have been commonly used in the past 10 years for regional surveys (e.g. McClenaghan, 1992b; Bajc, 1996) and gold exploration programs (e.g. Harron et al., 1987; Bird and Coker, 1987; Sauerbrei et al., 1987) in the western Abitibi Greenstone Belt.

Sample processing

The 10-kg till samples were processed by Overburden Drilling Management Ltd. (ODM), Nepean, Ontario to recover gold grains and prepare heavy mineral concentrates for geochemical analysis (Sample A- Fig. 3). Weights for each fraction produced during the processing procedure are reported in Appendix B. The >1.7 mm (+10 mesh) material was screened and retained for

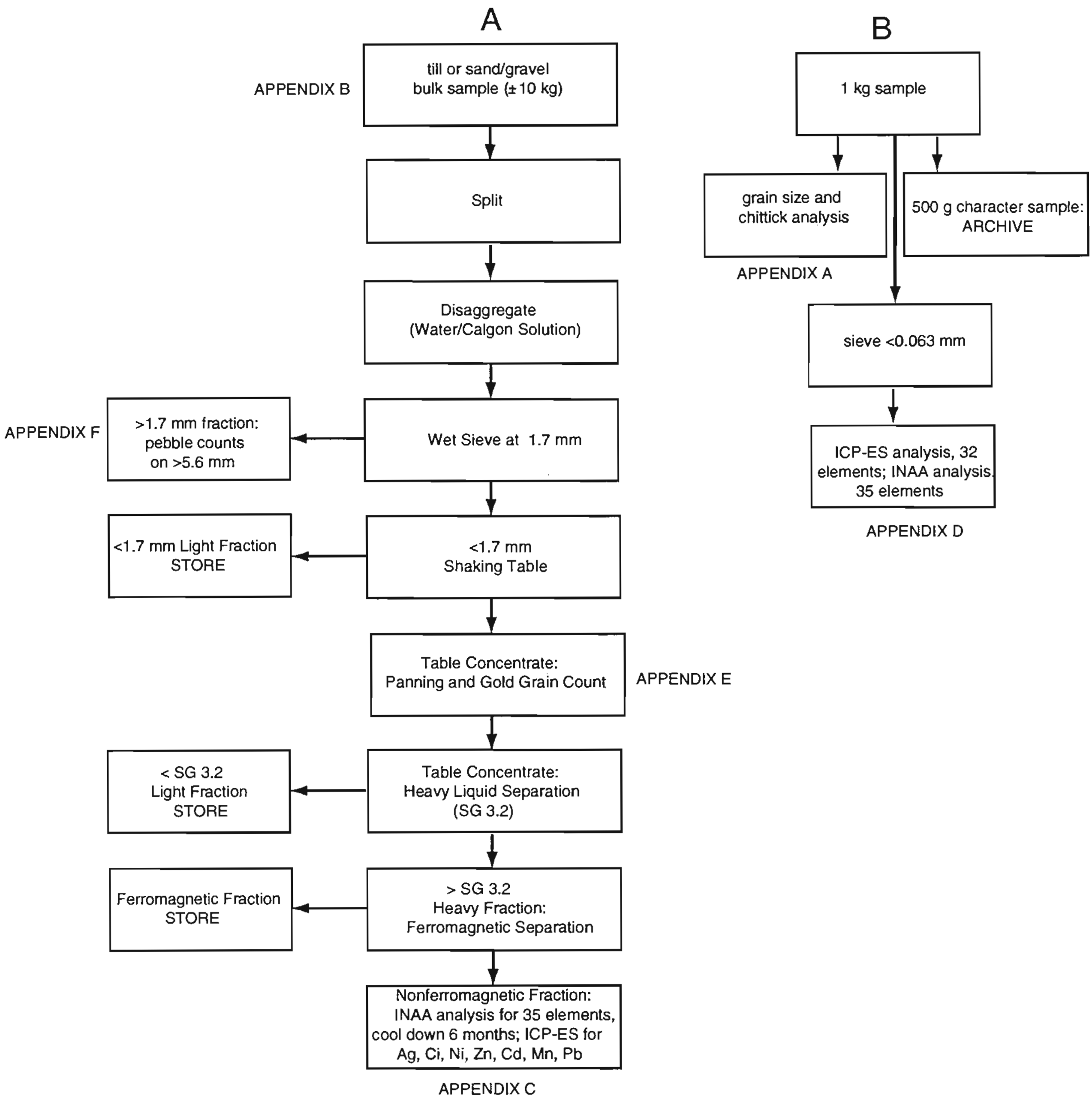

Figure 3. Sample processing flow sheet for: A) recovery of gold grains and a heavy mineral fraction for geochemical analysis; and B) <0.063 mm fraction geochemical analysis. Shaded boxes refer to data in appendices.

pebble lithology classification. The <1.7 mm fraction was processed using a combination of tabling and heavy liquid separation. First, it was passed over a shaking table to obtain a preconcentrate, which was then panned to recover gold grains.

The gold grains were counted and described because the presence of numerous gold grains in the heavy mineral fraction of till is a direct indication of gold mineralization in bedrock. Generally, 10-kg till samples containing more than 5 gold grains are considered to be anomalous in the Timmins-Matheson region (Averill and Huneault, 1991; McClenaghan,1992b; McClenaghan et al., 1998). Grains were classified by ODM using the three morphologic categories of DiLabio (1990) (Appendix E) that reflect increasing distance of glacial transport: pristine, modified and reshaped. 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. Estimated gold assays for each sample were calculated by ODM based on the abundance and size of the gold grains recovered and these values are reported in Appendix E. Gold grain counts were normalized to a 10-kg weight of <1.7 mm (table feed) material in order to compare samples of variable weight. Both measured and normalized gold grain counts are listed in Appendix E but only the normalized counts are discussed in the results below.

After examination, gold grains were returned to the sample and the preconcentrate was further refined using heavy liquid separation using methylene iodide (MI, specific gravity=3.3) to remove the light mineral fraction (S.G. <3.3). The ferromagnetic minerals were then removed from the heavy mineral fraction using a hand magnet and archived, leaving a <1.7 mm non-ferromagnetic heavy mineral fraction for geochemical analysis.

Geochemical analysis

More detailed descriptions of analytical methods, lower detection limits, and analytical quality control results for both the heavy mineral and <0.063 mm fractions are reported in McClenaghan et al. (1998). The <1.7 mm non-ferromagnetic heavy mineral concentrates (Fig. 3-Sample A) were analyzed for 35 elements by Activation Laboratories Ltd., Ancaster, Ontario using instrumental neutron activation analysis (INAA). These data are reported in Appendix C.1. Samples were analyzed by this method because it allows the entire sample to be analyzed without any destruction or loss of heavy minerals. A 1.0 g aliquot of the irradiated heavy mineral fraction was analyzed using aqua regia/inductively coupled plasma-emission spectrometry (ICP-ES) to determine Ag, Cu, Ni, Zn, Cd, Mn and Pb (Appendix C.2).

The 1-kg sample of till (Fig. 3-Sample B) was oven dried at 40° C, sieved to <0.063 mm (-230 mesh) and analyzed by Bondar-Clegg and Company Ltd., Ottawa, Ontario for 34 elements using ICP-ES following a aqua regia digestion. Samples collected in 1993 to 1995 were analyzed for Au by fire assay-direct current plasma emission spectrometry (FA-DCP) on a 30 g aliquot (Appendix D.2). For samples collected in 1996, the <0.063 mm fraction was also analyzed for Au+35 elements by Activation Labs using INAA (Appendix D.1).

Textural and carbonate analysis

Textural and matrix carbonate analyses of till samples were completed at the GSC Sedimentology Lab. The grain size characteristics (% clay, silt and sand) of the <2.0 mm fraction of till were determined using dry sieving and pipette methods. Matrix carbonate content of the <0.063 mm fraction was determined using the chittick method of Dreimanis (1962). Textural and matrix carbonate data are listed in Appendix A.

Pebble lithology analysis

The 5.6 mm to 6 cm (pebble) fraction of till samples was screened from the >1.7 mm (+10 mesh) fraction (Fig. 3). Approximately 300 clasts were examined and classified into eight categories that reflect the major rocks types in the region and to the north: 1) felsic to intermediate intrusive rocks; 2) mafic intrusive rocks; 3) metavolcanic rocks; 4) ultramafic rocks; 5) metasedimentary rocks; 6) Paleozoic carbonate rocks from the Hudson Bay Lowlands; 7) vein quartz; and 8) other or unknown rock types. Abundances for each lithological category were converted to number percent, so that data for each sample total 100%. Abundances are listed in Appendix F.

Data interpretation

Till geochemical signatures of gold deposits in this study were evaluated by comparing the results to background values defined using the 95th percentile for surface till geochemical surveys conducted in the region (Fig. 1). Samples from deposits near Timmins were compared to data from the regional surface till geochemical survey of the Timmins-Kamiskotia area (McClenaghan et al., 1998). The Hislop Township open pit data were compared to results of the regional till geochemical survey of the Black River-Matheson area (McClenaghan, 1990, 1992b). Threshold values between regional background and anomalous values used in to evaluate the gold data from this study are summarized in Table 1. Note that threshold values for the Timmins area are lower than those for the Matheson area, located farther to the east. These differences are likely due to location within the AGB and to ice flow directions. Background gold content in till is related to the amount of volcanic terrane present up-ice (Averill, 1988). The Timmins area is located in the northwest corner of the AGB whereas the Matheson area is more centrally located within the AGB. Glaciers flowing southwest during the main phase of the Laurentide Ice Sheet (Phases II and III, Fig. 2) crossed a much greater expanse of volcanic terrane up-ice of Matheson as compared to Timmins.

	Timmins	Matheson
Number of gold grains/10 kg sample	5 grains	5 grains
Au in heavy mineral fraction	500 ppb	1500 ppb
Au in <0.063 mm fraction	5 ppb	20 ppb
Reference	McClenaghan et al., 1998	McClenaghan 1990, 1992b

Table 1. Thresholds between background and anomalous gold values for the Timmins and Matheson areas as defined by regional till geochemical surveys

RESULTS

Each deposit and the resulting data will be discussed in a similar format: location and geology, gold grains, till geochemistry and pebble lithologies.

PAMOUR MINE

The Pamour Mine property, owned by Royal Oak Mines Inc., is 15 km east of Timmins in northeast Whitney Township. Deposit geology and production figures reported here were provided by K. Tyler, Chief Mine Geologist (pers. comm, 1998). Gold mineralization occurs north of Destor-Porcupine fault zone at the unconformity between Timiskaming metasedimentary rocks to the south and mafic and ultramafic volcanic rocks to the north (Fig. 4). Gold occurs in quartz-carbonate veins and wall rock. Pyrite is ubiquitous throughout the deposit. Arsenopyrite, sphalerite and galena are associated with gold mineralization in high grade gold zones and where gold is very nuggety. Silver occurs in electrum at an overall gold:silver ratio of 5:1.

The Pamour Mine has been in production since 1936. Three open pits (Fig. 4) access the upper parts of the orebody on the property; 1) the No. 2 pit on the southeast side of Highway 101, mined between 1976 and 1996, with an average ore grade 0.061 oz. per ton; 2) No. 3 pit on the northwest side of Highway 101, mined from 1976 to present, grading 0.059 oz. per ton; and 3) the No. 5 pit, 2 km west of the No. 3 pit mined between 1985 and 1994, grading 0.083 oz per ton. Till samples were collected from thick sections of Matheson Till exposed in the walls of the three open pits. Matheson Till on the Pamour Mine property is a silty-sand till, containing on average, 55% sand, 33% silt and 12% clay in the <2.0 mm fraction and 18% carbonate in the matrix (Appendix A). Till samples collected from the three pits were unoxidized and olive-grey in colour.

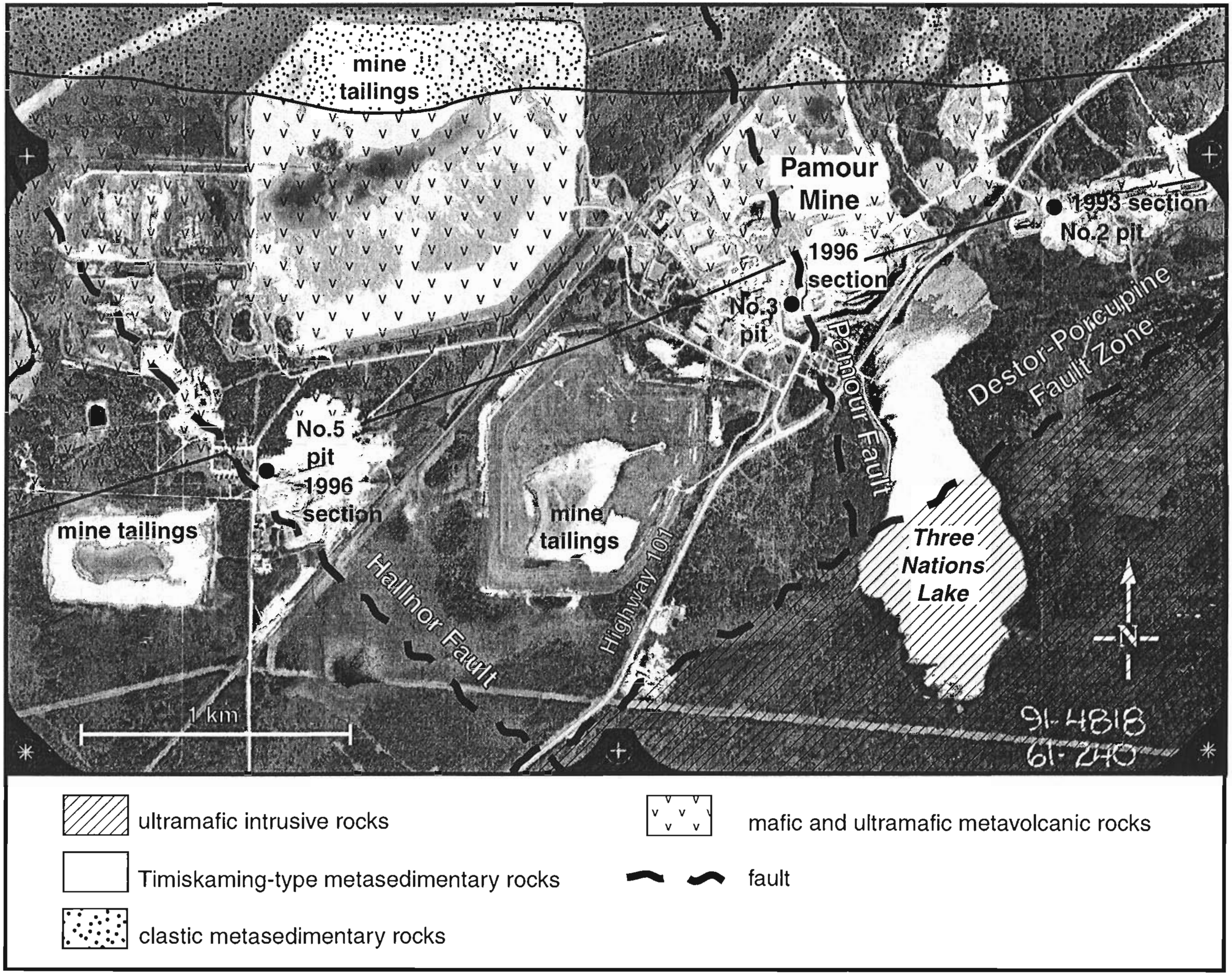

Figure 4. Bedrock geology and location of till sample sites on the Pamour Mine property, Whitney Township.

i) No. 5 pit

No. 5 pit is in an area of thick (>5 m) glacial sediments directly overlying mineralized bedrock. In 1996, samples were collected from a vertical 20 m section of Matheson Till exposed along the west wall of the pit (Fig. 5). Fourteen contiguous 1-kg till samples were collected up the section, starting at 96MPB6080A at the base up to 96MPB6080N collected at 1.8 m below the natural land surface. Six 10-kg till samples were collected from six (6080A, D, G, K, M, N) of the sample intervals (Fig. 5 and 6). Sample depths are listed in Appendix A.

Gold grains

The lowermost till sample (6080A), just above bedrock, is highly anomalous, containing 880 grains in 10 kg of <1.7 mm material. The sample above this is also anomalous, containing 119 grains. Gold grain content decreases exponentially up section to a background concentration of 2 grains at the top of the section (6080N). Approximately 95% of the gold grains in the anomalous till are pristine in shape with reshaped grains becoming more abundant higher in the section. Gold grain size varies from 10 μm to 300 μm, however approximately 70% of the grains are silt-sized (<50 μm) (Fig. 7).

Till geochemistry

The heavy mineral fraction of the lowermost two 10-kg till samples (6080A and D) contains anomalous concentrations of Au, As, Cd, Ag (Fig. 6) and W. In <0.063 mm fraction, the lowermost 8 m of till, samples 6080A to G, contain anomalous concentrations of Au and As (Fig. 6).

Pebbles

Approximately 80% of the pebble fraction of gold rich till directly overlying bedrock consists of local bedrock lithologies (Archean metasedimentary and metavolcanic rocks and vein quartz). Exotic bedrock (Paleozoic carbonate and Archean felsic to intermediate intrusive) content increases up section as gold

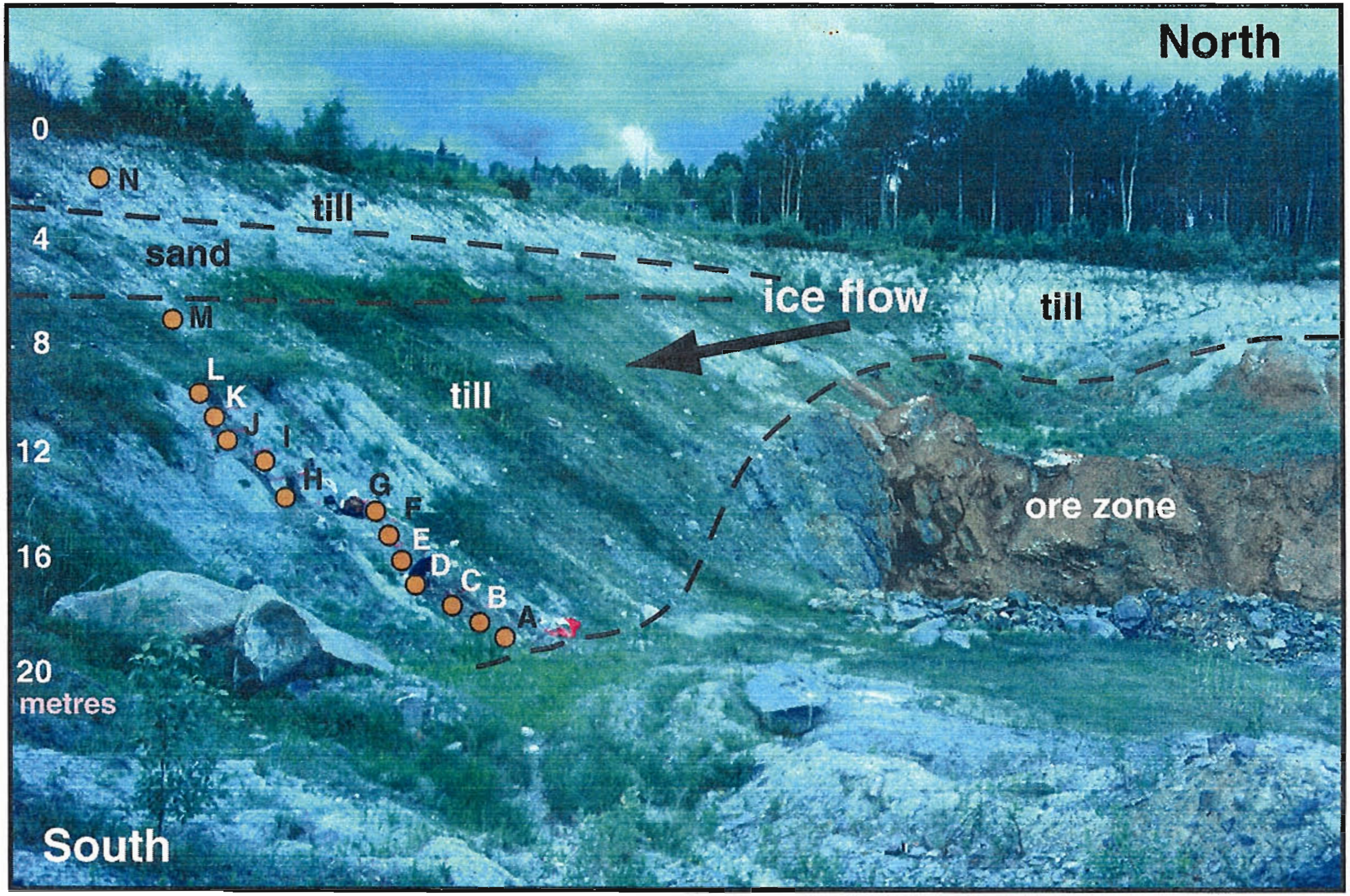

Figure 5. Quaternary stratigraphic section and till sample sites (96MPB6080 A to N) on the west side of the Pamour No. 5 pit.

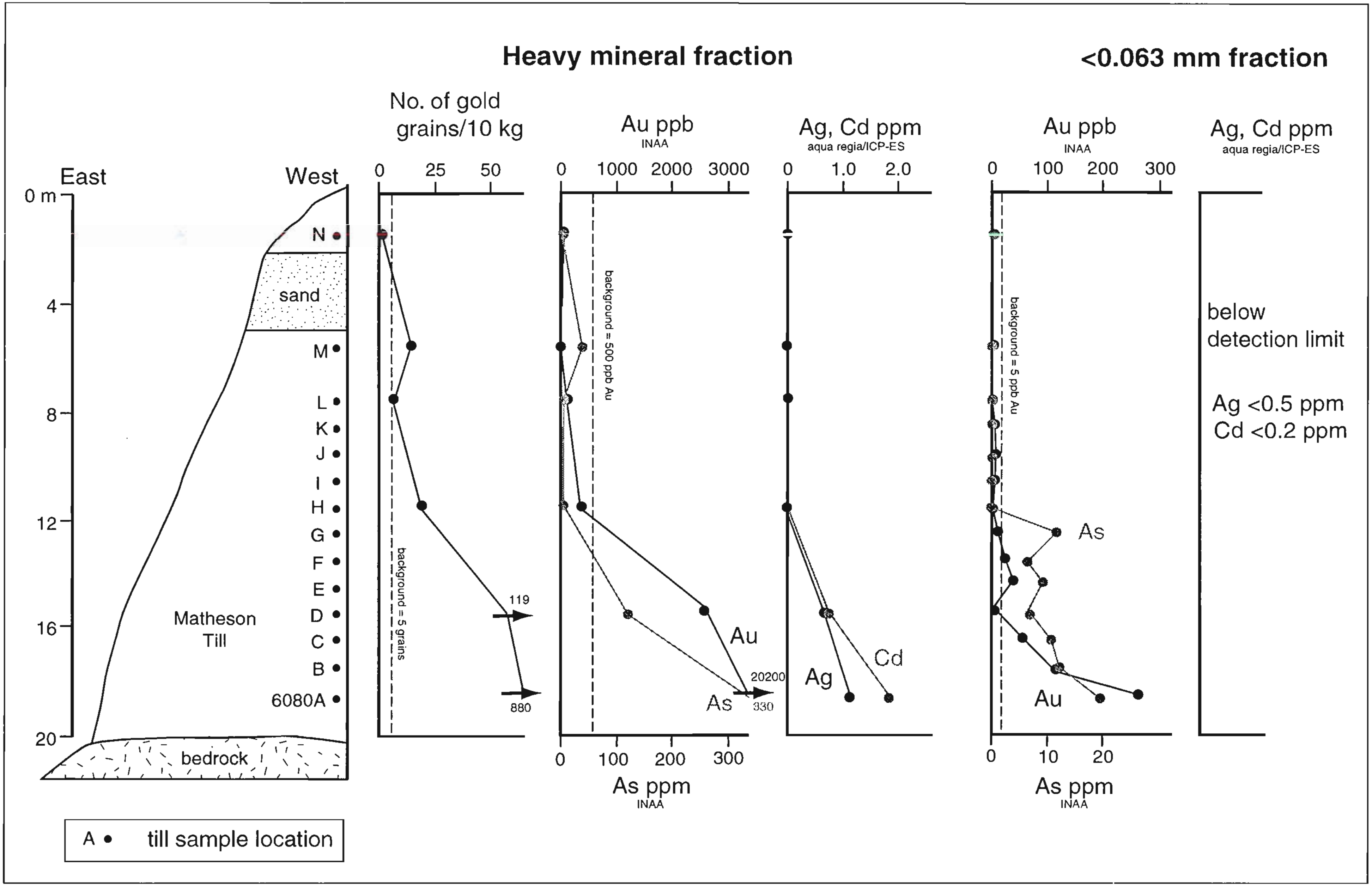

Figure 6. Quaternary straigraphic section, gold grain abundance and till geochemistry for till samples 96MPB6080A to N collected in the Pamour No. 5 pit.

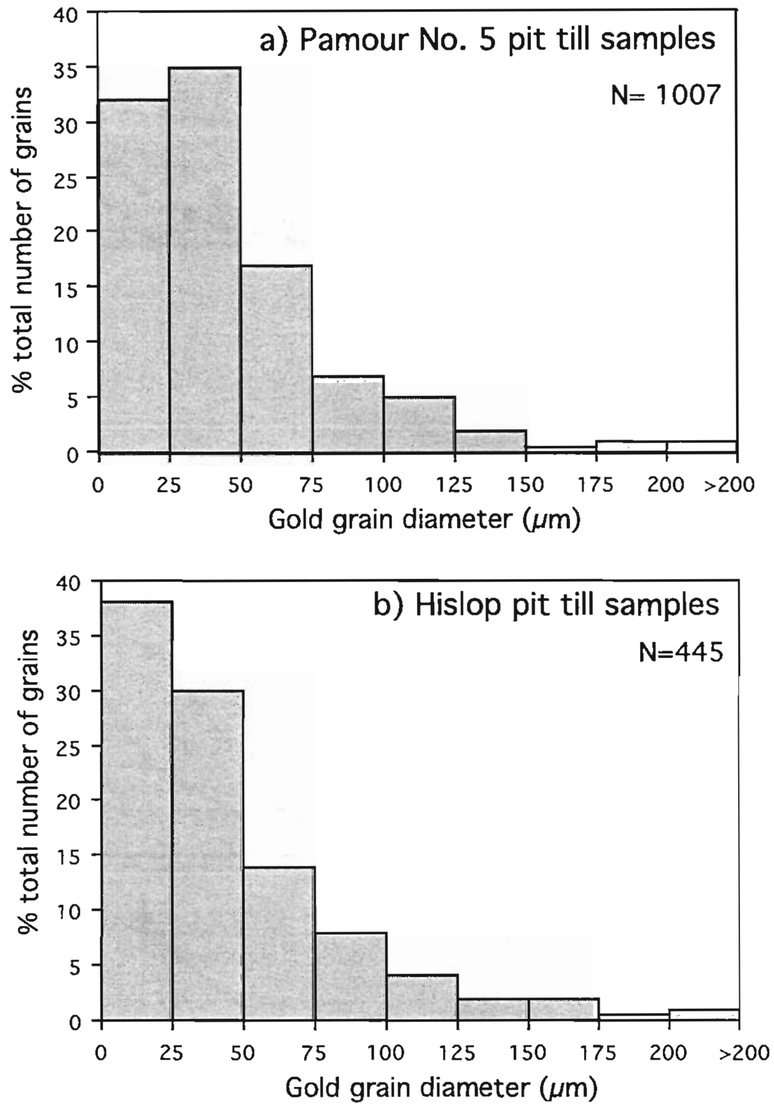

Figure 7. Frequency histogram showing the range of gold grain size (largest dimension) recovered from till at: a) Pamour No.5 pit, and b) Hislop pit.

content decreases, to a maximum of approximately 60% in the uppermost till sample.

ii) No. 3 pit

The No. 3 pit is in an area covered by thick glacial sediments (5 to 15 m). In 1996, till samples were collected from a 9 m vertical section of Matheson Till overlain by 2 m of glaciolacustrine sand in the west end of the pit (Fig. 4). A 1.5 m thick unit of clast-supported, poorly sorted angular rock fragments occurs in the middle of the till unit (Fig. 8). Nine contiguous 1-kg samples (96MPB6069A,B and 96MPB6079A to G) were collected from a vertical transect up the section and two 10-kg samples (96MPB6069A and B) were collected from the upper and lower parts of the till unit (Fig. 8). Sample depths are listed in Appendix A. Striations on bedrock around the edge of the No. 3 pit indicate ice flowed towards 180 to 200°.

Gold grains

Only two bulk samples were collected for gold grain analysis, 6069A and B. Both samples contain background concentrations of gold grains, and the grains are reshaped and small.

Till geochemistry

The heavy mineral fractions of samples 6069A and B have slightly elevated concentrations of As (60 ppm) and Cd (1.0 ppm) as compared to the regional background (As <2 ppm; Cd < 0.5 ppm). The <0.063 mm fraction of two of the nine 1-kg samples contains anomalous concentrations of Au (Fig. 8) and As.

Pebbles

Only 50% of the pebble fraction of samples 6069 A and B is local bedrock lithologies (metasedimentary and metavolcanic rocks and vein quartz). Exotic lithologies (Paleozoic carbonate and Archean felsic to intermediate

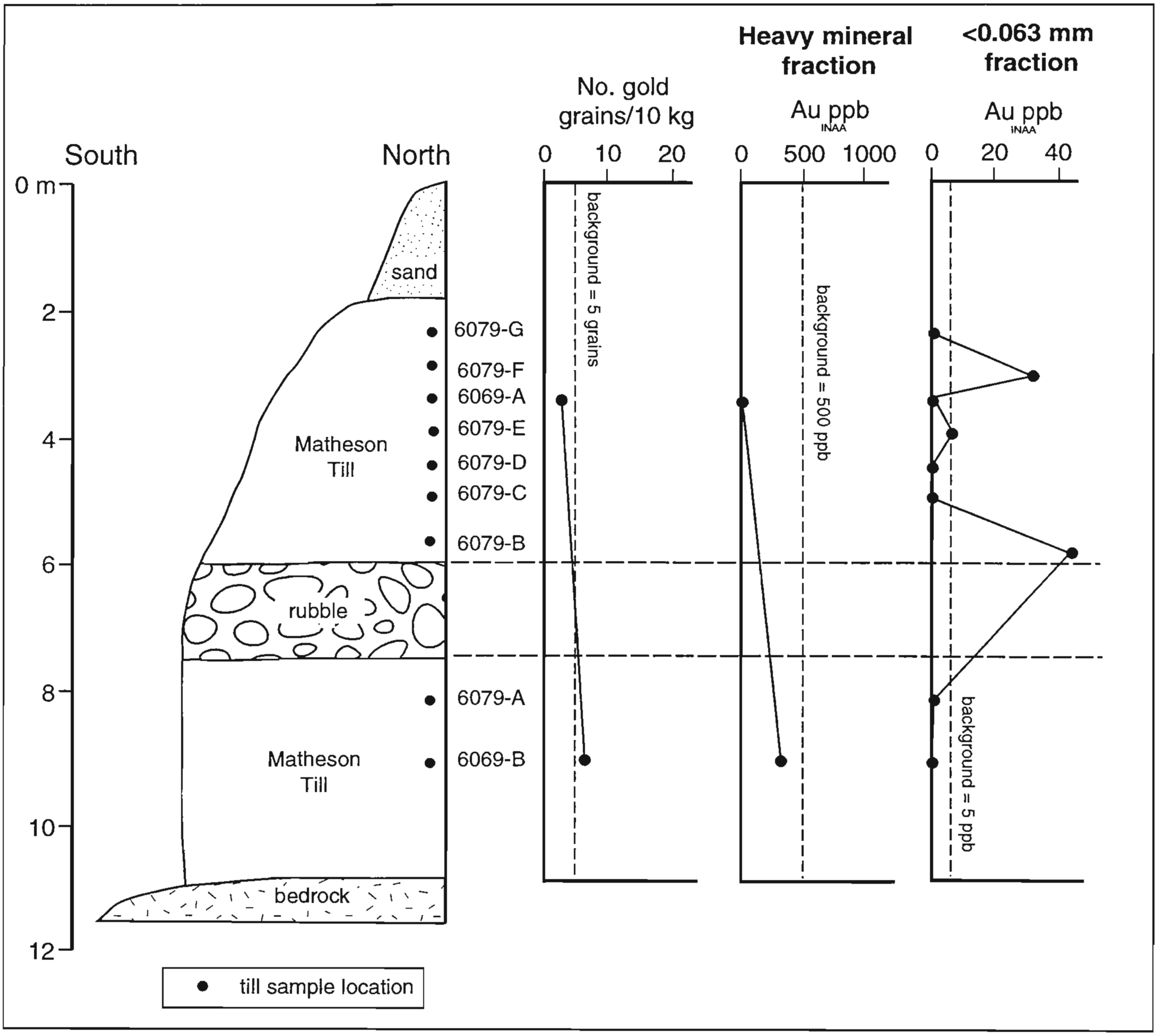

Figure 8. Stratigraphic section, sample locations and concentrations of Au in till samples 96MPB6069A and B and 6079A to G from the Pamour No. 3 pit.

intrusive rocks) comprise the rest of the pebble fraction, indicating that the till here contains relatively low amounts of local material.

iii) No. 2 pit

The No. 2 pit is in an area covered by thick (5 to 10 m) glacial sediments. In 1993, till samples were collected from a 10 m vertical section of Matheson Till overlain by 3 m of varved glaciolacustrine clay in the west end of the pit (Fig. 4). Both 10-kg and 1-kg sample were collected from five intervals along a vertical transect up the section (Fig. 9), from 93MPB425 at the base to 93MPB429 at the top of the till unit. Sample depths are listed in Appendix A. Striations on bedrock around the edge of the No. 2 pit indicate ice flowed towards 180°.

Gold grains

Gold grain content varies between 20 grains at the base, to 31 grains in the middle, to 5 grains at the top of the till unit (Fig. 9) Compared to the regional background of 5 gold grains (McClenaghan et al., 1998), the lowermost four samples are all moderately anomalous. Gold grains display a mixture of reshaped, modified and pristine shapes (Appendix E). Grain size varies from 15 μm to 175 μm, however most are grains silt-sized (<50 μm).

Till geochemistry

The heavy mineral fraction of five till samples was not analyzed. The highest Au concentration in the <0.063 mm fraction is in sample 93MPB427, which contains a slightly anomalous 14 ppb as well as the highest number of gold grains (Fig. 9).

Pebbles

Approximately 75% of the pebble fraction of till directly overlying bedrock consists of local lithologies (metasedimentary & metavolcanic rocks and vein quartz). Exotic bedrock (Paleozoic carbonate and felsic to intermediate

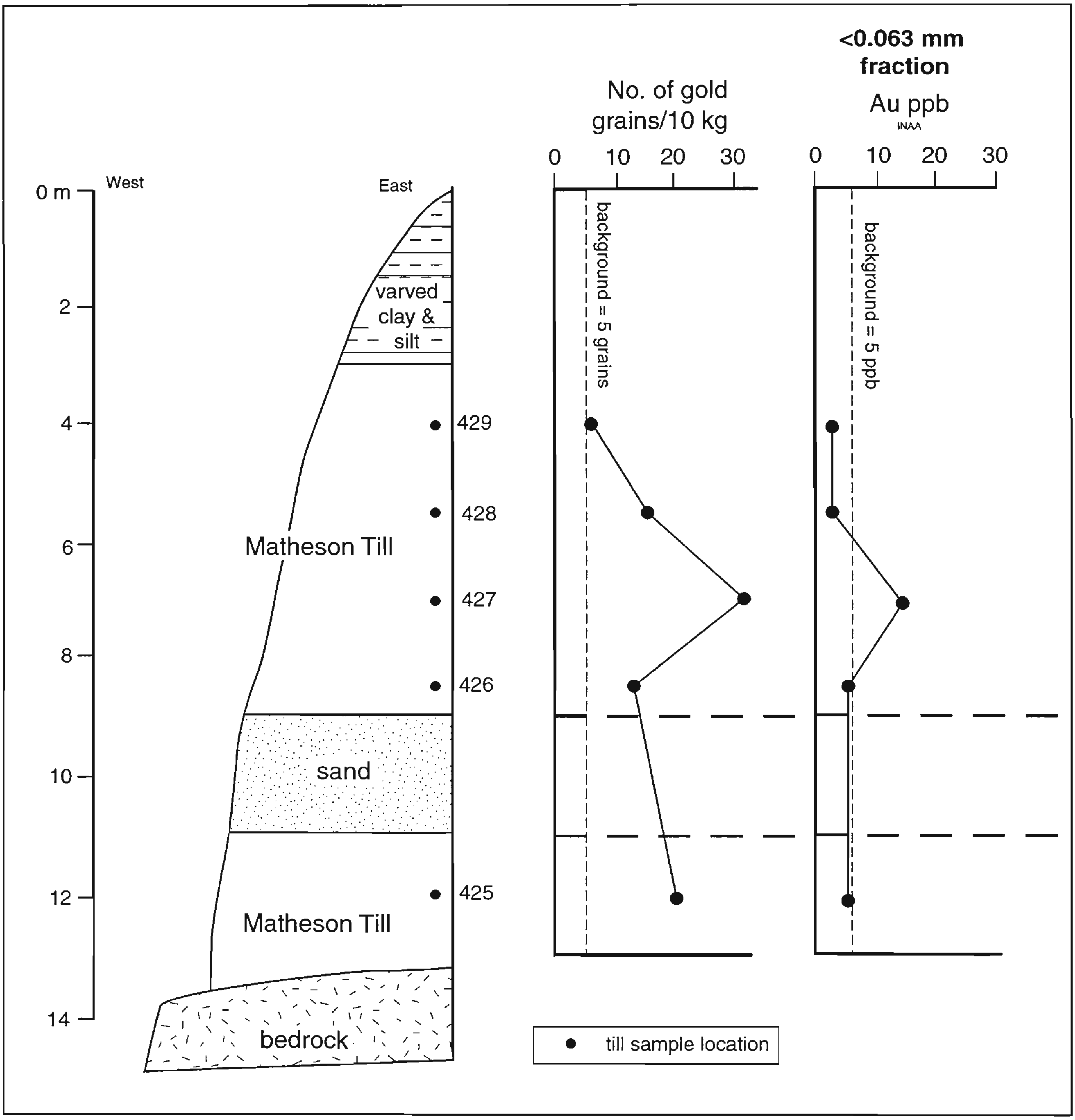

Figure 9. Stratigraphic section, sample locations and gold concentration for till samples 93MPB425 to 429 from the Pamour No. 2 pit.

intrusive rocks) content increases up section, such that 50% of the clasts in the uppermost sample are exotic.

Conclusions for the Pamour property

Till samples from the Pamour Mine property were collected in areas of thick (5 to 20 m) drift. Overburden drilling would be needed to collect similar till samples had the pits not been excavated. The geochemical and gold grain response in till from the three pits represents a continuum from highly anomalous in the No. 5 pit to background in the No. 3 pit. Till overlying bedrock in the No. 5 pit is closest in composition to its main bedrock source. Gold grains counts are the highest here and approximately 98% of the grains are pristine. Till samples from the No. 2 pit have moderately anomalous gold concentrations and the gold grains are a mixture of reshaped to pristine grains. Till from the No. 3 pit contains only background gold concentrations and the few gold grains that were recovered are mostly reshaped. The geochemical response in the heavy mineral and <0.063 mm fractions of till from the No. 5 and No. 2 pits display similar patterns, in that the same samples have anomalous concentrations in both fractions. The heavy mineral fraction anomalies have much greater contrast with background and include other trace elements. Gold grains in till from the Pamour property are fine grained; approximately 70% of the grains are <50 µm.

The gold content of the till overlying the deposit in the No. 5 pit is so high (20200 ppb Au in the heavy mineral concentrate) that the till could have been mined as ore. Elevated levels of As, Sb, Zn, Cd in the heavy mineral fraction from the No. 5 pit indicates that sulphide minerals are present. The No. 5 pit contains the highest As concentrations (330 ppm) in till of the five deposits studied. High Au concentrations are accompanied by high As, indicating gold is strongly associated with arsenopyrite in this sediment-hosted ore zone.

DAVIDSON-TISDALE MINE

The Davidson-Tisdale property is on the east side of Timmins, just north of the town of South Porcupine, in southwest Tisdale Township. Gold mineralization is hosted in mafic metavolcanic rocks, mostly in quartz veins. The deposit was mined from 1918 to 1920 and in 1988 (Piroshco and Kettles, 1991; Luhta et al., 1989, 1996). The area is dominated by abundant bedrock outcrop and thin glacial sediments (Richard, 1983). Bedrock striations on outcrops on the property indicate that ice flowed south and southeast. At five sites (Fig. 10), 1-kg and 10-kg samples of moderately oxidized grey-brown till were collected beside bedrock outcrops (96MPB6073, 6074, 6075, 6076, 6091). Sample locations and depths are listed in Appendix A.

Gold grains

Gold grain content varies between background concentrations of grains in samples 6073 and 6076 and an anomalous concentration of 50 grains in sample 6075. Most gold grains in sample 6075 are pristine in shape. Grain size varies from 10 µm to 175 µm in the five till samples, however the majority of gold grains are silt-sized (<50 µm) (Appendix E).

Till geochemistry

Although, sample 6075 contains a high concentration of gold grains (50 grains in 10-kg sample), the grains are so small that the predicted and Au actual concentrations determined by geochemical analysis are very low (289 and 487 ppb). All other element concentrations in the heavy mineral and <0.063 mm fractions are well below the regional threshold values.

Pebbles

Till around the Davidson-Tisdale mine contains on average, 30% metavolcanic rocks, 25% metasedimentary rocks, 30% felsic to intermediate intrusive rocks and 5 % Paleozoic carbonate rocks. Till sample 6075, which contains the most gold grains and the highest Au concentration in the heavy

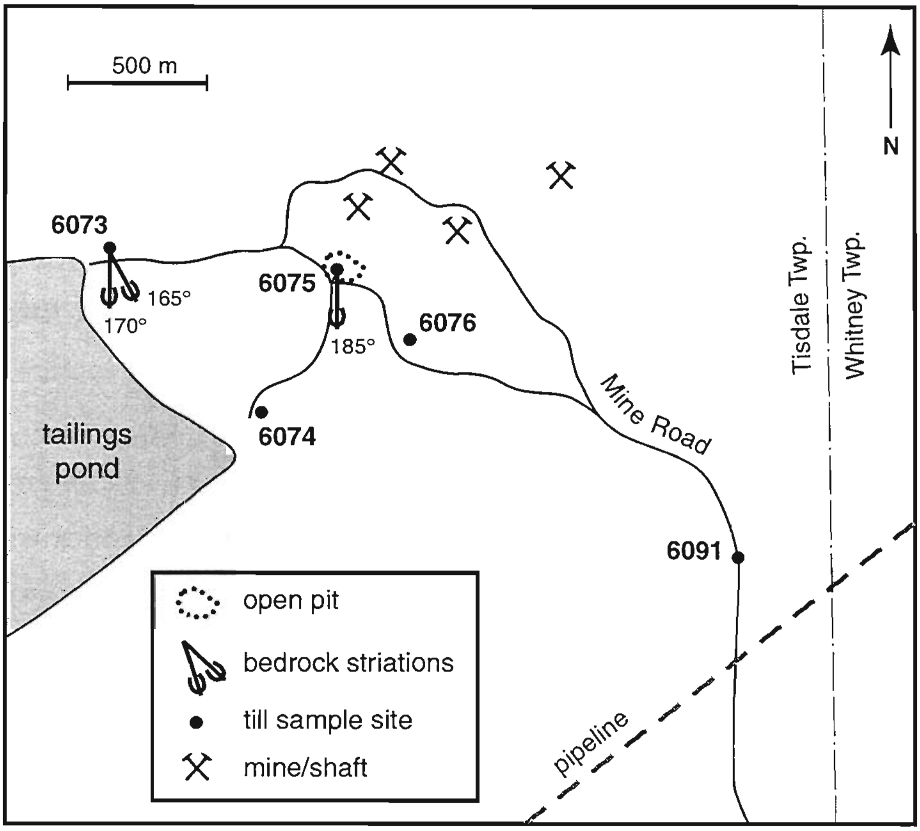

Figure 10. Location of till sample sites on the Davidson-Tisdale mine property.

mineral fraction, contains the highest amount (40%) of local metavolcanic bedrock clasts.

Conclusions

Results from surface till samples spaced 500 to 1000 m apart indicate the presence of gold mineralization on the thinly drift-covered Davidson-Tisdale property. Abundant gold grains in sample 6075 certainly identifies this area as anomalous, but the gold geochemical response is much more subtle.

BELL CREEK AND MARLHILL MINES

The Bell Creek Mine, owned by Kinross Gold Corp., and the Marlhill Mine owned by Pentland Firth Ventures Ltd., are on the east side of Timmins, north of the town of Porcupine, in southwest Hoyle Township. The geology of the deposits is summarized from Berger (1992). The Bell Creek Mine went into production in 1987 and ceased production in 1991. Gold mineralization occurs well north of the Destor-Porcupine deformation zone, within mafic metavolcanic rocks (Fig. 11). Gold mineralization occurs as visible gold in quartz veins and with sulphides in quartz veins and altered zones within the mafic metavolcanic rocks. Sulphide minerals include pyrite and pyrrhotite with accessory chalcopyrite and arsenopyrite. At the Marlhill deposit, visible gold is rare. Here, gold is associated with sulphide minerals, most commonly with arsenopyrite. Tourmaline is common in both deposits.

Both deposits occur in an area of bedrock outcrop and thin glaciolacustrine sediments and till over bedrock (Richard, 1983). Striated bedrock outcrops on the mine properties (Fig. 12) indicate ice flowed towards 170° and later towards 190° (Fig. 11) (McClenaghan et al., 1995; Veillette and McClenaghan, 1996).

Four moderately oxidized till samples were collected from areas of bedrock outcrop around the mine property (Fig. 11). Sample 96MPB6114 was collected

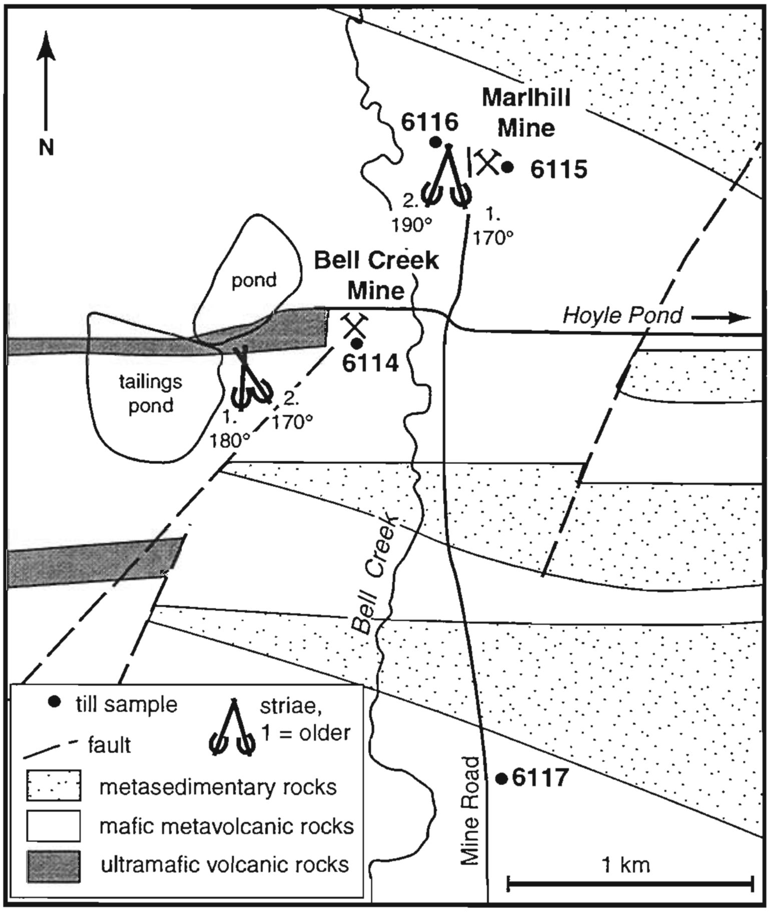

Figure 11. Bedrock geology and till sample locations around the Bell Creek and Marlhill gold mines. Bedrock geology from Berger (1992).

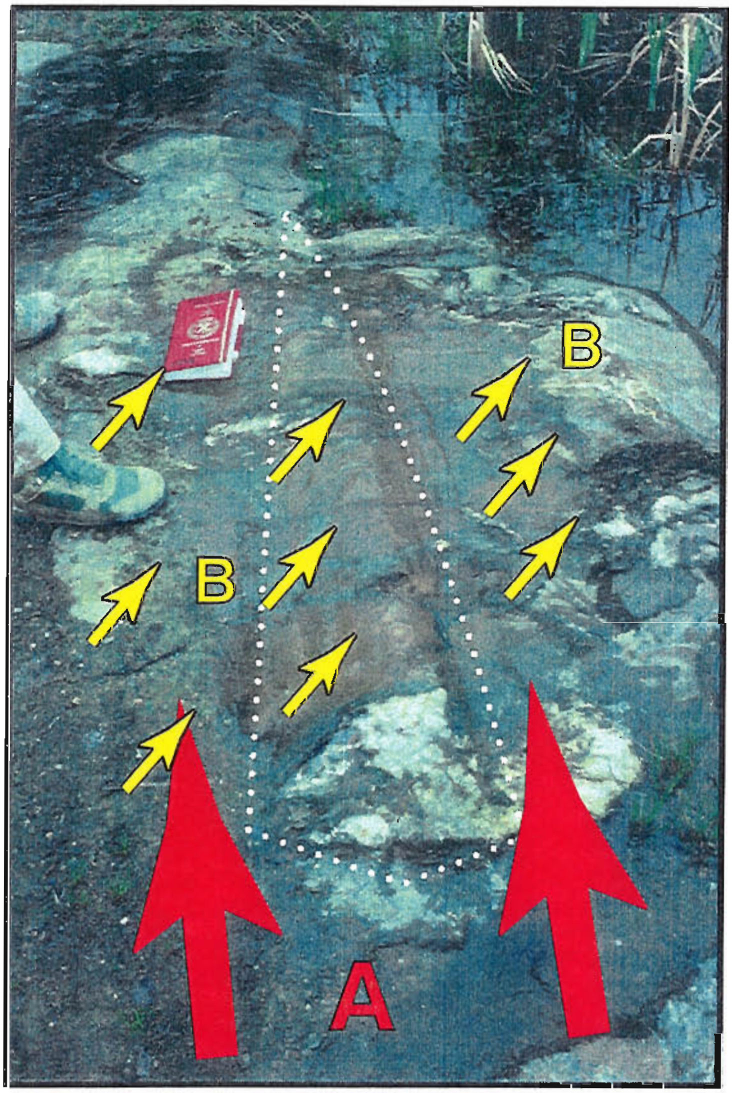

Figure 12. Photo of cross-striated bedrock at till sample site 96MPB6116 on the Bell Creek property: (A) older, southward (170°) ice flow has strongly shaped the outcrop forming crag and tail features (outlined by dashed line) and striations; and (B) younger southwest (190°) ice flow has striated the up-ice side of the tail.

just south of the Bell Creek headframe, 96MPB6115 was collected on the east side of the Marlhill outcrop, 96MPB6116 was taken from a stripped outcrop a few hundred metres northwest of Marlhill and 96MPB6117 was collected 2 km south of the Bell Creek Mine on the mine access road.

Gold grains

All four till samples are anomalous, containing between 12 and 82 gold grains. Grains in samples 6114, 6115 and 6116 are pristine in shape (Appendix E), indicating their close proximity to their bedrock source. Not unexpectedly, gold grains in sample 6117, 2 km south of the mines (Table 2), are less abundant and reshaped. Gold grains vary in size from 10 µm to 400 µm, however 95% of the grains are silt-sized (<50 µm).

Till geochemistry

Of the four till samples, only sample 6116 contains anomalous Au concentrations in the heavy mineral (1140 ppb) and <0.063 mm (26 ppb) fractions (Table 2). Although, sample 6114 also contains a high concentration of gold grains (82 grains in 10-kg, the grains are so small that the predicted and actual concentrations determined by geochemical analysis are very low (170 and 276 ppb). Sample 6116 also contains elevated concentrations of As in the <0.063 mm fraction (33 ppm).

Pebbles

The four till samples display a decreasing abundance of metasedimentary pebbles from north (sample 6116) to south (sample 6117). Approximately 85% of the pebble fraction of sample 6116 consists of local bedrock lithologies (metasedimentary and metavolcanic rocks and vein quartz). The content of exotic bedrock lithologies (Paleozoic carbonate and Archean felsic to intermediate intrusive rocks) is highest in sample 6177, the one with the lowest gold content and the farthest south of the mine.

Sample	No. gold grains/ 10 kg	Au ppb HMC fraction	Au ppb <0.063 mm fraction
96MPB6114	82	276	7
96MPB6115	16	108	<2
96MPB6116	76	1140	23
96MPB6117	12	266	18

Table 2. Comparison of gold grain counts and Au concentration in the heavy mineral and <0.063 mm fractions of till samples from the Bell Creek property.

Conclusions

Till samples collected this site are just a few metres to 2 km down-ice (south) of gold mineralization. Shallow till sampling was a successful method for detecting gold mineralization in this area. Till samples 6114, 6115 and 6116 consist of very locally derived material as indicated by the pebble lithologies and anomalous gold contents. The presence of large quantities of very small gold grains (<50 µm) in the till samples indicate that subcropping gold mineralization contains predominantly fine grained gold. Sample 6114 is an example of a significant gold grain anomaly not accompanied by a Au geochemical anomaly (Table 2) and demonstrates the value of gold grain counting as well as till geochemistry in gold exploration. Elevated As in the <0.063 mm fraction but not the heavy mineral fraction of sample 6116, suggests that the sample likely contained some arsenopyrite that has weathered, leaving As adsorbed onto the clay-sized fraction of till.

NIGHT HAWK MINE

The Night Hawk gold mine, owned by Royal Oak Mines Inc., is 25 km east of Timmins on the south end of the Northern Peninsula on Night Hawk Lake (Fig. 13). The mine was previously known as the Porcupine Peninsular Mine in the 1920's. Open pit mining by Royal Oak Mines Inc. began in 1994 with the excavation of a small open pit and the underground mine has been in production since 1995. Gold mineralization is hosted by altered mafic metavolcanic rocks and is spatially associated with fine grained disseminated pyrite mineralization and associated albite, silica, ankerite and sericite alteration. Minor visible gold is present only in the quartz stringers. The deposit contains 2 to 15 % pyrite (Harvey et al., in press). A total of 59,225 tons were mined from the open pit at an average grade of 0.71 oz Au per ton. Total production from the open pit and underground mine between 1994 and 1998 has been 1,023,397 tons at 0.127 oz Au per ton (P. Coad, pers. comm., 1998).

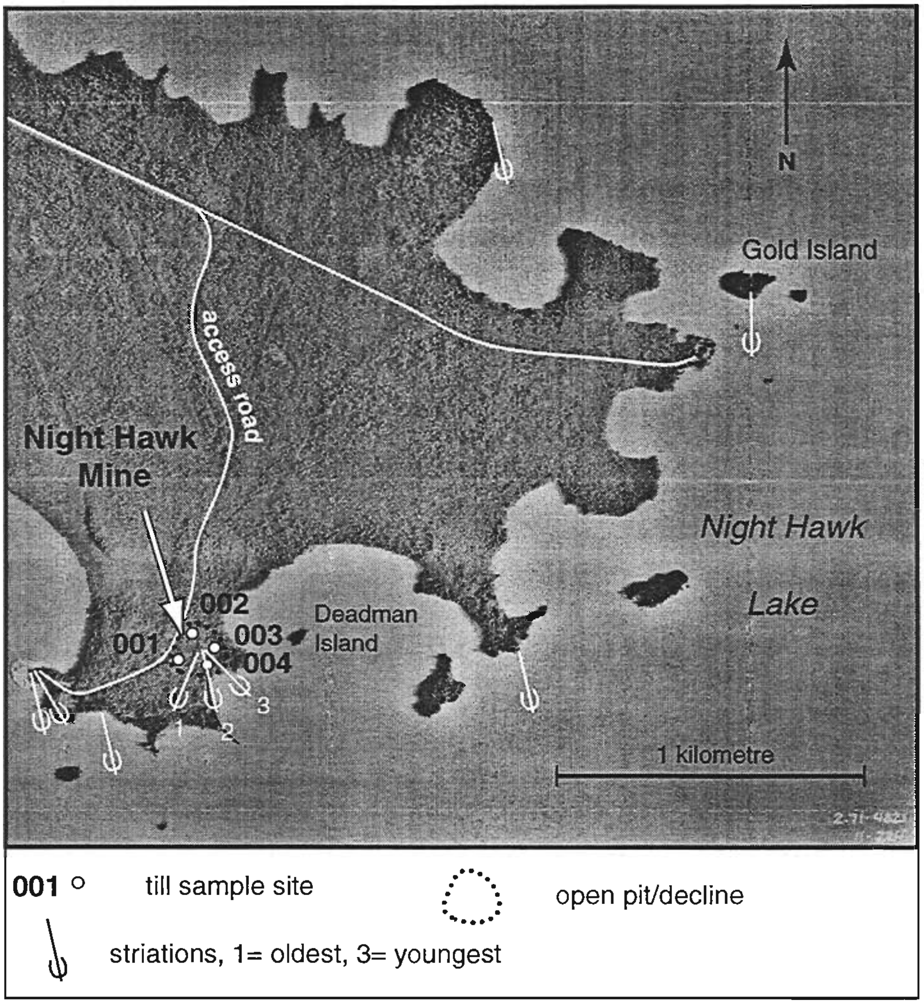

Figure 13. Location of the Night Hawk gold mine and till sample sites.

The deposit is in an area of thick glacial sediment cover (Richard and McClenaghan, 1985) and is overlain by 1 m of Matheson Till and 6 m of varved clay and silt. The bedrock surface exposed on the pit floor in 1994 was well polished and striated at, from oldest to youngest: 1) 225°, 2) 160°, 3) 135°. Bedrock along the nearby shoreline of Night Hawk Lake is well sculpted and striated at 160 to 170° (Richard and McClenaghan, 1985; McClenaghan et al., 1995; Veillette and McClenaghan, 1996). During the early phase of pit development in the summer of 1994, four 10-kg and 1-kg till samples (94MPB001 to 004) were collected from four sites just above bedrock in the pit (Fig. 13). Till samples were unoxidized and olive-grey in colour. Sample descriptions are listed in Appendix A.

Gold grains

All four till samples are only marginally anomalous, containing between 6 and 11 gold grains. Gold grains vary in size from 15 µm to 550 µm, however most grains are silt-sized (<50 µm) (Appendix E). Most grains are reshaped.

Till geochemistry

Three of the four samples contain anomalous (>500 ppb) Au in the heavy mineral fraction. Sample 002 contains an impressive 14,600 ppb Au, considerably more gold in the heavy mineral fraction than predicted using gold grain counts (Appendix E). The much higher concentration is likely due to missed gold grains or "occluded" gold in sulphide minerals. Sample 004 contains considerably less gold than predicted (Appendix E.1) which may be due to loss of gold grains during sample preparation or over-estimation of gold grain size. The heavy mineral fraction of all four till samples from the Night Hawk deposit contains high concentrations of As (90 to 220 ppm), as well as elevated levels of Ag (0.2 to 0.7 ppm) and Cd (0.8 to 1.4 ppm). Elevated concentrations of these elements likely reflect the presence of sulphide minerals in the local bedrock. The <0.063 mm fraction displays no anomalous concentrations.

Pebbles

All four till samples are very similar in pebble composition and contain, on average, 40% metavolcanic rocks, 35% felsic to intermediate intrusive rocks, 9% metasedimentary rocks, 9% Paleozoic carbonate rocks, and 3% ultramafic rocks.

Conclusions

Till samples collected from this site are overlying or just a few metres down-ice (south) of gold mineralization. Heavy mineral fraction geochemistry was successful in detecting the mineralized bedrock. Elevated As in the heavy mineral fraction of till are among the highest detected at the five different gold deposits, and suggests that the local bedrock contains abundant arsenopyrite. The Night Hawk Lake deposit is covered by a thin till unit (1 to 2 m thick) that is overlain by 4 to 8 m of varved clay and silt. The open pit provided an unique opportunity to examine large expanses of well polished and cross-striated bedrock and to collect till samples. Usually, till sampling in this type of area can only be conducted using backhoe trenching or overburden drilling.

HISLOP TOWNSHIP PIT

The Hislop Township gold deposit, owned by Matachewan Consolidated Mines Ltd. and optioned by Royal Oak Mines Inc., is in eastern Hislop Township 70 km east of Timmins. It is 4 km north of the town of Holtyre on the west side of Highway 572 (Fig. 14). In 1995, approximately 40,000 tons with an average Au grade of 0.10 oz per ton, was mined from a small, 40 m wide open pit. Mineralization occurs at the contact between mafic metavolcanic rocks to the north and ultramafic metavolcanic rocks to the south. The ultramafic rocks are altered and contain significant amounts of fuchsite. The deposit lies within the Destor-Porcupine deformation zone (Troop, 1990; Prest, 1955). Visible gold occurs in quartz veins and as inclusions in pyrite.

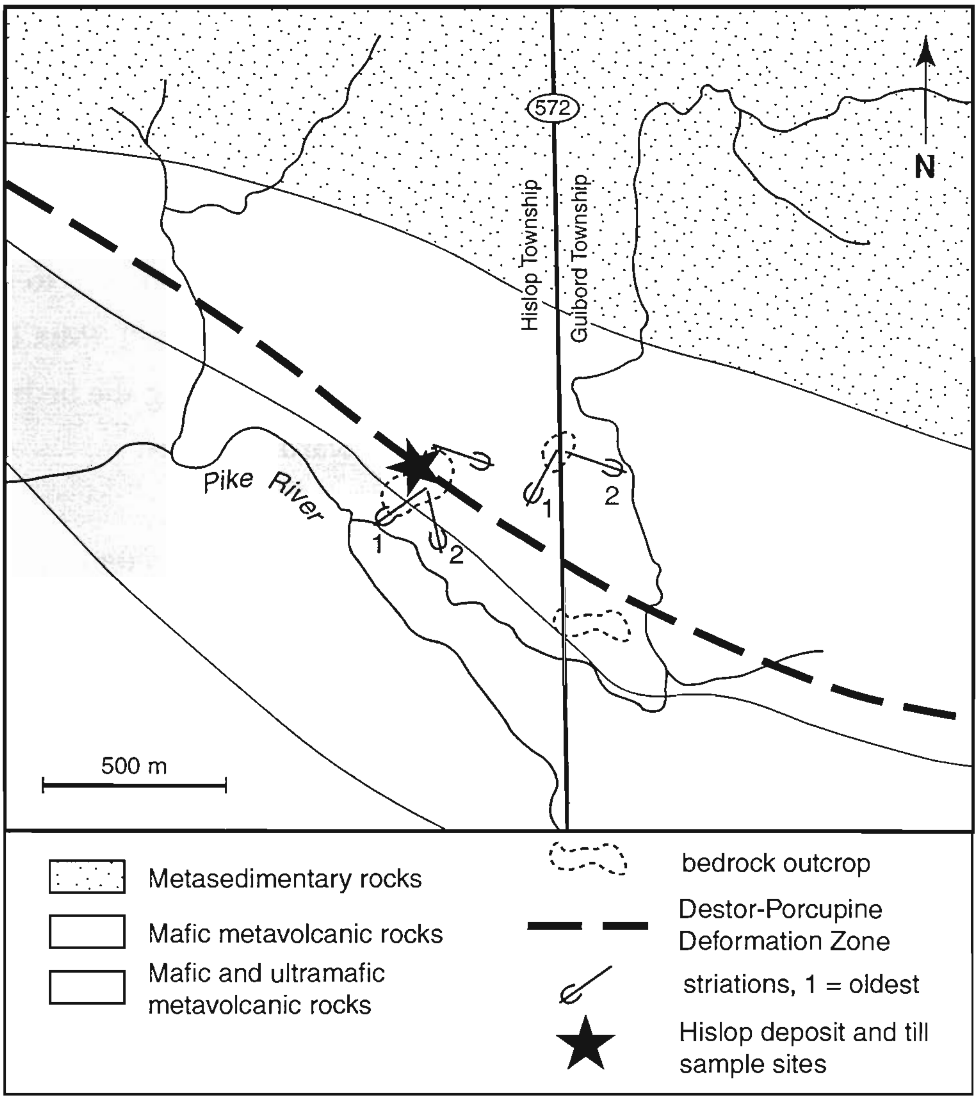

Figure 14. Bedrock geology of the Hislop Township area and location of the gold deposit.

Pyrite is the main sulphide mineral present, with chalcopyrite and galena present in minor quantities. Tourmaline is common and locally abundant.

The Hislop deposit outcrops at surface and is surrounded by thick deposits of glaciolacustrine clay (Vagners, 1984). Silty-sand till overlies bedrock around the flanks of the outcrop and is in turn overlain by glaciolacustrine clay and silt. Till flanking the outcrop is heavily oxidized and weathered to a light brown colour. Bedrock that was stripped prior to mining (and is now mined out), was well sculpted and striated, from oldest to youngest, 1) to the southwest (240 to 260°), and 2) to the southeast (145 to 160°) (McClenaghan et al., 1995; Veillette and McClenaghan, 1996). Till mantling the bedrock outcrop is associated with the most recent southeastward ice flow.

In 1994, two north-trending backhoe trenches were excavated north and south of the mineralized outcrop to collect till samples in areas where the drift is thin (<3 m) (Fig. 15). Ten till samples (94MPB018 to 027) were collected at varying distances south of the ore zone in the south trench, two till samples (94MPB028 and 029) were collected in the north trench and 4 till samples (94MPB014 to 017) were collected from a small section exposed just east of the pit (Fig. 15).

Gold grain and till geochemical data for this site were compared to regional surface till data published by the Ontario Geological Survey for the Black-River Matheson area (McClenaghan, 1990, 1992b). The threshold for anomalous gold grain abundance is 5 grains, and for Au concentration in the heavy mineral and fine fractions is 1500 ppb and 20 ppb, respectively.

Gold grains

Gold grain content in till varies between 4 and 371 grains, and 15 of the 16 till samples contain >5 grains. The highest concentrations are in till samples immediately south (down ice) of the ore zone (Fig. 16). Gold grains vary in

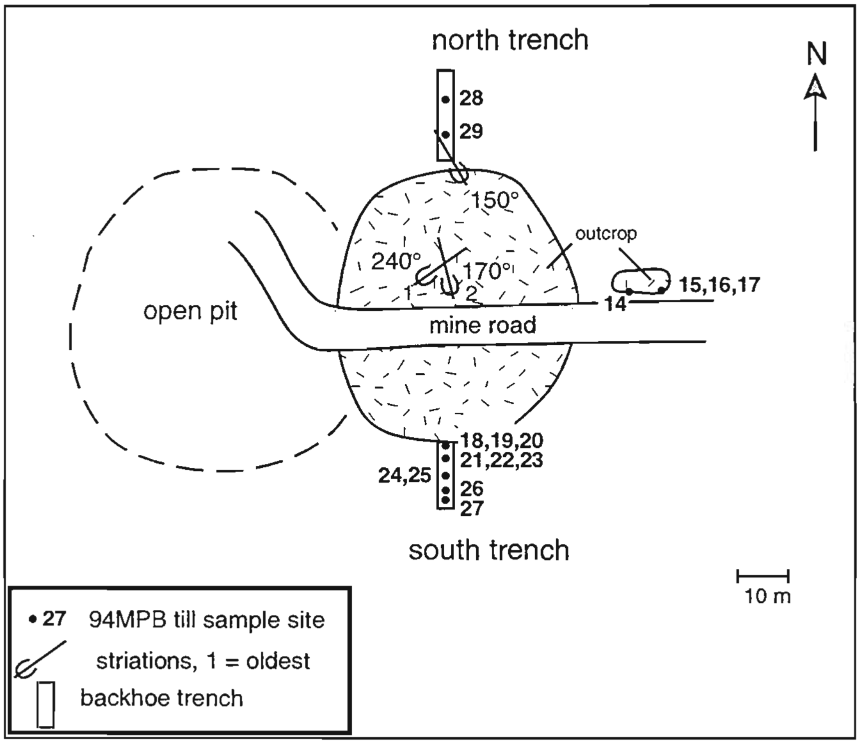

Figure 15. Till sample locations around Royal Oak Mines' Hislop Township gold deposit.

size from 15 to 625 µm, however 70% of the grains are silt-sized (<50 µm) (Fig. 7b). Most grains are pristine (Appendix E) indicating their close proximity to the bedrock source.

Till geochemistry

Gold concentrations in the heavy mineral fraction vary between 256 and 23700 ppb Au. Nine of the 16 till samples contain anomalous (>1500 ppb) Au concentrations. Till down-ice (south) of the ore zone contains significantly more Au than till up-ice (north) (Fig. 16). Anomalous Au values are accompanied by varying combinations of elevated Sb (up to 1.7 ppm), Ag (3.4 ppm), Cd (1.4 ppm), Zn (431 ppm), and Cu (253 ppm) indicating the presence of sulphide minerals in the local bedrock. For 13 of the 16 till samples, the calculated gold assay based on gold grain counts is less than the actual Au concentration determined by INAA (Appendix E.1). The ratio of actual to calculated Au concentration is listed in Appendix E.1, and indicates that the actual gold content is up to 15 times higher than predicted. The calculated gold contents are lower than the actual Au contents because not all of the gold grains recovered were observed and therefore the amount of gold in the sample was underestimated. Not all gold grains were observed due to their small size and because of gold embedded in gangue minerals or weathering products of minerals such as limonite and goethite (S. Averill, pers. comm., 1998).

Five till samples display anomalous gold contents (>20 ppb) in the <0.063 mm fraction, all of which are south of the ore zone (Fig. 16). The highest concentration of Au is an impressive 1324 ppb. No other elements in the <0.063 mm fraction display anomalous concentrations.

Pebbles

Till at this site is comprised mostly of local bedrock, containing on average 70% metavolcanic rocks. Paleozoic clast content is the lowest of the five

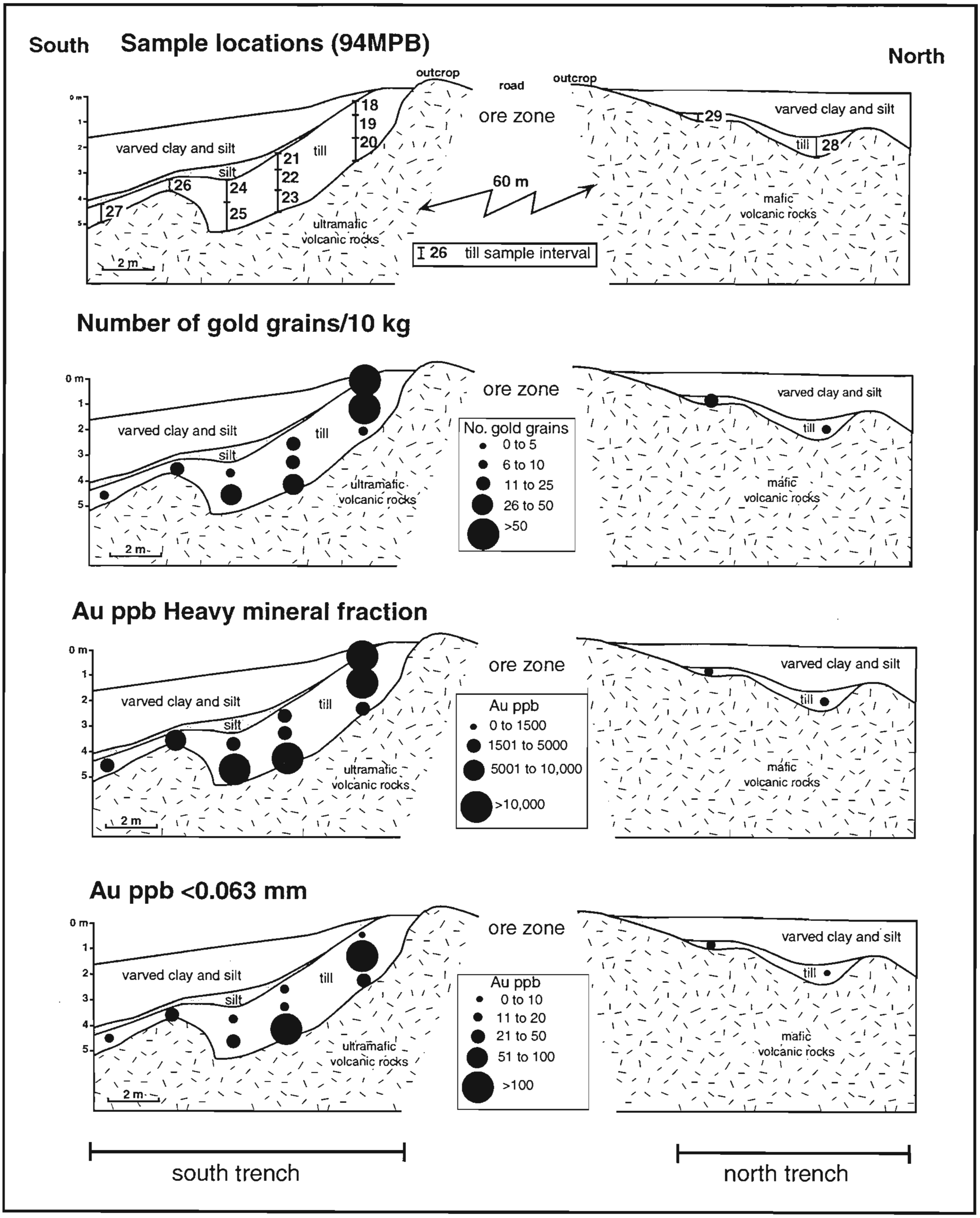

Figure 16. Till sample locations and gold abundance in till north and south of the Hislop Township gold deposit.

deposits, generally <2%. This low abundance is due to a combination of post-glacial weathering of carbonate clasts and the eastward decrease in abundance of Paleozoic carbonate clasts dispersed from the Hudson Bay Lowlands as noted by McClenaghan (1992a) and Veillette and McClenaghan (1996).

Conclusions

Shallow till sampling was a successful method for detecting the gold mineralization in bedrock at this site. Till samples collected are from just a few metres down-ice of gold mineralization. Till is very locally derived as indicated by the presence of large number of local bedrock pebbles and the large concentrations of pristine gold grains. The large quantities of very small gold grains (<50 μm) in the till samples indicate that subcropping gold mineralization contains predominantly fine-grained gold. Anomalous Au concentrations in the heavy mineral fraction of till at the south end of the southern trench indicate that the dispersal train is at least 12 m long and probably longer. Some till samples on the south side of the ore zone contain sufficient gold that they could have been mined as ore.

RESULTS FROM OTHER GOLD DEPOSITS

Heavy mineral concentrates are the most commonly used till fraction for gold exploration in regional geochemical surveys and property-scale surveys in the Abitibi Greenstone Belt (e.g. Gray, 1983; Gleeson and Sheehan, 1987; Bird and Coker, 1987; Harron et al., 1987; Sauerbrei et al., 1987; Averill, 1988; Bajc, 1996) and elsewhere on the Canadian Shield (e.g. Averill and Zimmerman, 1986; Bernier et al., 1995, Chapman et al., 1990; Bajc, 1991; Henderson and Roy, 1995). Bird and Coker (1987) found up to 250,000 ppb Au in the heavy mineral fraction of till overlying the Owl Creek gold deposit, 3 km east of the Bell Creek Mine. Just 1.5 km north of the Bell Creek Mine, Harron et al. (1987) recovered up to 19,000 ppb Au in the heavy mineral concentrates of till overlying mineralized bedrock. The gold grain and geochemical signature in till around the Golden Pond gold deposits in the Casa Berardi area (Sauerbrei et al., 1987) is similar in magnitude to the signature of the Pamour No. 5 pit. At Golden Pond East, the heavy mineral concentrate of till contained up to 700 gold grains, 106,000 ppb Au, and 140,000 ppm As. The Timmins deposits, however, do not contain as much As. In the Cadillac area of western Quebec, heavy mineral concentrates of till down-ice from Doyon gold deposit contained >15,000 ppb Au, and up to 9600 ppb Au in till overlying the Bosquet deposit (Gleeson and Sheehan, 1987).

DISCUSSION

Till samples were collected from five Archean lode gold deposits during mapping of surficial geology and glacial striae. Property visits and subsequent till sampling were constrained by accessibility and time. Till sampling was carried out not to outline individual dispersal trains around each deposit, but merely to detect glacial dispersal. These samples provide insights into the variable magnitude of the geochemical and gold grain signatures of five gold deposits in areas of thick and thin glacial drift. Gold grain and geochemical data for these till samples have been evaluated in the context of regional background values determined by regional till surveys (McClenaghan et al., 1998; McClenaghan, 1990, 1992b).

Each of the five gold deposits has a different gold grain and geochemical signature in till, of which the maximum value for gold grains and Au, As, Ag and Cd are summarized in Table 3. These different signatures are primarily a reflection of the variations in ore grade and composition of the subcropping bedrock. The exceptionally high Au content in the till at the Pamour No. 5 and Hislop Township pits indicate that the subcropping parts of the ore zones on these properties are higher grade. In contrast, one till sample from the Davidson-Tisdale property contains anomalous gold grain concentrations yet displays no geochemical signature of the deposit. These much lower Au concentrations suggest that subcropping part of the mineralization here may be lower grade.

		Heavy mineral fraction					<0.063 mm fraction		Pebble fraction
Deposit	**N**	Gold Grains	Au ppb	As ppm	Ag ppm	Cd ppm	Au ppb	As ppb	% local bedrock
Pamour No. 2 pit	5	31	NA	NA	NA	NA	14	8	75
Pamour No. 3 pit	2/8	6	248	60	<0.2	1.0	41	10	50
Pamour No. 5 pit	4	880	20,200	330	1.1	1.8	250	17	80
Bell Creek Mine	3	82	1140	23	0.8	<0.5	26	33	75
Davidson-Tisdale Mine	4	50	487	<2	<0.2	<0.5	5	6	63
Night Hawk Lake Mine	4	11	14,600	220	0.7	1.4	4	<5	50
Hislop pit	16	371	23,700	43	3.4	1.4	1324	6	80
*regional background Timmins		5	500	<2	<0.2	<0.5	5	5	
**regional background Matheson		5	1500	5	<0.5	NA	20	3	

NA= not analyzed
N= number of samples in heavy mineral/<0.063 mm fractions
*regional background = 95th percentile of regional geochemical data (McClenaghan et al., 1998)
**regional background = 95th percentile of regional geochemical data (McClenaghan, 1990, 1992b)

Table 3. Maximum concentration of gold grains, Au, As, Ag and Cd in the heavy mineral (HMC) and <0.063 mm fractions of till, and local bedrock clasts in till collected around gold deposits in the Timmins area. Anomalous values are shaded grey.

Gold grains as small as 10 µm were recovered routinely from the heavy mineral fraction of till. Most gold grains in the anomalous till samples are silt-sized (<50 µm). This suggests that most gold in these five deposits is also fine-grained. In two cases, anomalous gold gain counts are not accompanied by gold geochemical anomalies. These samples are still considered to be anomalous and indicate the importance of gold grain examination in additional to till geochemistry.

Although most of the gold in the <1.7 mm heavy mineral fraction is silt-sized (<50 µm), the heavy mineral fraction is consistently better than the silt+ clay (<0.063 mm) fraction for indicating Au mineralization at the five deposits. The heavy mineral fraction displays the strongest contrast between background and anomalous concentrations. Till from the Pamour No. 5 pit contained the most gold grains of the five sites, 880 gold grains assaying 20200 ppb Au in the heavy mineral fraction. Till from the Hislop pit contains a similar concentration of gold in the heavy mineral fraction (23,700 ppb), but far fewer gold grains. This difference in gold grain content may indicate that the Pamour No. 5 ore zone contains much more fine-grained gold than the Hislop deposit. The Pearson linear correlation coefficient for Au concentration in heavy mineral versus the <0.063 mm fraction is 0.597 (Fig. 17). Gold concentrations in the <0.063 mm fraction mimic the gold abundances in the heavy mineral fraction, but the contrast between background and anomalous levels in the <0.063 mm fraction is much more subdued.

Arsenic is a common pathfinder element for gold deposits (e.g. Sauerbrei et al., 1987; Kaszycki et al., 1988; Lestinen et al., 1991; Hartikainen and Damsten, 1991). At the five gold deposits studied, As, Ag and Cd are pathfinder elements, but all three elements are not always detectable in till around each deposit. The highest As content in till from the five deposits occurs around

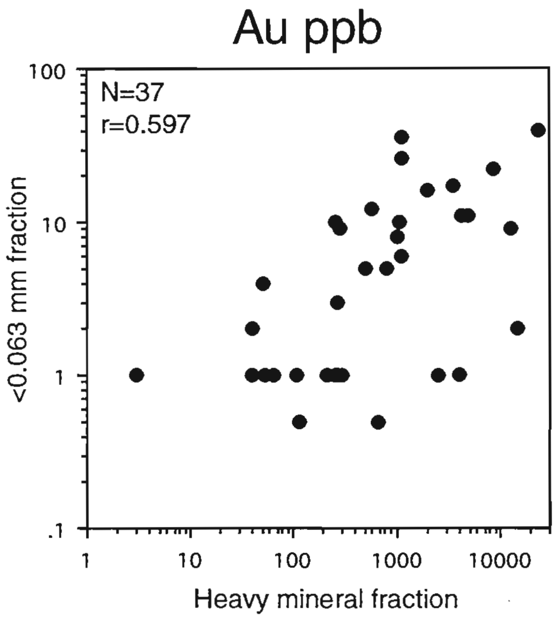

Figure 17. Comparison of gold concentration in the heavy mineral and <0.063 mm fractions of till near gold deposits in the Timmins area.

the Pamour No. 5 pit (330 ppm) and the Hislop Township gold deposit (220 ppm). These high values likely reflect the presence of arsenopyrite in the heavy mineral fraction of till, and hence the deposits. Note that these values although high among the five deposits are much less than As concentrations in till (up to 140,000 ppm) around the Golden Pond East deposit (Sauerbrei et al., 1987). Documenting high As concentrations in till around known gold deposits demonstrates the value of detailed, deposit-scale studies of the chemical composition of local glacial deposits for environmental purposes. These high As concentrations are naturally occurring and were produced by glacial dispersal from mineralized bedrock enriched in As. Ag concentration in till is highest around the Hislop Township deposit (3.4 ppm). Cd in till is slightly elevated around three of the deposits (0.5 to 1.4 ppm), and is likely present in sphalerite. Determining the presence and areal extent of metal-rich tills may also have important implications for understanding groundwater quality in the area and for planning mine site remediation.

Unweathered, grey till was sampled in the Pamour and Night Hawk Lake pits. Till collected at or near the surface around Bell Creek, Davidson-Tisdale and the Hislop Township mines was moderately to highly oxidized/weathered to a mottled grey-brown to brownish orange colour. Weathered till contains few to no sulphide minerals in the heavy mineral fraction (Appendix E) and contains very little carbonate in the matrix fraction (<5 % carbonate by the chittick method or <1.0 % Ca by aqua regia-ICP-AES). Differences in the till geochemical signatures of the deposits, however, is not related to the degree of till weathering.

Examination of the pebble-sized fraction of till provides a simple a visual estimate of the amount of local versus exotic debris in the till. Deposits with strong gold grain and geochemical signatures also contain a high percentage of local bedrock lithologies (e.g. Table 3; Sauerbrei et al., 1987). Till with weak or no gold grain/geochemical signatures such as at the Davidson-Tisdale

Mine and Pamour No. 3 pit, contains a higher percentage of exotic lithologies such as Paleozoic carbonate and felsic to intermediate intrusive rocks. Thus, the lack of till geochemical and gold grain responses from a property does not always indicate the absence of bedrock gold mineralization. Instead, it could indicate that the till does not reflect the local bedrock, i.e. glaciers did not erode the local bedrock. The local versus exotic components of till should always be considered when evaluating the presence/absence and magnitude of till geochemical and gold grain anomalies.

Future work will include additional detailed sampling around other gold deposits in the Timmins area, detailed SEM studies of the gold grain shapes and Au:Ag composition of grains from anomalous till samples and mineralized bedrock, and detailed mineralogical studies of heavy mineral concentrates from anomalous till samples in search of ore minerals and accessory minerals that could be used as indicators of gold mineralization.

CONCLUSIONS

This study has shown that Archean lode gold deposits in the Western Abitibi Greenstone Belt have visible gold grain and Au geochemical signatures in till down-ice. These signatures are most easily detected using the heavy mineral fraction of till. The fine (<0.063 mm) fraction also displays Au signatures, but the signatures are more subtle. Pathfinder elements can be used to fingerprint individual deposits, but must be present with Au to indicate the presence of bedrock mineralization. The five gold deposits are overlain by stony, sandy-silt Matheson Till which contains a large percentage of local bedrock pebbles. Both weathered Matheson Till collected in areas of thin cover over bedrock and unweathered till in areas covered by thick glacial sediments were equally effective sampling media for detecting bedrock mineralization.

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Appendix A. Till sample locations, descriptions, and textural and chittick data

Appendix A: Till sample locations and descriptions

Sample Number	Year	Location	NTS sheet	Easting	Northing	Sample depth (m)	Site type	% Clast content	Munsell colour	Degree of oxidation	% Sand	% Silt	% Clay	Weight % total carbonate
93MPB425	1993	Pamour No. 2 pit	42A/11	492450	5374400	11.5	open pit	10	green-grey	none	--	--	--	12.59
93MPB426	1993	Pamour No. 2 pit	42A/11	492450	5374400	8.5	open pit	10-15	grey-brown	none	--	--	--	11.93
93MPB427	1993	Pamour No. 2 pit	42A/11	492450	5374400	7.0	open pit	10-15	grey	none	--	--	--	17.83
93MPB428	1993	Pamour No. 2 pit	42A/11	492450	5374400	5.5	open pit	10-15	grey	none	--	--	--	17.26
93MPB429	1993	Pamour No. 2 pit	42A/11	492450	5374400	4.0	open pit	10-15	grey	none	--	--	--	19.49
94MPB001	1994	Night Hawk Lake pit	42A/7	502500	5371300	6.0	open pit	10	olive grey	none	--	--	--	20.34
94MPB002	1994	Night Hawk Lake pit	42A/7	502500	5371300	6.0	open pit	10	grey	none	--	--	--	19.38
94MPB003	1994	Night Hawk Lake pit	42A/7	502500	5371300	6.0	open pit	10	grey	none	--	--	--	25.19
94MPB004	1994	Night Hawk Lake pit	42A/7	502500	5371300	6.0	open pit	10	grey	none	--	--	--	20.30
94MPB014	1994	Hislop pit	42A/9	553100	5372700	1.0	open pit	10-15	olive grey	moderate	--	--	--	--
94MPB015	1994	Hislop pit	42A/9	553103	5372700	1.2	open pit	10-15	light brown	moderate	--	--	--	--
94MPB016	1994	Hislop pit	42A/9	553103	5372700	0.5	open pit	10-15	brownish grey	moderate	--	--	--	--
94MPB017	1994	Hislop pit	42A/9	553103	5372700	0.1	open pit	10-15	brown	high	--	--	--	--
94MPB018	1994	Hislop pit	42A/9	553060	5372671	0.5	open pit	10-15	reddish brown	high	--	--	--	--
94MPB019	1994	Hislop pit	42A/9	553060	5372671	1.5	open pit	10-15	reddish brown	high	--	--	--	--
94MPB020	1994	Hislop pit	42A/9	553060	5372671	2.0	open pit	10-15	reddish brown	high	--	--	--	--
94MPB021	1994	Hislop pit	42A/9	553060	5372669	1.5	open pit	10-15	reddish brown	high	--	--	--	--
94MPB022	1994	Hislop pit	42A/9	553060	5372669	1.9	open pit	10-15	olive grey	high	--	--	--	--
94MPB023	1994	Hislop pit	42A/9	553060	5372669	2.1	open pit	10-15	olive grey	high	--	--	--	--
94MPB024	1994	Hislop pit	42A/9	553060	5372667	2.5	open pit	10-15	grey	moderate	--	--	--	--
94MPB025	1994	Hislop pit	42A/9	553060	5372667	3.5	open pit	10-15	grey	moderate	--	--	--	--
94MPB026	1994	Hislop pit	42A/9	553060	5372665	2.5	open pit	10-15	grey	moderate	--	--	--	--
94MPB027	1994	Hislop pit	42A/9	553060	5372662	4.3	open pit	10-15	grey	moderate	--	--	--	--
94MPB028	1994	Hislop pit	42A/9	553060	5372737	2.6	open pit	10-15	brownish grey	high	--	--	--	--
94MPB029	1994	Hislop pit	42A/9	553060	5372735	1.0	open pit	10-15	brownish grey	high	--	--	--	--
96MPB6073	1996	Davidson-Tisdale Mine	42A/11	482656	5372968	2.3	hand dug pit	10-15	olive grey	moderate	46.6	49.3	4.1	16.28
96MPB6074	1996	Davidson-Tisdale Mine	42A/11	482942	5372459	2.0	trench	10	lt olive brown	high	77.4	20.4	2.2	0.70
96MPB6075	1996	Davidson-Tisdale Mine	42A/11	483356	5372946	1.5	trench	15	lt olive brown	high	81.2	16.8	2.0	0.90
96MPB6076	1996	Davidson-Tisdale Mine	42A/11	483549	5372760	2.0	trench	10	olive grey	low	42.9	52.2	4.9	13.66
96MPB6091	1996	Davidson-Tisdale Mine	42A/11	484530	5371970	0.6	hand dug pit	10	brown	high	43.3	47.7	9.0	1.12
96MPB6069A	1996	Pamour No. 3 pit	42A/11	491800	5374300	3.3	open pit	5-7	dark grey	none	53.9	33.4	12.7	16.57
96MPB6069B	1996	Pamour No. 3 pit	42A/11	491800	5374300	9.0	open pit	5-7	dark grey	none	48.3	32.2	19.4	18.32

Appendix A: Till sample locations and descriptions

Sample Number	Year	Location	NTS sheet	Easting	Northing	Sample depth (m)	Site type	% Clast content	Munsell colour	Degree of oxidation	% Sand	% Silt	% Clay	Weight % total carbonate
96MPB6079A	1996	Pamour No. 3 pit	42A/11	491800	5374300	8.0	open pit	5-7	dark grey	none	55.1	29.9	14.9	17.15
96MPB6079B	1996	Pamour No. 3 pit	42A/11	491800	5374300	5.5	open pit	5-7	olive grey	none	55.1	32.8	12.1	18.42
96MPB6079C	1996	Pamour No. 3 pit	42A/11	491800	5374300	4.8	open pit	5-7	dark grey	none	56.3	31.2	12.5	17.78
96MPB6079D	1996	Pamour No. 3 pit	42A/11	491800	5374300	4.3	open pit	5-7	dark olive grey	none	52.5	34.8	12.7	17.04
96MPB6079E	1996	Pamour No. 3 pit	42A/11	491800	5374300	3.8	open pit	5-7	olive grey	none	53.2	34.3	12.5	18.46
96MPB6079F	1996	Pamour No. 3 pit	42A/11	491800	5374300	2.8	open pit	5-7	dark grey	none	54.5	33.0	12.5	19.53
96MPB6079G	1996	Pamour No. 3 pit	42A/11	491800	5374300	2.3	open pit	5-7	dark grey	moderate	54.7	33.4	11.9	18.60
96MPB6080A	1996	Pamour No. 5 pit	42A/11	489700	5373450	18.5	open pit	10	grey	none	49.8	38.5	11.7	15.90
96MPB6080B	1996	Pamour No. 5 pit	42A/11	489700	5373450	17.5	open pit	10	grey	none	50.3	38.6	11.0	17.85
96MPB6080C	1996	Pamour No. 5 pit	42A/11	489700	5373450	16.5	open pit	10	olive grey	none	52.1	37.6	10.3	19.93
96MPB6080D	1996	Pamour No. 5 pit	42A/11	489700	5373450	15.5	open pit	10	grey	none	52.4	37.9	9.7	16.22
96MPB6080E	1996	Pamour No. 5 pit	42A/11	489700	5373450	14.5	open pit	10	grey	none	53.4	36.3	10.3	17.14
96MPB6080F	1996	Pamour No. 5 pit	42A/11	489700	5373450	13.5	open pit	10	dark grey	none	51.6	39.0	9.4	17.82
96MPB6080G	1996	Pamour No. 5 pit	42A/11	489700	5373450	12.5	open pit	10	olive grey	none	51.1	36.4	12.5	18.54
96MPB6080H	1996	Pamour No. 5 pit	42A/11	489700	5373450	11.5	open pit	10	grey brown	none	53.9	33.0	13.1	16.31
96MPB6080I	1996	Pamour No. 5 pit	42A/11	489700	5373450	10.5	open pit	10	dark grey	none	53.5	33.9	12.6	16.95
96MPB6080J	1996	Pamour No. 5 pit	42A/11	489700	5373450	9.5	open pit	10	grey	none	55.5	32.2	12.3	16.31
96MPB6080K	1996	Pamour No. 5 pit	42A/11	489700	5373450	8.5	open pit	10	dark grey	none	54.8	32.9	12.3	18.11
96MPB6080L	1996	Pamour No. 5 pit	42A/11	489700	5373450	7.5	open pit	10	dark grey	none	54.5	33.8	11.7	16.97
96MPB6080M	1996	Pamour No. 5 pit	42A/11	489700	5373450	5.0	open pit	10	grey	none	58.9	37.2	3.9	16.22
96MPB6080N	1996	Pamour No. 5 pit	42A/11	489700	5373450	1.8	open pit	10	olive grey	moderate	66.7	29.6	3.7	11.82
96MPB6114	1996	Bell Creek Mine	42A/11	486840	5377380	0.6	hand dug pit	20	lt olive brown	high	63.3	34.8	1.9	1.12
96MPB6115	1996	Bell Creek Mine	42A/11	487349	5378194	0.4	hand dug pit	20	yellow brown	high	77.1	20.8	2.1	0.24
96MPB6116	1996	Bell Creek Mine	42A/11	487167	5378443	0.6	hand dug pit	20	yellow brown	high	82.9	16.2	1.0	0.45
96MPB6117	1996	Bell Creek Mine Rd.	42A/11	487500	5375400	2.0	excavation	10	grey brown	none	59.4	33.3	7.3	14.91

Appendix B. Weight data for 10-kg bulk till samples processed to recover gold grains and heavy minerals for geochemical analysis

APPENDIX B: BULK TILL SAMPLE WEIGHT DATA

SAMPLE	Location	TOTAL SAMPLE WEIGHT (kg, wet)	>1.7 mm (kg, wet)	<1.7 mm (kg, wet)	TABLE CONC (g, wet)	M.I. LIGHTS (g, dry)	HEAVY MINERAL CONCENTRATE TOTAL WEIGHT (g, dry)	HEAVY MINERAL CONCENTRATE NON FERRO-MAG (g, dry)	HEAVY MINERAL CONCENTRATE FERRO-MAG (g, dry)	WEIGHT HCM/10 kg OF <1.7mm
93MPB425	Pamour No. 2 pit	5.8	1.2	4.5	572.3	529.7	42.6	32.1	10.5	94.7
93MPB426	Pamour No. 2 pit	6.3	1.1	5.2	439.5	405.2	34.3	27.4	6.9	66.0
93MPB427	Pamour No. 2 pit	5.5	0.6	4.8	496.0	468.9	27.1	21.8	5.3	56.5
93MPB428	Pamour No. 2 pit	6.0	0.7	5.3	559.0	522.2	36.8	30.3	6.5	69.4
93MPB429	Pamour No. 2 pit	6.4	0.7	5.7	671.8	632.3	39.5	33.6	5.9	69.3
94MPB001	Night Hawk Lake pit	7.8	0.9	6.9	235.2	227.9	7.3	4.5	2.8	10.6
94MPB002	Night Hawk Lake pit	8.0	0.8	7.2	220.7	207.7	13.0	8.9	4.1	18.1
94MPB003	Night Hawk Lake pit	6.3	0.6	5.7	209.9	200.2	9.7	6.9	2.8	17.0
94MPB004	Night Hawk Lake pit	6.9	0.8	6.1	138.3	124.9	13.4	9.4	4.0	22.0
94MPB014	Hislop pit	8.2	1.4	6.8	229.4	219.9	9.5	5.6	3.9	14.0
94MPB015	Hislop pit	6.7	1.2	5.5	160.7	148.8	11.9	7.7	4.2	21.6
94MPB016	Hislop pit	7.4	1.4	6.0	97.8	78.0	19.8	13.9	5.9	33.0
94MPB017	Hislop pit	3.7	1.4	2.3	99.8	96.9	2.9	2.1	0.8	12.6
94MPB018	Hislop pit	6.6	1.0	5.6	219.4	202.6	16.8	12.6	4.2	30.0
94MPB019	Hislop pit	6.6	2.1	4.5	202.8	189.5	13.3	9.6	3.7	29.6
94MPB020	Hislop pit	5.9	1.3	4.6	196.1	169.6	26.5	15.4	11.1	57.6
94MPB021	Hislop pit	7.0	0.9	6.1	260.9	255.8	5.1	2.6	2.5	8.4
94MPB022	Hislop pit	6.1	2.0	4.1	326.3	319.0	7.3	4.9	2.4	17.8
94MPB023	Hislop pit	5.8	1.1	4.7	370.3	349.8	20.5	12.6	7.9	43.6
94MPB024	Hislop pit	6.2	2.0	4.2	368.1	353.0	15.1	9.5	5.6	36.0
94MPB025	Hislop pit	6.9	2.3	4.6	308.3	282.0	26.3	16.2	10.1	57.2
94MPB026	Hislop pit	6.2	1.3	4.9	452.3	443.8	8.5	5.3	3.2	17.3
94MPB027	Hislop pit	6.4	2.1	4.3	301.9	289.9	12.0	6.7	5.3	27.9
94MPB028	Hislop pit	8.0	0.5	7.5	358.2	338.3	19.9	14.0	5.9	26.5
94MPB029	Hislop pit	8.3	1.4	6.9	502.1	491.7	10.4	6.3	4.1	15.1
96MPB6073	Davidson-Tisdale Mine	13.6	0.8	12.8	269.5	192.0	77.5	66.0	11.5	60.5
96MPB6074	Davidson-Tisdale Mine	11.2	1.4	9.8	275.5	260.8	14.7	12.2	2.5	15.0
96MPB6075	Davidson-Tisdale Mine	13.3	2.6	10.8	431.4	342.9	88.5	78.5	10.0	82.3
96MPB6076	Davidson-Tisdale Mine	12.3	1.2	11.1	183.2	139.4	43.8	37.0	6.8	39.6
96MPB6091	Davidson-Tisdale Mine	11.0	1.1	10.0	345.6	308.3	37.3	35.1	2.2	37.5

APPENDIX B: BULK TILL SAMPLE WEIGHT DATA

SAMPLE	Location	TOTAL SAMPLE WEIGHT (kg, wet)	>1.7 mm (kg, wet)	<1.7 mm (kg, wet)	TABLE CONC (g, wet)	M.I. LIGHTS (g, dry)	HEAVY MINERAL CONCENTRATE TOTAL WEIGHT (g, dry)	HEAVY MINERAL CONCENTRATE NON FERRO-MAG (g, dry)	HEAVY MINERAL CONCENTRATE FERRO-MAG (g, dry)	WEIGHT HCM/10 kg OF <1.7mm
96MPB6069A	Pamour No. 3 pit	10.9	0.9	10.1	310.7	271.2	39.5	33.4	6.1	39.3
96MPB6069B	Pamour No. 3 pit	10.0	0.7	9.3	313.6	266.5	47.1	40.9	6.2	50.6
96MPB6079A	Pamour No. 3 pit	no sample								
96MPB6079B	Pamour No. 3 pit	no sample								
96MPB6079C	Pamour No. 3 pit	no sample								
96MPB6079D	Pamour No. 3 pit	no sample								
96MPB6079E	Pamour No. 3 pit	no sample								
96MPB6079F	Pamour No. 3 pit	no sample								
96MPB6079G	Pamour No. 3 pit	no sample								
96MPB6080A	Pamour No. 5 pit	11.8	2.3	9.5	353.1	319.8	33.3	28.1	5.2	35.2
96MPB6080B	Pamour No. 5 pit	no sample								
96MPB6080C	Pamour No. 5 pit	no sample								
96MPB6080D	Pamour No. 5 pit	12.8	1.6	11.2	460.1	425.5	34.6	28.5	6.1	30.9
96MPB6080E	Pamour No. 5 pit	no sample								
96MPB6080F	Pamour No. 5 pit	no sample								
96MPB6080G	Pamour No. 5 pit	no sample								
96MPB6080H	Pamour No. 5 pit	11.6	0.8	10.8	326.0	281.9	44.1	37.1	7.0	40.8
96MPB6080I	Pamour No. 5 pit	no sample								
96MPB6080J	Pamour No. 5 pit	no sample								
96MPB6080K	Pamour No. 5 pit	no sample								
96MPB6080L	Pamour No. 5 pit	10.9	0.7	10.2	440.1	390.5	49.6	42.4	7.2	48.6
96MPB6080M	Pamour No. 5 pit	9.6	0.7	8.9	312.9	276.2	36.7	31.4	5.3	41.2
96MPB6080N	Pamour No. 5 pit	13.0	1.4	11.6	283.9	225.9	58.0	46.9	11.1	50.0
96MPB6114	Bell Creek Mine	14.7	3.2	11.6	347.7	293.8	53.9	53.8	0.1	46.7
96MPB6115	Bell Creek Mine	12.8	2.2	10.7	426.9	350.1	76.8	73.8	3.0	72.1
96MPB6116	Bell Creek Mine	12.6	2.6	10.0	332.3	271.2	61.1	52.2	8.9	61.1
96MPB6117	Bell Creek Mine Rd.	14.1	1.9	12.2	394.8	347.1	47.7	39.3	8.4	39.1

Appendix C. <1.7 mm heavy mineral fraction till geochemical data

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Appendix C.1 Heavy mineral fraction INAA data

Element	Location	AU	AS	SB	CO	W	CR	FE	HF	CA	NA	SC	TA	TH	U	ZN
Units		PPB	PPM	PPM	PPM	PPM	PPM	%	PPM	%	PPM	PPM	PPM	PPM	PPM	PPM
Detection Limit		5	2	0.2	5	4	10	0.02	1	1	500	0.1	1	0.5	0.5	200
93MPB425	Pamour No. 2 pit	not analyzed														
93MPB426	Pamour No. 2 pit	not analyzed														
93MPB427	Pamour No. 2 pit	not analyzed														
93MPB428	Pamour No. 2 pit	not analyzed														
93MPB429	Pamour No. 2 pit	not analyzed														
94MPB001	Night Hawk Lake pit	674	220	<0.5	170	<4	1800	31.90	310	<2	3150	120	24	390	37	<200
94MPB002	Night Hawk Lake pit	14600	100	1.8	90	<4	1200	23.90	260	11	2060	110	14	270	24	<200
94MPB003	Night Hawk Lake pit	112	92	1.8	87	<4	1200	22.20	230	<2	2190	100	18	250	23	<200
94MPB004	Night Hawk Lake pit	4120	92	<0.3	84	<4	1100	23.20	280	<2	2040	100	11	260	24	<200
94MPB014	Hislop pit	781	<3	<0.4	38	<4	920	24.60	230	<2	1700	100	26	260	22	<200
94MPB015	Hislop pit	1090	11	<0.2	35	<4	1100	25.70	240	<2	2790	110	13	270	20	<200
94MPB016	Hislop pit	256	<2	<0.2	30	<4	850	18.40	230	<2	2380	85	17	200	18	605
94MPB017	Hislop pit	1060	<2	<0.2	37	<4	1200	22.00	190	<2	1540	90	11	200	15	230
94MPB018	Hislop pit	12500	23	<0.2	110	<4	1000	20.70	240	<2	2490	88	21	200	16	340
94MPB019	Hislop pit	23000	23	<0.2	99	47	820	21.80	210	10	2660	88	9	150	17	<200
94MPB020	Hislop pit	1090	21	1.7	97	22	960	20.20	200	<2	2900	89	18	180	13	724
94MPB021	Hislop pit	5000	<2	1.5	36	<4	890	20.30	230	<2	3090	92	10	250	19	<200
94MPB022	Hislop pit	3430	43	1.7	270	<4	1400	21.60	210	8	2450	95	15	230	11	440
94MPB023	Hislop pit	10200	<2	<0.2	75	210	1000	20.60	110	<2	1450	84	18	210	15	<200
94MPB024	Hislop pit	4170	10	<0.2	45	<4	770	22.10	160	<2	2080	92	18	200	15	<200
94MPB025	Hislop pit	23700	<2	<0.2	43	140	1000	20.00	200	<2	2330	85	49	260	24	<200
94MPB026	Hislop pit	8510	<2	<0.2	54	<4	950	20.70	200	<2	2420	100	18	230	17	<200
94MPB027	Hislop pit	2000	<2	<0.2	51	85	1000	22.30	200	<2	2890	100	16	290	17	360
94MPB028	Hislop pit	1010	<2	<0.2	33	<4	930	21.90	180	10	2450	110	13	210	22	340
94MPB029	Hislop pit	568	11	<0.3	56	89	1000	26.50	170	<2	2010	110	13	270	15	<200
96MPB6073	Davidson-Tisdale Mine	269	<2	<0.2	24	<4	510	12.30	130	<2	3030	72	10	110	14	<200
96MPB6074	Davidson-Tisdale Mine	298	<2	<0.2	40	<4	660	17.70	190	<2	4190	100	9	190	23	<200
96MPB6075	Davidson-Tisdale Mine	487	<2	<0.2	29	<4	610	13.80	120	9	3760	79	4	110	16	<200
96MPB6076	Davidson-Tisdale Mine	51	<2	<0.2	25	<4	590	14.00	180	<2	4700	83	10	150	11	<200
96MPB6091	Davidson-Tisdale Mine	64	<2	<0.2	28	<4	660	15.40	130	9	3610	84	5	130	20	517
96MPB6069A	Pamour No. 3 pit	40	<2	<0.2	37	<4	690	14.30	150	10	3490	80	7	140	21	494
96MPB6069B	Pamour No. 3 pit	248	60	<0.2	36	<4	610	14.00	130	10	4440	81	7	110	19	<200
96MPB6079A	Pamour No. 3 pit	no sample														
96MPB6079B	Pamour No. 3 pit	no sample														
96MPB6079C	Pamour No. 3 pit	no sample														
96MPB6079D	Pamour No. 3 pit	no sample														
96MPB6079E	Pamour No. 3 pit	no sample														
96MPB6079F	Pamour No. 3 pit	no sample														

Appendix C.1 Heavy mineral fraction INAA data

Element	Location	AU	AS	SB	CO	W	CR	FE	HF	CA	NA	SC	TA	TH	U	ZN
Units		PPB	PPM	PPM	PPM	PPM	PPM	%	PPM	%	PPM	PPM	PPM	PPM	PPM	PPM
Detection Limit		5	2	0.2	5	4	10	0.02	1	1	500	0.1	1	0.5	0.5	200
96MPB6079G	Pamour No. 3 pit	no sample														
96MPB6080A	Pamour No. 5 pit	20200	330	<0.3	65	29	830	18.60	130	7	4280	86	8	130	17	<200
96MPB6080B	Pamour No. 5 pit	no sample														
96MPB6080C	Pamour No. 5 pit	no sample														
96MPB6080D	Pamour No. 5 pit	2530	110	<0.3	46	<4	860	18.00	170	9	4350	90	9	160	21	<200
96MPB6080E	Pamour No. 5 pit	no sample														
96MPB6080F	Pamour No. 5 pit	no sample														
96MPB6080G	Pamour No. 5 pit	no sample														
96MPB6080H	Pamour No. 5 pit	212	<2	<0.2	34	<4	660	15.30	170	8	4040	85	11	150	25	396
96MPB6080I	Pamour No. 5 pit	no sample														
96MPB6080J	Pamour No. 5 pit	no sample														
96MPB6080K	Pamour No. 5 pit	no sample														
96MPB6080L	Pamour No. 5 pit	52	<2	<0.2	35	<4	560	14.20	140	<2	3690	80	9	130	20	<200
96MPB6080M	Pamour No. 5 pit	<5	19	<0.2	41	<4	660	15.70	150	<2	4240	88	8	130	16	<200
96MPB6080N	Pamour No. 5 pit	39	<2	<0.2	31	<4	790	14.60	130	12	3280	84	7	140	15	<200
96MPB6114	Bell Creek Mine	276	7	<0.2	26	<4	940	12.80	130	7	3310	83	5	110	14	<200
96MPB6115	Bell Creek Mine	108	<2	<0.2	33	<4	1000	14.10	140	<2	3360	86	10	130	19	<200
96MPB6116	Bell Creek Mine	1140	23	<0.2	31	<4	700	15.90	120	10	3600	92	7	110	8.4	<200
96MPB6117	Bell Creek Mine Rd.	266	18	<0.2	33	<5	1000	16.50	150	10	2920	93	9	150	19	466

Appendix C.1 Heavy mineral fraction INAA data

Element	Location	LA	CE	ND	SM	EU	TB	YB	LU	Mass
Units		PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	g
Detection Limit		1	3	10	0.1	0.2	2	0.2	0.1	0.00
93MPB425	Pamour No. 2 pit	not analyzed								
93MPB426	Pamour No. 2 pit	not analyzed								
93MPB427	Pamour No. 2 pit	not analyzed								
93MPB428	Pamour No. 2 pit	not analyzed								
93MPB429	Pamour No. 2 pit	not analyzed								
94MPB001	Night Hawk Lake pit	860	1600	800	85	7.8	5	49.8	8.3	3.56
94MPB002	Night Hawk Lake pit	620	1100	440	62	8.2	8	36.2	6.6	7.29
94MPB003	Night Hawk Lake pit	560	1000	370	59	7.4	<2	40.5	6.5	6.23
94MPB004	Night Hawk Lake pit	580	1000	380	58	7.4	7	41.4	6.9	8.53
94MPB014	Hislop pit	550	960	380	55	6.3	<2	43.8	7.7	4.44
94MPB015	Hislop pit	550	990	390	59	6.7	8	48.0	8.0	6.87
94MPB016	Hislop pit	360	760	270	45	8.6	11	36.0	6.8	13.12
94MPB017	Hislop pit	399	779	288	49	5.5	6	32.4	5.4	1.44
94MPB018	Hislop pit	360	840	280	50	9.7	6	36.1	6.8	12.02
94MPB019	Hislop pit	380	680	300	44	7.7	<2	35.6	6.0	8.91
94MPB020	Hislop pit	330	730	230	41	9.3	6	37.5	6.7	14.11
94MPB021	Hislop pit	510	940	500	53	8.1	<2	43.0	7.7	2.43
94MPB022	Hislop pit	490	890	320	52	7.3	<2	39.1	6.9	4.56
94MPB023	Hislop pit	320	690	200	38	5.8	6	37.2	7.5	12.07
94MPB024	Hislop pit	420	740	310	45	5.6	7	37.5	6.5	7.94
94MPB025	Hislop pit	460	950	370	55	8.6	6	40.7	7.8	16.43
94MPB026	Hislop pit	490	940	350	55	6.6	<2	47.5	7.8	4.60
94MPB027	Hislop pit	580	1100	380	58	6.5	9	43.5	7.5	5.78
94MPB028	Hislop pit	380	850	270	53	8.7	8	39.7	7.5	12.99
94MPB029	Hislop pit	540	1000	390	56	6.8	8	46.2	7.3	6.12
96MPB6073	Davidson-Tisdale Mine	290	550	170	31	6.5	5	19.3	3.9	66.19
96MPB6074	Davidson-Tisdale Mine	470	790	310	47	5.9	<2	28.7	5.0	12.06
96MPB6075	Davidson-Tisdale Mine	280	610	220	38	8.5	<2	22.9	3.4	78.57
96MPB6076	Davidson-Tisdale Mine	370	760	270	43	8.3	7	25.4	4.8	37.11
96MPB6091	Davidson-Tisdale Mine	280	570	180	31	5.5	6	23.0	4.5	35.22
96MPB6069A	Pamour No. 3 pit	340	690	250	40	6.8	6	23.5	4.7	33.56
96MPB6069B	Pamour No. 3 pit	280	570	200	34	7.5	6	21.4	4.2	40.95
96MPB6079A	Pamour No. 3 pit	no sample								
96MPB6079B	Pamour No. 3 pit	no sample								
96MPB6079C	Pamour No. 3 pit	no sample								
96MPB6079D	Pamour No. 3 pit	no sample								
96MPB6079E	Pamour No. 3 pit	no sample								
96MPB6079F	Pamour No. 3 pit	no sample								

Appendix C.1 Heavy mineral fraction INAA data

Element	Location	LA	CE	ND	SM	EU	TB	YB	LU	Mass
Units		PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	g
Detection Limit		1	3	10	0.1	0.2	2	0.2	0.1	0.00
96MPB6079G	Pamour No. 3 pit	no sample								
96MPB6080A	Pamour No. 5 pit	330	650	230	40	8.2	4	23.1	4.7	28.05
96MPB6080B	Pamour No. 5 pit	no sample								
96MPB6080C	Pamour No. 5 pit	no sample								
96MPB6080D	Pamour No. 5 pit	380	770	280	47	8.6	6	26.7	5.4	28.73
96MPB6080E	Pamour No. 5 pit	no sample								
96MPB6080F	Pamour No. 5 pit	no sample								
96MPB6080G	Pamour No. 5 pit	no sample								
96MPB6080H	Pamour No. 5 pit	350	690	210	43	8.4	6	25.1	5.0	37.21
96MPB6080I	Pamour No. 5 pit	no sample								
96MPB6080J	Pamour No. 5 pit	no sample								
96MPB6080K	Pamour No. 5 pit	no sample								
96MPB6080L	Pamour No. 5 pit	300	620	220	37	7.4	7	23.2	4.3	42.59
96MPB6080M	Pamour No. 5 pit	320	650	240	42	8.4	<2	26.2	4.9	31.66
96MPB6080N	Pamour No. 5 pit	330	670	190	38	6.7	<2	24.6	5.0	47.10
96MPB6114	Bell Creek Mine	270	490	160	27	5.3	7	19.3	4.2	53.90
96MPB6115	Bell Creek Mine	320	580	190	32	6.0	4	22.7	4.3	73.99
96MPB6116	Bell Creek Mine	280	530	170	30	5.9	<2	23.9	4.4	52.24
96MPB6117	Bell Creek Mine Rd.	370	700	220	39	7.4	5	25.6	5.1	39.23

APPENDIX C.2: <1.7 mm HEAVY MINERAL FRACTION AQUA REGIA/ICP-ES DATA

SAMPLE	Location	Ag ppm	Cu ppm	Ni ppm	Pb ppm	Zn ppm	Cd ppm	Mn ppm
93MPB425	Pamour No. 2 pit	no sample						
93MPB426	Pamour No. 2 pit	no sample						
93MPB427	Pamour No. 2 pit	no sample						
93MPB428	Pamour No. 2 pit	no sample						
93MPB429	Pamour No. 2 pit	no sample						
94MPB001	Night Hawk Lake pit	0.3	110	130	64	95	1.4	830
94MPB002	Night Hawk Lake pit	0.7	76	68	49	75	0.8	564
94MPB003	Night Hawk Lake pit	0.2	77	65	71	58	1.1	607
94MPB004	Night Hawk Lake pit	0.3	80	68	31	54	1.3	572
94MPB014	Hislop pit	<0.2	9	12	17	10	<0.5	942
94MPB015	Hislop pit	<0.2	11	17	15	11	<0.5	690
94MPB016	Hislop pit	<0.2	13	22	11	10	0.5	479
94MPB017	Hislop pit	<0.2	29	24	21	20	<0.5	1230
94MPB018	Hislop pit	0.7	161	216	8	10	0.7	400
94MPB019	Hislop pit	1.2	52	183	4	9	0.6	389
94MPB020	Hislop pit	1.5	253	62	44	431	1.4	445
94MPB021	Hislop pit	0.8	22	12	15	18	<0.5	898
94MPB022	Hislop pit	0.3	30	145	6	14	0.7	660
94MPB023	Hislop pit	<0.2	12	66	8	10	0.5	715
94MPB024	Hislop pit	3.4	15	22	14	15	<0.5	690
94MPB025	Hislop pit	2.1	8	32	12	10	<0.5	517
94MPB026	Hislop pit	<0.2	11	35	15	12	<0.5	926
94MPB027	Hislop pit	<0.2	10	32	14	12	<0.5	798
94MPB028	Hislop pit	<0.2	13	12	13	17	<0.5	557
94MPB029	Hislop pit	0.2	12	39	7	8	<0.5	344
96MPB6073	Davidson-Tisdale Mine	<0.2	5	48	9	7	<0.5	115
96MPB6074	Davidson-Tisdale Mine	<0.2	5	14	9	7	<0.5	98
96MPB6075	Davidson-Tisdale Mine	<0.2	11	26	7	11	<0.5	137
96MPB6076	Davidson-Tisdale Mine	<0.2	5	18	8	7	<0.5	125
96MPB6091	Davidson-Tisdale Mine	<0.2	5	10	8	8	<0.5	74
96MPB6069A	Pamour No. 3 pit	<0.2	38	21	8	20	0.5	121
96MPB6069B	Pamour No. 3 pit	<0.2	19	19	13	71	1.0	112
96MPB6079A	Pamour No. 3 pit	no sample						
96MPB6079B	Pamour No. 3 pit	no sample						
96MPB6079C	Pamour No. 3 pit	no sample						
96MPB6079D	Pamour No. 3 pit	no sample						
96MPB6079E	Pamour No. 3 pit	no sample						
96MPB6079F	Pamour No. 3 pit	no sample						
96MPB6079G	Pamour No. 3 pit	no sample						
96MPB6080A	Pamour No. 5 pit	1.1	96	88	27	29	1.8	147
96MPB6080B	Pamour No. 5 pit	no sample						
96MPB6080C	Pamour No. 5 pit	no sample						
96MPB6080D	Pamour No. 5 pit	no sample						
96MPB6080E	Pamour No. 5 pit	0.7	44	69	12	39	0.8	122

APPENDIX C.2: <1.7 mm HEAVY MINERAL FRACTION AQUA REGIA/ICP-ES DATA

SAMPLE	Location	Ag ppm	Cu ppm	Ni ppm	Pb ppm	Zn ppm	Cd ppm	Mn ppm
96MPB6080F	Pamour No. 5 pit	no sample						
96MPB6080G	Pamour No. 5 pit	no sample						
96MPB6080H	Pamour No. 5 pit	no sample						
96MPB6080I	Pamour No. 5 pit	<0.2	25	13	28	5	<0.5	118
96MPB6080J	Pamour No. 5 pit	no sample						
96MPB6080K	Pamour No. 5 pit	no sample						
96MPB6080L	Pamour No. 5 pit	<0.2	21	18	14	33	<0.5	115
96MPB6080M	Pamour No. 5 pit	<0.2	17	10	10	11	<0.5	115
96MPB6080N	Pamour No. 5 pit	<0.2	4	10	10	8	<0.5	110
96MPB6114	Bell Creek Mine	<0.2	6	9	9	8	<0.5	71
96MPB6115	Bell Creek Mine	0.8	4	11	9	6	<0.5	73
96MPB6116	Bell Creek Mine	<0.2	10	22	8	9	0.5	116
96MPB6117	Bell Creek Mine Rd.	<0.2	17	11	10	7	<0.5	136

Appendix D <0.063 mm fraction till geochemical data

APPENDIX D.1: <0.063 mm fraction till INAA data

Element	Location	Au	As	Sb	Mo	Co	Ba	Br	Ca	Cr	Fe	Hf	Na	Rb	Sc	Ta	Th	U	La
Units		ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit		2	0.5	0.1	1	1	50	0.5	1	5	0.01	1	0.01	15	0.1	0.5	0.2	0.5	0.5
93MPB425	Pamour No. 2 pit	not analyzed																	
93MPB426	Pamour No. 2 pit	not analyzed																	
93MPB427	Pamour No. 2 pit	not analyzed																	
93MPB428	Pamour No. 2 pit	not analyzed																	
93MPB429	Pamour No. 2 pit	not analyzed																	
94MPB001	Night Hawk Lake pit	not analyzed																	
94MPB002	Night Hawk Lake pit	not analyzed																	
94MPB003	Night Hawk Lake pit	not analyzed																	
94MPB004	Night Hawk Lake pit	not analyzed																	
94MPB014	Hislop pit	not analyzed																	
94MPB015	Hislop pit	not analyzed																	
94MPB016	Hislop pit	not analyzed																	
94MPB017	Hislop pit	not analyzed																	
94MPB018	Hislop pit	not analyzed																	
94MPB019	Hislop pit	not analyzed																	
94MPB020	Hislop pit	not analyzed																	
94MPB021	Hislop pit	not analyzed																	
94MPB022	Hislop pit	not analyzed																	
94MPB023	Hislop pit	not analyzed																	
94MPB024	Hislop pit	not analyzed																	
94MPB025	Hislop pit	not analyzed																	
94MPB026	Hislop pit	not analyzed																	
94MPB027	Hislop pit	not analyzed																	
94MPB028	Hislop pit	not analyzed																	
94MPB029	Hislop pit	not analyzed																	
96MPB6073	Davidson-Tisdale Mine	<2	1.3	<0.1	<1	4	310	1.4	5	46	1.02	5	1.30	44	4.4	<0.5	3.1	<0.5	14
96MPB6074	Davidson-Tisdale Mine	<2	3.4	<0.1	1	6	420	<0.5	<1	54	1.26	8	1.65	38	5.5	<0.5	5.9	1.0	19
96MPB6075	Davidson-Tisdale Mine	5	4.4	<0.1	<1	9	420	<0.5	2	70	1.66	6	1.47	31	6.8	<0.5	5.1	0.9	23
96MPB6076	Davidson-Tisdale Mine	4	0.9	0.2	<1	4	290	1.9	4	46	1.08	5	1.34	48	4.6	<0.5	3.6	<0.5	15
96MPB6091	Davidson-Tisdale Mine	<2	1.2	<0.1	<1	4	430	<0.5	<1	42	1.15	5	1.36	30	4.8	<0.5	4.1	1.0	15
96MPB6069A	Pamour No. 3 pit	<2	2.1	<0.1	<1	5	230	1.5	4	41	1.30	4	1.11	36	4.7	<0.5	4.4	1.3	16
96MPB6069B	Pamour No. 3 pit	<2	2.6	0.3	<1	5	420	1.6	4	45	1.36	4	1.09	39	4.8	0.6	4.5	1.5	17
96MPB6079A	Pamour No. 3 pit	<2	2.8	<0.1	<1	6	420	1.4	4	45	1.37	4	1.15	37	4.9	<0.5	4.6	<0.5	17
96MPB6079B	Pamour No. 3 pit	41	9.5	<0.1	<1	6	350	1.5	5	46	1.36	5	1.18	43	5.0	<0.5	4.3	1.2	18

APPENDIX D.1: <0.063 mm fraction till INAA data

Element	Location	Au	As	Sb	Mo	Co	Ba	Br	Ca	Cr	Fe	Hf	Na	Rb	Sc	Ta	Th	U	La
Units		ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit		2	0.5	0.1	1	1	50	0.5	1	5	0.01	1	0.01	15	0.1	0.5	0.2	0.5	0.5
96MPB6079C	Pamour No. 3 pit	<2	1.7	<0.1	<1	6	390	1.2	5	47	1.34	5	1.18	44	5.0	<0.5	4.3	<0.5	17
96MPB6079D	Pamour No. 3 pit	<2	2.3	<0.1	<1	5	350	1.6	5	47	1.33	4	1.16	26	4.9	<0.5	4.4	0.6	17
96MPB6079E	Pamour No. 3 pit	6	2.0	0.1	<1	5	380	1.5	6	45	1.26	4	1.14	31	4.7	<0.5	4.0	0.9	16
96MPB6079F	Pamour No. 3 pit	30	2.7	0.2	<1	5	330	<0.5	6	45	1.29	4	1.13	30	4.7	<0.5	4.2	1.1	17
96MPB6079G	Pamour No. 3 pit	<2	1.9	<0.1	<1	5	370	1.5	6	44	1.27	4	1.09	46	4.7	<0.5	4.1	0.9	16
96MPB6080A	Pamour No. 5 pit	250	12.0	0.1	<1	7	290	1.1	5	68	1.43	4	0.99	39	5.3	<0.5	3.9	1.0	16
96MPB6080B	Pamour No. 5 pit	105	7.7	0.1	<1	7	340	1.4	6	56	1.28	4	1.06	38	5.0	<0.5	3.9	<0.5	16
96MPB6080C	Pamour No. 5 pit	58	6.2	0.1	<1	6	400	1.8	6	59	1.32	4	1.11	44	4.9	<0.5	4.3	<0.5	17
96MPB6080D	Pamour No. 5 pit	<2	4.0	0.1	<1	6	370	1.2	5	65	1.27	4	1.11	39	4.7	<0.5	3.7	1.0	16
96MPB6080E	Pamour No. 5 pit	35	2.3	<0.1	<1	3	170	<0.5	2	22	0.60	2	0.53	24	2.2	<0.5	1.8	<0.5	7.1
96MPB6080F	Pamour No. 5 pit	18	4.6	<0.1	<1	6	300	1.3	5	61	1.29	5	1.17	33	4.9	0.7	4.2	0.8	17
96MPB6080G	Pamour No. 5 pit	7	7.4	<0.1	1	7	290	1.1	5	83	1.41	4	1.15	43	5.2	<0.5	4.0	0.7	16
96MPB6080H	Pamour No. 5 pit	<2	2.7	<0.1	<1	5	370	1.5	5	45	1.31	4	1.22	40	4.8	0.7	4.3	0.9	17
96MPB6080I	Pamour No. 5 pit	3	2.2	<0.1	<1	5	300	1.5	5	46	1.37	4	1.20	41	4.8	0.8	4.4	1.3	17
96MPB6080J	Pamour No. 5 pit	4	1.7	<0.1	<1	5	360	1.1	5	41	1.31	4	1.17	40	4.7	<0.5	4.4	<0.5	17
96MPB6080K	Pamour No. 5 pit	2	1.5	<0.1	<1	5	320	1.3	4	43	1.27	4	1.16	31	4.6	<0.5	4.3	0.9	16
96MPB6080L	Pamour No. 5 pit	<2	1.9	<0.1	<1	5	320	1.5	5	41	1.32	4	1.21	42	4.8	<0.5	4.3	0.7	17
96MPB6080M	Pamour No. 5 pit	<2	1.1	0.1	<1	4	340	1.2	5	41	1.17	5	1.26	30	4.4	<0.5	3.8	<0.5	16
96MPB6080N	Pamour No. 5 pit	2	1.1	<0.1	<1	3	370	1.4	4	42	0.93	5	1.29	31	4.0	<0.5	3.0	0.9	14
96MPB6114	Bell Creek Mine	9	2.2	<0.1	4	8	420	<0.5	<1	54	1.88	6	1.43	33	9.3	<0.5	3.3	<0.5	13
96MPB6115	Bell Creek Mine	<2	7.9	<0.1	3	5	380	2.9	<1	46	1.15	8	1.45	42	5.5	0.6	4.2	<0.5	15
96MPB6116	Bell Creek Mine	26	22.0	0.1	<1	8	350	2.4	1	42	1.23	5	1.55	47	5.7	<0.5	3.8	1.4	14
96MPB6117	Bell Creek Mine Rd.	3	1.8	<0.1	<1	6	390	1.3	4	44	1.21	5	1.28	<15	5.1	<0.5	3.6	1.4	15

APPENDIX D.1: <0.063 mm fraction till INAA data

Element	Location	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass
Units		ppm	ppm	ppm	ppm	ppm	ppm	ppm	g
Detection Limit		3	5	0.1	0.2	0.5	0.2	0.05	
93MPB425	Pamour No. 2 pit	not analyzed							
93MPB426	Pamour No. 2 pit	not analyzed							
93MPB427	Pamour No. 2 pit	not analyzed							
93MPB428	Pamour No. 2 pit	not analyzed							
93MPB429	Pamour No. 2 pit	not analyzed							
94MPB001	Night Hawk Lake pit	not analyzed							
94MPB002	Night Hawk Lake pit	not analyzed							
94MPB003	Night Hawk Lake pit	not analyzed							
94MPB004	Night Hawk Lake pit	not analyzed							
94MPB014	Hislop pit	not analyzed							
94MPB015	Hislop pit	not analyzed							
94MPB016	Hislop pit	not analyzed							
94MPB017	Hislop pit	not analyzed							
94MPB018	Hislop pit	not analyzed							
94MPB019	Hislop pit	not analyzed							
94MPB020	Hislop pit	not analyzed							
94MPB021	Hislop pit	not analyzed							
94MPB022	Hislop pit	not analyzed							
94MPB023	Hislop pit	not analyzed							
94MPB024	Hislop pit	not analyzed							
94MPB025	Hislop pit	not analyzed							
94MPB026	Hislop pit	not analyzed							
94MPB027	Hislop pit	not analyzed							
94MPB028	Hislop pit	not analyzed							
94MPB029	Hislop pit	not analyzed							
96MPB6073	Davidson-Tisdale Mine	24	10	1.9	0.5	<0.5	0.8	0.15	41.27
96MPB6074	Davidson-Tisdale Mine	33	10	2.5	0.6	<0.5	1.1	0.22	41.37
96MPB6075	Davidson-Tisdale Mine	37	15	3.0	0.8	<0.5	1.0	0.22	41.57
96MPB6076	Davidson-Tisdale Mine	26	10	2.1	0.6	<0.5	0.9	0.17	41.02
96MPB6091	Davidson-Tisdale Mine	28	9	1.9	0.5	0.7	0.8	0.16	37.33
96MPB6069A	Pamour No. 3 pit	26	9	2.0	0.6	<0.5	0.8	0.17	39.07
96MPB6069B	Pamour No. 3 pit	27	11	2.1	0.6	<0.5	0.9	0.14	38.75
96MPB6079A	Pamour No. 3 pit	29	10	2.2	0.6	<0.5	0.9	0.15	38.58
96MPB6079B	Pamour No. 3 pit	28	11	2.2	0.6	<0.5	0.8	0.17	37.75

APPENDIX D.1: <0.063 mm fraction till INAA data

Element	Location	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass
Units		ppm	ppm	ppm	ppm	ppm	ppm	ppm	g
Detection Limit		3	5	0.1	0.2	0.5	0.2	0.05	
96MPB6079C	Pamour No. 3 pit	28	10	2.2	0.6	<0.5	0.9	0.14	38.19
96MPB6079D	Pamour No. 3 pit	28	9	2.2	0.6	<0.5	0.9	0.15	36.21
96MPB6079E	Pamour No. 3 pit	27	10	2.0	0.6	<0.5	0.8	0.15	38.73
96MPB6079F	Pamour No. 3 pit	27	10	2.1	0.5	<0.5	0.9	0.18	37.42
96MPB6079G	Pamour No. 3 pit	28	10	2.0	0.5	<0.5	0.9	0.16	36.06
96MPB6080A	Pamour No. 5 pit	26	10	2.1	0.6	<0.5	0.7	0.16	36.84
96MPB6080B	Pamour No. 5 pit	28	9	2.1	0.5	<0.5	0.8	0.17	36.01
96MPB6080C	Pamour No. 5 pit	27	12	2.1	0.5	<0.5	0.8	0.18	39.31
96MPB6080D	Pamour No. 5 pit	26	11	2.0	0.5	<0.5	0.8	0.17	37.37
96MPB6080E	Pamour No. 5 pit	11	8	0.8	0.2	<0.5	0.3	<0.05	38.75
96MPB6080F	Pamour No. 5 pit	27	12	2.1	0.6	<0.5	0.9	0.18	37.89
96MPB6080G	Pamour No. 5 pit	25	9	2.0	0.5	<0.5	0.8	0.15	37.37
96MPB6080H	Pamour No. 5 pit	27	13	2.1	0.6	<0.5	0.8	0.14	38.11
96MPB6080I	Pamour No. 5 pit	27	11	2.1	0.6	<0.5	0.8	0.16	38.12
96MPB6080J	Pamour No. 5 pit	27	10	2.1	0.6	<0.5	0.9	0.16	37.06
96MPB6080K	Pamour No. 5 pit	26	10	2.0	0.5	<0.5	0.8	0.14	36.52
96MPB6080L	Pamour No. 5 pit	27	10	2.1	0.6	<0.5	0.8	0.18	37.31
96MPB6080M	Pamour No. 5 pit	26	9	2.0	0.6	<0.5	0.9	0.15	39.73
96MPB6080N	Pamour No. 5 pit	22	9	1.8	0.5	<0.5	0.8	0.17	41.60
96MPB6114	Bell Creek Mine	21	8	1.9	0.4	<0.5	1.2	0.21	38.61
96MPB6115	Bell Creek Mine	27	12	2.2	0.6	<0.5	1.1	0.2	41.56
96MPB6116	Bell Creek Mine	29	11	2.0	0.6	<0.5	0.9	0.12	41.60
96MPB6117	Bell Creek Mine Rd.	23	8	1.9	0.6	<0.5	0.8	0.17	38.79

Appendix D.2: <0.063 mm till ICP-ES data

Sample	Location	Au	Ag	As	Hg	Cu	Pb	Zn	Mo	Ni	Co	Cd	Fe	Mn	Ba	Cr	V	La	Al	Mg	Ca	Na
Units		ppb	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	%	%	%
Detection limit		1	0.2	5	5	1	2	1	1	1	1	0.2	0.01	1	1	1	1	1	0.01	0.01	0.01	0.01
93MPB425	Pamour No. 2 pit	4	<0.2	8	12	56	14	80	1	123	37	0.4	2.93	2062	34	171	43	20	1.69	1.85	4.23	0.02
93MPB426	Pamour No. 2 pit	4	<0.2	<5	<5	21	6	25	<1	47	9	<0.2	1.16	508	18	62	25	15	0.69	1.63	3.74	0.02
93MPB427	Pamour No. 2 pit	14	<0.2	<5	25	14	6	20	<1	34	6	<0.2	0.86	306	29	42	18	15	0.64	2.05	5.66	0.02
93MPB428	Pamour No. 2 pit	2	<0.2	<5	28	14	5	15	<1	29	5	0.2	0.67	221	17	41	15	14	0.42	2.02	5.19	0.02
93MPB429	Pamour No. 2 pit	2	<0.2	<5	14	10	6	22	1	21	4	0.3	0.84	264	25	41	19	15	0.62	2.27	6.05	0.02
94MPB001	Night Hawk Lake pit	<1	<0.2	<5	28	12	8	28	1	23	5	0.4	1.05	292	32	36	22	16	0.80	2.12	5.99	0.03
94MPB002	Night Hawk Lake pit	2	<0.2	<5	12	13	8	32	1	25	5	<0.2	1.15	306	36	42	24	17	0.88	2.15	6.13	0.03
94MPB003	Night Hawk Lake pit	<1	<0.2	<5	28	13	7	29	<1	24	5	<0.2	1.18	321	39	37	23	17	0.92	2.17	6.33	0.03
94MPB004	Night Hawk Lake pit	1	<0.2	<5	39	13	9	30	1	23	5	0.3	1.13	312	35	37	23	18	0.87	2.22	6.37	0.03
94MPB014	Hislop pit	5	<0.2	<5	19	23	8	32	<1	40	9	<0.2	1.53	378	40	48	31	18	1.11	0.75	0.60	0.04
94MPB015	Hislop pit	6	<0.2	<5	10	24	9	25	<1	49	10	<0.2	1.36	339	26	39	28	13	1.25	0.64	0.62	0.03
94MPB016	Hislop pit	10	<0.2	<5	<5	24	8	23	1	48	9	<0.2	1.29	365	30	38	27	13	1.15	0.57	0.54	0.03
94MPB017	Hislop pit	10	<0.2	6	65	28	13	22	3	33	6	0.3	2.28	139	27	43	41	10	2.31	0.40	0.41	0.02
94MPB018	Hislop pit	9	<0.2	<5	23	12	6	17	<1	54	8	<0.2	1.20	446	20	41	23	16	0.94	0.39	0.47	0.03
94MPB019	Hislop pit	1324	<0.2	<5	22	37	12	28	2	180	20	<0.2	3.39	1535	34	147	32	21	1.48	0.80	0.56	0.02
94MPB020	Hislop pit	36	<0.2	<5	28	24	9	22	1	159	18	<0.2	2.52	1099	23	141	26	22	1.00	0.80	0.50	0.03
94MPB021	Hislop pit	11	<0.2	<5	<5	16	6	23	<1	27	6	0.4	1.16	278	27	41	26	19	0.87	0.50	0.46	0.03
94MPB022	Hislop pit	17	<0.2	<5	10	22	11	25	2	175	20	<0.2	2.22	812	24	179	30	14	0.95	1.64	1.67	0.03
94MPB023	Hislop pit	242	<0.2	<5	7	31	8	27	1	172	24	<0.2	2.57	917	20	190	32	16	0.91	1.05	0.56	0.02
94MPB024	Hislop pit	11	<0.2	<5	9	21	7	20	1	32	8	<0.2	1.18	361	25	37	25	17	0.69	0.52	0.61	0.03
94MPB025	Hislop pit	40	<0.2	<5	23	32	9	33	1	77	16	0.3	1.50	544	27	85	27	16	0.76	1.72	3.16	0.03
94MPB026	Hislop pit	22	<0.2	<5	<5	13	5	15	2	50	7	0.5	0.80	229	16	28	18	14	0.50	1.54	3.25	0.03
94MPB027	Hislop pit	16	<0.2	<5	12	19	6	19	1	125	19	<0.2	1.24	458	17	104	23	13	0.56	1.69	3.27	0.02
94MPB028	Hislop pit	8	<0.2	<5	<5	18	6	24	<1	29	6	<0.2	1.22	288	35	33	27	13	0.90	1.58	2.08	0.04
94MPB029	Hislop pit	12	<0.2	<5	<5	17	7	28	1	26	5	<0.2	1.31	288	50	37	28	15	0.98	1.15	1.41	0.04
96MPB6073	Davidson-Tisdale Mine	NA	0.8	<5	11	10	6	16	<1	18	4	<0.2	0.91	205	20	30	15	13	0.60	2.26	5.82	0.04
96MPB6074	Davidson-Tisdale Mine	NA	0.3	<5	<5	21	9	19	<1	36	7	<0.2	1.15	266	37	45	21	18	0.80	0.34	0.35	<0.01
96MPB6075	Davidson-Tisdale Mine	NA	0.4	6	15	30	9	25	<1	44	12	<0.2	1.90	402	28	57	26	25	0.95	0.66	0.86	<0.01
96MPB6076	Davidson-Tisdale Mine	NA	0.6	<5	14	12	6	14	<1	20	3	<0.2	0.95	210	19	30	15	15	0.59	2.21	4.33	<0.01
96MPB6091	Davidson-Tisdale Mine	NA	0.3	<5	34	11	4	19	1	21	5	<0.2	1.31	176	34	37	26	17	1.20	0.41	0.31	<0.01
96MPB6069A	Pamour No. 3 pit	NA	0.8	<5	11	13	7	21	<1	19	6	<0.2	1.26	310	47	33	23	17	1.00	2.20	6.80	0.04
96MPB6069B	Pamour No. 3 pit	NA	0.8	<5	28	16	7	26	<1	22	6	<0.2	1.56	362	59	38	26	19	1.29	2.39	6.49	0.05
96MPB6079A	Pamour No. 3 pit	NA	0.8	<5	13	13	7	23	<1	20	6	<0.2	1.43	329	51	34	24	17	1.13	2.22	5.85	0.05
96MPB6079B	Pamour No. 3 pit	NA	0.8	10	20	14	7	22	<1	20	6	<0.2	1.31	314	43	34	22	17	1.07	2.22	6.41	0.04
96MPB6079C	Pamour No. 3 pit	NA	0.8	<5	22	13	7	22	<1	21	6	<0.2	1.25	297	46	35	23	16	1.07	2.08	6.56	0.05
96MPB6079D	Pamour No. 3 pit	NA	0.8	<5	17	12	8	20	<1	18	5	<0.2	1.33	301	41	31	21	16	0.98	2.24	6.20	0.04
96MPB6079E	Pamour No. 3 pit	NA	0.8	<5	24	12	6	20	<1	18	5	<0.2	1.23	296	41	31	21	15	0.97	2.21	6.17	0.04
96MPB6079F	Pamour No. 3 pit	NA	0.8	<5	25	13	7	21	<1	19	6	<0.2	1.28	332	45	33	22	16	1.04	2.32	5.89	0.04
96MPB6079G	Pamour No. 3 pit	NA	0.8	<5	25	13	6	21	<1	19	6	<0.2	1.33	339	44	32	22	16	1.01	2.29	5.98	0.04

Appendix D.2: <0.063 mm till ICP-ES data

Sample	Location	Au	Ag	As	Hg	Cu	Pb	Zn	Mo	Ni	Co	Cd	Fe	Mn	Ba	Cr	V	La	Al	Mg	Ca	Na
Units		ppb	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	%	%	%
Detection limit		1	0.2	5	5	1	2	1	1	1	1	0.2	0.01	1	1	1	1	1	0.01	0.01	0.01	0.01
96MPB6080A	Pamour No. 5 pit	NA	0.7	17	20	20	9	31	<1	35	9	<0.2	1.50	456	33	48	20	16	0.98	2.09	6.01	<0.01
96MPB6080B	Pamour No. 5 pit	NA	0.8	10	21	17	8	27	<1	28	9	0.2	1.41	348	37	41	21	16	0.96	2.18	6.55	<0.01
96MPB6080C	Pamour No. 5 pit	NA	0.8	8	19	13	7	23	<1	24	7	0.2	1.22	297	37	40	20	15	0.87	2.07	6.15	<0.01
96MPB6080D	Pamour No. 5 pit	NA	0.7	6	20	12	6	21	<1	28	7	<0.2	1.24	291	39	54	22	16	0.90	2.23	6.37	0.04
96MPB6080E	Pamour No. 5 pit	NA	0.8	7	14	12	6	23	<1	24	7	<0.2	1.29	285	42	39	22	16	0.91	2.06	6.02	0.04
96MPB6080F	Pamour No. 5 pit	NA	0.8	6	20	12	6	21	<1	25	7	<0.2	1.19	264	40	46	21	15	0.88	2.01	5.97	0.04
96MPB6080G	Pamour No. 5 pit	NA	0.7	10	24	15	6	25	<1	62	10	<0.2	1.32	292	42	69	24	16	1.04	1.91	6.78	0.04
96MPB6080H	Pamour No. 5 pit	NA	0.7	<5	17	12	6	23	<1	18	6	<0.2	1.29	275	50	30	22	17	1.00	1.97	5.89	0.05
96MPB6080I	Pamour No. 5 pit	NA	0.8	<5	22	11	6	23	<1	18	6	<0.2	1.34	282	45	30	23	16	1.01	2.05	6.52	0.05
96MPB6080J	Pamour No. 5 pit	NA	0.7	<5	21	12	6	23	<1	17	5	0.2	1.29	274	48	29	23	17	1.04	1.96	5.88	0.05
96MPB6080K	Pamour No. 5 pit	NA	0.7	<5	9	11	6	23	<1	17	6	<0.2	1.24	261	46	30	23	16	0.98	1.84	6.34	0.05
96MPB6080L	Pamour No. 5 pit	NA	0.7	<5	24	11	6	23	<1	17	6	<0.2	1.29	269	48	30	23	16	1.04	1.92	5.81	0.05
96MPB6080M	Pamour No. 5 pit	NA	0.8	<5	14	9	5	17	<1	14	5	<0.2	1.11	223	34	24	19	15	0.77	1.86	5.77	0.05
96MPB6080N	Pamour No. 5 pit	NA	0.6	<5	14	8	4	10	<1	13	3	<0.2	0.79	134	19	25	13	13	0.48	1.68	4.94	0.04
96MPB6114	Bell Creek Mine	NA	0.3	<5	18	30	3	41	2	35	10	<0.2	2.08	214	15	36	63	12	1.42	0.74	0.28	<0.01
96MPB6115	Bell Creek Mine	NA	<0.2	10	8	11	4	11	<1	32	6	<0.2	0.94	107	15	20	17	14	0.83	0.24	0.37	<0.01
96MPB6116	Bell Creek Mine	NA	<0.2	33	<5	13	5	14	<1	30	12	<0.2	1.06	273	12	21	15	12	0.81	0.23	0.25	<0.01
96MPB6117	Bell Creek Mine Rd.	NA	0.7	<5	10	15	4	22	<1	23	5	0.2	1.12	208	28	26	23	13	0.73	1.81	5.66	0.02

Appendix D.2: <0.063 mm till ICP-ES data

Sample	Location	K	Sr	Y	Ga	Li	Nb	Sc	Ti	Zr
Units		%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Detection limit		0.01	1	1	2	1	1	5	0.01	1
93MPB425	Pamour No. 2 pit	0.14	36	7	13	12	7	<5	0.09	20
93MPB426	Pamour No. 2 pit	0.05	34	5	6	5	5	<5	0.07	15
93MPB427	Pamour No. 2 pit	0.07	37	5	5	6	5	<5	0.06	14
93MPB428	Pamour No. 2 pit	0.04	34	4	4	4	4	<5	0.05	12
93MPB429	Pamour No. 2 pit	0.08	42	5	5	7	5	<5	0.07	9
94MPB001	Night Hawk Lake pit	0.12	44	5	6	10	5	<5	0.07	12
94MPB002	Night Hawk Lake pit	0.14	46	5	6	11	5	<5	0.08	12
94MPB003	Night Hawk Lake pit	0.15	50	5	6	12	5	<5	0.08	13
94MPB004	Night Hawk Lake pit	0.14	48	5	6	11	5	<5	0.08	13
94MPB014	Hislop pit	0.08	29	7	8	9	8	<5	0.11	10
94MPB015	Hislop pit	0.07	24	5	7	7	6	<5	0.10	6
94MPB016	Hislop pit	0.07	25	5	8	6	6	<5	0.10	7
94MPB017	Hislop pit	0.04	17	4	6	7	7	<5	0.07	3
94MPB018	Hislop pit	0.05	21	6	6	5	7	<5	0.08	4
94MPB019	Hislop pit	0.07	25	9	9	8	9	6	0.08	3
94MPB020	Hislop pit	0.06	23	10	7	7	11	7	0.07	4
94MPB021	Hislop pit	0.07	24	7	6	7	7	<5	0.09	9
94MPB022	Hislop pit	0.07	26	6	8	7	7	5	0.08	7
94MPB023	Hislop pit	0.05	20	7	7	6	8	6	0.07	8
94MPB024	Hislop pit	0.05	24	7	7	6	7	<5	0.09	9
94MPB025	Hislop pit	0.07	32	6	7	7	6	<5	0.08	9
94MPB026	Hislop pit	0.04	31	5	5	4	5	<5	0.07	7
94MPB027	Hislop pit	0.04	29	5	6	5	5	<5	0.07	7
94MPB028	Hislop pit	0.07	28	6	7	7	6	<5	0.09	11
94MPB029	Hislop pit	0.08	30	6	7	9	6	<5	0.10	10
96MPB6073	Davidson-Tisdale Mine	0.06	42	4	<2	6	<1	<5	0.07	7
96MPB6074	Davidson-Tisdale Mine	0.07	14	7	<2	7	<1	<5	0.08	6
96MPB6075	Davidson-Tisdale Mine	0.07	14	7	<2	8	<1	<5	0.08	5
96MPB6076	Davidson-Tisdale Mine	0.06	31	5	<2	6	<1	<5	0.07	8
96MPB6091	Davidson-Tisdale Mine	0.05	13	5	2	10	<1	<5	0.09	5
96MPB6069A	Pamour No. 3 pit	0.16	53	4	<2	12	<1	<5	0.08	16
96MPB6069B	Pamour No. 3 pit	0.21	61	5	<2	15	<1	<5	0.09	18
96MPB6079A	Pamour No. 3 pit	0.19	54	4	<2	13	<1	<5	0.09	15
96MPB6079B	Pamour No. 3 pit	0.16	54	5	<2	13	<1	<5	0.08	15
96MPB6079C	Pamour No. 3 pit	0.16	52	5	<2	12	<1	<5	0.08	15
96MPB6079D	Pamour No. 3 pit	0.16	49	5	<2	12	<1	<5	0.08	15
96MPB6079E	Pamour No. 3 pit	0.15	49	4	<2	12	<1	<5	0.08	14
96MPB6079F	Pamour No. 3 pit	0.17	50	5	<2	13	<1	<5	0.08	16
96MPB6079G	Pamour No. 3 pit	0.16	52	5	<2	12	<1	<5	0.08	15

Appendix D.2: <0.063 mm till ICP-ES data

Sample	Location	K	Sr	Y	Ga	Li	Nb	Sc	Ti	Zr
Units		%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
Detection limit		0.01	1	1	2	1	1	5	0.01	1
96MPB6080A	Pamour No. 5 pit	0.13	47	4	<2	11	<1	<5	0.07	17
96MPB6080B	Pamour No. 5 pit	0.12	50	5	<2	11	<1	<5	0.07	17
96MPB6080C	Pamour No. 5 pit	0.11	48	5	<2	11	<1	<5	0.07	14
96MPB6080D	Pamour No. 5 pit	0.12	51	5	<2	11	<1	<5	0.07	14
96MPB6080E	Pamour No. 5 pit	0.12	48	5	<2	11	<1	<5	0.07	14
96MPB6080F	Pamour No. 5 pit	0.11	49	5	<2	11	<1	<5	0.07	13
96MPB6080G	Pamour No. 5 pit	0.12	51	5	<2	12	<1	<5	0.07	14
96MPB6080H	Pamour No. 5 pit	0.16	49	5	<2	13	<1	<5	0.08	14
96MPB6080I	Pamour No. 5 pit	0.17	50	5	<2	14	<1	<5	0.08	13
96MPB6080J	Pamour No. 5 pit	0.17	51	5	<2	14	<1	<5	0.08	14
96MPB6080K	Pamour No. 5 pit	0.16	49	5	<2	13	<1	<5	0.08	13
96MPB6080L	Pamour No. 5 pit	0.16	51	5	<2	13	<1	<5	0.08	13
96MPB6080M	Pamour No. 5 pit	0.12	42	4	<2	10	<1	<5	0.08	10
96MPB6080N	Pamour No. 5 pit	0.05	34	4	<2	5	<1	<5	0.06	7
96MPB6114	Bell Creek Mine	0.02	9	4	3	13	<1	6	0.07	2
96MPB6115	Bell Creek Mine	0.03	11	4	<2	5	<1	<5	0.04	<1
96MPB6116	Bell Creek Mine	0.03	7	4	<2	5	<1	<5	0.04	<1
96MPB6117	Bell Creek Mine Rd.	0.07	41	4	<2	7	<1	<5	0.07	10

Appendix E. Gold grain data

Page

Appendix E.1 Gold grain abundances and normalized counts

SAMPLE	LOCATION	NUMBER OF GOLD GRAINS				TOTAL WEIGHT <1.7 mm	CALC NUMBER OF GOLD GRAINS	CALC Au ppb	ACTUAL AU ppb	Ratio ACTUAL/ CALC	REMARKS
		TOTAL	Reshaped	Modified	Pristine	(kg, wet)	/10 kg		(INAA)	Au ppb	
93MPB425	Pamour No. 2 pit	9	6	3	0	4.5	20	187	NA		No sulphides
93MPB426	Pamour No. 2 pit	6	2	2	2	5.2	12	207	NA		
93MPB427	Pamour No. 2 pit	15	6	5	4	4.8	31	234	NA		
93MPB428	Pamour No. 2 pit	8	6	0	2	5.3	15	23	NA		
93MPB429	Pamour No. 2 pit	3	1	1	1	5.7	5	9	NA		
94MPB001	Night Hawk Lake pit	4	4	0	0	6.9	6	189	674	4	0.5% pyrite
94MPB002	Night Hawk Lake pit	8	7	1	0	7.2	11	486	14600	30	0.5% pyrite
94MPB003	Night Hawk Lake pit	5	5	0	0	5.7	9	12	112	9	0.5% pyrite
94MPB004	Night Hawk Lake pit	7	6	1	0	6.1	11	20230	4120	0.2	0.5% pyrite
94MPB014	Hislop pit	7	6	0	1	6.8	10	293	781	3	No sulphides
94MPB015	Hislop pit	8	8	0	0	5.5	15	270	1090	4	No sulphides
94MPB016	Hislop pit	14	8	2	4	6.0	23	257	256	1	No sulphides
94MPB017	Hislop pit	1	0	0	1	2.3	4	714	1060	1	No sulphides
94MPB018	Hislop pit	56	3	6	47	5.6	100	3818	12500	3	1% py, 0.1% cpy, 0.1% Im/goe
94MPB019	Hislop pit	167	0	0	167	4.5	371	8989	23000	3	5% Im/goe
94MPB020	Hislop pit	9	2	7	0	4.6	20	108	1090	10	No sulphides
94MPB021	Hislop pit	12	8	0	4	6.1	20	945	5000	5	No sulphides
94MPB022	Hislop pit	23	2	7	14	4.1	56	1565	3430	2	No sulphides
94MPB023	Hislop pit	52	9	14	29	4.7	111	10201	10200	1	No sulphides
94MPB024	Hislop pit	9	4	4	1	4.2	21	566	4170	7	No sulphides
94MPB025	Hislop pit	45	3	29	13	4.6	98	54886	23700	0.4	No sulphides
94MPB026	Hislop pit	12	0	8	4	4.9	24	2625	8510	3	No sulphides
94MPB027	Hislop pit	9	0	3	6	4.3	21	131	2000	15	No sulphides
94MPB028	Hislop pit	9	4	2	3	7.5	12	382	1010	3	No sulphides
94MPB029	Hislop pit	13	1	6	6	6.9	19	695	568	1	No sulphides
96MPB6073	Davidson-Tisdale Mine	8	8	0	0	12.8	6	148	269	2	No sulphides
96MPB6074	Davidson-Tisdale Mine	10	10	0	0	9.8	10	267	298	1	No sulphides
96MPB6075	Davidson-Tisdale Mine	54	8	7	39	10.8	50	289	487	2	No sulphides
96MPB6076	Davidson-Tisdale Mine	6	4	0	2	11.1	5	55	51	1	No sulphides
96MPB6091	Davidson-Tisdale Mine	2	1	1	0	10.0	2	13	64	5	No sulphides
96MPB6069A	Pamour No. 3 pit	2	2	0	0	10.1	2	14	40	3	No sulphides
96MPB6069B	Pamour No. 3 pit	6	4	2	0	9.3	6	167	248	1	No sulphides
96MPB6079A	Pamour No. 3 pit	no sample									

Appendix E.1 Gold grain abundances and normalized counts

SAMPLE	LOCATION	NUMBER OF GOLD GRAINS				TOTAL WEIGHT <1.7 mm (kg, wet)	CALC NUMBER OF GOLD GRAINS /10 kg	CALC Au ppb	ACTUAL AU ppb (INAA)	Ratio ACTUAL/ CALC Au ppb	REMARKS
		TOTAL	Reshaped	Modified	Pristine						
96MPB6079B	Pamour No. 3 pit	no sample									
96MPB6079C	Pamour No. 3 pit	no sample									
96MPB6079D	Pamour No. 3 pit	no sample									
96MPB6079E	Pamour No. 3 pit	no sample									
96MPB6079F	Pamour No. 3 pit	no sample									
96MPB6079G	Pamour No. 3 pit	no sample									
96MPB6080A	Pamour No. 5 pit	832	0	0	832	9.5	880	14847	20200	1	0.1% py
96MPB6080B	Pamour No. 5 pit	no sample									
96MPB6080C	Pamour No. 5 pit	no sample									
96MPB6080D	Pamour No. 5 pit	133	0	5	128	11.2	119	719	2530	4	0.1% py
96MPB6080E	Pamour No. 5 pit	no sample									
96MPB6080F	Pamour No. 5 pit	no sample									
96MPB6080G	Pamour No. 5 pit	no sample									
96MPB6080H	Pamour No. 5 pit	20	7	0	13	10.8	19	255	212	1	100 grains of py
96MPB6080I	Pamour No. 5 pit	no sample									
96MPB6080J	Pamour No. 5 pit	no sample									
96MPB6080K	Pamour No. 5 pit	no sample									
96MPB6080L	Pamour No. 5 pit	8	6	0	2	10.2	8	21	52	3	No sulphides
96MPB6080M	Pamour No. 5 pit	12	6	2	4	8.9	13	9	<5		No sulphides
96MPB6080N	Pamour No. 5 pit	2	2	0	0	11.6	2	36	39	1	No sulphides
96MPB6114	Bell Creek Mine	95	1	2	92	11.6	82	170	276	2	No sulphides
96MPB6115	Bell Creek Mine	17	7	5	5	10.7	16	49	108	2	No sulphides
96MPB6116	Bell Creek Mine	76	2	8	66	10.0	76	1389	1140	1	No sulphides
96MPB6117	Bell Creek Mine Rd.	15	15	0	0	12.2	12	458	266	1	No sulphides

NA = not analyzed

py = pyrite Lm/goe = limonite/goethite
cpy = chalcopyrite

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS			TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
				RESHAPED	MODIFIED	PRISTINE			
93MPB425	Pamour No. 2	15 X 15	3		1		1		
93MPB425	Pamour No. 2	50 X 50	10	1			1		
93MPB425	Pamour No. 2	50 X 75	13	1			1		
93MPB425	Pamour No. 2	50 X 100	15	1			1		
93MPB425	Pamour No. 2	50 X 125	18		1		1		
93MPB425	Pamour No. 2	75 X 75	15	1			1		
93MPB425	Pamour No. 2	75 X 100	18	2	1		3		
							9	187	
93MPB426	Pamour No. 2	25 X 50	8			1	1		
93MPB426	Pamour No. 2	50 X 75	13	2	1		3		
93MPB426	Pamour No. 2	75 X 100	50		1		1		
93MPB426	Pamour No. 2	75 X 125	20			1	1		
							6	207	
93MPB427	Pamour No. 2	25 X 25	5	1	2	3	6		
93MPB427	Pamour No. 2	25 X 50	8	3	2	1	6		
93MPB427	Pamour No. 2	50 X 50	10	1			1		
93MPB427	Pamour No. 2	50 X 75	13	1			1		
93MPB427	Pamour No. 2	100 X 175	27		1		1		
							15	234	
93MPB428	Pamour No. 2	15 X 15	3			1	1		
93MPB428	Pamour No. 2	25 X 25	5	2		1	3		
93MPB428	Pamour No. 2	25 X 50	8	3			3		
93MPB428	Pamour No. 2	50 X 75	13	1			1		
							8	23	
93MPB429	Pamour No. 2	25 X 25	5	1			1		
93MPB429	Pamour No. 2	25 X 50	8			1	1		
93MPB429	Pamour No. 2	25 X 75	10		1		1		
							3	9	
94MPB001	Night Hawk Lake pit	25 X 25	5	1			1		0.5% pyrite
94MPB001	Night Hawk Lake pit	25 X 50	8	1			1		
94MPB001	Night Hawk Lake pit	50 X 75	13	2			2		
							4	189	

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (μm)	CALCULATED GRAIN THICKNESS (μm)	NUMBER OF GOLD GRAINS RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
94MPB002	Night Hawk Lake pit	15 X 15	3	1			1		0.5% pyrite
94MPB002	Night Hawk Lake pit	25 X 25	5	1	1		2		
94MPB002	Night Hawk Lake pit	25 X 50	8	2			2		
94MPB002	Night Hawk Lake pit	50 X 50	10	1			1		
94MPB002	Night Hawk Lake pit	50 X 75	13	1			1		
94MPB002	Night Hawk Lake pit	125 X 150	25	1			1		
							8	486	
94MPB003	Night Hawk Lake pit	15 X 15	3	2			2		0.5% pyrite
94MPB003	Night Hawk Lake pit	25 X 25	5	3			3		
							5	12	
94MPB004	Night Hawk Lake pit	25 X 25	5	3			3		0.5% pyrite
94MPB004	Night Hawk Lake pit	25 X 50	8	2	1		3		
94MPB004	Night Hawk Lake pit	350 X 550	125	1			1		
							7	20230	
94MPB014	Hislop pit	25 X 25	5	2			2		
94MPB014	Hislop pit	25 X 75	10			1	1		no sulphide minerals
94MPB014	Hislop pit	25 X 100	13	1			1		
94MPB014	Hislop pit	50 X 50	10	2			2		
94MPB014	Hislop pit	50 X 100	15	1			1		
							7	293	
94MPB015	Hislop pit	25 X 25	5	3			3		
94MPB015	Hislop pit	25 X 50	8	2			2		no sulphide minerals
94MPB015	Hislop pit	25 X 75	10	1			1		
94MPB015	Hislop pit	50 X 100	15	1			1		
94MPB015	Hislop pit	75 X 100	18	1			1		
							8	270	
94MPB016	Hislop pit	15 X 15	3	2		1	3		
94MPB016	Hislop pit	25 X 25	5	4		1	5		no sulphide minerals
94MPB016	Hislop pit	25 X 50	8	1		2	3		
94MPB016	Hislop pit	50 X 50	10	1			1		
94MPB016	Hislop pit	50 X 150	20		1		1		
94MPB016	Hislop pit	75 X 125	20		1		1		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS: RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
							14	257	
94MPB017	Hislop pit	75 X 125	20			1	1	714	no sulphide minerals
94MPB018	Hislop pit	15 X 15	3		2	1	3		1% PYRITE;1% PYRITE;
94MPB018	Hislop pit	25 X 25	5		2	13	15		0.1% CHALCOPYRITE;
94MPB018	Hislop pit	25 X 50	8	1	1	7	9		0.1 % LIMONITE/GOETHITE
94MPB018	Hislop pit	25 X 75	10			3	3		
94MPB018	Hislop pit	25 X 100	13			3	3		
94MPB018	Hislop pit	25 X 125	15			1	1		
94MPB018	Hislop pit	50 X 50	10			6	6		
94MPB018	Hislop pit	50 X 75	13			1	1		
94MPB018	Hislop pit	50 X 100	15	2			2		
94MPB018	Hislop pit	50 X 125	18			4	4		
94MPB018	Hislop pit	75 X 100	18			2	2		
94MPB018	Hislop pit	75 X 125	20			1	1		
94MPB018	Hislop pit	100 X 100	20			1	1		
94MPB018	Hislop pit	100 X 125	22			2	2		
94MPB018	Hislop pit	100 X 175	27			1	1		
94MPB018	Hislop pit	150 X 150	29			1	1		
94MPB018	Hislop pit	150 X 225	75		1		1		
							56	3818	
94MPB019	Hislop pit	15 X 15	3			13	13		5 % LIMONITE/GOETHITE
94MPB019	Hislop pit	25 X 25	5			41	41		
94MPB019	Hislop pit	25 X 50	8			50	50		
94MPB019	Hislop pit	25 X 75	10			13	13		
94MPB019	Hislop pit	25 X 100	13			5	5		
94MPB019	Hislop pit	25 X 125	15			1	1		
94MPB019	Hislop pit	25 X 150	18			1	1		
94MPB019	Hislop pit	50 X 50	10			17	17		
94MPB019	Hislop pit	50 X 75	13			12	12		
94MPB019	Hislop pit	50 X 100	15			1	1		
94MPB019	Hislop pit	50 X 150	20			1	1		
94MPB019	Hislop pit	75 X 75	15			1	1		
94MPB019	Hislop pit	75 X 125	20			1	1		
94MPB019	Hislop pit	75 X 150	22			2	2		
94MPB019	Hislop pit	75 X 175	25			1	1		
94MPB019	Hislop pit	100 X 100	20			1	1		
94MPB019	Hislop pit	100 X 125	22			1	1		
94MPB019	Hislop pit	100 X 150	25			1	1		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
94MPB019	Hislop pit	100 X 175	27			1	1		
94MPB019	Hislop pit	125 X 175	29			1	1		
94MPB019	Hislop pit	125 X 225	34			1	1		
94MPB019	Hislop pit	175 X 200	125			1	1		
							167	8989	
94MPB020	Hislop pit	15 X 15	3		1		1		
94MPB020	Hislop pit	25 X 25	5	1	3		4		
94MPB020	Hislop pit	25 X 50	8		1		1		
94MPB020	Hislop pit	50 X 50	10		1		1		
94MPB020	Hislop pit	50 X 100	15	1			1		
94MPB020	Hislop pit	75 X 75	15		1		1		
							9	108	
94MPB021	Hislop pit	15 X 15	3			3	3		
94MPB021	Hislop pit	25 X 25	5	1		1	2		no sulphide minerals
94MPB021	Hislop pit	25 X 50	8	2			2		
94MPB021	Hislop pit	25 X 75	10	3			3		
94MPB021	Hislop pit	50 X 100	15	1			1		
94MPB021	Hislop pit	75 X 100	18	1			1		
							12	945	
94MPB022	Hislop pit	10 X 10	2			2	2		
94MPB022	Hislop pit	15 X 15	3		1	4	5		
94MPB022	Hislop pit	15 X 25	4		1	1	2		no sulphide minerals
94MPB022	Hislop pit	25 X 25	5		1	2	3		
94MPB022	Hislop pit	25 X 50	8	1	3	2	6		
94MPB022	Hislop pit	50 X 50	10			1	1		
94MPB022	Hislop pit	50 X 100	15		1	1	2		
94MPB022	Hislop pit	75 X 75	15			1	1		
		125 X 175	29	1			1		
							23	1565	
94MPB023	Hislop pit	10 X 10	2			2	2		
94MPB023	Hislop pit	15 X 15	3		2	3	5		no sulphide minerals
94MPB023	Hislop pit	15 X 25	4		1		1		
94MPB023	Hislop pit	25 X 25	5		5	8	13		
94MPB023	Hislop pit	25 X 50	8		2	6	8		
94MPB023	Hislop pit	25 X 75	10		1	1	2		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS			TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
				RESHAPED	MODIFIED	PRISTINE			
94MPB023	Hislop pit	50 X 50	10	2		3	5		
94MPB023	Hislop pit	50 X 75	13	3	1	3	7		
94MPB023	Hislop pit	50 X 100	15			2	2		
94MPB023	Hislop pit	75 X 75	15	1			1		
94MPB023	Hislop pit	75 X 100	18	1			1		
94MPB023	Hislop pit	75 X 125	20	1	1		2		
94MPB023	Hislop pit	75 X 175	25		1		1		
94MPB023	Hislop pit	100 X 125	22	1			1		
94MPB023	Hislop pit	375 X 400	100			1	1		
							52	10201	
94MPB024	Hislop pit	15 X 15	3	1	1		2		
94MPB024	Hislop pit	25 X 25	5	2	1		3		no sulphide minerals
94MPB024	Hislop pit	25 X 50	8		1		1		
94MPB024	Hislop pit	50 X 50	10			1	1		
94MPB024	Hislop pit	75 X 175	25	1			1		
94MPB024	Hislop pit	100 X 125	22		1		1		
							9	566	
94MPB025	Hislop pit	15 X 15	3			4	4		
94MPB025	Hislop pit	15 X 25	4		3	1	4		no sulphide minerals
94MPB025	Hislop pit	25 X 25	5	1	5	2	8		
94MPB025	Hislop pit	25 X 50	8		7		7		
94MPB025	Hislop pit	25 X 75	10		3		3		
94MPB025	Hislop pit	50 X 50	10		2	2	4		
94MPB025	Hislop pit	50 X 75	13	1	4	1	6		
94MPB025	Hislop pit	50 X 100	15		3	1	4		
94MPB025	Hislop pit	75 X 75	15		1		1		
94MPB025	Hislop pit	75 X 100	18			1	1		
94MPB025	Hislop pit	175 X 400	52		1		1		
94MPB025	Hislop pit	275 X 625	500			1	1		
94MPB025	Hislop pit	300 X 525	70	1			1		
							45	54886	
94MPB026	Hislop pit	10 X 10	2			1	1		
94MPB026	Hislop pit	15 X 15	3		1	1	2		no sulphide minerals
94MPB026	Hislop pit	15 X 25	4		1		1		
94MPB026	Hislop pit	25 X 25	5		2		2		
94MPB026	Hislop pit	25 X 50	8		2		2		
94MPB026	Hislop pit	50 X 50	10			1	1		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS			TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
				RESHAPED	MODIFIED	PRISTINE			
94MPB026	Hislop pit	75 X 100	18		1		1		
94MPB026	Hislop pit	125 X 200	31			1	1		
94MPB026	Hislop pit	150 X 175	31		1		1		
							12	2625	
94MPB027	Hislop pit	15 X 15	3			1	1		
94MPB027	Hislop pit	15 X 25	4		1		1		no sulphide minerals
94MPB027	Hislop pit	25 X 25	5			2	2		
94MPB027	Hislop pit	25 X 50	8		1	2	3		
94MPB027	Hislop pit	50 X 50	10		1		1		
94MPB027	Hislop pit	50 X 75	13			1	1		
							9	131	
94MPB028	Hislop pit	15 X 15	3			2	2		
94MPB028	Hislop pit	25 X 25	5	1		1	2		no sulphide minerals
94MPB028	Hislop pit	50 X 75	13	1	1		2		
94MPB028	Hislop pit	75 X 75	15	1			1		
94MPB028	Hislop pit	75 X 100	18	1			1		
94MPB028	Hislop pit	100 X 150	25		1		1		
							9	382	
94MPB029	Hislop pit	15 X 15	3			1	1		
94MPB029	Hislop pit	15 X 25	4		1	1	2		no sulphide minerals
94MPB029	Hislop pit	25 X 25	5		3	2	5		
94MPB029	Hislop pit	25 X 50	8	1			1		
94MPB029	Hislop pit	50 X 75	13			1	1		
94MPB029	Hislop pit	75 X 75	15		1		1		
94MPB029	Hislop pit	75 X 100	18		1		1		
94MPB029	Hislop pit	75 X 150	22			1	1		
							13	695	
96MPB6069A	Pamour No. 3	25 X 50	8	1			1		no sulphide minerals
96MPB6069A	Pamour No. 3	50 X 75	13	1			1		
							2	14	
96MPB6069B	Pamour No. 3	25 X 25	5	2			2		no sulphide minerals
96MPB6069B	Pamour No. 3	25 X 50	8	1	1		2		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS: RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
96MPB6069B	Pamour No. 3	50 X 75	13		1		1		
96MPB6069B	Pamour No. 3	150 X 175	31	1			1		
							6	167	
96MPB6073	Davidson-Tisdale Mine	15 X 15	3	1			1		no sulphide minerals
96MPB6073	Davidson-Tisdale Mine	25 X 100	13	1			1		
96MPB6073	Davidson-Tisdale Mine	50 X 50	10	1			1		
96MPB6073	Davidson-Tisdale Mine	50 X 75	13	2			2		
96MPB6073	Davidson-Tisdale Mine	75 X 75	15	1			1		
96MPB6073	Davidson-Tisdale Mine	75 X 175	25	1			1		
96MPB6073	Davidson-Tisdale Mine	125 X 175	29	1			1		
							8	148	
96MPB6074	Davidson-Tisdale Mine	25 X 25	5	2			2		no sulphide minerals
96MPB6074	Davidson-Tisdale Mine	25 X 50	8	4			4		
96MPB6074	Davidson-Tisdale Mine	25 X 100	13	1			1		
96MPB6074	Davidson-Tisdale Mine	50 X 50	10	2			2		
96MPB6074	Davidson-Tisdale Mine	75 X 150	22	1			1		
							10	267	
96MPB6075	Davidson-Tisdale Mine	15 X 15	3			4	4		no sulphide minerals
96MPB6075	Davidson-Tisdale Mine	15 X 25	4		2	5	7		
96MPB6075	Davidson-Tisdale Mine	15 X 50	7			3	3		
96MPB6075	Davidson-Tisdale Mine	15 X 75	9			3	3		
96MPB6075	Davidson-Tisdale Mine	25 X 25	5	2	1	5	8		
96MPB6075	Davidson-Tisdale Mine	25 X 50	8		1	4	5		
96MPB6075	Davidson-Tisdale Mine	25 X 75	10		1	1	2		
96MPB6075	Davidson-Tisdale Mine	25 X 100	13			3	3		
96MPB6075	Davidson-Tisdale Mine	25 X 125	15			2	2		
96MPB6075	Davidson-Tisdale Mine	50 X 50	10	1	1	3	5		
96MPB6075	Davidson-Tisdale Mine	50 X 75	13	2	1	3	6		
96MPB6075	Davidson-Tisdale Mine	75 X 100	18	1			1		
96MPB6075	Davidson-Tisdale Mine	75 X 125	20	1		2	3		
96MPB6075	Davidson-Tisdale Mine	125 X 175	29	1		1	2		
							54	289	
96MPB6076	Davidson-Tisdale Mine	10 X 10	2			1	1		no sulphide minerals
96MPB6076	Davidson-Tisdale Mine	25 X 50	8	1			1		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (μm)	CALCULATED GRAIN THICKNESS (μm)	NUMBER OF GOLD GRAINS RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
96MPB6076	Davidson-Tisdale Mine	25 X 75	10	1			1		
96MPB6076	Davidson-Tisdale Mine	50 X 75	13	1		1	2		
96MPB6076	Davidson-Tisdale Mine	50 X 125	18	1			1		
							6	55	
96MPB6091	Davidson-Tisdale Mine	25 X 50	8	1			1		no sulphide minerals
96MPB6091	Davidson-Tisdale Mine	50 X 75	13		1		1		
							2	13	
96MPB6080A	Pamour No. 5	10 X 10	2			30	**30**		0.1% pyrite
96MPB6080A	Pamour No. 5	15 X 15	3			50	**50**		Finer gold counts
96MPB6080A	Pamour No. 5	15 X 25	4			60	**60**		are estimates.
96MPB6080A	Pamour No. 5	15 X 50	7			46	**46**		
96MPB6080A	Pamour No. 5	15 X 75	9			3	**3**		
96MPB6080A	Pamour No. 5	15 X 125	14			1	**1**		
96MPB6080A	Pamour No. 5	25 X 25	5			95	**95**		
96MPB6080A	Pamour No. 5	25 X 50	8			210	**210**		
96MPB6080A	Pamour No. 5	25 X 75	10			73	**73**		
96MPB6080A	Pamour No. 5	25 X 100	13			17	**17**		
96MPB6080A	Pamour No. 5	25 X 125	15			8	**8**		
96MPB6080A	Pamour No. 5	25 X 150	18			5	**5**		
96MPB6080A	Pamour No. 5	50 X 50	10			50	**50**		
96MPB6080A	Pamour No. 5	50 X 75	13			66	**66**		
96MPB6080A	Pamour No. 5	50 X 100	15			38	**38**		
96MPB6080A	Pamour No. 5	50 X 125	18			12	**12**		
96MPB6080A	Pamour No. 5	50 X 150	20			7	**7**		
96MPB6080A	Pamour No. 5	50 X 225	27			2	**2**		
96MPB6080A	Pamour No. 5	75 X 75	15			7	**7**		
96MPB6080A	Pamour No. 5	75 X 100	18			8	**8**		
96MPB6080A	Pamour No. 5	75 X 125	20			7	**7**		
96MPB6080A	Pamour No. 5	75 X 150	22			5	**5**		
96MPB6080A	Pamour No. 5	75 X 200	27			4	**4**		
96MPB6080A	Pamour No. 5	100 X 100	20			1	**1**		
96MPB6080A	Pamour No. 5	100 X 125	22			4	**4**		
96MPB6080A	Pamour No. 5	100 X 150	25			4	**4**		
96MPB6080A	Pamour No. 5	100 X 175	27			4	**4**		
96MPB6080A	Pamour No. 5	100 X 425	48			1	**1**		
96MPB6080A	Pamour No. 5	125 X 125	25			4	**4**		
96MPB6080A	Pamour No. 5	125 X 200	31			2	**2**		
96MPB6080A	Pamour No. 5	125 X 250	36			2	**2**		

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
96MPB6080A	Pamour No. 5	150 X 350	46			1	**1**		
96MPB6080A	Pamour No. 5	200 X 200	38			2	**2**		
96MPB6080A	Pamour No. 5	200 X 300	46			2	**2**		
96MPB6080A	Pamour No. 5	275 X 300	52			1	**1**		
							832	14847	
96MPB6080D	Pamour No. 5	10 X 10	2			1	**1**		0.1% pyrite
96MPB6080D	Pamour No. 5	15 X 15	3			20	**20**		
96MPB6080D	Pamour No. 5	15 X 25	4			27	**27**		
96MPB6080D	Pamour No. 5	15 X 50	7			20	**15**		
96MPB6080D	Pamour No. 5	15 X 75	9			6	**6**		
96MPB6080D	Pamour No. 5	25 X 25	5		2	23	**25**		
96MPB6080D	Pamour No. 5	25 X 50	8		2	11	**13**		
96MPB6080D	Pamour No. 5	25 X 75	10			5	**5**		
96MPB6080D	Pamour No. 5	25 X 100	13			2	**2**		
96MPB6080D	Pamour No. 5	25 X 125	15			1	**1**		
96MPB6080D	Pamour No. 5	50 X 50	10			7	**7**		
96MPB6080D	Pamour No. 5	50 X 75	13			2	**2**		
96MPB6080D	Pamour No. 5	50 X 125	18			3	**3**		
96MPB6080D	Pamour No. 5	50 X 175	22			1	**1**		
96MPB6080D	Pamour No. 5	75 X 100	18		1	1	**2**		
96MPB6080D	Pamour No. 5	75 X 125	20			2	**2**		
96MPB6080D	Pamour No. 5	100 X 125	22			1	**1**		
							133	719	
96MPB6080H	Pamour No. 5	10 X 10	2			1	**1**		100 grains of pyrite
96MPB6080H	Pamour No. 5	15 X 25	4			1	**1**		
96MPB6080H	Pamour No. 5	15 X 50	7			2	**2**		
96MPB6080H	Pamour No. 5	25 X 25	5	1		1	**2**		
96MPB6080H	Pamour No. 5	25 X 50	8			2	**2**		
96MPB6080H	Pamour No. 5	25 X 75	10	1		1	**2**		
96MPB6080H	Pamour No. 5	50 X 50	10			1	**1**		
96MPB6080H	Pamour No. 5	50 X 75	13	2		1	**3**		
96MPB6080H	Pamour No. 5	50 X 100	15	1			**1**		
96MPB6080H	Pamour No. 5	50 X 125	18			1	**1**		
96MPB6080H	Pamour No. 5	75 X 75	15	1			**1**		
96MPB6080H	Pamour No. 5	75 X 125	20	1		2	**2**		
96MPB6080H	Pamour No. 5	100 X 125	22			1	**1**		
							20	255	

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS: RESHAPED	MODIFIED	PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
96MPB6080L	Pamour No. 5	25 X 25	5	2			**2**		no sulphide minerals
96MPB6080L	Pamour No. 5	25 X 50	8	3			**3**		
96MPB6080L	Pamour No. 5	50 X 50	10	1		2	**3**		
							8	21	
96MPB6080M	Pamour No. 5	10 X 10	2	1		1	**2**		no sulphide minerals
96MPB6080M	Pamour No. 5	15 X 15	3	2	2		**4**		
96MPB6080M	Pamour No. 5	25 X 25	5	2		2	**4**		
96MPB6080M	Pamour No. 5	25 X 50	8	1		1	**2**		
							12	9	
96MPB6080N	Pamour No. 5	50 X 50	10	1			**1**		no sulphide minerals
96MPB6080N	Pamour No. 5	100 X 100	20	1			**1**		
							2	36	
96MPB6114	Bell Creek Mine	10 X 10	2			12	**12**		no sulphide minerals
96MPB6114	Bell Creek Mine	15 X 15	3	1		7	**8**		
96MPB6114	Bell Creek Mine	15 X 25	4			10	**10**		
96MPB6114	Bell Creek Mine	15 X 50	7			7	**7**		
96MPB6114	Bell Creek Mine	25 X 25	5			19	**19**		
96MPB6114	Bell Creek Mine	25 X 50	8		1	17	**18**		
96MPB6114	Bell Creek Mine	25 X 75	10			4	**4**		
96MPB6114	Bell Creek Mine	25 X 100	13			1	**1**		
96MPB6114	Bell Creek Mine	25 X 125	15			1	**1**		
96MPB6114	Bell Creek Mine	50 X 50	10			7	**7**		
96MPB6114	Bell Creek Mine	50 X 75	13			6	**6**		
96MPB6114	Bell Creek Mine	50 X 100	15		1	1	**2**		
							95	170	
96MPB6115	Bell Creek Mine	25 X 25	5	1	3		**4**		no sulphide minerals
96MPB6115	Bell Creek Mine	25 X 50	8	1	1	4	**6**		
96MPB6115	Bell Creek Mine	25 X 75	10	1			1		
96MPB6115	Bell Creek Mine	50 X 50	10	1			**1**		
96MPB6115	Bell Creek Mine	50 X 75	13	1	1		**2**		
96MPB6115	Bell Creek Mine	75 X 75	15	2		1	**3**		
							17	49	

Appendix E.2: Gold grain size data

SAMPLE	LOCATION	GRAIN DIAMETER (µm)	CALCULATED GRAIN THICKNESS (µm)	NUMBER OF GOLD GRAINS: RESHAPED	NUMBER OF GOLD GRAINS: MODIFIED	NUMBER OF GOLD GRAINS: PRISTINE	TOTAL NUMBER OF GRAINS	CALCULATED Au ppb	REMARKS
96MPB6116	Bell Creek Mine	10 X 10	2			5	**5**		no sulphide minerals
96MPB6116	Bell Creek Mine	15 X 15	3		2	7	**9**		
96MPB6116	Bell Creek Mine	15 X 25	4		4	8	**12**		
96MPB6116	Bell Creek Mine	15 X 50	7			4	**4**		
96MPB6116	Bell Creek Mine	25 X 25	5		1	17	**18**		
96MPB6116	Bell Creek Mine	25 X 50	8			8	**8**		
96MPB6116	Bell Creek Mine	25 X 75	10		1	2	**3**		
96MPB6116	Bell Creek Mine	50 X 50	10	2		6	**8**		
96MPB6116	Bell Creek Mine	50 X 75	13			3	**3**		
96MPB6116	Bell Creek Mine	50 X 100	15			1	**1**		
96MPB6116	Bell Creek Mine	50 X 125	18			3	**3**		
96MPB6116	Bell Creek Mine	75 X 150	22			1	**1**		
96MPB6116	Bell Creek Mine	175 X 400	100			1	**1**		
							76	1389	
96MPB6117	Bell Creek Mine	15 X 15	3	3			**3**		no sulphide minerals
96MPB6117	Bell Creek Mine	15 X 50	7	1			**1**		
96MPB6117	Bell Creek Mine	25 X 25	5	2			**2**		
96MPB6117	Bell Creek Mine	25 X 50	8	1			**1**		
96MPB6117	Bell Creek Mine	25 X 75	10	1			**1**		
96MPB6117	Bell Creek Mine	25 X 100	13	1			**1**		
96MPB6117	Bell Creek Mine	50 X 50	10	1			**1**		
96MPB6117	Bell Creek Mine	50 X 75	13	2			**2**		
96MPB6117	Bell Creek Mine	50 X 100	15	1			**1**		
96MPB6117	Bell Creek Mine	75 X 75	15	1			**1**		
96MPB6117	Bell Creek Mine	175 X 225	50	1			**1**		
							15	458	

Appendix F. Pebble lithology data

<u>Legend</u>

% Felsic intrusive	= number percent Archean felsic to intermediate intrusive pebbles
% Mafic intrusive	= number percent Archean mafic intrusive pebbles
% Metavolc	= number percent Archean metavolcanic pebbles
% Metased	= number percent Archean metasedimentary pebbles
% Ultramafic	= number percent Archean ultramafic pebbles
% Paleozoic	= number percent Paleozoic carbonate pebbles
% vein quartz	= number percent Archean vein quartz pebbles
% other	= number percent other rock type pebbles
% total	= total number percent
COMMENTS	= unusual or distinct rock types present

Appendix F: Pebble lithology data for the >5.6 mm fraction

Sample No.	Location	% Felsic intrusive	% Mafic intrusive	% Metavolc	% Metased	% Ultramafic	% Paleozoic	% vein quartz	% other	% total
93MPB425	Pamour No. 2 pit	16.9	1.9	59.1	13.2	0.3	5.4	3.2	0.0	100.0
93MPB426	Pamour No. 2 pit	10.7	2.7	64.6	12.9	2.2	4.4	2.4	0.0	100.0
93MPB427	Pamour No. 2 pit	35.5	2.6	39.0	6.6	1.8	14.0	0.4	0.0	100.0
93MPB428	Pamour No. 2 pit	33.3	3.0	40.7	7.7	2.0	12.7	0.7	0.0	100.0
93MPB429	Pamour No. 2 pit	36.7	2.5	42.0	6.8	0.6	9.9	1.5	0.0	100.0
94MPB001	Night Hawk Lake pit	34.0	3.6	42.0	9.1	2.8	8.0	0.6	0.0	100.0
94MPB002	Night Hawk Lake pit	32.9	3.6	42.0	7.6	3.9	9.4	0.6	0.0	100.0
94MPB003	Night Hawk Lake pit	37.0	5.9	35.2	8.2	3.2	9.1	1.4	0.0	100.0
94MPB004	Night Hawk Lake pit	40.7	2.2	34.1	9.6	3.0	9.6	0.7	0.0	100.0
94MPB014	Hislop pit	23.8	1.7	67.9	3.9	1.9	0.4	0.0	0.4	100.0
94MPB015	Hislop pit	27.5	2.9	61.9	4.2	2.1	0.8	0.3	0.3	100.0
94MPB016	Hislop pit	21.8	1.6	69.1	4.2	1.6	1.0	0.0	0.8	100.0
94MPB017	Hislop pit	22.3	3.3	67.4	4.7	1.4	0.9	0.0	0.0	100.0
94MPB018	Hislop pit	12.8	2.0	75.9	2.0	2.7	0.2	2.0	2.3	100.0
94MPB019	Hislop pit	12.8	2.7	76.5	4.8	1.5	0.3	1.2	0.3	100.0
94MPB020	Hislop pit	7.1	1.2	86.3	1.5	1.0	0.5	1.5	1.0	100.0
94MPB021	Hislop pit	25.4	4.2	57.9	3.8	7.9	0.4	0.4	0.0	100.0
94MPB022	Hislop pit	5.1	2.3	86.0	0.6	1.7	0.9	3.4	0.0	100.0
94MPB023	Hislop pit	10.4	4.9	78.8	3.0	2.8	0.2	0.0	0.0	100.0
94MPB024	Hislop pit	23.7	2.9	62.7	3.3	5.8	0.8	0.8	0.0	100.0
94MPB025	Hislop pit	14.0	3.1	70.5	4.3	5.9	1.6	0.6	0.0	100.0
94MPB026	Hislop pit	26.1	3.3	58.6	3.8	4.9	0.9	2.4	0.0	100.0
94MPB027	Hislop pit	10.7	2.4	79.9	3.7	0.4	2.5	0.3	0.0	100.0
94MPB028	Hislop pit	21.4	3.3	66.5	7.1	1.1	0.5	0.0	0.0	100.0
94MPB029	Hislop pit	29.6	6.3	47.2	9.0	0.8	0.3	6.9	0.0	100.0
96MPB6073	Davidson-Tisdale Mine	25.6	1.6	33.2	28.0	0.8	9.2	1.6	0.0	100.0
96MPB6074	Davidson-Tisdale Mine	54.5	2.6	20.8	19.5	0.0	1.9	0.6	0.0	100.0
96MPB6075	Davidson-Tisdale Mine	27.1	1.4	40.9	23.0	1.7	3.8	2.1	0.0	100.0
96MPB6076	Davidson-Tisdale Mine	27.9	2.7	32.7	24.4	0.8	11.0	0.5	0.0	100.0
96MPB6091	Davidson-Tisdale Mine	50.7	3.9	28.7	13.8	0.7	2.1	0.0	0.0	100.0
96MPB6069A	Pamour No. 3 pit	37.5	2.5	16.6	27.2	1.8	14.1	0.4	0.0	100.0
96MPB6069B	Pamour No. 3 pit	32.5	3.3	21.4	28.8	0.4	11.8	1.8	0.0	100.0
96MPB6080A	Pamour No. 5 pit	11.4	2.4	14.5	48.5	0.3	6.4	16.5	0.0	100.0
96MPB6080D	Pamour No. 5 pit	24.4	1.5	10.7	50.3	0.5	8.6	4.1	0.0	100.0
96MPB6080H	Pamour No. 5 pit	44.4	1.5	15.4	20.1	3.5	13.9	1.2	0.0	100.0
96MPB6080L	Pamour No. 5 pit	47.9	2.2	20.6	14.6	0.0	14.6	0.0	0.0	100.0

Appendix F: Pebble lithology data for the >5.6 mm fraction

Sample No.	Location	% Felsic intrusive	% Mafic intrusive	% Metavolc	% Metased	% Ultramafic	% Paleozoic	% vein quartz	% other	% total
93MPB425	Pamour No. 2 pit	16.9	1.9	59.1	13.2	0.3	5.4	3.2	0.0	100.0
96MPB6080M	Pamour No. 5 pit	48.6	2.9	14.8	15.6	0.4	17.3	0.4	0.0	100.0
96MPB6080N	Pamour No. 5 pit	48.4	3.1	21.7	12.4	0.6	13.7	0.0	0.0	100.0
96MPB6114	Bell Creek Mine	12.1	1.7	38.0	41.6	0.4	5.8	0.4	0.0	100.0
96MPB6115	Bell Creek Mine	29.6	1.1	10.9	54.0	0.4	4.0	0.0	0.0	100.0
96MPB6116	Bell Creek Mine	11.7	0.2	12.0	64.5	0.0	2.2	9.3	0.0	100.0
96MPB6117	Bell Creek Mine	33.7	1.9	25.5	27.4	1.0	8.7	1.9	0.0	100.0