We are committed to providing accessible customer service.
If you need accessible formats or communications supports, please contact us.

Nous tenons à améliorer l’accessibilité des services à la clientèle.
Si vous avez besoin de formats accessibles ou d’aide à la communication, veuillez nous contacter.

Ontario

Northern Superior Resources Inc.

Ti-pa-haa-kaa-ning – 2017 Summer Exploration Program

NTS 43 D/5

Rowlandson Lake, Ontario

Reporting Period: July 31 to December 30, 2017

Prepared by:

J. O'Callaghan, GIT
R. Avery, P.Geo.
D. Meldrum, P.Geo
Sudbury, ON.

December, 2017
File: 2017_summer exploration report.doc

KEYWORDS

Mineral exploration
Prospecting
Glacial Till
Dispersal train
Gold in till anomaly
Heavy Mineral Concentrate
Boulder sampling
Geophysics
- Induced polarization (IP)
- Magnetic survey

Geological mapping
Geochemistry
Petrographics
Drilling
- Diamond drilling
- Reverse Circulation (RC)

Re-logging core
Geostatistics

Contents

LIST OF TABLES

LIST OF FIGURES

Figure 17: Till sample sites from the 2017 Annex program, with limestone clast content highlighted. Carbonate bearing till is considered to represent material derived from further up-ice and may not be representative of the local geology. The limestone clast content of the till tends to be greater in the north and north east of the sample area.

Figure 18: Till sample sites from the 2017 Annex program, with the total gold grain content obtained by ODM heavy mineral separation clast content highlighted in pink. The Keeley Lake gold train, identified in historic till sample programs, is highlighted in yellow. The 2017 sampling demonstrates that the gold-bearing till-train extends up to a thin greenstone belt at the southern shore of Fishbasket lake. Till samples with > 10% limestone clasts (carbonate-bearing tills) and samples classified as soil or glaciolacustrine sediments have been removed. These samples are not considered to provide an accurate representation of local geology

Figure 19: The clast components of the 2017 till samples from Annex, versus their gold content. V/S: Volcanics and Sedimentary rock clasts. GR: Granite clasts. LS: Limestone clasts. The diagram demonstrates that till with a higher volcanic/sedimentary rock clast content tend to host higher gold grain counts, supporting the notion that the Keeley Lake gold-in-till train is derived from a greenstone belt.

Figure 20: Till sample sites from the 2017 Annex program, with Cu (ppm) content obtained by ICP-MS analysis at ALS labs. The Cu content of the till corresponds with the Keeley Lake gold train and an area of greenstone belt further to the west. Till samples with > 10% limestone clasts (carbonate-bearing tills) and samples classified as soil or glaciolacustrine sediments have been removed. These samples are not considered to provide an accurate representation of local geology

Figure 21: Paragenetic sequence diagram for the mineralogy of samples from (a) the Northern area of the Big Dam property (target areas 1 and 3), and (b) the Southern area of the Big Dam property (target area 2). The sequences have been based on interpretation of shear zone and host rock thin sections from drill core.

Figure 22: Drill hole targets based on gold grain in till, till geochemistry, boulder sampling, geophysics, previous drilling, and paleo-ice flow direction.

LIST OF APPENDICES

1.0 INTRODUCTION

The Ti-pa-haa kaa-ning Property is located in northwestern Ontario, approximately 30 kilometres north of the community of Neskatanga. Till sampling, prospecting, geological mapping and core re-logging was completed in the Big Dam and Annex areas of the property during August and September 2017.

1.1 Location, Access and Physiography

The Ti-pa-haa kaa-ning Project is centered at latitude 52º 27'N and longitude 87º 50'W within NTS mapsheet 43 D/5 (Figure 1). The work area is accessible by helicopter and float plane from Lansdowne House (Neskantaga) which is situated at the southwestern corner of Attawapiskat Lake, 365 km northeast of Sioux Lookout.

Lansdowne House is a community of 450 people which serves as the administrative centre for the Neskantaga First Nation, which is part of the Mattawa First Nation tribal council. The community is not assessable by road during the summer months. Two commercial air charters each day originating from Pickle Lake and Thunder Bay landing on a 4000' gravel airstrip service the community. Neskatanga features a nursing station, schools and stores for provisioning. During the winter months, the community receives goods and supplies on a winter road maintained under the auspices of the Ontario Department of Highways Northern Ontario Resources Trail initiative.

The topography of the Ti-pa-haa kaa-ning project area is similar to other glaciated portions of the Canadian Shield wherein low rolling hills are frequently interspersed with numerous lakes and swamps. The topography is dominated by lakes and proglacial features such as eskers created by the southwesterly (230°) flow of late Wisconsin glaciers across the region. Local relief in the project area is generally in the range of several tens of metres, with overall relief on the order of 50 m. Outcrop exposure throughout the project area is sparse (5-10%), with extensive tracts covered by mature stands of pine, spruce, poplar and birch. The effects of a forest fire around the northern shores of Rowlandson Lake in the late 1980's are still visible.

The climate of the Ti-pa-haa kaa-ning area is classified as a cold temperate continental climate (Köppen classification: Dfc) with vegetation and ground cover typical of that of a coniferous boreal forest. On average, Lansdowne House has only 145 frost free days each year. The warmest month is July with an average daily temperature July of 17.2° C. The coldest month is January with an average daily temperature of -22.3° C. Lansdowne House receives on average, 700 mm of precipitation each year, 30% of which is received as snowfall. Snow begins to accumulate in the area during October and generally persists into April. Lakes in the work area are generally frozen over between December and May each year.

1.2 Property and Ownership

The Ti-pa-haa-kaa-ning Property consists of 190 contiguous mining claims that comprise 2,506 units totalling 42,719 hectares (Appendix 2). The location of the claims is shown in Figure 2. The claims are located in the unsurveyed portion of the Patricia Mining Division, in and around Wapitotem Lake, Michikenopik Lake, Mameigwess Lake and Bosworth Lake.

Owing to its large size, and diversity of geological targets, the Property has been subdivided into three parts. From east to west, these are: a) the TPK area which includes several historic gold showings located on Rowlandson Lake; b) the Big Dam area which is characterized by a broad gold-in-till dispersal apron; and c) the adjoining New Growth area to the northwest which hosts the Keely Lake gold-in-till dispersion train (Figure. 3).

2.0 GEOLOGY

2.1 Regional Geology

Geologically, the Ti-pa-haa kaa-ning Property is located in the Superior Province along the southwest margin of the Oxford-Stull Domain which forms a narrow ribbon of 2.8 to 2.7 Ga metavolcanic and metasedimentary rocks adjacent to the 2.9 to 3.0 Ga rocks of the North Caribou Terrane to the south (Figure 4). The northwest-trending Stull-Wunnumin Fault Zone, a 2 km wide corridor of dextral shearing occupies the contact between the Oxford-Stull Domain and the North Caribou Terrane. The TPK property is underlain by a west to southwest-trending assemblage mafic to intermediate metavolcanic rocks with occasional discontinuous interflow chemical sediments of the Bartman Lake Greenstone Belt. The metavolcanic rocks are intruded by sills and dykes ranging in composition from gabbro, to diorite, to tonalite and granodiorite. To the north, the greenstone assemblage is bordered by massive to weakly foliated tonalite, granodiorite, granite and quartz monzonite of the Freure Lake Batholith. The southern margin of the greenstone belt abuts granodiorites of the Spero Lake Batholith. The metavolcanic rocks have an east-trending foliation, with stretching mineral lineations plunging in a shallow direction towards the southwest. East to northeast-trending splays of the northwest-trending Stull-Wunnummin Fault are inferred to cross the property and offset magnetic features (Hart and Boucher, 2010).

2.2 Property Geology

The Ti-pa-haa kaa-ning Property is situated within a favorable structural geological setting wherein the Archean-age Bartman Lake Greenstone Belt lies adjacent to a major flexure in the regional Stull-Wunnumin Fault and has been intruded by the 15 km long Freure Lake Batholith. A 7 km wide x 15 km long gold grain dispersal train identified by till sampling is seen to build in intensity northeastward across a narrow remnant of the greenstone belt onto the southern edge of the batholith, suggesting that the bend in the fault propagated a series of gold-bearing shear splays that are concentrated along the southern margin of the structurally resistant buttress formed by the batholith. This metallogenic model is structurally analogous to the Malartic – Val d'Or gold district in Québec where gold deposits are controlled by splay shears related to a major bend in the Cadillac-Larder Lake Fault and are hosted by the synvolcanic Bourlamaque Batholith and several smaller granitoid and porphyry stocks (Averill, 2010).

The paucity of outcrop in the TPK project area makes it difficult to interpret geological features with much certainty. Much of the understanding of the bedrock geology comes from analysis of chip samples obtained from reverse circulation (RC) drilling. The greenstone belt is perhaps the best exposed unit in the region with notable exposures at Rowlandson Lake and on the western shore of Crying Boy Lake.

In the TPK project area, the Bartman Lake Greenstone belt ranges 100 to 800 m in width and consists mainly of basalt and andesite flows with gabbro sills. Komatiite was reported in one RC drillhole (Averill *et al*., 2011). Mafic volcanic rocks consist of dark to pale green to grey flows, pillowed flows and lapilli tuffs. Felsic volcanic rock primarily comprises plagioclase-phyric andesite exhibiting magmatic foliation. Both the mafic and felsic lithologies are variably silicified and chloritized and are cut by common fracture filling quartz veins. Chemical metasedimentary rocks consisting of oxide facies iron formation and quartz-dolomite hornfels are also observed in the TPK area (Hart and Boucher, 2010; Colombo, 2017a). The iron formations are up to 4 m thick and are generally discontinuous and appear highly deformed (Hart and Boucher, 2010).

The Freure Lake Batholith, located north of the belt is composed of massive to weakly foliated, fine to medium-grained biotite tonalite to granodiorite (Hart and Boucher, 2010) as well as monzogranite and granite (Averill, 2010; Colombo 2017a). In the TPK project area Averill (2010) and Colombo (2017a) have further subdivided the Freure Lake Batholith into two phases which include a northern "main phase" of monzogranite (historically termed quartz monzonite), and the smaller "Contact Stock" leucocratic syeno-granite phase (historically termed leucogranite), which occurs along the southern portion of the batholith at the contact with the greenstone belt. The main monzogranite phase of the Freure Lake Batholith consist of coarse-grained (1-3 mm), grey-white to pale pink rock that typically contains 40% quartz, 3 to 4% biotite and 50 to 60% feldspar with k-spar nominally subordinate to plagioclase in a ratio between 1:1 and 1:2 (Colombo, 2017a).

Syenogranites of the Contact Stock are pale pink to variably hematite-stained, orange-pink to brick red rocks that typically contains 30 to 40% quartz, 50 to 60% feldspar and sparse (5 to 7%) accessory biotite (Colombo, 2017a). The syenogranite in the northern part of the stock is as coarse grained (1-3 mm) as the adjoining quartz monzonite of the Freure Lake Batholith. The absence of a chilled margin in either the stock or batholith suggests that the stock is a late stage, highly fractionated, siliceous phase of the batholith. Within the Contact Stock, the grain size of the syenogranite diminishes progressively south towards the greenstone belt. The progressive southward decrease in the grain size within the Contact Stock, the extensive dykeing and minimal metamorphism of the greenstone belt by the stock, and the volcanogenic hydrothermal alteration within the stock, indicate that the Contact Stock – and by extension the Freure Lake Batholith – are synvolcanic intrusions (Averill, 2010).

Granodiorites of the Spero Lake Batholith that abut the southern margin of the greenstone belt are typically medium to coarse grained and strongly sheared. The coarse primary grain size, in combination with a lack of thermal metamorphic effects in the adjacent volcanic rocks and the Spero Lake Batholith suggest a structural contact (Averill *et al*., 2011).

2.3 Structure and Mineralization

Despite its proximity to the Stull-Wunnummin Fault and its location in proximity to bounding plutons to the north and south, the greenstone rocks underlying the TPK property are relatively undeformed and only weakly metamorphosed. Deformation associated with the Stull-Wunnummin Fault appears to have been accommodated primarily within the plutonic rocks (Averill *et al*., 2011). The main shear zone associated with the fault occurs in the northern part of the Spero Lake Batholith and is approximately 500 m wide on the TPK property. The Stull-Wunnummin Fault trends east–west in the TPK area and then bends north-northwesterly across the western portion of the property in the New Growth area.

The main structural fabric seen in the greenstone belt is a week to moderate steeply dipping foliation. This fabric generally trends east-west and dips either to the north and south at around 70°. The variation in dip across the property may be the result of rotated block faulting.

Discrete shear zones occur within the Freure Lake Batholith are primarily concentrated in the Contact Stock. These shears which are interpreted to be splays of the main Stull Wunnummin Fault generally consist of quartz-sericite orthoschists that host accessory sulphide minerals including pyrite, pyrrhotite and lesser arsenopyrite and chalcopyrite (Colombo, 2017a). Trace quantities of sphalerite and tourmaline are also observed in the shear zones. Gold mineralization is typically anomalous within the quartz-sericite shear zones, although the highest gold values are not necessarily confined to these zones according to Hyde (2012).

The highest grade mineralization encountered by drilling on the TPK property to date occurs in the northern portion of the Freure Lake Batholith, where grades of up to 25.9 g/t Au over 13.5 m, occur as course grained visible gold in quartz veining within strongly altered and sheared quartz monzonite. Anomalous gold values have also been associated with shear-zone-hosted, disseminated-sulphide style mineralization. In these situations, the gold appears to be hosted as discrete micro-inclusions within sulphide grains (Colombo, 2017b).

The main focus of current exploration in the TPK area is for granitoid/syenite-associated (orogenic) gold and greenstone-hosted quartz-carbonate vein hosted mineralization, although much of the property remains unexplored and other types of mineralization may exist elsewhere on the property (Hart and Boucher, 2010). In particular, grab samples from the Annex portion of the TPK property suggest the presence of Cu-Ag-Zn mineralization in a volcanogenic-massive-sulphide-style system.

2.4 Quaternary Geology

It is now widely accepted that the Laurentide Ice Sheet comprised a number of contiguous domes or centers of ice dispersal that characterize the Late Wisconsin advance across north-central Ontario. The Tipahaakaaning project area is interpreted to have been covered by two lobes of the Laurentide Ice Sheet: the Lac Seul lobe which moved east-west, and the Windigo or Hudson Bay lobe which moved in a south to southwesterly direction. The Lac Seul lobe appears to have commenced retreating eastward across the area sometime between 10,000 and 11,000 BP during development of the Pillar-Armstrong outlet of Glacial Lake Agassiz. As this ice sheet retreated, glacial lake waters derived from the wasting glaciers collected in the area east and south of the ice margin (Thurston and Carter, 1970).

In the Tipahaakaaning project area glacial lake waters were impounded both to the west and south by high ground, and on the east and north by the receding ice front. As the glacial front receded further northeast, the lake surface dropped from its high water stand and utilized a series of outlet channels which were subsequently blocked by a readvance, forcing the lake to drain through the Kaiashk spillway. The next episode of glacial retreat permitted glacial Lake Aggasiz to drain southward through the Pikitgushi outlet and then through the Sandy Lake basin, an extension of which passes into glacial Lake Barlow-Ojibway.

A re-advance of the confluent ice lobes from the northeast blocked the outlet to lake Barlow-Ojibway and built a major end moraine system, the Agutua moraine. On retreat, Lake

Aggasiz discharged for a second time through the Pikitgushi outlet. Further retreat resulted in the formation of the Crescent moraine.

The re-establishment of lobate patterns in the ice sheet and fluctuations at the margin of the ice mass resulted in the deposition of the Nakina moraines which appear to correlate with moraine features mapped southwest of Lansdowne House. For part of this time, Lake Aggasiz was confluent with Lake Barlow-Ojibway.

The retreat of the waning ice sheet into James Bay was interrupted by a surge of ice moving in a southerly direction known as the Cochrane re-advance around 8200 BP.

The occurrence of fossiliferous limestones along the west coast of Hudson Bay and James Bay, and the absence of any rocks of a similar nature further to the south makes the character of traveled limestone boulders a sure index of the direction followed by past ice sheets. Striae measured on the height of land in the Lansdowne House region by Mc Innes were seen to vary from 212°-230° and are interpreted to represent the general direction of the late Wisconsin glaciation, whereas striae measured in the Winisk River channel (186°-206°) appear to have been locally deflected by the river course. Similarly, striae measured in the valleys of the Albany and Attawapiskat rivers (244°-263°) appear to be largely influenced by the trend of these bedrock controlled river valleys.

Older glacial striae trending northwest are preserved on the lee side of glaciated outcrops which were interpreted by Prest (1963) to represent evidence for an early Wisconsin glaciation. Isolated striae indicating this direction are also found along the Attawapiskat River east of Lansdowne House and north of Wunnumin Lake. The bulk of glacial striae, drumlins and fluted ridges however, represent the last direction of southwesterly directed ice movement in the area.

Several workers have noted that drumlinoid ridges in the fluted terrane surrounding Rowlandson Lake lack the steep stoss end and gently tapering lee side of normal drumlins. Rather, these features are seen to form uniform, elongate ridges 12-30 m high and 0.8-2.4 km long. North of latitude 52°, where ice movement appears to have varied from north to north-northeast, the majority of these features occur as drumlinoid ridges. South of latitude 52°, these features are oriented primarily in a northeast to easterly direction, and striae appear to be much more abundant.

Esker systems which normally parallel the ice flow direction, are variable in size and shape throughout the Tipahaakaaning area, ranging from simple single ridges, to larger complex systems of medial ridges which range in height from 3-40 m. In terms of lithology, the eskers vary from well sorted, washed glaciofluvial material to unsorted material indistinguishable from till.

Throughout most of northwest and central northern Ontario, eskers form a dendritic pattern which appear to converge towards the centre of the Laurentide Ice Sheet. Kames are usually found at the head of esker systems. South of latitude 52° however, eskers appear to be less abundant, having been obliterated by the wave action of glacial lakes Nakina and Kelvin.

End moraines in the Lansdowne/Rowlandson Lake area rise only a few metres above the local terrane. In other areas, moraines form a rugged topography rising up to 170 m above the surrounding terrain. One such major end moraine formed by a re-advance of the Windigo Lobe extends from Manitoba through the Sachigo-Stull lakes-Fort Hope area and extends as far south as latitude 51° where it splits. This moraine complex which was originally named the Agutua moraine by Tyrrell and Prest (1963) is relatively continuous down to latitude 51° where it is intersects the Nakina moraine (Zoltai,1965).

Most of the area surrounding Lansdowne House was covered by glacial lake waters, and both shoreline beach sand and gravel deposits are widespread. Shoreline deposits range from winnowed till on the flanks of ridges that were subjected to wave action, to lake bottom sediments consisting of varved clays, silts and fine sand. More extensive deposits were also deposited as ice-marginal deposits which form integral parts of end moraine complexes.

Figure 5 indicates the gross aspects of surficial geology in northeastern Ontario with respect to the Tipahaakaaning project area.

2.5 Property Surficial Geology

Overburden across the Ti-pa-haa-kaa-ning Property is seen to be extensive, ranging anywhere from 90% in the Rowlandson Lake area to greater than 98% in the Mameigwess Lake area in the Annex portion of the property. Similarly, the composition of the overburden cover is seen to be quite variable: ranging from thick till blankets to thin till veneers, ice contact stratified drift (eskers, moraines), glaciofluvial outwash, and glaciolacustrine deposits (Parsons, 2008).

Parsons (2008) indicates the stratigraphy of tills on the TPK property consists of a lower, older, carbonate-bearing lodgement till; a middle carbonate-bearing deformation till; and an upper non-carbonate-bearing till. Although carbonate-bearing tills appear regionally widespread across the property, the distribution of non-carbonate-bearing till is localized and is absent in some areas. Glacial striations as measured in outcrop on the property range between 171° and 271°. The average glacial orientation (235°) is interpreted to reflect the last direction of ice movement in the region. The long-axis of drumlins and drumlinoid features as measured on air photos ranges between 182° and 258°, with an average orientation of 211°. The lower carbonate-bearing lodgement till displayed two distinct directions with some sites having an average fabric orientation of 185°, whereas other sites averaged 235°. These local variations in ice-flow direction at the property scale may be related to different ice flow dynamics at the regional scale (Parsons, 2008).

During a property wide till sampling program across the Big Dam and New Growth portions of the property in 2008, the majority of samples (521 of 675 samples) were collected either from the upper non-carbonate-bearing lodgment till sequence or from thin till veneer material (Parsons, 2008). The drumlins and drumlinoid features characterized by carbonate-bearing tills which are prevalent in the northwestern portion of the TPK Annex area, appear to be more subdued in the Canopener/Rowlandson Lake area where the tills are predominantly non-carbonate (Fig. 5). Parsons surmised that carbonate-bearing till likely once blanketed the entire area, and has been stripped away in the Rowlandson Lake area, allowing basal shearing in the receding ice mass to erode and deposit bedrock material sourced from local outcrops at the glacial margin as non-carbonate till material. Material derived from local bedrock should therefore dominate the composition of the non-carbonate tills. Till veneers were also interpreted by Parsons to be derived from local bedrock, and in all likelihood transported less than a few hundred metres.

Drift prospecting of the locally-derived upper till is believed to provide a very reliable method for tracing mineral dispersal trains to a bedrock source. The distance to the source area depends on the duration of time that the ice-margin remained stable, and on the intensity of subglacial basal shearing of the material. The presence of high concentrations of pristine shaped gold grains in the heavy mineral concentrate fraction of till samples indicates that the upper, non-carbonate bearing till on the property has been transported less than one kilometre from a bedrock source (Averill, 2001). This distance estimate agrees well with the high gold grain concentrations observed in the till samples collected south of the Big Dam occurrence, in a transitional area between carbonate-bearing (lower) till and non-carbonate bearing (upper) till, which is marked by a series of end-moraines that are located approximately 600-800 m down-ice of outcrops that host the occurrence. Gold grains are elevated in some carbonate-rich till samples on the property, which Parsons has interpreted to be the result of mixing of tills types in the transition zone between either till sheet.

3.0 PREVIOUS INVESTIGATIONS

3.1 Geological Mapping

During the early 1900's, W. Mc Innes (1904, 1911) on behalf by the Geological Survey of Canada explored the area between Webequie and Lansdowne House passing through the Bartman Lake area (two portages east of Rowlandson Lake). Since then, the region has seen only sporadic geological investigations. In 1939, Prest (1940a, 1940b) conducted reconnaissance bedrock mapping survey in the district and produced geological maps of the Wunnumin Lake and Red Lake-Lansdowne House areas. In early 1960's, Prest also completed a surficial mapping program and produced the first ever surficial map of the area (Prest 1963).

Between 1959 and 1961, the Federal Department of Mines and Technical Surveys and the Ontario Department of Mines jointly conducted various geological and geophysical surveys throughout northwestern Ontario that covered approximately 50,000 square miles (Duffell *et al.* 1963). The Lansdowne House property area was included in these surveys.

In early 1970's, the Ontario Geological Survey conducted a large helicopter supported reconnaissance bedrock-mapping program ("Operation Winisk") covering the area west of James Bay to the Big Trout-North Caribou lakes area in northwestern Ontario (Thurston *et al.* 1979). In the recent past, as part of the Geology of Ontario Project, the Ontario Geological Survey produced a set of geological (bedrock and surficial), tectonic and geophysical (magnetic and gravity) compilation maps (scale 1: 1,000,000) for the region (OGS 1991).

3.2 Historical Exploration Work

Prospecting activity in the Lansdowne House area during the early part of the 20^{th} century largely concentrated on the discovery of gold and silver. During the Second World War, this focus was supplanted by an interest in base metals, particularly for copper and nickel which continued into the 1950's, concomitant with the development of airborne geophysical methods which were particularly well suited to base metal exploration. The publication of federal-provincial aeromagnetic maps in the late 1950's also generated interest in iron formation hosted deposits throughout the area. This led to the discovery and development of

Anaconda Iron Ore Ltd.'s Skibi Lake deposit in 1966 with total reserves of 335 M tons of concentrating iron averaging 26.2% acid soluble iron.

The increase in gold prices during the 1980's once again shifted the focus of mineral exploration back to gold in the district, with sporadic copper-nickel and diamond exploration throughout the area in the late 1990's.

1930-1936 - Mineral exploration began in the Lansdowne House area when a mineralized (Cu-Ni sulphides) rock sample found by a local Ojibway trapper on a small peninsula on an unnamed lake (later Rowlandson Lake), was brought to the attention of local developer J.E. Rowlandson. Rowlandson staked the showing and adjacent areas, and conducted a minor amount trenching, sampling and diamond-drilling. The claims lapsed after a few years and were re-staked by Rowlandson once again in 1936. At that time, more work was conducted, which led to the discovery of a new gold showing on Rowlandson Lake that contained samples with up to 5.36 oz/t gold (Mazur and Osmani, 2002).

1937-1940: Lansdowne Minerals Limited founded by J.E. Rowlandson in the mid-1930's optioned the Copper Point property to Winisk River Mines Limited in 1937. Winisk River completed a program of prospecting, trenching, pit blasting and diamond drilling at Copper Point which identified copper mineralization hosted by gabbros that assayed 1.2% Cu/10 m, in addition to several narrow gold and copper mineralized zones (Hart and Boucher, 2010). Prospecting by Winisk River Mines identified two zones of gold mineralization in the Copper Point area: a vein southwest of Copper Point called the No. 6 Vein (1400S), and a vein to the northwest known as the No. 2 Vein (500S) (Rowlandson 1937). Trenching, pitting and channel sampling was completed on both veins in 1937. Channel sampling of the No. 6 Vein which contained abundant arsenopyrite, returned assays of up to $277.20 (7.96 oz Au/ton or 272.9 g Au /t) over 16 to 30 inches (0.40-0.76 m). Grab samples from the No. 2 Vein along the northern margin of a granodiorite dyke returned up to $213.50 (6.14 oz Au/ton or 210.4 g/t Au).

Drill testing of several new quartz veins discovered by prospecting and trenching yielded multiple intersections of gold values ranging from $1.75- $4.55 over 2.5-5.0 feet (*Northern Miner*, December 1937). A single diamond-drill hole undercutting the No. 6 Vein intersected $18.90 over 42 inches (0.54 oz Au/t or 18.62 g/t Au/1.06 m). Three other holes drilled from north to south undercutting the No. 2 Vein (500S Showing) intersected a series of enechelon veins that returned up to $4.55 over 3 feet (0.13 oz Au/t or 4.48 g/t Au/0.91 m). A single hole collared south of the No. 2 Vein intersected anomalous copper and gold. One other hole collared south of Copper Point and drilled under the showing intersected three anomalous mineralized zones with values up to 2.45% Cu over 5 feet (1.52 m) (Hart, 2009).

These initial successes achieved by Rowlandson an Winisk River Mines triggered a staking rush in the area and as a result, many more Cu-Ni and gold discoveries were made in the district in the early 1940's. Further exploration in the area however, was halted by a manpower shortage caused by the Second World War.

1950's and 60's: A number of companies conducted exploration for copper-nickel in the Rowlandson Lake area during the late 1950's and 1960's. La Corne Lithium Ltd. was one such company who completed ground magnetic and horizontal loop electromagnetic surveys (EM) covering the western shore of Rowlandson Lake, over the same ground previously held by Winisk River Mines Ltd. (Hart and Boucher, 2010).

The results of these surveys were compiled but no follow-up work was conducted.

1956: Aberdoon Mines Ltd. carried out prospecting and diamond drilling (4 holes, 505 m) in the Bartman Lake area. All of the holes intersected mineralization in the form of pyrite-pyrrhotite-chalcopyrite-magnetite hosted by amphibolite/gabbro-diorite that reportedly yielded anomalous Cu+Ni value of up to 0.16%/26-29 m (Mazur and Osmani, 2002).

1960: Pickle Patricia Explorers drilled 2 holes (233 m) along the east-central shore of Bartman Lake in 1960. Both holes intersected predominantly gabbro to diorite with minor mafic volcanic rocks. Mineralized diorite (up to 10% py-po-cpy-mt) was intersected in either hole. No assay results were reported by the company.

1960: Temagami Mining Company Ltd. carried out geophysical surveys and diamond drilling (3 holes; 583 m) north of Lavoie Lake. No assay results reported by the company.

1970-81: Canadian Nickel Company (a.k.a. INCO) carried out a systematic exploration program, which included both airborne and ground magnetic and EM (vertical and horizontal loop EMs) surveys and diamond drilling (47 holes; 5,839 m). Drilling was concentrated on two 3 km long EM anomalies, the L-11 and M-12 zones, coincident with magnetic highs in the Lavoie-Springer Lake area in an area east of the TPK property. The odd intersection of anomalous platinum, palladium and gold was reported by the drilling (Novak, 1992). This property is currently held by PGM/Canterra Ventures.

Canico's anomalies on the far western side of the TPK property were follow-up by ground magnetic and EM surveys. Anomalies identified by ground geophysics were subsequently tested with a packsack drill (Hart and Boucher, 2010).

A portion of the Canico airborne survey covered most of the TPK property as well as anomalies located on the New Growth portion of the property. Follow-up ground magnetic and EM surveys were completed on the best combined airborne magnetic and EM anomalies which were tested by packsack drills if located in areas not underlain by lakes or swamps. Two closely spaced diamond drillholes (DH's 49113 and 49116) collared west of Keeley Lake intersected mafic metavolcanic rocks, gabbro and magnetite iron formation (Hannila 1971a). One other hole (DH 49117) collared southwest of Keely Lake and north of Michikenopik Lake intersected two intervals of massive sulphides: 21.5 feet (6.55 m) of 80-85% pyrite and 5-15% pyrrhotite, and 30 feet (9.3 m) of 30-99% pyrite and 5% pyrrhotite, hosted by mafic metavolcanic rocks (Hannila 1971b). A single hole (49118) located about 10 km northwest of Keely Lake intersected mafic metavolcanic rocks and chlorite-amphibole-quartz schist with sulphide-rich bands up to 2.9 feet (0.88 m) in width hosting up to 65% pyrite, and iron formation (Hannila 1971c). A single hole (49190) located approximately 2.5 km northwest of Keely Lake intersected fine-grained mafic metavolcanic rocks (Blanchard 1972). Two other holes (DH's 49192 and 49193) drilled in an area about 6 km northwest of Keely Lake intersected dacite and felsic schist (Blanchard 1972b).

Inco also staked 4 claims and conducted follow-up ground magnetic and horizontal loop electromagnetic (EM) surveys across an anomaly in the area north of Canopener Lake. A single 164 foot (50 m) hole which was drilled to investigate the anomaly intersected variably sheared mafic rocks cut by quartz veins containing pyrite, pyrrhotite, and lesser arsenopyrite, but no assays were reported (Blanchard 1973).

1983-86: In 1983, Forester Resources Inc**.** acquired 1,400 claims stretching from Lavoie Lake west to Rowlandson Lake. The claims included all Cu-Ni-PGM occurrences that had been defined by previous work completed by Canico in the 1970's. The following year, Forester completed regional airborne and ground geophysical surveys (magnetic, EM) and geological mapping throughout the Rowlandson, Canopener and Springer-Lavoie lakes areas. Trenching, sampling and diamond drilling (280 m) were concentrated primarily in the Rowlandson Lake area. During 1985-86, a detailed induced polarization survey was also carried out in this area and additional trenching and diamond drilling (540 m) was completed.

The best results of the 1984 Forester program originated from the 1400S Showing which included grab samples grading up to 167 g/t gold and channel samples of up to 10.3 g/t Au/5.9 m (Novak, 1985). Diamond-drill hole testing of the zone (DH FRI-84-1) returned disappointing result however, with a best assay of only 3.2 g/t Au/0.43 m. Subsequent induced polarization (IP) surveys suggested that these holes may have over-drilled the intended target (Childe and Kaip, 2002).

The narrow gold zone outlined by Forester Resources at Copper Point in 1984 was described to occur within a relatively narrow east-west trending, north dipping shear zone along the contact of a multi-phase intrusive that had intruded felsic to intermediate tuffaceous country rocks. The intrusive/volcanic contact appeared sheared along strike as well as cross-faulted in a direction oblique to the main shear, resulting in a block faulted shear zone which is very difficult to trace in a diamond drill program of limited scope.

Additional exploration by Forester Resources in 1985-86 focused on the area's copper-nickel potential and specifically on geophysical anomalies in the vicinity of the Copper Point Showing. This work involved limited backhoe trenching of EM conductors, 37 line-km of IP/Resistivity survey, and 7 diamond-drill holes (883 m) testing IP and EM anomalies. Highlights of this drilling include 3.4 g/t Au/2.8 m in DH FRI-85-4, and 21.5 m of 0.21% combined Cu + Ni (including 5.6 m of 0.39% combined Cu + Ni) in DH FRI-85-01 which undercut the Copper Point Showing (Novak, 1985; 1986). The drillholes intersected volcanic and volcanoclastic strata which were seen to be cut by intrusives of mafic to intermediate composition. Volcanic and volcanoclastic strata in the drillholes were seen to consist of mafic to intermediate, to locally felsic tuffs, pyroclastic breccias, and flows. Intrusive lithologies included pyroxenite, gabbro (mapped/logged as hornblendite by Forester Resources), diorite, quartz diorite and granodiorite (Childe and Kaip, 2002).

Work completed by Forester Resources at Copper Point exposed the showing for more than 50 m along strike and for 5 to 10 m in width. Grid mapping indicated that outcrops of mineralized gabbro occurred for 70 m further to the west where the gabbro appeared to pinch out (or is truncated by faults) in a sequence of felsic to intermediate volcanics. Mineralized gabbro crops out again about 800 meters west-southwest of Copper Point, and was mapped over a strike length of 120 metres, open to the west. Forester mapped the gabbro bodies as "hornblendite", indicating its generally melanocratic appearance, and the predominance of prograde and retrograde amphiboles (Bradford, 2001).

The 1985-86 drilling indicated that the Copper Point mineralization was more or less continuous for a minimum of 210 m along strike and across widths approaching 120 m (Novak, 1988). Basemetal enrichment zones including copper and nickel concentrations up to 1% combined copper and nickel were seen throughout the intrusive, as well as anomalous (near economic) concentrations of gold (e.g. Forester drillhole 85-4; 0.108 opt Au/2.59 m).

In outcrop, the Copper Point mineralization is seen to consist of up to 10% pyrrhotite-pyrite-chalcopyrite-pentlandite that occur as disseminations, clots and stringers. Mineralization is poddy and strongly sheared in places. Three samples of typical Copper Point mineralization averaged 0.47% Cu, 0.13% Ni, 40 ppb Pt and 41 ppb Pd (166842-4) (Bradford, 2001).

After disappointing drill results in 1985, no additional assessment work was filed by Forester Resources for the Rowlandson Lake area and the claims were allowed to lapse.

1985: Blue Falcon Mines completed an airborne magnetic and VLF electromagnetic survey that covered most of the eastern end of the Ti-pa-haa-kaa-ning property and an area further to the east (Barrie 1985).

Additional field work consisting of linecutting, a VLF-EM16 survey, and geological mapping was also completed on the Bryndon Ventures - 777 Syndicate property north and northwest of Canopener Lake in 1985 (Novak 1986).

1991: Seaway Base Metals Limited carried out airborne geophysical survey in the Bartman, Owen, Springer and Wapitotem lakes area but no other follow-up work was conducted (Barrie 1991).

1992: KWG Resources Inc. completed diamond drilling in areas tested previously by Canico in 1970-74. The KWG work confirmed Canico's earlier results. Selected mineralized (copper and nickel) drill intersections are listed in Table 1 (Mazur and Osmani, 2002).

Table 1: Selected Drillhole Results (1992) – KWG Resources Inc.

Zone	DDH	Cu (%/m)	Ni (%/m)	Canico/Inco Zone
A-B	92-A-1	0.45/5.2	0.20/5.8	M-12
A-B	92-A-2	0.13/32.3	0.05/32.3	M-12
A-B	92-A-3	0.30/27.5	0.22/27.5	M-12
A-B	92-A-4	0.32/29.0	0.17/29.0	M-12
A-B	92-A-5	0.31/16.0	0.19/16.0	M-12
A-B	92-A-6	0.12/16.8	0.11/16.8	M-12
A-B	92-A-7	0.32/8.5	0.10/8.5	M-12
A-C	92-A-8	0.11/3.5	0,.06/3.5	M-12
A-B	92-A-9	0.13/29.6	0.12/29.6	M-12
A-A	92-A-10	0.94/10.2	0.12/10.2	M-12
C	92-C-1	0.23/49.6	0.06/49.6	L-11
D	92-D-1	0.20/37.0	0.08/37.0	L-11
D	92-D-2	0.51/53.0	0.11/53.0	L-11
D	92-D-3	0.32/40.7	0.07/40.7	L-11
D	92-D-4	0.34/22.6	0.12/22.6	L-11
D	92-D-5	0.41/24.7	0.13/24.7	L-11
D	92-D-6	0.28/45.3	0.11/45.3	L-11
D	92-D-7	0.16/13.7	0.06/13.7	L-11

Novak (1992) reports that in 1974 Inco had delineated a mineralized body (10 m thick on average), comprising 14.6 Mt grading 0.58% Cu, 0.37% Ni, 0.03% cobalt for the L-11 and M-12 Zones which do not correspond to any present day resource definitions under 43-101 reporting standards.

2001–2003: Aurora Platinum Corp. conducted reconnaissance exploration in 2001 and 2002 over a part of the eastern portion of the TPK property. The work was completed in conjunction with Inco's proprietary airborne magnetic and EM survey data and diamond-drill hole databases covering portions of northwest Ontario and northeast Manitoba. The program focused on gold, base metal and copper nickel-platinum group metals. Several drillholes were completed in the Copper Point area (Bradford, 2001) (Hart and Boucher, 2010).

Several geophysical surveys were also completed by Aurora Platinum including a regional helicopter-borne magnetic and IMPULSE-EM survey, a portion of which covers the TPK property. An 11.25 km line IP survey was also completed in the Rowlandson Lake area in 2003.

In 2002, six days of fieldwork consisting of geological mapping and till sampling were completed on the property by Aurora Platinum. A total of 31 rock and 52 till samples were collected for assay, with grab samples from the 1400S Showing returning assays of up to 154.15 g/t Au. Samples with elevated gold values were seen to have a strong positive correlation with As, Co, Pb, Sb and Zn, as well as a weak positive correlation with Ag and Cu (Childe and Kaip, 2002).

Past work in the Rowlandson-Canopener Lake area had demonstrated potential for both gold and Cu-Ni-PGE mineralization. Gold mineralization in the Copper Point area was seen to be hosted within and adjacent to quartz-sulphide veins in an east-west tending, steeply dipping shear zones, including the #1 and 2 Veins and the 1,400S Showing. Historic sampling of the 1400S Showing returned bonanza grades of up to 166.7 g/t gold (5.36 ounces per ton). The re-sampling by Aurora in 2002 returned comparable grades (154.15 g/t gold) at the showing (Childe and Kaip, 2002).

Elevated gold values at the 1400S Showing were seen to be spatially associated with abundant arsenopyrite and lesser chalcopyrite and sphalerite. Alteration associated with the shear-hosted gold mineralization included biotite, chlorite, carbonate and silicification. Aurora's mapping and sampling at the showing indicated a west trending, steep south dipping (094°/87°) shear that hosted a 0.3 m wide quartz-sulphide vein consisting of grayish quartz and crudely banded sulphides with pyrite>pyrrhotite>>arsenopyrite>chalcopyrite>sphalerite. A 1.5-2.0 m wide alteration envelope enclosing the vein was seen to consist of strongly sheared and silicified plagioclase-hornblende porphyry containing 1-2% fine grained pyrite-pyrrhotite. The porphyry was interpreted as a hypabyssal mafic intrusive of dioritic to quartz dioritic composition (Childe and Kaip, 2002).

Aurora Platinum's investigations in the Copper Point area found that copper-nickel ± PGE mineralization was spatially associated with altered and moderately to heavily pyrrhotite-pyrite-chalcopyrite mineralized pyroxenite and gabbro. Bradford (2001) described four showings in the area, namely the Copper Pont, Island, Peninsula and Canopener showings, where earlier sampling by Forester Resources had yielded channel assays of up to 5.9 metres averaging 1.03% combined Cu + Ni at Copper Point (Childe and Kaip, 2002).

3.3 Work Completed by Northern Superior Resources

2005-2010: Northern Superior Resources (previously Superior Diamonds) became involved with the TPK project while conducting till sampling and prospecting for kimberlite indicator minerals in support of Aurora Platinum's regional exploration program in the region. Till sampling for kimberlite indicator minerals during the initial round of exploration in the area in 2002 which included analyses for gold plus a suite of base metal heavy minerals, identified several gold anomalies in the Canopener/Keely lakes area (Kaip and Childe, 2002).

In 2003, a total of 104 follow-up samples were collected in the area (Fig. 7) which identified a number of high total and pristine gold grain counts in samples from the Spero Lake area.

In 2005, Aurora Platinum was purchased by FNX Mining Company Inc. and Aurora's interest in the remaining Rowlandson Lake and Canopener Lake claims was sold to Lake Shore Gold. Northern Superior and Lake Shore then formed a 50:50 joint-venture to investigate the gold-in-till anomalies. During follow-up sampling in 2005, a total of 111 samples were collected regionally as well as in the vicinity of anomalous gold-in-till samples identified previously in the Spero-Canopener and Keely lakes areas (Sooley, 2008) (Fig. 7).

In 2007, 223 samples were collected on a 200 x 200 m grid up-ice of the 2005 Spero Lake anomaly in an area 1.5 km north and 5 km east of Canopener Lake. The results of this sampling extended the gold-in-till dispersal train an additional 3 km northeast of Canopener Lake into the Big Dam area, approximately 10 km northeast of the original anomaly identified in the Spero Lake area in 2005 (Sooley, 2008).

In 2008, Superior Diamonds completed expanded till sampling (805 samples) across the entire property as well as a higher density sampling within the interpreted head of the dispersal train northeast of Canopener Lake. This sampling defined a 7 km wide gold grain dispersal train which built in intensity for 8 km towards the Bartman Lake Greenstone Belt and for an additional 7 km into the Freure Lake Batholith before abruptly terminating. Additional claims were staked on the property to cover both the 7 x 7 km apron of the main anomaly, as well as weaker anomalies towards the west in the New Growth area (Averill *et al.,* 2011).

In 2008, an in-house interpretation of the surficial geology in the Big Dam area of the property was undertaken using existing 1:63,360 scale (1"=1 mile) air photographs. Follow-up ground truthing was conducted during June through August in conjunction with till sampling on the property (Parsons, 2008). During the mapping program, surficial material classification and till fabric orientation measurements were determined by means of hand-augering and shovel trenching to depths of up to 3 m to allow for detailed classification of the surficial materials. Outcrops were also examined for striae and other ice-flow indicators.

In 2009, Northern Superior conducted a series of airborne electromagnetic and magnetic surveys including a detailed magnetic survey in the TPK are of the property in an effort to identify diamond drill targets within the gold grain anomaly. These surveys were of limited assistance however, showing negligible conductivity and little magnetic variability other than the expected normal contrast between the greenstone belt and batholiths (Averill *et al*., 2011).

In March 2010, Overburden Drilling Management (ODM) was contracted by Northern Superior Resources to conduct a reconnaissance-scale reverse circulation (RC) drilling program to better define the gold-in-till anomaly identified by the surface sampling on the TPK property. Four gold targets were identified by the Phase I RC drilling. A second phase of RC drilling was completed in late 2010. Of the 117 holes completed during the Phase II drilling, 88 holes targeted the Contact Stock and Freure Lake Batholith north of the Bartman Lake Greenstone Belt, immediately west of the Phase I drill area. Twenty-nine other holes were drilled further to the south in a 400 x 400 m reconnaissance pattern to assess the previously untested southwestern half of the gold-grain-in-till dispersal train.

The 88 northern holes completed during the Phase II RC drilling were drilled mainly to infill and refine four gold-in-till peaks designated Targets 1 to 4 that had been identified during the Phase I drilling. Seventeen holes prepared on the frozen surface of Crying Boy Lake to test the central portion of the Target 2 area were not completed because permission was withheld by Neskantaga First Nation. Of the 29 southern holes, 20 were drilled within the Bartman Lake Greenstone Belt, which had not been intersected in any of the Phase I holes. Nine other holes were drilled on the Spero Lake Batholith south of the greenstone belt (Averill *et al*., 2011).

Northern Superior completed three separate programs of follow-up diamond drilling totaling 64 holes in 2007 and 2008 (Hart and Boucher, 2010). Due to the dearth of electromagnetic anomalies, this drilling was either concentrated around known gold showings in the greenstone belt or targeted subtle magnetic anomalies in the Freure Lake Batholith up-ice of the belt. The Rowlandson Lake showings were tested by 25 coreholes even though historical drilling had indicated that these showings were very minor and surface till sampling had produced a gold grain anomaly train much shorter and spottier than that associated with the main anomaly further to the west. The remaining 39 holes were drilled in the area subsequently targeted by the Phase I and Phase II RC drilling programs with 11 holes clustered around known minor showings in the greenstone belt; 15 holes on three north-south stratigraphic sections across the belt; 9 holes around a new showing discovered by Northern Superior in the Freure Lake Batholith west of Big Dam Lake; and 4 holes on a north-south section across a weak magnetic anomaly in the batholith southwest of Big Dam Lake (Averill *et al.*, 2011).

In 2012**,** Northern Superior Resources completed a reconnaissance seven hole (2,241 m) diamond-drill hole program in the New Growth portion of the property. The highlights of the drilling are summarized in the following table:

Table 2: Northern Superior Resources New Growth Drilling Assay Highlights.

Drillhole	Sample Depth Interval		Gold Assay (g/t Au)	Silver Assay (g/t Ag)	Sample Length (m)	Host Rock
	From (m)	To (m)				
NG-12-001c	21.0	27.0	0.49		6.00	qtz-chlorite veins, 3-5% dissem pyrite
NG-12-002c	279.2	280.7	2.25		1.50	
NG-12-003c	146.0	151.0	4.62		5.50	qtz veins in mafic intrusive, 1% py; trace cpy + tml
including	145.6	146.6	20.80		1.00	
NG-12-004c	224.0	229.1	1.31		5.10	qtz-carb-chl veinlets, 5-7% pyrite
including	224.0	226.0	2.80		2.00	
NG-12-005c	162.3	164.2	13.40		1.90	qtz veins in qtz-diorite, 3-8% pyrite
including	162.3	192.9		8.27	0.60	
NG-12-006c	135.3	137.00	0.84		1.70	qtz-chl veinlets in mylonite, 2% py
NG-12-007c	267.6	270.1	1.20		2.50	
including	267.6	268.6		2.66	1.00	pyrite-magnetite bands
NG-12-007c	372.5	374.5	0.54		2.00	

3.4 Work Completed by Rainy River Resources

2010: In late 2010, Rainy River Resources Ltd. (Rainy River) assumed operatorship of the TPK exploration program in joint-venture participation with Northern Superior Resources. Rainy River drilled 23 holes from the fall of 2010 through the winter 2011. The main focus of the drilling was the Target 3 area as defined by ODM. Drillhole TPK-10-004 intersected high-grade gold mineralization grading 25.9 g/t Au over 13.5 m within a series of shear zone hosted quartz veins.

2011: In October 2011, Overburden Drilling Management collected 103 grab samples that were analyzed for gold plus 48 elements on the TPK portion of the property (Hyde, 2012). The program was designed to test two areas of gold-in-till anomalies previously defined by surface till sampling and reverse circulation drilling. The target areas include: the western shore of Big Dam Lake (identified as Targets 4, 5 and 6 by the Phase II RC drilling) and the Target 8 area located approximately 1 km north of Canopener Lake.

Nearly all the samples in the Target areas 4, 5 and 6 consisted of variably mineralized quartz monzonite. The sampling did not pinpoint a significant gold source in the area owing to large gaps between sample locations. A fence of three coreholes in 2008 intersected narrow mineralized shear zones similar to mineralized surface samples at the Big Dam Showing.

Prospecting in the Target 8 area uncovered angular leucogranite boulders which were variably mineralized. Nearly all samples returned anomalous gold values associated with variable pyrite, sericite and arsenopyrite (Hyde, 2012a). All rusty boulders in the Target 8 area returned anomalous or better assay values for gold with the best sample returning 12.30 g/t Au.

2012: During the period January through April 2012, a 36 hole diamond drilling (8,008.1 m) program was conducted by Rainy River Resources to test the gold-in-till anomaly outlined by previous surface sampling and reverse circulation drilling in the Target 2 area.

Although anomalous gold values were identified in quartz-sericite-sulphide shear zones by the 2012 drilling, none of the intercepts explained the very strong gold-in-till anomaly present along the western shore of Crying Boy Lake. (Hyde, 2012b).

During the 2012 summer field season, an additional 67 prospecting samples were collected in the Target 8 area on the TPK property where earlier prospecting in 2011 had identified a 250m long northeast-southwest trending boulder train approximately 1 km north or Canopener Lake. Follow-up prospecting along newly constructed drill roads on the property resulted in 8 samples which assayed greater than 1.0 g/t Au including 3 samples greater than 2.5 g/t Au (Hyde, 2012c).

4.0 LOGISTICS

Table 3: Summary of Investigations – 2017 TPK Summer Exploration Program.

Fixed Wing Air Charter:	
Nakina Air Service, Nakina, ON	17 charter trips
Helicopter Support:	
Forest Helicopters, Kenora, ON	91.4 flying hours
Corehole Re-logging:	9 holes, 2,373 m; 10 mandays
Till Sampling:	290 samples; 104 mandays
Prospecting:	
A-Star Prospecting, Thunder Bay, ON	442 samples; 88 mandays
Analysis and Assaying:	
ALS Canada Ltd., Sudbury ON	18 core samples
	290 till geochem samples
ALS Canada Ltd., Thunder Bay, ON	442 prospecting samples
Overburden Drilling Management; Nepean, ON	290 heavy mineral analyses
Petrology:	
Vancouver Petrographics; Langley, BC	23 thin sections; 1 report

Forest Helicopters of Kenora, Ontario, provided a 5-seat A-Star Helicopter, which was used each day to ferry the prospecting and till sampling teams to the field sites at Annex and Big Dam. The helicopter was also used to ferry supplies and fuel from Lansdowne House Airport. Nakina Air Service provided a Single-Engine Turbo-Otter float plane. The aircraft brought field crew and equipment to and from Rowlandson camp. A weekly charter flight brought in groceries and other supplies, and backhauled till and prospecting samples. 17 charter flights between Nakina and Rowlandson camp were completed during the summer program A round trip between the two locations is 280 nautical miles.

5.0 INVESTIGATIONS

Investigations undertaken during the reporting period are summarized in the following table.

5.1 Corehole Re-logging

The core re-logging program focused on a selection of drillholes from the 2010-2012 Rainy River drilling projects at Big Dam. The intention was to gather samples for petrographic analysis and gain a better understanding of the geology and orientation of structures that are prospective for gold mineralization on the property. Nine holes, totaling 2,373 metres of core were re-logged (Figure 8).

Eighteen new split core samples were submitted for assay. The samples originated from a sulphide-bearing, silicified shear zones in the upper portion of drillhole TPK-10-003 which were located up-dip from a gold bearing structure identified in undercut drillhole TPK-10-004.

5.2 Till Sampling

Bulk till sampling was completed in an 8.5 km (north to south) by 10.5 km (east to west) area in the northwestern portion of the TPK Annex area during August 2017. The purpose of the work was to define the up-ice cut-off of a gold-in-till dispersion train that had been only partially defined by previous work in the area.

As seen in figure 9, the sampling was undertaken on a successive series of northwest to southeast (310°-130°) profiles spaced 300-500 m apart, oriented perpendicular to the trend of Late Wisconsinan glaciation in the area (220°-225°), with samples on each of the profiles collected at 200 to 250 m intervals. In all, 290 samples were collected at 313 sites. There were 23 sites where till was not present within a 30-50 m radius of a selected sample site location (92.6% sample success rate).

The target sample media consisted of basal lodgement till that varied in texture from silty-sand to sandy-silty-clayey diamicton. A well-developed series of drumlins oriented parallel to the direction of Late Wisconsinan glacial flow (220°-225°) in the area were seen to consist of variably reworked or washed till, flanked laterally, by more silt and clay-rich lodgement tills.

For a sampling program targeting a proximal bedrock source, the most desirable glacial material is basal lodgement till, but since >3 m overburden depths are not uncommon across much of the TPK and Annex areas, the C soil horizon was more commonly sampled. Within soil profiles, the C-horizon is the optimum zone for sampling since it represents largely unoxidized, unweathered material as it was initially deposited at the sole of the glacial ice mass (S. Averill, *personal communication*).

During previous basal till sampling programs on the property, 15 kg samples were collected in order to yield a sufficiently large heavy mineral concentrate for diamond indicator mineral sampling (Morris and Kaszycki 1997). For sample programs intended to delineate gold and base metal dispersion trains, a nominal 12 kg sample (wet) is more appropriate which generally yields a 10 kg table feed for the recovery of heavy minerals including gold. The 10-12 kg sample size is consistent with till geochemical surveys undertaken for gold in the Slave Province by Kerr and Knight (2007) and Mc Martin (2000). The smaller sample size also allowed field crews to collect more samples each day and lowered analytical costs for sample processing.

The same sample collection procedure used by Northern Superior Resources for its overburden sampling programs in 2002, 2003, 2005, 2007 and 2008 programs was implemented in 2017. At each sample site, a soil auger was initially used to determine the suitability of the material at depth prior to a hole being dug with a shovel to extract a larger sample. The sample was screened in the field through a -7 mm square mesh aperture screen with 12 kg of material collected on a ground sheet. The sample was then transferred to a plastic sample bag with a unique sample number written on the outside of the bag. A representative 60-90 grams sub-sample of the till was also collected and placed in a similarly numbered kraft paper envelope for multi-element ICP analysis as a corollary to the heavy mineral analysis completed on the till sample. The sample was then weighed in the field using a portable scale to ensure that the desired 12 kg sample volume had been collected. A representative selection of +7 mm oversize gravels and pebbles was added to each till sample bag for lithological identification at the lab. Each bag was then sealed with a single use tie wrap and moved to a helicopter cache point for transport back to the Rowlandson Lake basecamp.

At each sample site, notes were taken regarding the texture of the sample, as well as an estimate of the percentage of +7 mm oversize fraction in the sample. The UTM location of each site was noted, as well as the general slope of the site, the nature of the Quaternary sediments present (e.g. till blanket, till veneer, outwash sequence etc.) and proximity of any outcrop or accumulations of boulders in the immediate vicinity of the sample site. As part of Northern Superior's QA/QC (quality assurance/quality control) procedure, an image of each bagged sample was recorded at each site with a digital camera which was stored in an electronic database for future reference if required.

At the end of each day's traverse the till samples were tallied and re-weighed at Northern Superior's Rowlandson basecamp before being bulked for shipment in polywoven sacks. Each sack was sealed by a single use tie wrap and provided with a unique identifier on the outside of the bag for sample tracking purposes. Once each week, a consignment of samples was flown via aircraft from the camp to Nakina where the samples were forwarded by courier to various labs for treatment.

5.2.1 Heavy Mineral Sample Procedure

From Nakina, till samples were shipped via courier directly to Overburden Drilling Management (ODM) in Nepean, Ontario for analysis. Samples were progressively reduced in size to produce a heavy mineral concentrate (>3.3 g-cm^{-3}) that was visually analyzed by means of a binocular microscope to determine the number and size of gold grains recovered from each sample.

After each sample consignment entering the lab had been checked against the accompanying consignment list prepared by Northern Superior personnel, and was found to be error free, a 500 g character sample was extracted by ODM and archived for future reference, if required. Thereafter, each sample was wet screened at 2.0 mm to create a -2.0 mm table concentrate. The table concentrate was purposely large (~1,000 g) and of low grade (10-25% heavy minerals) in order to achieve the desired high (80-90%) gold grain recovery rate as a final product. The gold grains which are mostly silt-sized at this stage of the sample treatment are further enhanced by micropanning. The recovered heavy mineral concentrate, including the gold grains in each sample are then counted, measured, and classified as to degree of wear and abrasion.

A flow chart of Overburden Drilling Management's sample treatment process is shown in Figure 10.

5.2.2 Till Geochemistry

Kraft paper bags containing till geochemistry samples were tallied, weighed and bulked together in polywoven bags at the Rowlandson Lake camp before they were dispatched by aircraft to Nakina for courier delivery to ALS-Chemex Labs in Sudbury, Ontario for the determination of gold, and major and minor trace elements by a combination of inductively coupled plasma-atomic emission spectrometry and inductively coupled mass spectrometry.

Upon arrival at the lab, sample consignments were initially tallied and compared against the control documents accompanying each consignment. Any noted discrepancies between the sample manifest and the sample shipment were noted and brought to the attention of Northern Superior personnel. Thereafter, samples were logged into the assay lab's Local Information System (LIMS) which assigns each group of samples entering the lab a specific job number as well as an identifier unique to each sample which is not duplicated elsewhere in the lab.

The samples were then dried, if required, in ovens at a maximum temperature of 60°C to remove any excess moisture from the samples. The samples were then screened to less than 63 microns and homogenized. Thereafter, each sample was analysed for multiple elements by means of aqua regia leach.

For the determination of major and minor trace element abundances, ALS employs inductively coupled mass spectrometry (ICP-MS). Therein, a 0.5 g representative sample is digested in aqua regia at 90°C in a microprocessor-controlled digestion block for two hours. Upon cooling, the digested samples are diluted and analyzed by a Perkin Elmer Sciex ELAN ICP/MS unit. As part of ALS's quality assurance/quality control program (QA/QC) one blank sample is analyzed for every 68 samples and an in-house control sample is analyzed at the rate of approximately one in every 33 samples. The ICP/MS instrument is recalibrated after every 68 samples with all of the QA/QC data captured digitally within the lab's LIMS database.

Fire assay analyses for gold (ALS lab code: Au-ICP21) requires a 30 g aliquot to be fused with a mixture of lead oxide, sodium carbonate, borax, silica and other reagents which is then inquarted with 6 mg of gold-free silver. The resulting lead button is then cupelled to remove the lead and yield a precious metal bead. The bead is digested in 0.5 mL dilute nitric acid and heated in an oven. Thereafter, 0.5 mL concentrated hydrochloric acid is added to further digest the bead when is then re-heated. The digested solution is then cooled, diluted to a total volume of 4 mL with de-mineralized water, and analyzed by inductively coupled plasma-atomic emission spectrometry (ICP-AES) against a series of matrix-matched standards

The results of fire assays and ICP analyses are checked by a lab technician and are then forwarded to lab's data manager by means of electronic transfer. After the checking the data for completeness, the Laboratory Manager validates that it is error free and then issues a certificate. The results are then forwarded to Northern Superior Resources via electronic transfer, and a hardcopy of the assay certificate is mailed to Northern Superior's office for long term storage.

5.3 Prospecting

Prospecting was undertaken by a four-man team, provided by A-Star Prospecting of Thunder Bay, and focused on the Big Dam and Annex portions of the property. At Big Dam, the aim of the prospecting was to provide an up-ice cut off to a gold-bearing boulder train present around Crying Boy Lake. Historic till and grab sampling programs in the Annex portion of the TPK property had identified Au-Ag-Cu anomalies that were potentially associated with the contact between a greenstone belt and intermediate to felsic lithologies. However, further sampling was required to identify the up-ice cut off for the till anomaly (a.k.a. The Keeley Lake dispersal train). Furthermore, magnetics data had identified a series of highs that were potentially associated with magmatic intrusions that warranted further investigation through prospecting.

A total of 191 samples were collected from the Annex area (figure 11) and 251 from Big Dam (figure 12). Samples were analyzed for a suite of 50 elements, including fire assay Au, through ALS laboratories. Combined with historic sample programs between 2007 and 2012 the total number of samples collected across the property totals 1320.

5.4 Petrographic Studies

Fifteen core and four grab samples were submitted to Vancouver Petrographics for thin section preparation and petrographic description during the reporting period. As summarized in Table 4, the samples comprise an array of rock types found on the Big Dam and Annex portions of the property, including several samples of sericite schist that are known to be prospective for lode gold mineralization.

The new sampling will build upon the findings of an earlier petrographic study conducted by Laramide Petrologic Services (Mysyk 2008), and will assist in distinguishing various lithologies encountered on the property and aid in the identification of economically prospective shear zones on the property. The study will also build a general framework for the mineralization history at TPK and the timing of various mineralizing events

Table 4: Summary of TPK Project Samples Submitted for Petrographic Study.

	Sample No.	BHID	From–To	Lithology (Classified in the Field)	Rock Code	Magnetic Susceptibility (SI ·10^{-3})	Rock Type (After Petrographic Analysis)	Hydrothermal Alteration or Contact Metamorphism (*)
Big Dam South	1	TPK-12-038	26.55–26.75	Quartz monzonite	QMNZ	0.187	Leucocratic microsyenogranite	biotite: weak; white mica: subtle to weak; pyrite-iron oxides: subtle
Big Dam South	2	TPK-12-038	71.8–72.00	Metasediment	SED	0.074	Garnet-white mica-quartz-dolomite hornfels	*K-feldspar: moderate to strong(?); white mica-garnet-quartz-chlorite: weak
Big Dam South	3	TPK-12-038	51.45–51.66	Sheared and potassic altered quartz monzonite	(M8)QMNZ	0.248	Orthomylonite	K-feldspar(?): moderate; white mica: weak; pyrite-magnetite: subtle
Big Dam South	4	TPK-12-038	125.32–125.52	Schist	M8	0.186	Biotite schist	K-feldspar-calcite: weak; magnetite(?)-pyrite-chalcopyrite-epidote: subtle
Big Dam South	5	TPK-12-038	171.36–171.56	Intermediate volcanic with feldspar phenocrysts	V2	2.72	Plagioclase-phyric andesite; Biotite-quartz schist	K-feldspar: weak within the andesite; clay and/or epidote: weak within the plagioclase; white mica: subtle
Big Dam South	6	TPK-12-038	165.92–166.15	Mafic volcanic	V3	1.98	Biotite-plagioclase schist	
Big Dam North	7	TPK-10-004	93.43–93.57	Potassic altered quartz monzonite	QMNZ	1.55	Monzogranite	chlorite: strong after biotite(?); clay and/or white mica: subtle to weak after plagioclase; calcite-pyrite: subtle
Big Dam North	8	TPK-10-004	187.04–187.27	Pseudotachylite (in quartz monzonite)	QMNZ	0.99	Monzogranite(?); Pseudotachylite	chlorite: strong after biotite; epidote-magnetite: subtle after biotite; clay and/or white mica: subtle to weak after plagioclase
Big Dam North	9	TPK-11-013	190.8–190.90	Au-bearing sheared quartz monzonite	(M8)QMNZ	0.006	Quartz-white mica ortho(?)schist	
Big Dam North	10	TPK-10-011	72.15–72.33	Sheared quartz monzonite	(M8)QMNZ	16	Quartz-white mica orthoschist	

	Sample No.	BHID	From–To	Lithology (Classified in the Field)	Rock Code	Magnetic Susceptibility (SI ·10⁻³)	Rock Type (After Petrographic Analysis)	Hydrothermal Alteration or Contact Metamorphism (*)
Big Dam North	11	TPK-12-056	115.96–116.05	Sheared-protomylonitic quartz monzonite	(M8)QMNZ	0.537	Quartz-white mica-K-feldspar-plagioclase granofels	
	12	TPK-12-056	117.26–117.36	Sheared quartz monzonite	(M8)QMNZ	0.782	Metamonzonite	
	13	TPK-12-056	149.90–150.05	Strongly sheared and silicified, Au-bearing QMNZ	(M8)QMNZ	0.143	Orthoschist	
	14	TPK-12-056	29.3–29.4	Quartz monzonite with weak potassic alteration	QMNZ	3.23	Monzogranite	white mica: subtle within the plagioclase; titanite: subtle within the biotite
	15	TPK-12-056	185.37–185.49	Leucogranite with weak potassic alteration	I1B	4.88	Monzogranite	white mica and/or clay: subtle to weak within the plagioclase; titanite-epidote: subtle to weak after biotite
	16	H755585	Grab	Strongly sheared and silicified, Au-bearing schist	M8	0.006	Silicified white mica-schist	quartz: strong; K-feldspar(?): weak; pyrite: subtle
	17	H755545	Grab	Strongly sheared and silicified, Au-bearing schist	M8	0.01	Quartz-white mica schist	iron oxides: subtle after pyrite
Annex	18	W129984	Grab	Fine grained, quartz-feldspar porphyry	QFP	1.37	Albite-dolomite/ankerite-biotite alteration zone; Pyrite-dolomite/ankerite-K-feldspar-biotite vein; Dolomite/ankerite-calcite vein	albite: strong; dolomite/calcite-biotite: weak
	19	W130465	Grab	Silicified metasediment with replacement sulphides	SED	0.116	Albite-quartz-biotite schist	

6.0 RESULTS

6.1 Corehole Re-logging

Descriptions of each of the three target sites, followed by summaries from the 2017 re-logging program are provided below:

6.1.1 Target 3:

Rainy River Resources undertook drilling in the Target 3 area during the winter of 2010-2011, following up on earlier till sampling, reverse circulation and core drilling programs in the area, completed by Northern Superior Resources and Overburden Drilling Management (ODM). These surveys identified in-till As and Au anomalies. IP surveys conducted by Abitibi Geophysics in 2008 and 2011 also identified chargeability and resistivity anomalies associated with vein or disseminated sulphide style mineralization, hosted within NE trending structures that might be dissected by NW trending faults (Abitibi Geophysics, 2011). A total of 19 drill holes, scissoring north to south, were collared at Target 3. They returned several impressive Au-intersections (including 25.9 g/t over 13.5m in TPK-10-004), hosted as disseminated and vein style mineralization within strongly sheared to mylonitic quartz monzonite. However, the structure was reportedly difficult to follow along strike to the east and west, and no further drilling was undertaken in the target area by Rainy River Resources.

TPK-10-003 (TPK-17-003):

TPK-10-003 was collared into light grey monzonite hosting sporadic aplite dykes to a depth of 45m. From 45 to 100m there are a series of steeply dipping, silicified and sericitized shear zones up to 5m in width, hosting disseminated pyrite and arsenopyrite. In some cases the silicification has resulted in subsequent brittle fracturing, caused by later faulting, as evidenced by the presence of thin fault gouge at 49.95m. Between 100.02 and 109.31 a series thin (1cm) quartz-tourmaline-epidote veins were noted that hosted trace amounts of galena, as well as disseminated pyrite. The remainder of the hole was predominantly foliated quartz monzonite with sporadic, thin aplite dykes. Several sections of, previously un-sampled, moderately sheared, silicified, sulphide bearing core were sent to ALS for analysis. The sampled core is up-dip of the auriferous zones encountered in TPK-10-004. Although the newly sampled core returned relatively low Au values (up to 0.057 g/t), anomalous Ag, As, S and Sb values in the interval between 48 and 52m confirm that hydrothermal fluids have moved through, and altered a wider and more continuous zone of shearing than previously reported.
Best Au- intersection in drillhole: 1.76 g/t over 0.38m.

TPK-10-004 (TPK-17-004):

In TPK-10-004, from 0-84m the drill hole intersected foliated quartz monzonite exhibiting weak-moderate potassic alteration that appears to be spatially associated with thin, crosscutting aplite dykes. From 84-110m there are a series of thin shear zones (up to 3m in width) exhibiting silicification, sericite alteration and rare saussuritization hosting patchy, anomalous Au values up to 1.76g/t over 1.2m. The shears zones are at various degrees to core axis, ranging from 45-25° TCA. From 148-164m, a strongly sheared to proto-mylonitic interval of quartz monzonite was intersected. The shear zone exhibited pervasive silicification and sericite alteration, which has encouraged subsequent brittle fragmentation, either by later tectonic activity or by drill induced fracturing. The shear zone hosts disseminated specks of pyrite, arsenopyrite and rare galena, as well as several quartz-sericite veins up to 50cm wide. Several specks of visible gold were

identified in quartz veining around 157m. The lower contact of the shear zones was gradational into an underlying sequence of foliated and potassic-chlorite-saussaurite altered, quartz monzonite. Further sericite-silicic altered shearing was encountered near the end of the hole between 235 and 237m depth.
Best Au-intersection in drilhole: 25.9 g/t over 13.5m (including 749.00 g/t over 0.3m).

TPK-11-013 (TPK-17-013):

TPK11-013 was collared into light grey, coarse grained quartz monzonite with thin, sporadic zones of weak shearing defined by wispy sericite alteration. Within 30m of the main shear zone (at 187m) there are several aplite dykes up to 3m wide, that dip steeply to the north. From 187-194m the drill hole intersects the same zone of shearing, silicification and sericitic alteration and quartz veining as was encountered in TPK-10-004. Brittle fragmentation of the core is also noted, likely caused by the silicic alteration and subsequent drill induced or tectonic induced stresses. The quartz-sericite-actinolite-chlorite veins are up to 1.8m wide and host rare, disseminated pyrite. No visible gold was observed. The drill core then transitions back into potassic-chlorite altered quartz monzonite to the end of hole.
Best Au-intersection in drillhole: 4.31g/t over 6.84m (including 34.00 g/t over 0.5m).

TPK-11-014 (TPK-17-014):

TPK-11-014 was collared into foliated, light grey, xenolith-bearing quartz monzonite, crosscut by sporadic aplite dykes that were spatially associated with diffuse potassic and hematite alteration. Intermittent zones of thin, weak shearing were encountered to 200-209m depth, wherein the intensity of shearing increased abruptly in association with increased potassic, silicic and sericitic alteration. Brittle fragmentation of the drill core was observed between 218-227m although this did not correlate with the presence of any shearing. Weak shearing and silicification was encountered between 240 and 253m, with associated disseminated pyrite. From 253-321m, the drill core returned to quartz monzonite with intermittent zones of moderate shearing as well as intervals of unmineralized, stockwork chlorite-quartz veining. Two, approximately 20cm wide quartz-chlorite-carbonate veins were encountered towards the end of the hole (319-320m) though neither returned any anomalous gold values.
Best Au-intersection in drillhole: 0.97g/t over 5.1m (including 3.63 g/t over 0.8m).

TPK-11-019 (TPK-17-019):

TPK-11-019 was collared in quartz monzonite before transitioning into a 12m wide aplite dyke at 25m. Further aplite intrusions were encountered at 68 and 155m. The latter exhibited two phases; a fine grained un-mineralized aplite, and a pegmatitic, coarse grained and sulphide bearing variety. The exact relationship between either intrusive phase is uncertain. Strong shearing with potassic, sericitic alteration and silicification was encountered between 178 and 198m. The silicification has caused the core to undergo later, brittle fragmentation due to tectonic or drill-induced stresses. Further fracturing and fragmentation was encountered between 227-236m, though this was not associated with alteration or shearing. Two thin shear zones were encountered at 251 and 277m. Although both intervals were less than 3m in width, either interval returned two of the best Au-intersections in the hole (1.56 over 1.0m and 1.62 g/t over 1.0m).
Best Au-intersection in drillhole: 1.78 g/t over 0.5m.

TPK-10-005 (TPK-17-005):

TPK-10-005 begins in foliated, light grey, xenolith-bearing quartz monzonite. From 22-72m, the drill intersects a series of thin, sporadic, weak-moderate shears, defined by attenuated quartz-feldspar grains and wispy sericite. Despite the weak shearing and alteration, patchy zones of

Au-mineralization were encountered, up to 5.59 g/t over 0.5m. Further, thin shearing with weak silicic and sericitic alteration was encountered at 125 and 158m, both associated with later, brittle fragmentation of the core. The presence of fault gouge indicates some later tectonic adjustments to the shear zones. Sporadic, <1m wide aplite dykes at 60-70° TCA were also encountered throughout the drill core.
Best Au-intersection: 3.81 g/t over 1.15m.

Target 3 conclusions:
The shear zone encountered at Target 3 is hosted entirely within quartz monzonite that exhibits varying degrees of potassic-carbonate alteration, though both are largely absent within the shears zones themselves, which are strongly silicified and sericitized. Although the original Rainy River drill logs correctly identify the structure as a strongly sheared quartz monzonite, emphasis is later placed on the presence of a brittle ‘fracture zone’ (cf. Rainy River drill sections). This fracture zone runs across the Target 3 area and may be associated with silicification contemporaneous with the shearing event. Silicification can cause the rock to become brittle making it susceptible to later fragmentation by either tectonic activity (e.g., faulting) or by drilling. Evidence of tectonic and drilling induced fragmentation is observed in drill core at Target 3. Importantly, the ‘fracture zone’ itself, post-dates and therefore does not control the location of Au-mineralization in the Target 3 area.
As noted by Rainy River, Au mineralization is discontinuous and the shear zone changes orientation and dip along its strike length. In cross-section, the mineralization is seen to dip steeply to the north. The paucity of the shear zone and associated mineralization may be explained by projecting the shear zone and mineralized intervals to surface. Shearing is consistently intersected at around 150m depth across the Target 3 area and is interpreted to represent the same shear zone. The widest section of the shear zone (TPK-10-003, 004 and TPK-11-013, 014) also hosts the highest Au assays and the widest intervals of mineralization. To the west and east, the width of the shear zone pinches out and the strike of the structure appears to change azimuth from 124° to 100°. The Au-mineralization may therefore represent a dilatational bend in the shear zone, in which tensile stresses have facilitated a greater influx of Au-bearing fluids (figure 13). This may also explain the absence of a significant shear zone in drill holes collared further to the west. The strike of the structure also roughly matches the trend of IP structures noted by Abitibi Geophysics (~130°). The notable increase in the frequency of aplite dykes proximal to the main zones of Au-mineralization encountered in TPK-10-004 and TPK-11-013, may also be due to dilatational conditions. The diffuse, albeit Au-bearing shears encountered at the top of TPK-10-005 are at 40m depth and may represent a separate shear splay or horsetailing structure.

Visible gold is observed in quartz veins in TPK-10-004, although elevated Au values are more widely associated with fine grained, disseminated pyrite and arsenopyrite within the shear zone groundmass. This suggests that the mineralization was contemporaneous with brittle-ductile and ductile deformation (veining tends to be associated with more brittle deformation regimes) (Hodgson, 1989). The predominantly ductile nature of the shearing is consistent with the relatively limited wallrock alteration observed on either side of the structure (potassic alteration in the quartz monzonite being associated primarily with aplite dykes, and carbonate alteration largely absent). Fluids within ductile shears tend to be added incrementally and frequently occur contemporaneously with metamorphic reactions which equilibrate magmatic-metamorphic fluids with the composition of more local, meteoric-metamorphic fluids (Murphy, 1989). In contrast, brittle shear zones tend to favor veining and extensive wallrock alteration (Robert, 1991).

6.1.2 Target 2:

The Target 2 area is defined by elevated Au+As values in till samples and an Au-bearing boulder train (Hart and Boucher 2010). Previous prospecting and mapping on the property had identified a thin greenstone belt ~600m wide, which was also seen in the 2002 Aeroquest airborne magnetic survey data, and in the Abitibi Geophysics ground mag data (2008, 2009). Reverse circulation drilling undertaken by ODM encountered several zones of sheared bedrock at surface (e.g. TPKRC-10-084, 085), which suggest that the contact between the greenstone belt and felsic intrusive rocks further to the north was characterized by a shear zone contact, trending approximately E-W (Averill, 2011). Chargeability and resistivity anomalies across the target area are sporadic and partially obscured by lacustrine deposits associated with periglacial lakes. Drilling undertaken by Rainy River during 2010 and 2012 encountered sporadic anomalous gold mineralization, typically associated with quartz-sericite-sulphide shear/ alteration zones. The highest gold values were seen to be associated with visible gold occurrences on the outer margins of quartz-sericite zones (e.g. TPK-12-043 and TPK-12-052) or within chlorite-chalcopyrite mineralized shear zones as in TPK-12-030. However, the results were deemed insufficient to explain the grades and size of the Au-bearing boulder train and till anomalies in the area. Rainy River concluded that either the main zone of mineralization had been eroded away, or that it existed further up-ice, possibly beneath Crying Boy Lake.

TPK-10-011 (TPK-17-011):

TPK-10-11 was re-logged since it was collared close to the hypothesised main zone of mineralization beneath Crying Boy Lake, and provided some of the better Au-bearing intersections in the Target 2 area. The drill hole was collared into foliated, weakly potassic altered quartz monzonite. Several zones of thin shearing were encountered between 42 and 102m. The shear zones are less than 5m wide and exhibit strong silicification and sericitization, occasionally accompanied by patchy magnetism, associated with disseminated pyrrhotite. Disseminated pyrite and rare arsenopyrite and chalcopyrite were also observed throughout the shear zones. Veining comprised a combination of quartz-sericite-chlorite-carbonate veins up to 0.5m in width, as well as stockwork zones of hairline width chlorite-quartz veinlets, both of which returned anomalous gold values. Both the shears and associated veins dip steeply to the north at ~70°. Beyond 102m depth in the drillhole, the core consist of foliated, relatively unaltered quartz monzonite with occasional, thin aplite dykes as well as a wide mafic intrusion between 207 and 219m. Au mineralization was restricted to shear zones hosting quartz veining and adjacent areas of stockwork veining.
Best Au-intersection in drillhole: 1.65 g/t over 0.5m.

TPK-12-038 (TPK-17-038)

TPK-12-038 was re-logged in order to provide a suite of representative samples across the greenstone belt and felsic intrusive contact zone. The last 70m of the drill hole (logged as gabbro) could not be located. Drilling commenced in TPK-12-038 within quartz monzonite that hosted weak, patchy magnetism. At around 48 m depth, potassic alteration and shearing increase abruptly in the drillhole, although sulphides are absent. Between 66 and 80m, a block of fine grained, brown rock with a greasy lustre was present that was previously logged as metasediment. It may represent a raft of xenolith material within the intrusion. From 112-132m there is a strongly sheared, chlorite-biotite schist crosscut by boudinaged and auto-brecciated veins of quartz-chlorite hosting rare specks of pyrite and chalcopyrite. Disseminated pyrite is also observed within the schist groundmass. The shear zone marks the contact between the felsic intrusive suite and the greenstone belt, with drill core

transitioning to a series of mafic volcanics and gabbros interlayered with thin horizons of intermediate volcanics.
Best Au-intersection in drillhole: 5.34 g/t over 1.5m.

6.1.3: Target 1:

The Target 1 area was identified as prospective for Au-mineralization during earlier reverse circulation drilling completed by ODM (Averill, 2011). The drilling confirmed the presence of sheared quartz monzonite and gold in-till (e.g. TPKRC-10-081). Geophysical surveys also indicate strong conductivity and resistivity anomalies in the area. Airborne mag data implies that an apophyses of the greenstone belt to the south also terminates or forms a west verging fold closure immediately east of the target area. Although the greenstone belt does not crop out in the area, prospecting during 2017 confirmed the presence of gabbro/mafic intrusive boulders down-ice from the hypothesised apophyses.
Drilling in the Target 1 area was conducted towards the end of Rainy River's 2012 winter drill program. The drill collars were sited east of the main conductivity-resistivity anomalies, away from the greenstone belt. The host lithology was logged as quartz monzonite with sporadic thin silicified shears hosting disseminated pyrite-pyrrhotite. These features were considered to be the cause of the geophysical anomalies in the area. Rare visible gold was observed in TPK-12-056 although assays 'only' returned 1.12g/t Au across that 1m interval. After three holes in the Target 1 area, the drill program ended, and no further follow up work was completed in the area.

TPK-12-056 (TPK-17-056):
TPK-12-056 was collared in moderate-weakly altered quartz monzonite, crosscut by thin zones of weak to moderate, steeply dipping (70-80° TCA) shearing Increased potassic and hematite alteration is observed adjacent to a cross cutting aplite dyke at 84m. Moderate to strong shearing commences at 66m and continues to 154m, with zones of protomylonitic shearing and blocks of less strongly sheared quartz monzonite. The shear zones are up to 6m wide and exhibit strong silicification and sericitization. Patchy magnetism is associated with rare, disseminated pyrrhotite, and disseminated pyrite is observed throughout the shears. Rare arsenopyrite and chalcopyrite are also noted. Visible gold is observed at 123.43m within a block of strongly silicified but weakly sheared quartz monzonite bracketed by intervals of more intense shearing. The shear zones are subvertical to steeply south dipping, and Au-bearing intervals > 0.5g/t are confined to the central core of the shear zone. From 154m onwards, TPK-12-056 intersected weakly altered and foliated felsic plutonic rocks. The finer grain size, reduced biotite content, and presence of angular feldspar grains suggests this rock is a leucogranite (Mysyk, 2008). The shear zone may therefore represent a contact between the Freure Lake Batholith and Contact Stock (Averill, 2011).

Target 1 Conclusions:
Although drilling in the Target 1 area encountered strongly silicified shear zones that hosted disseminated pyrite and pyrrhotite, none of the three holes were collared into the centre of the geophysical anomaly that had been originally been outlined for drill testing. Recent prospecting in 2017 further supports the magnetic data which indicates the presence of a greenstone belt or an apophyses is present and additional 500m further to the east. Hinges and folds within greenstone belts are known to make excellent structural traps, concentrating fluid flow, and potentially acting as a dam for Au mineralization (e.g. saddle reefs). Furthermore, there are a number of Au-bearing grab samples immediately down-ice of the geophysical anomaly (M766281: 6.22 g/t Au, H755511: 1.19 g/t Au). Further drilling at this location should be sited on/immediately south of the resistivity and chargeability anomalies. Prospecting results from the

2017 program will also help to determine whether further work is warranted to the east of Target 1 or not.

6.2 Prospecting

Big Dam Summary

Of the 251 samples collected at Big Dam in 2017, 153 samples had visible sulphide (primarily pyrite with minor pyrrhotite, arsenopyrite and chalcopyrite). The highest Au-grade boulder collected at Big Dam in 2017 ran 24.7 g/t (historic highest Au-grade: 94.2 g/t). A total of 37 samples had >0.5 g/t Au. Two samples also returned Ag grades of 58.6 and 55.0 g/t respectively. Boulders with elevated Au primarily comprised sheared quartz-monzonite and leucogranites, hosting disseminated sulphides. Quartz veining was observed in some Au-bearing boulder, but does not appear to be a requisite for elevated Au grades.
Disseminated-sulphide style mineralization, hosting Au, is consistent with the mineralization style observed in drill core from the 2017 re-logging program (see separate report: TPK 2017 Drill Core Relogging Report). The disseminated sulphides are hosted in ductile shear zones, with higher grade quartz veining apparently localized to dilatational structures.

Principal component analysis using ioGAS™ confirmed that the Au-bearing boulders have signatures consistent with typical orogenic Au mineralization (figure 14). Sheared samples hosting Au exhibit a positive correlation with Sb, S and As. This correlates with drill core observations, in which Au is primarily hosted as inclusions within sulphides (Colombo 2017a). Within quartz vein samples, the correlation between Au and Sb is exceptionally high (98% Au-Sb correlation coefficient). This suggests that there is a correlation between Au and stibnite (Sb2S3) in both disseminated and vein-style mineralization. Strong correlations between Ag, Te and Bi imply that silver is primarily present as a bismuth-telluride. K, Rb and Tl exhibit a strong positive correlation and a negative correlation against Ca and Sr, which likely reflects sericitization of feldspar (figure 14). Sericitization is commonly associated with shearing in the Big Dam area, though there is no definite correlation between sericite alteration and elevated-Au samples. Recent petrographic work has indicated that the sericite alteration is contemporaneous with mineralization at Big Dam, whereas K-feldspar alteration predates shearing and mineralization (Colombo, 2017b). Negative correlations between Si versus Na, Ca, Al, Ti and Mg in sheared samples is likely the result of silicification. Although drill core observations noted that silicification appeared to be spatially associated with shearing and Au-mineralization, there is no definite geochemical relationship between Si and Au in either boulders or core.

Annex Summary

The highest Au grade from the 2017 program was a quartz vein hosted in a chloritized volcanic, which returned 46.9 g/t Au (highest historic Au assay at 727 g/t). Interestingly the sample only contained a trace amount of pyrite. 18 samples yielded >0.5 g/t Au (figure 15). The samples were primarily quartz veins, hosted in un-sheared to moderately sheared mafic volcanic or intrusive units, with chalcopyrite, malachite and pyrite commonly observed. 33 samples yielded >0.5 g/t Ag, with the highest grade at 48 ppm Ag in a gold and copper bearing quartz vein that had a ‘conglomerate-like’ appearance (sample W129936). The same sample also yielded the 2017 programs highest Cu value at 3.42 wt% (highest historic assay 1.92 wt.%). This sample was situated on the shoreline of Fishbasket Lake, suggesting that additional targets for Cu-Ag-Zn mineralization may exist further up-ice into the north of the property. 23 samples returned Cu values exceeding 0.5 wt%. Elevated Cu and Ag samples are primarily associated with sulphide-bearing mafic volcanic and intrusive rocks. The percentage of visible sulphides can vary between 0.5 vol.% and 40 vol.%. Shearing or strong alteration was not a requisite for high assay Cu and Ag values.

Principal component analysis indicates that Au does not tend to correlate with Cu, but exhibits a weak positive correlation with Ag, Te, Bi and Mo. In contrast, Cu shows a moderate-strong correlation with Ag, Zn, Se, Cd and In, and a weak positive correlation with Mo and Fe. These are indicator elements of VMS-style mineralization (McClenaghan et al., 2015), though indicator minerals such as galena and sphalerite have not been noted in till sampling to date. There is also a positive correlation between K, Tl and Rb, versus Ca and Sr which, as noted earlier, likely represents sericite alteration of feldspars. This alteration does not appear to correlate with Au or Cu-Ag-Zn mineralization. Spatially, the highest Au values (>10 g/t) do not correspond with the highest Ag, Cu and Zn values. The former is primarily concentrated in quartz veins around the site of the 2012 drill program. The elevated Cu, Ag and Zn boulders are 1.3km to the west, along the southern and eastern margins of a magnetic high that may represent a mafic intrusive with associated VMS style mineralization (figure 16). Two well-mineralized, erratic, quartz vein boulders, hosting anomalous Cu, Ag and Zn values were collected to the north; along the shore line of Fishbasket Lake (3.42 wt% Cu, 3.79 g/t Au, 48ppm Ag and 341 ppm Zn). As stated earlier, their presence suggests additional targets for mineralization may exist in the north of the property.

The geochemistry of the boulders from the Annex property indicates that the area can be broadly subdivided into intermediate (diorite-granodiorite-andesite) and mafic (basalt-gabbro) lithologies. Granite and quartz monzonite are present, but represent a relatively minor component compared with the Big Dam area. This appears to be largely consistent with drill logs from the 2011 drilling program, in which mafic volcanics and andesite were the primary rock encountered in core.

6.3 Till Sampling

Of the 300 till sample sites planned in the Annex portion of the property, 290 provided sufficient material for heavy mineral analysis by Overburden Drilling Management (ODM) in Ottawa, and 51 element geochemistry analysis by ALS in Sudbury. Previous studies on the quaternary geology of the TPK property by Parsons (2008) and Shank (2009) identified two distinct till units; an earlier, carbonate-bearing lodgment till, and a later, carbonate-absent till deposited during the glacial retreat. The presence of carbonates, omars and jaspers within the carbonate-till, indicate transportation from at least 200km (and possibly as far as 1000km) up-ice. Although there is evidence that the lodgment till eroded local bedrock in parts of the TPK area, interpretation and application of its mineral content and geochemistry to the local area should be done with caution. The carbonate-absent till is considered to be derived from local, up-ice bedrock exposures that were not covered by the earlier lodgment till. It was therefore recommended by Parson (2008) that this till unit should be the focus for future sampling programs. The two tills can be distinguished by their limestone clast content (early lodgment till >20% limestone clasts), their colour (lodgment till: grey, recessional till: brown) and their clay content. Other glacial sediments found on the TPK property include eskers, lacustrine clays and glaciofluvial sediments. More details on the property's quaternary geology can be found in Parsons 2008.
Limestone clast content exceeding 20% was noted in 104 samples. Carbonate-bearing tills are largely constrained to the North-East portion of the 2017 till sampling area, around Fishbasket Lake (fig. 17). There were also 19 samples that ODM classified as non-till (e.g., glaciofluvial sand).

The Keeley Lake gold grain-bearing till train, initially identified in the 2008 New Growth till sample program, is found to continue up-ice into the Annex portion of the property. The presence of pristine gold grains throughout the till-train led Parson (2011) to conclude that there are likely several sources for the gold grains. One such source was intersected by diamond drilling in 2012 (up to 20.80 g/t Au over 1m), within the same area as the 2017 till sampling program. The results from 2017 indicate that the Keeley Lake gold train terminates near the southern shore of Fishbasket Lake, further up-ice of the 2012 drill program (fig. 18). Till samples collected up-ice of the southern shore of Fishbasket contain <3 gold grains (after filtering out of lodgment till samples). The terminus of the Keeley Lake gold train corresponds with a 1.1km wide greenstone belt, originally mapped by Thurston (1979), with outcrops mapped along the south shoreline of Fishbasket Lake. This is supported by an associated between elevated gold grains in the till and samples hosting >50% volcanic/sedimentary rock clasts (fig. 19). Gold-in-till results also show a weak positive correlation with tungsten and arsenic, both of which are considered pathfinder elements for orogenic-gold-style mineralization similar to that observed in the Big Dam portion of the property.

There are two separate areas of elevated Cu-in-till (up to 55 ppm), one corresponds with the Keeley Lake gold train. The other anomalous area, situated further west, corresponds with underlying greenstone belt material (fig. 20). As with the gold geochemistry and mineral concentrate results, anomalous copper results within the Keeley dispersal train are absent up-ice of the greenstone belt. Silver exhibits a similar distribution to Cu, with elevated values (up to 500 ppb) across the greenstone belt and along the Keeley dispersal train.

6.4 Petrographic Studies

A detailed report on the petrographic study was provided by Dr. Colombo (Colombo 2017a). Below are summaries of the key findings:

- The Big Dam property can be broadly separated into the monzogranite Freure Lake Batholith (historically termed quartz-monzonite), the syenogranite Contact Stock (historically termed leucogranite) and the Bartmann Lake Greenstone Belt. The latter comprises biotite schist, basalts, gabbro, plagioclase-phyric andesite and rare dolomite hornfels.
- Shear zones are identified as quartz-white mica-feldspar orthoschist to orthomylonite. Silicification, biotitization and carbonatization alteration are considered synchronous with shearing and regional metamorphic activity (figs. 21)
- Late-post tectonic hydrothermal alteration produced white-mica, tourmaline, garnet, epidote and titanite. This alteration is considered to be largely synchronous with sulphide and precious metal mineralization.
- Pyrrhotite was the first sulphide species to form, later being overprinted by pyrite and minor chalcopyrite. Visible gold was not identified in any of the samples submitted, though four samples are known to host anomalous gold values (no quartz-carbonate veins were submitted for analysis). This implies that gold is hosted as micro-inclusions or a coating on sulphide grains. The report identifies two phases of pyrite growth, an early euhedral phase with later, anhedral, radial growths. The interface between these two phases is recommended as a viable site for Au-precipitation, and further scanning-electron-microscope work is proposed to investigate this theory.

- The two samples from Annex were classified as a xenoblastic aggregate of albite-dolomite/ankerite-biotite, and a quartz-albite-biotite schist. Sulphides are associated with quartz lenses and cross-cutting dolomite/ankerite-feldspar-biotite veins. As these samples were both boulder grabs, the relationship between the two lithologies cannot be determined.
- Magnetic susceptibility readings demonstrate that the monzogranite has a higher susceptibility (>1.0 $SI \cdot 10^{-3}$) than the syenogranite (<0.2 $SI \cdot 10^{-3}$). This is supported by contours in airborne magnetic maps and indicates that the contact between the two can be detected by the magnetometers during core-logging. This contact is a potential shear zone that may host Au-mineralization.

It has been decided that scanning-electron-microscope analysis of the gold-bearing shear zones at Big Dam will assist in gaining a better understanding on the relative timing and controls for gold precipitation. Vancouver Petrographics will be provided with additional, quartz-vein-style gold-bearing samples to complement the suite of disseminated sulphide-style samples already in their collection. This will enable the investigation to directly compare the two mineralization styles found at Big Dam.

7.0 CONCLUSIONS AND RECOMMENDATIONS

In the summer of 2017 Northern Superior Resources mounted a significant multi-disciplinary mineral exploration program. The program consisted primarily of boulder sampling (191 samples from Annex and 251 samples from Big Dam), till geochemistry sampling (290 samples from Annex), heavy mineral concentrate sampling (290 samples from Annex), petrographic studies (23 thin sections), and core relogging (9 holes 2,373m with 18 samples sent for assay).

Each part of the program has provided useful information.

Boulder sampling in the Big Dam area has refined and help prioritize drill targets.

Boulder sampling / till sampling in the Annex area have produced a new target, the Fishbasket Lake Copper target (Figure 14). Samples from the shore of Fishbasket Lake indicate the presence of Cu-Ag-Zn mineralization further up-ice into the north of the property. This sampling also cut off the up-ice extent of the gold mineralization (Figures 15 and 18). This limit coincides with a greenstone belt.

The relogging of the core and petrographic studies have shed light on the lithologies and alteration styles associated with the strongest mineralization. Careful plotting of the drillholes in 3-D also changed the understanding of the geometry of the shears associated with gold mineralization (Figure 13).

After reviewing all available geoscience information, it is recommended that a drill program be mounted to explore for the bedrock source of the gold found in surficial materials (till, HMC and boulders samples) in the Big Dam area. A fence of drill holes should be drilled up-ice from the best gold grain in till samples (largest number of gold grains with significant portion of those grains being pristine). The holes should be not more than 350m in depth and drilled at a low angle (-45 degrees). The fence should extend from the sample up ice for 700m or until mineralization is encountered. The number of holes to be drilled will depend on finances available and how quickly mineralization is discovered. No less than 5 targets should be investigated, each would require as many as 4 holes (Figure 22).

Geologist's Certificate

I, Dan Meldrum, do hereby certify that:

1. I am a professional geoscientist residing at 1820 Mary Hill Road, Port Coquitlam, B.C., Canada;

2. I have co-authored this report entitled "Tipahaakaaning – 2017 Summer Exploration Program"

3. I have a M.Sc. degree in Earth and Atmospheric Sciences from The University of Alberta, 2009. I am a Licensed Professional Geoscientist (P. Geo.) in good standing with the Engineers and Geoscientists of British Columbia. I have experience in exploration and mining operations in Canada, USA, Mexico, Vietnam, Laos, Russia, China, and Mongolia and am a qualified person for the purposes of NI 43-101;

4. I have completed a personal inspection of the TPK property;

5. I am responsible for all items of this technical report;

6. I am not independent of Northern Superior Resources;

7. As of the effective date of this Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Signed and dated at Port Coquitlam, British Columbia, on the 20th day of December, 2017.

Dan Meldrum M.Sc., P.Geo.

8.0 REFERENCES

Averill, S.A., 2001:
The Application of Heavy Indicator Minerals in Mineral Exploration With Emphasis on Base Metal Indicators in Glaciated and Plutonic Terrains; *in* M.B. Mc Clenaghan, P.T. Bobrowsky,

G.M.E. Hall and S. Cook, eds., Drift Exploration in Glaciated Terrains, Special Volume 1985, Geological Society of London, pp. 69-82.

Averill, S.A., Holmes, D.R., and Hozjan, D.J., 2011:
Reverse Circulation Overburden Drilling and Heavy Mineral Geochemical Sampling for Gold - Phase II; *unpublished report* for Rainy River Resources Ltd. and Northern Superior Resources Inc., July 29, 2011, 93 p.

Barrie, C.Q. 1991:
A Report on a High Sensitivity Magnetic and VLF-EM Airborne Survey, Attawapiskat Area, Bartman, Wapitotem, Springer and Owen Lakes Areas, Thunder Bay Mining Division, Ontario; for Seaway Base Metals Ltd., by Terraquest Ltd. June 1991; Ministry of Northern Development and Mines Assessment File AFRI# 43D12SE9906.

Blanchard, P.R., 1972a:
Bosworth Lake Report No. 12, Patricia Mining Division, Ontario; for the Canadian Nickel Company Ltd.; Ministry of Northern Development and Mines Assessment File AFRI# 53A09SE0003.

Blanchard, P.R., 1972b:
Bosworth Lake Report No. 11, Patricia Mining Division, Ontario; for the Canadian Nickel Company Ltd.; Ministry of Northern Development and Mines Assessment File AFRI# 53A09SE0001.

Bradford, J., 2001:
Geology and Exploration Potential of the Rowlandson Lake–Canopener Lake Area, Northwestern Ontario (NTS 43D/5); AEM Project; *internal report* for Aurora Platinum Corporation / Inco Ltd., September 2001, 17 p.

Childe, F. and Kaip, A., 2002:
Rowlandson Lake–Canopener Lake Properties, Northwestern Ontario: Summary of Work and Recommendations for Future Work; *internal report* for Aurora Platinum Corp., September 2002, 13 p.

Colombo, F., 2017a:
Petrographic Report on 19 Rock Samples from TPK Gold-Silver-Copper Property, Northern Ontario. *Internal report* for Northern Superior Resources. Vancouver Petrographics Report 170584, September 2017, 61 p.

Colombo, F., 2017b:
Summary of the Petrographic Report on 19 Rock Samples from TPK Gold-Silver-Copper Property, Northern Ontario. *Internal report* for Northern Superior Resources. Vancouver Petrographics Report 170584, October 2017, 13p.

Duffell, S., Mac Laren, A.S. and Holman, R.H.C., 1963:
Red Lake-Lansdowne House Area (Bedrock Geology, Geophysical and Geochemical Investigations), Northwestern Ontario; Geological Survey of Canada Paper 63-5, 15 p.

Hannila, J.J., 1971a:
Michikenopik Lake Report No. 10, for Canadian Nickel Company Ltd.; Patricia Mining

Division, Ontario; Ministry of Northern Development and Mines Assessment File AFRI# 53A08NE0001.

Hannila, J.J., 1971b:
Michikenopik Lake Report No. 11, for Canadian Nickel Company Ltd.; Patricia Mining Division, Ontario; Ministry of Northern Development and Mines Assessment File AFRI# 53A08NE0002.

Hannila, J.J., 1971c:
Bosworth Lake Report No. 10, for Canadian Nickel Company Ltd.; Patricia Mining Division, Ontario; Ministry of Northern Development and Mines Assessment File AFRI# 53A09SE0002.

Hart, T.R., 2009:
Technical Report on the Ti-pa-haa-kaa-ning Property Lansdowne House, Northwest Ontario NTS 43-D05, 12, 53A-08, 09; 43-101F Technical Report for Northern Superior Resources Inc., March 2009, 123 p.

Hart, T.R. and Boucher, D.R., 2010:
Technical Report on the Ti-pa-haa-kaa-ning Property, Lansdowne House, Northwest Ontario; 43-101F1 Technical Report prepared for Northern Superior Resources Inc.

Hodgson, C.J. 1989:
Patterns in Mineralization: *in* Bursnall J.T., ed., Mineralization and Shear Zones, Geological Association of Canada Short Course Notes, Vol. 6, pp.51-89

Hyde, D., 2012a:
Prospecting Work Report – TPK Project – 2011, Rainy River Resources Ltd.–Northern Superior Resource Inc., December 15, 2012, 38 p.

Hyde, D., 2012b:
Diamond Drill Assessment Report – TPK Project Winter 2012, Thunder Bay Mining Division; Rainy River Resources Ltd.–Northern Superior Resource Inc., June 27, 2012, 27 p.

Hyde, D., 2012c:
Prospecting Work Report – TPK Project 2012, Thunder Bay Mining Division; Rainy River Resources Ltd. – Northern Superior Resource Inc., December 19, 2012, 29 p.

Kerr, D.E. and Knight, R.D., 2007:
Gold Grains in Till, Slave Province, Northwest Territories and Nunavut; Geological Survey of Canada Open File 5463, 8 p.

Mazur, R. J. and Osmani, I.A., 2002:
Lansdowne House Property – Bartman Lake Area, Northwestern Ontario; National Instrument 43-101F1 Technical Report; *internal report* for Aurora Platinum Corp., April 12, 2002, 49 p.

Mc Innes, W., 1911:
Report on the part of the Northwest Territories of Canada drained by the Winisk and Upper Attawapiskat Rivers; Geological Survey of Canada Publication 1080.

Mc Martin, I., 2000:
Till Composition Across the Meliadine Trend, Rankin Inlet Area, Kivalliq Region, Nunavut; Geological Survey of Canada Open File 3747, 40 p.

Morris, T.F. and Kaszycki, C.A., 1997:
Prospector's Guide to Drift Prospecting for Diamonds in Northern Ontario; Ontario Geological Survey, Miscellaneous Paper 167, 63 p.

Murphy J.B., 1989:
Tectonic environment and metamorphic characteristics of shear zones: *in* Bursnall J.T., ed., Mineralization and Shear Zones, Geological Association of Canada Short Course Notes, Vol. 6, pp. 29-50.

Mysyk, W.K. 2008:
Petrographic Analyses of Twelve Drill Core Samples, Tipahaakaaning Gold Project, Canopener Lake, Northern Ontario: Laramide Petrologic Services, Saskatoon, 39p.

Novak, N.D. 1986:
Exploration Results on "777 Syndicate Option" for Bryndon Ventures Inc., June 13, 1986; Patricia Mining Division, Ontario; Ministry of Northern Development and Mines Assessment File AFRI# 43D06NW9905.

Novak, N.D., 1988:
Geological Evaluation on the Lansdowne House Project, Ontario; a report prepared for Forester Resources Inc., June 9, 1988; Ministry of Northern Development and Mines Assessment File AFRI# 43D05NW000. 41 p.

Parsons, S.R.G., 2008:
Interpretation of Gold Grain Dispersal, Tipahaakaaning Property, Lansdowne House Area, Northwestern Ontario, Canada; *internal report* for Northern Superior Resources Inc., October 11, 2008, 23 p.

Prest, V.K., 1940a:
Geology of the Rowlandson Lake area; Ontario Department of Mines, Volume 49, Part 8, pp. 1-9.

Prest, V.K., 1940b:
Geology of the Wunnumin Lake area; Ontario Department of Mines, Vol. 49, Part 8, pp. 10-19.

Prest, V.K., 1963:
Red Lake-Lansdowne House area (Surficial Geology), Northwestern Ontario; Geological Survey of Canada Paper 63-6, 23 p.

Robert, F., 2001:
Syenite-associated disseminated gold deposits in the Abitibi greenstone belt, Canada; Mineralium Deposita 36, pp 503-516

Rowlandson, J.E., 1937:
Report on Winisk River Mines Limited; Unpublished Annual Report, Assessment Files, Red Lake Resident Geologists Office.

Sooley, M.J., 2008:
Ti-pa-haa-kaa-ning Property 2007 Overburden Sampling Program Lansdowne House, Ontario: NTS 43D05; *internal report* for Northern Superior Resources, April 29, 2008, __p.

Thurston, P.C., Sage, R.P. and Siragusa, G.M., 1979:
Geology of the Winisk Lake area; District of Kenora (Patricia Portion); Ontario Geological Survey Geological Report 193, 169 p.

Thurston, P.C., Osmani, I.A. and Stone, D., 1991:
Northwestern Superior Province: Review and Terrane analysis; *in* Geology of Ontario, Ontario Geological Survey, Special Volume 4, Part 1, pp. 81-142.

9.0 FIGURES

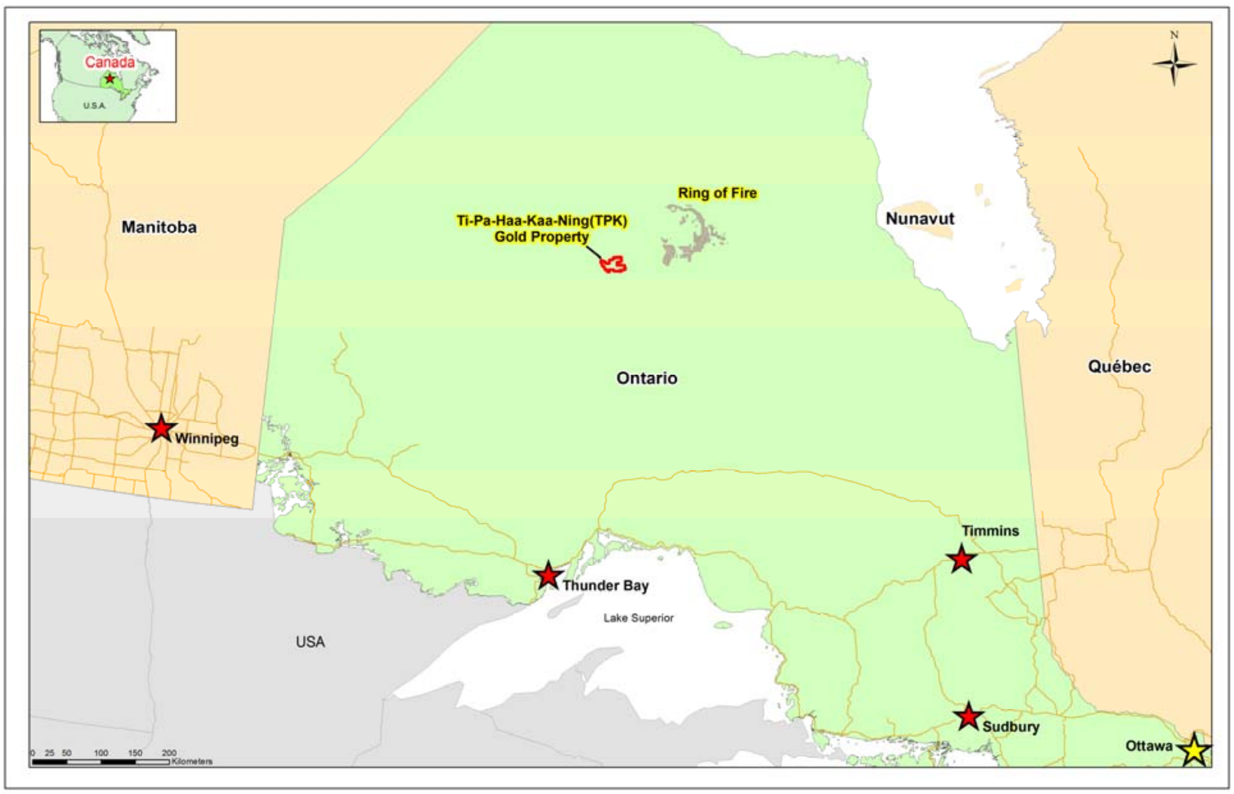


Figure 1: The TPK property relative to the Ring of Fire, major infrastructure and large communities.

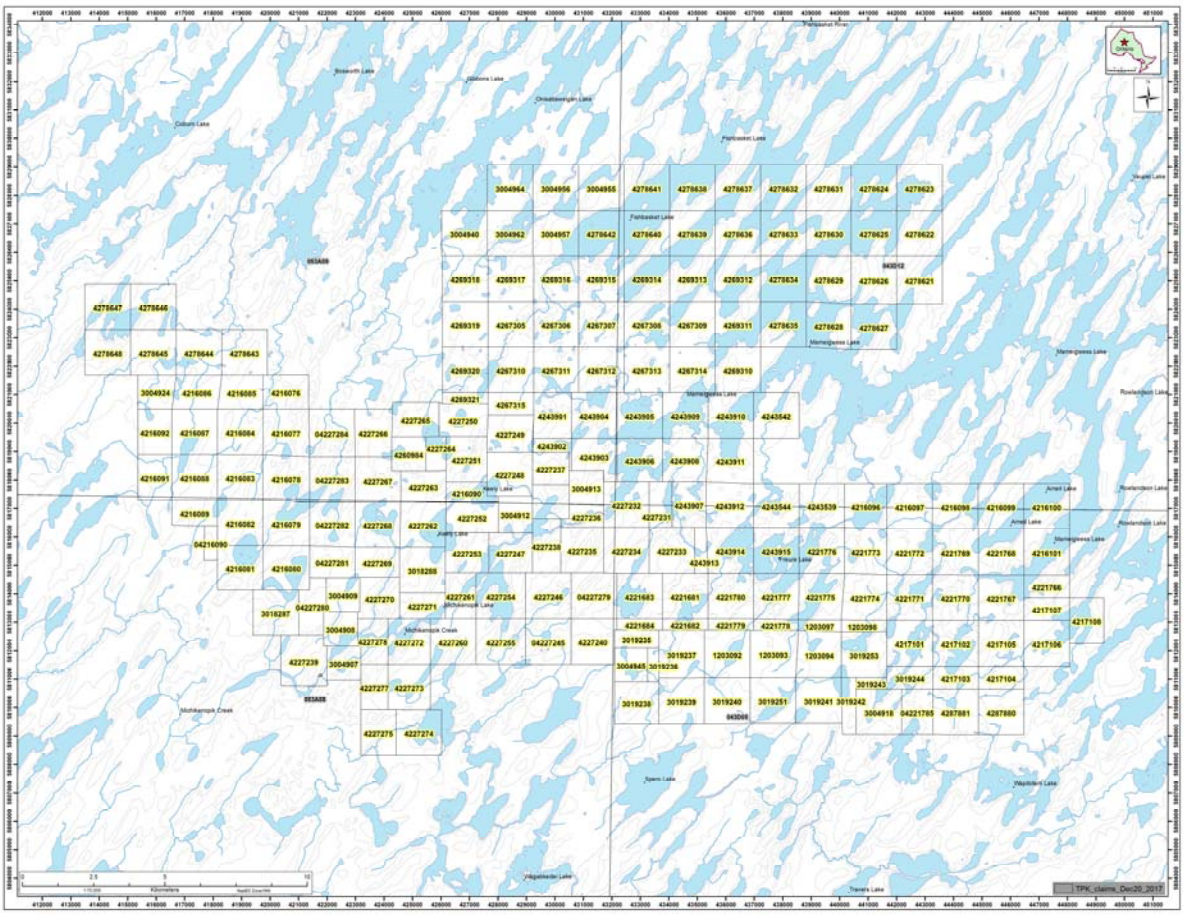


Figure 2: Property claim map (as of December 2017).

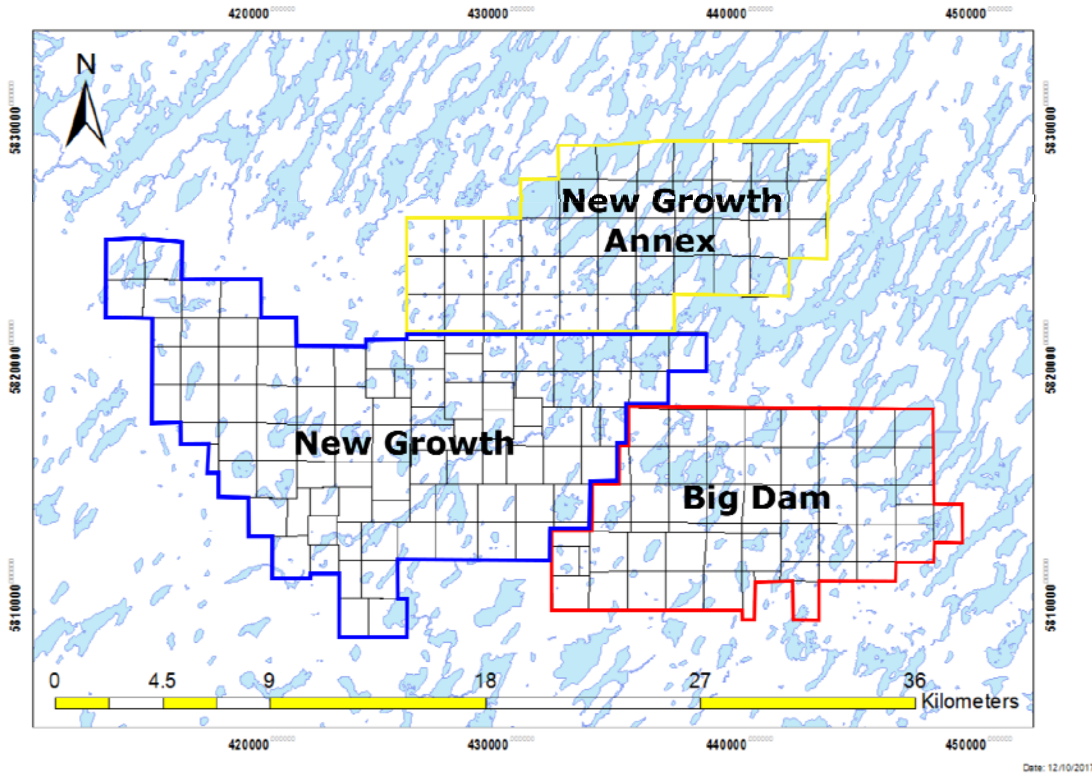


Figure 3: The Ti-Pa-Haa Kaa-Ning property, with the property subdivisions outlined and named. Exploration in the summer 2017 field season focused on the New Growth Annex and Big Dam portions of the property.

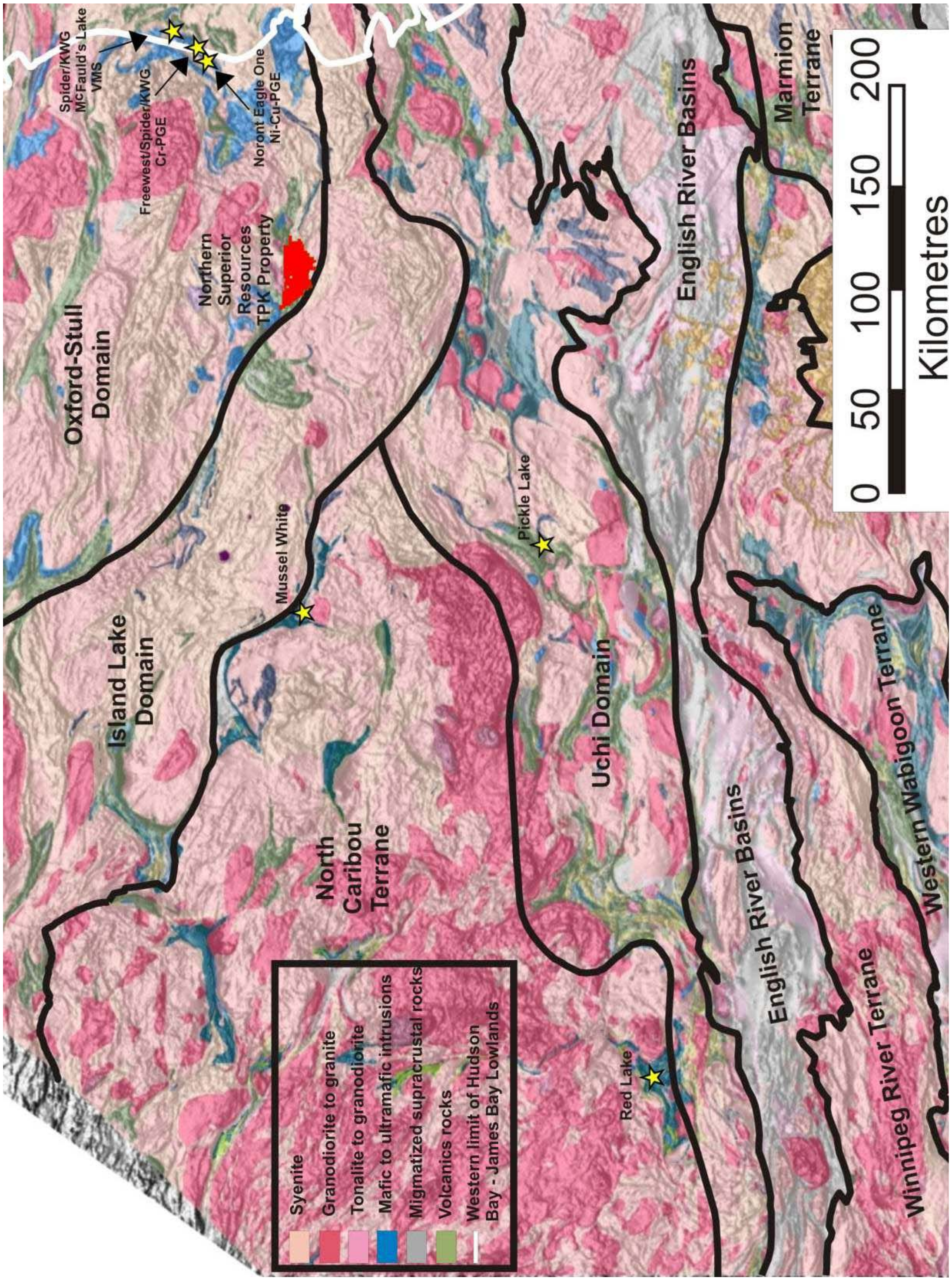


Figure 4: Regional geology of the eastern portion of the Oxford-Stull Domain (after Stott 2007).

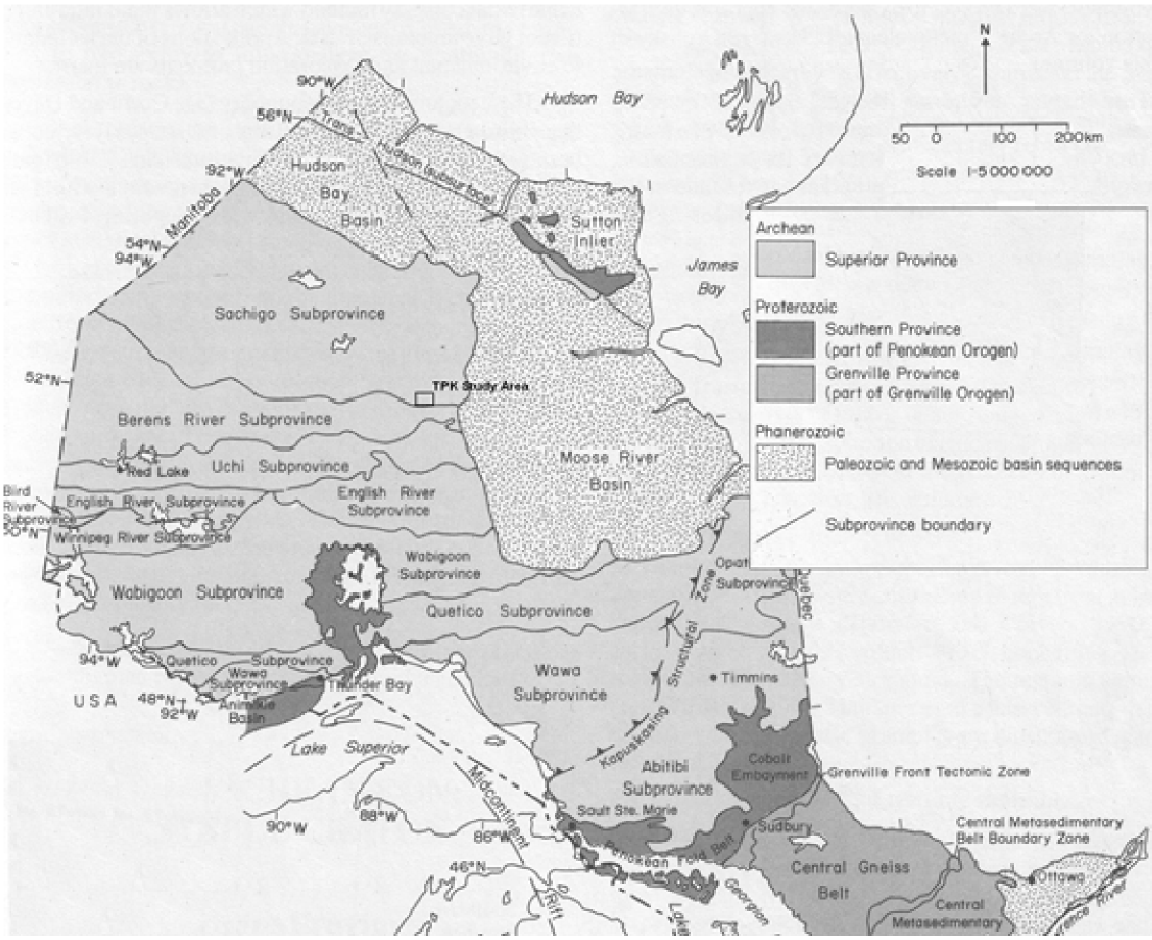


Figure 5: Quaternary geology of Ontario, with the TPK property highlighted (Thurston 1991).

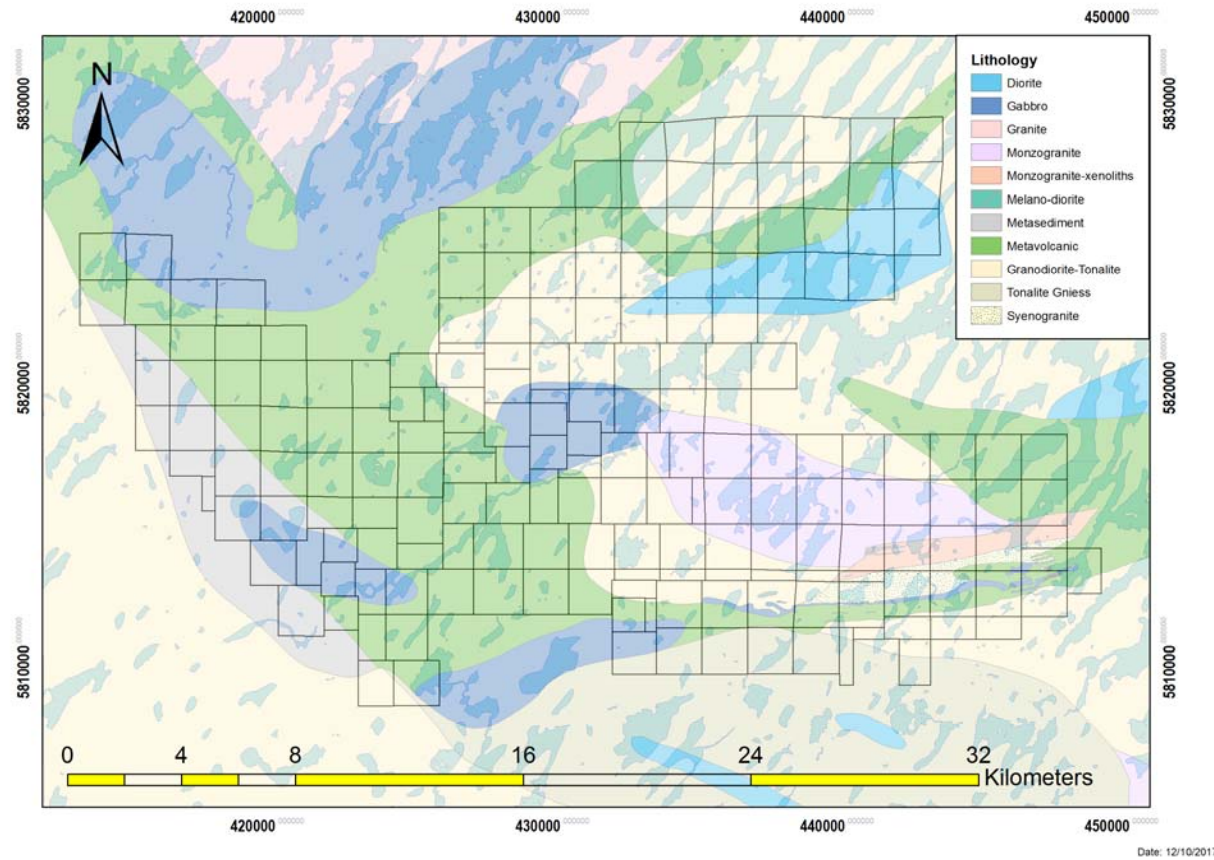


Figure 6: Property-wide geology at TPK-Bartman Lake Greenstone belt area (after Heyden 2009). Outlined claims as of August 2017.

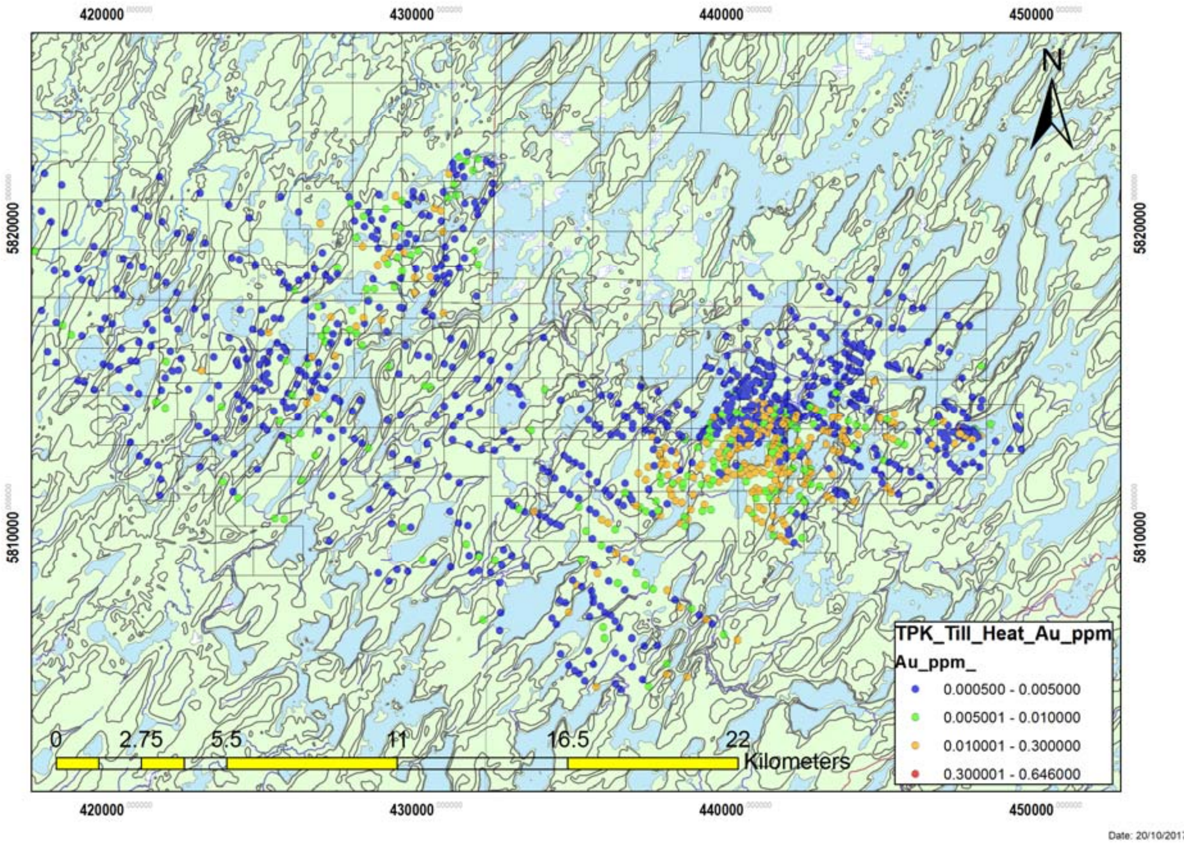


Figure 7: Till geochemistry results from across the TPK property (prior to the 2017 summer program), demonstrating the presence of two anomalous gold-till trains. One across the Big Dam portion of the property and the other, termed the Keeley Lake Train, stretching from New Growth into the Annex portion of the property.

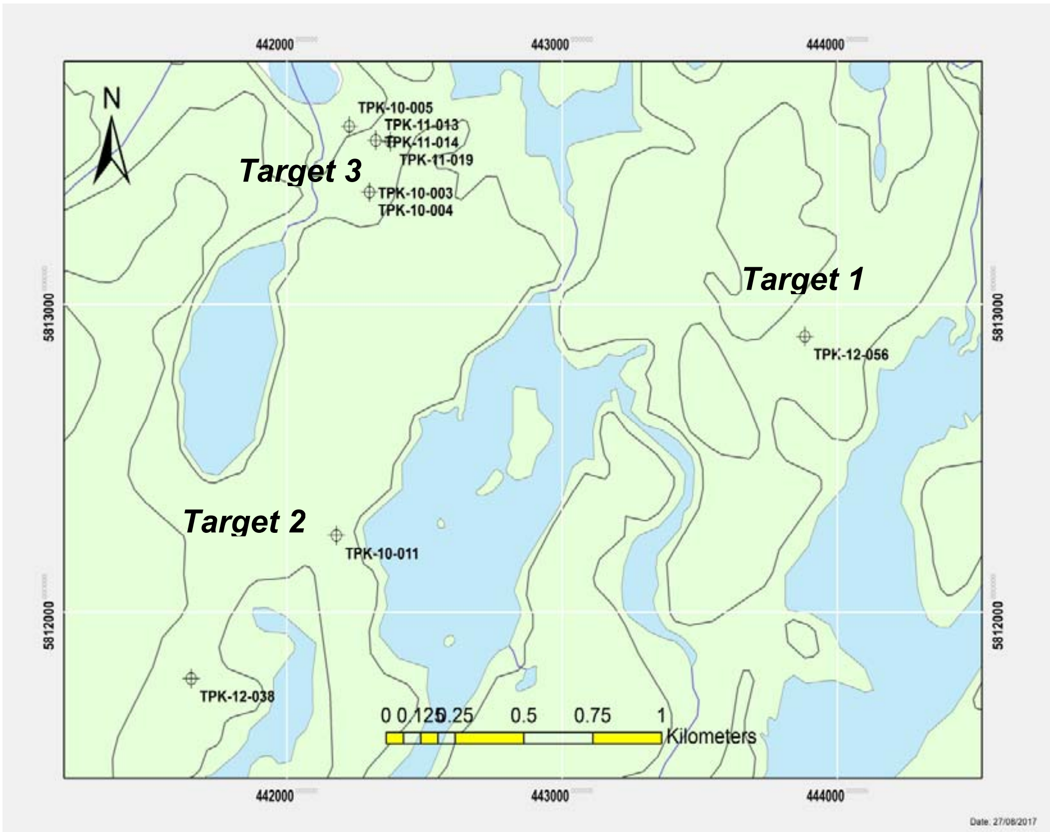


Figure 8: Three target areas at the Big Dam portion of the TPK property, with the location of the relogged historic boreholes highlighted.

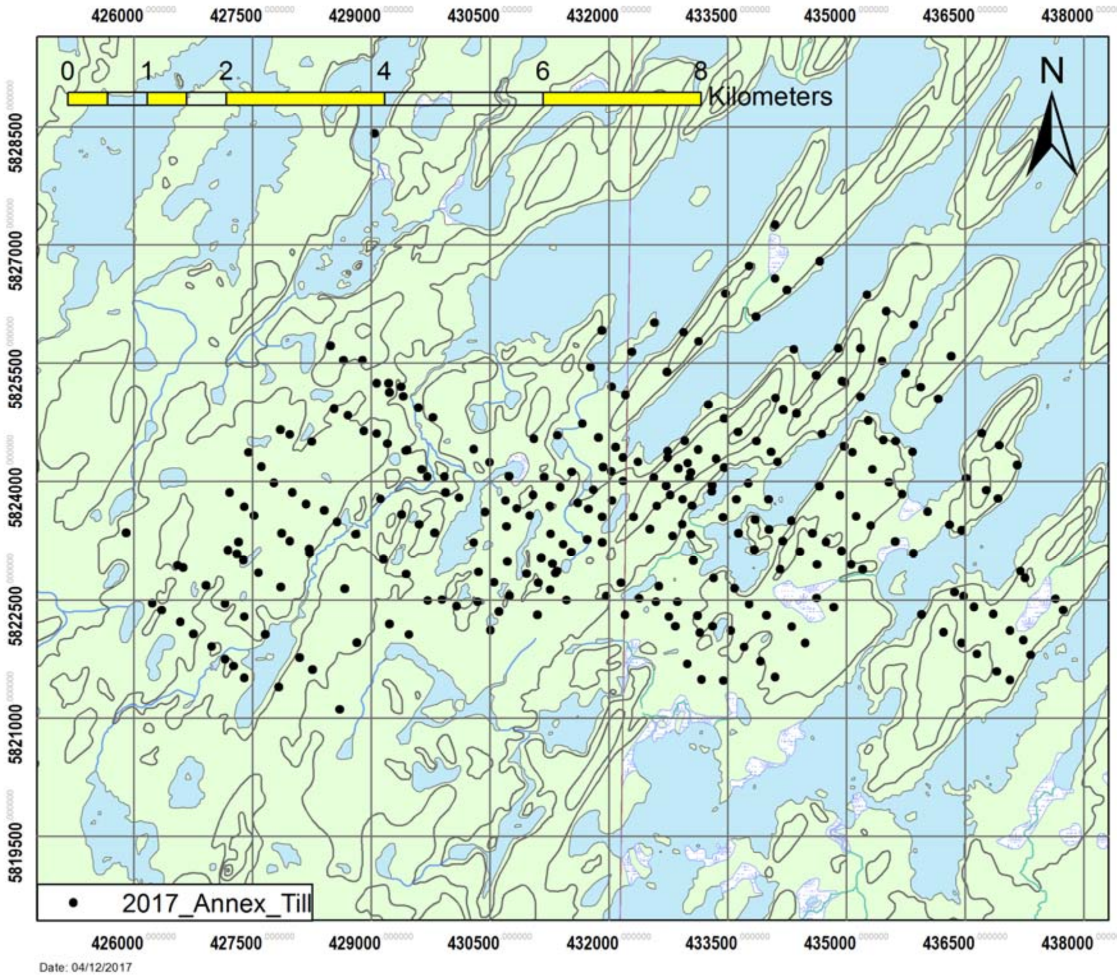


Figure 9: Till sample sites for summer 2017 Annex exploration program.

OVERBURDEN DRILLING MANAGEMENT LIMITED

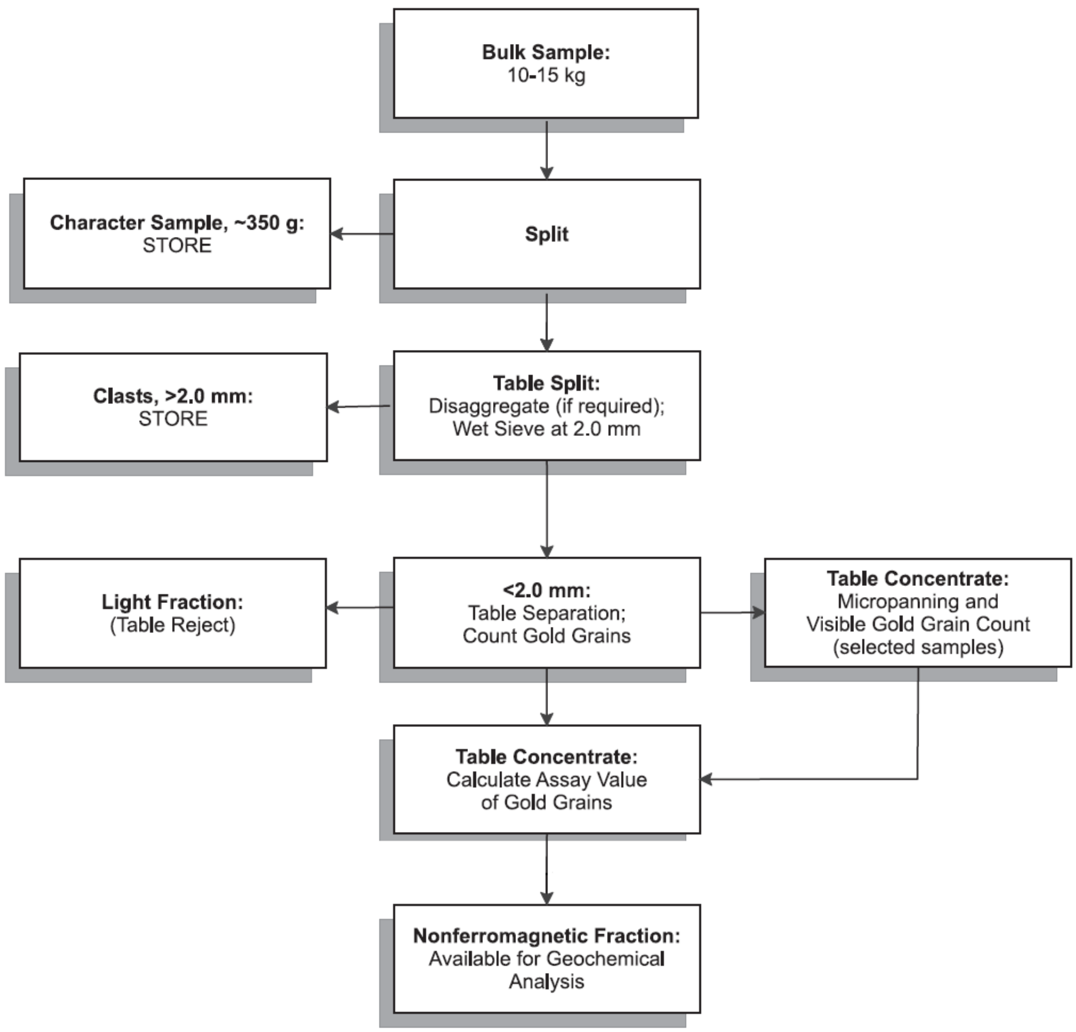


Figure 10: ODM flowchart for standard till sample processing. Flowchart courtesy of R. Huneault (ODM).

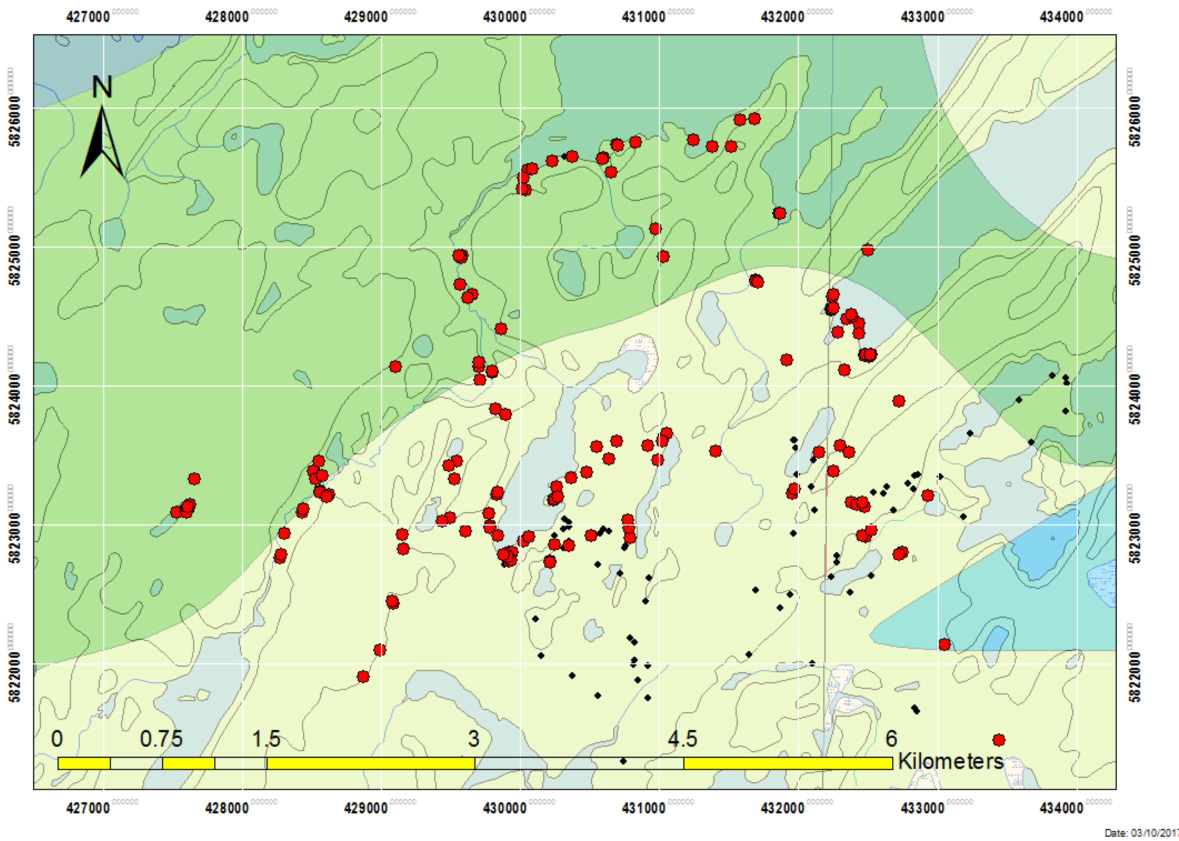


Figure 11: Grab samples from the Annex property at TPK. Black dots represent historic grab sampling, red dots represent samples collected during the 2017 summer field program. The 2009 geological interpretation is also displayed

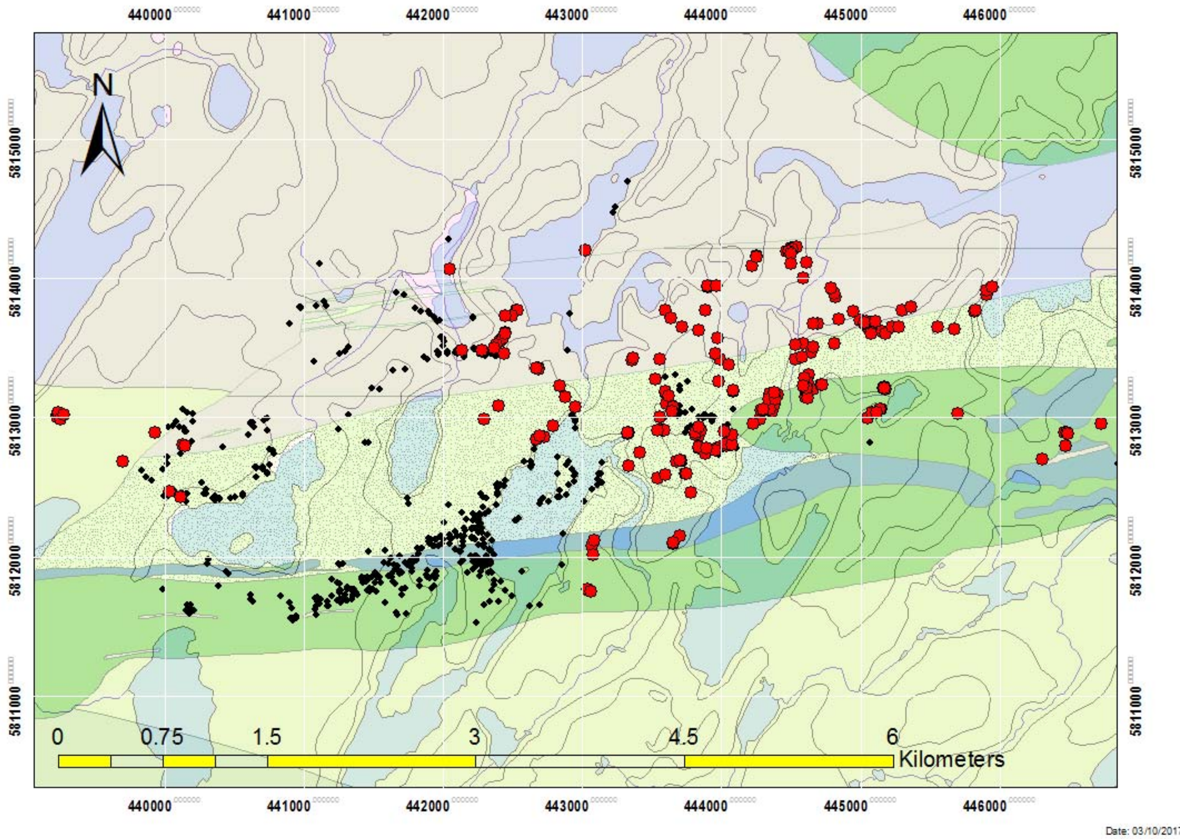


Figure 12: Grab samples from the Big Dam property at TPK. Black dots represent historic grab sampling, red dots represent samples collected during the 2017 summer field program. The 2009 geological interpretation is also displayed.

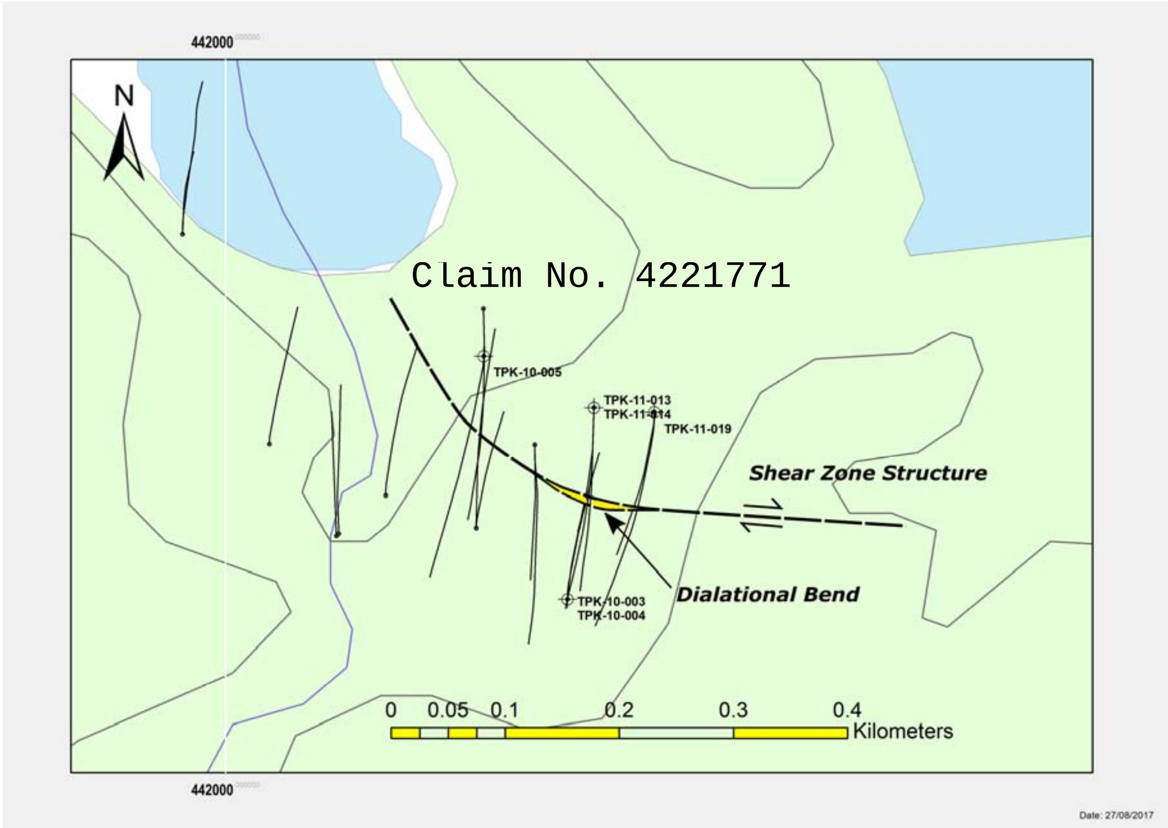


Figure 13: Schematic diagram of target 3, with drill hole collars and traces projected to surface. Labelled collars are those re-logged in 2017, though all bore holes were reviewed in Geotic and Mira Geoscience Analyst. The approximate location of the shear zone and inferred dilatational bend is shown in the figure as well.

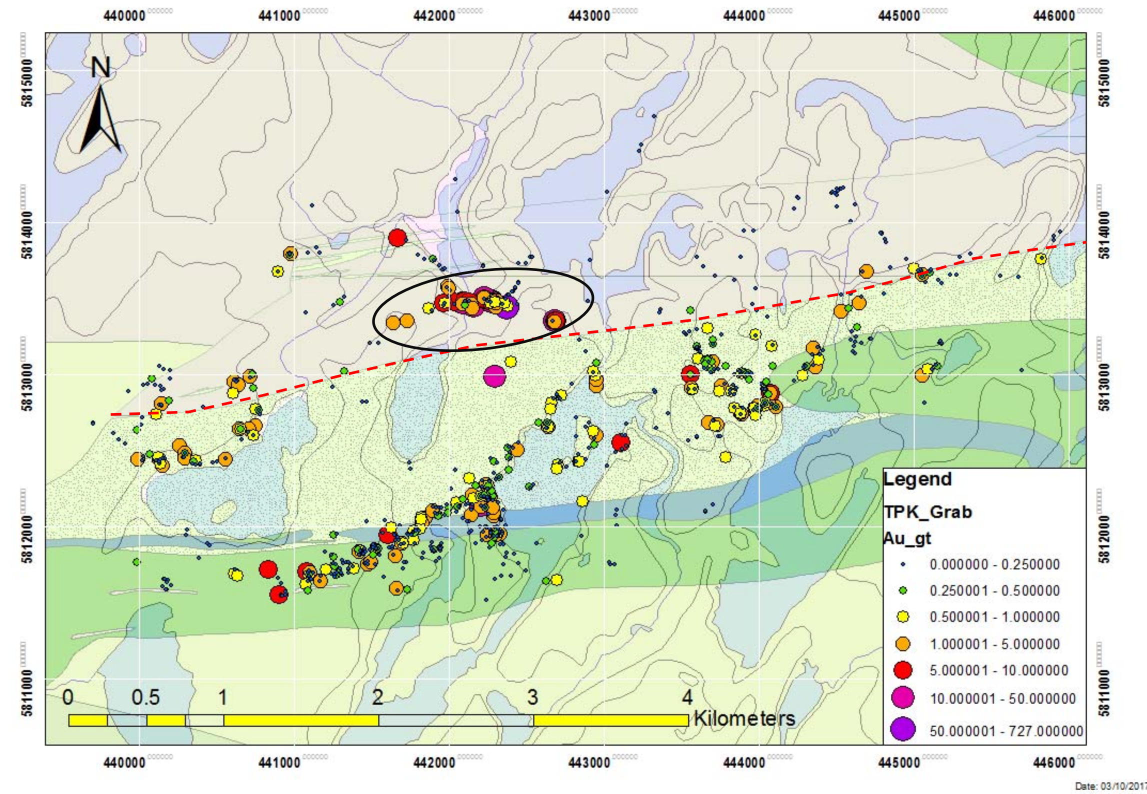


Figure 14: Historic and 2017 Au grab-sample results from the Big Dam area. Of note is the apparent cut off at the contact between the Contact Stock and Freure Lake Batholith (red dashed line), with the exception of the target three area (circled).

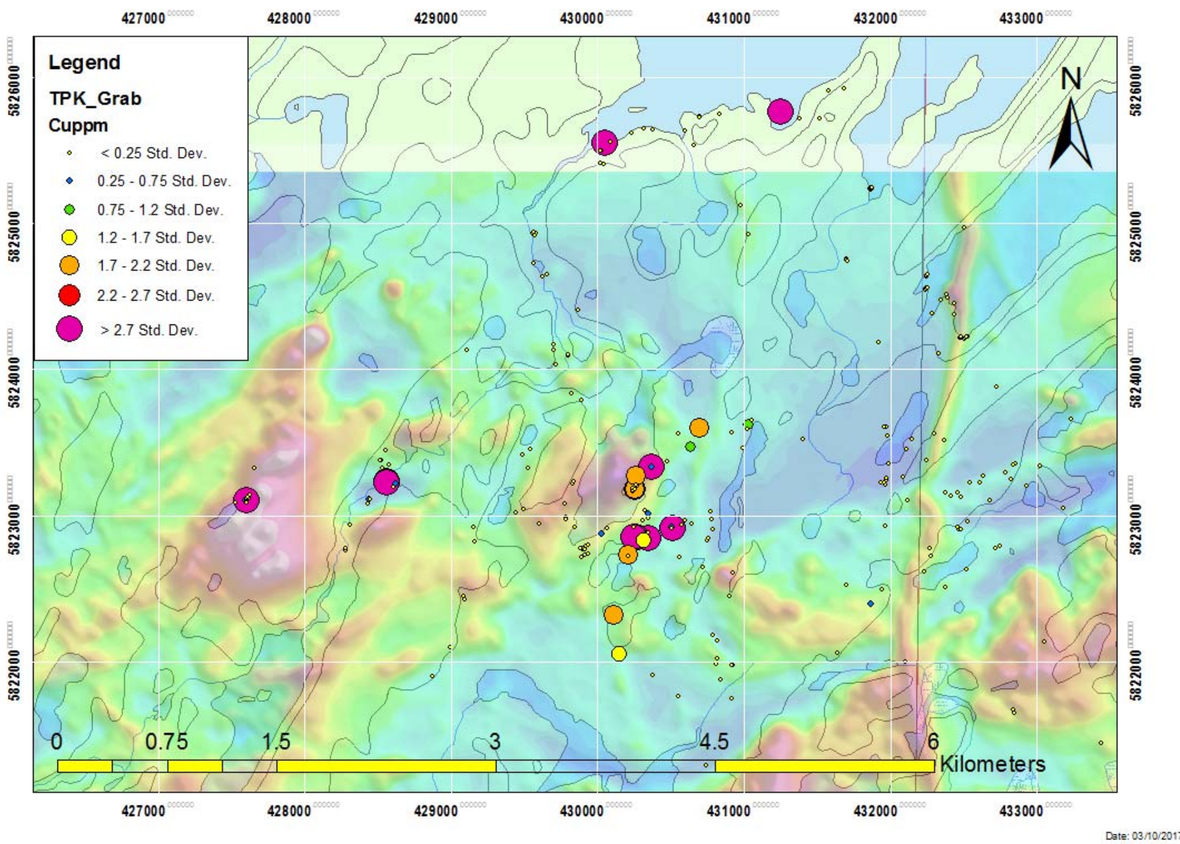


Figure 16: Cu-bearing grab samples from the Annex property. The majority of Cu-bearing samples clusters around the south margin of a magnetics high. Other high-grade samples are present to the west and along the shoreline of Fishbasket Lake.

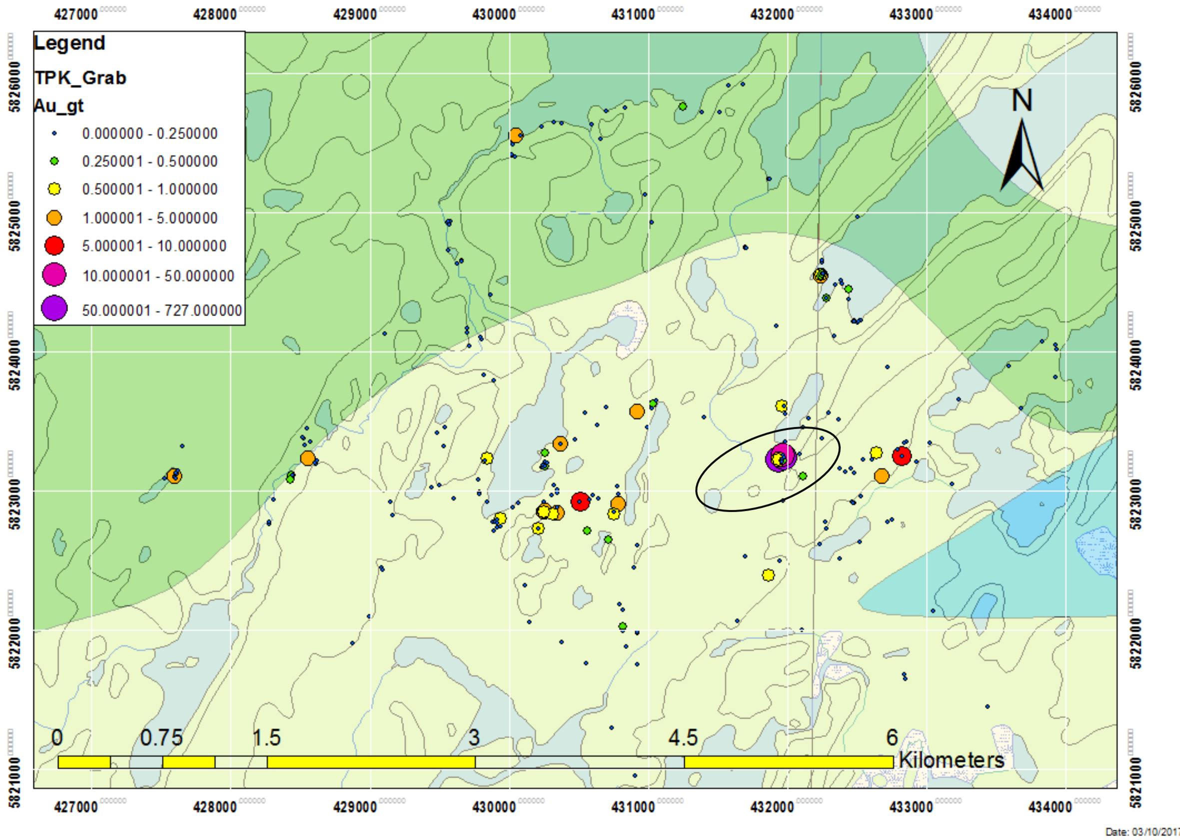


Figure 15: Historic and 2017 Au grab-sample results from the Annex area. The 2011 drill program focussed in particular on the Au-quartz veins in the area circled and an inferred contact between basalt and felsic-intermediate intrusives.

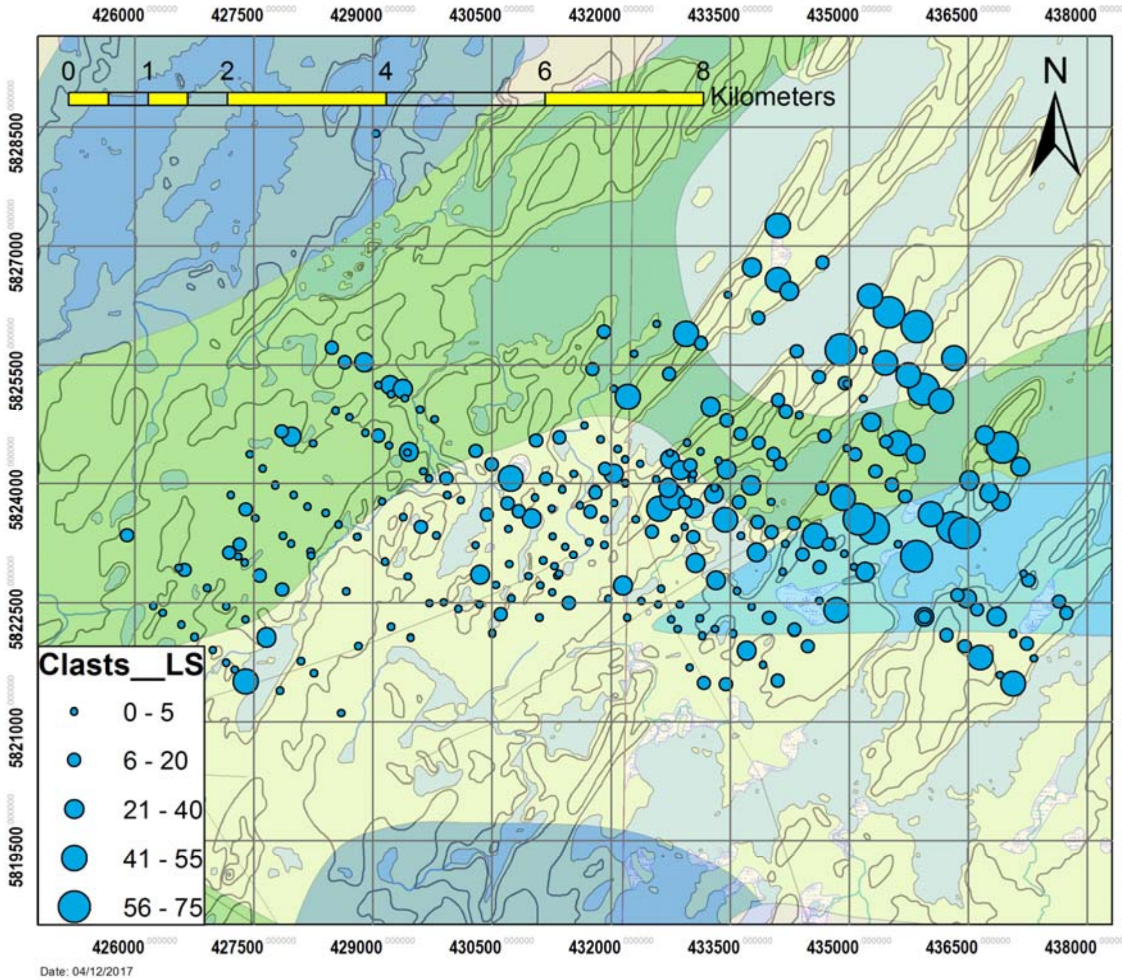


Figure 17: Till sample sites from the 2017 Annex program, with limestone clast content highlighted. Carbonate bearing till is considered to represent material derived from further up-ice and may not be representative of the local geology. The limestone clast content of the till tends to be greater in the north and north east of the sample area.

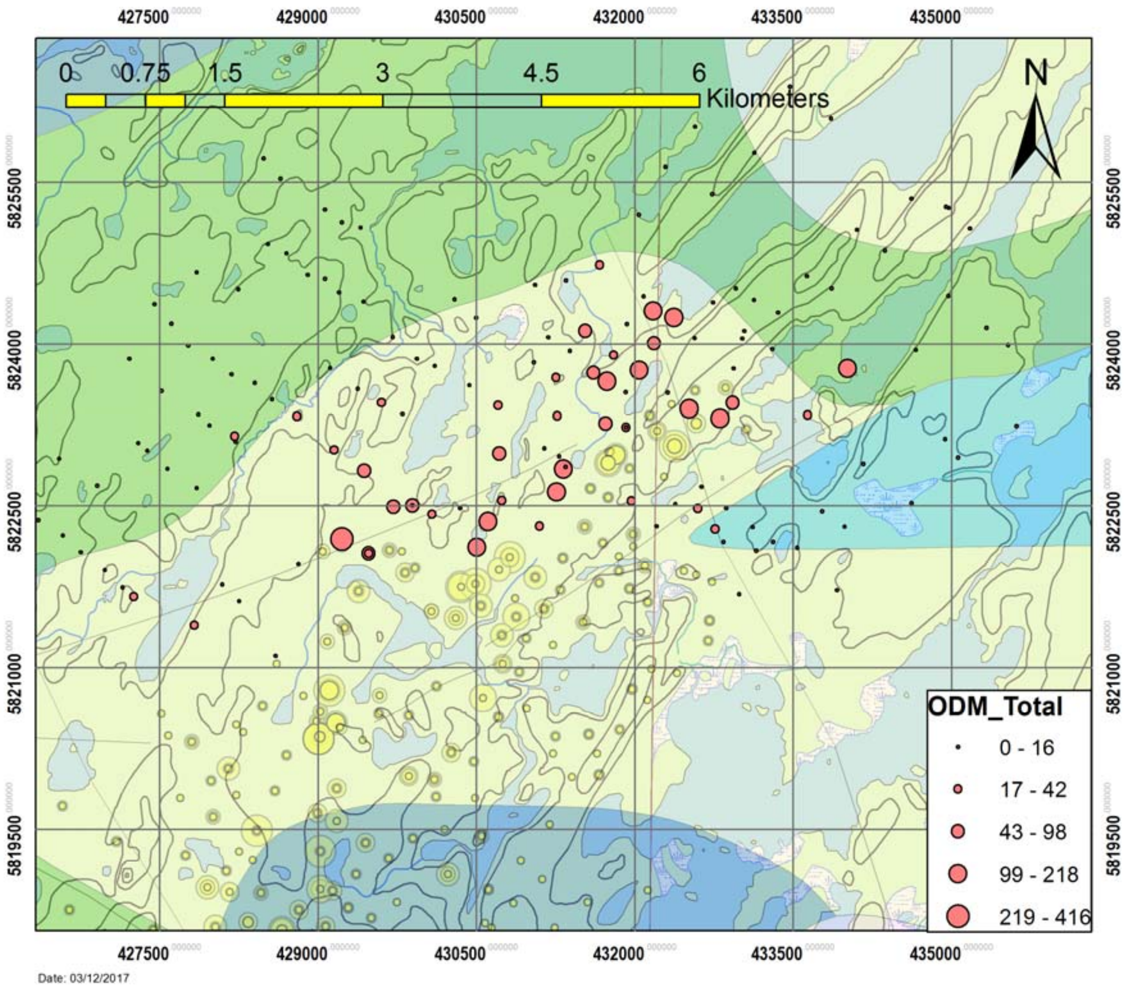


Figure 18: Till sample sites from the 2017 Annex program, with the total gold grain content obtained by ODM heavy mineral separation clast content highlighted in pink. The Keeley Lake gold train, identified in historic till sample programs, is highlighted in yellow. The 2017 sampling demonstrates that the gold-bearing till-train extends up to a thin greenstone belt at the southern shore of Fishbasket lake. Till samples with > 10% limestone clasts (carbonate-bearing tills) and samples classified as soil or glaciolacustrine sediments have been removed. These samples are not considered to provide an accurate representation of local geology

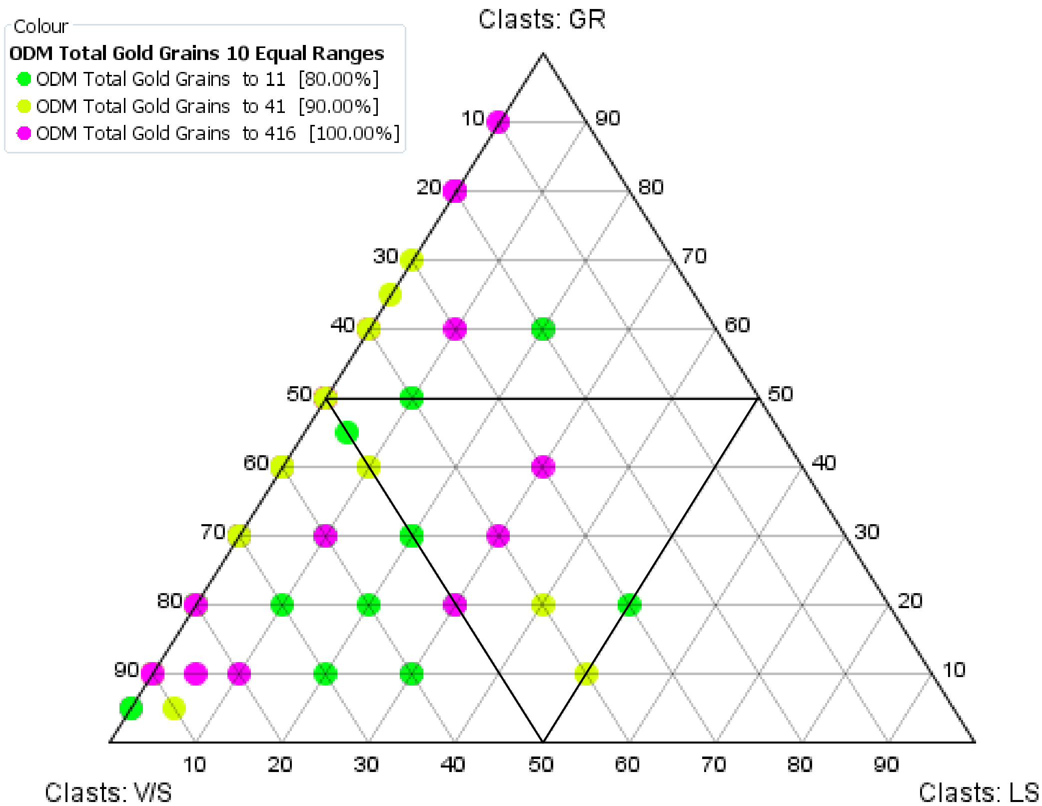


Figure 19: The clast components of the 2017 till samples from Annex, versus their gold content. V/S: Volcanics and Sedimentary rock clasts. GR: Granite clasts. LS: Limestone clasts. The diagram demonstrates that till with a higher volcanic/sedimentary rock clast content tend to host higher gold grain counts, supporting the notion that the Keeley Lake gold-in-till train is derived from a greenstone belt.

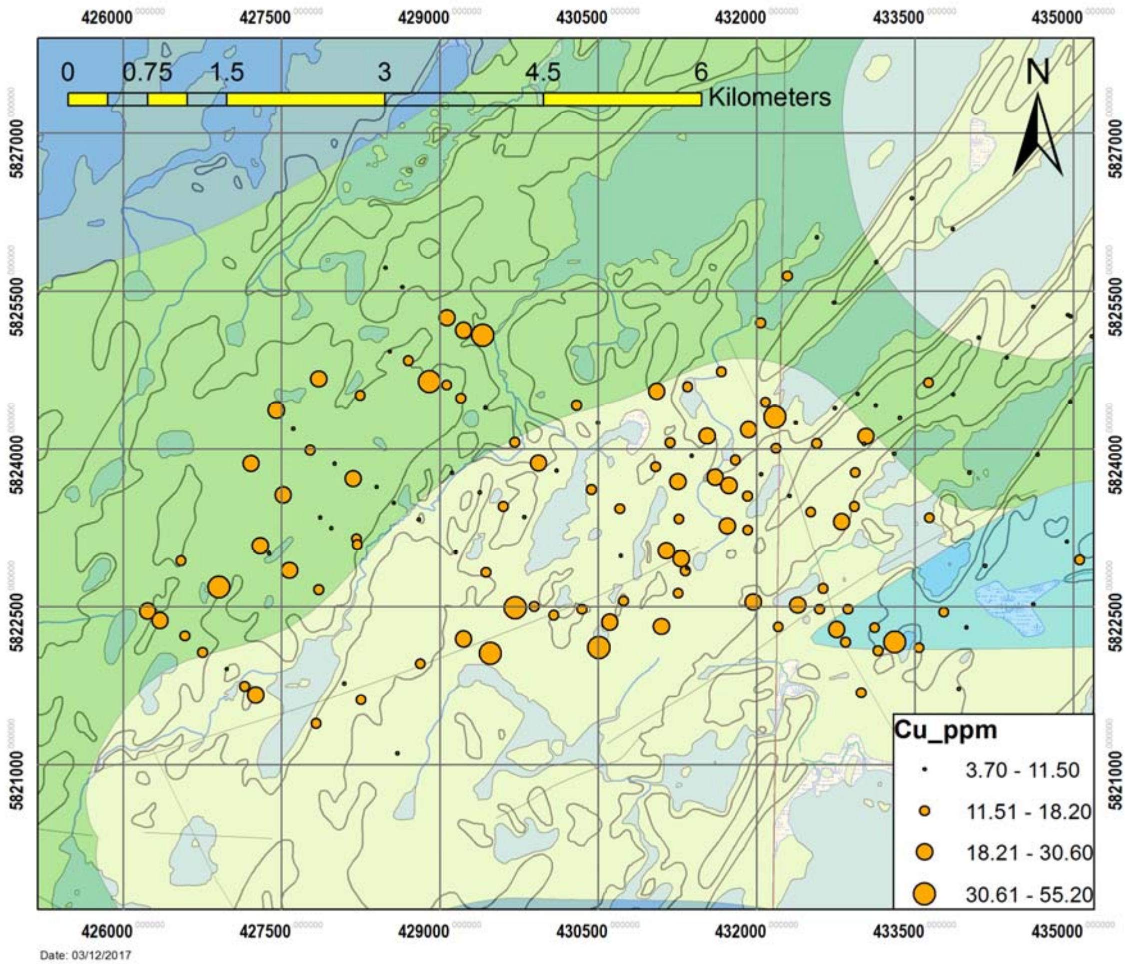


Figure 20: Till sample sites from the 2017 Annex program, with Cu (ppm) content obtained by ICP-MS analysis at ALS labs. The Cu content of the till corresponds with the Keeley Lake gold train and an area of greenstone belt further to the west. Till samples with > 10% limestone clasts (carbonate-bearing tills) and samples classified as soil or glaciolacustrine sediments have been removed. These samples are not considered to provide an accurate representation of local geology

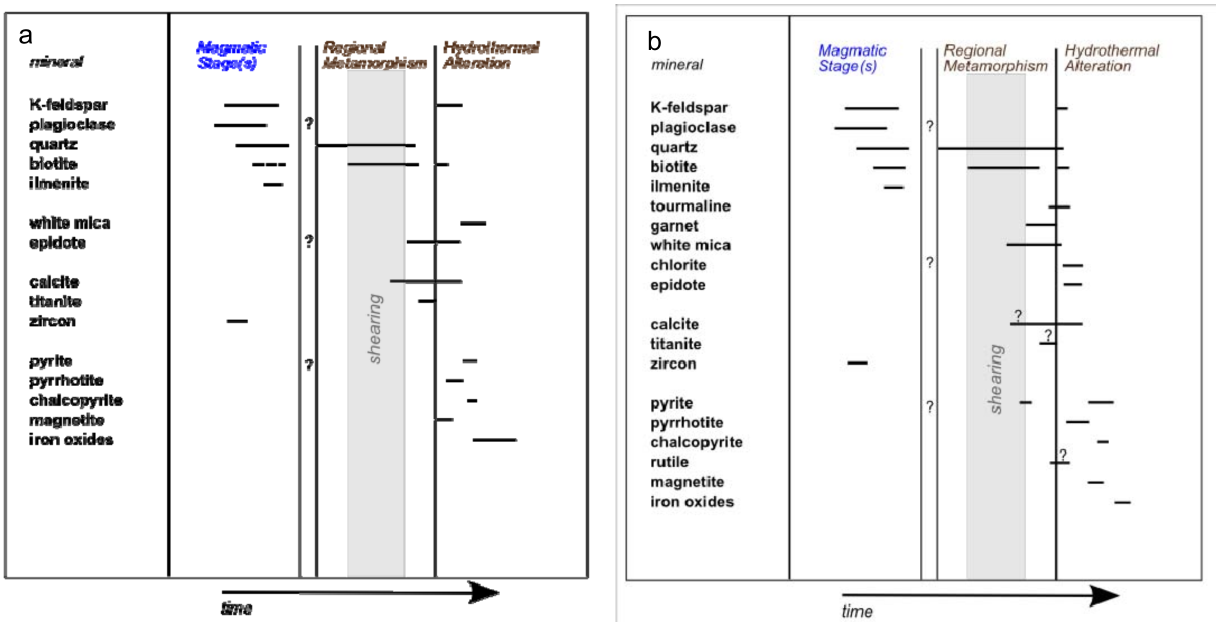


Figure 21: Paragenetic sequence diagram for the mineralogy of samples from (a) the Northern area of the Big Dam property (target areas 1 and 3), and (b) the Southern area of the Big Dam property (target area 2). The sequences have been based on interpretation of shear zone and host rock thin sections from drill core.

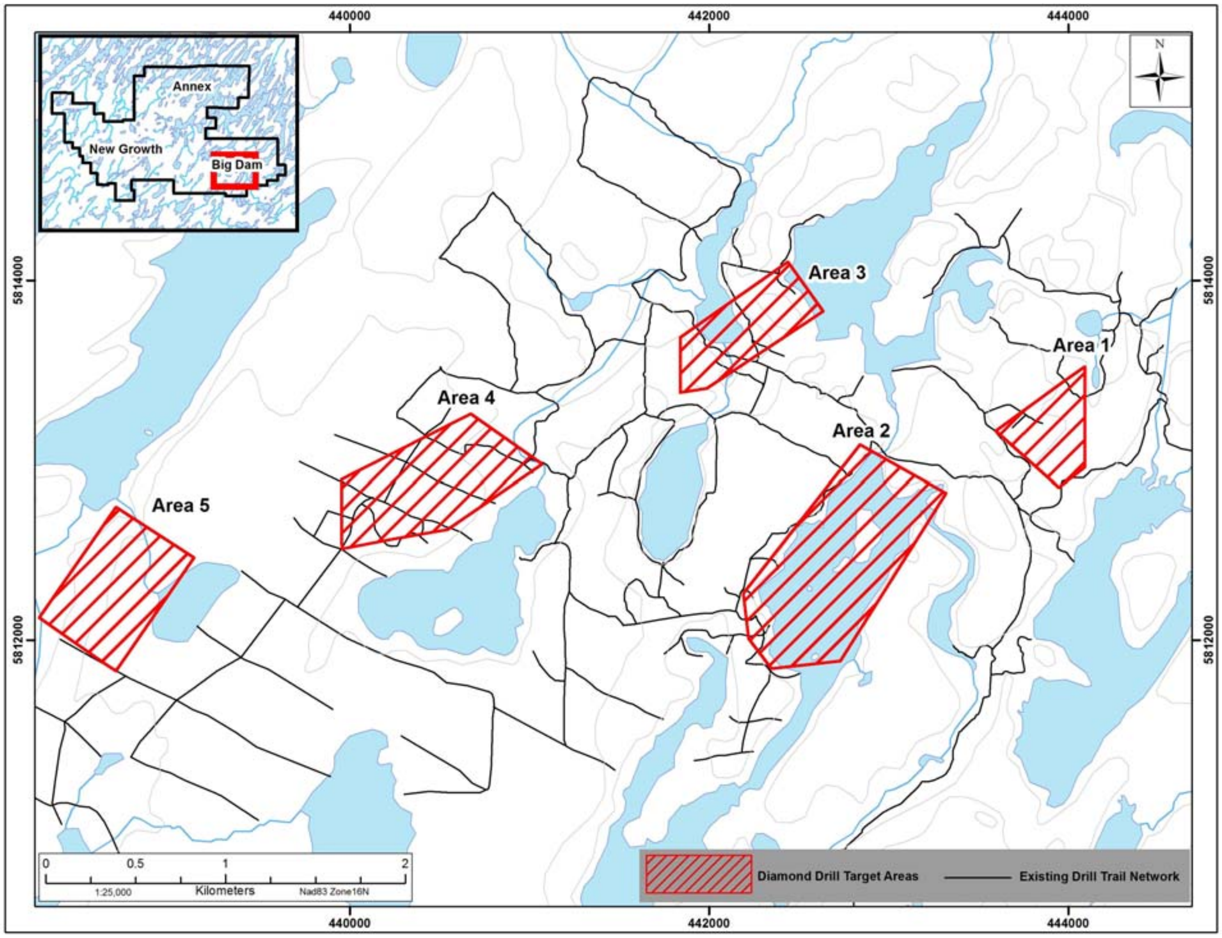


Figure 22: Drill hole targets based on gold grain in till, till geochemistry, boulder sampling, geophysics, previous drilling, and paleo-ice flow direction.

Northern Superior Resources Inc.

DDH: **TPK-17-003**

Claims title:		Section:	5813363
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	29/10/2010	Description date:	17/08/2017
End date:	09/11/2010	Author:	Jon O'Callaghan

Collar

Azimuth: 360.00°
Dip: -50.00°
Length: 222.00

UTM NAD83

East	442299.0
North	5813363.0
Elevation	252.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Collar	0.00	360.00°	-50.00°	No
Reflex	24.00	9.40°	-53.90°	No
Reflex	51.00	10.60°	-53.90°	No
Reflex	75.00	11.50°	-53.70°	No
Reflex	99.00	12.10°	-53.50°	No
Reflex	123.00	13.40°	-53.70°	No
Reflex	150.00	14.50°	-53.80°	No

Type	Depth	Azimuth	Dip	Invalid
Reflex	198.00	16.20°	-54.10°	No

Number of samples: 18
Number of QAQC samples: 0
Total sampled length: 15.02

Description:

Originally logged by Raint River geologist, Sarah Miller. Relogged by NSR geologist Jon O'Callaghan as part of relogging excerise to confirm orientation of Au-bearing structures at target 2. Au intersections exceeding 0.5g/t @ ~68, 80, 85 and 73m.

Core size: BQ core   Cemented: No   Stored: Yes

Description			
0.00	12.70		CSG **Casing** Overburden, no core recovered.
12.70	15.40		MNZ **Monzonite** Fractured, coarse grained, pink-grey non-magnetic, unsheared QMNZ/MNZ with pos mafic xenolith @ 14.00m. Sulphides absent.
	12.70	62.15	Chl10; Car02; Pot08 **Chloritization 10; Carbonatization 2; Potassic 8** Weakly altered QMNZ with diffuse zones of potassic alteration and patchy chlorite clots. Very weak, diffuse carbonate throughout the interval. Serecite alteration restricted to zones of shearing (e.g., @ 26.80, 45.15m).
15.40	15.80		I1F **Aplite 25°** Pink, strongly potassic altered, fg apkite dyke with sharp contacts @ 25 deg tca. Sulphides absent. Non-magnetic.
15.80	26.23		MNZ **Monzonite** Continuation of coarse grained, non-magnetic, unsheared, relatively homogenous MNZ with patchy zones of potassic and chlorite alteration. Between 27.55-27.85m possible felsic/aplite xenolith, fragmented and recements by QMNZ material. Hosts fine grained specks of pyrite and pos. chalcopyrite. Between30.00-30.16 xenolith of non-magnetic, fine grained, possible metasediment xenolith. No associated sulphides.
26.23	26.90		M8 (QMNZ); CIS **Sheared Monzonite 45°; Sheared** Two sections of strongly sheared QMNZ, shearing defined by grain size reduction, attenuated quartz grains and wispy serecite bands. Rare, fg disseminated pyrite specks throughout. Blebby arsenopyrite in the hangingwall of the sheared QMNZ(between 26.23-26.48m). Non-magnetic. Sharply defined lower contact, gradational upper contact.
	26.50	26.90	CIS80 **Sheared80 50°** Shearing defined by attenuated quartz and wispy serecite bands @ 50 deg tca. Sharp lower contact, gradational upper contact. Rare specks of pyrite and blebby arsenopyrite.
26.90	45.15		QMNZ **Quartz Monzonite** Coarse grained, unsheared, non-magnetic, relatively homogenous QMNZ with diffuse zones of potassic and patchy chlorite alteration. Rare, vfg dissseminated specks of pyrite. 4cm wide pink aplite dyke @ 36.72m @30 deg tca. 11cm wide I3 xenolith or dyke with partially assimilated QMNZ clasts @ 50 deg tca. Sulphides absent, non-magnetic.
	31.27	31.28	VEI;0.01;Cl Qz Cb;T;90°;Py10; **Vein 0.01 Chlorite Quartz Carbonate Tension 90° Pyrite 10%** Hairline veinlet of chlorite-quartz-carbonate with blebby pyrite.
	32.50	32.51	VEI;0.01;Cb Pg Qz;T;20°;; **Vein 0.01 Carbonate Plagioclase Quartz Tension 20°** <1cm wide quartz-carbonate-feldspar vein @ 20 deg tca within zone of potassic altered QMNZ. Sulphides absent. Non-magnetic.

Description

45.15 45.21 M8 (QMNZ); CIS
Sheared Monzonite 80°; Sheared
Thin, but strongly sheared-protomylonitic interval of QMNZ with diffuse potassic alteration. Shearing is sharply defined by wispy serecite bands and hosts disseminated pyrite specks. Non-magnetic.

45.15 45.21 CIS70
Sheared70 80°
Shearing defined by attenuated quartz and wispy serecite bands @ 50 deg tca. Sharp contacts. Rare specks of pyrite. Diffuse potassic alteration throughout.

45.21 48.25 QMNZ
Quartz Monzonite
Continuation of pink-potassic altered, unsheared, non-magnetic, coarse grained QMNZ with very rare, disseminated specks of pyrite.

45.74 45.83 CIS50
Sheared50 60°
Moderately sheared QMNZ with wispy serecite bands and rare disseminated specks of pyrite. Sharp lower contact, gradational upper contact.

48.25 48.53 I1F
Aplite 15°
Two 6cm wide pink-grey, potassic altered, fine grained, unmineralized, non-magnetic aplite dykes separated by slither of QMNZ.

48.53 62.15 QMNZ
Quartz Monzonite
Coarse grained, unsheared, non-magnetic QMNZ with diffuse potassic alteration. Two zones of weak-moderate shearing @ 53.60 and 54.00m with rare specks of disseminated pyrite. Both zones @ ~75 deg tca. 7cm wide pink-grey aplite dyke @ 58.13m @ 50 deg tca. Between 48.95-50.00m QMNZ fractured and recemented by dark green chlorite-carbonate material that hosts rare specks of pyrite. At 49.95 there is a 2cm wide, well cemented fault with subangular, <1cm clasts of QMNZ in a chlorite-quartz carbonate matrix. Fault contacts @ 40 deg tca.

49.95 49.97 FLT
Fault 40°
Sharply defined, 2cm wide fault with well cemented gouge material, comprising <1cm, subangular-subrounded clasts of QMNZ in a dark green, chlorite-carbonate-quartz matrix. Sulphides absent from fault but are found in fragmented core of hangingwall

53.70 53.75 CIS50
Sheared50 60°
Moderately sheared interval of QMNZ defined by wispy serecite bands @ 60 deg tca. Rare specks of disseminated pyrite.

54.00 54.12 CIS30
Sheared30 60°
Weak to moderately sheared QMNZ defined by wispy serecite bands @ 60 deg tca. Sharp lower contact, gradational upper contact.

61.90 67.54 CIS70; FRC80
Sheared70 80°; Fractured80
Fractured and fragmented core, with fragmentation increasing downhole. Open fracture at various degrees tca, open surfaces have a

Description			
			chlorite-clay coating. Fragmentation coincides with zones of strong-moderate serecite-silicic alteration and sharing around ~65.40-66.00m @ ~ 80 deg tca, but difficult to confirm due to core fragmentation.
62.15	65.40		QMNZ **Quartz Monzonite** Coarse grained, non-magnetic, unsheared QMNZ with fracturing and fragmentation core. Fractures are at various degrees tca, and have a green chlorite-carbonate clay infill, creating hairline green-coloured stockwork. Rare specks of disseminated pyrite within QMNZ groundmass.
	62.15	65.40	Pot05; Sil05; Chl15; Car05 **Potassic 5; Silicification 5; Chloritization 15; Carbonatization 5** Fractured and fragmented QMNZ with numerous hairline fractures at various deg tca host chlorite and carbonate. Adjacent QMNZ also altered to greenish colour due to pervasive chlorite. Weak silicic alteration with smokey grey discolouration of core.
65.40	66.00		M8 (QMNZ); CIS **Sheared Monzonite 80°; Sheared** Strongly sheared QMNZ with wispy serecite bands and pervasive silicic alteration, hosting fine grained blebs and specks pf py and pos. cpy. Thin, undulose discontinuous stringers of carbonate cross cut shearing @ ~ 140 tca. Core fragmented and blocky, making orientation difficult to determine. Shearing @ 80 deg tca. Non-magnetic.
	65.40	66.00	Ser15; Sil15; Car05 **Sericitization 15; Silicification 15; Carbonatization 5** Strongly sheared QMNZ with light-grey to cream colour. Wispy serecite bands and pervasive silicic alteration. Carbonate restricted to cross cutting, hairline veinlets.
66.00	67.90		QMNZ **Quartz Monzonite** Continuation of fractured and fragmented, unsheared, non-magnetic QMNZ with moderate potassic alteration and rare specks of disseminated pyrite. Possible, medium grained mafic xenolith @ ~67.00m.
	66.00	67.90	Car03; Pot10; Chl10 **Carbonatization 3; Potassic 10; Chloritization 10** Fractured and fragmented QMNZ with diffuse moderate potassic and weak carbonate alteration. Patchy chlorite alteration.
67.90	68.76		M8 (QMNZ); CIS **Sheared Monzonite 30°; Sheared** Strongly sheared to protomylonitic QMNZ with pervasive pink-red potassic and haematitic alteration. Grey-transluscent quartz veinlets <5cm tca parallel to shearing. Upper margin of shear zone is fragmented, lower contact is gradational. Specks of disseminated pyrite throughout the groundmass of the shear zone. Non-magnetic.
	67.90	68.76	Ser15; Sil25; Pot05; Hem10 **Sericitization 15; Silicification 25; Potassic 5; Hematization 10** Strongly sheared to protomylonitic QMNZ with pervasive strong silicic alteration, wispy serecite and attenuated bands of red potassic/haematite.
68.76	80.44		QMNZ **Quartz Monzonite**

Description

Coarse grained, non-magnetic, unsheared/unfoliated, prey-medium grey QMNZ with patchy chlorite and diffuse weak-moderate potassic alteration. Fine grained rare disseminated pyrite and chalcopyrite within QMNZ throughout the interval, but becoming common from ~78.00m onwards (associated with underlying shear interval).

68.76 78.50 Pot10; Hem03; Car03; Chl10
Potassic 10; Hematization 3; Carbonatization 3; Chloritization 10
Diffuse potassic and carbonate alteration and patchy chloritization of unsheared, homogenous QMNZ interval.

78.50 80.44 Pot20; Hem05; Car05; Chl05
Potassic 20; Hematization 5; Carbonatization 5; Chloritization 5
Abrupt increase in potassic/haematite alteration, pervasive throughout interval, which is situated in the hangingwall of shear zone. Increase in alteration intensity conincident with increase disseminated sulphide vol.% in QMNZ.

80.44 85.90 M8 (QMNZ); CIS
Sheared Monzonite 50°; Sheared
Strongly sheared to protomylonitic, coarse grained, potassic/haematite altered QMNZ with attenuated and elongate quartz-feldspar grains and wispy serecite. Shearing increases in intensity downhole, with increases silicic and serecitic alteration. Rare, fine grained, disseminated pyrite specks. Core fractured and fragmented. Aplite dyke at ~82.40m, 7cm wide. Contacts fragmented so no orientation No quartz veining. Sharply defined lower contact, upper contact more gradational.

80.44 85.36 Chl03; Pot20; Hem05; Sil10; Ser10
Chloritization 3; Potassic 20; Hematization 5; Silicification 10; Sericitization 10
Shear zone with pervasive potassic/haematite alteration that decreases marginally in intensity downhole. Patchy carbonate and chlorite alteration. Diffuse silicic smokey grey alteration and wispy serecite.

80.44 85.90 CIS90
Sheared90 50°
Strongly sheared to protomylonitic, coarse grained, potassic/haematite altered QMNZ with attenuated and elongate quartz-feldspar grains and wispy serecite. Shearing increases in intensity downhole, with increases silicic and serecitic alteration. Sharply defined lower contact, upper contact more gradational.

85.36 85.90 Ser20; Sil20; Car05
Sericitization 20; Silicification 20; Carbonatization 5
Very strongly sheared interval, potassic/haematite/chlorite absent. Pervasive silicic alteration, patchy carbonate and wispy serecite.

85.90 130.07 QMNZ
Quartz Monzonite
Light grey, coarse grained, non-magnetic, relatively unaltered QMNZ. Gradational increase in diffuse potassic alteration below 119.00m. Rare, fg disseminated specks of pyrite in the groundmass of the QMNZ, especially around thin <15cm wide, intermittent zones of strong-moderate shearing (e.g., @ 95.70, 95.65, 103.60, 108.30 and 109.50m). The shear zones are defined by attenuated quartz, wispy serecite and grain size reduction and are consistently @ 25 deg tca, hosting fine grained, disseminated pyrite, arsenopyrite and rare chalcopyrite. Shears @ 95.70 and 95.65m are the best mineralized but were unsampled by Rainy River.

85.90 119.00 Car03; Chl10; Ser05
Carbonatization 3; Chloritization 10; Sericitization 5
Large interval of relatively unaltered QMNZ with diffuse carbonate and patchy chlorite alteration. Wispy serecite bands associated with

		Description
		cross cutting, thin (<10cm wide) intermittent zones of moderate-strong shearing, e.g., @ 92.20, 90.75, 103.50m).
90.70	90.92	CIS80 **Sheared80 25°** Strongly sheared interval of QMNZ defined by grain size reduction, attenuated quartz grains and wispy serecite. Sheared interval is undulose and wraps around sections of unsheared QMNZ. Fine-medium grained pyrite and rare arsenopyrite hosted within sheared interval.
95.69	95.90	CIS80 **Sheared80 25°** Strongly sheared interval of QMNZ defined by grain size reduction, attenuated quartz grains and wispy serecite. Fine-medium grained pyrite and rare arsenopyrite hosted within sheared interval. Open fracture parallel to shearing coated with chlorites.
100.02	100.03	VEI;0.01;Qz;T;10°;Gn05; **Vein 0.01 Quartz Tension 10° Galena 5%** 5mm wide, grey-transluscent quartz veinlet hosting anhedral blebs of medium-fine grained galena. No galena observed in adjacent, unsheared QMNZ. Non-magnetic.
103.60	103.70	CIS60 **Sheared60 25°** Moderately sheared interval of QMNZ defined by grain size reduction, attenuated quartz grains and wispy serecite. Fine grained pyrite hosted within sheared interval.
104.50	104.60	CIS50 **Sheared50 25°** Moderately sheared interval of QMNZ defined by grain size reduction, attenuated quartz grains and wispy serecite. Fine grained pyrite hosted within sheared interval.
108.27	108.40	CIS80 **Sheared80 25°** Strongly sheared interval of QMNZ defined by grain size reduction and wispy serecite. Fine grained pyrite hosted within sheared interval. Shear parallel, hairline width, quartz-tourmaline-epidote (apple green) veinlet at centre of sheared interval.
108.36	108.37	VEI;0.01;Qz Tl Ep;T;25°;; **Vein 0.01 Quartz Tourmaline Epidote Tension 25°** Shear parallel, hairline quartz-tourmaline-epidote (apple green) veinlet at centre of 10cm wide sheared interval of QMNZ. Shear hosts disseminated pyrite specks. Non-magnetic.
109.20	109.35	CIS70 **Sheared70 25°** Strongly sheared interval of QMNZ defined by grain size reduction and wispy serecite. Fine grained pyrite hosted within sheared interval. Shear parallel, 3mm width, quartz-tourmaline-epidote (apple green) veinlet at lower contact of the sheared interval.
109.30	109.31	VEI;0.01;Tl Qz Ep Cb;T;30°;; **Vein 0.01 Tourmaline Quartz Epidote Carbonate Tension 30°** Shear parallel, 3mm quartz-tourmaline-epidote (apple green) veinlet at lower contact of 12cm wide sheared interval of QMNZ. Shear hosts disseminated pyrite specks. Non-magnetic.

Description

111.80 112.02 CIS60
Sheared60 45°
Moderately sheared interval of QMNZ defined by grain size reduction, attenuated quartz grains and wispy serecite. Fine grained pyrite hosted within sheared interval.

119.00 222.00 Car03; Chl10; Ser03; Pot05
Carbonatization 3; Chloritization 10; Sericitization 3; Potassic 5
Large interval of homogenous QMNZ. Relatively consistent degree of weak chlorite and carbonate alteration throughout with wispy serecite constrained to sporadic areas of weak-moderate shearing. Zones of marginally more intense albeit still diffuse potassic alteration between 119.00 and 129.00m and 195.00-196.50m, associated with veining in the latter case.

130.07 130.40 M8 (QMNZ); CIS
Sheared Monzonite 50°; Sheared
Moderately sheared interval of QMNZ with attenuated quartz grains, wispy serecite and grain size reduction. Lower and upper contacts sharp @ 50 deg tca. Blebs of disseminated pyrite and rare secks of chalcopyrite. Non-magnetic.

130.07 130.40 CIS50
Sheared50 55°
Moderately sheared interval with attenuated quartz grains and wispy serecite @ 55 eg tca. Rare specks of disseminated pyrite and chalcoyrite. Sharp upper and lower contacts.

130.40 159.40 QMNZ
Quartz Monzonite
Coarse grained, light grey, non-magnetic, relatively unaltered QMNZ with intermittent zones of thin, <10cm wide moderate-weak shearing (e.g., @ 133.77, 134.70m) at 60-80 deg tca, hosting rare specks of disseminated pyrite.Shearing defined by attenuated quartz grains, wispy serecite and grain size reduced. Sporadic, <5cm wide grey-transluscent quartz veins, no associated sulphide.

133.80 133.90 CIS50
Sheared50 80°
Moderately sheared interval with attenuated quartz grains and wispy serecite @ 80 deg tca. Trace specks of disseminated pyrite. Sharp upper and lower contacts.

138.18 138.19 VEI;0.01;Qz;T;70°;;
Vein 0.01 Quartz Tension 70°
Grey-transluscent quartz vein. Sulphides absent. Non-magnetic.

139.56 139.60 VEI;0.03;Qz;T;;;
Vein 0.03 Quartz Tension
Grey-transluscent quartz vein. Sulphides absent. Non-magnetic.

159.40 159.55 I1F
Aplite 45°
Light grey, fine grained, non-magnetic aplite dyke with sharply defined contacts @ 50 deg tca. Sulphides absent.

159.55 192.99 QMNZ
Quartz Monzonite
Large interval of homogenous, relatively unaltered, coarse grained, non-magnetic, light grey QMNZ. Thin (<15cm wide) zone of moderate

Description			
			shearing at 169.68m. Shearing @ 80 deg tca and hosting carbonate veining and trace, fg specks of disseminated pyrite.
169.70	169.92	CIS70	**Sheared70 80°** Moderately-strongly sheared interval with attenuated quartz grains and wispy serecite @ 80 deg tca. Euhedral cubes of disseminated pyrite within the shear. Shear parallel, <5mm wide quartz-carbonate veinlets. Sharp upper and lower contacts.
192.99	193.19	I1F	**Aplite 80°** Pink-grey (unlike overlying light grey aplite dyke) coloured, fine grained aplite dyke with a pegmatitic core of quartz-feldspar. Non-magnetic, sulphides absent. Contacts sharply defined @ 80 deg tca.
193.19	222.00	QMNZ	**Quartz Monzonite** Large interval of homogenous, relatively unaltered, coarse grained, non-magnetic, light grey QMNZ. Sporadic, thin (<15cm wide) zones of moderate shearing at 197.10, 209.32, 212.32m. Shearing @ 40-80 deg tca (see structure notes) and hosting trace, fg specks of disseminated pyrite. Some potassic alteration around 196.00m associated with cross cutting quartz vein. EOH @ 222.00m
196.00	196.10	VEI;0.01;Qz Cl Cb;T;5°;Py05;	**Vein 0.01 Quartz Chlorite Carbonate Tension 5° Pyrite 5%** Quartz-carbonate with vein margin chlorite hosting specks and blebs of disseminated pyrite. Adjacent 30cm of QMNZ is moderately potassic altered. Vein is undulose and pinches/swells along its length. Non-magnetic.
197.10	197.24	CIS60	**Sheared60 45°** Moderately sheared interval with attenuated quartz grains and wispy serecite @ 45 deg tca. Trace specks of disseminated pyrite. Sharp upper contact, gradational lower contact.
198.80	198.83	VEI;0.03;Pg Qz;T;55°;;	**Vein 0.03 Plagioclase Quartz Tension 55°** Pink-grey quartz-feldspar vein. Sulphides absent. Non-magnetic.
205.70	205.80	CIS70	**Sheared70 60°** Moderately-strongly sheared interval with attenuated quartz grains and wispy serecite @ 60 deg tca. Trace specks of disseminated pyrite. Sharp upper and lower contacts. Diffuse potassic alteration around sheared interval.
208.32	208.40	CIS50	**Sheared50 50°** Moderately sheared interval with attenuated quartz grains and wispy serecite @ 50 deg tca. Trace specks of vfg disseminated pyrite. Sharp upper and lower contacts.
212.30	212.41	CIS50	**Sheared50 80°** Moderately sheared interval with attenuated quartz grains and wispy serecite @ 80 deg tca. Trace specks of disseminated pyrite and arsenopyrite. Sharp lower contact, gradational upper contact.

Northern Superior Resources Inc.

Assay

From	To	Sample number	AU_GPT_AA (g/t)	AU_GPT_GRA (g/t)	AU_Calc_Final (g/t)	Ag_MS (ppm)	As_MS (ppm)	
30.16	31.07	W130353	<0.005		<0.005	0.17	43.500	
31.07	31.46	W130354	<0.005		<0.005	0.11	42.700	
31.46	32.25	W130355	<0.005		<0.005	0.10	18.200	
32.25	33.00	W130356	0.036		0.036	0.10	65.900	
48.00	48.95	W130357	<0.005		<0.005	0.07	25.300	
48.95	49.95	W130358	0.005		0.005	0.29	1475.000	
49.95	50.70	W130359	<0.005		<0.005	0.15	12.500	
50.70	51.75	W130360	<0.005		<0.005	0.10	10.600	
90.07	91.05	W130361	0.005		0.005	0.10	24.500	
91.05	92.05	W130362	0.044		0.044	0.06	39.900	
92.05	93.00	W130363	0.006		0.006	0.05	26.200	
93.00	93.90	W130364	<0.005		<0.005	0.05	25.000	
93.90	94.40	W130365	0.007		0.007	0.05	33.300	
94.40	95.45	W130366	0.031		0.031	0.08	24.700	
95.45	95.87	W130367	0.005		0.005	0.05	28.800	
95.87	96.90	W130368	0.057		0.057	0.15	43.800	
96.90	97.46	W130369	0.005		0.005	0.05	28.600	
97.46	98.50	W130370	<0.005		<0.005	0.04	14.500	

Northern Superior Resources Inc.

Claims title:		Section:	5813368
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	03/11/2010	Description date:	04/08/2017
End date:	06/11/2010	Author:	Jon O'Callaghan

DDH: TPK-17-004

Collar

Azimuth: 360.00°
Dip: -70.00°
Length: 246.00

UTM NAD83

East	442299.7
North	5813363.5
Elevation	252.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	18.00	6.20°	-69.80°	No
Reflex	42.00	6.70°	-69.80°	No
Reflex	68.00	8.30°	-69.60°	No
Reflex	93.00	10.10°	-69.20°	No
Reflex	120.00	11.20°	-69.30°	No
Reflex	144.00	11.80°	-69.00°	No
Reflex	168.00	12.00°	-68.70°	No

Type	Depth	Azimuth	Dip	Invalid
Reflex	192.00	14.80°	-68.90°	No
Reflex	219.00	16.60°	-69.00°	No

Number of samples: 2
Number of QAQC samples: 0
Total sampled length: 14.11

Description:

TPK-10-004 originally logged by Rainy River geologist, Sarah Miller in Fall 2010. Relogged by NSR geologist Jon O'Callaghan, summer 2017 with the intention of better defining the structures controlling auiferous zones at the target 3 area.

Core size: BQ core   Cemented: No   Stored: Yes

Description			
0.00	11.18		CSG **Casing** Overburden. No core recovered.
11.18	81.87		QMNZ; I1F **Quartz Monzonite; Aplite** Coarse grained, non-magnetic, unfoliated/unsheared monzonite with mm-sized feldspar phenocrysts. Light-medium grey where fresh, pervasive pink-potassic alteration throughout, appears associated with sporadic <20cm wide, crosscutting, fine grained, pink aplite dykes (e.g. @ 75.85m) orientated around 20 deg tca). Core fragmented and blocky with numerous fractures, some possibly drill/saw induced. Open fractures coated with limonite alteration. Rare specks of fine-grained, disseminated pyrite and arsenpyrite throughout monzonite groundmass. Patchy, light-green (epidote?) alteration. Hairline veinlets and patchy chlorite alteration also observed throughout the interval.
	11.18	81.87	Pot15; Hem10; Chl10; Sau01 **Potassic 15; Hematization 10; Chloritization 10; Saussauritization 1** Pervasive zones of potassic alteration and haematite staining up to 10's m in width. Chlorite alteration throughout the interval with patchy zones of apple-green discolouration to feldspars (saussauritization). Fresher QMNZ is grey in colour, lacking potassic and haematite alt.
81.87	84.70		M8 (QMNZ); CIS **Sheared Monzonite 25°; Sheared** Medium grey, medium grained, moderate-strongly sheared, non-magnetic quartz monzonite with sharp upper and lower contacts @ 25 deg tca. Interval cros cut by grey-transluscent quartz-chlorite veinlets and sporadic zons of hairline chlorite-actinolite stock work. Blebby pyrite-chalcopyrite and arsenopyryite specks with <20cm of veinlets.
	81.87	84.70	Sau05; Chl15; Ser10; Sil05 **Saussauritization 5; Chloritization 15; Sericitization 10; Silicification 5** Sheared QMNZ with patchy chlorite and saussaurite alteration. Zones of stronger shearing host quartz flooding and shear-parallel wispy sericite banding.
	81.87	84.70	CIS60 **Sheared60 25°** Sheared QMNZ. Shearing defined by wispy sericite @ 25 deg tca.
	83.94	84.00	VEI;0.03;Qz Cl;T;30°;Py02; **Vein 0.03 Quartz Chlorite Tension 30° Pyrite 2%** Grey quartz vein with specks of green chlorite. Blebs and specks of pyrite up to 10cm into adjacent sheared QMNZ. Non-magnetic.
	84.38	84.40	VEI;0.02;Cl Qz Ac;T;30°;Py01; **Vein 0.02 Chlorite Quartz Actinolite Tension 30° Pyrite 1%** Grey quartz vein with vein-margin chlorite and actinolite. Specks of disseminated pyrite (and pos chalcopyrite?) associated with chlorite.
84.70	106.52		QMNZ **Quartz Monzonite** Continuation of coarse grained, pink-grey, feldspar-rich quartz monzonite with pervasive, intense potassic alteration. Zones of green-grey saussarite and chlorite alteration betweeen 84.70-90.00m associated with stringers of cross cutting sericite and hairline chlorite-actinolite veinlets. Rare specks of disseminated pyrite and arsenopyrite throughout monzonite groundmass. No aplite dykes observed. Non-magnetic.
	84.70	91.32	Pot05; Sau10; Chl15; Act05

Description		
		Potassic 5; Saussauritization 10; Chloritization 15; Actinolite 5
		Unsheared QMNZ with greenish-grey colour caused by pervsive chlorite-saussaurite alteration. Patchy pink potassic alteration of feldspars.
90.90	91.05	STW;1%;Ac Qz;T;10°;;
		Stockwork 1% Actinolite Quartz Tension 10°
		Hairline width quartz vein with patchy chlorite-actinolite alteration in adjacent QMNZ. Sulphides absent.
91.25	91.26	VEI;0.01;Qz Pg Cl;T;30°;;
		Vein 0.01 Quartz Plagioclase Chlorite Tension 30°
		Boundinaged, 1cm wide quartz-feldspar vein with vein margin chlorite. Sulphides absent.
91.32	106.52	Pot20; Hem15
		Potassic 20; Hematization 15
		Strongly potassic altered QMNZ with pervasive haematite staining.
93.18	96.27	Vn;3%;Cl Qz Cb;T;80°;As00.5;
		stringers, veinlets 3% Chlorite Quartz Carbonate Tension 80° Arsenopyrite 0.5%
		<5mm wide quartz-carbonate veinlets with vein margin chlorite. Some veinlets host blebs of arsenopyrite elongated parallel to vein margin (e.g. @ 96.03m). Non-magnetic.
106.52	107.10	M8 (QMNZ); CIS
		Sheared Monzonite 45°; Sheared
		Moderately sheared, moderately potassic altered QMNZ with a 13cm wide 'centre' of strongly sheared QMNZ. <1mm wide, boudinaged grey quartz-chlorite-actinolite veinlets @ 30 deg tca with associated blebby pyrite. specks of disseminate pyrite-arsenopyrite througout the sheared interval. Non-magnetic.Sharp contacts with adjacent, unsheared QMNZ.
106.52	107.10	Pot05; Ser10; Act05; Chl05
		Potassic 5; Sericitization 10; Actinolite 5; Chloritization 5
		Sheared QMNZ with bands of wispy sericite alteration. Patchy chlorite-actinolite alteration associated wcross cutting, boudinaged quartz-sulphide veinlets.
106.52	107.10	CIS40
		Sheared40 30°
		Sheared QMNZ. Shearing defined by wispy sericite and attenuated quartz-feldspar grains @ 30 deg tca.
107.10	113.14	QMNZ
		Quartz Monzonite
		Continuation of coarse grained, pink-grey coloured, potassic altered and haematite stained, non-magnetic, unfoliated quartz monzonite with specks of rare, disseminated pyrite. The interval is crosscut by occasional, hairline chlorite-actinolite and quartz-tourmaline veilets at 20-30 deg tca. Wider quartz veins (e.g. @ 109.38m) host blebs of pyrite up to 2x2cm within vein and upto 2cm into adjacent QMNZ.
107.10	113.14	Chl05; Pot05; Act05
		Chloritization 5; Potassic 5; Actinolite 5
		Relatively fresh, unsheared QMNZ with patchy chlorite-actinolite alteration.
109.27	109.38	VEI;0.11;Qz Cl Pg Cb;T;35°;Py10;
		Vein 0.11 Quartz Chlorite Plagioclase Carbonate Tension 35° Pyrite 10%

Description

Laminated, 11cm wide quartz-feldspar with wispy chlorite and patches of white carbonate (or albite?). Blebs of anhedral pyrite up to 2 x 2cm in size along vein margin and within the vein. Non-magnetic. Some pink-potassic alteration to feldspars.

113.14 114.30 M8 (QMNZ); CIS
Sheared Monzonite 35°; Sheared
Strongly sheared, pinkish-grey, weak-moderately potassic altered QMNZ. At 113.17m 3cm wide band of aphanitic, v-fine grained, dark grey, chlorite-quartz hosting material (pseudotachylitic?) @ 15 deg tca. Disseminated, fine grained pyrite and arsenopyrite throughout interval @ approx 0.5 vol.%. Sharp contacts with adjacent unsheared QMNZ. Non-magnetic.

113.14 114.30 Act05; Chl05; Ser10
Actinolite 5; Chloritization 5; Sericitization 10
Sheared QMNZ with wispy sericite alt and patchy chlorite-actinolite. Pos actinolite patches within 3cm band of very fg 'pseudotachylitic' material.

113.14 114.30 CIS80
Sheared80 15°
Strongly sheared QMNZ. Shearing defined by wisoy sericite and strongly attenuated quartz-feldspar grains.

114.30 148.37 QMNZ
Quartz Monzonite
Moderately-strongly, pinkish-grey, coarse-grained, relatively homogenous interval of potassic altered and haematite stained, non-magnetic QMNZ with rare specks of very fine grained, disseminated-blebby pyrite (e.g. 129.95m) and arsenopyrite throughout groundmass. Interval cross cut by sporadic 1mm to hairline-width quartz-tourmaline and chlorite-actinolite veinlets @<20 deg tca with no associated sulphide. Thin zones of weak shearing <30cm wide, defined by sericite, e.g. @ 135.50m.
Rare, <5cm wide, fine grained, pink, potassic altered aplite dykelets @ 60-80 deg tca. No associated sulphides.

114.30 149.20 Chl10; Pot10; Hem05; Ser02
Chloritization 10; Potassic 10; Hematization 5; Sericitization 2
Unsheared QMNZ with pervasive potassic alteration and haematite staining. Patchy chorite alteration throughout interval. Rare wispy sericite alteration associated with <30cm wide, intermittent, weak-moderate shearing. Potassic alteration and haematite staining decrease in intensity below 147.00m. Wispy sericit and chlorite increase below 148.37m.

119.48 119.82 I1F
Aplite 40°
Pink fine grained, hetrogenous aplite intrusion with sharp contacts @ 40 deg tca. Non-magnetic. Rare specks of pyrite associated with hairline bands of wispy sericite and pos tourmline at centre of aplite.

130.87 131.21 CIS25
Sheared25 80°
Weak shearing @ 80 deg tca, defined by wispy sericite. Shearing appears associated with a thin <10cm wide selvage of fine grained, dark grey, non-magnetic mafic material. Disseminated pyrite and pos arsenopyrite increases in vol.% within sheared QMNZ.

135.46 135.65 CIS20
Sheared20 35°
Weak shear zone defined by wispy sericite @ 35 deg tca.

141.52 141.54 VEI;0.02;Qz;T;50°;Py01;

		Description
		Vein 0.02 Tension 50° Pyrite 1%
		Grey-transluscent, 2cm wide quartz vein @ 50 deg tca. Euhedral cubes of pyrite ~ 5 x 5 mm within the quartz vein.
142.50	142.59	CIS35
		Sheared35 30°
		Weak-moderate, 9cm wide zone of sharply defined shearing with wispy sericite and associated, fg disseminated pyrite.
147.63	147.68	CIS60
		Sheared60 45°
		Thin, sharply defined zone of strong shearing with wispy sericite and fg, disseminated pyrite and minor arseonopyrite specks.
148.37	154.26	M8 (QMNZ); CIS
		Sheared Monzonite 40°; Sheared
		Strongly sheared to proto-mylonitic, non-magnetic QMNZ with pervasive silicic and sericitic alteration throughout. The silicic alteration has made the shear brittle, causing extensive fracturing and fragmentation of the core that post dates shearing and mineralization. Some fracturing is drill-induced. The interval is cross cut by several <5cm wide, grey-transluscent quartz veins approximately parallel to shearing. Fine grained disseminated specks of subhedral-euhedral pyrite and arsenopyrite throughout the shear fabric. Rare specks of anhedral galena.
148.37	154.26	CIS70
		Sheared70 35°
		Moderate to strongly sheared interval of QMNZ protolith, defined by wispy sericite and accompanied by pervasive silicic alteration.
148.37	154.26	Py03; As00.5; Gn00.05
		Pyrite 3%; Arsenopyrite 0.5%; Galena 0.05%
		Fine grained disseminated specks of subhedral-euhedral pyrite and arsenopyrite throughout the strongly sheared QMNZ fabric. Rare specks of anhedral galena.
149.20	150.09	Ser20; Sil15; Chl05
		Sericitization 20; Silicification 15; Chloritization 5
		Strong sheared interval of quartz monzonite either-side of grey-transluscent quartz vein. Pervasive silicic alteration with wispy sericite and patchy chlorite.
149.50	149.70	VEI;0.2;Qz Sr Cl Ac;T;20°;Py03;
		Vein 0.2 Quartz Sericite Chlorite Actinolite Tension 20° Pyrite 3%
		Grey-transluscent, shear-zone-hosted quartz vein with wispy, laminated sericite and chlorite, possible patchy actinolite. Disseminated and blebby, anhedral pyrite associated with sericite-chlorite.
150.09	152.57	Ser15; Sil05; Sau03; Chl05
		Sericitization 15; Silicification 5; Saussauritization 3; Chloritization 5
		Weak-moderately sheared QMNZ with wispy sericite, patchy chlorite and subtle saussaurite alteration.
150.99	151.07	VEI;0.08;Qz Sr Ac;T;45°;Py00.5 As00.5;
		Vein 0.08 Quartz Sericite Actinolite Tension 45° Pyrite 0.5% Arsenopyrite 0.5%
		Grey-transluscent quartz with wispy sericite. Specks of disseminated, anhedral pyrite and arsenopyrite associated with sericite and chlorite/actinolite?
152.19	152.23	VEI;0.04;Qz;T;75°;Py00.5;

Description

Vein 0.04 Quartz Tension 75° Pyrite 0.5%
Grey-transluscent quartz vein, with anhedral specks of pyrite along vein margin.

152.57 154.26 Ser35; Sil20; Chl02
Sericitization 35; Silicification 20; Chloritization 2
Strongly sheared QMNZ with pervasive silicic alteration and wispy sericite throughout. Patchy chlorite alteration.

153.00 153.29 VEI;0.29;Qz;T;35°;Py00.5;
Vein 0.29 Quartz Tension 35° Pyrite 0.5%
Grey-transluscent quartz vein with wispy sericite and chlorite. Anhedral, <mm sized blebs of pyrite throughout vein, associated with sericite.

154.26 155.92 QMNZ; FO
Quartz Monzonite; Foliated
Weakly sheared to unsheared interval of grey-coloured, coarse grained, non-magnetic quartz monzonite. Wispy chlorite-sericite alteration defines weak shearing/foliation, with several foliation-parallel, grey-transluscent quartz-chlorite veins <2cm wide. Fine grained disseminated specks of pyrite and pos arsenopyrite throughout interval.

154.26 155.92 Chl10; Ser05; Sil05
Chloritization 10; Sericitization 5; Silicification 5
Relatively unsheared interval of QMNZ with patchy chlorite and wispy sericite alteration.

155.36 155.40 VEI;0.04;Qz Sr Cl;T;30°;Py00.5;
Vein 0.04 Quartz Sericite Chlorite Tension 30° Pyrite 0.5%
Grey-transluscent quartz vein with wispy chlorite-sericite and associated disseminated specks of anhedral pyrite, which are also present in adjacent QMNZ groundmass.

155.92 164.14 M8 (QMNZ); CIS; MN
Sheared Monzonite 30°; Sheared; Mylonitic
Strongly sheared to protomylonitic (feldspar 'proto-augen' texture) interval of QMNZ protolith, with pervasive, strong silicic and sericite alteration overprinting protolith features. The silicic alteration has made the lithology brittle, creating numerous post-shear and mineralization fractures (some of which are drilled induced) (a.k.a., in historic Rainy River logs as 'Fracture Zone'). The interval is cross cut by numerous milky-white to milky-grey coloured quartz veins up to approximately 50cm in width. Some veins are partially laminated with wispy sericite and chlorite. Disseminated, fine grained specks of subhedral pyrite and arsenopyrite throughout shear fabric. Rare specks of anhedral, galena. Several specks of <mm sized, visible gold observed at 157.30m within milky-white quartz vein. Shearing ends abruptly around 164m, with associated strong alteration continuing into underlying QMNZ.

155.92 164.14 Chl05; Sil40; Ser35
Chloritization 5; Silicification 40; Sericitization 35
Strongly sheared-proto-mylonitic QMNZ protolith, with alteration intensity increasing downhole. Pervasive silicic and wispy chlorite and sericite alteration throughout, obliterating precusor textures in areas. Silicic alteration has resulted in fracturing and fragmentation of core (a.k.a. 'Fracture Zone' in historic Rainy River logs).

155.92 164.14 CIS90
Sheared90 25°
Zone of strong shearing - proto mylonite defined by wispy sericite and attenuated quartz-feldspar grains. Shearing is with associated

Description

silicic and sericite alteration and quartz veining. Shearing averages ~25 deg tca. Fg specks of pyrite and arsenopyrite disseminated throughout interval.

155.92 164.14 Gn00.05; Au00.05; Py03; As00.5
Galena 0.05%; Gold 0.05%; Pyrite 3%; Arsenopyrite 0.5%
Disseminated, fine grained specks of subhedral pyrite and arsenopyrite throughout strongly sheared QMNZ fabric. Rare specks of anhedral, galena. Several specks of <mm sized, visible gold observed at 157.30m within milky-white quartz vein.

156.90 156.99 VEI;0.05;Qz Sr Ac Gr;T;30°;Py00.5;
Vein 0.05 Quartz Sericite Actinolite Garnet Tension 30° Pyrite 0.5%
Grey-transluscent quartz vein parallel to shear fabric, with wispy sericite and patchy actinolite. 3 <mm sized specks of red-coloured garnet associated with the sericite bands. Fine grained specks of disseminated pyrite.

157.13 157.64 VEI;0.51;Qz Sr Ac Gr;T;30°;Py00.05 As00.05 Au00.05;
Vein 0.51 Quartz Sericite Actinolite Garnet Tension 30° Pyrite 0.05% Arsenopyrite 0.05% Gold 0.05%
Milky gre-white coloured quartz vein paralel to shear fabric, with wispy sericite and actinolite bands. Very fine grained red garnets associated with actinolite. Very fine grained, disseminated pyrite, arsenopyrite and visible gold hosted within the quartz or associated sericite bands. Vein at least 50cm in length, fractured and fragmented core means vein could be up to 90cm in length.

161.35 161.90 VEI;0.55;Qz Sr Cl;T;30°;Py00.05;
Vein 0.55 Quartz Sericite Chlorite Tension 30° Pyrite 0.05%
Milky white-grey coloured, shear-parallel quartz vein with stringers of sericite and chlorite. No visible sulphides. Fragmented core masks length of vein, orientation of vein based on parallel stringers of chlorite within quartz.

163.30 163.42 VEI;0.12;Qz Sr;T;70°;Py00.05;
Vein 0.12 Quartz Sericite Tension 70°
Milky white quartz vein with wispy sericite. Rare, fine grained specks of disseminated pyrite associated with sericite at vein margins.

164.14 169.95 QMNZ
Quartz Monzonite
Unsheared, but strongly altered QMNZ with pervasive saussaurite, chlorite, actinolite and sereicite alteration. Fine grained specks of disseminated pyrite and arsenopyrite throughout the QMNZ fabric and associated with occasional cross cutting, hairline veinlets of chlorite. Non-magnetic. Alteration gives the interval a distinct grey-green colouration.

164.14 169.95 Ser15; Sil20; Sau10; Act05; Chl05
Sericitization 15; Silicification 20; Saussauritization 10; Actinolite 5; Chloritization 5
Strongly altered, but relatively unsheared QMNZ with pervasive silicic alteration, wispy sericite-chlorite and patchy actinolite alteration. Subtle saussaurite alteration of feldspars give the interval a grey-green colouration.

165.00 167.00 Vn;3%;Cl;T;40°;Py00.05;
stringers, veinlets 3% Chlorite Tension 40° Pyrite 0.05%
Series of occasional, hairline width chlorite veinlets at various deg tca, hosting rare, fine grained specks of disseminated pyrite.

168.17 168.30 VEI;0.12;Qz Sr Cl;T;80°;Py00.5;
Vein 0.12 Quartz Sericite Chlorite Tension 80° Pyrite 0.5%
Milky-grey, folded and possibly boudinaged quartz vein with sericite and patchy chlorite. Fine grained, disseminated anhedral specks of pyrite associated with chlorite.

Description		
169.95	234.50	QMNZ **Quartz Monzonite** Relatively homogenous, unsheared, unfoliated and, grey to pink coloured, coarse grained QMNZ. Veining largely absent, trace amounts of fine grained, disseminated pyrite in groundmass of QMNZ. Patches of potassic altered and haematite staining matrerial. At 186.42-187.35m are <2cm wide to hairline veinlets of pseudotachylite. Non-magnetic.
169.95	234.50	Pot15; Hem10; Chl10 **Potassic 15; Hematization 10; Chloritization 10** Unsheared, elatively homogenous QMNZ with zones of more intense potassic alteration and associated pink haematite staining. Patchy chloritization throughout interval.
185.80	185.90	VEI;0.01;Qz Pg;T;40°;; **Vein 0.01 Quartz Plagioclase Tension 40°** Grey-transluscent coloured, undulose quartz with potassic altered, pink feldspar. Sulphides absent.
218.84	219.35	STR;20%;Qz Cl Cb Ac;T;50°;Py01; **Stringers 20% Quartz Chlorite Carbonate Actinolite Tension 50° Pyrite 1%** Series of <1cm wide quartz veins with vein margin chlorite-actinolite, plus possible carbonate/albite. Rare, fine grained, euhedral pyrite associated with chlorite. Pyrite extends up to 3cm into adjacent QMNZ groundmass.
234.50	235.03	M8 (QMNZ); CIS **Sheared Monzonite 40°; Sheared** Moderate-weakly sheared, grey QMNZ with shearing defined by wispy chlorite and sericite. Silicic alteration or poorly defined quartz vein at centre of shear zone. Fine grained, rare specks of disseminated pyrite within silicic alteration.
234.50	237.45	Sil10; Chl10; Ser10 **Silicification 10; Chloritization 10; Sericitization 10** Weak to moderately sheared QMNZ with pervasive silicic alteration around 233.70-234.05m. Wispy sericite and chlorite alteration throughout with associated specks of disseminated pyrite.
234.50	237.45	CIS30 **Sheared30 20°** Weak to moderately sheared QMNZ @ 20-30 deg tca defined by wispy sericite and chlorite bands. Some silicic alteration between 233.70-234.05m. Fine grained, disseminated specks of pyrite throughout the interval.
235.03	237.45	M8 (QMNZ); CIS **Sheared Monzonite 20°; Sheared** Moderately to weakly sheared quartz monzonite with associated wispy sericite and chlorite. Pervasive silicic alteration between 233.70 and 234.05m. Fine grained, disseminated pyrite associated with serecite throughout sheared interval. Footwall of shear zone is sharply defined by 2cm wide band of strongly sheared, dark grey, non-magnetic material. Possibly strongly shear, mafic/diorite horizon?
237.45	246.00	QMNZ **Quartz Monzonite 20°** Light grey, unsheared, unfoliated, relatively unaltered QMNZ with rare, very fine grained, disseminated pyrite. Non magnetic. EOH @ 246.00m.
237.45	246.00	Chl05

Description
Chloritization 5 Relatively fresh, unsheared, unfoliated QMNZ. Patchy chlorite alteration.

Northern Superior Resources Inc.

DDH: **TPK-17-005**

Claims title:		Section:	5813576
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	06/11/2010	Description date:	10/08/2017
End date:	09/11/2010	Author:	Jon O'Callaghan

Collar

Azimuth: 180.00°
Dip: -50.00°
Length: 318.00

UTM NAD83

East	442226.3
North	5813576.5
Elevation	253.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	18.00	190.30°	-50.50°	No
Reflex	42.00	191.30°	-50.30°	No
Reflex	69.00	190.90°	-50.80°	No
Reflex	95.00	193.50°	-51.00°	No
Reflex	120.00	193.80°	-51.00°	No
Reflex	137.00	194.00°	-51.10°	No
Reflex	161.00	194.60°	-51.30°	No

Type	Depth	Azimuth	Dip	Invalid
Reflex	189.00	196.00°	-51.60°	No

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Originally logged by Rainy River geologist, Sarah Miller. Relogged by NSR geologist Jon O'Callaghan with the intention of better defining the structures controlling auiferous zones at the target 3 area.

Core size: BQ core   Cemented: No   Stored: Yes

Description

0.00 4.90 CSG
Casing
Overburden. No core recovered.

4.90 22.66 QMNZ
Quartz Monzonite
Light grey, non-magnetic, coarse-grained, unsheared, unfoliated, relatively homogenous QMNZ with sporadic ~1x1cm patches of chlorite. Sulphides absent.

4.90 68.72 Ser03; Chl10; Car05
Sericitization 3; Chloritization 10; Carbonatization 5
Relatively unaltered homogenous, coarse grained QMNZ with zones of wispy sereicite alteration associated with weak-moderate shearing. Patchy green chlorite alteration and clots of chlorite up to 1x1cm within QMNZ groundmass. Diffuse, weak carbonate alteration throughout interval.

12.57 12.58 VEI;0.01;Qz Cb Cl;T;25°;Py05;
Vein 0.01 Quartz Carbonate Chlorite Tension 25° Pyrite 5%
Laminated grey-transluscent quartz vein with vein margin chlorite hosting disseminated blebs of pyrite. Pyrite specks also observed up to 5cm into adjacent QMNZ groundmass.

22.66 23.45 M8 (QMNZ); CIS
Sheared Monzonite 80°; Sheared
Moderately sheared QMNZ with attenuated quartz grains, grain size reduction and wispy sericite. Non-magnetic, with rare specks of pyrite associated with patches of grey carbonate.(e.g. @23.30m). Sharp upper contact @ 80 deg tca and gradational lower contact.

22.66 23.45 CIS40
Sheared40 80°
Moderately sheared QMNZ. Shearing defined by attenuated quartz grains, grain size reduction and wispy sericite. Sharp upper contact @ 80 deg tca and gradational lower contact.

23.45 32.97 QMNZ
Quartz Monzonite
Continuation of coarse grained, unaltered, unsheared and relatively homogenous, non-magnetic QMNZ with sporadic zones of thin (<2cm wide) weak shearing defined by wispy sericite-chlorite bands. Sulphides absent.

32.97 33.16 M8 (QMNZ); CIS
Sheared Monzonite 80°; Sheared
Thin zones of strongly sheared QMNZ defined by attenuated quartz and wispy sericite. Sharp upper and lower contacts @ 80 eg tca. Rare specks of pyrite present in cross cutting 2cm wide quartz vein at centre of shear zone.

32.97 33.16 CIS70
Sheared70 80°
Thin zones of strongly sheared QMNZ defined by attenuated quartz and wispy sericite. Sharp upper and lower contacts @ 80 eg tca.

33.13 33.19 VEI;0.06;Qz Ab;T;50°;Py01;
Vein 0.06 Quartz Albite Tension 50° Pyrite 1%
Grey-pink coloured quartz vein with white albite, hosted within moderately sheared QMNZ. Rare specks of pyrite at vein margin.

Description		
33.16	68.72	QMNZ **Quartz Monzonite** Continuation of light grey, unfoliated, coarse grained, relatively homogenous,unaltered, non-magnetic QMNZ with sporadic, 1x1cm patches of chlorite alteration. Sporadic zones of <5cm wide, weak shearing defined by wispy sericite bands. Shearing generally @ 20-30 deg tca (main shear zones seem to be at high deg tca, compared with these intermittent, weaker zones). Sulphides absent.
39.70	39.72	VEI;0.02;Qz;T;85°;; **Vein 0.02 Quartz Tension 85°** Grey-transluscent quartz vein @ 85 deg tca. Sulphides absent. Non-magnetic.
49.50	49.52	VEI;0.02;Qz Cb;T;85°;; **Vein 0.02 Quartz Carbonate Tension 85°** Pink-grey quartz vein with white carbonate patches. Sulphides absent. Non-magnetic.
68.72	69.90	M8 (QMNZ); CIS **Sheared Monzonite 75°; Sheared** Strongly sheared, non-magnetic, medium grey coloured QMNZ, with grain size reduction, attenuated quartz and wispy sericite. Upper and lower contacts sharply defined @ 75-80 deg tca. Rare specks of disseminated pyrite within shear groundmass. Veining absent.
68.72	72.00	Chl05; Ser15; Sil05; Car08 **Chloritization 5; Sericitization 15; Silicification 5; Carbonatization 8** Strongly-moderately sheared QMNZ with diffuse silicic and carbonate alteration and wispy serecite-chlorite alteration.
68.72	68.90	CIS70 **Sheared70 80°** Strongly sheared, non-magnetic, medium grey coloured QMNZ. Shearing defined by grain size reduction, attenuated quartz and wispy sericite. Upper and lower contacts sharply defined @ 75-80 deg tca.
69.90	71.09	QMNZ **Quartz Monzonite** Unsheared, light grey, coarse grained, non-magnetic quartz-monzonite. Sulphides absent.
71.09	72.28	M8 (QMNZ); CIS **Sheared Monzonite 80°; Sheared** Moderately sheared QMNZ with relatively sharp upper contact at ~80 deg tca, gradational lower contact. Fabric at the margins of shear zone @ 80 deg tca, centre of sheared zone @ 40 deg tca. Shearing defined by attenuated quartz grains and wispy serecite. Sulphides absent. Non-magnetic.
71.09	72.28	CIS50 **Sheared50 80°** Moderately sheared QMNZ with relatively sharp upper contact at ~80 deg tca, gradational lower contact. Fabric at the margins of shear zone @ 80 deg tca, centre of sheared zone @ 40 deg tca. Shearing defined by attenuated quartz grains and wispy serecite.
72.00	121.90	Car05; Chl10; Ser03 **Carbonatization 5; Chloritization 10; Sericitization 3** Continuation of relatively unaltered homogenous, coarse grained QMNZ with zones of wispy sereicite alteration associated with intermittent weak shearing. Patchy green-grey chlorite alteration and clots of chlorite up to 1x1cm within QMNZ groundmass. Diffuse,

Description		
		weak carbonate alteration throughout interval.
72.28	125.72	QMNZ **Quartz Monzonite** Coarse grained, homogenous, unsheared, unfoliated, unaltered QMNZ with patchy, sporadic chlorite. Rare, sporadic, < 10cm wide, light grey-beige, non-magnetic, vfg aplite(?) dykes @ 70 deg tca (e.g., @ 90.00m).
81.63	81.66	VEI;0.02;Cb Qz Cl;T;70°;; **Vein 0.02 Carbonate Quartz Chlorite Tension 70°** Pink-grey quartz-carbonate vein with chlorite patches. Sulphides absent.Non-magnetic.
101.08	101.20	VEI;0.01;Cl Qz;T;25°;Py05 Gn00.5; **Vein 0.01 Chlorite Quartz Tension 25° Pyrite 5% Galena 0.5%** Wispy, undulose and poorly defined zone of weak shearing and alteration with chlorite, hosting common pyrite specks and rarer speckd of subhedral galena. Non-magnetic.
121.90	142.98	Chl10; Pot15; Hem05; Car05 **Chloritization 10; Potassic 15; Hematization 5; Carbonatization 5** Abrupt increase in potassic/haematite alteration of QMNZ groundmass, causing pink discolouration. Patchy chlorite and diffuse carbonate alteration throughout the interval. Potassic alteration most intense near top of interval, becoming gradually weaker downhole.
123.32	123.35	VEI;0.03;Qz;T;90°;; **Vein 0.03 Quartz Tension 90°** Grey-transluscent quartz vein with contacts @ 90 deg tca. Sulphides absent.
125.47	125.73	VEI;0.27;Qz Cl Pg;T;80°;; **Vein 0.27 Quartz Chlorite Plagioclase Tension 80°** Grey-transluscent quartz vein with stringers of green chlorite and rare patches of pink potassic altered feldspar. Sulphides absent. Non-magnetic. Hangingwall marked by fault gouge.
125.70	125.87	FG **Fault gouge 80°** Poorly cemented fault gouge composed of green chlorite-carbonate clays with attenuated fragments of quartz-carbonate material. Sulphides absent. Non-magnetic.
125.72	126.21	M8 (QMNZ); CIS **Sheared Monzonite 65°; Sheared** Strongly sheared, chlorite-carbonate altered QMNZ. Core fractured and fragmented with fault gouge material between 125.72 and 125.86m. Sulphides absent. Non-magnetic.Chlorite clay coating on open fractures.
125.87	127.35	FRC70 **Fractured70** Zone of fractured and fragmented QMNZ and M8(QMNZ). Fragmentation likely due to overlying fault as silicic alteration (which makes the QMNZ brittle) is absent/weak.
126.21	142.98	QMNZ **Quartz Monzonite** Coarse grained, non-magnetic, unsheared/unfoliated QMNZ with notable increase in potassic/haematite alteration compared with overlying

Description			
			intervals. Very rare, disseminated fine grained sulphides.
142.98	143.50		V3; CIS **Mafic volcanic 65°; Sheared** Black-dark green, fine grained mafic volcanic with possible amygdales of zeolite and quartz. Moderate to trong shearing with lenses of attenuated quartz-carbonate material. Contacts fractured and fragmented at approximately 65 deg tca. Sulphides absent. Non-magnetic.
	142.98	143.50	Car10; Chl30 **Carbonatization 10; Chloritization 30** Strongly sheared nterval of dark green-black metavolcanics with pervasive chloritic alteration and carbonate lenses.
	143.14	144.50	CIS80 **Sheared80 40°** Strongly sheared, fine grained V3. Shearing defined by attenuated quartz-carbonate lenses and schistosity @40 deg tca.
143.50	154.54		QMNZ **Quartz Monzonite** Continuation of weakly potassic/haematite altered, unfoliated/unsheared, coarse-grained, non-magnetic QMNZ with green chlorite clots. QMNZ becomes increasingly fractured with increased silicic alteration downhole from ~ 153.57m onwards, with rare specks of disseminated pyrite.
	143.50	153.60	Pot10; Hem05; Car05; Chl10 **Potassic 10; Hematization 5; Carbonatization 5; Chloritization 10** Continuation of weak potassic/haematite alteration with sporadic clots of chlorite and diffuse carbonate alteration.
	151.05	151.55	VEI;0.01;Qz;T;5°;; **Vein 0.01 Quartz Tension 5°** Light grey-transluscent, undulose quartz vein @5 deg tca. Sulphides absent. Hosted within potassic/haematite altered QMNZ.
	153.60	159.30	Chl10; Pot05; Ser05; Sil05 **Chloritization 10; Potassic 5; Sericitization 5; Silicification 5** Very weak, diffuse silicic alteration causing brittle fracturing of core. Weak sericitic alteration with sericite bands. Weak diffuse potassic alteration and patchy chlorite alteration.
	153.66	159.30	FRC60 **Fractured60** Fractured and fragmented QMNZ due to diffuse, weak silicic alteration causing the coe to become brittle. No evidence of faulting. Sulphides absent and no coating on open fractures, some of which is drilling induced.
154.54	155.00		I1F **Aplite 35°** Very fine grained, moderately potassic/haematite altered, non-magnetic aplite dyke with sharply defined upper contact @ 35 deg tca. Rare, vfg specks of disseminated pyrite.
155.00	157.40		QMNZ **Quartz Monzonite** Fractured and fragmented core possible due to pervasive but weak silicic alteration of unsheared, coarse grained, non-magnetic QMNZ. Rare, fine grained, disseminated specks of pyrite in QMNZ groundmass.

Description

155.47 156.46 STW;5%;Qz;T;;;
Stockwork 5% Quartz Tension
Series of hairline to mm wide grey quartz veins at various degrees tca within silicicfied, fractured and fragmented QMNZ. Rare, fg specks of pyrite associated with the stockworking.

157.40 159.26 M8 (QMNZ); CIS
Sheared Monzonite 70°; Sheared
Fractured and fragmented core due to pervasive but weak silicic alteration. Moderate-weakly sheared QMNZ defined by attenuated quartz grains and wispy sericite bands. Rare, fine grained disseminated specks of pyrite. Non-magnetic.

159.26 178.30 QMNZ
Quartz Monzonite
Return to relatively unaltered, homogenous, light grey, coarse grained, non-magnetic QMNZ with sporadic chlorite clots. Non-magnetic. Sulphides largely absent with exception of zone of weak-moderate shearing between 168.11-186.25m. Shearing defined by wispy sericite and attenuated quartz grains @ 50 deg tca, with specks of fg disseminated pyrite.

159.30 255.75 Ser03; Chl10
Sericitization 3; Chloritization 10
Relatively unaltered, homogenous QMNZ. Potassic/haematite alteration and associated pink discolouration restricted to one aplite dyke @ 178.30m. Patchy chlorite alteration and clots throughout the interval. Serecite alteration and wispy bands restricted to sporadic zones of shearing <20cm wide, e.g. @ 226.46m.

168.11 168.25 CIS50
Sheared50 60°
Moderately sheared interval of QMNZ defined by attenuated quartz grains and wispy sericite-chlorite. Sheared interval hosts shear-parallel quartz vein. Fine grained specks of pyrite throughout the shear zone groundmass. Non-magnetic. Sharp hangingwall contact @ 60 deg tca. Gradational footwall contact.

168.19 168.21 VEI;0.02;Qz;T;70°;;
Vein 0.02 Quartz Tension 70°
Light grey quartz vein hosted with zone of moderate shearing. Contacts sharply defined @ 70 deg tca. Sulphides absent. Non-magnetic.

178.30 178.70 I1F
Aplite 85°
Fine grained, pink-grey, haematite altered aplite dyke with sharply defined upper and lower contacts @ 85 deg tca. Sulphides absent. Non-magnetic.

178.70 203.84 QMNZ
Quartz Monzonite
Continuation of homogenous, light grey, non-magnetic, coarse-grained QMNZ with sporadic zones of weak-moderate shearing (E.g. @ 192.65m). Shearing generally >70 deg tca and defined by attenuated quartz wth wispy sericite bands. Sulphides absent. TPK-10-005 EOH @ 198.56m. TPK-11-005 redrill commences from 198.80m onwards. 7cm wide, vfg, light grey , intermediate xenolith (I1F) @ 202.00m @ 60 deg tca.

184.60 184.78 CIS50
Sheared50 85°

Description			
			Moderately sheared interval of QMNZ. Shearing defined by attenuated quartz grains and wispy sericite-chlorite bands. Fine grained specks of disseminated pyrite throughout the sheared groundmass. Sharp hangingwall contact @ 85 deg tca. Gradational footwall contact. Non-magnetic.
	192.70	192.81	CIS80 **Sheared80 80°** Strongly sheared interval of QMNZ, almost proto-mylonite. Shearing defined by attenuated grains of quartz and wispy sericite. Rare specks of fine grained, disseminated pyrite throughout the groundmass of the shear zone. Sharp upper and lower contacts.
203.84	204.10		I1F **Aplite 60°** Medium grey medium grained, non-magnetic dyke/xenolith with sharply defined contacts @ 60 deg tca and white feldspar phenocrysts. Sulphides absent. Non-magnetic.
204.10	255.75		QMNZ; I1F **Quartz Monzonite; Aplite** Continuation of light grey, unsheared, unfoliated, relatively unaltered and homogenous, non-magnetic, coarse grained QMNZ with rare clots of chlorite. Interval hosts several <10cm wide, light pink-grey to beige-grey aplite dykes or felsic xenoliths with sharply defined contacts at <80 deg tca. Sulphides absent. Xenoliths/dykes increasingly frequent downhole.
	209.68	209.69	VEI;0.02;Qz Cl;T;70°;; **Vein 0.02 Quartz Chlorite Tension 70°** Grey-transluscent, laminated quartz vein with vein-margin chlorite. Sulphides absent. Non-magnetic.
	226.46	226.57	CIS70 **Sheared70 60°** Moderately-strongly sheared interval of QMNZ defined by attenuated quartz grains and wispy sericite-chlorite. Sulphides absent. Non-magnetic.
	255.74	256.18	CIS70 **Sheared70 10°** Moderate-strongly sheared QMNZ defined by attenuated quartz grains and flattened/parallel chlorite grains. Shear zone weakly silicified with shear parallel quartz vein. Sulphides absent. non-magnetic.
255.75	256.10		M8 (QMNZ); CIS **Sheared Monzonite 20°; Sheared** Moderately-strongly sheared QMNZ with attenuated quartz grains, wispy sericite and shear-parallel quartz veining. Rare, fg disseminated specks of pyrite. Core fractured and feagmented due to silicic alteration.
	255.75	256.10	Ser05; Sil10; Chl05; Car03 **Sericitization 5; Silicification 10; Chloritization 5; Carbonatization 3** Weakly silicified, carbonatized and sericitized sheared QMNZ with attenuated chlorite grains, pos altered from precusor biotite.
	255.86	255.87	VEI;0.01;Qz Cl Cb;T;10°;; **Vein 0.01 Quartz Chlorite Carbonate Tension 10°** Light grey quartz vein with patchy vein margin chlorite and weak carbonate alteration. Vein hosted within weakly silicified sheared QMNZ. Sulphides absent. Non-magnetic.

Description

256.10 278.30 QMNZ
Quartz Monzonite
Continuation of light grey, coarse grained, non-magnetic, unfoliated QMNZ with sporadic chlorite clots. Zone of moderate shearing between 264.97-265.35m derfined by wispy sericite bands and attenuated quartz grains. Sulphides absent and no aplite dykes / felsic xenoliths. Sulphides absent with exception of sheared zone, which hosts fine grained, rare specks of disseminated pyrite.

256.10 311.00 Car03; Chl10
Carbonatization 3; Chloritization 10
Relatively unaltered QMNZ with exception of weakly potassic/haematite altered aplite dyke @ 278.30m. Some wispy sericite alteration associated with moderately sheared QMNZ @ 264.96m. Gradational change into underlying alteration style.

264.96 265.35 CIS70
Sheared70 75°
Moderate-strongly sheared QMNZ defined by attenuated quartz grains, grain size reduction and serecite-chlorite bands. Upper and lower contacts sharply defined @ 75 deg tca. Rare specks of fg disseminated pyrite. Non-magnetic.

278.30 278.86 I1F
Aplite 75°
Fine grained, pink-grey potassic altered, non-magnetic aplite dyke with sharply defined contacts at 70-80 deg tca. Sulphides absent.

278.86 318.00 QMNZ
Quartz Monzonite
Continuation of light grey, unfoliated, unsheared, relatively homogenous and unaltered, coarse grained QMNZ with sporadic <15cm wide felsic xenoliths / light grey-beige aplite dykes at <70 deg tca and sporadic chlorite clots. Sulphides absent. Non-magnetic. Slight oncrease in pink potassic/haematite alteration below 311.00m
EOH at 318.00m

311.00 318.00 Chl10; Hem03; Pot08
Chloritization 10; Hematization 3; Potassic 8
Gradational change into weakly potassic/haematite altered QMNZ with pink-grey discolouration to QMNZ. Chloritization alteration throughout.

Northern Superior Resources Inc.

DDH: **TPK-17-011**

Claims title:		Section:	5812250
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	08/12/2010	Description date:	06/08/2017
End date:	12/12/2010	Author:	Jon O'Callaghan

Collar

Azimuth: 360.00°
Dip: -70.00°
Length: 234.00

UTM NAD83

East	441280.0
North	5812250.0
Elevation	250.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	30.00	356.20°	-72.50°	No
Reflex	60.00	358.90°	-72.60°	No
Reflex	90.00	354.30°	72.40°	No
Reflex	120.00	359.80°	-72.40°	No
Reflex	150.00	0.00°	-72.40°	No
Reflex	180.00	1.50°	-72.40°	No
Reflex	210.00	3.20°	-72.40°	No

Type	Depth	Azimuth	Dip	Invalid

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Historic Rainy River core originally logged by Sarah Miller. Relogged by NSR geologist, Jon O'Callaghan with the intention of better defining the structures controlling auiferous zones at the target 3 area.

Core size: BQ core Cemented: No Stored: Yes

Description			
0.00	10.30		CSG **Casing** Overburden. No core recovered.
10.30	43.43		QMNZ **Quartz Monzonite** Pink-grey, moderately potassic/haematire altered, relatively homogenous, coarse grained QMNZ with patchy, weak magnetism, associated with 'light grey' less potassic altered zones. Intermittent zones of weak shearing defined by wispy sericite. Shearing <5cm wide. Sporadic, <5mm wide veinlets of chlorite At <70 deg tca. Rare specks of fg, disseminated pyrite within QMNZ groundmass.
	10.30	43.43	Pot10; Hem05; Chl10 **Potassic 10; Hematization 5; Chloritization 10** Weakly potassic/haematite altered QMNZ with patchy chloritization of precusor biotites.
43.43	44.99		M8 (QMNZ); CIS **Sheared Monzonite 30°; Sheared** Medium grey, weak-moderately magnetic, moderately sheared QMNZ defined by wispy bands of sericite and chlorite. Trace specks of fg, disseminated arsenopyrite. Upper contact is gradational, lower contact is sharp @ 30 deg tca.
	43.43	44.99	Chl10; Ser15; Sil15 **Chloritization 10; Sericitization 15; Silicification 15** Moderartely silicified, sheared QMNZ with wispy sericite chlorite bands defining shearing @ 30 deg tca.
	43.43	44.99	CIS30 **Sheared30 25°** Weakly-moderately sheared QMNZ defined by aligned biotite and wispy sereicite @ 25 deg tca.
44.99	66.28		QMNZ **Quartz Monzonite** Continuation of light-grey coloured, weakly magnetic, coarse grained, unfoliated and unsheared QMNZ with moderate, patchy, pink-potassic alteration. Between 51.68-51.77m thin, strongly sheared, strongly magnetic, medium-dark grey M8 (QMNZ) with shear-parallel, boudinaged/discontinuous grey-transluscent vein hosting ~30-40 vol.$% pyrite and 3 vol.% Sharply defined upper and lower contacts @ 30 deg tca. 22cm wide shear zone at 53.08-53.30m with similar dark grey colouration, grain size reduction and increased sericite/chlorite content. Cross cut by <2cm wide quartz-carbonate-tourmaline vein with rare specks of disseminated pyrite and chalcopyrite. Similar, thin, dark grey, sericite-chlorite banded, weakly-non magnetic shear zones @ 57.70-58.08 and 60.90-61.28m, hosting trace, fg, disseminated specks of pyrite.
	44.99	66.28	Pot10; Hem05; Chl10 **Potassic 10; Hematization 5; Chloritization 10** Continuation of weakly potassic/haematite altered QMNZ with patchy chloritization of precusor biotites.
	49.32	50.40	STW;15%;Qz Sr Cl Cb;T;60°;Py00.5; **Stockwork 15% Quartz Sericite Chlorite Carbonate Tension 60° Pyrite 0.5%** Series of regularly spaced, undulose, hairline-width quartz-chlorite-sericite-carbonate stringers @ 60 deg tca, hosting rare, vfg disseminated pyrite/arsenopyrite. Non-magnetic.
	51.68	51.77	CIS70

		Description
		Sheared70 30°
		Strongly sheared interval of strongly magnetic QMNZ hosting blebs of pyrite. Shearing defined by grain size reduction and chlorite bands @ 30 deg tca.
51.69	51.71	VEI;0.01;Cl Qz Cb;T;30°;Py20 As02;
		Vein 0.01 Chlorite Quartz Carbonate Tension 30° Pyrite 20% Arsenopyrite 2%
		Grey-transluscent quartz (with v minor carbonate) vein within strong sheared, chlorite-bearing QMNZ. Vein hosts inter-connected blebs of anhedral pyrite and arseopyrite. Strongly magnetic.
53.08	53.30	CIS50
		Sheared50 30°
		Moderately sheared, weakly magnetic QMNZ defined by grain size reduction, aligned biotites and wispy chlorite @ 30 deg tca.
53.15	53.17	VEI;0.02;Cb Qz Tl;T;40°;As00.05 Mt00.05;
		Vein 0.02 Carbonate Quartz Tourmaline Tension 40° Arsenopyrite 0.05% Magnetite 0.05%
		Grey-transluscent quartz-carbonate vein with black, subhedral tourmaline and very rare, vfg specks of magnetite (strong response) and arsenopyrite. Vein hosted within moderate-strongly sheared QMNZ.
57.70	58.08	CIS20
		Sheared20 25°
		Weakly sheared QMNZ with patchy magnetism. Shearing defined by aligned biotites and wispy sericite @ 25 eg tca.
60.90	61.28	CIS35
		Sheared35 20°
		Weak-moderately sheared QMNZ with patchy magnetism. Shearing defined by wispy sericite-chlorite and aligned biotites.
66.28	70.14	M8 (QMNZ); CIS
		Sheared Monzonite 40°; Sheared
		Moderate-strongly sheared, weakly magnetic, medium-light grey, medium grained QMNZ with zones of garin-size reduction, pervasive silicic and wispy sericite-chlorite alteration. Interval cross cut by several quartz-chlorite veins hosting blebs and stringers of pyrite-arsenopyrite (upto ~20 vol.% in veins). Rare blebs of pink-grey coloured, strongly magnetic sulphide (pyrrhotite?). Veining is parallel to shearing @ 40 deg tca, with diffuse contacts into M8 (QMNZ).
66.28	70.14	Sil25; Ser20
		Silicification 25; Sericitization 20
		Strongly silicic altered sheared QMNZ with wispy sericite bands throughout. Alteration overprints precusor textures.
66.28	70.14	CIS30
		Sheared30 40°
		Weak-moderately sheared QMNZ with gradational upper contact, increasing intensity of shearing downhole and sharp lower contact. with unsheared QMNZ. Patxchy magnetism. Shearing defined by wispy sericite, chlorite and aligned biotites. Pervasive weak silicic alteration throughout.
67.14	67.19	VEI;0.05;Qz Sr;T;80°;;
		Vein 0.05 Quartz Sericite Tension 80°
		Milky-white quartz vein with sereicite. Sulphides absent. Non-magnetic.
68.65	68.73	VEI;0.08;Sr Qz Cl;T;60°;Po03 Py00.5;

Description

Vein 0.08 Sericite Quartz Chlorite Tension 60° Pyrrhotite 3% Pyrite 0.5%
Milky-white quartz-carbonate vein with patchy chlorite alteration, vfg disseminated specks of pyrite and blebs of anhedral, pink-grey, strongly magnetic sulphide (pyrrhotite).

70.14 71.48 QMNZ
Quartz Monzonite
Continuation of pink-grey, weakly magnetic, unfoliated, unsheared, coarse-grained QMNZ hosting sporadic, hairline veinlets quartz-chlorite @ ~80 deg tca. Sulphides absent.

70.14 71.48 Pot10; Hem05; Chl10; Ser05
Potassic 10; Hematization 5; Chloritization 10; Sericitization 5
Continuation of weakly potassic/haematite altered QMNZ with patchy chloritization of precusor biotites. Sporadic, hairline width bands of sericite.

71.48 72.53 M8 (QMNZ); CIS
Sheared Monzonite 30°; Sheared
Medium grey, moderate-strongly sheared QMNZ with patchy magnetism and bands of sericite-chlorite. Rare specks and hairline stringers of pyrite. Rare specks of fine grained, partially resorbed garnet (garnet appears restricted to sheared zones). Diffuse upper contact, sharp lower contact with unsheared QMNZ.

71.48 72.53 Ser15; Chl05; Sil05
Sericitization 15; Chloritization 5; Silicification 5
Sheared QMNZ defined by wispy sericite-chlorite band with weak, diffuse silicic alteration.

71.48 72.53 CIS60
Sheared60 40°
Moderately sheared QMNZ with pervasive weak silicic alteration. Shearing defined by wispy sericite alteration. Rare, vfg specks of red garnet throughout sheared interval. Patchy magnetism.

72.53 95.40 QMNZ
Quartz Monzonite
Continuation of relatively homogenous, pink-potassic/haematite altered, coarse-grained, unsheared, unfoliated QMNZ with patchy zones of weak magnetism are very rare, vfg specks of disseminated pyrite. Between 85.35-85.45m is zone of sharply defined, moderate shearing with attenuated quartz 'augen' and wispy sericite-chlorite bands plus very rare specks of vfg disseminated pyrite. Between 86.70-89.50 are series of regular spaced, hairline veinlets of quartz-chlorite @ 50-70 deg tca. Very rare, fine grained specks of disseminated pyrite.

72.53 95.40 Pot10; Hem05; Chl10
Potassic 10; Hematization 5; Chloritization 10
Weakly potassic/haematite altered, unsheared QMNZ with patchy chlorite alteration of biotites.

85.35 85.45 CIS30
Sheared30 30°
Moderately sheared QMNZ defined by attenuated quartz grains with wispy sericite-chlorite @ 30 deg tca.

95.40 97.16 M8 (QMNZ); CIS
Sheared Monzonite 45°; Sheared
Moderately sheared, non-magnetic, moderately silicic altered QMNZ with wispy sericite throughout. Several laminated, shear-paralell

Description

quartz-chlorite veins. Rare, fine grained specks of disseminated arsenopyrite and pyrite. Diffuse upper contact. Sharp lower contact with unsheared QMNZ, marked by 10cm wide laminated quartz-chlorite vein.

95.40 97.16 Chl15; Ser10; Sil10
Chloritization 15; Sericitization 10; Silicification 10
Moderately silicic altered, sheared QMNZ with bands of serecite and chlorite alteration and vein-margin chlorite associated with cross cutting quartz veinlets.

95.40 97.16 CIS30
Sheared30 35°
Weakly-moderately sheared QMNZ defined by attenuaed quartz grains and wispy sericite-chlorite. Quartz-chlorite vein parallel to shearing @ 96.64m. Non-magnetic.

96.65 96.76 VEI;0.11;Cl Qz;T;40°;Py02;
Vein 0.11 Chlorite Quartz Tension 40° Pyrite 2%
Grey-transluscent quartz vein with wispy chlorite hosting fg disseminated specks of pyrite/arsenopyrite. Non-magnetic.

97.16 102.96 QMNZ
Quartz Monzonite
Continuation of pink-ish grey, coarse grained, weakly magnetic, unsheared, unfoliated QMNZ, cross cut by sporadic, hairline-1cm wide quartz-chlorite veinlets/stringers hosting specks-blebs of anhedral, disseminated pyrite/arsenopyrite, with weak magnetic response. Veinlets predominantly @ 60-80 deg tca.

97.16 102.96 Pot10; Hem05; Chl10
Potassic 10; Hematization 5; Chloritization 10
Continuation of weakly potassic/haematite altered QMNZ with patchy chloritization of precusor biotites.

102.96 104.94 M8 (QMNZ); CIS
Sheared Monzonite 50°; Sheared
Strongly sheared, non-magnetic QMNZ with pervasive silicic and sericite alteration throughout, with rare, vfg disseminated specks of pyrite and arsenopyrite. Sharp upper and lower contacts wth unsheared QMNZ. Between 103.37-103.86m is sheared, grey-transluscent quartz-chlorite vein with sericite bands. Contacts parallel to shearing @ ~40 deg tca. Rare specks of vfg disseminated pyrite.

102.96 104.94 Chl15; Ser15; Sil25
Chloritization 15; Sericitization 15; Silicification 25
Strongly sheared QMNZ with pervasive, strong silicic alteration and wispy sericite-chlorite bands. Alteration overprints precusor textures.

102.96 104.94 CIS80
Sheared80 35°
Strongly sheared interval of non-magnertic QMNZ with pervasive silicic and wispy sericite throughout. Cross cut by ~60cm wide shear parallel quartz-carbonate-chlorite vein @ 103.37m.

103.37 103.86 VEI;0.66;Qz Sr Cl Cb;T;40°;Py01 As00.5;
Vein 0.66 Quartz Sericite Chlorite Carbonate Tension 40° Pyrite 1% Arsenopyrite 0.5%
Milky-grey quartz vein with wispy sericite and patchy chlorite-carbonate, hosting rare, fg disseminated specks of pyrite-arsenopyrite. Vein is fractured and hosting within strongly sheared QMNZ. Non-magnetic.

104.94 153.74 QMNZ

Description
Quartz Monzonite
Pink-potassic/haematite altered, coarse grained, relatively homogenous, non-magnetic QMNZ with rare, vfg disseminated specks of pyrite. Between ~108-114.50m are a series of regularly spaced, hairline to cm wide quartz-chlorite-actinolite veins with associated, fine grained, disseminated specks pyrite. Veinlets orientated @ approximately 40 deg tca.
104.94 153.74 Pot10; Hem05; Chl10
Potassic 10; Hematization 5; Chloritization 10
Continuation of weakly potassic/haematite altered, unsheared QMNZ with patchy chloritization of precusor biotites.
107.90 113.00 STR;5%;Cb Ac Cl Qz;T;75°;Py00.5;
Stringers 5% Carbonate Actinolite Chlorite Quartz Tension 75° Pyrite 0.5%
Series of regularly spaced quartz carbonate veinlets with vein margin chlorite-actinolite, hosted within unsheared QMNZ. The veinlets host rare, fg specks of pyrite, with exception of veinlet @ 111.20m, which hosts Upto 5 vol.% pyrite as blebs. Non-magnetic.
153.74 155.40 I1F
Aplite 70°
Fine grained, homogenous, pink-potassic/haematite altered, weak-patchy magnetic aplite intrusion with harply defined contacts @ 70 deg tca. Hosting trace, fine grained disseminated specks of pyrite. Hangingwall contact marked by milky-grey quartz-feldspar-chlorite vein 28cm wide with rare specks of red garnet.
153.74 155.40 Pot15; Hem05
Potassic 15; Hematization 5
Weakly altered aplite dyke with diffuse potassic/haematite throughout.
153.74 154.04 VEI;0.3;Qz Pg Cl;T;30°;Py00.05;
Vein 0.3 Quartz Plagioclase Chlorite Tension 30° Pyrite 0.05%
Grey-transluscent quartz vein with patchy chlorite and potassic altered feldspar. Rare, vfg disseminated pyrite. Vein situated on hangingwall contact between QMNZ and aplite dyke. Non-magnetic.
155.40 199.28 QMNZ
Quartz Monzonite
Continuation of coarse grained, relatively homogenous, non-magnetic, pink-grey potassic-haematite altered QMNZ with rare specks of fg pyrite disseminated in the groundmass. Sporadic, <10cm wide zones of weak-moderate shearing defined by wispy chlorite-serecite (e.g. @ 195.67m)
155.40 199.25 Hem05; Pot10; Chl10
Hematization 5; Potassic 10; Chloritization 10
Continuation of weakly potassic/haematite altered, unsheared QMNZ with patchy chloritization of precusor biotites.
159.90 159.96 CIS40
Sheared40 40°
Moderately sheared, strongly silicified QMNZ. Sulphides absent. Non-magnetic.
195.67 195.84 CIS60
Sheared60 10°
3cm wide zone of moderate-strongly sheared QMNZ with attenuated quartz grains and wispy sericite bands @ 10 deg tca.. Sulphides absent. Non-magnetic.

Description
199.25 200.10 Pot15; Hem10
Potassic 15; Hematization 10
Weakly altered aplite intrusion with diffuse potassic/haematite alteration.
199.28 200.60 I1F
Aplite 80°
Fine grained, homogenous, pink-potassic/haematite altered, weak-patchy magnetic aplite intrusion with harply defined contacts @ 70 deg tca. Hosting trace, fine grained disseminated specks of pyrite.
200.10 206.75 Pot05; Hem03; Chl10
Potassic 5; Hematization 3; Chloritization 10
Relatively unaltered, coarse grained QMNZ. Patchy chlorite alteration of precusor biotites.
200.60 206.75 QMNZ
Quartz Monzonite
Light grey, coarse grained, non-magnetic QMNZ with zons of sporadic, weak shearing and quartz-chlorite-epidote veining.
206.75 207.62 I2D
Diorite 40°
Medium grained, brown-grey coloured, non-magnetic diorite intrusion in hangingwall of metavolcanic sequence. Sharply defined contacts @ 80 deg tca.
206.75 219.50 Car05; Chl15
Carbonatization 5; Chloritization 15
Weakly altered diorite-metavolcanic sequence. Diffuse chlorite and carbonate alteration throughout, latter associated with stockwork of quartz-carbonate veinlets.
207.62 219.50 V3
Mafic volcanic 40°
Dark grey, medium-fine grained, dark grey-green, relatively homogenous, non-magnetic mafic volcanic (pos vfg doirite?). Sharp contacts of discoloured brown-grey diorite with assimilated clasts of QMNZ. Sulphides absent.
208.60 216.90 STW;10%;Cb Qz;T;30°;;
Stockwork 10% Carbonate Quartz Tension 30°
<1mm wide series of white quartz-carbonate veinlets at various angles tca. Sulphides absent. Non-magnetic. Hosted entirely within metavolcanic sequence.
219.50 234.00 QMNZ
Quartz Monzonite
Continuation of pink-grey potassic altered, coarse grained, non-magnetic QMNZ. Sulphides absent.
EOH @ 234.00m
219.50 234.00 Pot10; Hem05; Chl10
Potassic 10; Hematization 5; Chloritization 10
Continuation of weakly potassic/haematite altered, unsheared QMNZ with patchy chloritization of precusor biotites.
223.15 223.17 VEI;0.02;Qz Cl Sr;T;70°;;
Vein 0.02 Quartz Chlorite Sericite Tension 70°

Description
Grey-transluscent quartz vein with bands of wispy vein-margin sericite and chlorite. Sulphides absent. Non-magnetic.

Northern Superior Resources Inc.

Claims title:		Section:	5813531
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	19/01/2011	Description date:	05/08/2017
End date:	29/01/2011	Author:	Jon O'Callaghan

DDH: TPK-17-013

Collar

Azimuth: 180.00°
Dip: -50.00°
Length: 284.00

UTM NAD83

East	442323.0
North	5813531.0
Elevation	247.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	32.00	182.30°	-50.70°	No
Reflex	62.00	180.70°	-50.70°	No
Reflex	92.00	186.10°	-52.10°	No
Reflex	122.00	187.80°	-52.00°	No
Reflex	142.00	189.10°	-51.90°	No
Reflex	172.00	190.30°	-52.00°	No
Reflex	192.00	192.80°	-51.20°	No

Type	Depth	Azimuth	Dip	Invalid
Reflex	222.00	191.70°	-50.20°	No
Reflex	251.00	195.80°	-50.60°	No
Reflex	284.00	189.60°	-50.20°	No

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Relog of Rainy River core. Originally logged by Sarah Miller, relogged by NSR geologist Jon O'Callaghan with the intention of better defining the structures controlling auiferous zones at the target 3 area.

Core size: BQ core — Cemented: No — Stored: Yes

Description

0.00 6.65 CSG
Casing
Overburden. No core recovered.

6.65 11.75 QMNZ
Quartz Monzonite
Unsheared, unfoliated, relatively unaltered, light grey, coarse grained, non-magnetic QMNZ with rare specks of fine grained, disseminated pyrite. Patchy chloritization throughout. Some clay coatings on open fractures.

6.65 150.61 Chl10; Ser03
Chloritization 10; Sericitization 3
Weakly altered, coarse grained QMNZ with patchy chloritization throughout and wispy sericite alteration associated with intermittent, thin zones of shearing. Potassic alteration and haematite staining are absent. No alteration associated with cross cutting aplite dykes.

11.75 12.68 M8 (QMNZ); CIS
Sheared Monzonite 70°; Sheared
Moderately sheared, light to medium grey QMNZ with attenuated quartz and wispy sericite-chlorote. Rare, very fine grained specks of disseminated pyrite. Non-magnetic. Sharp upper contact @ 80 deg tca, gradational lower contact. Shear fabric @ 70 deg tca.

11.75 12.68 CIS40
Sheared40 65°
Moderately sheared QMNZ defined by attenuated quartz grains and wispy chlorite-sericite @ 65-70 deg tca. Upper contact of sheared QMNZ is sharply defined, lower contact is gradational. Non-magnetic.

12.68 21.02 QMNZ
Quartz Monzonite
Continuation of unfoliated, unsheared and relatively fresh, light grey, weakly chloritized, non-magnetic, coarse grained QMNZ with trace fine grained disseminated specks of pyrite associated with patchy chlorite alteration. Interval is cross cut by two, fine grained, light grey aplite dykes @ 18.00 (10cm wide) and 18.28m (6cm wide). Sharp contacts with aplite dykes at 60 deg tca.

21.00 21.35 CIS50
Sheared50 25°
Moderately sheared QMNZ with associated undulose, boudinaged quartz vein. Shearing defined by attenuated quartz grains and wispy sericite-chlorite.

21.02 21.38 M8 (QMNZ); CIS
Sheared Monzonite 15°; Sheared
Moderately sheared, medium grey, fine grained QMNZ with associated, deformed quartz veining and wispy sericite-chlorite. Rare, fine grained, disseminated pyrite specks within sheared groundmass. Sharp upper and lower contacts @ 15 deg tca. Non-magnetic.

21.15 21.17 VEI;0.02;Qz Cl Sr;T;30°;Py00.05;
Vein 0.02 Quartz Chlorite Sericite Tension 30° Pyrite 0.05%
Boudinaged and undulose, grey-transluscent quartz vein with wispy stringers of serecite and chlorite, hosting very fine grained, disseminated specks of pyrite. Vein hosted within thin zone of moderate shearing. Non-magnetic.

21.38 54.39 QMNZ
Quartz Monzonite

Description

Light grey, unfoliated and relatively fresh, homogenous, coarse grained, non-magnetic QMNZ with patchy chlorite alteration throughout. Rare specks of fine grained, disseminated pyrite. Intermittent, discontinuous zones of thin, weak shearing. Sporadic, <10cm wide, light grey, fine grained aplite dykes (e.g., @ 96.02m) @ ~90 deg tca. Interval cross cut by intermittent, <5cm wide, grey-transluscent quartz veins at <45 deg tca e.g. @ 44.15m).

35.10 35.30 CIS20
Sheared20 40°
Weakly to moderately shared interval of QMNZ defined by wispy sericite-chlorite with sharp contacts to adjacent, unsheared QMNZ.

41.20 41.33 VEI;0.02;Qz Cl;T;15°;Py00.5;
Vein 0.02 Quartz Chlorite Tension 15° Pyrite 0.5%
Grey-transluscent quartz vein with wispy stringers of vein-margin chlorite. Rare blebs of fine graine pyrite hosted within the quartz. Non-magnetic.

44.18 44.38 VEI;0.22;Qz Pg Cl;T;55°;;
Vein 0.22 Quartz Plagioclase Chlorite Tension 55°
Fine graine breccia, with quartz matrix hosting angular fragments of quartz-feldspar and blebs of chlorite. Sulphides absent. Non-magnetic. Sharp contacts with adjacent QMNZ.

54.39 55.11 M8 (QMNZ); CIS
Sheared Monzonite 75°; Sheared
Moderately sheared, medium grey QMNZ with associated wispy chlorite-sericite and attenuated quartz grains. Sharp upper and lower contacts with unsheared QMNZ. Non-magnetic. Fine grained, disseminated specks of pyrite.

54.39 55.11 CIS70
Sheared70 70°
Moderately sheared QMNZ defined by attenuated quartz grains and wispy bands of sericite-chlorite. Sharp upper and lower contacts with unsheared QMNZ.

55.11 150.61 QMNZ
Quartz Monzonite
Light grey, unfoliated and relatively fresh, homogenous, coarse grained, non-magnetic QMNZ with patchy chlorite alteration throughout. Rare specks of fine grained, disseminated pyrite. Intermittent, discontinuous zones of thin, weak shearing. Sporadic, <10cm wide, light grey, fine grained aplite dykes (e.g., @ 96.02m) @ ~90 deg tca. Sporadic, <5cm wide, fine grained, light grey, non-magnetic aplite dykes @ ~ 90-80 deg tca (e.g., @ 96.10m).

66.54 66.70 CIS50
Sheared50 80°
Moderately sheared QMNZ defined by attenuated quartz grains and wispy bands of sericite-chlorite. Sharp upper and lower contacts with unsheared QMNZ.

98.05 98.19 VEI;0.14;Qz;T;45°;;
Vein 0.14 Quartz Tension 45°
Grey-transluscent quartz vein. Sulphides absent. Non-magnetic.

99.30 99.85 CIS20
Sheared20 60°

Description		
		Weakly sheared QMNZ defined by wispy sereicite-chlorite. Cross cut by undulose quartz vein. Upper and lower contacts with unsheared QMNZ are gradational.
99.45	99.55	VEI;0.1;Qz;T;40°;Py00.05;
		Vein 0.1 Quartz Tension 40° Pyrite 0.05%
		Grey-transluscent quartz vein with wispy chlorite stringers hosting very fine grained specks of disseminated pyrite. Weak shearing in adjacent QMNZ. Non-magnetic.
134.20	135.94	CIS20
		Sheared20 50°
		Weakly sheared QMNZ with gradational contacts into adjacent, unsheared QMNZ. Shearing defined by undulose bands of wispy chlorite-sericite and occasional, attenuated quartz grains. Rare, fine grained, disseminated specks of pyrite. Non-magnetic.
150.61	151.02	I1F
		Aplite 60°
		Pinkish-grey, fine grained, non-magnetic aplite dyke with sharp contacts with adjacent QMNZ. Patchy chlorite alteration. Sulphides absent.
150.61	182.30	Pot40; Hem20; Chl10
		Potassic 40; Hematization 20; Chloritization 10
		Strong pervasive potassic alteration and associated haematite staining, with patchy chlorite. Alteration appears to be strongly associated with prescense of cross cutting aplite dykes. Alteration strong enough it obscures protolith features in places.
151.02	163.80	QMNZ
		Quartz Monzonite
		Continuation of unfoliated, unsheared coarse grained, non-magnetic QMNZ, with trace pink-potassic alteration and patchy chlorite alteratio throughout.
163.80	165.20	M8 (QMNZ); CIS
		Sheared Monzonite 40°; Sheared
		Strongly sheared, strongly potassic altered QMNZ with attenuated quartz/feldspar grains and pink haematite staining. Sharp upper contact with unsheared, relatively unaltered QMNZ. Sulphides absent. Non-magnetic. Between 155.05-155.19m is entrained xenolith of finely banded mafic material hosting 2 vol.% pyrite as discontinuous stringers. Non-magnetic. Sharp contacts with QMNZ @ 60 deg tca.
163.87	164.14	CIS70
		Sheared70 60°
		Strongly sheared to protomylonite with attenuated quartz-feldspar grains and wispy chlorite. Pink potassic alteration/haematite staining throughout.
164.00	164.04	VEI;0.03;Qz Mv Cl;T;45°;;
		Vein 0.03 Quartz Muscovite Chlorite Tension 45°
		Milky-grey quartz vein with wispy stringers of chlorite-muscovite and vein-margin chlorite. Sulphides absent. Non-magnetic.
165.20	168.40	I1F
		Aplite 60°
		Medium grained, strongly altered and partially brecciated aplite dyke with sharp contacts @ 60 deg tca. Intense, pink potassic and haematite alteration throughout. Some core-loss due to grinding by drill. Sulphides absent. Non-magnetic.
168.40	172.75	QMNZ

		Description
		Quartz Monzonite Weakly to unsheared, coarse grained QMNZ with sporadic patches of intense pink potassic-haematite alteration. Chlorite alteration throughout. Sulphides absent. Non-magnetic.
172.75	173.90	I1F **Aplite 20°** Medium-fine grained, non-magnetic, strongly pottasic-haematite altered, patchy chlorite altered, pink-coloured aplite dyke with sharp contacts @ 20 deg tca. Sulphides absent. Unsheared/unfoliated.
173.90	174.50	QMNZ **Quartz Monzonite** Unsheared, unfoliated, potassic-haematite -chlorite-altered, coarse grained, non-magnetic QMNZ with pinkish-grey colouration. Sulphides absent.
174.50	175.56	I1F **Aplite 20°** Medium-fine grained, non-magnetic, strongly pottasic-haematite altered, patchy chlorite altered, pink-coloured aplite dyke with sharp contacts @ 20 deg tca. Sulphides absent. Unsheared/unfoliated.
175.56	187.10	QMNZ **Quartz Monzonite** Unsheared, unfoliated, coarse grained, non-magnetic QMNZ exhbiting moderate pink-potassic-haematite, light-green-saussaurite and dark green-chlorite alteration. Rare, very fine grained, disseminated specks of pyrite within groundmass. Increased silicic alteration towards underlying shear zone. 15cm wide, pink, potassic altered aplite dyke @ 185.70m, with sharp contacts @ 50 deg tca. No associated sulphide.
182.30	187.10	Pot05; Ser10; Sil05; Sau05; Chl10 **Potassic 5; Sericitization 10; Silicification 5; Saussauritization 5; Chloritization 10** Partially silicified QMNZ with wispy serecite alteration and patchy dark grey chlorite and light grey-green saussaurite alteration. Weak potassic alteration associated with in aplite dyke @ 185.76m.
182.60	183.20	STR;5%;Cl Cb Qz;T;15°;Py00.5; **Stringers 5% Chlorite Carbonate Quartz Tension 15° Pyrite 0.5%** 1-2mm wide stringers of quartz-carbonate with vein margin chlorite hosting rare, fine grained specks of disseminated pyrite. Stringers cut through altered, silicified but unshear QMNZ.
187.10	193.60	M8 (QMNZ); CIS **Sheared Monzonite 45°; Sheared** Strongly sheared to proto-mylonitic QMNZ with pervasive silicic alteration and wispy serecite alteration throughout, overprinting protlith textures. Potassic and chloritic alteration absent. The silicic alteration has made the rock brittle, resulting in numerous fractures and fragmented core. Fragmentation post-dates shearing and mineralization. Interval cross-cut by numerous, milky-white-grey coloured quartz vein. Historic logs indicate this is a gold-bearing interval. Fine grained specks, blebs and stringers of pyrite throughout groundmass of shear zone. No VG observed. Non-magnetic. Sharp upper and lower contacts at ~45 deg tca.
187.10	193.90	Ser30; Sil40 **Sericitization 30; Silicification 40** Strongly sheared QMNZ with strong, pervasive silicic alteration and wispy serecite bands throughout, overprinting protolith textures.

Description		
187.10	193.60	CIS90 **Sheared90 50°** Strongly sheared to proto-mylonitic zone that overprints protolith texture. Shearing defined by wispy serecite bands.
187.14	187.50	VEI;0.38;Qz Sr Cl Ac;T;60°;Py00.5 As00.5; **Vein 0.38 Quartz Sericite Chlorite Actinolite Tension 60° Pyrite 0.5% Arsenopyrite 0.5%** Laminated, milky-grey quartz vein with wispy stringers of chlorite-actinolite-sericite. Rare, very fine grained specks of pyrite and arsenopyrite.
187.67	187.71	VEI;0.03;Ac Qz Cl;T;60°;As00.5 Py00.5; **Vein 0.03 Actinolite Quartz Chlorite Tension 60° Arsenopyrite 0.5% Pyrite 0.5%** Milky-grey quartz vein with actinolite specks and chlorite stringers hosting fine grained, disseminated pyrite and pos. arsenopyrite.
189.00	189.30	VEI;0.3;Cl Ac Qz Sr;T;30°;Py00.5 As00.05; **Vein 0.3 Chlorite Actinolite Quartz Sericite Tension 30° Pyrite 0.5% Arsenopyrite 0.05%** Milky white quartz vein with stringers of chlorite-actinolite-sericite hosting vfg specks of disseminated pyrite and pos arsenopyrite.
189.54	189.59	VEI;0.04;Sr Qz Cl;T;60°;Py01; **Vein 0.04 Sericite Quartz Chlorite Tension 60° Pyrite 1%** Grey-transluscent quartz vein with wispy stringers and patchy chlorite-actinolite hosting fg specks of pyrite.
189.80	189.92	VEI;0.12;Cl Qz Ac;T;60°;Py00.05; **Vein 0.12 Chlorite Quartz Actinolite Tension 60° Pyrite 0.05%** Grey-transluscent quartz vein with wispy stringers and patchy chlorite-actinolite hosting fg specks of pyrite.
191.58	193.33	VEI;1.75;Qz Sr Cl;T;40°;Py00.5; **Vein 1.75 Quartz Sericite Chlorite Tension 40° Pyrite 0.5%** Milky-grey quartz vein with numerous bands of serecite creating a 'schistose' appearance. Patchy specks and blebs of chlorite throughout and inclusions of M8 (QMNZ) up to 10cm in size (or numerous veins with interstitial zones of M8(QMNZ)). Trace specks of fine grained disseminated pyrite throughout. No VG observed. Non-magnetic.
193.60	200.10	M8 (QMNZ); CIS **Sheared Monzonite 40°; Sheared** Moderate-strongly sheared QMNZ with bands of wispy sericite-chlorite and attenuated quartz-feldspar grains. Weak potassic alteration and patchy chlorite alteration throughout. Silicic alteration absent. Rare, fine grained specks of disseminated pyrite throughout groundass. Non-magnetic.
193.60	200.10	CIS70 **Sheared70 45°** Strongly sheared QMNZ. Shearing defined bands of wispy serecite-chlorite and attenuated quartz grains.
193.90	200.10	Sil05; Ser15; Chl20 **Silicification 5; Sericitization 15; Chloritization 20** Strong-moderately sheared QMNZ with bands of wispy chlorite-sericite and weak, pervasive silicic alteration.
196.11	196.36	VEI;0.01;Pg Qz;T;5°;; **Vein 0.01 Plagioclase Quartz Tension 5°** Undulose grey-transluscent quartz vein with minor, pink potassic altered feldspar. Sulphides absent. Non-magnetic.

Description

200.10 244.00 QMNZ; I1F
Quartz Monzonite; Aplite
Coarse grained, non-magnetic, unsheared, unfoliated, relatively homogenous QMNZ with weak potassic alteration and patchy chlorite alteration. Rare, fine grained, disseminated pyrite specks disseminated throughout interval. Intermittent zones of weak-moderate shearing <30cm wide defined by wispy sericite-chlorite bands and attenuated quartz grains. Between 227.94-230.48m are a series of <11cm wide, fine grained, pinkish-grey, relatively unaltered aplite dykes with sharp contacts @ 65 deg tca. No associated alteration or sulphides.
Non-magnetic.

200.10 244.00 Chl10; Pot10; Hem05
Chloritization 10; Potassic 10; Hematization 5
Unsheared/unfoliated, homogenous, relatively homogenous and unaltered QMNZ with zones of weak potassic alteration and haematite staining and patchy chlorite alteration. No association between alteration intensity and proximity to cross cutting aplite dykes around 227-230m.

203.77 204.04 VEI;0.01;Qz Cl Cb Ac;T;5°;;
Vein 0.01 Quartz Chlorite Carbonate Actinolite Tension 5°
<5mm wide, undulose quartz-carbonate veinlet with vein margin chlorite-actinolite. Sulphides absent. Non-magnetic.

205.00 205.30 CIS50
Sheared50 60°
Moderate-strongly sheared QMNZ defined by wispy serecite bands and attenuated quartz grains.

207.60 207.70 CIS40
Sheared40 40°
Moderately sheared QMNZ defined by sericite-chlorite bands.

219.67 219.75 CIS40
Sheared40 30°
Moderately sheared QMNZ defined by chlorite-serecite bands.

228.44 228.46 VEI;0.02;Pg Qz;T;40°;;
Vein 0.02 Plagioclase Quartz Tension 40°
2cm wide, pegmatitic quartz and potassic-altered, pink feldspar vein. Sulphides absent. Non-magnetic.

244.00 245.70 M8 (QMNZ); CIS
Sheared Monzonite 60°; Sheared
Moderately sheared QMNZ with bands of chlorite and serecite, plus attenuated quartz. Hangingwall is sharply defined @ 60 deg tca, footwall is gradational into unsheared QMNZ. Interval is cross cut by several milky-white-grey transluscent quartz-chlorite veins up to 53cm wide.
Very rare, fg disseminated specks of pyrite in groundmass of shear. Non-magnetic.

244.00 245.70 Ser10; Chl15; Pot05
Sericitization 10; Chloritization 15; Potassic 5
Wispy sericite and chlorite bands throughout moderately sheared QMNZ. Weak, dffuse potassic alteration and silicic alteration associated with cross cutting quartz-chlorite veins.

244.00 245.70 CIS40
Sheared40 60°

Description

Moderate-weakly sheared QMNZ defined by wispy bands of sericite and chlorite, plus rare, attenuated quartz grains. Shear zone cross cut by series of quartz-chlorite veinlets.

244.40 244.61 VEI;0.21;Ac Cl Pg Qz;T;60°;;
Vein 0.21 Actinolite Chlorite Plagioclase Quartz Tension 60°
Grey-transluscent quartz vein with pink potassic altered, coarse grains of feldspar and wispy chlorite-actinolite stringers. No visible sulphides. Non-magnetic.

244.86 245.38 VEI;0.51;Pg Qz Cl Ac;T;45°;Py00.05 As00.05;
Vein 0.51 Plagioclase Quartz Chlorite Actinolite Tension 45° Pyrite 0.05% Arsenopyrite 0.05%
Grey-transluscent quartz vein with pink potassic altered, coarse grains of feldspar and patchy chlorite-actinolite stringers. Rare specks of fg, disseminated pyrite and arsenopyrite associated with chlorite. Non-magnetic.

245.64 245.66 VEI;0.02;Qz Pg;T;75°;;
Vein 0.02 Quartz Plagioclase Tension 75°
Coarse grained-pegmatitic quartz-feldspar vein with pink potassic alteration. Sulphides absent. Non-magnetic.

245.70 284.00 QMNZ
Quartz Monzonite
Coarse grained, light grey, relatively homogenous QMNZ with thin zones of weak shearing/foliation <20cm wide. Diffuse zones of weak potassic alteration associated with cross cutting quartz-feldspar veinlets (e.g. @ 273m). Sulphides absent. Non-magnetic.
EOH @ 284m

245.70 284.00 Pot10; Chl10; Hem05
Potassic 10; Chloritization 10; Hematization 5
Relatively unaltered QMNZ with diffuse zones of weak potassic alteration and associated haematite. Alteration associated with series of <cm wide quartz-feldspar veinlets at 273m. Patchy chlorite alteration throughout.

265.25 265.64 STR;20%;Pg Qz;T;;;
Stringers 20% Plagioclase Quartz Tension
Series of <1cm wide quartz veins with patchy feldspar-chlorite. Sulphides absent. Non-magnetic. Strong potassic alteration in adjacent, unsheared QMNZ.

269.62 270.50 STR;30%;Qz Pg Cl;T;40°;;
Stringers 30% Quartz Plagioclase Chlorite Tension 40°
Series of <1cm- 9cm wide quartz-feldspar-chlorite stringers, some exhibiting autobrecciation. Sulphides absent. Non-magnetic. Moderate pink potassic alteration in adjacent unsheared QMNZ.

282.71 282.77 VEI;0.05;Cl Qz;T;90°;Py01;
Vein 0.05 Chlorite Quartz Tension 90° Pyrite 1%
Grey-transluscent quartz vein with wispy chlorite stringers, hosting mm-sized blebs of anhedral pyrite. Non-magnetic.

Northern Superior Resources Inc.

DDH: **TPK-17-014**

Claims title:		Section:	5813531
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	29/01/2011	Description date:	11/08/2017
End date:	02/02/2011	Author:	Jon O'Callaghan

Collar

Azimuth: 180.00°
Dip: -70.00°
Length: 321.00

UTM NAD83

East	442323.0
North	5813531.0
Elevation	247.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	60.00	182.20°	-70.20°	No
Reflex	90.00	183.20°	-69.80°	No
Reflex	120.00	185.40°	-70.30°	No
Reflex	150.00	186.60°	-70.10°	No
Reflex	180.00	187.60°	-69.90°	No
Reflex	210.00	191.10°	-70.20°	No
Reflex	240.00	190.50°	-70.10°	No

Type	Depth	Azimuth	Dip	Invalid
Reflex	270.00	192.90°	-70.00°	No
Reflex	300.00	194.60°	-70.10°	No
Reflex	318.00	194.30°	-69.90°	No

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Originally logged by Rainy River geologist, Sarah Miller. Relogged by NSR geologist, Jon O'Callaghan to better constrain Au-bearing structures identified in TPK-10-004 and TPK-11-013.

Core size: BQ core   Cemented: No   Stored: Yes

Description			
0.00	7.00		CSG **Casing** Overburden, no core recovered.
7.00	14.44		QMNZ **Quartz Monzonite** Light grey, coarse grained, non-magnetic, unfoliated/unsheared, relatively unaltered QMNZ with clots of chlorite alteration (pos xenoliths?) <1x1cm. Sulphides absent. Distinguished from leucogranite by greater biotite/chlorite content.
	7.00	14.44	Chl10 **Chloritization 10** Patchy chloritization of xenolith material (?) and precusor biotites. Relatively unaltered QMNZ.
14.44	14.87		M8 (QMNZ); CIS **Sheared Monzonite 75°; Sheared** Strongly sheared towards proto-mylonitic interval of QMNZ with sharply defined upper and lower contacts @ 75 deg tca. Shearing defined by attenuated quartz grains and wispy sericite/chlorite. Non-magnetic, with rare specks of disseminated pyrite.
	14.44	14.87	Chl05; Ser05; Sil07; Car10 **Chloritization 5; Sericitization 5; Silicification 7; Carbonatization 10** Strongly sheared interval of QMNZ with weak silicic alteration, patcy carbonate and wispy chlorite-sericite.
	14.44	14.87	CIS90 **Sheared90 75°** Strongly sheared-protomylonitic interval of QMNZ. Shearing defined by attenuated quartz grains with wispy sericite and chlorite. Sharply defined upper and lower contacts @ 75 deg tca.
14.87	58.60		QMNZ; I1F **Quartz Monzonite; Aplite 50°** Relatively homogenous, coarse grained, unaltered, unfoliated quartz monzonite with sporadic <5x5cm subrounded xenoliths of chloritized mafic material <1 vol.%. Sporadic, thin zones of weak-moderate shearing < 10cm wide (e.g. @ 55.70m) with shaply defined contacts @ 75 deg tca, shearing defined by wispy sericite-chlorite. Interval also hosts several light grey, fine grained felsic dykes (aplite?) or xenoliths up to 30cm wide (e.g. @ 23.03-23.30m, 50.48-50.58m) with sharply defined contacts @ 50 deg tca. No associated sulphides. Non-magnetic.
	14.87	58.60	Car02; Chl10 **Carbonatization 2; Chloritization 10** Relatively unaltered, homogenous QMNZ with patchy chlorite alteration and weak, diffuse carbonate alteration.
	39.96	39.98	VEI;0.02;Cb Sr Qz Cl;T;40°;Py03; **Vein 0.02 Carbonate Sericite Quartz Chlorite Tension 40° Pyrite 3%** Boudinaged, discontinuous quartz-carbonate vein with vein margin chlorite-sericite defined <1cm wide zone of moderate shearing. Vein hosts rare blebs of anhedral pyrite. Non-magnetic.
	55.70	55.80	CIS50 **Sheared50 70°** Moderately sheared QMNZ defined by wispy chlorite-sericite and attenuated quartz grains. Hosts fine grained, rare disseminated specks of pyrite. Sharply defined upper contact. Gradational lower contact.

Description
58.60 58.72 I1F
Aplite 70°
Thin zone of fine grained, grey-beige, weakly silicic altered aplite in hangingwall of quartz vein-hosting shear zone. Sharply defined contacts @ 70 deg tca. Sulphides absent. Non-magnetic.
58.60 59.20 Chl05; Car05; Sil05
Chloritization 5; Carbonatization 5; Silicification 5
Weakly silicified, sheared QMNZ with associated quartz-chlorite vein. Patchy carbonate alteration.
58.60 59.20 CIS70
Sheared70 35°
Strongly sheared interval of QMNZ. Upper contact marked by aplite dyke and quartz-chlorite vein, lower contact obscured by fractures. Shearing defined by attenuated quartz and garnet (?) grains. Rare, fg, disseminated specks of pyrite.
58.72 59.20 M8 (QMNZ); CIS
Sheared Monzonite 35°; Sheared
Strongly sheared QMNZ defined by attenuated quartz grains and wispy sericite-chlorite alteration, with specks of fine grained disseminated pyrite and pos vfg red garnets. Shear hosts grey-transluscent quartz vein with chlorite. Lower contact with unsheared QMNZ fractured.
58.72 58.88 VEI;0.2;Qz Cb Cl;T;65°;;
Vein 0.2 Quartz Carbonate Chlorite Tension 65°
Grey-transluscent quartz vein with chlorite stringers. Sulphides absent, but occur in adjacent sheared QMNZ. Vein occurs at contact between aplite and sheared QMNZ.
59.20 77.82 QMNZ
Quartz Monzonite
Continuation of light grey, coarse grained, relatively unaltered, unfoliated QMNZ with sporadic, chloritized xenoliths of mafic material. Sporadic, thin aplite dykes/felsic xenoliths with sharply defined contacts @ 35 deg tca. Sulphides absent. Non-magnetic. Rare zones of weak shearing, <20cm wide, defined by wispy sericite-chlorite (e.g., @ 72.04 and 77.60m), no associated sulphide.
59.20 77.82 Car03; Chl10
Carbonatization 3; Chloritization 10
Continuation of relatively unaltered, homogenous QMNZ with weak, diffuse carbonate alteration and patchy chlorite alteration of precusor biotite and rare mafic xenoliths.
72.04 72.16 CIS25
Sheared25 60°
Weak zone of shearing defined by wispy sericite-chlorite bands. Rare patches of pink-potassic alteration to QMNZ feldspars adjacent to sheared interval. Hosts rare, fg specks of disseminated pyrite.
77.60 77.82 CIS30
Sheared30 65°
Zone of weak shearing defined by wispy sericite-chlorite bands and attenuated quartz grains. Shearing situated in hangingwall contact between QMNZ and underlying aplite dyke. Sulphides absent. Non-magnetic.
77.82 79.10 I1F
Aplite 85°

Description

Fine grained, homogenous, pink-grey, potassic altered aplite dyke with sharply defined contacts @ 85 deg tca. Hangingwall and footwall contacts marked by thin zones of moderate-weak shearing. Aplite hosts very rare, vfg disseminated specks of pyrite. Non-magnetic.

77.82 79.10 Pot05
Potassic 5
Weakly potassic/haematite altered, pink-grey, fine-grained aplite intrusion.

79.10 86.30 QMNZ
Quartz Monzonite
Continuation of relatively unaltered, unfoliated, light grey, coarse grained QMNZ with patchy chlorite clots. Sulphides absent. Non-magnetic.

79.10 86.30 Car03; Chl10
Carbonatization 3; Chloritization 10
Homogenous, relatively unaltered QMNZ with weak, diffuse carbonate and patchy chlorite alteration.

79.10 79.27 CIS40
Sheared40 60°
Weak-moderate shearing defined by attenuated quartz grains and wispy sericite-chlorite. Shear zone hosts discontinuous quartz vein and is situated in footwall contact between aplite and underlying QMNZ. Rare specks of disseminated pyrite. Non-magnetic.

79.12 79.14 VEI;0.02;Cl Qz Cb;T;90°;Py00.5;
Vein 0.02 Chlorite Quartz Carbonate Tension 90° Pyrite 0.5%
Discontinuous, boudinaged, grey-transluscent quartz-carbonate vein with chlorite stringers, hosting rare specks of vein margin chlorite. Vein hosted within sheared QMNZ in footwall of aplite intrusion. Non-magnetic.

86.30 88.80 I1F; PEG
Aplite 70°; Pegmatitic
Pink-grey potassic/haematite altered, fine grained aplite dyke with sharp lower contact @ 70 deg tca. Upper contact obscured by 20cm wide zone of felsic (quartz-feldspar) pegmatitic material with difuse contact into overlying QMNZ. Sulphides absent. Non-magnetic.

86.30 88.80 Pot08; Hem03
Potassic 8; Hematization 3
Weakly potassic/haematite altered, pink-grey coloured, fine grained aplite dyke.

88.80 144.68 QMNZ
Quartz Monzonite
Continuation of light grey, relatively unaltered, unfoliated, unsheared, coarse grained QMNZ with sporadic, light grey-beige fg felsic dykes (aplite) or xenoliths, with contacts varying from 65-5 deg tca. Sulphides absent. Non-magnetic.

88.80 144.68 Car03; Chl10
Carbonatization 3; Chloritization 10
Continuation of relatively unaltered, homogenous QMNZ with weak, diffuse carbonate and patchy chlorite alteration.

88.97 89.03 CIS60
Sheared60 40°
Thin zone of sharply defined, moderately sheared QMNZ with rare, fg specks of disseminated pyrite. Shearing defined by attenuated quartz grains and wispy sericite bands.

119.67 119.72 VEI;0.04;Cb Cl Qz;T;70°;;

Description

Vein 0.04 Carbonate Chlorite Quartz Tension 70°
Grey-transluscent quartz vein with weak carbonate alteration and vein margin chlorite. Sulphides absent. Non-magnetic.

144.68 145.17 M8 (QMNZ); CIS
Sheared Monzonite 70°; Sheared
Crenulated zone of sheared QMNZ with discontinuous lenses of boudinaged quartz-chlorite, attenuated quartz grains and wispy sericite-chlorite. Footwall of sheared zone marked by grey-transluscent quartz vein. Sulphides absent. Non-magnetic.

144.68 145.17 Chl10; Sil10
Chloritization 10; Silicification 10
Moderately silificed interval of moderately sheared, crenulated QMNZ.

144.68 145.17 CIS70
Sheared70 70°
Moderate-strongly sheared QMNZ defined by wispy sericite-chlorite and attenuated quartz grains. Some crenulation observed. Sulphides absent. Non-magnetic. Diffuse upper contact. Sharp lower contact.

145.00 145.17 VEI;0.16;Qz;T;85°;;
Vein 0.16 Quartz Tension 85°
Grey-transluscent, 'sugary' textured quartz vein. Sulphides absent. Vein hosted in footwall of thin, moderately sheared interval of QMNZ.

145.17 200.00 QMNZ
Quartz Monzonite
Continuation of light grey, coarse grained, relatively unaltered, homogenous QMNZ with patchy chlorite alteration. Sporadic, fine grained, unsheared, non-magnetic, mafic xenoliths < 30cm wide (e.g., @ 163.09 and 176.60m). Sulphides absent. Zone of moderate shearing between 186.00-186.15m. No associated sulphides.

145.17 204.98 Car03; Chl10
Carbonatization 3; Chloritization 10
Continuation of relatively unaltered QMNZ, with weak, diffuse carbonate and patchy chloritization. Possible diffuse silicic and chloritic alteration associated with intermediate composition xenoliths at 163.09, 176.60 and 200.00m.

184.74 184.81 VEI;0.07;Qz Pg Cb Cl;T;70°;;
Vein 0.07 Quartz Plagioclase Carbonate Chlorite Tension 70°
Grey-transluscent quartz vein with vein margin carbonate-chlorite and pink-potassic altered feldspars. Sulphides absent. Non-magnetic.

186.00 186.16 CIS20
Sheared20 85°
Zone of weak shearing defined by wispy sericite alteration. Sulphides absent. Non-magnetic. Relatively sharp upper contact. Gradational lower contact.

200.00 201.20 V2; Xen
Intermediate volcanic 80°; Xenoliths
1.2m wide, QMNZ-hosted xenolith of medium grey, medium-fine grained, intermediate material with rounded clasts <3mm wide of quartz-feldspar material. Contacts sharply defined at 80 deg tca. Non-magnetic. Sulphides absent.

201.20 204.98 QMNZ
Quartz Monzonite

Description
Continuation of light grey, coarse grained, unsheared, relatvely unaltered QMNZ. Sulphides absent. Non-magnetic.
204.98 208.73 M8 (QMNZ); CIS
Sheared Monzonite 60°; Sheared
Abrupt increase in shearing, potassic-alteration, associated pink discolouration and fragmentation of core. QMNZ moderately-strongly sheared with diffuse potassic-silicic alteration throughout. No evidence of veining. Non-magnetic. Sulphides absent.
204.98 208.73 Chl05; Sil05; Pot15; Hem05; Car05
Chloritization 5; Silicification 5; Potassic 15; Hematization 5; Carbonatization 5
Strongly altered interval of sheared QMNZ and fractured/fragmented core with pervasive potassic alteration and haematite staining. Possible, weak silicic alteration and a noticeable increase in carbonate compared with adjacent QMNZ.
204.98 208.73 CIS50; FRC
Sheared50 60°; Fractured
Fractured and fragmented core. Moderately sheared QMNZ with diffuse weak silicic and strong pervasive potassic/haematite alteration. Sulphides absent. Non-magnetic. Shearing defined by attenuated quartz-feldspar grains.
208.73 211.27 QMNZ
Quartz Monzonite
Coarse grained, unsheared QMNZ with diffuse weak carbonate a pink-potassic/haematite alteration. Non-magnetic. Sulphides absent.
208.73 239.80 Car05; Pot15; Hem05; Sil05; Chl10
Carbonatization 5; Potassic 15; Hematization 5; Silicification 5; Chloritization 10
Fractured and fragmented QMNZ with chlorite alteration on open fractures. Diffuse silicic and pervasive potassic alteration throughout, gradually weakening downhole below 238.00m.
211.27 211.67 I1F
Aplite 90°
Pink potassic/haematite altered aplite dyke with sharply defined contacts @ 90 deg tca. Sulphides absent but some coarse phenocrysts chloritized biotite.
211.67 218.00 QMNZ
Quartz Monzonite
Coarse grained QMNZ with diffuse potassic and carbonate alteration throughout. Relatively unsheared/unfoliated with exception between 215.70-215.90m, where moderate-strongly sheared, silicic altered QMNZ is present with diffuse contacts into adjacent QMNZ. Fine grained disseminated sulphides within the sheared interval. Fracturing and fragmentation of core reduced compared in intervals eitherside. Non-magnetic.
215.75 215.90 CIS60
Sheared60 40°
Moderately to strongly sheared QMNZ with pervasive potassic and diffuse silicic alteration. Diffuse contacts into unsheared QMNZ. Fine grained, disseminated specks of pyrite throughout the groundmass. Non-magnetic.
218.00 227.82 QMNZ; FBX
Quartz Monzonite; Fault breccia
Fractured and fragmented core with green chlorite clay coating on fracture surfaces. Pervasive strong potassic/haematite alteration to QMNZ which exhibits some weak shearing. Brittle fault zone? Rare very fine grained disseminated specks of pyrite. Non-magnetic.

Description
218.00 227.82 FRC80 **Fractured80** Zone of fractured and fragmented core. Appears to be associated with noticeable increase in potassic/haematite alteration. Possible brittle fault structure. Sulphides absent.
227.82 239.80 QMNZ **Quartz Monzonite** Coarse grained, pink potassic altered, coarse grained, unsheared QMNZ with patchy clots of chlorite alteration. Sulphides absent. Non-magnetic.
227.82 238.00 FRC50 **Fractured50** Fracturing of core continues from overlying interval but reduced somewhat.
239.80 243.75 M8 (QMNZ); FO **Sheared Monzonite 30°; Foliated** Weakly sheared/foliated, coarse grained QMNZ with diffuse somkey grey silicic alteration, chlorite-actinolite stringers @50 deg tca. Stringers and groundmass of QMNZ hosts fine grained disseminated pyrite specks throughout.
239.80 248.50 Chl10; Sil05; Act01 **Chloritization 10; Silicification 5; Actinolite 1** Diffuse, weak silicic alteration and patchy chlorite alteration throughout QMNZ. Rare actinolite associated with cross cutting stringers of quartz-pyrite. No carbonate.
243.75 248.50 QMNZ **Quartz Monzonite** Unsheared, weakly altered, coarse grained, pink-grey QMNZ. Sulphides absent. Non-magnetic.
248.50 253.25 M8 (QMNZ); CIS; SIF **Sheared Monzonite 40°; Sheared; Silicate Iron Formation** Brick red and black coloured, strongly sheared and altered QMNZ (possible SIF?) within fractured and fragmented core. Sulphides absent. Non-magnetic.
248.50 249.66 Pot25; Hem10; Chl05; Car05 **Potassic 25; Hematization 10; Chloritization 5; Carbonatization 5** Strongly sheared QMNZ with intense pink-brick red potassic/haematite alteration and weak carbonate/chlorite.
248.50 249.66 CIS70; FRC **Sheared70 30°; Fractured** Strongly sheared QMNZ with strong potassic/haematite/silicic alteration to a brick red and black colour. Possible strongly altered ironstone horizon? Core fractured and fragmented.
249.66 262.30 Car03; Chl10; Sil05 **Carbonatization 3; Chloritization 10; Silicification 5** Relatively unaltered quartz monzonite with diffuse, sporadic zones of weak silicic and potassic alteration associated with weak shearing. E.g. @ 260.00-260.90m.

Description

253.25 262.30 QMNZ
Quartz Monzonite
Coarse grained, relatively unaltered, non-magnetic QMNZ with diffuse zones of weak shearing and patchy chlorite Betwen 260.00-261.62m the QMNZ is unsheared but exhbits diffuse smokey grey silicic alteration and hosts up to 5 vol.% disseminated specks of pyrite.
Non-magnetic.

262.30 262.84 M8 (QMNZ); CIS
Sheared Monzonite 80°; Sheared
Strongly sheared QMNZ with attenuated quartz grains, wispy chlorite-serecite bands and fine grained, disseminated specks and stringers of pyrite upto ~5 vol. %. Sharply efined upper contact, gradational lower contact.

262.30 262.84 Sil05; Ser05; Chl05
Silicification 5; Sericitization 5; Chloritization 5
Sheared QMNZ with diffuse, weak silicic alteration and wispy chlorite-serecite bands.

262.30 262.84 CIS80
Sheared80 65°
Strongly sheared QMNZ defined by attenuated quartz grains and wispy sericite-chlorite bands. Rare specks of fine grained, disseminated pyrite throughout groundmass. Sharply defined upper contact @ 65 eg tca. Gradational lower contact.

262.84 268.85 QMNZ
Quartz Monzonite
Continuation of coarse grained, unsheared QMNZ with increasingly pervasive and strong potassic/haematite alteration and associated core fracturing and fragmentation from 264.80m onwards. Rare specks of disseminated, fg pyrite.

262.84 264.80 Chl10; Pot03; Hem01
Chloritization 10; Potassic 3; Hematization 1
Weakly altered, unsheared QMNZ with diffuse, pink-grey potassic and patchy chlorite alteration.

264.80 282.86 Pot20; Hem05; Sil05; Ser05; Chl10
Potassic 20; Hematization 5; Silicification 5; Sericitization 5; Chloritization 10
Fractured and fragmented QMNZ and aplite, with pervasive pink potassic alteration and haematite staining. Sporadic zones of wispy sericite and diffuse, smokey-grey silicic alteration. Gradational decrease in intensity of alteration downhole.

268.85 269.37 I1F
Aplite 60°
Fine grained, homogenous, pink-potassic altered aplite dyke with sharply defined contacts @ 60 deg tca. Sulphides absent. Non-magnetic.

269.37 282.86 QMNZ; Xen
Quartz Monzonite; Xenoliths
Fractured and fragmented core. Pink-potassic altered, coarse grained QMNZ with zones of diffuse silicic alteration associated with disseminated specks of sulphides. At 270.49m 42cm wide xenolith of dark grey, fine grained material hosting potassic altered feldspar phenocrysts (intermediate volcanic?). Weak stockwork of quartz-chlorite veinlets throughout interval. Non-magnetic.

269.37 275.60 STW;10%;Cl Qz;T;30°;Py01;
Stockwork 10% Chlorite Quartz Tension 30° Pyrite 1%
Weakly developed stock work of <1cm wide quartz veinlets at various deg tca, predominantly 30 deg tca, with vein margin chlorite hosting

Description

rare specks of disseminated pyrite.

275.60 275.63 VEI;0.03;Qz Cl;T;35°;Py05;
Vein 0.03 Quartz Chlorite Tension 35° Pyrite 5%
Grey-transluscent quartz vein with stringers of chlorite and vein-margin chlorite hosting specks of disseminated pyrite.

276.35 276.36 VEI;0.01;Cl Qz;T;35°;Py05;
Vein 0.01 Chlorite Quartz Tension 35° Pyrite 5%
Hairline quartz chlorite veinlet with disseminated pyrite in the vein groundmass and up to 5cm into the adjacent QMNZ.

282.86 321.00 QMNZ
Quartz Monzonite
Light grey, relatively homogenous, unaltered QMNZ with sporadic zones of weak, thin shearing (e.g. @ 300.40 and 301.86m). Quartz chlorite veinlets between 306.50-307.78m. Sulphides absent. 10cm wide light grey-beige aplite dyke (or xenolith?) @ 316.80m. Non-magnetic.
EOH @ 321.00m.

282.86 321.00 Chl10; Car03; Sil03
Chloritization 10; Carbonatization 3; Silicification 3
Relatively unaltered, homogenous QMNZ with patchy chlorite and weak, diffuse carbonate alteration. Rare, smokey-grey, diffuse silicic alteration associated with sporadic zones of weak-moderate shearing.

300.35 300.37 CIS90
Sheared90 25°
Thin, sharply defined, strongly sheared section of QMNZ defined by wispy sericite and grain size reduction. Hosts rare, fine grained specks of sulphide.

306.50 307.78 Vn;5%;Qz Cl;T;60°;;
stringers, veinlets 5% Quartz Chlorite Tension 60°
Regularly spaced, hairline to 1cm wide grey quartz- green chlorite stringers and veinlets @ 60 deg tca. Sulphides absent.

319.20 319.40 VEI;0.2;Cl Qz;T;50°;;
Vein 0.2 Chlorite Quartz Tension 50°
Grey transluscent quartz vein with vein margin chlorite. Sulphides absent.

320.30 320.42 VEI;0.12;Qz Cl Cb;T;50°;Py05;
Vein 0.12 Quartz Chlorite Carbonate Tension 50° Pyrite 5%
Grey-transluscent quartz-carbonate vein with stringers of chlorite hosting blebby pyrite stringers. Non-magnetic.

Northern Superior Resources Inc.

DDH: **TPK-17-019**

Claims title:		Section:	58135277
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	02/03/2011	Description date:	12/08/2017
End date:	05/03/2011	Author:	Jon O'Callaghan

Collar

Azimuth: 180.00°
Dip: -50.00°
Length: 300.00

UTM NAD83

East	442376.0
North	5813527.0
Elevation	252.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	30.00	188.30°	-48.10°	No
Reflex	60.00	191.30°	-48.80°	No
Reflex	90.00	192.10°	-49.00°	No
Reflex	120.00	194.00°	-49.60°	No
Reflex	150.00	195.60°	-49.80°	No
Reflex	180.00	199.70°	-49.90°	No
Reflex	210.00	201.40°	-50.00°	No

Type	Depth	Azimuth	Dip	Invalid

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Core originally logged in 2011 by Rainy River geologist, Seah Miller. Relogged by NSR geologist, Jon O'Callaghan in 2017 to assist in constraining the orientation of Au bearing structures at Target 2.

Core size: BQ core   Cemented: No   Stored: Yes

Description		
0.00	9.90	CSG **Casing** Overburden. No core recovered.
9.90	14.93	QMNZ **Quartz Monzonite** Light grey, coarse grained, non-magnetic, unsheared, unfoliated QMNZ with weak, diffuse patches of potassic alteration and patchy chlorite alteration. Sulphides absent.
9.90	14.93	Car03; Chl10; Pot01 **Carbonatization 3; Chloritization 10; Potassic 1** Weak, diffuse carbonate and patchy clots of chlorite alteration. Very weak, diffuse pink-grey patches of potassic alteration, diminishes downhole.
14.93	15.44	M8 (QMNZ); CIS; MN **Sheared Monzonite 90°; Sheared; Mylonitic** Strongly sheared to proto-mylonitic QMNZ with gradational upper contact and sharply defined lower contact @ 90 deg tca. Shearing efined by mylonitic banding, wispy serecite and grain-size reduction. Rare, very fine grained specks of pyrite associated with thin stringers of quartz carbonate. Non-magnetic.
14.93	15.44	Sil10; Ser05; Car03 **Silicification 10; Sericitization 5; Carbonatization 3** Strongly-sheared to protomylonitic QMNZ with weak, diffuse, smokey-grey silicic alteration and wispy sericite. Patchy lenses of carbonate.
14.93	15.44	CIS95 **Sheared95 85°** Strongly sheared to proto-mylonitic QMNZ. Shearing @ 85 deg tca, defined by fabric banding and grain size reduction. Sharp lower contact with unsheared QMNZ, gradational upper contact.
15.08	15.09	VEI;0.01;Qz;T;85°;Py00.05; **Vein 0.01 Quartz Tension 85° Pyrite 0.05%** Grey-transluscent quartz vein with rare specks of disseminated pyrite in adjacent, strongly sheared QMNZ.
15.44	25.50	QMNZ; Xen **Quartz Monzonite; Xenoliths** Continuation of coarse grained, light grey, relatively homogenous and unaltered, non-magnetic QMNZ with sporadic < 10cm wide, fine grained, subrounded to angular, non-magnetic, unmineralized mafic xenoliths (e.g. @ 16.18 and 23.60m). Fine, anhedral blebs of arsenopyrite observed in chlorite stringer @ 23.50m, otherwise sulphides absent from the interval.
15.44	66.90	Car03; Chl10; Pot03 **Carbonatization 3; Chloritization 10; Potassic 3** Continuation of relatively unaltered QMNZ. Weak, diffuse carbonate and patchy chlorite alteration. Some rare serecite associated with sporadic zones of thin, weak shearing. Weak, diffuse pink-grey potassic alteration restricted to cross-cutting aplite dykes.
23.50	23.60	VEI;0.01;Cb Cl;T;20°;As05; **Vein 0.01 Carbonate Chlorite Tension 20° Arsenopyrite 5%** Discontinuous, hairline width chorite-carbonate stringer hosting anhedral blebs of arsenopyrite up to 5x2mm in size, elongate parallel to

		Description
		veining.
25.50	35.56	I1F **Aplite 60°** Light grey-beige coloured, fine grained, non-magnetic aplite dyke with sharply defined upper contact, lower contact appears to be more diffuse. Sulphides absent.
35.56	35.75	QMNZ **Quartz Monzonite** Continuation of light grey, homogenous, coarse grained, relatively unaltered, non-magnetic QMNZ. Sulphides and xenoliths absent. At 32.80 there is a 15cm wide, pink-grey aplite dyke with contacts @ 60 deg tca. Sulphides absent.
35.75	36.15	I1F **Aplite 70°** Pink-grey, fine grained aplite dyke with sharply defined contacts @ 70 deg tca. Non-magnetic. Sulphides absent.
36.15	66.65	QMNZ **Quartz Monzonite** Continuation of light grey, homogenous, coarse grained, relatively unaltered, non-magnetic, unfoliated QMNZ with patchy chlorite clots. Sulphides and xenoliths absent. At 38.84 there is a 15cm wide, pink-grey aplite dyke with contacts @ 85 deg tca. Sulphides absent.
46.46	46.50	CIS30 **Sheared30 50°** Weak to moderately sheared QMNZ with sharply defined contacts. Shearing defined by attenuated quartz grains and wispy serecite-chlorite.
49.43	49.48	CIS30 **Sheared30 60°** Weak to moderately sheared QMNZ with poorly defined contacts. Shearing defined by attenuated quartz grains and wispy serecite-chlorite.
66.65	66.90	I1F **Aplite 20°** Light grey to beige coloured, fine grained aplite dyke with shaply defined contacts @ 20 eg tca. Footwall contact with zone of strongly sheared, cross-cutting M8 (QMNZ). Sulphides absent. Non-magnetic.
66.90	67.15	M8 (QMNZ); CIS **Sheared Monzonite 85°; Sheared** Strongly sheared interval of medium grey QMNZ defined by attenuated quartz grains, grain size reduction and wispy sericite. Patchy carbonate lenses parallel to shearing. Hangingwall contact with aplite dyke, footwall contact sharply defined. Rare, very fine grained specks of disseminated pyrite. Non-magnetic.
66.90	67.20	Car05; Ser05; Chl05; Sil10 **Carbonatization 5; Sericitization 5; Chloritization 5; Silicification 10** Strongly sheared QMNZ with diffuse weak, smokey grey silicic alteration and wispy sericite-chlorite. Patchy lenses of carbonate.
66.90	67.26	CIS90 **Sheared90 85°**

Northern Superior Resources Inc.

Description

Strongly sheared QMNZ defined by attenuated quartz grains, banded fabric and grain size reduction. Hangingwall marked by aplite dyke. Sharply defined lower contact. Rare, very fine grained specks of disseminated pyrite.

67.15 154.20 QMNZ

Quartz Monzonite

Large interval of homogenous, coarse grained, unfoliated, non-magnetic, light grey QMNZ with patchy chloritie alteration. Sulphides absent. Three thin zones of moderate shearing <30cm wide @ 83.07,117.78 and 134.80m. Sporadic, <5cm wide, subrounded, non-magnetic, mafic xenoliths observed (e.g., @ 119.30m). Aplite dykes noticeably absent below shearing @ 66.90m.

67.20 154.25 Car03; Chl10; Ser02

Carbonatization 3; Chloritization 10; Sericitization 2

Continuation of weakly altered QMNZ with sporadic, thin zones of weak shearing <10cm wide with associated wispy serecite.

83.07 83.17 CIS20

Sheared20 70°

Zone of weak shearing defined by wispy sericite grains. Sharply defined contacts @ 70 deg tca.

117.78 117.82 CIS30

Sheared30 70°

Zone of weak shearing defined by attenuated quartz and wispy serecite. Rare specks of fine grained disseminated pyrite.

134.80 135.10 CIS35

Sheared35 60°

Weak to moderately sheared QMNZ defined by attenuated quartz grains and wispy sericite/chlorite bands. Sharply defined upper and lower contacts.

154.20 158.24 I1F

Aplite 70°

Fine-medium grained, pink-potassic/haematite altered, non-magnetic aplite dyke with shaply defined upper and lower contacts @ ~70 deg tca. The dyke is split in two, with a poorly defined undulose contact @ 156.90m. The lower section of the dyke has a lighter, pink-colouration, is slightly coarser grained and hosts 1-2 vol.% disseinated, ragged blebs of pyrite and arsenopyrite throughout the groundmass, associated with carbonate-chlorite patches. Non-magnetic.

154.25 156.90 Pot20; Hem05

Potassic 20; Hematization 5

Moderately potassic altered and haematite stained aplite dyke.

156.90 158.24 Hem05; Car03; Pot20

Hematization 5; Carbonatization 3; Potassic 20

Continuation of overlying aplite dyke, except coarse grained, sulphide bearing and with patches of carbonate alteration associated with sulphides.

158.24 178.48 QMNZ

Quartz Monzonite

Light grey, relatively homogenous, coarse grained, unfoliated, non-magnetic QMNZ with patchy chlorite and sporadic potassic alteration. Sporadic zones of weak shearing defined by wispy sericite-chlorite bands (e.g.@ 165.30cm). Rare, very fine grained specks of disseminated pyrite in the QMNZ groundmass. Occasional, <10cm wide, rounded, fine graine, non-magnetic mafic xenoliths.

Description

158.24 185.36 Pot05; Hem02; Sil03; Car03; Chl05; Ser05
Potassic 5; Hematization 2; Silicification 3; Carbonatization 3; Chloritization 5; Sericitization 5
Weakly altered QMNZ with patchy chlorite alteration and weak, diffuse potassic and carbonate alteration. Wispy serecite and diffuse silicic alteration associated with moderately sheared QMNZ @ 178.48-180.00m.

173.56 173.67 VEI;0.11;Cl Cb Qz Pg;T;50°;Py03;
Vein 0.11 Chlorite Carbonate Quartz Plagioclase Tension 50° Pyrite 3%
Grey transluscent quartz and pink-white coloured feldspar vein with rare, large (up to ~ 5x5mm) blebs of pyrite. and patchy chlorite-carbonate stringers. Non-magnetic.

178.48 180.00 M8 (QMNZ); CIS; FBX
Sheared Monzonite 50°; Sheared; Fault breccia
Moderately sheared QMNZ defined by wispy sericite and chlorite, and attenuated quartz grains. Diffuse weak silicic and potassic alteration, with trace, very fine grained, disseminated specks of pyrite. Betweem 179.26-179.70 core fractured and fragmented. Possible brittle structure? Non-magnetic.

178.48 180.00 CIS60; CIS
Sheared60 40°; Sheared
Moderately to strongly sheared QMNZ. Shearing defined by attenuated quartz grains and wispy serecite/chlorite bands.

180.00 185.36 QMNZ; Xen
Quartz Monzonite; Xenoliths
Continuation of coarse grained, light grey-pink coloured, relatively homogenous QMNZ with weak, diffuse pink potassic alteration. At 184.28m black, fine grained, non-magnetic, mafic xenolith 10cm wide. Sulphides absent.

183.40 183.45 VEI;0.05;Pg Qz Cb Cl;T;40°;;
Vein 0.05 Plagioclase Quartz Carbonate Chlorite Tension 40°
Grey-transluscent quartz vein with pink potassic altered feldspars, stringers of chlorite and patchy carbonate. Hangingwall contact @ 40 deg tca, footwall contact @ 90 deg tca.

185.36 185.60 I1F
Aplite 60°
Very fine grained, pink-potassic coloured, non-magnetic aplite dyke with sharply defined contacts @ 60 deg tca. Rare, vfg disseminated specks of pyrite.

185.36 190.82 Pot20; Hem05; Sil05; Ser05; Car03
Potassic 20; Hematization 5; Silicification 5; Sericitization 5; Carbonatization 3
Strongly altered, unsheared QMNZ with pervasive pink-potassic/haematite alteration and weaker, diffuse silicic and carbonate alteration.

185.60 186.10 CIS70
Sheared70 50°
Strongly sheared QMNZ with diffuse potassic and silicic alteration. Shearing defined by wispy serecite/chlorite bands and attenuated quartz feldspar grains. Upper contact with aplite dyke, lower bcontact gradational.

185.84 186.10 M8 (QMNZ); CIS
Sheared Monzonite 50°; Sheared
Moderately sheared, weakly silicic and potassic altered QMNZ. Shearing defined by attenuated quartz grains. Rare specks of disseminated

Description

pyrite and possible arsenopyrite. Gradational lower contact into unsheared QMNZ. Non-magnetic.

186.10 190.67 QMNZ

Quartz Monzonite

Coarse grained, non-magnetic, unsheared-weakly sheared QMNZ with pervasvive moderate-strong potassic /haematite alteration and weak bzones of smokey grey silicic alteration. Rare, vfg specks of disseminated pyrite. Non-magnetic.

190.67 198.70 M8 (QMNZ); CIS; MN; FBX

Sheared Monzonite 60°; Sheared; Mylonitic; Fault breccia

Continuous zone of strongly sheared to protomylonitc QMNZ. Shearing defined by grain size reduction, banded fabric, attenuated quartz grains and wispy serecite-chlorite. Weak potassic alteration and moderate smokey grey silicic alteration throughout the interval, with possiblem 3cm wide aplite dykelet @ 191.50m. Fine grained, disseminated specks of pyrite throughout the sheared interval. Core fractured and fragmented between 190.82-192.00m. Likely caused by brittle faulting, with fault gouge material at 190.82-190.87m.

190.67 190.82 CIS95

Sheared95 85°

Very strongly sheared to protomylonitic QMNZ with pervasive potassic alteration. Shearing defined by banded fabric.

190.82 198.70 Car03; Chl05; Ser20; Sil15; Pot03

Carbonatization 3; Chloritization 5; Sericitization 20; Silicification 15; Potassic 3

Moderately silicified shear zone with wispy serecite bands throughout and patchy, weak potassic and carbonate alteration.

190.82 192.00 FLT; FG; CIS

Fault; Fault gouge; Sheared

Fractured and fragmented core with evidence of poorly cemented, limonite clay gouge at 190.82-190.87m. Core fragments comprise of strongly sheared QMNZ and possible grey-transluscent quartz veining. No sulphides.

192.00 198.70 CIS70

Sheared70 55°

Series of moderate to strongly sheared interval of QMNZ. Shearing defined by attenuated quartz-feldspar grains with wispy serecite-chlorite. Fine grained disseminated pyrite specks throughout sheared interval. Gradational lower contact into unsheared QMNZ.

198.70 205.31 QMNZ

Quartz Monzonite

Unsheared-weakly sheared, coarse grained, weakly potassic and silicic altered QMNZ. Rare, very fine grained specks of disseminated pyrite. Non-magnetic. 10cm wide, fine grained, potassic pink aplite dyke @ 199.94m @ 40 deg tca, no associated sulphides.

198.70 222.00 Pot05; Sil03; Ser03; Chl10; Car03

Potassic 5; Silicification 3; Sericitization 3; Chloritization 10; Carbonatization 3

Relatively weakly altered QMNZ with weak silicic and serecitic alteration constrainied to shearing between 205.31-205.83m. Diffuse, weak carbonate and potassic alteration and patchy chlorite alteration throughout.

205.31 205.83 M8 (QMNZ); CIS

Sheared Monzonite 35°; Sheared

Strongly sheared QMNZ, with attenuated quartz grains and diffuse silicic alteration. Wispy serecite and chlorite, with fg, disseminated soecks of pyrite. Sulphide vol.% and silicic alteration increase slightly downhole to 205.83m.

205.31 205.83 CIS50

Description

Sheared50 50°
Moderately sheared QMNZ defined by attenuated quartz grains and wspy chlorite-serecite. Upper and lower contacts are sharply defined. Specks of disseminated pyrite throughout.

205.83 237.00 QMNZ
Quartz Monzonite
Coarse grained quartz monzonite. Light pink-grey with weak, diffuse potassic alteration to ~222.00m where potassic and silicic alteration become more intense. This conincides with fracturing and fragmentation of core to 239.90m. Greenish chlorite clay gouge(?) on some surfaces , possible poorly cemented fault gouge @ 239.00m. Rare, very fine grained specks of disseminated pyrite. Thin zone of moderate shearing from 226.90-227.10m. Sulphides absent. Non-magnetic.

222.00 239.90 Car01; Chl05; Sil10; Pot20; Hem05
Carbonatization 1; Chloritization 5; Silicification 10; Potassic 20; Hematization 5
Strongly pink-potassic/haematite altered, unsheared but fractured/fragmented QMNZ with patchy chlorite and chloritic clay coatings on fracture surfaces. Weak, diffuse silicic alteration throughout interval, likely encouraging brittle fragmentation.

226.90 227.10 CIS50
Sheared50 50°
Moderately sheared QMNZ. Shearing defined by attenuated quartz grains and wispy serecite alteration. Sharply defined contacts @ 50 deg tca.

227.10 237.55 FRC
Fractured
Core fractured and fragmented. No evidence of faulting, but QMNZ exhibits strong potassic and weak silicic alteration that may have made the core brittle. At least some fragmentation is drill-induced.Thin coating of dark green chlorite clay on some fracture surfaces.

237.00 251.80 QMNZ; Xen
Quartz Monzonite; Xenoliths
Pink grey, weakly potassic altered, non-magnetic, coarse grained unsheared QMNZ. Rare specks of disseminated pyrite within groundmass. Dark grey, vfg, non-magnetic, mafic xenolith 24cm wide @ 248.00m. Potassic-pink coluration decreasesin in intensity/occurance downhole from 243.00m.

239.90 251.80 Pot15; Hem03; Car03; Chl05
Potassic 15; Hematization 3; Carbonatization 3; Chloritization 5
Diffuse potassic and haematite alteration that decreases in intensity downhole. Weak diffuse carbonate and patchy chlorite alteration.

251.80 254.05 M8 (QMNZ); CIS
Sheared Monzonite 40°; Sheared
Strongly sheared QMNZ with attenuated quartz-feldspar grains and pervasive silicic alteration and wispy serecite bands throughout. Upper and lower contacts of sheared zone are gradational. Fine grained, disseminated specks of pyrite throughout the sheared interval.
Grey-transluscent, 1cm wide quartz vein cross cuts shearing @ 10 deg tca @ 253.50m. No sulphides hosted within the vein.

251.80 254.05 Chl05; Ser15; Sil20
Chloritization 5; Sericitization 15; Silicification 20
Sheared QMNZ with pervasive smokey grey silicic and wispy serecite alteration throughout.

251.80 254.05 CIS85

Description

Sheared85 35°
Strongly sheared QMNZ with pervasive silici alteration. Shearing defined by attenuated quartz grains and chlorite.

254.05 277.16 QMNZ
Quartz Monzonite
Coarse grained, unsheared, unfoliated QMNZ with zones of diffuse potassic alteration (e.g. @ 261m). Rare specks of disseminated pyrite. Core box between 264-270m is missing.

254.05 278.40 Sil05; Pot05; Chl10; Ser05
Silicification 5; Potassic 5; Chloritization 10; Sericitization 5
Unsheared QMNZ with weak, diffuse silicic and potassic alteration, patchy chlorite and occasional zones of wispy serecite. Potassic alteration strongest around 261.00m associated with <5mm wide chlorite-carbonate stringer @ 80 deg tca.

260.60 260.67 VEI;0.07;Qz Pg Sr Cl;T;50°;;
Vein 0.07 Quartz Plagioclase Sericite Chlorite Tension 50°
Grey-transluscent quartz vein with wispy serecite and patchy chlorite. Patches of pink grey potassic altered plagioclase. Sulphides absent.

263.80 263.85 VEI;0.05;Qz Pg Sr Cl;T;80°;Py05;
Vein 0.05 Quartz Plagioclase Sericite Chlorite Tension 80° Pyrite 5%
Laminated quartz feldspar vein with wispy serecite and chlorite. Sub-euhedral cubes of pyrite up to 3x3mm in size. Non-magnetic.

277.16 279.70 M8 (QMNZ); CIS
Sheared Monzonite 30°; Sheared
Strongly sheared QMNZ with pervasive silicic and carbonate alteration and wispy serecite-chlorite. Hangingwall sharply defined, footwall gradational. Shearing defined by attenuated quartz grains. Fine grained specks of disseminated pyrite throughout the sheared interval and possible, shear-parallel, boudinaged grey quartz veins. Non-magnetic.

277.16 279.70 CIS85
Sheared85 30°
Strongly sheared interval of QMNZ with silicic alteration. Shearing defined by attenuated quartz grains and chlorite.

278.40 284.32 Ser10; Sil15; Chl10; Car03
Sericitization 10; Silicification 15; Chloritization 10; Carbonatization 3
Sheared QMNZ with moderate-weak, diffuse silicic-carbonate alteration and wispy serecite.

278.45 278.50 VEI;0.05;Cb Mv Qz;T;50°;;
Vein 0.05 Carbonate Muscovite Quartz Tension 50°
Grey-transluscent quartz-carbonate vein with pegamatitic books of muscovite. Sulphides absent.

279.70 282.82 QMNZ
Quartz Monzonite
Coarse grained, unsheared-weakly sheared, non-magnetic, medium grey QMNZ, with disseminated specks of pyrite throughout the groundmass, which is weakly silicified and carbonate altered.

282.82 284.32 M8 (QMNZ); CIS
Sheared Monzonite 20°; Sheared
Moderately sheared QMNZ with pervasive, moderate silicic and weak carbonate alteration and wispy serecite-chlorite. Hangingwall sharply

Description

defined, footwall gradational. Shearing defined by attenuated quartz grains. Fine grained specks of disseminated pyrite throughout the sheared interval. Non-magnetic.

282.82 284.32 CIS70
Sheared70 30°
Strongly sheared interval of QMNZ with silicic alteration. Shearing defined by attenuated quartz grains and chlorite.

284.32 300.00 QMNZ
Quartz Monzonite
Light grey to pink-green coloured QMNZ with thin zones of weak, shearing averaging 30-40 deg tca with rare, fine grained, disseminated pyrite. Sheared zones have gradational contacts into unsheared QMNZ and are usually < 5cm wide and splayed/horsetailed. Diffuse, weak potassic and chloritic alteration throughout. Non-magnetic.
EOH at 300m.

284.32 300.00 Car03
Carbonatization 3
Unsheared QMNZ with patchy chlorite and weak, diffuse carbonate alteration

292.16 292.22 VEI;0.06;Qz Pg Cb;T;50°;Py02;
Vein 0.06 Quartz Plagioclase Carbonate Tension 50° Pyrite 2%
Fractured and fragmented core with quartz-plagioclase-carbonate and blebs of disseminated pyrite.

Northern Superior Resources Inc.

DDH: **TPK-17-038**

Claims title:		Section:	5811786
Township:		Level:	Surface
Range:	Wapitotem	Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	25/02/2012	Description date:	03/08/2017
End date:	03/03/2012	Author:	Jon O'Callaghan

Collar

Azimuth: 360.00°
Dip: -50.00°
Length: 250.00

UTM NAD83

East	441652.0
North	5811786.0
Elevation	271.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	10.00	360.00°	-50.00°	No
Reflex	24.00	356.30°	-47.30°	No
Reflex	50.00	357.30°	-47.40°	No
Reflex	101.00	359.10°	-46.10°	No

Type	Depth	Azimuth	Dip	Invalid

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Originally logged by Rainy River Geologist, Darrell Hyde. =Relogged by NSR geologist, Jon O'Callaghan in order to better understand structures hosting gold in the target 2 area.

Core size: BQ core   Cemented: No   Stored: Yes

Description			
0.00	11.78	CSG **Casing** Casing	
11.78	65.80	QMNZ; GS; CIS **Quartz Monzonite; gneissic; Sheared** Light-med grey coloured, coarse-med grained quartz monzonite with patchy, weak magnetism associated with fine grained, rare, disseminated sulphides. Zones of weak-moderate shearing up to 2m wide with associated, rare, fine-grained garnets. Lithology gradually becoming more mafic downhole. Possible gniessic banding, with interlayered zones of more felsic and more mafic material. Potassic alteration abrupty increases in intensity from 48.35m onwards, with bands of strong-moderate shearing. Sulphides absent. Non-magnetic.	
11.78	48.35	Chl10; Lim15 **Chloritization 10; Limonitization 15** Patchy chlorite alteration (likely of precursor biotite). Patchy yellow-tan coloured limonite alteration ajacent to fractures.	
13.18	13.19	FO **Foliated 40°** Foliation at 40 deg TCA.	
14.95	14.96	FO **Foliated 45°** Foliation at 45 deg TCA.	
17.60	17.61	CIS **Sheared 30°** Moderate shearing defined by wispy biotite @ 30 deg TCA.	
18.11	18.14	VEI;0.03;Qz Mv Lm;T;85°;; **Vein 0.03 Quartz Muscovite Limonite Tension 85°** Pegmatitic quartz vein with yellow limonite staining extending 5cm into adjacent monzonite. Sulphides absent. Non-magnetic.	
20.90	20.91	CIS **Sheared 35°** Moerate shearing defined by wispy biotite @ 35 deg TCA.	
24.05	24.06	CIS **Sheared 35°** Weak shearing defined by wispy biotite-garnet @ 35 deg TCA.	
27.05	27.06	FO **Foliated 40°** Foliation at 40 deg tca.	
30.10	30.11	FO **Foliated 55°** Foliation at 55 deg TCA.	
33.50	33.51	FO **Foliated 25°**	

		Description
		Foliation at 25 deg TCA.
36.01	36.02	FO
		Foliated 35°
		Foliation at 35 deg TCA.
38.90	38.91	CIS
		Sheared 30°
		Shearing defined by wispy biotite @ 30 deg tca.
42.20	42.21	CIS
		Sheared 45°
		Moderate shearinf defineed by wispy chlorite/biotite @45 deg tca.
45.00	45.01	GS
		Gneissic 75°
		Mafic-felsic gneissic band @75 deg tca.
48.10	48.11	CIS
		Sheared 30°
		Strong shearing defined by wispy biotite @ 30 deg tca.
48.36	63.85	POT30; Chl10
		Potassic 30; Chloritization 10
		Moderate to intense potassic alteration throughout monzonite, particularly strong proximal to cross cutting veinlets.
51.20	51.21	CIS
		Sheared 25°
		Strong shearing defined by wispy biotite @ 25 deg tca.
54.05	54.06	CIS
		Sheared 45°
		Moderate shearing defined by wispy biotite at 45 deg tca.
54.06	54.07	FO
		Foliated 60°
		Foliation at 60 deg tca.
55.13	55.18	VEI;0.05;Qz Cb Cl Fp;T;75°;;
		Vein 0.05 Quartz Carbonate Chlorite Feldspar (alkali) Tension 75°
		Quartz vein with patchy chlorite and carbonate along vein margins. Intense potassic alt extending 3cm into adjacent monzonite. Sulphides absent. Non-magnetic.
56.50	56.87	Vn;30%;Cl Qz;T;80°;;
		stringers, veinlets 30% Chlorite Quartz Tension 80°
		<1cm wide quartz-chlorite veinlets at 80 deg tca, sulphides absent. Intense potassic alteration in adjacent monzonite. Non-magnetic.
60.20	60.21	CIS
		Sheared 35°
		Strong shearing at 35 deg tca defined by wispy biotite.

Description			
	60.21	60.22	FO **Foliated 60°** Foliation defined by wispy muscovite @ 60 deg tca.
	63.85	78.55	POT20; Hem10; Lim05 **Potassic 20; Hematization 10; Limonitization 5** Fractured and fragmented core with moderate, pervasive potassic alt, diminshing downhole. Limonite/haematite alt on open fractures.
	63.85	71.70	FRC85 **Fractured85** Core is blocky and fragmented, some possibly drilling or core-saw induced. RQD ~5% recovered. Heamatite staining on some open fracture surfaces. No associated sulphides.
65.80	80.28		Sed; CIS **Sediment (undefined) 40°; Sheared** Dark grey, very fine-grained metasediment with mm-sized grains of quartz distributed sporadically throughout interval. Weak-moderate shearing, with potassic alteration observed with <3cm of cross-cutting quartz-chlorite veinlets. Unit is fragmented and blocky with limonite/haematite alteration on open fractures. Sulphides absent. Patchy muscovite-rich zones. Non-magnetic. Upper conact broken, lower contact sharp @ 40 deg tca.
	72.00	72.01	CIS **Sheared 35°** Strong shearing defined by wispy biotite @ 35 deg tca
	74.85	75.00	FRC **Fractured 10°** Open fracture @ 10 deg tca with limonite-clay infill.
	78.20	78.21	CIS **Sheared 35°** Shearing defined by elongate quartz lenses @ 35 deg tca.
	78.55	112.26	POT30; Chl10 **Potassic 30; Chloritization 10** Moderate to intense potassic alteration, with patchy chlorite.
80.28	112.26		QMNZ **Quartz Monzonite** Pink-ish grey potassic altered, med-coarse grained quartz monzonite with zones of weak-moderate shearing < 0.5m wide. Rare, hairline width stringers of arsenopyrite and pyrite observed at 98.60m.
	80.95	80.96	FO **Foliated 65°** Foliation @ 65 deg tca.
	81.01	81.20	Vn;40%;Qz Cl Fp;T;55°;; **stringers, veinlets 40% Quartz Chlorite Feldspar (alkali) Tension 55°** Quartz veins with vein-margin chlorite and patchy, saussauritized green-grey feldspar. Sulphides absent. Non-magnetic.

Description			
83.95	83.96	FO **Foliated 60°** Foliation @ 60 deg tca.	
86.98	86.99	FO **Foliated 50°** Foliation @ 50 deg tca.	
87.27	87.55	Vn;25%;Fp Cl Qz;T;80°;; **stringers, veinlets 25% Feldspar (alkali) Chlorite Quartz Tension 80°** <1cm wide quartz veinlets with vein margin chlorite (pos, fine specks of tourmaline?) and intense potassic alteration in adjacent monzonite. Sulphides absent. Non-magnetic.	
89.90	89.91	FO **Foliated 50°** Foliation at 50 deg TCA.	
93.10	93.11	GS **Gneissic 55°** Mafic-felsic gneissic band @ 55 deg tca.	
96.04	96.05	FO **Foliated 40°** Foliation at 40 deg TCA.	
99.05	99.06	FO **Foliated 30°** Foliation at 30 deg TCA.	
101.90	101.91	CIS **Sheared 40°** Moderate shearing defined by wispy biotite @ 40 deg tca.	
104.95	104.96	FO **Foliated 40°** Foliation at 40 deg TCA.	
110.82	110.83	VEI;0.01;Qz Cl;T;140°;; **Vein 0.01 Quartz Chlorite Tension 140°** Quartz vein with vein margin chlorite. Sulphides absent. Non-magnetic.	
111.20	111.21	FO **Foliated 45°** Foliation at 45 deg TCA.	
112.26	132.00	M8; CIS; MN **Schist 40°; Sheared; Mylonitic** Dark grey-green biotite-chlorite schist with intervals of proto-mylonitic material. Crenulation cleavage observed at 117.10m 90 deg tca. Cross cut by sporadic boudinaged and auto-brecciated quartz-chlorite veinlets, hosting rare specks of pyrite and chalcopyrite with rare, patchy	

From	To	Description
		fuchsite alteration. Protolith a combination of mafic-volcanics and quartz-monzonite. Non-magnetic. Disseminated specks of pyrite within schist fabric below 124.00m.
112.26	132.00	Bio30; Chl10; Fu01; Car05 **Biotization 30; Chloritization 10; Fuschitization 1; Carbonatization 5** Moderate-strongly altered shear zone with pervasive biotite / chlorite, carbonate alteration and rare, patchy fuchsite in some quartz veinlets.
114.18	114.19	CIS **Sheared 35°** Strong shearing defined by elongate quartz @ 35 deg tca.
114.53	114.55	VEI;0.02;Cl Qz Mv;T;90°;; **Vein 0.02 Chlorite Quartz Muscovite Tension 90°** Quartz vein with patchy vein margin chlorite and rare, patchy muscovite. Sulphides absent. Non-magnetic.
115.44	116.00	Vn;20%;Cl Qz Pg;T;40°;; **stringers, veinlets 20% Chlorite Quartz Plagioclase Tension 40°** Quartz vein with vein margin chlorite and patchy feldspar. Sulphides absent. Non-magnetic.
116.91	116.92	CIS **Sheared 50°** Strong shearing defined by wispy biotite @ 50 deg tca.
118.85	118.95	VEI;0.04;Qz Mv Pg Cl;T;50°;; **Vein 0.04 Quartz Muscovite Plagioclase Chlorite Tension 50°** Quartz vein with wispy chlorite and muscovite and patchy feldspars. Sulphides absent. Non-magnetic.
120.14	120.15	CIS; MYL **Sheared 50°; Mylonitized** Strong shearing to mylonitization defined by wispy biotite @ 50 deg tca.
120.30	124.05	Vn;10%;Cl Qz Pg;T;50°;Cp00.01 Py00.01; **stringers, veinlets 10% Chlorite Quartz Plagioclase Tension 50° Chalcopyrite 0.01% Pyrite 0.01%** Series of <3cm wide quartz veins with patchy feldspar and wispy chlorite. Some veins are boudinaged or discontinuous, some (e.g. @ 121.38m) exhibit autobrecciation. Very rare, fine grained, disseminated specks of pyrite and chalcopyrite observed in some veins (e.g. @ 120.80m). Rare fuchsite alteration also observed. Non-magnetic.
123.74	123.75	CIS **Sheared 40°** Strong shearing defined by wispy biotite @ 40 deg tca.
124.20	124.44	VEI;0.24;Qz Ab Cl Mv;T;25°;Py00.05; **Vein 0.24 Quartz Albite Chlorite Muscovite Tension 25° Pyrite 0.05%** Discontinuous, boundinaged quartz vein with wispy chlorite and patchy albite. Rare, very fine graned specks of pyrite in chlorite.
124.50	125.60	Py00.5; Cp00.05 **Pyrite 0.5%; Chalcopyrite 0.05%** Fine grained specks of disseminated pyrite and pos. chalcopyrite within sheared diorite material.

Description			
	126.00	126.01	CIS **Sheared 35°** Shearing defined by wispy biotite at 35 deg tca.
	129.30	129.31	CIS **Sheared 25°** Shearing defined by wispy biotite at 25 deg tca.
	131.35	131.49	VEI;0.05;Cl Qz Pg Sr;T;20°;Py00.5; **Vein 0.05 Chlorite Quartz Plagioclase Sericite Tension 20° Pyrite 0.5%** Translucent quartz vein with intensely sheared mafic volcanics. Weakly potassic altered felspars and wispy chlorite-sericite in vein and vein margins. Yellow (sericite?) alteration extending 10cm into adjacent core. Rare, fine grained disseminated pyrite associated with chlorite stringers. Non-magnetic.
132.00	137.00	V3; CIS **Mafic volcanic 60°; Sheared** Dark grey-green, fine-medium-grained, moderate-weakly sheared, non-magnetic, chloritized mafic volcanic. Coarsens downhole, coincident with reduced intensity of shearing. Sulphides absent. Lower contact is sharp @ 60 deg tca	
	132.00	178.40	Chl10; Bio10; POT05 **Chloritization 10; Biotization 10; Potassic 5** Interlayered intervals of mafic volcanics; with wispy biotite and chlorite alteration, and intermediate volcanics with patchy potassic alteration associated with feldspar phenocryts.
	132.10	132.11	CIS **Sheared 40°** Shearing defined by wispy biotite at 40 deg tca.
	134.00	134.02	VEI;0.02;Qz Cl;T;35°;; **Vein 0.02 Quartz Chlorite Tension 35°** 2cm wide quartz vein with wispy chlorite. Sulphides absent. Non-magnetic.
	135.15	135.16	CIS **Sheared 35°** Shearing defined by wispy biotite at 35 deg tca.
137.00	178.40	V2; V3; CIS **Intermediate volcanic 35°; Mafic volcanic; Sheared** Series of interlayered mafic and intermediate volcanic intervals up to 6m in width. Mafic volcanic intervals are fine grained, biotite-chlorite rich, moderately sheared, non-magnetic with rare, fine grained disseminated pyrite. Intermediate volcanics are weakly sheared, medium grained, with white-pink coloured, sub-euhedral, <mm sized clusters of feldspar phenocrysts in a dark-medium grey, fine grained matrix. Sulphides absent, non-magnetic. Contacts are sharp at approximately 35-50 deg tca. REMAINDER OF CORE MISSING / MISLABELLED FROM ROWLANDSON CAMP.	
	138.05	138.06	FO **Foliated 30°** Foliation defined by wispy sericite @ 30 deg tca.

		Description
139.90	139.91	VEI;0.01;Mv Qz Tl;T;35°;Py00.5; **Vein 0.01 Muscovite Quartz Tourmaline Tension 35° Pyrite 0.5%** 1cm wide quartz vein with black tourmaline at vein margins. Disseminated blebs of <mm sized pyrite at vein margins. Potassic alteration and muscovite up to 10cm into adjacent volcanic host. Non-magnetic.
141.10	141.11	FO **Foliated 40°** Foliation defined by wispy biotite at 40 deg tca.
144.06	144.07	FO **Foliated 40°** Foliation defined by wispy biotite at 40 deg tca.
147.05	147.06	FO **Foliated 40°** Foliation defined by wispy biotite a 40 deg tca.
153.20	153.21	FO **Foliated 45°** Foliation defined by wispy biotite at 45 deg tca.
156.25	156.26	FO **Foliated 40°** Foliation defined by elong feldspar phenocrysts @ 40 deg tca.
159.10	159.11	CIS **Sheared 35°** Shearing defined by wispy biotite at 35 deg tca.
161.85	161.86	CIS **Sheared 30°** Shearing defined by composition changes at 30 deg tca.
170.70	170.71	CIS **Sheared 50°** Shearing defined by attenuated carbonate lenses at 50 deg tca.
174.10	174.11	CIS **Sheared 30°** Weak shearing defined by attenuated feldspar phenocrysts at 30 deg tca.
177.05	177.06	CIS **Sheared 40°** Moderate shearing defined by wispy chlorite at 40 deg tca.
177.95	178.00	VEI;0.05;Pg Qz Cl;T;40°;; **Vein 0.05 Plagioclase Quartz Chlorite Tension 40°** Quartz-feldspar vein with wispy, laminated and a ladder texture, with infilling, potassic altered feldspar. Sulphides absent. Non-magnetic.

Northern Superior Resources Inc.

DDH: **TPK-17-056**

Claims title:		Section:	5812896
Township:	Wapitotem	Level:	Surface
Range:		Work place:	Rowlandson
Lot:		Contractor:	Bradley Brothers
Start date:	25/03/2012	Description date:	25/08/2017
End date:	26/03/2012	Author:	Jon O'Callaghan

Collar

Azimuth:	360.00°
Dip:	-50.00°
Length:	198.00

UTM NAD83

East	443882.0
North	5812896.0
Elevation	261.0

Down hole survey

Type	Depth	Azimuth	Dip	Invalid
Reflex	18.00	358.60°	-48.90°	No
Reflex	51.00	358.50°	-48.00°	No
Reflex	102.00	1.90°	-47.70°	No

Type	Depth	Azimuth	Dip	Invalid

Number of samples: 0
Number of QAQC samples: 0
Total sampled length: 0.00

Description:

Core originally logged by Raint River geologist, Darrell Hyde. Relogged by NSR geologist Jon O'Callaghan to gain a better understanding of the high-chargeability and high-resistivity anomaly situated immediately east of the drill collar. Drill collar also situated up-ice of Au-bearing boulder train (as of 2012). Historic summary: 'TPK-12-056 was drilled on the Target 1 area. The hole was designed to test a strong conductivity anomaly as defined by IP. The hole encountered coarse grained quartz monzonite with minor shear zones. Sheared units occur sporadically from 115.9 to 134.9 m. From 123.6 –123.7 one sub-mm speck of visible gold was observed in a quartz vein. The vein contained approximately 20% very coarse pyrrhotite. The shear zones observed appear to coincide with the projection of the very strong conductivity anomaly.'

Core size: BQ core   Cemented: No   Stored: Yes

Description

0.00	7.00	CSG **Casing** Overburden. No core recovered.
7.00	114.30	QMNZ **Quartz Monzonite** Relatively homogenous, coarse grained, grey to grey-pink coloured, non-magnetic quartz monzonite with sporadic zones of increased potassic-haematite alteration associated with intermittent, thin, cross cutting aplite dykes (e.g. @ 83.65m). The interval is cross cut by intermittent zones of weak-moderate shearing, defined by serecite-chlorite bands and attenuated grains of quartz. Some zones of shearing host trace-rare diseminated specks of pyrite and possible arsenopyrite. Quartz veining largely absent from the interval. Possible brittle fault/structure @ 63.52-64.20m defined by rubble core.
7.00	80.50	Chl10; Pot07; Ser05; Car01; Hem02 **Chloritization 10; Potassic 7; Sericitization 5; Carbonatization 1; Hematization 2** Relatively homogenous QMNZ with sporadic zones of weak, diffuse pink potassic-haematite alteration. Weak, diffuse carbonate throughout. Serecite alteration associated with intermittent zones of thin, weak-moderate shearing.
17.14	17.17	VEI;0.02;Cl Qz Pg;T;75°;Py01; **Vein 0.02 Chlorite Quartz Plagioclase Tension 75° Pyrite 1%** Laminated quartz vein with feldspar and black chlorite stringers. Rare specks of fg pyrite. Hosted within weak-moderate sheared QMNZ. Non-magnetic.
20.83	20.86	CIS60 **Sheared60 40°** Weak-moderate shearing defined by wispy serecite-chlorite and grain size reduction. Sharp upper and lower contacts. Sulphides absent.
22.38	22.45	CIS40 **Sheared40 70°** Weak-moderate shearing defined by wispy serecite-chlorite and grain size reduction. Sharp upper and lower contacts. Sulphides absent. Shear parellel quartz vein.
22.43	22.46	VEI;0.02;Pg Qz Cl;T;70°;; **Vein 0.02 Plagioclase Quartz Chlorite Tension 70°** Grey quartz-feldspar with wispy chlorite stringers. Sulphides absent. Hosted in thin, weak-moderate shear zone.
29.60	29.65	CIS90 **Sheared90 50°** Moderate shear zone with chlorite-serecite bands with fine grained quartz augen. Gradational upper, sharp lower contact.
32.20	32.21	VEI;0.01;Qz Pg Cl;T;10°;; **Vein 0.01 Quartz Plagioclase Chlorite Tension 10°** 1cm wide grey quartz-pink feldspar vein with black chlorite along vein margins. Sulphides absent.
63.52	64.20	FRC **Fractured** Fractured and fragmented core with rubble material between 64.10-64.20m possibly a washed out fault material? Sulphides absent. No fracture coatings. Non-magnetic.

		Description
64.80	64.96	CIS20 **Sheared20 80°** Weakly sheared zone defined by wispy serecite-chlorite bands. Hosts elongated, anhedral stringers of pyrite. Weak magnetic response.
75.50	75.52	CIS25 **Sheared25 25°** Weakly sheared, thin interval of QMNZ with wispy serecite-chlorite. Sulphides abssent.
77.40	77.70	CIS30 **Sheared30 80°** Weakly sheared QMNZ defined by wispy-serecite-chlorite stringers. Sulphides absent. Non-magnetic
78.78	79.00	CIS30 **Sheared30 60°** Weakly sheared interval defined by wispy serecite-chlorite stringers. Sulphides absent. Sharp upper and lower contacts. Non-magnetic.
80.50	89.20	Hem05; Pot15; Car01; Chl10 **Hematization 5; Potassic 15; Carbonatization 1; Chloritization 10** Moderately-strongly potassic-haematite altered, pink-grey QMNZ with diffuse carbonate and patchy chlorite. Alteration gradationally increases and decreases in intensity. Appears to be spatially associated with thin (<10cm) cross cutting aplite dykes (e.g., @ 83.65m).
83.65	83.76	I1F **Aplite 85°** Fine grained, equigranular, pink-potassic altered aplite dyke with sharply defined upper contact, lower contact fractured and fragmented, possible fault? Sulphides absent. Non-magnetic.
89.20	114.30	Car01; Chl10; Hem02; Pot05; Ser08 **Carbonatization 1; Chloritization 10; Hematization 2; Potassic 5; Sericitization 8** Continuation of relatively homogenous QMNZ with diffuse, weak carbonate and sporadic potassic-haematite alteration. Serecite associated with intermittent, cross cutting shear zones.
92.32	92.46	CIS40 **Sheared40 70°** Weak-moderate sheared QMNZ defined by wispy serecite-chlorite and quartz-feldspar augen.
97.66	98.50	CIS20 **Sheared20 65°** Series of several, <3cm wide, weak shears defined by wispy serecite-chlorite stringers with rare, fine grained, disseminated specks of pyrite. Non-magnetic.
104.67	106.81	VEI;0.14;Qz Pg;T;30°;; **Vein 0.14 Quartz Plagioclase Tension 30°** Grey-transluscent quartz with pink feldspar. Sulphides absent.
105.45	105.50	CIS30 **Sheared30 85°** Weakly sheared interval of QMNZ defined by wispy serecite-chlorite. Sulphides absent.

Description		
106.50	106.52	CIS40 **Sheared40 20°** Thin, moderate shear zone defined by wispy serecite-chlorite. Sulphides absent.
111.00	111.70	CIS50 **Sheared50 5°** Wispy, serecite-chlorite shear <1cm wide with horsetail splays. Main shear at 5 deg tca. Non-magnetic. Trace disseminated specks of pyrite.
114.10	115.94	CIS10 **Sheared10 40°** Weak shear zone defined by sporadic, wispy bands of serecite-chlorite and an aligned mineral fabric within the QMNZ. Rare specks of pyrite associated with the serecite bands. Non-magnetic. Acts as upper contact area into main zone of shearing in underlying interval.
114.30	117.83	M8 (QMNZ); CIS; MN **Sheared Monzonite 50°; Sheared; Mylonitic** A moderately sheared interval of quartz monzonite, with a strongly sheared to protomylonitic 'core' between 115.94-116.95m, hosting rare clusters of pyrite and possibly pyrrhotite in a strongly silicified and serecitized matrix. The core fabric is also orientated at closer to 80 deg tca. The fabric in the adjacent zones (50 deg tca) could represent fault/shear-drag deformation. The adjacent sections of the shear also contain serecite-chlorite bands and an aligned mineral fabric with gradational contacts into the overlying and underlying intervals. Rare specks and stringers of disseminated pyrite throughout the entire interval. Patchy magnetism associated woth sulphide clusters.
114.30	115.94	Ser05; Sil15; Chl08 **Sericitization 5; Silicification 15; Chloritization 8** Increased shearing coincides with increased silicification and decreased potassic alteration of QMNZ groundmass.
114.30	123.30	Po00.5; Py02; As00.5 **Pyrrhotite 0.5%; Pyrite 2%; Arsenopyrite 0.5%** Fine grained specks of disseminated pyrite an trace pyrrhotite-arsenopyrite with the groundmass of serecitized shear zones and adjacent quartz monzonite groundmass.
115.94	116.95	Sil30; Ser30; Chl03; Car01 **Silicification 30; Sericitization 30; Chloritization 3; Carbonatization 1** Strongly altered and strongly sheared interval with pervasive silicic alterations and serecite clots. Rare wispy chlorite.
115.94	116.95	CIS90 **Sheared90 80°** Strongly sheared to protomylonitic interval of strongly silicified and serecitized QMNZ. Evidence of the precursor assemblage overprinted. Rare, hairline stringers of chlorite and blebby, sporadically disseminated, anhedral pyrite and possible rare pyrrhotite. Assayed ~0.96g/t Au (Rainy River Assays 2012).
116.67	116.68	VEI;0.01;Qz;T;80°;Py05; **Vein 0.01 Quartz Tension 80° Pyrite 5%** Grey-transluscent quartz vein with anhedral blebs of pyrite. Non-magnetic.
116.85	116.86	VEI;0.01;Qz;T;80°;Py00.5; **Vein 0.01 Quartz Tension 80° Pyrite 0.5%**

Description
Grey-transluscent quartz vein with rare specks of pyrite. Non-magnetic.
116.95 123.30 Car01; Chl10; Ser10; Pot02
Carbonatization 1; Chloritization 10; Sericitization 10; Potassic 2
Less altered and less sheared interval. Shear zones associated with increased serecite and chlorite content. Weak, patchy potassic alteration of individual feldspar grains. Diffuse carbonate alteration.
116.95 117.83 CIS60
Sheared60 40°
Moderate-strong sheared interval of QMNZ defined by serecite-chlorite bands and attenuated quartz-feldspar grains. Rare, fine grained disseminated specks and hairline stringers of pyrite.
117.83 123.30 QMNZ
Quartz Monzonite
Light grey, coarse grained, non-magnetic quartz monzonite with inermittent zones of moderate shearing defined by serecite-chlorite and attenuated quartz grains. Disseminated pyrite specks and stringers throughout the interval, though mainly associted with thin (<5cm wide) shear zones. Hydrosilicate content of the interval reduced compared to overlying quartz monzonite (transitioning towards leucogranite?).
121.56 121.87 CIS60
Sheared60 20°
Moderately sheared QMNZ with chlorite-serecite bands and attenuated quartz grains. Centre of shear is more quartz rich than margins.Rare specks of disseminated pyrite.
123.30 123.83 M8 (QMNZ); CIS
Sheared Monzonite 35°; Sheared
Moderately sheared QMNZ with undulose, wispy chlorite-serecite bands and attenuated quartz grains. The shear hosts clusters of medium-coarse grained pyrite-pyrrhotite, in addition to a very fine grained speck of visible gold @ 123.43m. Sharp upper and undulose lower contacts.
123.30 123.83 Sil15; Sil10
Silicification 15; Silicification 10
Moderately sheared interval of QMNZ with wispy bands of serecite and weak-diffuse silicic alteration. Interval hosts significant pyrite-pyrrhotite and visible Au.
123.30 123.83 CIS50
Sheared50 30°
Moderately sheared interval of QMNZ with hairline-width, curved planes of serecite-chlorite in the adjacent QMNZ (horsetails). Anhedral clusters of pyrite and (reported in Rainy River log 2012) pyrrhotite though none of latter observed. Patchy magnetism associated with sulphides.
123.30 123.83 Au00.05; Py10; As00.5; Cp02
Gold 0.05%; Pyrite 10%; Arsenopyrite 0.5%; Chalcopyrite 2%
Serecitized, moderately intense shear zone within quartz monzonite, hosting medium to coarse grained clusters of pyrite-pyrrhotite-chalcopyrite and possible, trace arsenopyrite. Single, fine grained speck of visible gold @ 123.43m within block of silicified but relatively unsheared quatz monzonite material hosted within the shear.
123.83 128.30 QMNZ

Description			
		Quartz Monzonite Light grey, coarse grained, non-magnetic QMNZ with fine grained disseminated specks of pyrite throughout. Intermittent zones of thin serecite-shearing @ 60 deg tca, some hosting shear parallel, <1cm wide, grey-transluscent quartz veinlets hosting specks of pyrite.	
123.83	128.30	Ser05; Car00.5; Chl10 **Sericitization 5; Carbonatization 0.5; Chloritization 10** Relatively unaltered QMNZ with very weak, diffuse carbonate alteration, patchy chlorite. Wispy serecite/silicic alteration associated with thin <5cm wide shear zones and associated quartz veinlets.	
123.83	128.30	Py05; As00.5; Cp00.5 **Pyrite 5%; Arsenopyrite 0.5%; Chalcopyrite 0.5%** Disseminations and stringers of fine grained pyrite throughout the relatively unsheared interval of QMNZ. Pos, trace chalcopyrite and arsenopyrite. Sulphides also associated with thin, cross cutting, serecite shear zones <5cm wide hosting shear parallel <1cm grey quartz veinlets.	
128.30	134.86	M8 (QMNZ); CIS **Sheared Monzonite 40°; Sheared** Shear zone comprising strong-moderately sheared, non-magnetic intervals of QMNZ, exhibiting pervasive silicic and serecitic alteration and hosting hairline stringers and disseminations of pyrite and rare-trace arsenopyrite throughout. Shearing most intense between 128.30-130.20 and 131.81-134.86m. Sharp upperc and lower contacts @ ~40 deg tca. Veining absent.	
128.30	134.86	Chl08; Sil15; Ser15 **Chloritization 8; Silicification 15; Sericitization 15** Strongly-moderately sheared interval of QMNZ (shearing strongest towards margins ov shear zone). Pervasive silicic-serecite alteration. Patchy chlorite associated with less-sheared sections of QMNZ.	
128.30	134.86	CIS80 **Sheared80 40°** Shear zone comprising strong-moderately sheared, non-magnetic intervals of QMNZ, exhibiting pervasive silicic and serecitic alteration and hosting hairline stringers and disseminations of pyrite and rare-trace arsenopyrite throughout. Shearing most intense between 128.30-130.20 and 131.81-134.86m. Sharp upperc and lower contacts @ ~40 deg tca. Veining absent.	
134.86	145.95	QMNZ **Quartz Monzonite** Coarse grained, moderate-weakly potassic-haematite altered, non-magnetic, unsheared quartz monzonite. Potassic alteration diminshes towards underlying shear zone from ~143.50m onwards. Rare-trace, disseminated specks of pyrite within the groundmass.	
134.86	145.95	Ser05; Pot10; Hem05; Car00.5; Chl10 **Sericitization 5; Potassic 10; Hematization 5; Carbonatization 0.5; Chloritization 10** Moderately potassic-haematite altered, unsheared QMNZ with patchy chlorite, wispy sporadic serecite and diffuse, weak carbonate alteration. Potassic/haematite absent from 144.50m.	
138.31	138.32	VEI;0.01;Qz;T;55°;; **Vein 0.01 Quartz Tension 55°** 1 cm wide, grey-transluscent quartz vein @ 55 deg tca. Sulphides absent.	
144.39	144.54	VEI;0.15;Qz Cl;T;30°;Py15;	

Description

Vein 0.15 Quartz Chlorite Tension 30° Pyrite 15%
Grey-transluscent quartz vein cross cutting shear zone at acute angle. Hosts interconnected, anhedral, angular (fracture filling?), coarse pyrite. Non-magnetic. Sporadic clots of chlorite hosted within the vein.

145.95 151.69 M8 (QMNZ); CIS
Sheared Monzonite 55°; Sheared
Strongly sheared-protomylonitic QMNZ with pervasive, strong silicic-serecitic alteration with quartz grain augens. Dissemination and shear-parallel stringers of pyrite-pyrrhotite throughout the shear zone. Sharp upper contact and gradational lower contact @ 55 deg tca. Shear cut by grey-transluscent quartz vein @149.26m. Patchy magnetism associated with pyrrhotite.

145.95 151.69 Chl05; Sil20; Ser15
Chloritization 5; Silicification 20; Sericitization 15
Strongly sheared-protomylonitic QMNZ with wispy serecite and pervasive silicic alteration. Sporadic stringers of hairline, shear-parallel chlorite.

145.95 151.69 CIS80
Sheared80 55°
Strongly sheared, silicified and serecitized shear zone with sharply defined upper contact and gradational lower contact, hosting pyrite-pyrrhotite. Patchy magnetism. Cross cut bu grey quartz vein that cuts shear foliation @ ~144.50m

145.95 151.69 Py02; As00.5; Po00.5
Pyrite 2%; Arsenopyrite 0.5%; Pyrrhotite 0.5%
Disseminations and stringers of fine grained pyrite, with patchy, magnetic pyrrhotite and possible trace arsenopyrite. Hosted within strongly sheared and altered QMNZ/I1B.

151.69 198.00 I1B
Granite
Tentatively termed 'Leucogranite', based on prescence of angular feldspar grains and reduced chlorite-biotite content compared with quartz monzonite seen in overlying interval (shear zones at QMNZ-I1B contact?). Relatively homogenous, unsheared, non-magnetic, coarse-medium grained. Sporadic, thin (<5cm wide) serecite shears @ 157.90, 159.43 and 167.60m. Sulphides absent. Patchy, diffuse-pervasive pink-potassic/haematite alteration throughout.
EOH @ 198.00m. Previously reported as 201.00m, but this does not comply with the run-markers.

151.69 198.00 Pot10; Hem05; Car00.5; Chl08; Ser03
Potassic 10; Hematization 5; Carbonatization 0.5; Chloritization 8; Sericitization 3
Pink-grey, unsheared, non-magnetic leucogranite with diffuse potassic-haematite and weak carbonate alteration. Patchy chlorite. Serecite associated with thin <5cm weak-moderate shears

157.96 157.97 CIS40
Sheared40 85°
Thin, moderately sheared interval defined by serecite bands and grain size reduction. Sulphides absent. Non-magnetic.

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Exploring Heavy Minerals

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	September 25, 2017
Project name:	TPK
ODM batch number:	7576
Sample numbers:	W129001 to 003, 007 to 015, 104 to 112, 313 to 315, 116 to 118, 151 to 153, 157 to 159, 201 to 203 and 304 to 307
Data file:	20177576 Northern Superior - Avery - W - 40 for gold - September 2017
Number of samples in this report:	40
Number of samples processed to date:	40
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

Don Holmes

Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

						Screening and Shaking Table Sample Descriptions												
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)							
	Weight (kg wet)						Percentage				Distribution					Colour		
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT**	S/U	SD	ST	CY	ORG	SD	CY	Class
W129001	13.5	0.3	13.2	1.4	11.8	P	40	30	30	0	U	+	Y	-	N	LOC	LOC	TILL
W129002	11.4	0.3	11.1	0.9	10.2	P	50	30	20	0	U	+	Y	-	N	LOC	LOC	TILL
W129003	15.6	0.3	15.3	2.3	13.0	P	85	10	5	0	U	+	Y	-	N	OC	OC	TILL
W129007	13.3	0.3	13.0	1.3	11.7	P	30	40	30	0	U	+	Y	-	N	OC	OC	TILL
W129008	15.3	0.3	15.0	1.2	13.8	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129009	12.5	0.3	12.2	0.0	12.2		No Clasts				S	F	+	+	N	OC	OC	SILT + CLAY
W129010	13.6	0.3	13.3	1.3	12.0	P	50	50	Tr	0	U	+	+	-	N	OC	OC	TILL
W129011	13.5	0.3	13.2	1.5	11.7	P	60	40	0	0	U	Y	Y	Y	N	OC	OC	TILL
W129012	13.2	0.3	12.9	1.3	11.6	P	90	10	0	0	U	Y	Y	Y	N	OC	OC	TILL
W129013	12.4	0.3	12.1	1.6	10.5	P	95	5	0	0	U	Y	Y	Y	N	OC	OC	TILL
W129014	14.6	0.3	14.3	2.6	11.7	P	80	10	10	0	U	+	Y	-	N	OC	OC	TILL
W129015	14.8	0.3	14.5	1.8	12.7	P	90	10	0	0	U	+	Y	-	N	OC	OC	TILL
W129104	11.3	0.3	11.0	1.1	9.9	P	70	30	0	0	U	Y	+	-	N	BE	LOC	TILL
W129105	12.5	0.3	12.2	1.8	10.4	P	60	30	10	0	U	Y	+	-	N	LOC	LOC	TILL
W129106	12.0	0.3	11.7	1.3	10.4	P	70	30	0	0	U	+	Y	-	N	OC	OC	TILL
W129107	11.8	0.3	11.5	0.8	10.7	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129108	11.6	0.3	11.3	0.8	10.5	P	60	10	30	0	U	+	Y	-	N	BE	LOC	TILL
W129109	12.2	0.3	11.9	0.6	11.3	P	70	20	10	0	U	Y	Y	Y	N	OC	OC	TILL
W129110	12.2	0.3	11.9	0.5	11.4	P	40	30	30	0	U	Y	+	-	N	BE	BE	TILL
W129111	12.1	0.3	11.8	0.8	11.0	P	95	5	0	0	U	Y	+	-	N	GY	GY	TILL
W129112	11.9	0.3	11.6	0.4	11.2	P	70	30	0	0	U	Y	+	-	Y	OC	OC	TILL
W129313	11.6	0.3	11.3	2.7	8.6	P	30	70	0	0	U	+	Y	-	Y	DOC	DOC	TILL
W129314	10.3	0.3	10.0	0.9	9.1	P	50	40	10	0	U	Y	+	-	N	LOC	LOC	TILL
W129315	11.9	0.3	11.6	0.5	11.1	P	35	50	15	0	U	Y	+	-	N	LOC	LOC	TILL
W129116	12.2	0.3	11.9	0.7	11.2	P	40	30	30	0	U	Y	Y	Y	N	LOC	LOC	TILL
W129117	12.0	0.3	11.7	0.9	10.8	P	60	20	20	0	U	Y	+	-	N	LOC	LOC	TILL
W129118	9.3	0.3	9.0	0.3	8.7	P	40	10	50	0	U	Y	Y	Y	N	BE	BE	TILL
W129151	13.4	0.3	13.1	2.4	10.7	P	40	40	20	Tr	U	+	Y	-	N	OC	OC	TILL
W129152	11.7	0.3	11.4	1.6	9.8	C	20	60	20	0	U	+	Y	-	N	LOC	LOC	TILL
W129153	15.5	0.3	15.2	1.4	13.8	P	40	20	40	0	U	Y	+	-	N	BE	BE	TILL
W129157	11.9	0.3	11.6	2.4	9.2	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129158	12.9	0.3	12.6	1.9	10.7	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129159	14.0	0.3	13.7	2.1	11.6	C	70	15	15	0	U	+	Y	-	N	BE	BE	TILL
W129201	12.4	0.3	12.1	2.4	9.7	P	45	10	45	0	U	+	Y	-	N	BE	BE	TILL
W129202	12.1	0.3	11.8	1.4	10.4	P	30	70	0	0	U	+	Y	-	N	OC	OC	TILL
W129203	9.8	0.3	9.5	1.1	8.4	C	50	50	0	0	U	Y	+	-	N	OC	OC	TILL
W129304	12.8	0.3	12.5	0.5	12.0	P	50	40	10	0	U	Y	Y	Y	N	OC	OC	TILL
W129305	13.1	0.3	12.8	1.6	11.2	P	80	20	0	0	U	Y	Y	Y	N	LOC	LOC	TILL
W129306	12.7	0.3	12.4	0.7	11.7	P	30	20	50	0	U	Y	Y	Y	N	BE	LOC	TILL
W129307	13.4	0.3	13.1	0.9	12.2	P	40	10	50	0	U	Y	Y	Y	N	BE	LOC	TILL

*Clast listed as "OT" is quartz.
** Samples prescreened to -8.0 mm in the field.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129001	2	0	1	1	47.2	1	0	1	<1
W129002	8	3	2	3	40.8	14	8	2	3
W129003	153	2	43	108	52.0	953	11	374	568
W129007	233	11	65	157	46.8	212	6	51	156
W129008	50	4	10	36	55.2	123	42	9	71
W129009	1	0	0	1	48.8	<1	0	0	<1
W129010	33	19	3	11	48.0	101	64	1	35
W129011	171	71	37	63	46.8	284	171	63	51
W129012	24	15	0	9	46.4	18	16	0	2
W129013	42	11	7	24	42.0	100	37	26	37
W129014	117	40	15	62	46.8	645	565	6	73
W129015	112	35	22	55	50.8	5475	2180	521	2774
W129104	8	0	1	7	39.6	21	0	5	16
W129105	4	1	0	3	41.6	13	5	0	9
W129106	218	19	23	176	41.6	342	19	132	191
W129107	4	3	1	0	42.8	3	1	2	0
W129108	8	5	1	2	42.0	10	9	1	<1
W129109	4	1	1	2	45.2	17	1	8	8
W129110	93	7	19	67	45.6	508	312	56	140
W129111	9	1	3	5	44.0	8	2	4	3
W129112	6	1	1	4	44.8	1	<1	1	<1
W129313	0	0	0	0	34.4	0	0	0	0
W129314	4	1	0	3	36.4	2	2	0	<1
W129315	3	0	1	2	44.4	9	0	8	1
W129116	1	0	1	0	44.8	<1	0	<1	0
W129117	2	2	0	0	43.2	2	2	0	0
W129118	1	0	0	1	34.8	<1	0	0	<1
W129151	6	1	2	3	42.8	45	1	40	5
W129152	9	2	2	5	39.2	9	6	2	1
W129153	27	3	3	21	55.2	37	7	20	10
W129157	11	1	1	9	36.8	93	<1	75	17
W129158	30	8	6	16	42.8	344	27	311	6
W129159	2	0	0	2	46.4	2	0	0	2
W129201	2	0	0	2	38.8	<1	0	0	<1
W129202	5	1	3	1	41.6	9	2	7	<1
W129203	17	1	3	13	33.6	102	1	94	7
W129304	41	3	4	34	48.0	30	1	12	17
W129305	53	1	4	48	44.8	76	<1	9	67
W129306	5	1	0	4	46.8	361	1	0	361
W129307	21	1	0	20	48.8	38	4	0	34

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129001	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25		1		1		1	
								2	47.2	1	
W129002	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25		1	2	3		2	
	8	C	25	50		1	1	2		4	
	10	C	25	75	1			1		4	
	10	C	50	50	1			1		5	
								8	40.8	14	
W129003	3	C	15	15		3	20	23		2	Tr (~20 grains) pyrite (25-150 µm).
	5	C	25	25		11	29	40		19	
	8	C	25	50		4	15	19		26	
	10	C	25	75		1	7	8		22	
	10	C	50	50	1	13	14	28		103	
	13	C	50	75	1	4	9	14		96	
	15	C	50	100			6	6		66	
	15	C	75	75		4	1	5		62	
	18	C	75	100		1	3	4		76	
	22	C	75	150			1	1		36	
	50	M	75	200		1	1	2		216	
	50	M	100	125			1	1		90	
	20	C	100	100			1	1		29	
	50	M	100	150		1		1		108	
								153	52.0	953	
W129007	3	C	15	15	5	30	80	115		13	Tr (~100 grains) pyrite (25-250 µm).
	5	C	25	25	4	20	41	65		34	
	8	C	25	50	2	12	25	39		60	
	10	C	25	75		1	3	4		12	
	10	C	50	50			4	4		16	
	13	C	50	75		2	2	4		31	
	15	C	75	75			1	1		14	
	20	C	100	100			1	1		32	
								233	46.8	212	
W129008	3	C	15	15		2	15	17		2	No sulphides.
	5	C	25	25		4	8	12		5	
	8	C	25	50		3	6	9		12	
	10	C	50	50	1	1	2	4		14	
	13	C	50	75	2		4	6		39	
	20	C	75	125	1		1	2		51	
								50	55.2	123	
W129009	5	C	25	25			1	1		<1	No sulphides.
								1	48.8	<1	
W129010	3	C	15	15	12	1	3	16		2	Tr (5 grains) pyrite (25-50 µm).
	5	C	25	25	5	2	6	13		7	
	8	C	25	50			1	1		2	
	22	C	50	175			1	1		31	
	20	C	75	125	1			1		29	
	20	C	100	100	1			1		31	
								33	48.0	101	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129011	3	C	15	15	36	13	38	87		10	No sulphides.
	5	C	25	25	20	15	13	48		25	
	8	C	25	50	3	4	7	14		22	
	10	C	25	75	1	2	2	5		15	
	10	C	50	50	3			3		12	
	13	C	50	75		1	3	4		31	
	15	C	50	100	3	1		4		49	
	15	C	75	75	2			2		27	
	18	C	75	100	2	1		3		63	
	20	C	75	125	1			1		30	
								171	46.8	284	
W129012	3	C	15	15	8		7	15		2	Tr (~100 grains) galena (15-125 µm).
	5	C	25	25	2		2	4		2	Tr (~10 grains) pyrite (25-125 µm).
	8	C	25	50	4			4		6	
	13	C	50	75	1			1		8	
								24	46.4	18	
W129013	3	C	15	15	2	1	11	14		2	Tr (~50 grains) pyrite (25-500 µm).
	5	C	25	25	2	3	5	10		6	
	8	C	25	50	1	1	4	6		10	
	10	C	25	75	1			1		3	
	10	C	50	50	3		2	5		23	
	13	C	50	75	2	1	2	5		43	
	15	C	50	100		1		1		14	
								42	42.0	100	
W129014	3	C	15	15	16	10	34	60		7	No sulphides.
	5	C	25	25	6	3	10	19		10	
	8	C	25	50	7	2	12	21		33	
	10	C	25	75	1			1		3	
	10	C	50	50	2		3	5		21	
	13	C	50	75	3		1	4		31	
	15	C	50	100			1	1		12	
	15	C	75	75	2		1	3		41	
	22	C	100	125	1			1		45	
	75	M	100	150	1			1		180	
	75	M	125	175	1			1		263	
								117	46.8	645	
W129015	3	C	15	15	8	6	27	41		4	Tr (2 grains) pyrite (25 µm).
	5	C	25	25	10	6	12	28		13	
	8	C	25	50	3	3	5	11		16	
	10	C	25	75			2	2		6	
	10	C	50	50	6		1	7		26	
	13	C	50	75	1	1	3	5		35	
	15	C	50	100	1			1		11	
	15	C	75	75	1	1	1	3		38	
	18	C	75	100	1	1	2	4		78	
	22	C	75	150	1	1	1	3		111	
	20	C	100	100	1			1		30	
	25	C	125	125		2		2		114	
	100	M	100	250	1			1		369	
	100	M	125	175		1		1		323	
	200	M	225	250	1			1		1661	
	200	M	275	325			1	1		2639	
								112	50.8	5475	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129104	3	C	15	15			5	5		1	No sulphides.
	5	C	25	25			1	1		1	
	10	C	50	50		1		1		5	
	15	C	50	100			1	1		14	
								8	39.6	21	
W129105	5	C	25	25			1	1		1	No sulphides.
	10	C	25	75			1	1		3	
	10	C	50	50	1		1	2		9	
								4	41.6	13	
W129106	3	C	15	15	9	8	112	129		16	No sulphides.
	5	C	25	25	6	7	40	53		31	
	8	C	25	50	1	1	10	12		21	
	10	C	25	75	1		1	2		7	
	10	C	50	50	2	2	5	9		42	
	13	C	50	75		3	4	7		60	
	15	C	50	100			3	3		41	
	18	C	75	100		1		1		24	
	20	C	75	125			1	1		34	
	25	C	100	150		1		1		67	
								218	41.6	342	
W129107	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	2			2		1	
	8	C	25	50		1		1		2	
								4	42.8	3	
W129108	3	C	15	15	3		2	5		1	No sulphides.
	5	C	25	25	1	1		2		1	
	13	C	50	75	1			1		9	
								8	42.0	10	
W129109	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25	1			1		1	
	13	C	50	75		1	1	2		16	
								4	45.2	17	
W129110	3	C	15	15	2	5	26	33		4	No sulphides.
	5	C	25	25	3	9	23	35		19	
	8	C	25	50	1	2	8	11		17	
	10	C	25	75			2	2		6	
	10	C	50	50		1	1	2		8	
	13	C	50	75			3	3		24	
	15	C	50	100		1	2	3		37	
	18	C	75	100			1	1		22	
	20	C	75	125		1	1	2		62	
	50	M	150	250	1			1		308	
								93	45.6	508	
W129111	3	C	15	15			2	2		<1	Tr (5 grains) pyrite (25-100 µm).
	5	C	25	25		1	2	3		2	
	8	C	25	50	1	2	1	4		7	
								9	44.0	8	
W129112	3	C	15	15	1		4	5		1	No sulphides.
	5	C	25	25		1		1		1	
								6	44.8	1	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129313	No Visible Gold										Tr (~20 grains) pyrite (25 µm).
W129314	3	C	15	15			3	3		<1	No sulphides.
	8	C	25	50	1			1		2	
								4	36.4	2	
W129315	3	C	15	15			1	1		<1	Tr (7 grains) scheelite (50-500 µm).
	5	C	25	25			1	1		1	Tr (1 grain) pyrite (500 µm).
	13	C	50	75		1		1		8	
								3	44.4	9	
W129116	3	C	15	15		1		1		<1	Tr (4 grains) scheelite (50-500 µm).
								1	44.8	0	No sulphides.
W129117	3	C	15	15	1			1		<1	No sulphides.
	8	C	25	50	1			1		2	
								2	43.2	2	
W129118	3	C	15	15			1	1		<1	No sulphides.
								1	34.8	0	
W129151	3	C	15	15			1	1		<1	Tr (~20 grains) pyrite (25-100 µm).
	5	C	25	25	1		1	2		1	
	10	C	50	50		1	1	2		9	
	20	C	100	100		1		1		35	
								6	42.8	45	
W129152	3	C	15	15			4	4		1	Tr (1 grain) scheelite (250 µm).
	5	C	25	25	1	1	1	3		2	No sulphides.
	8	C	25	50		1		1		2	
	10	C	50	50	1			1		5	
								9	39.2	9	
W129153	3	C	15	15	1		15	16		2	Tr (2 grains) scheelite (500 µm).
	5	C	25	25	1	1	3	5		2	No sulphides.
	8	C	25	50		1	1	2		3	
	10	C	25	75			1	1		3	
	10	C	50	50			1	1		3	
	13	C	50	75	1			1		6	
	18	C	75	100		1		1		18	
								27	55.2	37	
W129157	3	C	15	15	1		3	4		1	Tr (~30 grains) scheelite (25-1500 µm).
	5	C	25	25			2	2		1	No sulphides.
	8	C	25	50			3	3		6	
	13	C	50	75			1	1		10	
	25	C	100	150		1		1		75	
								11	36.8	93	
W129158	3	C	15	15	2	1	12	15		2	Tr (1 grain) molybdenite (100 µm).
	5	C	25	25	2	2	2	6		3	Tr (5 grains) pyrite (250-500 µm).
	8	C	25	50	1	2	2	5		8	
	10	C	50	50	2			2		9	
	15	C	75	75	1			1		15	
	100	M	100	175		1		1		307	
								30	42.8	344	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - 40 for gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7576

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129159	3	C	15	15			1	1		<1	Tr (5 grains) pyrite (25-50 µm).
	8	C	25	50			1	1		2	
								2	46.4	2	
W129201	3	C	15	15			2	2		<1	Tr (2 grains) scheelite (250-500 µm).
								2	38.8	<1	
W129202	3	C	15	15			1	1		<1	Tr (1 grain) scheelite (150 µm).
	5	C	25	25		1		1		1	
	8	C	25	50	1	1		2		3	
	10	C	50	50		1		1		5	
								5	41.6	9	
W129203	3	C	15	15			9	9		1	Tr (~20 grains) pyrite (25-500 µm).
	5	C	25	25	1	1	2	4		3	
	8	C	25	50			2	2		4	
	13	C	50	75		1		1		11	
	25	C	100	150		1		1		83	
								17	33.6	102	
W129304	3	C	15	15	2		19	21		2	Tr (1 grain) scheelite (250 µm).
	5	C	25	25	1		10	11		6	
	8	C	25	50		3	4	7		11	
	10	C	50	50			1	1		4	
	13	C	50	75		1		1		7	
								41	48.0	30	
W129305	3	C	15	15	1	1	30	32		4	Tr (~30 grains) scheelite (50-1000 µm).
	5	C	25	25		2	7	9		5	Tr (~10 grains) pyrite (50-250 µm).
	8	C	25	50			4	4		6	
	10	C	25	75			2	2		6	
	10	C	50	50			2	2		9	
	13	C	50	75		1	2	3		24	
	18	C	75	100			1	1		22	
								53	44.8	76	
W129306	3	C	15	15			3	3		<1	Tr (1 grain) pyrite (1000 µm).
	5	C	25	25	1			1		1	
	75	M	150	200			1	1		361	
								5	46.8	361	
W129307	3	C	15	15			10	10		1	Tr (1 grain) scheelite (250 µm).
	5	C	25	25			6	6		3	No sulphides.
	8	C	25	50			1	1		1	
	10	C	50	50	1		2	3		12	
	18	C	75	100			1	1		20	
								21	48.8	38	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Exploring Heavy Minerals

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	September 27, 2017
Project name:	TPK
ODM batch number:	7577
Sample numbers:	W129308 to 123312, W129113 to 129115, W129004 to 129006, W129016 to 129024
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	60
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:
1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

for Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7577

Sample Number	Weight (kg wet)					Screening and Shaking Table Sample Descriptions													
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)								
							Percentage				Distribution					Colour			
	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT	S/U	SD	ST	CY	ORG	SD	CY	Class
W129308	12.0	0.3	11.7	0.7	11.0	P	90	10	0	0	U	-	+	-	N	LOC	LOC	TILL
W129309	12.2	0.3	11.9	0.8	11.1	P	50	20	30	0	U	-	+	Y	N	LOC	LOC	TILL
W129310	12.7	0.3	12.4	0.6	11.8	P	50	10	40	0	U	+	Y	-	N	LOC	LOC	TILL
W129311	12.3	0.3	12.0	0.1	11.9	G	40	20	40	0	S	F	+	+	N	OC	OC	SAND + SILT + CLAY
W129312	8.7	0.3	8.4	0.1	8.3	G	50	50	0	0	S	F	+	+	N	OC	OC	SAND + SILT + CLAY
W129113	12.2	0.3	11.9	0.8	11.1	P	10	90	0	0	U	+	Y	-	N	OC	OC	TILL
W129114	12.1	0.3	11.8	1.6	10.2	P	10	90	0	0	U	Y	+	-	N	LOC	LOC	TILL
W129115	11.9	0.3	11.6	1.0	10.6	P	10	90	0	0	U	Y	+	-	N	LOC	LOC	TILL
W129004	11.4	0.3	11.1	0.1	11.0	G	10	90	0	0	S	F	+	+	N	OC	OC	SAND + SILT + CLAY
W129005	13.9	0.3	13.6	0.0	13.6			No Clasts			S	F	+	+	N	OC	OC	SAND + SILT + CLAY
W129006	16.0	0.3	15.7	0.2	15.5	G	60	40	0	0	S	F	+	+	N	DOC	DOC	SAND + SILT + CLAY
W129016	12.4	0.3	12.1	1.0	11.1	P	50	50	0	0	U	+	Y	-	N	OC	OC	TILL
W129017	14.0	0.3	13.7	3.0	10.7	P	40	60	0	0	U	+	Y	-	N	DOC	DOC	TILL
W129018	11.9	0.3	11.6	1.2	10.4	P	35	65	0	0	U	+	Y	-	N	LOC	LOC	TILL
W129019	13.1	0.3	12.8	0.9	11.9	P	50	50	0	0	U	+	Y	-	N	LOC	LOC	TILL
W129020	13.8	0.3	13.5	2.5	11.0	P	50	50	0	0	U	Y	+	-	N	OC	OC	TILL
W129021	13.9	0.3	13.6	3.3	10.3	P	90	5	5	0	U	+	Y	-	N	LOC	LOC	TILL
W129022	13.5	0.3	13.2	0.8	12.4	P	50	10	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129023	14.0	0.3	13.7	0.7	13.0	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129024	14.5	0.3	14.2	0.5	13.7	P	40	10	50	0	U	+	Y	-	N	GY	OC	TILL

* Samples prescreened to -8.0 mm in the field.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7577

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129308	98	8	14	76	44.0	167	2	15	150
W129309	122	10	7	105	44.4	103	14	11	78
W129310	4	1	1	2	47.2	9	<1	2	8
W129311	3	0	0	3	47.6	3	0	0	3
W129312	0	0	0	0	33.2	0	0	0	0
W129113	2	0	1	1	44.4	1	0	<1	1
W129114	3	0	2	1	40.8	6	0	5	1
W129115	3	1	1	1	42.4	11	1	8	2
W129004	6	0	3	3	44.0	6	0	1	5
W129005	3	0	2	1	54.4	11	0	11	<1
W129006	1	0	1	0	62.0	3	0	3	0
W129016	36	19	11	6	44.4	122	103	17	2
W129017	7	2	3	2	42.8	5	3	1	1
W129018	12	2	7	3	41.6	72	16	40	17
W129019	80	18	25	37	47.6	135	36	73	27
W129020	74	6	23	45	44.0	130	39	23	68
W129021	36	3	7	26	41.2	113	15	40	58
W129022	4	1	1	2	49.6	4	4	<1	<1
W129023	16	7	6	3	52.0	71	61	10	<1
W129024	2	1	1	0	54.8	<1	<1	<1	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7577

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129308	3	C	15	15	6	5	38	49		6	Tr (2 grains) scheelite (250 µm).
	5	C	25	25	2	5	27	34		19	No sulphides.
	8	C	25	50		2	3	5		8	
	10	C	50	50		2	2	4		17	
	13	C	50	75			1	1		8	
	15	C	75	75			2	2		29	
	18	C	75	100			2	2		45	
	20	C	100	100			1	1		34	
								98	44.0	167	
W129309	3	C	15	15	3	2	54	59		7	Tr (~500 grains) scheelite (50-250 µm).
	5	C	25	25	4	2	32	38		21	No sulphides.
	8	C	25	50	2	1	11	14		23	
	10	C	25	75		1	2	3		10	
	10	C	50	50		1	5	6		26	
	13	C	50	75	1		1	2		16	
								122	44.4	103	
W129310	3	C	15	15	1		1	2		<1	No sulphides.
	8	C	25	50		1		1		2	
	13	C	50	75			1	1		8	
								4	47.2	9	
W129311	5	C	25	25			2	2		1	No sulphides.
	8	C	25	50			1	1		2	
								3	47.6	3	
W129312	No Visible Gold										No sulphides.
W129113	3	C	15	15		1		1		<1	Tr (~20 grains) pyrite (25-50 µm).
	5	C	25	25			1	1		1	
								2	44.4	1	
W129114	5	C	25	25			1	1		1	Tr (~20 grains) pyrite (25-75 µm).
	8	C	25	50		1		1		2	
	10	C	25	75		1		1		4	
								3	40.8	6	
W129115	5	C	25	25	1			1		1	No sulphides.
	8	C	25	50			1	1		2	
	13	C	50	75		1		1		8	
								3	42.4	11	
W129004	3	C	15	15		2		2		<1	No sulphides.
	5	C	25	25		1		1		1	
	8	C	25	50			3	3		5	
								6	44.0	6	
W129005	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25		1		1		<1	
	15	C	50	100		1		1		10	
								3	54.4	11	
W129006	10	C	50	50		1		1		3	No sulphides.
								1	62.0	3	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7577

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129016	3	C	15	15	4	4	5	13		2	Tr (1 grain) pyrite (300 µm).
	5	C	25	25	9	2		11		6	
	8	C	25	50	2	2	1	5		8	
	10	C	25	75		1		1		3	
	10	C	50	50	1	2		3		13	
	18	C	75	100	1			1		22	
	20	C	100	100	2			2		68	
								36	44.4	122	
W129017	3	C	15	15	1	2	1	4		<1	No sulphides.
	5	C	25	25		1	1	2		1	
	10	C	25	75	1			1		3	
								7	42.8	5	
W129018	3	C	15	15		2		2		<1	Tr (~10 grains) scheelite (100-200 µm).
	5	C	25	25	1	1	2	4		2	
	8	C	25	50		1		1		2	
	10	C	50	50		1		1		5	
	13	C	50	75		1		1		9	
	15	C	75	75	1		1	2		31	
	18	C	75	100		1		1		24	
								12	41.6	72	
W129019	3	C	15	15	5	14	21	40		4	Tr (~20 grains) pyrite (50-500 µm).
	5	C	25	25	4	5	10	19		10	
	8	C	25	50	4	4	3	11		17	
	10	C	25	75			1	1		3	
	10	C	50	50	3	1	1	5		20	
	13	C	50	75	2		1	3		23	
	25	C	100	150		1		1		58	
								80	47.6	135	
W129020	3	C	15	15	1	7	16	24		3	Tr (4 grains) scheelite (100-150 µm).
	5	C	25	25	2	8	16	26		14	Tr (~20 grains) pyrite (100-2000µm).
	8	C	25	50	1	6	8	15		25	
	10	C	25	75		1		1		3	
	10	C	50	50	1	1	2	4		17	
	13	C	50	75			1	1		8	
	15	C	50	100			1	1		13	
	15	C	75	75			1	1		15	
	20	C	75	125	1			1		32	
								74	44.0	130	
W129021	3	C	15	15	1	3	12	16		2	Tr (5 grains) pyrite (50-250 µm).
	5	C	25	25	1	2	3	6		4	
	8	C	25	50			4	4		7	
	10	C	25	75			2	2		7	
	10	C	50	50		1	2	3		14	
	13	C	50	75			2	2		17	
	15	C	50	100	1		1	2		28	
	20	C	75	125		1		1		34	
								36	41.2	113	
W129022	3	C	15	15		1	2	3		<1	No sulphides.
	10	C	50	50	1			1		4	
								4	49.6	4	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7577

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129023	3	C	15	15		3	3	6		1	No sulphides.
	5	C	25	25	3			3		1	
	8	C	25	50	2	2		4		6	
	10	C	50	50	1			1		4	
	13	C	50	75		1		1		7	
	25	C	100	150	1			1		53	
								16	52.0	72	
W129024	3	C	15	15	1	1		2		<1	Tr (~20 grains) scheelite (50-150 µm).
								2	54.8	<1	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Exploring Heavy Minerals

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	September 27, 2017
Project name:	TPK
ODM batch number:	7578
Sample numbers:	W129025 to W129044
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	80
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7578

						Screening and Shaking Table Sample Descriptions												
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)							
	Weight (kg wet)						Percentage				Distribution					Colour		
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT	S/U	SD	ST	CY	ORG	SD	CY	Class
W129025	14.7	0.3	14.4	2.2	12.2	P	20	80	0	0	U	+	Y	-	N	OC	OC	TILL
W129026	13.5	0.3	13.2	1.9	11.3	P	20	80	0	0	U	Y	+	-	N	OC	OC	TILL
W129027	13.2	0.3	12.9	1.7	11.2	P	20	80	0	0	U	Y	+	-	N	OC	OC	TILL
W129028	14.6	0.3	14.3	1.8	12.5	P	80	Tr	20	0	U	Y	+	-	N	GB	GB	TILL
W129029	13.5	0.3	13.2	2.0	11.2	P	45	10	45	0	U	Y	+	-	N	LOC	LOC	TILL
W129030	16.2	0.3	15.9	1.2	14.7	P	20	60	20	0	U	Y	+	-	N	OC	OC	TILL
W129031	12.2	0.3	11.9	1.2	10.7	P	50	20	30	0	U	Y	+	-	N	LOC	LOC	TILL
W129032	15.1	0.3	14.8	1.2	13.6	P	40	20	40	0	U	+	Y	-	N	LOC	LOC	TILL
W129033	15.3	0.3	15.0	1.3	13.7	P	30	40	30	0	U	Y	+	-	N	LOC	LOC	TILL
W129034	12.7	0.3	12.4	0.5	11.9	P	60	40	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129035	12.9	0.3	12.6	1.8	10.8	P	60	10	30	0	U	+	Y	-	N	LOC	LOC	TILL
W129036	14.6	0.3	14.3	0.8	13.5	P	50	50	0	0	U	Y	+	-	N	DOC	DOC	TILL
W129037	13.6	0.3	13.3	1.6	11.7	P	60	35	5	0	U	+	Y	-	N	OC	OC	TILL
W129038	12.1	0.3	11.8	1.5	10.3	P	70	30	0	0	U	+	Y	-	N	DOC	DOC	TILL
W129039	14.6	0.3	14.3	1.5	12.8	P	60	40	0	0	U	Y	+	-	N	OC	OC	TILL
W129040	12.4	0.3	12.1	1.0	11.1	P	70	30	0	0	U	Y	+	-	N	OC	OC	TILL
W129041	12.7	0.3	12.4	1.1	11.3	P	80	20	0	0	U	Y	+	-	N	DOC	DOC	TILL
W129042	12.1	0.3	11.8	1.4	10.4	P	80	20	0	0	U	Y	+	-	N	DOC	DOC	TILL
W129043	12.4	0.3	12.1	1.4	10.7	P	90	10	0	0	U	Y	+	-	N	OC	OC	TILL
W129044	13.4	0.3	13.1	0.7	12.4	P	50	Tr	50	0	U	Y	+	-	N	LOC	LOC	TILL

* Samples prescreened to -8.0 mm in the field.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7578

Sample Number	Number of Visible Gold Grains: Total	Reshaped	Modified	Pristine	Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC: Total	Reshaped	Modified	Pristine
W129025	5	3	0	2	48.8	8	8	0	<1
W129026	156	16	23	117	45.2	1766	71	1569	126
W129027	84	8	27	49	44.8	696	16	530	150
W129028	45	8	9	28	50.0	75	20	32	23
W129029	5	2	0	3	44.8	17	9	0	9
W129030	57	6	13	38	58.8	82	2	53	27
W129031	10	4	4	2	42.8	29	25	4	1
W129032	3	3	0	0	54.4	6	6	0	0
W129033	3	3	0	0	54.8	1	1	0	0
W129034	0	0	0	0	47.6	0	0	0	0
W129035	115	15	23	77	43.2	207	12	69	125
W129036	0	0	0	0	54.0	0	0	0	0
W129037	3	2	0	1	46.8	<1	<1	0	<1
W129038	6	1	2	3	41.2	11	3	5	2
W129039	3	3	0	0	51.2	2	2	0	0
W129040	3	2	1	0	44.4	10	10	<1	0
W129041	2	1	0	1	45.2	1	<1	0	1
W129042	31	10	4	17	41.6	49	19	15	16
W129043	23	7	5	11	42.8	82	4	66	12
W129044	4	3	0	1	49.6	2	2	0	<1

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7578

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129025	3	C	15	15	2		2	4		<1	Tr (8 grains) scheelite (50-500 µm).
	13	C	50	75	1			1		7	Tr (3 grains) pyrite (250-1000 µm).
								5	48.8	8	
W129026	3	C	15	15	5	8	55	68		8	Tr (1 grain) pyrite (500 µm).
	5	C	25	25	8	12	46	66		36	
	8	C	25	50	1	1	10	12		19	
	10	C	25	75	1			1		3	
	10	C	50	50		1	1	2		9	
	13	C	50	75			2	2		16	
	15	C	50	100			2	2		25	
	20	C	100	100			1	1		33	
	25	C	100	150	1			1		61	
	150	M	250	250		1		1		1556	
								156	45.2	1766	
W129027	3	C	15	15		8	15	23		3	No sulphides.
	5	C	25	25	2	6	12	20		11	
	8	C	25	50	4	2	7	13		21	
	10	C	25	75			7	7		23	
	10	C	50	50	2	6		8		34	
	13	C	50	75			5	5		40	
	15	C	50	100		1	2	3		38	
	22	C	75	150		1	1	2		84	
	50	M	75	250		1		1		157	
	22	C	100	125		1		1		47	
	38	C	150	250		1		1		239	
								84	44.8	696	
W129028	3	C	15	15	1	4	13	18		2	Tr (~80 grains) scheelite (50-100 µm).
	5	C	25	25	3	1	12	16		8	No sulphides.
	8	C	25	50	2	1	2	5		7	
	10	C	25	75	1			1		3	
	10	C	50	50		1		1		4	
	15	C	75	75	1	2	1	4		51	
								45	50.0	75	
W129029	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25	1		1	2		1	
	13	C	50	75	1		1	2		16	
								5	44.8	17	
W129030	3	C	15	15	3	5	23	31		3	Tr (5 grain) pyrite (100-500 µm).
	5	C	25	25	2	3	5	10		4	
	8	C	25	50	1	1	6	8		10	
	10	C	25	75		1	1	2		5	
	10	C	50	50		2	2	4		13	
	13	C	50	75			1	1		6	
	25	C	75	175		1		1		41	
								57	58.8	82	
W129031	3	C	15	15		2	1	3		<1	No sulphides.
	5	C	25	25	3		1	4		2	
	8	C	25	50		2		2		3	
	18	C	75	100	1			1		23	
								10	42.8	29	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7578

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129032	5	C	25	25	1			1		<1	No sulphides.
	10	C	25	75	2			2		5	
								3	54.4	6	
W129033	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	1			1		<1	
								3	54.8	1	
W129034	No Visible Gold										No sulphides.
W129035	3	C	15	15	5	2	36	43		5	Tr (1 grain) scheelite (750 µm).
	5	C	25	25	7	12	27	46		26	No sulphides.
	8	C	25	50	2	4	7	13		22	
	10	C	25	75		1	3	4		13	
	10	C	50	50	1	2		3		13	
	13	C	50	75		1	2	3		25	
	20	C	75	125			1	1		33	
	20	C	100	100		1	1	2		69	
								115	43.2	207	
W129036	No Visible Gold										Tr (8 grains) scheelite (100-750 µm). No sulphides.
W129037	3	C	15	15	2		1	3		<1	Tr (5 grains) scheelite (75-250 µm).
								3	46.8	0	Tr (1 grain) pyrite (750 µm).
W129038	3	C	15	15			1	1		<1	Tr (~10 grains) pyrite (25-75 µm).
	5	C	25	25		1	1	2		1	
	8	C	25	50			1	1		2	
	10	C	25	75	1			1		3	
	10	C	50	50		1		1		5	
								6	41.2	11	
W129039	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		<1	
	8	C	25	50	1			1		1	
								3	51.2	2	
W129040	3	C	15	15		1		1		<1	Tr (2 grains) scheelite (200 µm).
	8	C	25	50	1			1		2	Tr (~20 grains) pyrite (50-500 µm).
	13	C	50	75	1			1		8	
								3	44.4	10	
W129041	3	C	15	15	1			1		<1	Tr (1 grain) scheelite (500 µm).
	5	C	25	25			1	1		1	Tr (1 grain) pyrite (500 µm).
								2	45.2	1	
W129042	3	C	15	15	3	2	10	15		2	Tr (5 grains) scheelite (75-250 µm).
	5	C	25	25	2	1	4	7		4	No sulphides.
	8	C	25	50	3		2	5		9	
	10	C	25	75	1			1		3	
	13	C	50	75	1		1	2		17	
	15	C	50	100		1		1		14	
								31	41.6	49	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7578

Sample Number	Dimensions (µm)				Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness		Width	Length	Reshaped	Modified	Pristine	Total			
W129043	3	C	15	15	2	2	5	9		1	Tr (5 grains) arsenopyrite (25-50 µm).
	5	C	25	25	4	2	4	10		6	
	8	C	25	50	1			1		2	
	10	C	50	50			2	2		9	
	25	C	100	150		1		1		65	
								23	42.8	82	
W129044	3	C	15	15	1		1	2		<1	Tr (1 grain) scheelite (250 µm).
	5	C	25	25	1			1		<1	No sulphides.
	8	C	25	50	1			1		1	
								4	49.6	2	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

ODM
Exploring Heavy Minerals

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	October 13, 2017
Project name:	TPK
ODM batch number:	7579
Sample numbers:	W129045 to W129054, W129064 to W129072 and W129101
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	100
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:
1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7579

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129045	0	0	0	0	40.0	0	0	0	0
W129046	4	4	0	0	44.4	1	1	0	0
W129047	2	0	1	1	79.2	2	0	1	1
W129048	1	0	0	1	38.8	1	0	0	1
W129049	0	0	0	0	40.8	0	0	0	0
W129050	7	4	1	2	42.8	4	1	2	1
W129051	10	1	4	5	45.6	3	<1	2	1
W129052	13	2	4	7	40.4	8	<1	6	3
W129053	12	2	2	8	44.8	3	<1	<1	3
W129054	2	0	0	2	51.6	1	0	0	1
W129064	7	3	0	4	55.6	17	16	0	1
W129065	4	4	0	0	49.2	5	5	0	0
W129066	17	7	3	7	47.6	18	6	3	9
W129067	8	1	1	6	43.2	3	<1	1	2
W129068	3	2	1	0	39.6	1	1	1	0
W129069	18	3	4	11	48.8	31	3	5	23
W129070	416	10	38	368	31.2	1068	21	36	1011
W129071	52	12	14	26	37.6	133	52	60	20
W129072	41	8	14	19	34.4	108	50	23	35
W129101	6	3	2	1	43.5	1	1	1	<1

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7579

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129045	No Visible Gold										No sulphides.
W129046	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	2			2		1	
								4	44.4	1	
W129047	8	C	25	50		1	1	2		3	Tr (5 grains) scheelite (50-150 µm).
								2	43.2	3	
W129048	5	C	25	25			1	1		1	Tr (2 grains) scheelite (50-100 µm).
								1	38.8	1	Tr (1 grain) pyrite (100 µm).
W129049	No Visible Gold										Tr (1 grain) scheelite (250 µm). Tr (~20 grains) pyrite (25-125 µm).
W129050	3	C	15	15	2		1	3		<1	No sulphides.
	5	C	25	25	2		1	3		2	
	8	C	25	50		1		1		2	
								7	42.8	4	
W129051	3	C	15	15	1	2	5	8		1	Tr (4 grains) scheelite (100 µm).
	5	C	25	25		1		1		1	Tr (3 grains) pyrite (75 µm).
	8	C	25	50		1		1		2	
								10	45.6	3	
W129052	3	C	15	15	2	2	6	10		1	Tr (~500 grains) scheelite (25-250 µm).
	5	C	25	25		1		1		1	Tr (2 grains) pyrite (1000 µm).
	8	C	25	50			1	1		2	
	10	C	50	50		1		1		5	
								13	40.4	8	
W129053	3	C	15	15	2	2	6	10		1	Tr (~1000 grains) scheelite (25-250 µm).
	5	C	25	25			1	1		1	No sulphides.
	8	C	25	50			1	1		2	
								12	44.8	3	
W129054	3	C	15	15			1	1		<1	Tr (~50 grains) pyrite (50-1000 µm).
	5	C	25	25			1	1		<1	
								2	51.6	1	
W129064	3	C	15	15			3	3		<1	No sulphides.
	5	C	25	25			1	1		<1	
	8	C	25	50	1			1		1	
	10	C	50	50	1			1		3	
	15	C	75	75	1			1		12	
								7	55.6	17	
W129065	3	C	15	15	1			1		<1	Tr (3 grains) scheelite (100 µm).
	5	C	25	25	2			2		1	No sulphides.
	10	C	50	50	1			1		4	
								4	49.2	5	
W129066	3	C	15	15	3		2	5		1	Tr (~500 grains) scheelite (50-250 µm).
	5	C	25	25	2	2	1	5		3	No sulphides.
	8	C	25	50	1	1	3	5		8	
	10	C	25	75	1			1		3	
	10	C	50	50			1	1		4	
								17	47.6	18	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7579

Sample Number	Dimensions (µm)				Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness		Width	Length	Reshaped	Modified	Pristine	Total			
W129067	3	C	15	15	1		3	4		<1	Tr (5 grains) scheelite (75-150 µm).
	5	C	25	25		1	3	4		2	
								8	43.2	3	
W129068	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1	1		2		1	
								3	39.6	1	
W129069	3	C	15	15	1	1	2	4		<1	Tr (~500 grains) scheelite (15-750 µm).
	5	C	25	25		1	2	3		1	
	8	C	25	50	2	1	5	8		12	
	10	C	25	75		1		1		3	
	13	C	50	75			2	2		15	
								18	48.8	31	
W129070	3	C	15	15	3	10	190	203		34	Tr (~500 grains) scheelite (15-100 µm).
	5	C	25	25	3	20	110	133		104	Tr (~200 grains) pyrite (25-250 µm).
	8	C	25	50	3	8	37	48		112	
	10	C	25	75			8	8		37	
	10	C	50	50			9	9		55	
	13	C	50	75	1		9	10		115	
	15	C	50	100			1	1		18	
	15	C	75	75			1	1		21	
	18	C	75	100			1	1		32	
	75	M	100	150			2	2		541	
								416	31.2	1068	
W129071	3	C	15	15	3	4	12	19		3	Tr (~500 grains) scheelite (15-250 µm).
	5	C	25	25	3	6	9	18		12	Tr (~100 grains) pyrite (25-500 µm).
	8	C	25	50	2	3	4	9		17	
	10	C	50	50	2		1	3		15	
	13	C	50	75	1			1		10	
	18	C	75	100	1			1		26	
	22	C	75	150		1		1		50	
								52	37.6	133	
W129072	3	C	15	15	3	4	12	19		3	Tr (~500 grains) scheelite (15-100 µm).
	5	C	25	25	2	5	6	13		9	No sulphides.
	8	C	25	50	1	4		5		11	
	10	C	50	50	1			1		6	
	13	C	50	75		1		1		10	
	18	C	75	100			1	1		29	
	20	C	75	125	1			1		41	
								41	34.4	108	
W129101	3	C	15	15	2	1	1	4		<1	No sulphides.
	5	C	25	25	1	1		2		1	
								6	43.5	2	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7579

	Weight (kg wet)					Screening and Shaking Table Sample Descriptions												
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)							
							Percentage				Distribution					Colour		
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT**	S/U	SD	ST	CY	ORG	SD	CY	Class
W129045	11.4	0.3	11.1	1.1	10.0	P	70	30	0	0	U	Y	+	-	N	DOC	DOC	TILL
W129046	12.7	0.3	12.4	1.3	11.1	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129047	12.2	0.3	11.9	1.1	10.8	P	60	30	10	Tr	U	+	Y	-	N	LOC	LOC	TILL
W129048	11.3	0.3	11.0	1.3	9.7	C	30	70	Tr	Tr	U	+	Y	-	N	DOC	DOC	TILL
W129049	11.8	0.3	11.5	1.3	10.2	P	80	10	10	Tr	U	Y	+	-	Y	GB	GB	TILL
W129050	11.7	0.3	11.4	0.7	10.7	P	80	20	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129051	12.1	0.3	11.8	0.4	11.4	P	80	20	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129052	10.9	0.3	10.6	0.5	10.1	P	40	60	0	0	U	Y	+	-	N	OC	OC	TILL
W129053	11.6	0.3	11.3	0.1	11.2	G	30	70	0	0	S	F	+	+	N	OC	OC	SILT + CLAY
W129054	14.9	0.3	14.6	1.7	12.9	P	10	90	0	0	U	Y	+	-	N	OC	OC	TILL
W129064	16.0	0.3	15.7	1.8	13.9	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129065	13.4	0.3	13.1	0.8	12.3	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129066	13.3	0.3	13.0	1.1	11.9	P	70	30	0	0	U	Y	+	-	N	LOC	LOC	TILL
W129067	12.8	0.3	12.5	1.7	10.8	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129068	10.9	0.3	10.6	0.7	9.9	P	70	30	0	0	U	Y	+	-	Y	OC	OC	TILL
W129069	14.5	0.3	14.2	2.0	12.2	P	60	40	0	0	U	Y	+	-	Y	LOC	LOC	TILL
W129070	9.7	0.3	9.4	1.6	7.8	P	90	10	0	0	U	Y	+	-	Y	DOC	DOC	TILL
W129071	12.0	0.3	11.7	2.3	9.4	P	80	20	0	0	U	+	Y	-	N	LOC	LOC	TILL
W129072	10.9	0.3	10.6	2.0	8.6	P	70	30	0	0	U	Y	+	-	N	OC	OC	TILL
W129101	12.0	0.3	11.7	0.8	10.9	P	30	70	0	Tr	U	Y	+	-	N	OC	OC	TILL

* Samples prescreened to -8.0 mm in the field.

** Clasts listed as "OT" is quartz.

Exploring Heavy Minerals

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	October 18, 2017
Project name:	TPK
ODM batch number:	7580
Sample numbers:	W129102, W129103, W129119 to W129136
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	120
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7580

Sample Number	Weight (kg wet)					Screening and Shaking Table Sample Descriptions												
							Clasts (+2.0 mm)*				Matrix (-2.0 mm)							
							Percentage				Distribution					Colour		
	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT**	S/U	SD	ST	CY	ORG	SD	CY	Class
W129102	12.4	0.3	12.1	1.7	10.4	P	30	60	10	0	U	+	Y	-	N	OC	OC	TILL
W129103	12.0	0.3	11.7	2.0	9.7	P	30	70	Tr	Tr	U	+	Y	-	N	OC	OC	TILL
W129119	11.2	0.3	10.9	1.3	9.6	P	30	50	20	0	U	+	Y	-	N	LOC	LOC	TILL
W129120	11.6	0.3	11.3	1.1	10.2	P	40	30	0	0	U	+	Y	-	N	OC	OC	TILL
W129121	12.0	0.3	11.7	2.4	9.3	P	40	60	Tr	0	U	+	Y	-	N	OC	OC	TILL
W129122	12.9	0.3	12.6	1.0	11.6	P	30	30	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129123	11.1	0.3	10.8	0.8	10.0	P	30	10	60	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129124	11.7	0.3	11.4	0.8	10.6	G	100	0	0	0	U	+	Y	-	N	DOC	DOC	TILL
W129125	11.9	0.3	11.6	0.6	11.0	P	40	0	60	0	U	Y	+	-	N	LOC	LOC	TILL
W129126	11.6	0.3	11.3	1.0	10.3	P	40	Tr	60	0	U	+	Y	-	N	LOC	LOC	TILL
W129127	12.0	0.3	11.7	1.1	10.6	P	80	20	0	Tr	U	Y	+	-	N	DOC	DOC	TILL
W129128	11.9	0.3	11.6	1.5	10.1	P	40	40	20	Tr	U	Y	+	-	N	OC	OC	TILL
W129129	12.1	0.3	11.8	1.3	10.5	P	80	20	0	Tr	U	Y	+	-	N	DOC	DOC	TILL
W129130	11.8	0.3	11.5	0.8	10.7	P	50	50	Tr	0	U	Y	+	-	N	LOC	LOC	TILL
W129131	11.7	0.3	11.4	1.0	10.4	P	50	10	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129132	12.3	0.3	12.0	1.3	10.7	P	80	20	0	0	U	Y	+	-	N	LOC	LOC	TILL
W129133	12.1	0.3	11.8	1.3	10.5	P	85	15	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129134	12.1	0.3	11.8	1.3	10.5	P	90	10	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129135	11.8	0.3	11.5	1.3	10.2	P	40	60	0	0	U	+	Y	-	N	OC	OC	TILL
W129136	12.0	0.3	11.7	0.6	11.1	P	30	50	20	Tr	U	Y	+	-	N	DOC	DOC	TILL

* Samples prescreened to -8.0 mm in the field.
** Clasts listed as "OT" is quartz.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7580

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129102	118	17	17	84	41.6	948	26	311	612
W129103	67	11	12	44	38.8	236	9	16	211
W129119	2	1	1	0	38.4	3	2	1	0
W129120	1	1	0	0	40.8	1	1	0	0
W129121	0	0	0	0	37.2	0	0	0	0
W129122	2	2	0	0	46.4	<1	<1	0	0
W129123	1	0	1	0	40.0	2	0	2	0
W129124	1	1	0	0	42.4	2	2	0	0
W129125	1	0	1	0	44.0	2	0	2	0
W129126	7	7	0	0	41.2	20	20	0	0
W129127	1	1	0	0	42.4	1	1	0	0
W129128	4	4	0	0	40.4	1	1	0	0
W129129	0	0	0	0	42.0	0	0	0	0
W129130	0	0	0	0	42.8	0	0	0	0
W129131	3	3	0	0	41.6	16	16	0	0
W129132	2	2	0	0	42.8	1	1	0	0
W129133	6	6	0	0	42.0	33	33	0	0
W129134	4	4	0	0	42.0	1	1	0	0
W129135	4	4	0	0	40.8	85	85	0	0
W129136	2	0	1	1	44.4	35	0	2	34

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Overburden Drilling Management Limited

2017-10-19

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7580

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129102	3	C	15	15	3	4	47	54		7	No sulphides.
	5	C	25	25	10	4	24	38		22	
	8	C	25	50	1	3	9	13		23	
	10	C	25	75			1	1		3	
	10	C	50	50	2	4	2	8		37	
	13	C	50	75	1			1		9	
	15	C	50	100		1		1		14	
	75	M	100	200		1		1		270	
	100	M	125	250			1	1		563	
								118	41.6	948	
W129103	3	C	15	15	4	3	30	37		5	No sulphides.
	5	C	25	25	6	5	9	20		13	
	8	C	25	50		2	3	5		9	
	10	C	25	75		1		1		4	
	10	C	50	50	1	1	1	3		15	
	75	M	75	175			1	1		190	
								67	38.8	236	
W129119	5	C	25	25		1		1		1	No sulphides.
	8	C	25	50	1			1		2	
								2	38.4	3	
W129120	5	C	25	25	1			1		1	No sulphides.
								1	40.8	1	
W129121	No Visible Gold										No sulphides.
W129122	3	C	15	15	2			2		<1	No sulphides.
								2	46.4	<1	
W129123	8	C	25	50		1		1		2	No sulphides.
								1	40.0	2	
W129124	8	C	25	50	1			1		2	Tr (1 grain) pyrite (50 µm).
								1	42.4	2	
W129125	8	C	25	50		1		1		2	No sulphides.
								1	44.0	2	
W129126	3	C	15	15	3			3		<1	No sulphides.
	5	C	25	25	2			2		1	
	10	C	50	50	1			1		5	
	15	C	50	100	1			1		14	
								7	41.2	20	
W129127	5	C	25	25	1			1		1	No sulphides.
								1	42.4	1	
W129128	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	2			2		1	
								4	40.4	1	
W129129	No Visible Gold										No sulphides.
W129130	No Visible Gold										No sulphides.

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7580

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129131	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
	15	C	75	75	1			1		15	
								3	41.6	16	
W129132	5	C	25	25	2			2		1	No sulphides.
								2	42.8	1	
W129133	3	C	15	15	3			3		<1	No sulphides.
	5	C	25	25	1			1		1	
	13	C	50	75	1			1		9	
	18	C	75	100	1			1		24	
								6	42.0	33	
W129134	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	2			2		1	
								4	42.0	1	
W129135	3	C	15	15	1			1		<1	Tr (2 grains) scheelite (250-500 µm).
	10	C	50	50	1			1		5	No sulphides.
	13	C	50	75	1			1		9	
	25	C	125	125	1			1		71	
								4	40.8	85	
W129136	8	C	25	50		1		1		2	No sulphides.
	20	C	100	100			1	1		34	
								2	44.4	35	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Exploring Heavy Minerals

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	October 20, 2017
Project name:	TPK
ODM batch number:	7611
Sample numbers:	W129137 to W129150, W129401, W129154 to W129156, W129160 and W129161
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	140
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7611

	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
Sample Number	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129137	0	0	0	0	41.6	0	0	0	0
W129138	0	0	0	0	45.6	0	0	0	0
W129139	8	4	1	3	41.6	39	5	9	25
W129140	0	0	0	0	45.2	0	0	0	0
W129141	3	0	1	2	44.4	3	0	2	1
W129142	1	1	0	0	42.4	1	1	0	0
W129143	1	1	0	0	42.0	<1	<1	0	0
W129144	4	3	0	1	44.4	3	2	0	2
W129145	4	1	1	2	42.4	3	2	1	1
W129146	1	0	0	1	44.0	1	0	0	1
W129147	29	13	4	12	41.6	40	13	10	17
W129148	5	4	0	1	42.8	3	3	0	<1
W129149	9	6	1	2	43.2	35	30	4	<1
W129150	8	6	0	2	42.8	5	3	0	2
W129401	4	4	0	0	42.4	1	1	0	0
W129154	3	2	1	0	47.2	5	2	3	0
W129155	32	16	9	7	46.8	30	17	12	1
W129156	7	5	1	1	45.2	52	16	3	33
W129160	7	3	2	2	44.8	88	80	8	<1
W129161	8	6	2	0	45.2	30	16	14	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7611

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129137	No Visible Gold										No sulphides.
W129138	No Visible Gold										No sulphides.
W129139	3	C	15	15	2		1	3		<1	No sulphides.
	5	C	25	25	1		1	2		1	
	10	C	50	50	1			1		5	
	13	C	50	75		1		1		9	
	18	C	75	100			1	1		24	
								8	41.6	39	
W129140	No Visible Gold										No sulphides.
W129141	5	C	25	25			2	2		1	No sulphides.
	8	C	25	50		1		1		2	
								3	44.4	3	
W129142	9	C	75	10	1			1		1	Tr (1 grain) pyrite (500 µm).
								1	42.4	1	
W129143	3	C	15	15	1			1		<1	No sulphides.
								1	42.0	<1	
W129144	5	C	25	25	3			3		2	No sulphides.
	8	C	25	50			1	1		2	
								4	44.4	3	
W129145	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25		1	1	2		1	
	8	C	25	50	1			1		2	
								4	42.4	3	
W129146	5	C	25	25			1	1		1	No sulphides.
								1	44.0	1	
W129147	3	C	15	15	4	1	7	12		2	Tr (1 grain) scheelite (500 µm).
	5	C	25	25	5	1	2	8		5	No sulphides.
	8	C	25	50	3		1	4		7	
	10	C	50	50	1	2	1	4		18	
	13	C	50	75			1	1		9	
								29	41.6	40	
W129148	3	C	15	15	1		1	2		<1	No sulphides.
	5	C	25	25	2			2		1	
	8	C	25	50	1			1		2	
								5	42.8	3	
W129149	3	C	15	15			2	2		<1	No sulphides.
	5	C	25	25	2			2		1	
	8	C	25	50	1			1		2	
	10	C	50	50	1	1		2		9	
	13	C	50	75	1			1		8	
	15	C	75	75	1			1		15	
								9	43.2	35	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7611

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129150	3	C	15	15	3		1	4		<1	No sulphides.
	5	C	25	25	2			2		1	
	8	C	25	50	1		1	2		3	
								8	42.8	5	
W129401	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	2			2		1	
								4	42.4	1	
W129154	5	C	25	25	1			1		1	No sulphides.
	8	C	25	50	1			1		2	
	10	C	25	75		1		1		3	
								3	47.2	5	
W129155	3	C	15	15	7	2	6	15		2	Tr (1 grain) cinnabar (25 µm).
	5	C	25	25	7	5	1	13		7	
	13	C	25	100	1	1		2		10	
	10	C	50	50		1		1		4	
	13	C	50	75	1			1		8	
								32	46.8	30	
W129156	5	C	25	25	3			3		2	No sulphides.
	8	C	25	50	1			1		2	
	10	C	25	75		1		1		3	
	15	C	50	100	1			1		13	
	20	C	100	100			1	1		33	
								7	45.2	52	
W129160	3	C	15	15	1	1	2	4		<1	Tr (~50 grains) pyrite (25-50 µm).
	5	C	25	25	1			1		1	
	13	C	50	75		1		1		8	
	27	C	100	175	1			1		79	
								7	44.8	88	
W129161	3	C	15	15	1			1		<1	Tr (5 grains) pyrite (25 µm).
	5	C	25	25	1			1		1	
	8	C	25	50	2	1		3		5	
	10	C	50	50	1			1		4	
	13	C	50	75	1			1		8	
	15	C	50	100		1		1		13	
								8	45.2	30	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7611

Sample Number	Weight (kg wet) Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	Clasts (+2.0 mm)* Percentage V/S	GR	LS	OT**	Matrix (-2.0 mm) Distribution S/U	SD	ST	CY	ORG	Colour SD	CY	Class
W129137	11.8	0.3	11.5	1.1	10.4	P	90	10	0	0	U	Y	+	-	N	OC	OC	TILL
W129138	11.9	0.3	11.6	0.2	11.4	P	15	85	0	0	S	FM	+	-	N	OC	OC	SAND + SILT
W129139	11.8	0.3	11.5	1.1	10.4	P	50	30	20	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129140	12.0	0.3	11.7	0.4	11.3	P	10	90	0	0	S	FM	+	-	N	OC	OC	SAND + SILT
W129141	12.0	0.3	11.7	0.6	11.1	P	50	10	40	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129142	12.2	0.3	11.9	1.3	10.6	P	70	30	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129143	11.8	0.3	11.5	1.0	10.5	P	60	20	20	Tr	U	Y	+	-	N	OC	OC	TILL
W129144	12.1	0.3	11.8	0.7	11.1	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129145	12.1	0.3	11.8	1.2	10.6	P	90	10	0	0	U	Y	+	-	N	OC	OC	TILL
W129146	12.1	0.3	11.8	0.8	11.0	P	50	50	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129147	12.0	0.3	11.7	1.3	10.4	P	70	30	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129148	11.9	0.3	11.6	0.9	10.7	P	80	20	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129149	12.0	0.3	11.7	0.9	10.8	P	80	20	0	Tr	U	+	Y	-	N	OC	OC	TILL
W129150	11.7	0.3	11.4	0.7	10.7	P	70	20	10	0	U	-	+	Y	N	GB	GB	TILL
W129401	12.1	0.3	11.8	1.2	10.6	P	50	10	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129154	13.1	0.3	12.8	1.0	11.8	P	50	10	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129155	13.6	0.3	13.3	1.6	11.7	P	90	10	0	0	U	Y	+	-	N	OC	OC	TILL
W129156	12.8	0.3	12.5	1.2	11.3	P	30	70	0	0	U	Y	+	-	N	LOC	LOC	TILL
W129160	13.4	0.3	13.1	1.9	11.2	P	50	30	20	0	U	Y	+	-	N	LOC	LOC	TILL
W129161	13.7	0.3	13.4	2.1	11.3	P	50	45	5	0	U	Y	+	-	N	OC	OC	TILL

Note: the columns from Size to Class fall under the heading "Screening and Shaking Table Sample Descriptions".

* Samples prescreened to -8.0 mm in the field.
** Clasts listed as "OT" is quartz.

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Exploring Heavy Minerals

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	October 20, 2017
Project name:	TPK
ODM batch number:	7612
Sample numbers:	W129162 to W129174 and W129204 to W129210
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	160
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7612

	Weight (kg wet)					Screening and Shaking Table Sample Descriptions													
							Clasts (+2.0 mm)*				Matrix (-2.0 mm)								
							Percentage				Distribution					Colour			
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT**	S/U	SD	ST	CY	ORG	SD	CY	Class
W129162	14.4	0.3	14.1	1.6	12.5	P	80	20	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129163	13.3	0.3	13.0	1.4	11.6	P	80	20	0	0	U	+	Y	-	N	OC	OC	TILL
W129164	13.4	0.3	13.1	2.0	11.1	P	80	20	0	0	U	+	Y	-	N	OC	OC	TILL
W129165	13.7	0.3	13.4	0.6	12.8	P	70	10	20	0	U	Y	+	-	N	OC	OC	TILL
W129166	13.1	0.3	12.8	1.5	11.3	P	80	20	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129167	14.8	0.3	14.5	2.0	12.5	P	70	10	20	0	U	+	Y	-	N	LOC	LOC	TILL
W129168	9.3	0.3	9.0	1.2	7.8	P	70	10	20	0	U	+	Y	-	N	OC	OC	TILL
W129169	14.2	0.3	13.9	2.0	11.9	P	40	10	50	0	U	+	Y	-	N	OC	OC	TILL
W129170	11.0	0.3	10.7	0.7	10.0	P	40	30	30	Tr	U	Y	Y	Y	N	BE	BE	TILL
W129171	12.7	0.3	12.4	1.8	10.6	P	40	60	Tr	0	U	-	+	Y	N	BE	BE	TILL
W129172	13.9	0.3	13.6	1.3	12.3	P	70	20	10	0	U	+	Y	-	N	OC	OC	TILL
W129173	11.9	0.3	11.6	1.3	10.3	P	70	20	10	Tr	U	Y	+	-	N	OC	OC	TILL
W129174	13.6	0.3	13.3	2.2	11.1	P	70	30	Tr	Tr	U	Y	+	-	N	OC	OC	TILL
W129204	12.1	0.3	11.8	0.3	11.5	G	10	90	0	0	S	FM	+	Y	N	LOC	LOC	SAND + SILT
W129205	10.2	0.3	9.9	0.2	9.7	G	Tr	100	Tr	0	S	F	+	+	N	LOC	LOC	SILT + CLAY
W129206	12.5	0.3	12.2	0.6	11.6	P	10	90	Tr	0	U	Y	Y	Y	N	OC	OC	TILL
W129207	8.4	0.3	8.1	0.5	7.6	P	10	90	0	0	U	Y	+	-	N	OC	OC	TILL
W129208	13.5	0.3	13.2	1.7	11.5	P	50	40	10	0	U	+	Y	Y	N	LOC	LOC	TILL
W129209	11.9	0.3	11.6	1.2	10.4	P	40	60	Tr	Tr	U	-	Y	+	N	DOC	DOC	TILL
W129210	13.0	0.3	12.7	0.1	12.6	G	10	90	0	0	S	F	+	+	N	OC	OC	SILT + CLAY

* Samples prescreened to -8.0 mm in the field.
** Clasts listed as "OT" is quartz.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7612

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129162	36	12	3	21	50.0	61	52	2	8
W129163	7	4	1	2	46.4	2	2	1	<1
W129164	5	4	0	1	44.4	4	4	0	<1
W129165	11	11	0	0	51.2	6	6	0	0
W129166	2	1	1	0	45.2	16	8	8	0
W129167	1	0	0	1	50.0	<1	0	0	<1
W129168	2	1	0	1	31.2	1	1	0	<1
W129169	1	1	0	0	47.6	390	390	0	0
W129170	1	1	0	0	40.0	1	1	0	0
W129171	1	1	0	0	42.4	2	2	0	0
W129172	3	3	0	0	49.2	9	9	0	0
W129173	1	1	0	0	41.2	1	1	0	0
W129174	2	2	0	0	44.4	5	5	0	0
W129204	7	1	1	5	46.0	5	<1	<1	5
W129205	14	8	4	2	38.8	19	3	16	1
W129206	31	5	3	23	46.4	22	3	4	15
W129207	60	13	14	33	30.4	116	15	61	40
W129208	3	1	0	2	46.0	4	2	0	2
W129209	21	9	3	9	41.6	44	4	37	3
W129210	0	0	0	0	50.4	0	0	0	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7612

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129162	3	C	15	15	5	2	14	21		2	No sulphides.
	5	C	25	25	3		4	7		3	
	8	C	25	50	1	1	3	5		7	
	13	C	50	75	1			1		7	
	15	C	75	75	1			1		13	
	20	C	75	125	1			1		28	
								36	50.0	61	
W129163	3	C	15	15	1		2	3		<1	Tr (2 grains) pyrite (25 µm).
	5	C	25	25	3	1		4		2	
	0	C						0		0	
								7	46.4	2	
W129164	3	C	15	15	3		1	4		<1	No sulphides.
	10	C	25	75	1			1		3	
								5	44.4	4	
W129165	3	C	15	15	8			8		1	Tr (1 grain) scheelite (500 µm).
	5	C	25	25	1			1		<1	No sulphides.
	8	C	25	50	1			1		1	
	10	C	25	75	1			1		3	
								11	51.2	6	
W129166	13	C	50	75	1	1		2		16	No sulphides.
								2	45.2	16	
W129167	3	C	15	15			1	1		<1	Tr (1 grains) scheelite (250 µm).
								1	50.0	<1	No sulphides.
W129168	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25	1			1		1	
								2	31.2	1	
W129169	52	C	475	100	1			1		390	No sulphides.
								1	47.6	390	
W129170	5	C	25	25	1			1		1	No sulphides.
								1	40.0	1	
W129171	8	C	25	50	1			1		2	No sulphides.
								1	42.4	2	
W129172	5	C	25	25	1			1		<1	No sulphides.
	8	C	25	50	1			1		1	
	13	C	50	75	1			1		7	
								3	49.2	9	
W129173	5	C	25	25	1			1		1	No sulphides.
								1	41.2	1	
W129174	5	C	25	25	1			1		1	No sulphides.
	10	C	50	50	1			1		4	
								2	44.4	5	
W129204	3	C	15	15	1	1	1	3		<1	Tr (5 grains) scheelite (100-250 µm).
	5	C	25	25			1	1		1	No sulphides.
	8	C	25	50			3	3		5	
								7	46.0	6	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7612

Sample Number	Dimensions (µm)			Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
W129205	3 C	15	15	5	2	1	8		1	Tr (~500 grains) scheelite (100-250 µm).
	5 C	25	25	3	1	1	5		3	No sulphides.
	15 C	50	100		1		1		15	
							14	38.8	19	
W129206	3 C	15	15	2	1	13	16		2	Tr (~500 grains) scheelite (100-250 µm).
	5 C	25	25	2	1	8	11		6	No sulphides.
	8 C	25	50	1		1	2		3	
	10 C	25	75		1		1		3	
	13 C	50	75			1	1		8	
							31	46.4	22	
W129207	3 C	15	15	10	5	15	30		5	Tr (~500 grains) scheelite (100-250 µm).
	5 C	25	25	2	2	10	14		11	No sulphides.
	8 C	25	50		3	5	8		19	
	10 C	25	75			1	1		5	
	10 C	50	50		3	2	5		32	
	13 C	50	75	1			1		12	
	18 C	75	100		1		1		33	
							60	30.4	116	
W129208	5 C	25	25			1	1		1	No sulphides.
	8 C	25	50	1		1	2		3	
							3	46.0	4	
W129209	3 C	15	15	5	1	8	14		2	Tr (5 grains) pyrite (25 µm).
	5 C	25	25	3	1		4		2	
	8 C	25	50	1		1	2		3	
	20 C	100	100		1		1		36	
							21	41.6	44	
W129210	No Visible Gold									No sulphides.

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Exploring Heavy Minerals

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	October 30, 2017
Project name:	TPK
ODM batch number:	7647
Sample numbers:	W129331 to 129338 and 129355 to 129366
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	20
Number of samples processed to date:	200
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7647

	Weight (kg wet)					Screening and Shaking Table Sample Descriptions													
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)								
							Percentage				Distribution					Colour			
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT	S/U	SD	ST	CY	ORG	SD	CY	Class
W129331	12.8	0.3	12.5	1.7	10.8	P	20	10	70	0	U	+	Y	-	N	LOC	LOC	TILL
W129332	13.4	0.3	13.1	1.4	11.7	P	20	10	70	0	U	+	Y	-	N	OC	OC	TILL
W129333	13.4	0.3	13.1	1.1	12.0	P	60	10	30	0	U	+	Y	-	N	OC	OC	TILL
W129334	12.9	0.3	12.6	0.6	12.0	P	75	Tr	25	0	U	+	Y	-	N	OC	OC	TILL
W129335	12.4	0.3	12.1	1.6	10.5	P	50	10	40	0	U	+	Y	-	N	LOC	LOC	TILL
W129336	13.3	0.3	13.0	1.6	11.4	P	55	10	35	0	U	+	Y	-	N	OC	OC	TILL
W129337	12.6	0.3	12.3	0.7	11.6	P	40	5	55	0	U	-	Y	+	N	LOC	LOC	TILL
W129338	13.7	0.3	13.4	0.9	12.5	P	45	15	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129355	9.1	0.3	8.8	1.8	7.0	P	75	5	20	0	U	+	Y	-	N	OC	OC	TILL
W129356	12.6	0.3	12.3	1.4	10.9	P	25	5	70	0	U	+	Y	-	N	OC	OC	TILL
W129357	14.0	0.3	13.7	0.7	13.0	P	35	5	60	0	U	Y	+	-	N	LOC	LOC	TILL
W129358	11.1	0.3	10.8	1.0	9.8	P	50	5	45	0	U	+	Y	-	N	LOC	LOC	TILL
W129359	9.8	0.3	9.5	0.1	9.4	P	75	25	0	0	S	F	+	+	N	LOC	LOC	SILT + CLAY
W129360	13.1	0.3	12.8	1.0	11.8	P	20	5	75	0	U	Y	+	-	N	LOC	LOC	TILL
W129361	13.0	0.3	12.7	0.8	11.9	P	65	20	15	0	U	+	Y	-	N	DOC	DOC	TILL
W129362	9.6	0.3	9.3	0.4	8.9	P	40	5	55	0	U	-	Y	+	N	LOC	LOC	TILL
W129363	13.5	0.3	13.2	1.3	11.9	P	75	0	25	0	U	+	Y	-	N	LOC	LOC	TILL
W129364	12.8	0.3	12.5	0.8	11.7	C	80	10	10	0	U	Y	+	-	N	LOC	LOC	TILL
W129365	13.9	0.3	13.6	1.7	11.9	P	70	10	20	0	U	+	Y	-	N	DOC	DOC	TILL
W129366	13.2	0.3	12.9	1.4	11.5	P	70	10	20	0	U	Y	+	-	N	OC	OC	TILL

* Samples prescreened to -8.0 mm in the field.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7647

	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
Sample Number	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129331	1	1	0	0	43.2	2	2	0	0
W129332	1	0	1	0	46.8	4	0	4	0
W129333	0	0	0	0	48.0	0	0	0	0
W129334	0	0	0	0	48.0	0	0	0	0
W129335	0	0	0	0	42.0	0	0	0	0
W129336	1	1	0	0	45.6	<1	<1	0	0
W129337	2	1	1	0	46.4	2	2	1	0
W129338	0	0	0	0	50.0	0	0	0	0
W129355	1	1	0	0	28.0	3	3	0	0
W129356	2	2	0	0	43.6	2	2	0	0
W129357	1	1	0	0	52.0	1	1	0	0
W129358	1	0	1	0	39.2	1	0	1	0
W129359	1	1	0	0	37.6	2	2	0	0
W129360	0	0	0	0	47.2	0	0	0	0
W129361	1	1	0	0	47.6	2	2	0	0
W129362	0	0	0	0	35.6	0	0	0	0
W129363	0	0	0	0	47.6	0	0	0	0
W129364	2	1	1	0	46.8	1	<1	1	0
W129365	0	0	0	0	47.6	0	0	0	0
W129366	0	0	0	0	46.0	0	0	0	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7647

Sample Number	Dimensions (µm)				Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness		Width	Length	Reshaped	Modified	Pristine	Total			
W129331	8	C	25	50	1			1		2	No sulphides.
								1	43.2	2	
W129332	10	C	50	50		1		1		4	No sulphides.
								1	46.8	4	
W129333	No Visible Gold										Tr (1 grain) cinnabar (25 µm).
W129334	No Visible Gold										No sulphides.
W129335	No Visible Gold										No sulphides.
W129336	3	C	15	15	1			1		<1	No sulphides.
								1	45.6	<1	
W129337	5	C	25	25		1		1		1	No sulphides.
	8	C	25	50	1			1		2	
								2	46.4	2	
W129338	No Visible Gold										No sulphides.
W129355	8	C	25	50	1			1		3	No sulphides.
								1	28.0	3	
W129356	5	C	25	25	1			1		1	No sulphides.
	8	C	25	50	1			1		2	
								2	43.6	2	
W129357	8	C	25	50	1			1		1	No sulphides.
								1	52.0	1	
W129358	5	C	25	25		1		1		1	No sulphides.
								1	39.2	1	
W129359	8	C	25	50	1			1		2	Tr (1 grain) cinnabar (25 µm).
								1	37.6	2	
W129360	No Visible Gold										No sulphides.
W129361	8	C	25	50	1			1		2	No sulphides.
								1	47.6	2	
W129362	No Visible Gold										No sulphides.
W129363	No Visible Gold										No sulphides.
W129364	3	C	15	15	1			1		<1	Tr (1 grain) cinnabar (25 µm).
	5	C	25	25		1		1		1	
								2	46.8	1	
W129365	No Visible Gold										No sulphides.

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northem Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 20
ODM Batch Number(s): 7647

Sample Number	Dimensions (µm)			Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness	Width	Length	Reshaped	Modified	Pristine	Total			
W129366	No Visible Gold									No sulphides.

Exploring Heavy Minerals

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	November 13, 2017
Project name:	TPK
ODM batch number:	7648
Sample numbers:	W129402 to 129413, 129055 to 129063, 129175 to 129185 and 129213 to 129220
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	40
Number of samples processed to date:	240
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For
Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

	Weight (kg wet)					Screening and Shaking Table Sample Descriptions												
						Clasts (+2.0 mm)*					Matrix (-2.0 mm)							
							Percentage				Distribution					Colour		
Sample Number	Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Size	V/S	GR	LS	OT**	S/U	SD	ST	CY	ORG	SD	CY	Class
W129402	12.1	0.3	11.8	0.8	11.0	P	90	10	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129403	11.5	0.3	11.2	0.6	10.6	P	50	20	30	0	U	-	Y	+	N	OC	OC	TILL
W129404	12.2	0.3	11.9	1.1	10.8	P	20	80	Tr	0	U	+	Y	-	+	DOC	DOC	TILL + SOIL
W129405	12.0	0.3	11.7	0.8	10.9	P	80	20	0	0	U	Y	+	-	N	OC	OC	TILL
W129406	12.0	0.3	11.7	1.8	9.9	P	80	20	Tr	Tr	U	+	Y	-	N	GB	GB	TILL
W129407	12.2	0.3	11.9	2.0	9.9	P	80	20	Tr	Tr	U	Y	+	-	N	OC	OC	TILL
W129408	12.1	0.3	11.8	0.8	11.0	P	30	40	30	0	U	+	Y	-	N	OC	OC	TILL
W129409	12.1	0.3	11.8	0.8	11.0	P	30	40	30	0	U	Y	+	-	N	LOC	LOC	TILL
W129410	12.1	0.3	11.8	0.7	11.1	P	70	30	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129411	12.0	0.3	11.7	1.1	10.6	P	60	40	0	0	U	+	Y	-	N	OC	OC	TILL
W129412	12.2	0.3	11.9	0.9	11.0	P	90	10	Tr	Tr	U	Y	+	-	N	DOC	DOC	TILL
W129413	12.0	0.3	11.7	0.5	11.2	P	60	30	10	0	U	Y	+	-	N	LOC	LOC	TILL
W129055	12.2	0.3	11.9	1.8	10.1	P	60	30	10	Tr	U	Y	+	-	N	OC	OC	TILL
W129056	12.1	0.3	11.8	2.3	9.5	P	50	40	10	Tr	U	Y	+	-	N	OC	OC	TILL
W129057	12.9	0.3	12.6	0.9	11.7	P	40	50	10	0	U	+	Y	-	N	OC	OC	TILL
W129058	13.6	0.3	13.3	4.4	8.9	P	40	50	10	0	U	+	Y	-	N	OC	OC	TILL
W129059	12.7	0.3	12.4	0.7	11.7	P	30	50	20	0	U	+	Y	-	N	OC	OC	TILL
W129060	14.2	0.3	13.9	1.6	12.3	P	50	45	5	0	U	Y	+	-	N	OC	OC	TILL
W129061	11.7	0.3	11.4	1.2	10.2	P	60	40	0	0	U	Y	+	-	N	OC	OC	TILL
W129062	14.3	0.3	14.0	1.3	12.7	P	50	40	10	Tr	U	Y	+	-	N	OC	OC	TILL
W129063	11.0	0.3	10.7	1.4	9.3	P	60	40	Tr	0	U	+	Y	-	N	OC	OC	TILL
W129175	13.0	0.3	12.7	1.4	11.3	P	50	40	10	Tr	U	+	Y	-	N	OC	OC	TILL
W129176	13.6	0.3	13.3	1.6	11.7	P	60	40	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129177	13.0	0.3	12.7	0.9	11.8	P	60	30	10	0	U	Y	+	-	N	OC	OC	TILL
W129178	12.5	0.3	12.2	0.9	11.3	P	50	30	20	0	U	-	Y	+	N	OC	OC	TILL
W129179	12.9	0.3	12.6	1.0	11.6	P	50	40	10	0	U	+	Y	-	N	DOC	DOC	TILL
W129180	13.4	0.3	13.1	1.9	11.2	P	60	40	Tr	0	U	+	Y	-	N	DOC	DOC	TILL
W129181	12.9	0.3	12.6	0.8	11.8	P	60	30	10	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129182	11.5	0.3	11.2	0.6	10.6	P	40	60	Tr	0	U	Y	+	-	N	LOC	LOC	TILL
W129183	10.8	0.3	10.5	1.0	9.5	P	40	60	Tr	Tr	U	Y	+	-	N	OC	OC	TILL
W129184	12.9	0.3	12.6	1.4	11.2	P	40	50	10	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129185	13.9	0.3	13.6	0.9	12.7	P	50	40	10	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129213	15.0	0.3	14.7	1.7	13.0	P	50	30	20	Tr	U	Y	+	-	N	LOC	LOC	TILL
W129214	13.8	0.3	13.5	1.5	12.0	P	50	30	20	0	U	Y	+	-	N	OC	OC	TILL
W129215	13.2	0.3	12.9	1.0	11.9	P	30	70	0	Tr	U	Y	+	-	N	OC	OC	TILL
W129216	14.0	0.3	13.7	1.5	12.2	P	50	50	Tr	Tr	U	Y	+	-	N	OC	OC	TILL
W129217	16.3	0.3	16.0	1.6	14.4	P	30	20	50	0	U	+	Y	-	N	DOC	DOC	TILL
W129218	14.1	0.3	13.8	1.8	12.0	P	40	10	50	0	U	Y	+	-	N	OC	OC	TILL
W129219	13.3	0.3	13.0	2.0	11.0	P	30	70	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129220	11.5	0.3	11.2	0.8	10.4	P	40	10	50	0	U	Y	+	-	N	LOC	LOC	TILL

* Samples prescreened to -8.0 mm in the field.
** Clasts listed as "OT" is quartz.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

Sample Number	Number of Visible Gold Grains				Nonmag HMC Weight (g)*	Calculated PPB Visible Gold in HMC			
	Total	Reshaped	Modified	Pristine		Total	Reshaped	Modified	Pristine
W129402	0	0	0	0	44.0	0	0	0	0
W129403	0	0	0	0	42.4	0	0	0	0
W129404	7	2	2	3	43.2	18	<1	13	5
W129405	4	0	0	4	43.6	1	0	0	1
W129406	8	3	3	2	39.6	12	6	6	<1
W129407	7	3	2	2	39.6	38	37	1	<1
W129408	1	1	0	0	44.0	2	2	0	0
W129409	2	0	1	1	44.0	1	0	1	<1
W129410	2	1	1	0	44.4	3	2	2	0
W129411	0	0	0	0	42.4	0	0	0	0
W129412	7	3	2	2	44.0	10	1	1	8
W129413	0	0	0	0	44.8	0	0	0	0
W129055	9	2	1	6	40.4	23	9	5	9
W129056	7	3	3	1	38.0	4	1	3	<1
W129057	11	5	2	4	46.8	17	3	8	6
W129058	2	2	0	0	35.6	3	3	0	0
W129059	0	0	0	0	46.8	0	0	0	0
W129060	4	1	3	0	49.2	17	12	5	0
W129061	16	8	4	4	40.8	14	11	1	1
W129062	29	19	6	4	50.8	24	12	11	1
W129063	12	6	0	6	37.2	10	2	0	8
W129175	1	1	0	0	45.2	13	13	0	0
W129176	3	2	0	1	46.8	9	9	0	<1
W129177	0	0	0	0	47.2	0	0	0	0
W129178	4	2	1	1	45.2	2	2	<1	<1
W129179	3	3	0	0	46.4	4	4	0	0
W129180	2	1	0	1	44.8	1	1	0	<1
W129181	11	4	4	3	47.2	15	9	5	1
W129182	3	1	2	0	42.4	11	5	7	0
W129183	21	10	2	9	38.0	46	6	1	39
W129184	11	5	3	3	44.8	4	2	1	1
W129185	5	3	2	0	50.8	27	13	14	0
W129213	2	1	1	0	52.0	1	<1	1	0
W129214	11	7	1	3	48.0	4	4	1	<1
W129215	5	4	1	0	47.6	2	2	<1	0
W129216	7	5	0	2	48.8	23	23	0	<1
W129217	9	6	0	3	57.6	14	4	0	10
W129218	3	3	0	0	48.0	14	14	0	0
W129219	9	7	2	0	44.0	4	3	1	0
W129220	3	3	0	0	41.6	1	1	0	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129402	No Visible Gold										No sulphides.
W129403	No Visible Gold										No sulphides.
W129404	3	C	15	15	2		1	3		<1	Tr (~10 grains) pyrite (25-50 µm).
	8	C	25	50			1	1		2	
	10	C	25	75			1	1		3	
	10	C	50	50		1		1		4	
	13	C	50	75		1		1		8	
								7	43.2	18	
W129405	3	C	15	15			3	3		<1	Tr ((2 grains) pyrite (100-150 µm).
	5	C	25	25			1	1		1	
								4	43.6	1	
W129406	3	C	15	15	1		2	3		<1	Tr (~800 grains) pyrite (25-150 µm).
	5	C	25	25	1	2		3		2	
	10	C	50	50	1	1		2		10	
								8	39.6	12	
W129407	3	C	15	15		1	2	3		<1	No sulphides.
	5	C	25	25		1		1		1	
	10	C	50	50	1			1		5	
	15	C	75	75	2			2		32	
								7	39.6	38	
W129408	8	C	25	50	1			1		2	No sulphides.
								1	44.0	2	
W129409	3	C	15	15			1	1		<1	Tr (5 grains) pyrite (25-50 µm).
	5	C	25	25		1		1		1	
								2	44.0	1	
W129410	8	C	25	50	1	1		2		3	No sulphides.
								2	44.4	3	
W129411	No Visible Gold										Tr (1 grain) cinnabar (25 µm). Tr (1 grain) arsenopyrite (100 µm). Tr (5 grains) pyrite (25-75 µm).
W129412	3	C	15	15	2		1	3		<1	Tr (1 grain) cinnabar (25 µm).
	5	C	25	25	1	2		3		2	Tr (~200 grains) pyrite (25-100 µm).
	13	C	50	75			1	1		8	
								7	44.0	10	
W129413	No Visible Gold										No sulphides.
W129055	3	C	15	15			2	2		<1	Tr (1 grain) sperrylite (50 µm).
	5	C	25	25	1		1	2		1	No sulphides.
	8	C	25	50			2	2		4	
	10	C	50	50		1	1	2		10	
	13	C	50	75	1			1		9	
								9	40.4	23	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

Sample Number	Dimensions (µm) Thickness	Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129056	3 C	15	15	1	1	1	3		<1	No sulphides.
	5 C	25	25	2	1		3		2	
	8 C	25	50		1		1		2	
							7	38.0	4	
W129057	3 C	15	15	2		2	4		<1	No sulphides.
	5 C	25	25	2	1		3		2	
	8 C	25	50	1		1	2		3	
	10 C	50	50			1	1		4	
	13 C	50	75		1		1		8	
							11	46.8	17	
W129058	5 C	25	25	1			1		1	Tr (~25 grains) cinnabar (15-50 µm).
	8 C	25	50	1			1		2	
							2	35.6	3	
W129059	No Visible Gold									No sulphides.
W129060	3 C	15	15		1		1		<1	No sulphides.
	8 C	25	50		1		1		1	
	10 C	50	50		1		1		4	
	15 C	50	100	1			1		12	
							4	49.2	17	
W129061	3 C	15	15	4	2	3	9		1	No sulphides.
	5 C	25	25	2	2	1	5		3	
	10 C	50	50	2			2		9	
							16	40.8	14	
W129062	3 C	15	15	13	1	3	17		2	No sulphides.
	5 C	25	25	3	1	1	5		2	
	8 C	25	50	1	2		3		4	
	10 C	50	50	2	2		4		15	
							29	50.8	24	
W129063	3 C	15	15	4		3	7		1	No sulphides.
	5 C	25	25	2		1	3		2	
	8 C	25	50			1	1		2	
	10 C	50	50			1	1		5	
							12	37.2	10	
W129175	15 C	50	100	1			1		13	No sulphides.
							1	45.2	13	
W129176	3 C	15	15			1	1		<1	No sulphides.
	8 C	25	50	1			1		2	
	13 C	50	75	1			1		8	
							3	46.8	9	
W129177	No Visible Gold									No sulphides.
W129178	3 C	15	15	1	1	1	3		<1	No sulphides.
	8 C	25	50	1			1		2	
							4	45.2	2	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129179	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
	10	C	25	75	1			1		3	
								3	46.4	4	
W129180	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25	1			1		1	
								2	44.8	1	
W129181	3	C	15	15	2	1	2	5		1	No sulphides.
	5	C	25	25		1	1	2		1	
	8	C	25	50	1	1		2		3	
	10	C	25	75		1		1		3	
	13	C	75	50	1			1		8	
								11	47.2	15	
W129182	10	C	25	75		2		2		7	No sulphides.
	10	C	50	50	1			1		5	
								3	42.4	11	
W129183	3	C	15	15	4	1	6	11		2	Tr (~20 grains) scheelite (25-500 µm).
	5	C	25	25	5	1	2	8		5	
	8	C	25	50	1			1		2	
	20	C	75	125			1	1		37	
								21	38.0	46	
W129184	3	C	15	15	2	1	1	4		<1	No sulphides.
	5	C	25	25	3	2	2	7		4	
								11	44.8	4	
W129185	3	C	15	15	1			1		<1	Tr (~20 grains) scheelite (25-500 µm).
	5	C	25	25	1			1		<1	
	13	C	50	75		2		2		14	
	15	C	75	75	1			1		13	
								5	50.8	27	
W129213	3	C	15	15	1			1		<1	No sulphides.
	8	C	25	50		1		1		1	
								2	52.0	1	
W129214	3	C	15	15	2		3	5		1	Tr (3 grains) cinnabar (50-100 µm).
	5	C	25	25	4	1		5		3	
	8	C	25	50	1			1		2	
								11	48.0	5	
W129215	3	C	15	15	3	1		4		<1	Tr (5 grains) scheelite (50-100 µm).
	8	C	25	50	1			1		2	
								5	47.6	2	
W129216	3	C	15	15			2	2		<1	Tr (2 grains) cinnabar (25-50 µm).
	5	C	25	25	3			3		1	Tr (1 grains) scheelite (250 µm).
	8	C	25	50	1			1		1	
	18	C	75	100	1			1		20	
								7	48.8	23	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 40
ODM Batch Number(s): 7648

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129217	3	C	15	15	4		2	6		1	No sulphides.
	5	C	25	25	1			1		<1	
	10	C	50	50	1			1		3	
	15	C	50	100			1	1		10	
								9	57.6	14	
W129218	5	C	25	25	2			2		1	No sulphides.
	15	C	75	75	1			1		13	
								3	48.0	14	
W129219	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	5	2		7		4	
								9	44.0	4	
W129220	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	1			1		1	
								3	41.6	1	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Overburden Drilling Management Limited
Unit 107, 15 Capella Court
Nepean, Ontario, Canada, K2E 7X1
Tel: (613) 226-1771 Fax: (613) 226-8753
odm@storm.ca www.odm.ca

Exploring Heavy Minerals

Laboratory Data Report

Client Information

Northern Superior Resources
1351C Kelly Lake Road, Unit 7
Sudbury, ON
P3E 5P5

data@nsuperior.com

Attention: Mr. Ron Avery

Data-File Information

Date:	November 14, 2017
Project name:	TPK
ODM batch number:	7649
Sample numbers:	W129221 to 129227, 129339 to 129343, 129345 to 129129354, 129367 to 129374 and 129414 to 129433
Data file:	20177576 Northern Superior - Avery - W - Gold - September 2017
Number of samples in this report:	50
Number of samples processed to date:	290
Total number of samples in project:	290
Preliminary data:	
Final data:	X
Revised data:	

Samples Processed For: Gold Grain Count

Processing Specifications:

1. Submitted by client: Till and sand/gravel samples prescreened to -8.0 mm in the field.
2. One ±300 g archival split taken from each sample.
3. All samples panned for gold, PGMs and fine-grained metallic indicator minerals.

Notes

For: Don Holmes, P.Geo.
President

Primary Sample Processing Weights and Descriptions

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

Sample Number	Weight (kg wet) Bulk Rec'd	Archived Split	Table Split	+2.0 mm Clasts*	Table Feed	Screening and Shaking Table Sample Descriptions: Clasts (+2.0 mm)* Size	Percentage V/S	GR	LS	OT**	Matrix (-2.0 mm) Distribution S/U	SD	ST	CY	ORG	Colour SD	CY	Class
W129221	12.6	0.3	12.3	1.3	11.0	P	30	40	30	0	U	Y	+	-	N	OC	OC	TILL
W129222	12.2	0.3	11.9	1.2	10.7	P	20	70	10	0	U	Y	+	-	Y	LOC	LOC	TILL
W129223	12.4	0.3	12.1	0.9	11.2	P	30	30	40	0	U	-	+	Y	N	LOC	LOC	TILL
W129224	13.4	0.3	13.1	1.2	11.9	P	70	20	10	0	U	Y	+	-	Y	BE	BE	TILL
W129225	15.8	0.3	15.5	1.8	13.7	P	30	20	50	0	U	Y	+	-	Y	BE	BE	TILL
W129226	14.7	0.3	14.4	1.6	12.8	P	30	70	0	0	U	+	Y	-	N	OC	OC	TILL
W129227	14.6	0.3	14.3	1.7	12.6	P	30	20	50	0	U	+	Y	-	N	BE	BE	TILL
W129339	12.8	0.3	12.5	0.7	11.8	P	20	10	70	0	U	Y	Y	Y	N	BE	BE	TILL
W129340	14.2	0.3	13.9	0.3	13.6	P	20	40	40	0	U	Y	Y	Y	N	OC	OC	TILL
W129341	14.2	0.3	13.9	0.7	13.2	P	30	20	50	0	U	Y	Y	Y	N	BE	BE	TILL
W129342	13.9	0.3	13.6	1.4	12.2	P	30	50	20	0	U	+	Y	-	N	OC	OC	TILL
W129343	14.3	0.3	14.0	1.6	12.4	P	30	40	30	0	U	+	Y	-	N	LOC	LOC	TILL
W129345	13.9	0.3	13.6	0.9	12.7	P	30	20	50	0	U	Y	+	-	N	BE	BE	TILL
W129346	12.1	0.3	11.8	0.8	11.0	P	20	80	0	0	U	Y	Y	Y	N	OC	OC	TILL
W129347	11.5	0.3	11.2	0.8	10.4	P	20	30	50	0	U	Y	Y	Y	N	BE	BE	TILL
W129348	12.8	0.3	12.5	1.2	11.3	P	30	50	20	0	U	+	Y	-	N	OC	OC	TILL
W129349	12.3	0.3	12.0	1.2	10.8	P	40	50	10	0	U	+	Y	-	N	OC	OC	TILL
W129350	13.4	0.3	13.1	1.6	11.5	P	40	55	5	0	U	+	Y	-	N	LOC	LOC	TILL
W129351	13.7	0.3	13.4	0.9	12.5	P	20	20	60	0	U	+	Y	-	N	OC	OC	TILL
W129352	12.5	0.3	12.2	1.2	11.0	P	30	20	50	0	U	+	Y	-	N	LOC	LOC	TILL
W129353	13.0	0.3	12.7	0.4	12.3	P	20	30	50	0	U	+	Y	-	N	GB	GB	TILL
W129354	12.5	0.3	12.2	0.7	11.5	C	30	20	50	0	U	Y	+	-	N	LOC	LOC	TILL
W129367	13.0	0.3	12.7	0.4	12.3	C	20	60	20	0	U	Y	Y	Y	N	LOC	LOC	TILL
W129368	11.6	0.3	11.3	0.2	11.1	P	50	30	20	0	S	FM	+	Y	N	OC	OC	SAND + SILT
W129369	13.6	0.3	13.3	1.0	12.3	P	70	30	Tr	0	U	Y	Y	Y	N	OC	OC	TILL
W129370	12.8	0.3	12.5	1.7	10.8	P	40	30	30	0	U	+	Y	-	N	OC	OC	TILL
W129371	12.7	0.3	12.4	1.4	11.0	G	50	30	20	0	U	+	Y	-	N	OC	OC	TILL
W129372	10.6	0.3	10.3	0.6	9.7	P	80	20	Tr	0	U	Y	+	-	Y	GB	GB	TILL
W129373	12.3	0.3	12.0	1.8	10.2	C	70	20	10	0	U	+	Y	-	Y	GB	GB	TILL
W129374	13.7	0.3	13.4	2.6	10.8	P	30	70	Tr	0	U	+	Y	-	N	DOC	DOC	TILL
W129414	12.2	0.3	11.9	0.9	11.0	P	90	10	0	0	U	Y	+	-	N	OC	OC	TILL
W129415	12.8	0.3	12.5	0.2	12.3	P	10	90	0	0	S	FM	+	-	N	OC	OC	SAND + SILT
W129416	12.4	0.3	12.1	0.5	11.6	P	20	80	Tr	0	S	FM	+	-	N	DOC	DOC	SAND + SILT
W129417	11.9	0.3	11.6	3.2	8.4	P	100	Tr	0	0	U	+	Y	-	N	OC	OC	TILL
W129418	12.6	0.3	12.3	0.4	11.9	P	100	Tr	Tr	0	U	Y	+	-	N	GB	GB	TILL
W129419	11.9	0.3	11.6	0.7	10.9	P	60	20	20	0	U	Y	+	-	N	BE	BE	TILL
W129420	12.0	0.3	11.7	0.8	10.9	P	50	30	20	0	U	Y	+	-	N	GB	GB	TILL
W129421	12.3	0.3	12.0	0.9	11.1	P	90	10	0	0	U	+	Y	-	N	OC	OC	TILL
W129422	12.0	0.3	11.7	1.1	10.6	P	90	10	0	0	U	Y	+	-	N	DOC	DOC	TILL
W129423	12.0	0.3	11.7	0.9	10.8	P	60	30	10	0	U	Y	+	-	N	GB	GB	TILL
W129424	12.3	0.3	12.0	0.9	11.1	P	60	30	10	0	U	+	Y	-	N	OC	OC	TILL
W129425	12.9	0.3	12.6	2.1	10.5	P	80	20	Tr	0	U	Y	+	-	N	DOC	DOC	TILL
W129426	12.6	0.3	12.3	1.1	11.2	P	40	60	0	0	U	+	Y	-	N	OC	OC	TILL
W129427	12.9	0.3	12.6	1.6	11.0	P	60	40	Tr	0	U	+	Y	-	N	OC	OC	TILL
W129428	12.6	0.3	12.3	0.1	12.2	P	20	80	Tr	0	S	FM	-	N	N	OC	NA	SAND
W129429	13.2	0.3	12.9	0.6	12.3	C	5	95	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129430	12.3	0.3	12.0	0.5	11.5	P	40	60	Tr	0	U	Y	+	-	N	OC	OC	TILL
W129431	12.4	0.3	12.1	0.6	11.5	P	50	10	40	0	U	Y	+	-	N	LOC	LOC	TILL
W129432	12.8	0.3	12.5	1.1	11.4	P	40	50	10	0	U	Y	+	-	N	OC	OC	TILL
W129433	12.6	0.3	12.3	1.2	11.1	P	70	20	10	0	U	Y	+	-	N	GB	GB	TILL

* Samples prescreened to -8.0 mm in the field.

Gold Grain Summary

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

	Number of Visible Gold Grains				Nonmag HMC Weight	Calculated PPB Visible Gold in HMC			
Sample Number	Total	Reshaped	Modified	Pristine	(g)*	Total	Reshaped	Modified	Pristine
W129221	2	2	0	0	44.0	1	1	0	0
W129222	0	0	0	0	42.8	0	0	0	0
W129223	0	0	0	0	44.8	0	0	0	0
W129224	2	1	0	1	47.6	4	4	0	<1
W129225	3	2	1	0	54.8	4	4	<1	0
W129226	2	2	0	0	51.2	2	2	0	0
W129227	1	1	0	0	50.4	<1	<1	0	0
W129339	4	4	0	0	47.2	1	1	0	0
W129340	2	2	0	0	54.4	1	1	0	0
W129341	2	2	0	0	52.8	<1	<1	0	0
W129342	2	2	0	0	48.8	1	1	0	0
W129343	4	4	0	0	49.6	6	6	0	0
W129345	1	1	0	0	50.8	<1	<1	0	0
W129346	119	5	2	112	44.0	187	3	1	183
W129347	2	2	0	0	41.6	1	1	0	0
W129348	3	3	0	0	45.2	2	2	0	0
W129349	5	4	0	1	43.2	7	5	0	2
W129350	1	1	0	0	46.0	4	4	0	0
W129351	2	2	0	0	50.0	<1	<1	0	0
W129352	3	2	0	1	44.0	13	13	0	1
W129353	3	1	2	0	49.2	5	4	1	0
W129354	4	4	0	0	46.0	2	2	0	0
W129367	1	0	1	0	49.2	<1	0	<1	0
W129368	1	1	0	0	44.4	8	8	0	0
W129369	2	2	0	0	49.2	<1	<1	0	0
W129370	2	2	0	0	43.2	1	1	0	0
W129371	3	1	0	2	44.0	<1	<1	0	<1
W129372	3	3	0	0	38.8	6	6	0	0
W129373	2	2	0	0	40.8	2	2	0	0
W129374	1	1	0	0	43.2	1	1	0	0
W129414	3	1	0	2	44.0	48	<1	0	48
W129415	1	1	0	0	49.2	114	114	0	0
W129416	3	3	0	0	46.4	22	22	0	0
W129417	0	0	0	0	33.6	0	0	0	0
W129418	2	1	1	0	47.6	12	4	8	0
W129419	5	4	1	0	43.6	7	6	1	0
W129420	4	3	0	1	43.6	1	1	0	<1
W129421	0	0	0	0	44.4	0	0	0	0
W129422	4	2	1	1	42.4	36	1	2	33
W129423	1	0	1	0	43.2	1	0	1	0
W129424	5	0	1	4	44.4	22	0	1	22
W129425	32	12	10	10	42.0	270	177	65	28
W129426	19	9	8	2	44.8	50	29	8	13
W129427	62	28	13	21	44.0	89	52	29	8
W129428	1	1	0	0	48.8	4	4	0	0
W129429	0	0	0	0	49.2	0	0	0	0
W129430	2	1	1	0	46.0	1	<1	1	0
W129431	1	1	0	0	46.0	1	1	0	0
W129432	2	2	0	0	45.6	1	1	0	0
W129433	1	1	0	0	44.4	2	2	0	0

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129221	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
								2	44.0	1	
W129222	No Visible Gold										No sulphides.
W129223	No Visible Gold										Tr (3 grains) pyrite (25-50 µm).
W129224	3	C	15	15			1	1		<1	No sulphides.
	10	C	50	50	1			1		4	
								2	47.6	4	
W129225	3	C	15	15	1			1		<1	Tr (5 grains) pyrite (25 µm).
	5	C	25	25		1		1		<1	
	10	C	50	50	1			1		4	
								3	54.8	4	
W129226	5	C	25	25	1			1		<1	No sulphides.
	8	C	25	50	1			1		1	
								2	51.2	2	
W129227	5	C	25	25	1			1		<1	No sulphides.
								1	50.4	<1	
W129339	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	2			2		1	
								4	47.2	1	
W129340	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		<1	
								2	54.4	1	
W129341	3	C	15	15	2			2		<1	No sulphides.
								2	52.8	<1	
W129342	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		<1	
								2	48.8	1	
W129343	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		<1	
	8	C	25	50	1			1		1	
	10	C	50	50	1			1		4	
								4	49.6	6	
W129345	5	C	25	25	1			1		<1	No sulphides.
								1	50.8	<1	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

Sample Number	Dimensions (µm)				Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness		Width	Length	Reshaped	Modified	Pristine	Total			
W129346	3	C	15	15	3		39	42		5	No sulphides.
	5	C	25	25	1	2	33	36		20	
	8	C	25	50	1		22	23		38	
	10	C	25	75			3	3		10	
	15	C	25	125			1	1		8	
	10	C	50	50			5	5		22	
	13	C	50	75			7	7		57	
	15	C	50	100			1	1		13	
	15	C	75	75			1	1		15	
								119	44.0	187	
W129347	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
								2	41.6	1	
W129348	5	C	25	25	3			3		2	No sulphides.
								3	45.2	2	
W129349	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25	1			1		1	
	8	C	25	50			1	1		2	
	10	C	50	50	1			1		4	
								5	43.2	7	
W129350	10	C	50	50	1			1		4	No sulphides.
								1	46.0	4	
W129351	3	C	15	15	2			2		<1	No sulphides.
								2	50.0	<1	
W129352	5	C	25	25			1	1		1	No sulphides.
	10	C	50	50	1			1		4	
	13	C	50	75	1			1		8	
								3	44.0	13	
W129353	3	C	15	15		1		1		<1	No sulphides.
	5	C	25	25		1		1		<1	
	10	C	50	50	1			1		4	
								3	49.2	5	
W129354	3	C	15	15	3			3		<1	No sulphides.
	8	C	25	50	1			1		2	
								4	46.0	2	
W129367	5	C	25	25		1		1		<1	No sulphides.
								1	49.2	<1	
W129368	13	C	50	75	1			1		8	No sulphides.
								1	44.4	8	
W129369	3	C	15	15	2			2		<1	No sulphides.
								2	49.2	<1	
W129370	3	C	15	15	1			1		<1	Tr (1 grain) cinnabar (25 µm).
	5	C	25	25	1			1		1	
								2	43.2	1	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

Sample Number	Dimensions (µm) Thickness		Width	Length	Number of Visible Gold Grains Reshaped	Modified	Pristine	Total	Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
W129371	3	C	15	15	1		2	3		<1	No sulphides.
								3	44.0	<1	
W129372	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
	10	C	50	50	1			1		5	
								3	38.8	6	
W129373	5	C	25	25	1			1		1	No sulphides.
	8	C	25	50	1			1		2	
								2	40.8	2	
W129374	5	C	25	25	1			1		1	Tr (1 grain) pyrite (25 µm).
								1	43.2	1	
W129414	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25			1	1		1	
	22	C	100	125			1	1		48	
								3	44.0	48	
W129415	50	M	100	150	1			1		114	No sulphides.
								1	49.2	114	
W129416	5	C	25	25	1			1		1	No sulphides.
	10	C	50	50	1			1		4	
	18	C	50	125	1			1		18	
								3	46.4	22	
W129417	No Visible Gold										No sulphides.
W129418	10	C	50	50	1			1		4	Tr (~100 grains) pyrite (25-250 µm).
	13	C	50	75		1		1		8	
								2	47.6	12	
W129419	3	C	15	15	2			2		<1	No sulphides.
	5	C	25	25		1		1		1	
	8	C	25	50	1			1		2	
	10	C	50	50	1			1		4	
								5	43.6	7	
W129420	3	C	15	15	1		1	2		<1	Tr (~200 grains) pyrite (25-200 µm).
	5	C	25	25	2			2		1	
								4	43.6	1	
W129421	No Visible Gold										No sulphides.
W129422	3	C	15	15	1			1		<1	Tr (5 grains) pyrite (25-250 µm).
	5	C	25	25	1			1		1	
	8	C	25	50		1		1		2	
	20	C	75	125			1	1		33	
								4	42.4	36	
W129423	5	C	25	25		1		1		1	No sulphides.
								1	43.2	1	

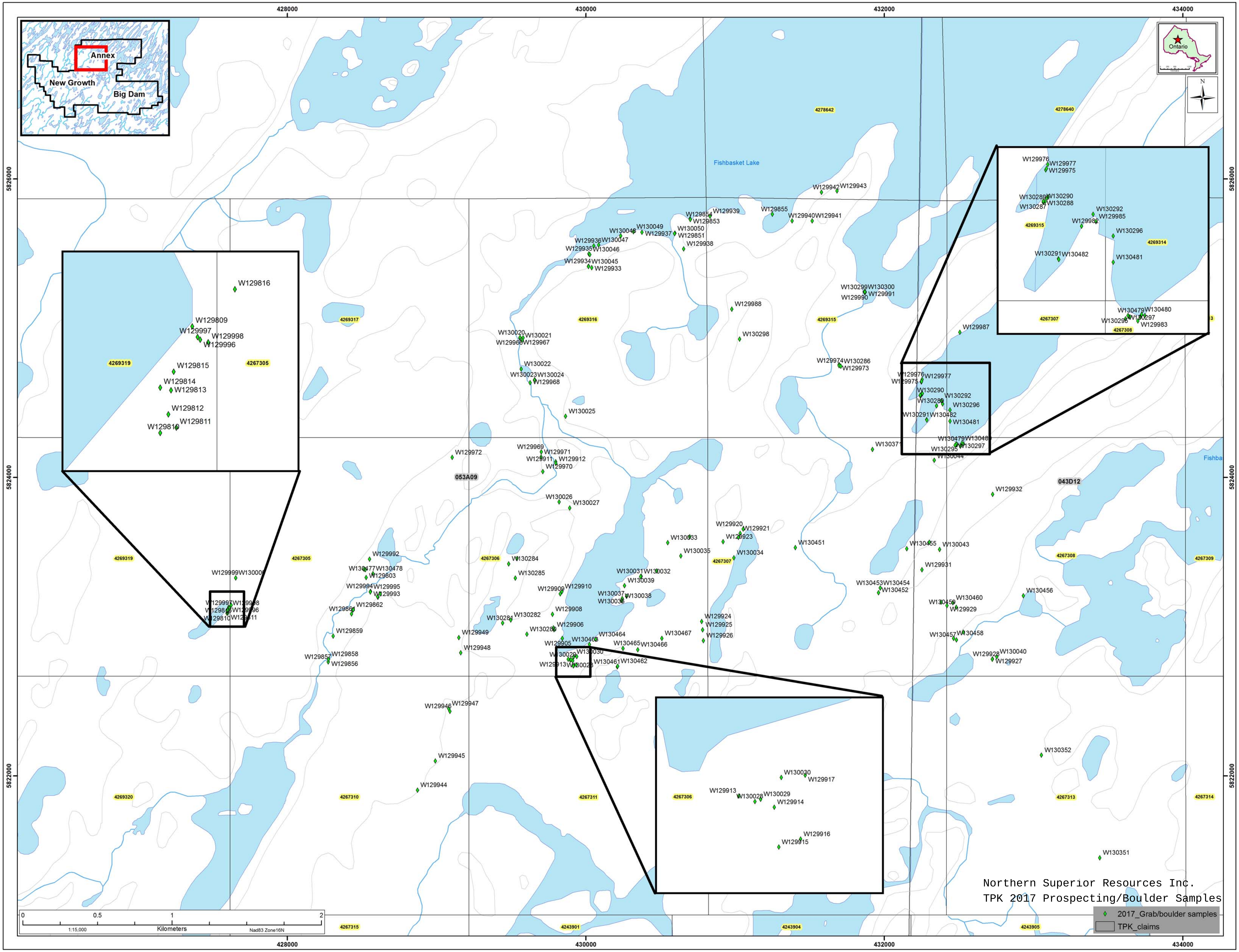
* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

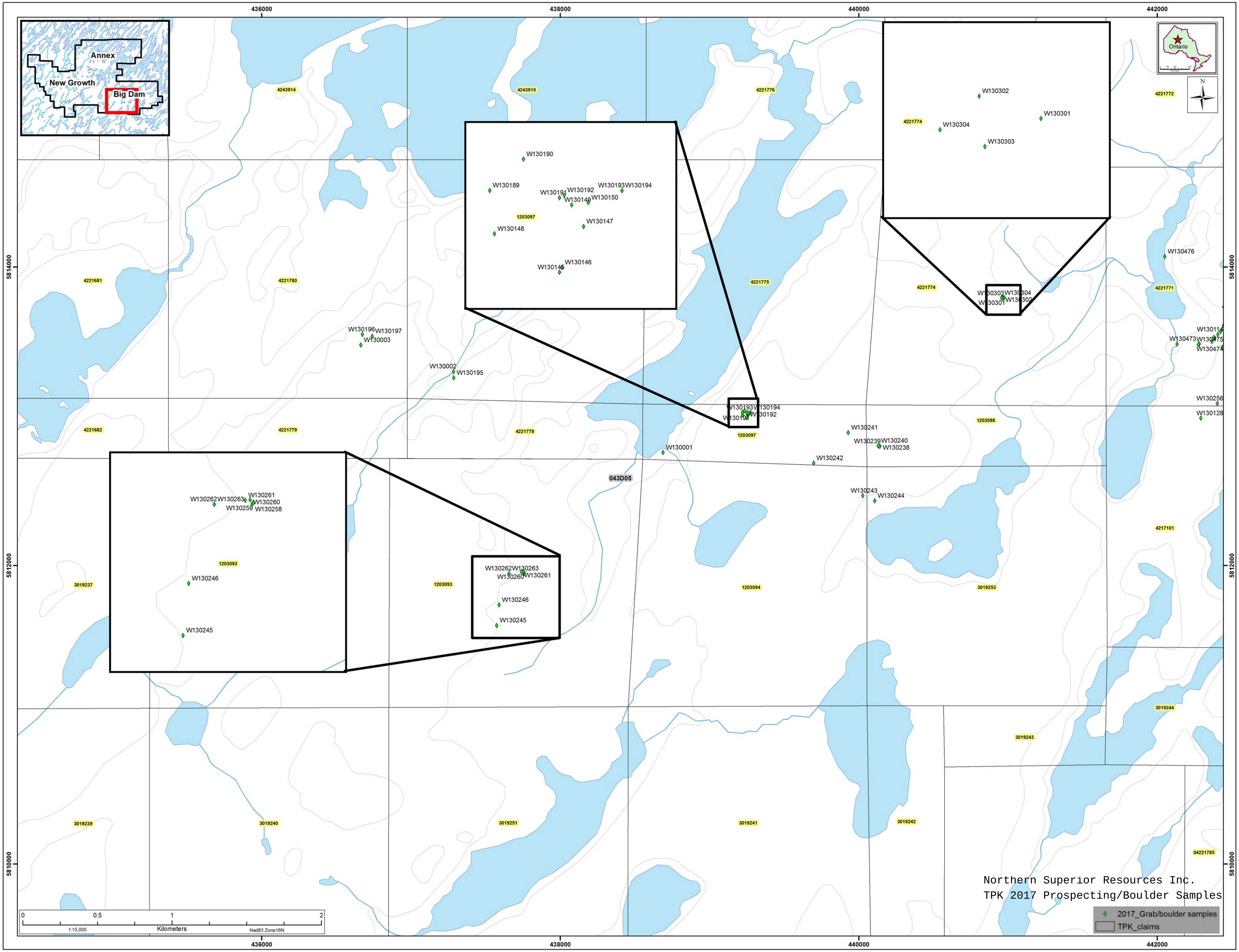
Detailed Gold Grain Data

Client: Northern Superior Resources
File Name: 20177576 Northern Superior - Avery - W - Gold - September 2017
Total Number of Samples in this Report: 50
ODM Batch Number(s): 7649

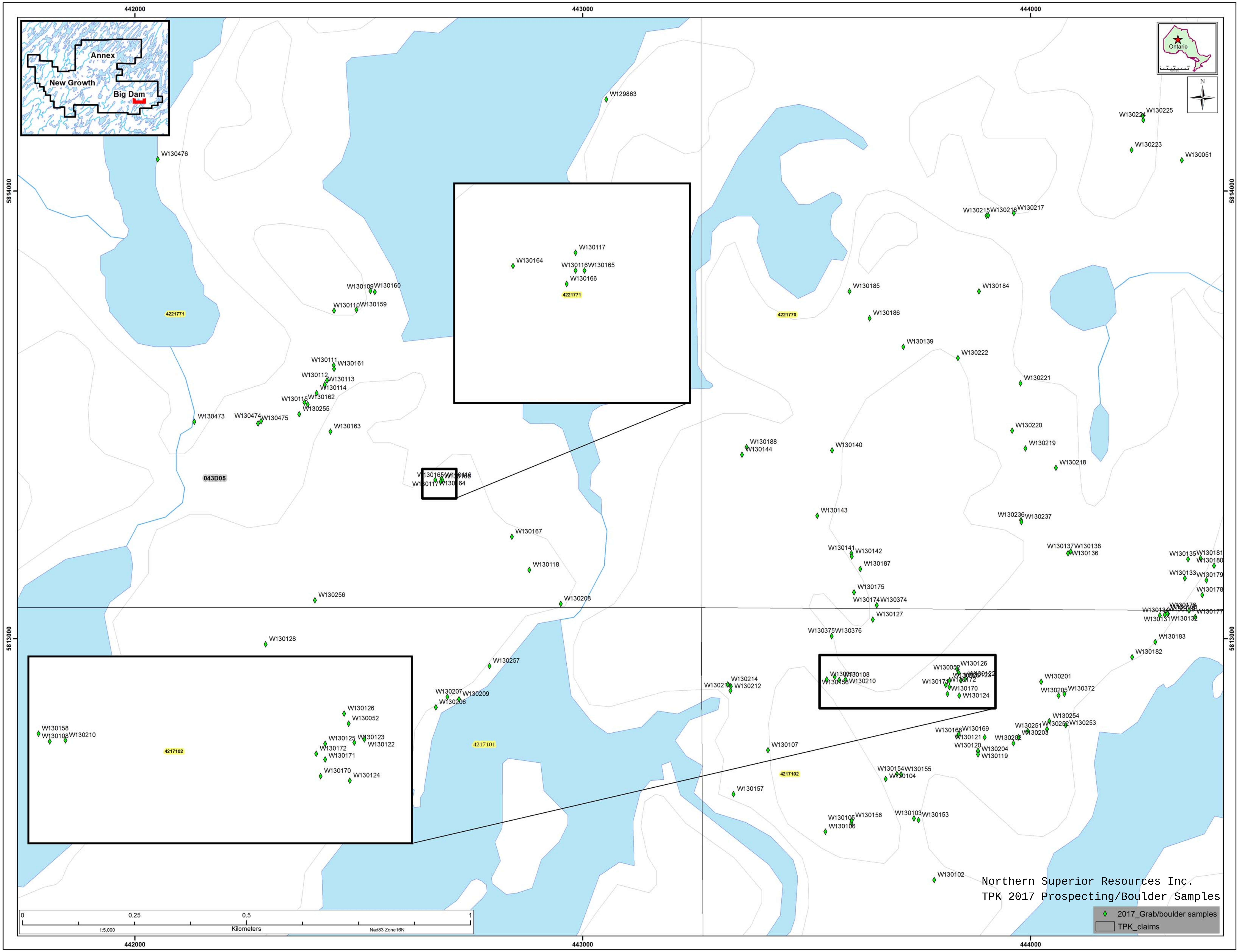
Sample Number	Dimensions (µm)				Number of Visible Gold Grains				Nonmag HMC Weight* (g)	Calculated V.G. Assay in HMC (ppb)	Metallic Minerals in Pan Concentrate
	Thickness		Width	Length	Reshaped	Modified	Pristine	Total			
W129424	3	C	15	15			1	1		<1	No sulphides.
	5	C	25	25		1	1	2		1	
	13	C	50	75			1	1		8	
	15	C	50	100			1	1		13	
								5	44.4	22	
W129425	3	C	15	15	2		2	4		1	Tr (3 grains) pyrite (50-125 µm).
	5	C	25	25	4	4	2	10		6	
	8	C	25	50	2	3	3	8		14	
	10	C	25	75		1		1		3	
	10	C	50	50	1	1	1	3		14	
	13	C	50	75			2	2		17	
	22	C	100	125	2	1		3		150	
	25	C	100	150	1			1		66	
								32	42.0	270	
W129426	3	C	15	15	2	3	1	6		1	Tr (~50 grains) pyrite (25-250 µm).
	5	C	25	25	3	3		6		3	
	8	C	25	50	3			3		5	
	10	C	25	75		2		2		6	
	15	C	50	100			1	1		13	
	18	C	75	100	1			1		22	
								19	44.8	50	
W129427	3	C	15	15	10	2	14	26		3	Tr (1 grain) pyrite (150 µm).
	5	C	25	25	13	4	5	22		12	
	8	C	25	50	2	4	2	8		13	
	10	C	25	75		1		1		3	
	10	C	50	50	2			2		9	
	13	C	50	75		2		2		16	
	20	C	75	125	1			1		32	
								62	44.0	89	
W129428	10	C	50	50	1			1		4	No sulphides.
								1	48.8	4	
W129429	No Visible Gold										No sulphides.
W129430	3	C	15	15	1			1		<1	Tr (~15 grains) pyrite (25-250 µm).
	5	C	25	25		1		1		1	
								2	46.0	1	
W129431	5	C	25	25	1			1		1	No sulphides.
								1	46.0	1	
W129432	3	C	15	15	1			1		<1	No sulphides.
	5	C	25	25	1			1		1	
								2	45.6	1	
W129433	8	C	25	50	1			1		2	No sulphides.
								1	44.4	2	

* Calculated PPB Au based on assumed nonmagnetic HMC weight equivalent to 1/250th of the table feed.

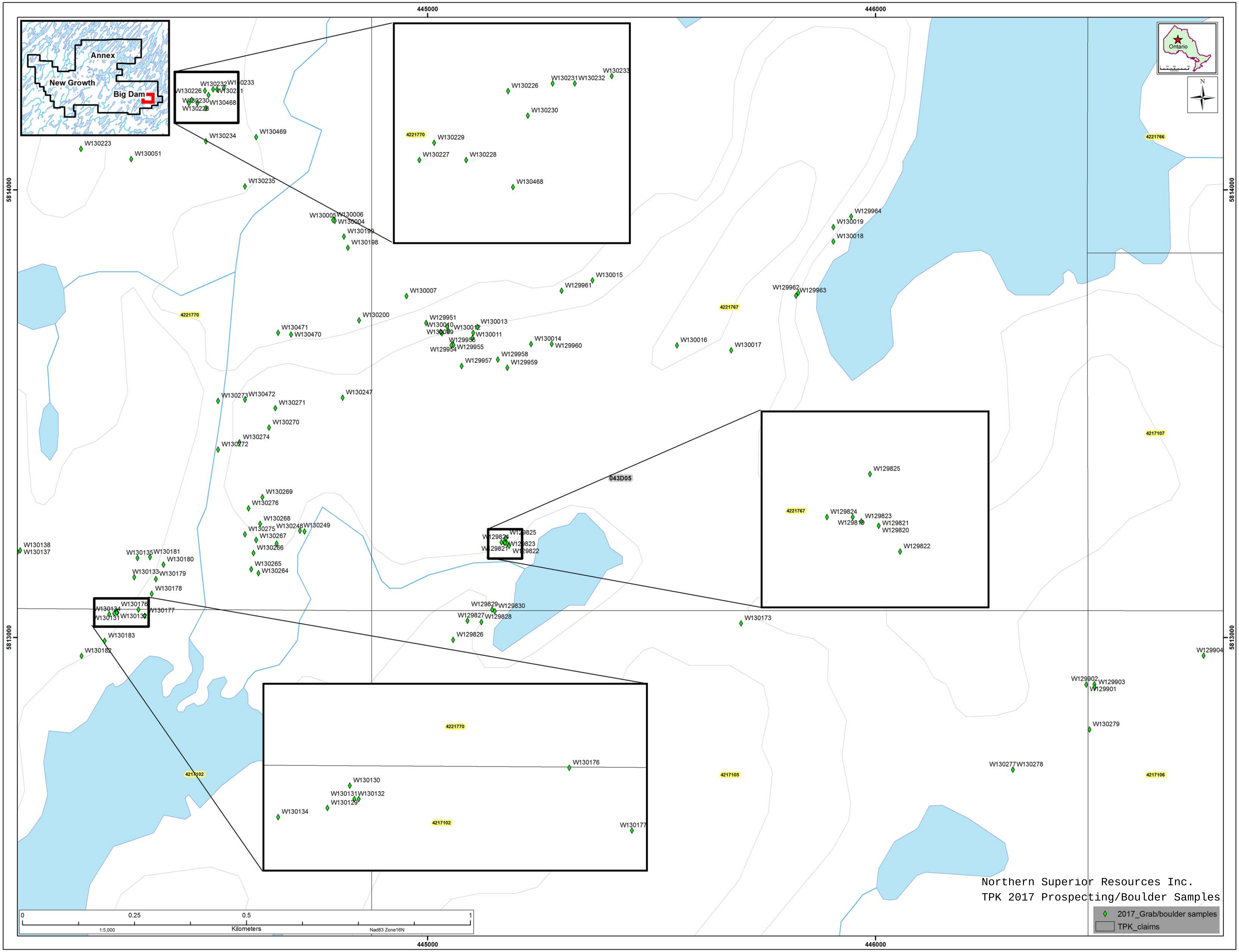

Northern Superior Resources Inc.
TPK 2017 Prospecting/Boulder Samples
2017_Grab/boulder samples
TPK_claims
Annex
New Growth
Big Dam
Ontario
N
Fishbasket Lake
053A09
043D12
428000
430000
432000
434000
5826000
5824000
5822000
0
0.5
1
2
1:15,000
Kilometers
Nad83 Zone16N
4278642
4278640
4269317
4269316
4269315
4269314
4269319
4267305
4267306
4267307
4267308
4267309
4269320
4267310
4267311
4267313
4267314
4267315
4243901
4243904
4243905
W129816
W129809
W129997
W129998
W129996
W129815
W129814
W129813
W129812
W129811
W129810
W129999
W130000
W129942
W129943
W129855
W129940
W129941
W129854
W129939
W129853
W130048
W130049
W129937
W130050
W129851
W129936
W130047
W129935
W130046
W129938
W129934
W130045
W129933
W130299
W130300
W129990
W129991
W129988
W130298
W130020
W130021
W129966
W129967
W129974
W130286
W129973
W130022
W130023
W130024
W129968
W130025
W129987
W129976
W129977
W129975
W130290
W130288
W130287
W130292
W129985
W130296
W130291
W130482
W130481
W130479
W130480
W130297
W129983
W130371
W130044
W129972
W129969
W129971
W129911
W129912
W129970
W129932
W130026
W130027
W129920
W129921
W129923
W130033
W130035
W130034
W130451
W130455
W130043
W129992
W130477
W130478
W129803
W130284
W130285
W129931
W130031
W130032
W130039
W130453
W130454
W130452
W129994
W129995
W129993
W129909
W129910
W130037
W130038
W130456
W130460
W129929
W129862
W129908
W130282
W129924
W129925
W129926
W129859
W129906
W129949
W130464
W130467
W130457
W130458
W129948
W129905
W130465
W130466
W129857
W129858
W129856
W130029
W130030
W129913
W130028
W130461
W130462
W129928
W130040
W129927
W129946
W129947
W129945
W129944
W130352
W130351
W129917
W129914
W129916
W129915



436000
438000
440000
442000
5814000
5812000
5810000
Annex
New Growth
Big Dam
Ontario
N
4243914
4243915
4221776
4221772
4221774
4221681
4221780
4221775
4221771
4221682
4221779
4221778
1203097
1203098
043D05
1203093
1203094
3019237
3019253
4217101
3019244
3019243
3019239
3019240
3019251
3019241
3019242
04221785
W130190
W130189
W130191
W130192
W130193
W130194
W130149
W130150
W130148
W130147
W130145
W130146
W130302
W130301
W130304
W130303
W130196
W130197
W130003
W130002
W130195
W130001
W130241
W130239
W130240
W130238
W130242
W130243
W130244
W130476
W130473
W130475
W130474
W130256
W130128
W130262
W130263
W130261
W130260
W130259
W130258
W130246
W130245
Northern Superior Resources Inc.
TPK 2017 Prospecting/Boulder Samples
2017_Grab/boulder samples
TPK_claims
0
0.5
1
2
1:15,000
Kilometers
Nad83 Zone16N



442000
443000
444000
5814000
5813000
Annex
New Growth
Big Dam
Ontario
N
W129863
W130476
W130224
W130225
W130223
W130051
W130215
W130216
W130217
W130117
W130164
W130116
W130165
W130166
4221771
W130109
W130160
W130110
W130159
W130185
W130184
W130186
4221770
W130139
W130222
W130221
W130111
W130161
W130112
W130113
W130114
W130115
W130162
W130255
W130473
W130474
W130475
W130163
W130220
W130219
W130218
W130188
W130144
W130140
043D05
W130167
W130143
W130236
W130237
W130141
W130142
W130187
W130137
W130138
W130136
W130135
W130181
W130180
W130133
W130179
W130178
W130118
W130175
W130256
W130208
W130174
W130374
W130127
W130177
W130131
W130132
W130375
W130376
W130183
W130128
W130182
W130257
W130126
W130052
W130214
W130212
W130108
W130210
W130158
W130124
W130201
W130205
W130372
W130207
W130209
W130206
W130125
W130123
W130122
W130172
W130171
W130170
4217102
4217101
W130254
W130253
W130251
W130252
W130203
W130169
W130121
W130202
W130120
W130204
W130119
W130107
W130154
W130155
W130104
W130157
W130105
W130156
W130106
W130103
W130153
W130102
Northern Superior Resources Inc.
TPK 2017 Prospecting/Boulder Samples
2017_Grab/boulder samples
TPK_claims
0
0.25
0.5
1
1:5,000
Kilometers
Nad83 Zone16N



Northern Superior Resources Inc.
TPK 2017 Prospecting/Boulder Samples
2017_Grab/boulder samples
TPK_claims
445000
446000
5814000
5813000
Annex
New Growth
Big Dam
Ontario
N
4221770
4221767
4221766
4217107
4217102
4217105
4217106
043D05
W130223
W130051
W130234
W130469
W130235
W130005
W130006
W130004
W130199
W130198
W130007
W130200
W130471
W130470
W129951
W130010
W130009
W130012
W130013
W130011
W129956
W129954
W129955
W129957
W129958
W129959
W130014
W129960
W129961
W130015
W130016
W130017
W129962
W129963
W129964
W130019
W130018
W130273
W130472
W130271
W130247
W130270
W130274
W130272
W130269
W130276
W130268
W130275
W130248
W130249
W130267
W130266
W130265
W130264
W130138
W130137
W130135
W130181
W130180
W130133
W130179
W130178
W130176
W130134
W130131
W130130
W130177
W130183
W130182
W129825
W129824
W129821
W129823
W129822
W129819
W129820
W129829
W129830
W129827
W129828
W129826
W130173
W129904
W129902
W129903
W129901
W130279
W130277
W130278
W130226
W130231
W130232
W130233
W130230
W130229
W130227
W130228
W130468
W130132
W130129
0
0.25
0.5
1
1:5,000
Kilometers
Nad83 Zone16N

Appendix 4: Prospecting sample site table wt clai

Sample_Number	Datum	utm_East	utm_North	Sample_Type	Collected	MajorU	Alteration	Rock_Code	Mineralization	Description	Claim_Number
W129751	NAD83z16	443037	5811766	Boulder	JA	Mafic intrusive	Wk sheared	I3		Weakly sheared, fine to medium grained mafic intrusive with rusty	4217101
W129752	NAD83z16	443074	5812081	Boulder	JA	Mafic intrusive		I3		Unsheared, coarse to medium grained mafic-intermediate intrusive with rusty staining. Some angular fragments of entrained comb-quartz veins. No sulphides.	4217101
W129753	NAD83z16	443085	5812115	Boulder	JA	Quartz Monzonite	Mod shearing	(M8)QMNZ		Moderately sheared, rust stained, medium grained QMNZ. No sulphides observed.	4217101
W129801	NAD83z16	431869	5825239	Grab	GS	Intermediate intrusive		I2	1Py, 0.5As	Intermediate intrusive. Rare specks of disseminated pyrite/arsenopyrite. Sample collected in between larger QV which were sampled by GG at the same time.	4269315
W129802	NAD83z16	431866	5825244	Grab	GS	Intermediate volcanic		V2		Medium grained intermediate volcanic(?) with pos lapilli. Host !cm wide set of cross cutting, grey quartz veinlets. Sulphides	4269315
W129803	NAD83z16	428528	5823329	Grab	GS	Intermediate volcanic	Mod sheared	V2	3Py	Moderately sheared, medium-fine grained intermediate volcanic/intrusive with strong silicic alteration along one margin, hosting euhedral, fine grained, disseminated pyrite.	4267305
W129804	NAD83z16	428515	5823385	Grab	GS	Quartz vein		QV	25Py, 1As	Rusty, white-grey quartz-carbonate vein with 4x4cm aggregates of pyrite and pos arsenopyrite.	4267305
W129805	NAD83z16	428524	5823383	Grab	GS	Intermediate volcanic	Strong shearing	I2	5Py, 1As	Strongly sheared, light grey-green, intermediate rock, difficult tc ascertain precursor rock. Shear parellel lenses of euhedral pyrite,	4267305
W129806	NAD83z16	428622	5823220	Boulder	GS	Intermediate volcanic	Strong shearing	I2	3Py, 1As	Strongly sheared, light grey-green, intermediate rock, difficult tc ascertain precursor rock. Shear parellel lenses of euhedral pyrite,	4267305
W129807	NAD83z16	428608	5823197	Boulder	GS	Quartz vein	Chloritised	QV	3Py	Grey-white quartz-carbonate vein hosting no sulphides. Coarse grained, subhedral pyrite present in adjacent, strongly chloritized	4267305
W129808	NAD83z16	428605	5823202	Boulder	GS	Mafic volcanic		V3		Dark green, fine grained mafic volcanic. Trace, very fine grainec disseminated pyrite.	4267305
W129809	NAD83z16	427608	5823130	Grab	GS	Mafic volcanic	Mod sheared	V3	1Py	Described as gossaneous rock with minor pyrite.	4269319
W129810	NAD83z16	427596	5823090	Grab	GS	Mafic volcanic	Mod sheared	V3	0.5Py	Described as gossaneous, moderately sheared mafic rock.	4269319
W129811	NAD83z16	427602	5823092	Grab	GS	Monzonite	Mod sheared	QMNZ	0.5Py	Reported as monzonite though looks more like intermediate-mafic volcanic with moderate shearing, rusty weathering and rare	4269319
W129812	NAD83z16	427599	5823097	Grab	GS	Mafic intrusive		I3	1Py	Unsheared, fine-medium grained mafic volcanic/intrusive, with disseminated, fg pyrite.	4269319
W129813	NAD83z16	427600	5823106	Grab	GS	Mafic volcanic	Mod sheared	V3	3Py, 0.5Cpy	Moderately sheared, rusty mafic rock (intrusive/volcanic?) with lenses of cubic pyrite and specks of chalcopyrite.	4269319
W129814	NAD83z16	427596	5823107	Grab	GS	Mafic volcanic	Wk Sheared	V3	2Py, 0.5Cpy, 0.5Mal	Weakly sheared to unsheared mafic volcanic/fg intrusive with disseminated and rare stringers of pyrite/chalcopyrite and trace	4269319
W129815	NAD83z16	427601	5823113	Grab	GS	Intermediate volcanic	Mod sheared, silicified	V2	1Py	Light grey green, weak-moderately sheared intermediate c silicified mafic volcanic with very fg lapilli(?) and rare disseminated	4269319
W129816	NAD83z16	427624	5823144	Grab	GS	Mafic volcanic	Mod sheared	V3	3Py, 0.5Cpy	Moderately sheared, rusty mafic rock (intrusive/volcanic?) with lenses of cubic pyrite and specks of chalcopyrite.	4267305
W129817	NAD83z16	445171	5813213	Boulder	GS	Monzonite		MNZ	2Py, 0.5Cpy	Coarse grained monzonite with compositional banded texture rare specks of disseminated pyrite, chalcopyrite reported.	4221767
W129818	NAD83z16	445171	5813213	Boulder	GS	Gabbro		I3G	8Py, 1As	Coarse grained mafic intrusive with clusters of anhedral pyrite.	4221767
W129819	NAD83z16	445171	5813213	Boulder	GS	Mafic intrusive		I3G		Coarse grained mafic intrusive, unsheared. Sulphides absent.	4221767
W129820	NAD83z16	445177	5813211	Boulder	GS	Mafic intrusive	Mod sheared	I3G		Moderately sheared, coarse grained mafic material with rusty	4221767
W129821	NAD83z16	445177	5813211	Boulder	GS	Gabbro		I3G	1Py, 0.5Cpy	Coarse grained mafic intrusive, unsheared. Trace pyrite, chalcopyrite also reported.	4221767
W129822	NAD83z16	445182	5813205	Boulder	GS	Quartz Monzonite	Potassic altered	QMNZ	1Py, 0.5Cpy	Coarse grained, pink-grey potassic altered QMNZ with disseminated pyrite and chalcopyrite.	4221767
W129823	NAD83z16	445173	5813212	Boulder	GS	Mafic intrusive		I3	3Py	Coarse-medium grained mafic intrusive, unsheared with blebby and stringers of pyrite. Strongly chloritized.	4221767
W129824	NAD83z16	445165	5813213	Boulder	GS	Mafic intrusive		I3	5Py	Moderately sheared, coarse grained mafic material with rusty staining and blebby pyrite.	4221767
W129825	NAD83z16	445175	5813223	Boulder	GS	Quartz Monzonite		QMNZ	2Py	Coarse grained quartz monzonite with rare stringers of pyrite and rusty weathering.	4221767
W129826	NAD83z16	445057	5812995	Boulder	GS	Quartz Monzonite		QMNZ	2Py	Coarse grained quartz monzonite with rare stringers of pyrite and rusty weathering.	4217105
W129827	NAD83z16	445089	5813038	Boulder	GS	Leucogranite		I1B	2Py	Coarse-medium grained leucogranite with rare disseminated of pyrite and rusty weathering.	4217105
W129828	NAD83z16	445120	5813035	Boulder	GS	Felsic intrusive		I1		Very quartz rich, light grey to white (aplite?) intrusive. Sulphides absent. Tourmaline reported but not observed.	4217105

W129829	NAD83z16	445144	5813063	Boulder	GS	Diorite		I2	3Py	Unsheared, medium grained, medium grey diorite with specks of disseminated pyrite.	4221767
W129830	NAD83z16	445150	5813059	Boulder	GS	Quartz Monzonite	Wk Sheared	QMNZ	0.5Py	Weakly sheared QMNZ with rare, very fine grained disseminatec specks of py and rusty weathering.	4217105
W129831	NAD83z16	431077	5816777	Boulder	GS	Mafic volcanic		V3		Fine grained, dark green, mafic volcanic	4227236
W129851	NAD83z16	430598	5825637	Grab	DC	Quartz vein		QV	0.5Py	Grey-white quartz-carbonate vein hosting trace disseminated specks of pyrite. Reportedly hosted in mafic volcanic. Malachite reported but not seen. Rusty weathering.	4269316
W129852	NAD83z16	430699	5825733	Boulder	DC	Quartz vein		QV	0.5Py	Sugary white, discontinous quartz vein hosted in strongly sheared, altered host. Pos intermediate intrusive. Trace specks of	4269316
W129853	NAD83z16	430699	5825733	Boulder	DC	Intermediate intrusive	Wk Sheared	I2	0.5Py	Green grey, medium grained intermediate intrusive from same boulder as sample W129852. Rare, disseminated, fine grained specks of pyrite and rusty weathering. Pyrite associated with	4269316
W129854	NAD83z16	430700	5825729	Boulder	DC	Mafic volcanic	Wk Sheared	V3		Magnetic, dark green, fine grained, mafic volcanic with rare disseminated py, pos cpy. Rusty staining.	4269316
W129855	NAD83z16	431250	5825764	Boulder	DC	Intermediate intrusive		I2	5Py, 3Cpy	Medium grained, grey-green intermediate intrusive with rusty grey transluscent quartz vein hosting coarse grained blebs of pyrite and chalcopyrite. Finer grained sulphides in adjacent host rock.	4269315
W129856	NAD83z16	428275	5822764	Boulder	DC	Mafic intrusive	Mod sheared	I3	10Py	Moderately sheared, medium-fine grained mafic intrusive-volcainic with lenses of euhedral pyrite throughout. Pos	4267305
W129857	NAD83z16	428275	5822764	Boulder	DC	Mafic intrusive	Mod sheared	I3	5Py	Moderately sheared, medium-fine grained mafic intrusive-volcainic with lenses of euhedral pyrite throughout. Pos arsenopyrite reported. Non-magnetic. Same as sample W129857	4267305
W129858	NAD83z16	428277	5822782	Boulder	DC	Quartz vein	Silicified	QV		Dark green, fine grained, moderately sheared mafic volcanic hosting white-opaque quartz vein ~2cm wide with apparent moderate silicification to adjacent mafic. Sulphides absent.	4267305
W129859	NAD83z16	428307	5822937	Boulder	DC	Intermediate volcanic	Mod sheared	I2	2Py, 0.5Cpy	Moderately sheared intermediate/mafic volcanic with possible attenuated, fg lapilli(?). Hosts disseminated pyrite and pos	4267305
W129860	NAD83z16	428438	5823112	Boulder	DC	Mafic volcanic		V3	1Py	Medium-fine grained, green-grey, non-magnetic mafic volcanic with disseminated specks of pyrite. Malachite reported but not	4267305
W129861	NAD83z16	428431	5823085	Grab	DC	Mafic volcanic		V3	5Py, 0.5As	Fine grained, green grey, unsheared mafic volcanic with rusty, grey transulscent quartz vein hosting sub-euhedral pyrite. Acicular arsenopyrite reported but not observed. Vein strikes 020'	4267305
W129862	NAD83z16	428442	5823113	Boulder	DC	Mafic volcanic	Wk Sheared	V3	3Py	Fine grained, green grey, unsheared, magnetic mafic/intermediat volcanic with rusty weathering and disseminated, subhedral	4267305
W129863	NAD83z16	443053	5814205	Boulder	DC	Quartz Monzonite		QMNZ	1Py	Unsheared, coarse-medium grained quartz monzonite with rare specks of disseminated pyrite.	4221771
W129864	NAD83z16	443066	5811754	Boulder	DC	Monzonite	Strongly sheared	(M8)QMNZ		Strongly sheared to protomylonitic monzonite with rusty staining. Sulphides absent.	4217101
W129865	NAD83z16	443082	5812012	Boulder	DC	Quartz Monzonite	Mod sheared and silicified	QMNZ	4Py	Moderate to weakly sheared and moderately silicified QMNZ with stringers and disseminations of pyrite with some rusty staining.	4217101
W129901	NAD83z16	446471	5812895	Boulder	JA	Aplite		I1F		Light grey fine grained aplite dyke	4217105
W129902	NAD83z16	446489	5812896	Boulder	JA	Mafic volcanic		V3	0.5Py	Black-dark green, fg, foliated mafic volcanic with rare specks of	4217106
W129903	NAD83z16	446490	5812889	Boulder	JA	Mafic volcanic		V3	0.5Py	Black-dark green, fg, foliated mafic volcanic with rare specks of	4217106
W129904	NAD83z16	446733	5812960	Boulder	JA	Mafic volcanic		V3	0.5Py	Black-dark green, fg, foliated mafic volcanic with rare specks of	4217106
W129905	NAD83z16	429843	5822922	Boulder	JA	Gabbro		I3G		Coarse grained gabbro. Rusty staining.	4267306
W129906	NAD83z16	429787	5822980	Boulder	JA	Mafic intrusive	Wk sheared	I3	0.5Py	Weakly sheared, medium grained mafic volcanic	4267306
W129907	NAD83z16	429784	5822992	Boulder	JA	Diorite		I2	1Py	Medium grained, intermediate-mafic with euhedral pyrite	4267306
W129908	NAD83z16	429777	5823083	Boulder	JA	Mafic intrusive		I3	10As	Fine grained mafic intrusive with 5mm wide massive arsenopyrite	4267306
W129909	NAD83z16	429829	5823220	Boulder	JA	Mafic intrusive		I3	2Py	Fine-medium grained mafic intrusive with quartz-carbonate veinlets hosting disseminated pyrite.	4267306
W129910	NAD83z16	429840	5823236	Boulder	JA	Mafic intrusive		I3		Fine-medium grained mafic intrusive	4267306
W129911	NAD83z16	429799	5824106	Boulder	JA	Mafic intrusive		I3	2Py	Fine-medium grained mafic intrusive with quartz-carbonate veinlets hosting disseminated pyrite.	4267306
W129912	NAD83z16	429800	5824094	Boulder	JA	Diorite		I2	2Py	Coarse grained diorite(?) with disseminated pyrite and rusty	4267306
W129913	NAD83z16	429882	5822782	Boulder	JA	Mafic intrusive		I3	3Py	Medium-fine grained mafic volcanic with disseminated, blebby	4267306
W129914	NAD83z16	429913	5822772	Boulder	JA	Mafic volcanic		V3	1Py	Fine grained mafic volcanic with disseminated specks of pyrite.	4267306
W129915	NAD83z16	429917	5822737	Boulder	JA	Mafic intrusive		I3	3Py	Medium-fine grained mafic volcanic with disseminated, blebby	4267306
W129916	NAD83z16	429936	5822744	Boulder	JA	Mafic volcanic		V3	2Py	Fine grained mafic volcanic with disseminated specks and blebs of	4267306
W129917	NAD83z16	429940	5822800	Boulder	JA	Quartz vein		QV	2Py	2cm wide quartz vein in mafic volcanic. Blebby pyrite along margin	4267306
W129918	NAD83z16	430476	5823374	Boulder	JA	Diorite		I2	1Py	Medium grained, medium grey diorite with specks of	4267306
W129919	NAD83z16	430696	5823602	Boulder	JA	Mafic intrusive		I3	0.5As	Dark green medium grained mafic intrusive	4267306

W129920	NAD83z16	431055	5823654	Boulder	JA	Mafic intrusive		I3	0.5As	Dark green medium grained mafic intrusive	4267307
W129921	NAD83z16	431034	5823625	Boulder	JA	Mafic intrusive		I3	0.5Py	Dark green medium grained mafic intrusive	4267307
W129922	NAD83z16	431023	5823598	Boulder	JA	Mafic intrusive	Wk Sheared	I3	1Py, 0.5As	Dark green, medium grained, weakly sheared mafic intrusive witl <1cm quartz vein hosting cubic pyrite.	4267307
W129923	NAD83z16	430920	5823569	Boulder	JA	Diorite		I2	0.5Py	Medium grained diorite? Intermediate intrusive with disseminated specks of pyrite.	4267307
W129924	NAD83z16	430776	5823035	Boulder	JA	Diorite		I2	0.5Py	Medium grained diorite? Intermediate intrusive with disseminated specks of pyrite.	4267306
W129925	NAD83z16	430783	5822979	Boulder	JA	Diorite		I2	1Py	Medium grained diorite or monzonite with disseminated specks	4267306
W129926	NAD83z16	430788	5822907	Boulder	JA	Mafic intrusive	Wk Sheared	I3	0.5Py	Weakly sheared mafic with <1cm white quartz veins. Rare specks of pyrite disseminated throughout.	4267306
W129927	NAD83z16	432725	5822783	Boulder	JA	Mafic volcanic	Mod sheared	V3		Moderately sheared, fine grained mafic volcanic	4267308
W129928	NAD83z16	432724	5822782	Boulder	JA	Mafic volcanic	Mod sheared	V3		Moderately sheared, fine grained mafic volcanic	4267308
W129929	NAD83z16	432420	5823142	Boulder	JA	Mafic intrusive		I3	3Py,1Cpy	Medium-fine grained mafic intrusive with disseminated, euhedral pyrite and minor chalcopyrite	4267308
W129930	NAD83z16	432381	5823164	Boulder	JA	Gabbro		I3G		Coarse grained mafic-intermediate rock with disseminated pyrite. Gabbro? Diorite?	4267307
W129931	NAD83z16	432253	5823381	Boulder	JA	Mafic intrusive		I3		Medium-fine grained mafic intrusve with grey, 2-3cm wide, grey quartz vein. Rusted but sulphides absent.	4267307
W129932	NAD83z16	432726	5823887	Boulder	JA	Intermediate intrusive		I2	0.5Py	Strongly chlorite-epidote(?)-Saussaurite(?) altered, medium grained mafic-intermediate rock. Trace disseminated pyrite.	4267308
W129933	NAD83z16	430040	5825406	Boulder	JA	Mafic volcanic	Mod sheared	V3	0.5Py	Moderately sheared mafic volcanic with white quartz lenses. Rare specks of fg pyrite.	4269316
W129934	NAD83z16	430019	5825416	Boulder	JA	Felsic intrusive	strongly silicified	I1		Possible felsic intrusive? Precursor overprinted by pervasive silicic alteration. Sulphides absent.	4269316
W129935	NAD83z16	430021	5825499	Boulder	JA	Quartz vein		QV	1Py, 0.5As	White, opaque quartz vein ~6cm wide in mafic material that hosts rare, fg specks of pyrite, pos arsenopyrite. No sulphides in the	4269316
W129936	NAD83z16	430054	5825552	Boulder	JA	Quartz vein		QV	20Py, 10Cpy, 5As	White-grey quartz vein. Almost conglomertic with sulphides acting as a matrix with quartz 'clasts'.	4269316
W129937	NAD83z16	430377	5825644	Boulder	JA	Mafic volcanic	Wk sheared	V3		Green grey, fine grained mafic volcanic, pos weak shearing with fine grained, disseminated pyrite. Pos arsenopyrite?	4269316
W129938	NAD83z16	430656	5825532	Boulder	JA	Quartz vein		QV		Grey-white transluscent, quartz vein. Rusty weathering. Pos rare specks of pyrite.	4269316
W129939	NAD83z16	430832	5825751	Boulder	JA	Mafic volcanic		V3	0.5Py	Fine-medium grained mafic volcanic with rust staining and rare, vfg disseminated specks of pyrite.	4269315
W129940	NAD83z16	431383	5825720	Boulder	JA	Mafic volcanic		V3	0.5Py	Fine-medium grained mafic volcanic with rust staining and rare, vfg disseminated specks of pyrite. Cross cut by <1cm quartz	4269315
W129941	NAD83z16	431517	5825720	Boulder	JA	Intermediate intrusive		I2		Coarse grained felsic-intermediate intrusive with discontinuous white sugary quartz-haematite vein. Rusty staining. Sulphides	4269315
W129942	NAD83z16	431579	5825911	Boulder	JA	Gabbro		I3G		Coarse grained gabbro/mafic intrusive with cross cutting quartz veinlets. Sulphides absent.	4278642
W129943	NAD83z16	431683	5825920	Boulder	JA	Felsic intrusive		I1		Felsic intrusive or pegmatitic quartz feldspar vein ~10cm wide. Sulphides absent.	4278642
W129944	NAD83z16	428873	5821905	Boulder	JA	Mafic volcanic		V3	1Py	Medium grained mafic volcanic with rare disseminated euhedral	4267310
W129945	NAD83z16	428992	5822100	Boulder	JA	Mafic volcanic		V3	1Py	Medium grained mafic volcanic with rare disseminated euhedral	4267310
W129946	NAD83z16	429090	5822433	Boulder	JA	Mafic volcanic	Mod sheared	V3	2Py	Moderately sheared, medium grained, mafic volcanic/intrusive with disseminated specks of pyrite.	4267310
W129947	NAD83z16	429083	5822451	Boulder	JA	Mafic intrusive		I3	1Py	Coarse-medium grained mafic intrusive, unsheared with rare specks of disseminated pyrite.	4267310
W129948	NAD83z16	429163	5822825	Boulder	JA	Mafic intrusive		I3	0.5Py	Medium grained mafic volcanic.	4267305
W129949	NAD83z16	429150	5822927	Boulder	JA	Mafic volcanic		V3	1Py	Medium grained mafic volcanic with rare disseminated euhedral	4267305
W129950	NAD83z16	443043	5811755	Boulder	JA	Quartz Monzonite	Strongly sheared	(M8)QMNZ		Strongly sheared to protomylonitic monzonite with rusty staining and 1-2mm sized muscovite mica plates. Sulphides absent.	4217101
W129951	NAD83z16	444997	5813703	Boulder	GG	Quartz vein		QV	5Py	Quartz vein with specks of pyrite-chalcopyrite.	4221767
W129952	NAD83z16	445032	5813680	Boulder	GG	Quartz vein		QV	2Py	Probably QV, very smalll sample, some pos mafic volcanic material. Disseminated blebs of pyrite.	4221767
W129953	NAD83z16	445029	5813683	Boulder	GG	Quartz Monzonite		QMNZ	1Cpy	Light grey coarse grained, unsheared QMNZ. Rare specks of oxidised cpy, reported as native copper.	4221767
W129954	NAD83z16	445055	5813656	Boulder	GG	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared QMNZ with rusty staining.	4221767
W129955	NAD83z16	445058	5813654	Boulder	GG	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared QMNZ with rusty staining. Cross cut by 1cm rusty quartz vein.	4221767

W129956	NAD83z16	445053	5813653	Boulder	GG	Monzonite	Mod sheared	MNZ	1Py	Strongly weathered and fragmented rock. Some shearing, reported as QMNZ but could be MNZ.	4221767
W129957	NAD83z16	445076	5813607	Boulder	GS	Quartz Monzonite		QMNZ	1Py	Coarse grained QMNZ with chlorite clots and disseminated pyrite	4221767
W129958	NAD83z16	445157	5813621	Boulder	GS	Quartz Monzonite	Strongly sheared	(M8)QMNZ	0.5Py	Strongly sheared and silicified QMNZ with diseminated specks of	4221767
W129959	NAD83z16	445178	5813603	Boulder	GS	Monzonite	Wk Sheared	MNZ		Weakly sheared, medium grey MNZ, sulphides absent	4221767
W129960	NAD83z16	445277	5813656	Boulder	GS	Quartz vein		QV		Quartz vein with hairline, parallel bands of haematite stained fractures and diffuse epidote alt. Sulphides absent. Reportedly in contact between shear zone and mafic country rock.	4221767
W129961	NAD83z16	445299	5813775	Boulder	GS	Quartz Monzonite	Mod sheared	(M8)QMNZ		Moderately sheared QMNZ with hairline chlorite veinlets/fracture infill. Sulphides absent.	4221767
W129962	NAD83z16	445828	5813770	Boulder	GS	Leucogranite		I1B	2Py	Light pink grey leucogranite (or aplite?) with blebby pyrite and	4221767
W129963	NAD83z16	445823	5813764	Boulder	GS	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared QMNZ with rare specks of disseminated pyrite and rusty weathering. Pos boudinaged, sugary quartz vein	4221767
W129964	NAD83z16	445946	5813941	Boulder	GG	Quartz Monzonite	Wk Sheared	QMNZ	0.5Py	Rusty quartz monzonite with <1cm QV and rare specks of pyrite.	4221767
W129965	NAD83z16	429559	5824934	Boulder	GG	Mafic Metavolcanic	Wk Sheared	V3	1Py	Dark green, schistose mafic volcanic with fine grained pyrite.	4269316
W129966	NAD83z16	429560	5824938	Boulder	GG	Mafic Metavolcanic	Wk Sheared	V3	1Py	Dark green, schistose mafic volcanic with fine grained pyrite.	4269316
W129967	NAD83z16	429560	5824938	Boulder	GG	Mafic Metavolcanic	Wk Sheared	V3	1Py	Dark green, schistose mafic volcanic with fine grained pyrite.	4269316
W129968	NAD83z16	429627	5824635	Boulder	GG	Mafic intrusive		I3	0.5Py	Medium grained, dark green mafic intrusive with fine grained	4269316
W129969	NAD83z16	429702	5824171	Boulder	GG	Mafic intrusive	Wk Sheared	I3	0.5Py	Medium grained, dark green, weakly sheared, mafic intrusive with fine grained pyrite.	4267306
W129970	NAD83z16	429712	5824039	Boulder	GG	Mafic intrusive	Wk Sheared	I3	0.5Py	Medium grained, dark green, weakly sheared, mafic intrusive with fine grained pyrite.	4267306
W129971	NAD83z16	429701	5824137	Boulder	GG	Mafic intrusive		I3	0.5Py	Medium grained, dark green, weakly sheared, mafic intrusive with fine grained pyrite.	4267306
W129972	NAD83z16	429105	5824134	Boulder	GG	Felsic intrusive					4267305
W129973	NAD83z16	431698	5824757	Boulder	GG	Quartz Monzonite		QMNZ	5Py, 1Cpy, 0.5Bor, 0.5Mal	Coarse grained QMNZ/MNZ (Diorite) with 1cm QV hosting large, cubic pyrite and disseminated specks of chalcopyrite, bornite and	4269315
W129974	NAD83z16	431698	5824749	Boulder	GG	Diorite		I2	3Py, 1Cpy	Coarse-medium grained, unsheared diorite hosting cubic pyrite and specks of chalcopyrite.	4269315
W129975	NAD83z16	432248	5824640	Boulder	GG	Diorite		I2	3Py, 1Cpy	Coarse-medium grained, unsheared diorite with <1cm quartz vein. Diorite groundmass and vein host cubic pyrite and specks of	4269315
W129976	NAD83z16	432254	5824656	Grab	GG	Mafic volcanic	Strongly sheared	V3		Strongly sheared, fine grained, green mafic volcanic with 2cm quartz vein and rusty weathering.	4269315
W129977	NAD83z16	432250	5824644	Boulder	GG	Quartz Monzonite		QMNZ	1Py	Coarse grained, light grey QMNZ with <1cm quartz vein hosting	4269315
W129978	NAD83z16	432252	5824562	Grab	GG	Quartz Monzonite	Mod sheared	(M8)QMNZ		Moderately sheared, possibly potassic altered, pink-grey (or	4269315
W129979	NAD83z16	432251	5824560	Grab	GG	Aplite	Mod sheared	I1F		Moderately sheared, possibly potassic altered, pink-grey (or rusty?) aplite, felsic dyke striking 250'	4269315
W129980	NAD83z16	432255	5824563	Grab	GG	Quartz Monzonite	Mod sheared	(M8)QMNZ		Moderately sheared, possibly potassic altered, pink-grey (or rusty?) QMNZ/ felsic dyke striking 250'	4269315
W129981	NAD83z16	432255	5824563	Grab	GG	Quartz Monzonite		QMNZ	0.5Py	Rusty QMNZ/ felsic dyke striking 250' with quartz veining.	4269315
W129982	NAD83z16	432350	5824480	Grab	GG	Quartz vein		QV	2Py	Milky-grey quartz vein with chlorite stringers and cubic pyrite.	4269315
W129983	NAD83z16	432510	5824210	Grab	GG	Diorite	Wk Sheared	I2	0.5Py	Weakly sheared medium grained diorite with rare specks of arsenoypyrite reported.	4267308
W129984	NAD83z16	432485	5824222	Boulder	GG	Felsic intrusive		I1	30Py, 0.5Mal	Pink-grey, fine grained qtz-feldspar porphyry material with pegmatitic qtz-carb-tourmline vein host euhedral pyrite cubes up to 4x4cm in size. Rare specks of malachite. Strongly carbonatised	4267308
W129985	NAD83z16	432391	5824493	Grab	GG	Mafic intrusive		I3	0.5Py	Dark-green to black mafic intrusive with disseminated specks of	4269315
W129986	NAD83z16	432488	5824221	Boulder	GG	Felsic intrusive		I1	30Py	Pink-grey, fine grained qtz-feldspar porphyry material with pegmatitic qtz-carb-tourmline vein host euhedral pyrite cubes up to 4x4cm in size. Strongly carbonatised	4267308
W129987	NAD83z16	432506	5824973	Boulder	GG	Quartz vein		QV	2Py, 0.5As, 0.5Bo	Grey-white, 5cm wide quartz vein in mafic/intermediate intrusive QV hosts euhedral, cubic fine grained pyrite/arsenopyrite, pos greenish malachite staining.	4269314
W129988	NAD83z16	430978	5825128	Boulder	GG	Mafic volcanic		V3	0.5Py	Fine grained, dark green mafic volcanic with rare disseminatec	4269315
W129989	NAD83z16	431873	5825243	Grab	GG	Mafic intrusive		I3	1Py	Mafic intrusive cross cut by 2cm wide grey-transluscent quartz vein with rare blebby pyrite.	4269315
W129990	NAD83z16	431872	5825241	Grab	GG	Quartz vein		QV	1Py, 1As	Pegmatitic quartz-carbonate in mafic intrusive. Rare blebs of pyrite-chalcopyrite.	4269315
W129991	NAD83z16	431873	5825242	Grab	GG	Mafic intrusive		I3	0.5Py	Medium grained mafic intrusive. Very rare specks of disseminated	4269315
W129992	NAD83z16	428551	5823453	Boulder	GG	Mafic volcanic	Wk Sheared	V3	0.5Py	Fine grained, dark green mafic volcanic with rare disseminatec pyrite, weak shearing and rusty staining.	4267305

W129993	NAD83z16	428557	5823233	Boulder	GG	Mafic volcanic		V3	40Py,As	Weakly sheared mafic volcanic with sub-anhedral sulphides throughout the boulder. Malachite reported but none observed.	4267305
W129994	NAD83z16	428558	5823237	Boulder	GG	Mafic volcanic		V3	40Py,As	Mafic volcanic with sub-anhedral sulphides throughout the boulder. Malachite reported but none observed. Same as sample	4267305
W129995	NAD83z16	428557	5823233	Boulder	GG	Mafic volcanic		V3	40Py,As	Mafic volcanic with sub-anhedral sulphides throughout the boulder and grey-transluscent quartz veins ~2cm wide, sulphides in host rock. Malachite reported but none observed. Same as	4267305
W129996	NAD83z16	427611	5823125	Grab	GS	Mafic volcanic	Strong shearing	V3	1Py	Strongly sheared, fine grained, dark green mafic with disseminated lenses of pyrite.	4269319
W129997	NAD83z16	427610	5823126	Grab	GS	Mafic volcanic	Mod sheared	V3	1Py	Strongly sheared, fine grained, dark green mafic with disseminated lenses of pyrite and cross cutting, 1mm wide quartz veinlets.	4269319
W129998	NAD83z16	427614	5823124	Grab	GS	Mafic intrusive		I3	3Py	Medium grained, green-grey mafic intrusive/volcanic with rusty weathering and disseminated blebs of sulphide throughout.	4269319
W129999	NAD83z16	427655	5823327	Boulder	GS	Mafic volcanic	Wk Sheared	V3	0.5Py	Weakly sheared, green-grey, mafic volcanic with rare,vfg specks of disseminated pyrite.	4267305
W130000	NAD83z16	427655	5823327	Grab	GS	Mafic volcanic	Wk Sheared	V3	0.5Py	Weakly sheared, green-grey, mafic volcanic with rare,vfg specks of disseminated pyrite with 1mm wide quartz veinlets.	4267305
W130001	NAD83z16	438689	5812758	Boulder	DC	Monzonite	Very strong shearing	(M8)QMNZ		Very strongly sheared to protomylonitic MNZ with pervasive silicic alteration. Sulphides absent.	1203097
W130002	NAD83z16	437285	5813301	Boulder	DC	Intermediate volcanic	chloritized. Wk shearing	V2		black, chloritized and foliated, medium grained intermediate volcanic. Sulphides absent.	4221777
W130003	NAD83z16	436664	5813478	Boulder	DC	Monzonite		MNZ		some rusty staining on unsheared monzonite. No visible	4221780
W130004	NAD83z16	444792	5813933	Boulder	DC	Monzonite	Strong shearing	MNZ	2Py	Crenulated, strongly sheared , dark green-grey monzonite with fg specks of pyrite. Same boulder as W130005 and 006	4221770
W130005	NAD83z16	444793	5813931	Boulder	DC	Monzonite	Strong shearing	MNZ	2Py	Crenulated, strongly sheared dark green-grey monzonite with fg specks of pyrite. Same boulder as W130004 and 006	4221770
W130006	NAD83z16	444789	5813933	Boulder	DC	Monzonite	Strong shearing	MNZ	2Py	Crenulated, strongly sheared dark green-grey monzonite with fg specks of pyrite. Same boulder as W130004 and 005	4221770
W130007	NAD83z16	444953	5813763	Boulder	DC	Quartz Monzonite	Mod sheared	QMNZ	1Py	Moderately sheared QMNZ with rare specks of disseminated	4221767
W130008	NAD83z16	445044	5813695	Boulder	DC	Quartz Monzonite	Mod sheared	QMNZ	1Py	Moderately sheared QMNZ with rare specks of disseminated	4221767
W130009	NAD83z16	445044	5813695	Boulder	DC	Leucogranite		I1B	2Py	Light grey-pink, unsheared granite with <5% biotite. Rare blebs of disseminated pyrite.	4221767
W130010	NAD83z16	445046	5813687	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Unsheared QMNZ with rusty staining and disseminated pyrite.	4221767
W130011	NAD83z16	445100	5813669	Boulder	DC	Quartz Monzonite	Strongly sheared	(M8)QMNZ	0.5Py	Strongly sheared to protomylonitic QMNZ with rusty staining and	4221767
W130012	NAD83z16	445102	5813681	Boulder	DC	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared QMNZ with rare, blebby pyrite and rusty	4221767
W130013	NAD83z16	445111	5813694	Boulder	DC	Quartz Monzonite	Wk Sheared	QMNZ		Contact between quartz-monzonite devoid of sulphides, and	4221767
W130014	NAD83z16	445231	5813656	Boulder	DC	Mafic volcanic		V3	0.5Py	Black, fine grained to schistose mafic volcanic with v rare	4221767
W130015	NAD83z16	445368	5813798	Boulder	DC	Monzonite		MNZ		Monzonite boulder with minor rust staining.	4221767
W130016	NAD83z16	445557	5813653	Boulder	DC	Monzonite	Mod sheared	MNZ	0.5Py	Monzonite with quartz veining and minor rusty staining,	4221767
W130017	NAD83z16	445678	5813642	Boulder	DC	Quartz Monzonite	strongly sheared	(M8)QMNZ	0.5Py	Rusty, strongly sheared QMNZ	4221767
W130018	NAD83z16	445906	5813885	Boulder	DC	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared QMNZ with rusty staining and disseminated	4221767
W130019	NAD83z16	445906	5813917	Boulder	DC	Quartz Monzonite		QMNZ	1Py, 0.5As	Unsheared QMNZ with rare bllebs of pyrite, pos arsenopyrite.	4221767
W130020	NAD83z16	429580	5824936	Boulder	DC	Schist	Strongly sheared	M8	5Py, 0.5Mal	Fine grained, serecite-altered schistose rock, pos felsic protolith? Fine grained, disseminated pyrite throughout, pos malachite	4269316
W130021	NAD83z16	429574	5824918	Boulder	DC	Mafic volcanic	Wk Sheared	V3	0.5Py	weakly sheared mafic volcanic, rare specks of disseminated pyrite, possible, black, <5cm lapilli.	4269316
W130022	NAD83z16	429567	5824727	Boulder	DC	Mafic intrusive		I3	3Py	Coarse grained mafic-intermediate rock with disseminated pyrite and rusty weathering.	4269316
W130023	NAD83z16	429658	5824655	Boulder	DC	Mafic volcanic		V3	1Py, 0.5Mal	Very fine grained mafic volcanic with fine grained, disseminated pyrite and specks of malachite.	4269316
W130024	NAD83z16	429656	5824653	Boulder	DC	Diorite		I2	0.5Py	Medium grained, intermediate volcanic with rare specks of pyrite	4269316
W130025	NAD83z16	429865	5824410	Boulder	DC	Diorite		I2	2Py	Medium grained, intermediate volcanic with rare specks of cubic, red discoloured pyrite.	4269316
W130026	NAD83z16	429821	5823836	Boulder	DC	Mafic volcanic		V3	0.5Py	weakly sheared mafic volcanic, rare specks of disseminated pyrite, possible silicified <5cm lapilli.	4267306
W130027	NAD83z16	429893	5823796	Boulder	DC	Mafic volcanic		V3	0.5Py	weakly sheared mafic volcanic, rare specks of disseminated pyrite, possible silicified <5cm lapilli.	4267306
W130028	NAD83z16	429896	5822777	Boulder	DC	Mafic intrusive		I3	0.5Py	Dark, fine-medium grained mafic with rare specks of pyrite and	4267306
W130029	NAD83z16	429901	5822779	Boulder	DC	Diorite		I2	1Py	Coarse-medium grained, unsheared diorite with <1cm quartz vein. Diorite groundmass and vein host cubic pyrite and specks of	4267306
W130030	NAD83z16	429919	5822798	Boulder	DC	Diorite		I2	4Py, 1As, 2Cpy	Medium grained, magnetic diorite with 'quartz sweats' and silicic alteration. Hosts radial tourmaline clusters within quartz veining.	4267306

W130031	NAD83z16	430371	5823338	Boulder	DC	Quartz Vein		QV	20Mal, 4Py	Coarse grained grey-blue-transluscent with disseminated pyrite. Host is possibly diorite and pervasively altered with malachite.	4267306
W130032	NAD83z16	430368	5823336	Boulder	DC	Diorite		I2	1Py, 0.5Cpy	Medium grained, dark grey diorite with disseminated pyrite chalcopyrite. Rusty staining.	4267306
W130033	NAD83z16	430549	5823563	Boulder	DC	Diorite		I2	1Py, 0.5Cpy	Coarse grained (almost gabbroic) diorite with cubic pyrite and specks of As. Non-magnetic.	4267306
W130034	NAD83z16	430992	5823462	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with disseminated specks of pyrite.	4267307
W130035	NAD83z16	430637	5823474	Boulder	DC	Diorite		I3	1Py, 0.5CPy, 0.5Mal	Medium grained diorite? QMNZ with <5mm quartz veins hosting sulphides. Malachite reported by prospector.	4267306
W130036	NAD83z16	430274	5823204	Boulder	DC	Mafic intrusive		I3		dark green mafic intrusive/volcanic	4267306
W130037	NAD83z16	430244	5823188	Boulder	DC	Andesite	Wk Sheared	I2J	0.5Py	Medium grey-green volcanic with fine lapilli. Rare sulphides	4267306
W130038	NAD83z16	430242	5823173	Boulder	DC	Mafic volcanic		V3	1Py	Fine grained, weathered mafic volcanic with rare disseminated pyrite. Malachite reported but none observed.	4267306
W130039	NAD83z16	430260	5823275	Boulder	DC	Diorite		I2	1Py	Medium grained diorite? Intermediate intrusive with disseminated specks of pyrite.	4267306
W130040	NAD83z16	432754	5822799	Boulder	DC	Mafic intrusive	Mod sheared	I3		Moderately sheared, fine grained mafic material with trace disseminated pyrite. Magnetic.	4267308
W130041	NAD83z16	432529	5822964	Boulder	DC	Mafic intrusive		I3		Dark green, unsheared magnetic rock with patchy chlorite. No	4267308
W130042	NAD83z16	432302	5823566	Boulder	DC	Mafic intrusive		I3		Dark green, unsheared magnetic rock with patchy chlorite. Patchy, disseminated arsenopyrite.	4267307
W130043	NAD83z16	432370	5823517	Boulder	DC	Diorite	Wk Sheared	I2	1Py,0.5As	Medium grey-green intrusive with weak shearing and disseminated pyrite/arsenopyrite.	4267307
W130044	NAD83z16	432335	5824115	Boulder	DC	Intermediate intrusive		I2		Coarse grained intrusive with rare, disseminated pyrite. Pos MNZ?	4267307
W130045	NAD83z16	430018	5825413	Boulder	DC	Mafic volcanic	Wk Sheared	V3	0.5Py	Weakly sheared mafic volcanic/mafic intrusive with disseminated stringers of fg pyrite. Non-magnetic.	4269316
W130046	NAD83z16	430027	5825494	Boulder	DC	Mafic intrusive		I3	0.5Py	Green-grey medium grained mafic intrusive with discontinuous 2cm wide quartz vein. Rare blebby pyrite.	4269316
W130047	NAD83z16	430087	5825558	Boulder	DC	Diorite		I2	4Py, 1Po	Medium grain intermediate intrusive(?) with rusty staining and medium-fine grained blebs of pyrite and possible pyrrhotite.	4269316
W130048	NAD83z16	430234	5825619	Boulder	DC	Mafic volcanic		V3	0.5Py	Green-grey medium grained mafic volcanic with <2cm wide sugary quartz vein. Rare specks of disseminated pyrite in mafic	4269316
W130049	NAD83z16	430320	5825647	Grab	DC	Intermediate intrusive		I2	2Py	Rusty weathered intermediate intrusive with cross cutting pegmatitic quartz-carbonate >3cm wide (off to one side of	4269316
W130050	NAD83z16	430595	5825634	Grab	DC	Mafic volcanic		V3		Mafic volcanic with rusty staining and grey-transluscent rusty quartz vein of undertermined thickness. Sulphides absent. Sample reportedly collected as close as possible to E-W striking QV with sulphide pods, could not be sampled as surface too flat.	4269316
W130051	NAD83z16	444338	5814069		DRB						4221770
W130052	NAD83z16	443840	5812924	Boulder	DRB	Schist		M8 (Si, Sr)	1Py, 1As	Silicified and serecitized, light grey-white coloured schist. Precursor rock overprinted. Hairline fractures with haematite coating. Disseminated specks of pyrite and arsenopyrite.	4217102
W130101	NAD83z16	443652	5812106	Boulder	DC	Mafic volcanic		V3		Dark green, mafic metavolcanic. Sulphides absent	4217102
W130102	NAD83z16	443785	5812461	Boulder	DC	Quartz Monzonite		QMNZ		Weakly sheared quartz monzonite with common specks of pyrite. Cross cut by 1.5cm wide qtz-fldspr vein, no sulphides in the vein.	4217102
W130103	NAD83z16	443740	5812599	Boulder	DC	Monzonite		MNZ	4Py	Monzonite (?), unsheared. Pyrite/arsenopyrite specks and	4217102
W130104	NAD83z16	443677	5812687	Boulder	DC	Leucogranite		I1B	1Py	Weakly -moderately sheared leucogranite with disseminated blebs	4217102
W130105	NAD83z16	443600	5812588	Boulder	DC	Quartz Monzonite		QMNZ		Weakly-moderately sheared quartz monzonite with common specks of pyrite. Cross cut by 1.5cm wide qtz-fldspr vein, no	4217102
W130106	NAD83z16	443542	5812569	Boulder	DC	Quartz Monzonite		(M8)QMNZ	1Py	Moderately sheared monzonite with rare disseminated specks of pyrite./arsenopyrite.	4217102
W130107	NAD83z16	443414	5812751	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Moderately sheared monzonite. Moderately weathered	4217102
W130108	NAD83z16	443573	5812908	Boulder	DC	Quartz Monzonite		(M8)QMNZ	2Py	Moderately sheared quartz-monzonite with disseminated and blebby pyrite throughout.	4217102
W130109	NAD83z16	442536	5813775	Boulder	DC	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with chlorite clots. Rare disseminated, fine	4221771
W130110	NAD83z16	442445	5813733	Boulder	DC	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with chlorite clots. Rare disseminated, fine	4221771
W130111	NAD83z16	442444	5813611	Boulder	DC	Mafic intrusive		I3		Moderately magnetic dolerite with pos oxidized sulphides.	4221771
W130112	NAD83z16	442429	5813577	Boulder	DC	Quartz Monzonite		(M8)QMNZ	2Py	Moderately sheared quartz-monzonite with disseminated and blebby pyrite throughout.	4221771
W130113	NAD83z16	442424	5813568	Boulder	DC	Monzonite		MNZ	0.5Py	Pos potassic and chlorite altered quartz monzonite. Rare specks of pyrite. 'Different from other boulders in area'.	4221771
W130114	NAD83z16	442406	5813549	Boulder	DC	Quartz vein		QV	1Py	Quartz vein with rare specks of sulphide and rust staining.	4221771
W130115	NAD83z16	442386	5813524	Boulder	DC	Quartz vein		QV		Quartz vein within moderately sheared quartz monzonite.	4221771

W130116	NAD83z16	442685	5813354	Boulder	DC	Quartz vein		QV	0.5Py	Rusty quartz vein boulder with pos tourmaline/chlorite.	4221771
W130117	NAD83z16	442685	5813358	Boulder	DC	Quartz Monzonite		QMNZ		Quartz monzonite with rusty staining. Host rock to W130116	4221771
W130118	NAD83z16	442881	5813154	Boulder	DC	Quartz Monzonite		QMNZ		Quartz monzonite with moderate shearing.	4221771
W130119	NAD83z16	443883	5812748	Boulder	DC	Quartz Monzonite		(M8)QMNZ	1Py	Moderately sheared, rusty quartz monzonite. Rare specks of	4217102
W130120	NAD83z16	443883	5812750	Boulder	DC	Monzonite		MNZ	1Py	Possibly monzonite or diorite(?) with specks of disseminated	4217102
W130121	NAD83z16	443898	5812780	Boulder	DC	Quartz Monzonite		(M8)QMNZ	1Py	Moderately sheared quartz monzonite with rusty staining and disseminated pyrite.	4217102
W130122	NAD83z16	443854	5812910	Boulder	DC	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with disseminated specks of pyrite.	4217102
W130123	NAD83z16	443845	5812907	Boulder	DC	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared quartz monzonite with disseminated pyrite and	4217102
W130124	NAD83z16	443841	5812873	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Very strongly sheared, potassic haematite altered rock (pos QMNZ). Brick red colouration. 'Sandstone-like'.	4217102
W130125	NAD83z16	443819	5812906	Boulder	DC	Monzonite		MNZ		Rusty quartz monzonite.	4217102
W130126	NAD83z16	443836	5812933	Boulder	DC	Leucogranite		I1B		Very coarse grained leucogranite with quartz veining. No visible	4217102
W130127	NAD83z16	443648	5813043	Boulder	DC	Quartz Monzonite		QMNZ	1Py	Quartz monzonite, rare specks of pyrite.	4217102
W130128	NAD83z16	442292	5812988	Boulder	DC	Quartz Monzonite		(M8)QMNZ	0.5Py	Sheared quartz monzonite with rusty staining.	4217101
W130129	NAD83z16	444300	5813054	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Sheared quartz monzonite (or leucogranite).	4217102
W130130	NAD83z16	444305	5813059	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Sheared, potassic altered quartz monzonite with rusty staining.	4217102
W130131	NAD83z16	444307	5813056	Boulder	DC	Quartz Monzonite		QMNZ		Quartz monzonite with rusty staining.	4217102
W130132	NAD83z16	444306	5813056	Boulder	DC	Quartz Monzonite		QMNZ		Quartz monzonite.	4217102
W130133	NAD83z16	444345	5813135	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with rusty staining.	4221770
W130134	NAD83z16	444289	5813052	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with rusty staining.	4217102
W130135	NAD83z16	444352	5813178	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Strongly sheared to protomylonitic quartz monzonite with rusty	4221770
W130136	NAD83z16	444084	5813191	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with rusty staining.	4221770
W130137	NAD83z16	444090	5813195	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with rusty staining. 5cm qtz vein. Appears to have detached from large boulder.	4221770
W130138	NAD83z16	444090	5813195	Boulder	DC	Quartz Monzonite		QMNZ	0.5Py	Quartz monzonite with rusty staining. 5cm qtz vein. Appears to have detached from large boulder.	4221770
W130139	NAD83z16	443716	5813652	Boulder	DC	Monzonite		MNZ		Monzonite with rusty staining.	4221770
W130140	NAD83z16	443557	5813421	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Strongly sheared, rusty monzonite.	4221770
W130141	NAD83z16	443600	5813191	Boulder	DC	Monzonite		MNZ		Rusty monzonite boulder.	4221770
W130142	NAD83z16	443601	5813184	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Strongly sheared, fine grained, altered and rusty QMNZ	4221770
W130143	NAD83z16	443524	5813275	Boulder	DC	Quartz Monzonite		(M8)QMNZ		Moderately sheared QMNZ with fine grained, disseminated specks	4221770
W130144	NAD83z16	443356	5813411	Boulder	DC	Quartz Monzonite		QMNZ		Quartz monzonite. Rusty surface staining.	4221770
W130145	NAD83z16	439250	5812992	Boulder	DC	Quartz vein	Mod sheared	QV	Py1	Grey quartz vein in a sheared moderately sheared, rusty	1203097
W130146	NAD83z16	439251	5812994	Boulder	DC	Leucogranite		I1B	Py1	Pink, sugary textured leucogranite with rare specks of pyrite and	1203097
W130147	NAD83z16	439260	5813011	Boulder	DC	Quartz Monzonite	Wk Sheared	QMNZ	Py1	Rusty stained, weakly sheared QMNZ	1203097
W130148	NAD83z16	439223	5813008	Boulder	DC	Monzonite		MNZ	Py2	Very rust stained MNZ boulder with rare specks of dissemeniated pyrite. Unsheared.	1203097
W130149	NAD83z16	439255	5813020	Boulder	DC	Quartz Monzonite	Wk Sheared	QMNZ	Py1	Weakly sheared, unweathered QMNZ with rare specks of	1203097
W130150	NAD83z16	439262	5813021	Boulder	DC	Quartz Monzonite		QMNZ	Py1	Unsheared QMNZ with patches of rusty, disseminated pyrite.	1203097
W130151	NAD83z16	443657	5812097	Boulder	GG	Mafic volcanic		V3	3Py	Fine grained, mafic metavolcanic. <1mm wide stringers of pyrite	4217102
W130152	NAD83z16	443703	5812148	Boulder	GG	Diorite		I1	1Py	Medium grained, mafic intrusive (diorite),. Rare specks of pyrite	4217102
W130153	NAD83z16	443750	5812595	Boulder	GG	Diorite		I1	3Py	Medium grained, mafic intrusive (diorite),. Common blebs of pyrite and pos arsenopyrite.	4217102
W130154	NAD83z16	443702	5812698	Boulder	GG	Leucogranite		I1B	2Py	Coarse grained, quartz-rich felsic with rare blebs of pyrite.	4217102
W130155	NAD83z16	443711	5812697	Boulder	GG	Leucogranite		I1B	2Py	Coarse grained, quartz-rich felsic with rare specks of pyrite.	4217102
W130156	NAD83z16	443601	5812594	Boulder	GG	Leucogranite		I1B	2Py	Coarse grained, quartz-rich felsic with rare specks of pyrite.	4217102
W130157	NAD83z16	443337	5812653	Boulder	GG	Quartz Monzonite		QMNZ	1Py	Coarse grained, weakly sheared felsic with specks of pyrite. (Quartz-Monzonite?) Moderately weathered	4217102
W130158	NAD83z16	443563	5812915	Boulder	GG	Quartz Monzonite		QMNZ	1Py	Contact between coarse grained quartz-monzonite with pyrite specks, and aplite intrusive.	4217102
W130159	NAD83z16	442495	5813735	Boulder	GG	Leucogranite		I1B	1Py	Leucogranite with disseminated specks of pyrite.	4221771
W130160	NAD83z16	442526	5813777	Boulder	GG	Gabbro		I3G	0.5Py	Pos gabbro with disseminated specks of pyrite.	4221771
W130161	NAD83z16	442445	5813603	Boulder	GG	Aplite		I1F		Aplite	4221771
W130162	NAD83z16	442379	5813528	Boulder	GG	Monzonite		MNZ	1Py	Sheared and rusty felsic/intermediate rock with rusty staining. Disseminated specks of pyrite,	4221771
W130163	NAD83z16	442437	5813463	Boulder	GG	Quartz Monzonite		QMNZ		Quartz monzonite.	4221771
W130164	NAD83z16	442671	5813355	Boulder	GG	Quartz Monzonite		QMNZ	1Py, 0.5Cpy	Possible gabbro/diorite with disseminated pyrite and	4221771
W130165	NAD83z16	442687	5813354	Boulder	GG	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with quartz veining and disseminated pyrite.	4221771
W130166	NAD83z16	442683	5813351	Boulder	GG	Quartz Monzonite		QMNZ		Quartz monzonite.	4221771
W130167	NAD83z16	442842	5813228	Boulder	GG	Quartz Monzonite		QMNZ	2Py	Quartz monzonite with shearing and disseminated pyrite.	4221771
W130168	NAD83z16	443838	5812784	Boulder	GG	Leucogranite		I1B	1Py	Leucogranite with disseminated specks of pyrite.	4217102

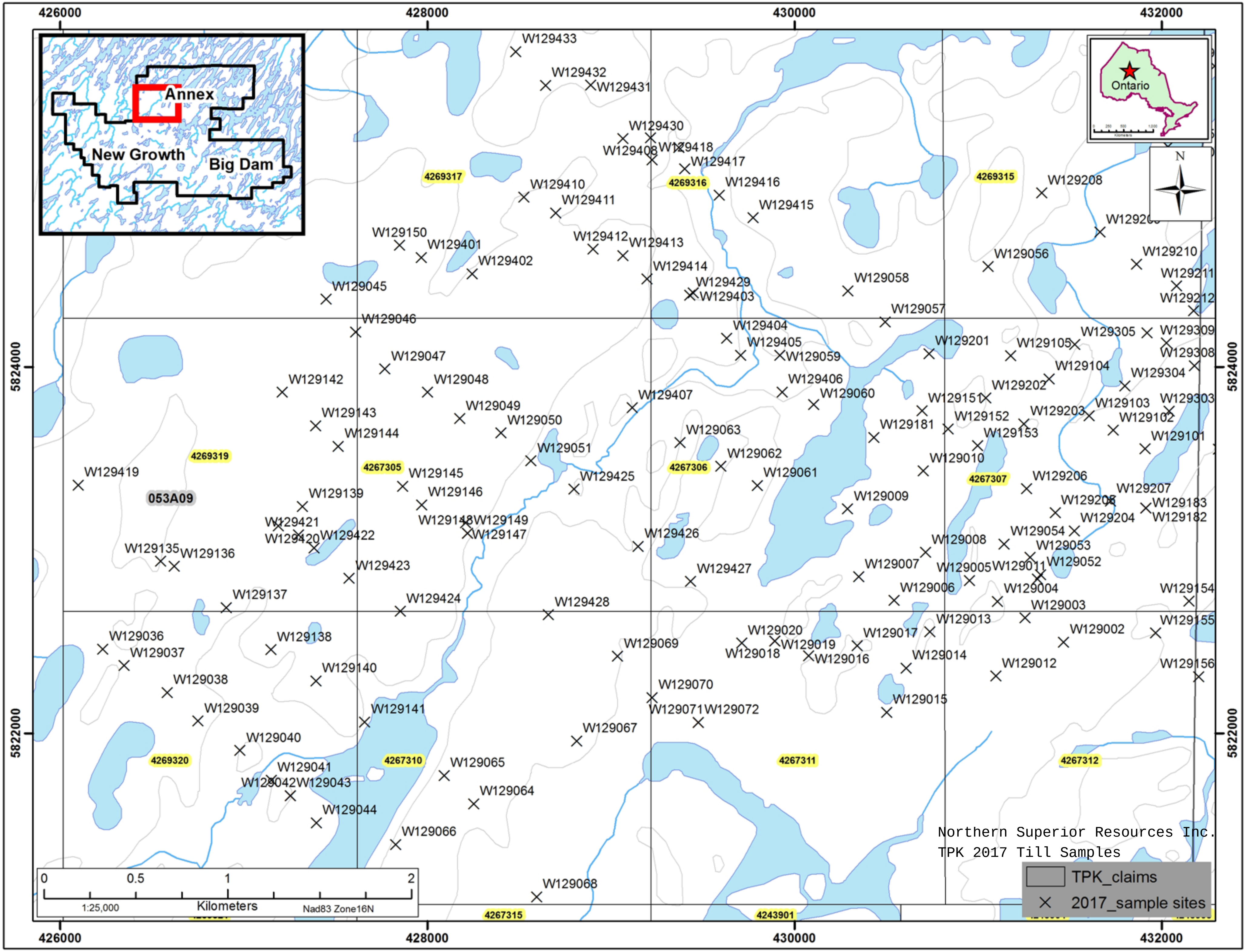
W130169	NAD83z16	443840	5812787	Boulder	GG	Quartz Monzonite		QMNZ	1Py	Rusty quartz monzonite with possible quartz-feldspar veinlet hosting specks of disseminated pyrite.	4217102
W130170	NAD83z16	443815	5812877	Boulder	GG	Gabbro		I3G	3Py	Rusty gabbro with disseminated specks/blebs of pyrite.	4217102
W130171	NAD83z16	443819	5812892	Boulder	GG	Quartz Monzonite		(M8)QMNZ		Rusty, strongly sheared quartz monzonite.	4217102
W130172	NAD83z16	443811	5812897	Boulder	GG	Quartz vein		QV		Rusty quartz vein.	4217102
W130173	NAD83z16	445700	5813032	Boulder	GG	Quartz Monzonite		QMNZ		Rusty, weakly sheared(?) quartz monzonite.	4217105
W130174	NAD83z16	443657	5813075	Boulder	GG	Quartz Monzonite		(M8)QMNZ	1Py	Rusty, strongly sheared quartz monzonite with disseminated	4221770
W130175	NAD83z16	443606	5813104	Boulder	GG	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared quartz monzonite with 1cm wide quartz vein. Rusty weathering with disseminated pyrite.	4221770
W130176	NAD83z16	444354	5813063	Boulder	GG	Quartz Monzonite		QMNZ		Quartz monzonite.	4217102
W130177	NAD83z16	444368	5813049	Boulder	GG	Monzonite		MNZ		Rusty monzonite boulder.	4217102
W130178	NAD83z16	444384	5813098	Boulder	GG	Quartz Monzonite		(M8)QMNZ	1Py	Moderately sheared monzonite. Specks of disseminated pyrite.	4221770
W130179	NAD83z16	444393	5813131	Boulder	GG	Quartz Monzonite		QMNZ	5Py	Quartz monzonite with sulphide stringers, pyrite.	4221770
W130180	NAD83z16	444410	5813163	Boulder	GG	Quartz Monzonite		QMNZ		Quartz monzonite.	4221770
W130181	NAD83z16	444380	5813180	Boulder	GG	Mafic intrusive		V3		Dark green, mafic metavolcanic. Pegmatitic quartz-feldspar vein	4221770
W130182	NAD83z16	444227	5812959	Boulder	GG	Quartz Monzonite		QMNZ		Rusty quartz monzonite.	4217102
W130183	NAD83z16	444279	5812993	Boulder	GG	Quartz Monzonite		QMNZ		Rusty quartz monzonite.	4217102
W130184	NAD83z16	443885	5813776	Boulder	GG	Quartz Monzonite		QMNZ		Quartz monzonite with rusty staining.	4221770
W130185	NAD83z16	443596	5813776	Boulder	GG	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared QMNZ with rusty staining and pyrite specks.	4221770
W130186	NAD83z16	443641	5813716	Boulder	GG	Quartz Monzonite		(M8)QMNZ		Moderately sheared QMNZ.	4221770
W130187	NAD83z16	443620	5813156	Boulder	GG	Quartz Monzonite		QMNZ		Weakly sheared, rust stained QMNZ.	4221770
W130188	NAD83z16	443366	5813428	Boulder	GG	Quartz Monzonite		QMNZ		Weakly sheared QMNZ	4221770
W130189	NAD83z16	439221	5813026	Boulder	GG	Aplite	No Shearing	I1F	2Py	Aplite with rusty staining and 2% blebby pyrite.	1203097
W130190	NAD83z16	439235	5813039	Boulder	GG	Monzonite	No Shearing	MNZ	1Py	Unsheared monzonite with rusty staining and quartz vein with 1% disseminated pyrite.	1203097
W130191	NAD83z16	439250	5813023	Boulder	GG	Quartz Monzonite	Strongly sheared	(M8)QMNZ	1Py	Strongly sheared QM with 1 % disseminated pyrite.	1203097
W130192	NAD83z16	439252	5813024	Boulder	GG	Quartz Monzonite	Strongly sheared	(M8)QMNZ	1Py	Strongly sheared QM with 1 % disseminated pyrite.	1203097
W130193	NAD83z16	439276	5813026	Boulder	GG	Mafic volcanic	Mod sheared	V3		Fine grained, foliated, green-black mafic volcanic with quartz-carbonate veinlets. Sulphides absent.	1203097
W130194	NAD83z16	439276	5813026	Boulder	GG	Quartz Monzonite	Strongly sheared	(M8)QMNZ	2Py	Strongly sheared to protomylonitic QMNZ with rusty staining and	1203097
W130195	NAD83z16	437287	5813258	Boulder	GG	Mafic volcanic		V3		Weakly sheared dark green mafic volcanic	4221777
W130196	NAD83z16	436675	5813549	Boulder	GG	Mafic volcanic	chloritized	V3		Weakly sheared dark green mafic volcanic with sugary quartz-feldspar-chlorite vein. Sulphides absent.	4221780
W130197	NAD83z16	436741	5813537	Boulder	GG	Monzonite		MNZ		Coarse grained, equigranular, unsheared monzonite. Sulphides	4221780
W130198	NAD83z16	444822	5813871	Boulder	GG	Quartz Monzonite		QMNZ	0.5Py	Coarse grained QMNZ with pyrite specks.	4221770
W130199	NAD83z16	444813	5813896	Boulder	GG	Monzonite		MNZ	0.5Py	Rusty monzonite boulder, no shearing, rare, very fine grained	4221770
W130200	NAD83z16	444847	5813709	Boulder	GG	Quartz Monzonite	strongly sheared	(M8)QMNZ	2Py	Strongly sheared QMNZ, protomylonitic with fine grained specks of disseminated pyrite.	4221770
W130201	NAD83z16	444024	5812904	Boulder	JA	Diorite		I1	1Py	Moderately sheared diorite with rare specks of disseminated	4217102
W130202	NAD83z16	443962	5812767	Boulder	JA	Monzonite		MNZ	1Py	Coarse grained monzonite with rare specks of disseminated	4217102
W130203	NAD83z16	443973	5812780	Boulder	JA	Gabbro		I3G	1Py	Moderately sheared gabbro with rare specks of disseminated	4217102
W130204	NAD83z16	443883	5812742	Boulder	JA	Monzonite		MNZ	1Py	Coarse grained quartz monzonite with rare specks of	4217102
W130205	NAD83z16	444063	5812873	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared monzonite/tonalite gneiss with rare specks of disseminated pyrite.	4217102
W130206	NAD83z16	442672	5812847	Boulder	JA	Leucogranite		I1B	1Py	Leucogranite with quartz veining and disseminated specks of	4217101
W130207	NAD83z16	442698	5812870	Boulder	JA	Leucogranite		I1B	1Py	Leucogranite with quartz veining and disseminated specks of	4217101
W130208	NAD83z16	442951	5813078	Boulder	JA	Quartz Monzonite		QMNZ		Weakly sheared quartz monzonite.	4221771
W130209	NAD83z16	442724	5812865	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Strongly sheared monzonite with rusty staining and possible	4217101
W130210	NAD83z16	443587	5812909	Boulder	JA	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with rust staining and specks of sulphides.	4217102
W130211	NAD83z16	443545	5812909	Boulder	JA	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with rusty staining and specks of pyrite.	4217102
W130212	NAD83z16	443331	5812894	Boulder	JA	Quartz Monzonite		QMNZ		Moderately sheared quartz monzonite with rusty staining.	4217102
W130213	NAD83z16	443330	5812884	Boulder	JA	Leucogranite		I1B		Leucogranite, weakly sheared	4217102
W130214	NAD83z16	443324	5812898	Boulder	JA	Leucogranite		I1B		Leaucogranite. Rusty staining.	4217102
W130215	NAD83z16	443902	5813945	Boulder	JA	Quartz Monzonite		QMNZ		Strongly epidote altered, moderately sheared QMNZ	4221770
W130216	NAD83z16	443906	5813946	Boulder	JA	Quartz vein		QV		Quartz chlorite vein with rusty staining.	4221770
W130217	NAD83z16	443963	5813951	Boulder	JA	Mafic intrusive		V3		Metavolcanic.	4221770
W130218	NAD83z16	444057	5813382	Boulder	JA	Quartz vein		QV		Quartz feldspar vein.	4221770
W130219	NAD83z16	443989	5813425	Boulder	JA	Quartz Monzonite		QMNZ		Quartz monzonite.	4221770
W130220	NAD83z16	443959	5813465	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Strongly sheared to protomylonitic quartz monzonite with rusty	4221770
W130221	NAD83z16	443978	5813571	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Strongly sheared quartz monzonite with rusty staining.	4221770
W130222	NAD83z16	443838	5813627	Boulder	JA	Gabbro		I3G		Rust stained gabbro.	4221770
W130223	NAD83z16	444226	5814092	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Moderately sheared QMNZ with rusty staining and disseminated	4221770

W130224	NAD83z16	444252	5814159	Boulder	JA	Leucogranite		I1B		Leucogranite.	4221770
W130225	NAD83z16	444251	5814168	Boulder	JA	Quartz Monzonite		QMNZ		Quartz monzonite with rusty staining.	4221770
W130226	NAD83z16	444503	5814222	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Moderately sheared monzonite with rusty staining.	4221770
W130227	NAD83z16	444467	5814194	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared QMNZ with rusty staining and pyrite specks.	4221770
W130228	NAD83z16	444486	5814194	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Strongly sheared monzonite with rusty staining.	4221770
W130229	NAD83z16	444473	5814201	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared monzonite with rusty staining and pyrite specks.	4221770
W130230	NAD83z16	444511	5814212	Boulder	JA	Quartz vein		QV		Sugary quartz vein with rusty shearing in mozonite.	4221770
W130231	NAD83z16	444521	5814225	Boulder	JA	Monzonite		MNZ		Monzonite, unsheared. Rusty staining.	4221770
W130232	NAD83z16	444530	5814225	Boulder	JA	Monzonite		MNZ		Monzonite, unsheared.	4221770
W130233	NAD83z16	444545	5814228	Boulder	JA	Quartz Monzonite		(M8)QMNZ		Garnet bearing, moderately sheared monzonite	4221770
W130234	NAD83z16	444505	5814109	Boulder	JA	Quartz Monzonite		(M8)QMNZ	0.5Py	Moderately sheared QMNZ with rusty staining.	4221770
W130235	NAD83z16	444592	5814008	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared QMNZ with rusty staining and pyrite specks.	4221770
W130236	NAD83z16	443979	5813265	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared QMNZ with rusty staining and pyrite specks.	4221770
W130237	NAD83z16	443980	5813261	Boulder	JA	Quartz Monzonite		(M8)QMNZ	1Py	Strongly sheared qMNZ with criss cutting quartz vein. Rare,	4221770
W130238	NAD83z16	440142	5812800	Boulder	JA GS	Quartz vein	Mod sheared	QV		Grey quartz vein in a sheared monzonite.	1203098
W130239	NAD83z16	440141	5812799	Boulder	JA GS	Monzonite	Mod sheared	(M8)QMNZ	Py1	Moderately sheared monzonite boulder with rare disseminated specks of pyrite.	1203098
W130240	NAD83z16	440130	5812803	Boulder	JA GS	Quartz Monzonite	Mod sheared	(M8)QMNZ	Py1	Moderately sheared QMNZ with rare disseminated specks of	1203098
W130241	NAD83z16	439930	5812891	Boulder	JA GS	Monzonite		MNZ	Py2	Unsheared, rusty monzonite boulder.	1203097
W130242	NAD83z16	439698	5812687	Boulder	JA GS	Monzonite	Mod sheared	MNZ		Moderately sheare, rusty monzonite	1203097
W130243	NAD83z16	440028	5812468	Boulder	JA GS	Quartz Monzonite	Mod sheared	QMNZ	Py5	Moderately sheared QMNZ with pyrite sulphide vein ~ 1cm wide	1203094
W130244	NAD83z16	440108	5812434	Boulder	JA GS	Quartz Monzonite		QMNZ	Py1	Unsheared, rusty monzonite boulder.	3019253
W130245	NAD83z16	437575	5811599	Grab	JA	Mafic volcanic		V3	1Py	Dark grey green, unsheared mafic volcanic. Rare, disseminatec	1203093
W130246	NAD83z16	437590	5811737	Grab	JA	Mafic volcanic		V3	1As	Dark grey green, unsheared, coarse grained mafic volcanic. Rare disseminated specks of arsenopyrite.	1203093
W130247	NAD83z16	444810	5813536	Boulder	JA	Quartz Monzonite	Mod sheared	(M8)QMNZ	0.5Py	Moderately sheared QMNZ with rusty weathering	4221770
W130248	NAD83z16	444725	5813237	Boulder	JA	Monzonite		MNZ		Monzonite boulder with minor rusty staining.	4221770
W130249	NAD83z16	444715	5813239	Boulder	JA	Leucogranite	Mod sheared	(M8)QMNZ	0.5Py	Moderately sheared leucogranite with rare specks of disseminated	4221770
W130250	NAD83z16	444663	5813210	Boulder	JA	Quartz Monzonite	Mod sheared	(M8)QMNZ	1Py	Moderately sheared quartz monzonite with rare specks of	4221770
W130251	NAD83z16	443994	5812794	Boulder	GS	Monzonite		MNZ	1Py	Sheared monozite with rare disseminated specks of pyrite.	4217102
W130252	NAD83z16	444037	5812798	Boulder	GS	Gabbro		I3G	1Py	Possible coarse grained gabbro with disseminated pyrite.	4217102
W130253	NAD83z16	444079	5812807	Boulder	GS	Quartz Monzonite		(M8)QMNZ	3Py	Moderately sheared quartz-monzonite with disseminated and blebby pyrite throughout.	4217102
W130254	NAD83z16	444042	5812816	Boulder	GS	Quartz Monzonite		QMNZ	1Py	Quartz monzonite with disseminated specks of pyrite.	4217102
W130255	NAD83z16	442367	5813502	Boulder	GS	Quartz Monzonite		QMNZ	4Py	Weakly sheared quartz monzonite with common specks of pyrite.	4221771
W130256	NAD83z16	442402	5813086	Boulder	GS	Quartz Monzonite		(M8)QMNZ		Moderately sheared quartz monzonite with rusty staining. Only rusty one collected in 25x25m boulder field.	4221771
W130257	NAD83z16	442792	5812939	Boulder	GS	Quartz Monzonite		QMNZ	1Py	Weakly sheared quartz monzonite with quartz lenses and disseminated specks of pyrite.	4217101
W130258	NAD83z16	437758	5811947	Grab	GS	Felsic intrusive	strongly silicified	I1		Strongly silicic altered, vfg/hornfelsed dike within V3 outcrop. Sulphides absent.	1203093
W130259	NAD83z16	437761	5811951	Grab	GS	Mafic volcanic		V3	0.5Py	Unsheared green-grey mafic volcanic. Trace pyrite	1203093
W130260	NAD83z16	437753	5811959	Grab	GS	Felsic intrusive	strongly silicified	I1		Strongly silicic altered, vfg/hornfelsed dike within V3 outcrop. Sulphides absent.	1203093
W130261	NAD83z16	437740	5811958	Grab	GS	Mafic volcanic	chloritized	V3		chloritized, fine grained mafic volcanic. Sulphides absent.	1203093
W130262	NAD83z16	437658	5811947	Grab	GS	Intermediate intrusive		I2		coarse grained, chloritized intermediate intrusive. Sulphides	1203093
W130263	NAD83z16	437658	5811947	Grab	GS	Mafic volcanic	chloritized	V3	0.5Py	weakly sheared mafic volcanic, rare specks of disseminated pyrite	1203093
W130264	NAD83z16	444622	5813144	Boulder	GS	Monzonite		MNZ	0.5Py	Rusty unsheared monzonite boulder.	4221770
W130265	NAD83z16	444606	5813153	Boulder	GS	Quartz Monzonite		QMNZ	3Py	Unsheared QMNZ with blebs of pyrite.	4221770
W130266	NAD83z16	444611	5813189	Boulder	GS	Quartz Monzonite		QMNZ	2Py	Unsheared QMNZ with blebs of pyrite.	4221770
W130267	NAD83z16	444617	5813218	Boulder	GS	Quartz vein		QV	15Py	Pegamtitic quartz-feldspar vein ~1ft wide with massive pyrite	4221770
W130268	NAD83z16	444626	5813254	Boulder	GS	Quartz Monzonite	Mod sheared	QMNZ	0.5Py	Moderately sheared QMNZ with rusty staining.	4221770
W130269	NAD83z16	444631	5813314	Boulder	GS	Aplite		I1F		Silicified aplite. Sulphides absent.	4221770
W130270	NAD83z16	444646	5813469	Boulder	GS	Quartz Monzonite		QMNZ	0.5Py	Rusty, unsheared QMNZ with disseminated, rare specks of pyrite.	4221770
W130271	NAD83z16	444660	5813513	Boulder	GS	Quartz Monzonite	Strongly sheared	(M8)QMNZ	0.5Py	Strongly sheared to protomylonitic QMNZ with rusty staining and	4221770
W130272	NAD83z16	444532	5813420	Boulder	GS	Quartz Monzonite		QMNZ	1Py	Unsheared QMNZ with rusty staining and disseminated pyrite.	4221770
W130273	NAD83z16	444532	5813529	Boulder	GS	Quartz Vein		QV		Grey-transluscent quartz vein with pos feldspar. Sulphides	4221770
W130274	NAD83z16	444580	5813436	Boulder	GS	Quartz Monzonite	Strongly sheared	(M8)QMNZ	0.5Py	Strongly sheared QMNZ with rare specks of disseminated pyrite.	4221770
W130275	NAD83z16	444592	5813231	Boulder	GS	Quartz Monzonite		QMNZ		Rusty quartz monzonite boulder	4221770
W130276	NAD83z16	444600	5813289	Boulder	GS	Quartz Monzonite		QMNZ	0.5Py	Rusty quartz monzonite boulder with heavy weathering.	4221770
W130277	NAD83z16	446307	5812705	Boulder	GS	Quartz Vein	Wk Sheared	QV	2Py	Sheared, grey quartz vein with blebby pyrite. Vein is close to contact between QMNZ and major mafic volcanic suite.	4217105

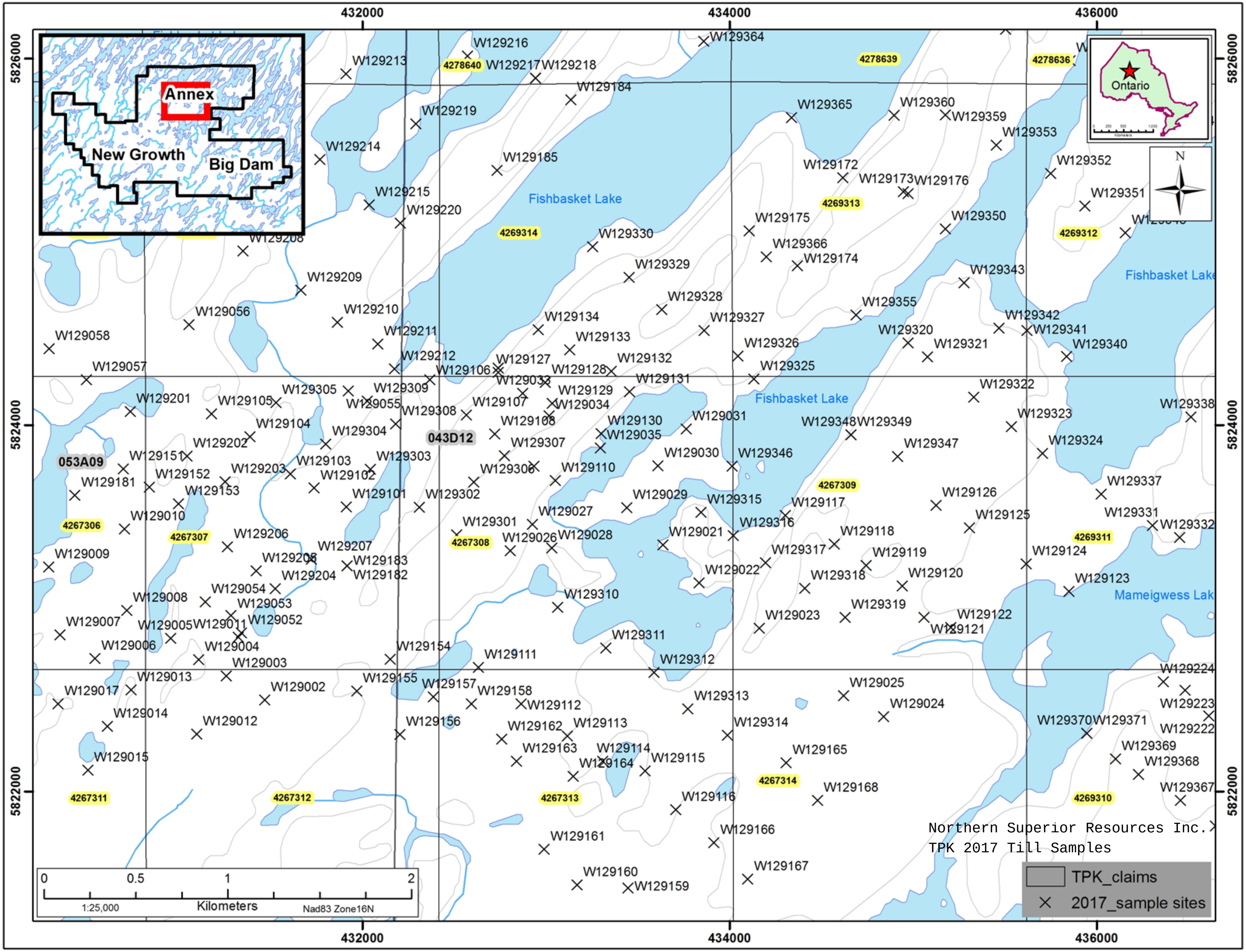
W130278	NAD83z16	446307	5812705	Boulder	GS	Quartz Monzonite		QMNZ	2Py	Rusty unsheared monzonite boulder.	4217105
W130279	NAD83z16	446478	5812795	Boulder	GS	Gabbro		I3G	1Py	Rusty gabbro with disseminated specks/blebs of pyrite. Some <1cm quartz veins.	4217106
W130280	NAD83z16	429605	5822949	Boulder	GS	Diorite		I2	0.5Py	Fine grained diorite with trace disseminated pyrite. Possibly	4267306
W130281	NAD83z16	429443	5823024	Boulder	GS	Andesite		I2J	2Py	Possibly andesite? Some mafic lapilli. Fine grained specks of pyrite disseminated throughout.	4267306
W130282	NAD83z16	429498	5823045	Boulder	GS	Mafic volcanic		I3	0.5Py	Fine grained mafic volcanic boulder. Trace disseminated pyrite	4267306
W130283	NAD83z16	429540	5823456	Boulder	GS	Mafic volcanic		I3		Fine grained mafic volcanic with epidote veinlets and rusty	4267306
W130284	NAD83z16	429484	5823421	Boulder	GS	Quartz vein		QV	1Py	Sugary, 1 inch wide quartz vein in mafic volcanics hosting trace,	4267306
W130285	NAD83z16	429528	5823325	Boulder	GS	Mafic intrusive		I3	1Py, 0.5Cpy	Fine grained mafic volcanic with hairline veinlets of brown quartz and chalcopyrite.	4267306
W130286	NAD83z16	431709	5824745	Boulder	GS	Diorite		I2	0.5Py	Diorite with sugary quartz-feldspar vein <2cm wide. Veins are folded. Disseminated, rare specks of pyrite.	4269315
W130287	NAD83z16	432246	5824550	Grab	GS	Quartz Monzonite	Mod sheared	(M8)QMNZ	0.5Py	Quartz monzonite with disseminated specks of pyrite. Hosts sugary quartz vein that trends N-S	4269315
W130288	NAD83z16	432242	5824549	Grab	GS	Quartz vein		QV		Sugary quartz vein with rusty staining in pos quartz monzonite.	4269315
W130289	NAD83z16	432241	5824548	Grab	GS	Mafic volcanic	Wk Sheared	V3	0.5Py, 0.5As	Dark green, fine grained, weakly sheared mafic volcanic with disseminated pyrite and pos arsenopyrite? Sugary quartz veining	4269315
W130290	NAD83z16	432241	5824551	Grab	GS	Monzonite	Wk Sheared	MNZ	0.5Py	Pos monzonite (could be gniess?, gniessose banding) with sugary quartz veins <2cm wide. Rusty weathering	4269315
W130291	NAD83z16	432284	5824387	Grab	GS	Mafic intrusive		I3	1As	Weathered mafic intrusive with disseminated arsenopyrite. Bulls qtz veins reported in area.	4269315
W130292	NAD83z16	432383	5824514	Grab	GS	Diorite		I2	0.5Py	Medium grained diorite? Intermediate intrusive with disseminated specks of pyrite.	4269315
W130293	NAD83z16	432517	5824220	Boulder	GS	Mafic volcanic	Mod sheared	V3	2As, 2Py	Moderately sheared, fine grained mafic material with disseminated pyrite and arsenopyrite, and lenses of strongly chloritized	4267308
W130294	NAD83z16	432483	5824224	Boulder	GS	Felsic intrusive		I1	30Py	Pink-grey, fine grained qtz-feldspar porphyry material with pegmatitic qtz-carb-tourmline vein host euhedral pyrite cubes up to 1x1cm in size. Strongly carbonatised	4267308
W130295	NAD83z16	432482	5824225	Boulder	GS	Felsic intrusive		I1	20Py	Pink-grey, fine grained qtz-feldspar porphyry material with pegmatitic qtz-carb-tourmline vein host euhedral pyrite cubes up to 1x1cm in size. Strongly carbonatised. Outcrop reported 30m	4267308
W130296	NAD83z16	432440	5824452	Grab	GS	Schist	Strongly sheared	M8	5Py	Rust stained, strongly sheared-protmylonitic schist with chlorite stringers. Precursor rock unknown. Rare specks of pyrite.	4269314
W130297	NAD83z16	432475	5824216	Boulder	GS	Felsic intrusive		I1	15Py	Pink-grey, fine grained qtz-feldspar porphyry material with pegmatitic qtz-carb-tourmline vein host euhedral pyrite cubes up to 1x1cm in size. Strongly carbonatised.	4267308
W130298	NAD83z16	431030	5824927	Boulder	GS	Quartz Vein		QV		White-pink quartz feldspar vein in mafic volcanic. Sulphides	4269315
W130299	NAD83z16	431870	5825241	Grab	GS	Intermediate intrusive		I2	5Py	Intermediate intrusive. Blebby and disseminated pyrite in the vein and adjacent mafic host rock. Sample collected in between larger QV which were sampled by GG at the same time.	4269315
W130300	NAD83z16	431870	5825243	Grab	GS	Intermediate intrusive		I2	8Py, 1As	Intermediate intrusive. Blebby and disseminated, euhedral pyrite/arsenopyrite forming 'discontinuous horizons of sulphide'. Sample collected in between larger QV which were sampled by GG	4269315
W130301	NAD83z16	440975	5813796		RA						4221774
W130302	NAD83z16	440964	5813800		RA						4221774
W130303	NAD83z16	440965	5813791		RA						4221774
W130304	NAD83z16	440957	5813794		RA						4221774
W130351	NAD83z16	433444	5821451	Boulder	JO'C	Gabbro		I3G		Coarse grained, unshearred non-magnetic felsic (qtz-fldspr) intrusive with chloritized biotite phenocrysts. Sulphides absent.	4267313
W130352	NAD83z16	433053	5822139	Boulder	JO'C	Gabbro	Wk Sheared	I3G		Weakly-unsheared, medium-coarse grained, non-magnetic gabbro. Sulphides absent.	4267313
W130371	NAD83z16	431921	5824188	outcrop	DB	Quartz vein w/ euhedral Pyrite				up ice of qtz boulder bay	4267307
W130372	NAD83z16	444076	5812877	Duplicate of M766281 2012 - Boulder	DB	1x1m part buried slab. Very rusty and int sheared with coarse aspy and py in stringer and blobs. Stringers parallel to foliation.					4217102
W130374	NAD83z16	443657	5813075	Dup - W130174 - Boulder	DB	Quartz Monzonite		(M8)QMNZ	1Py	Rusty, strongly sheared quartz monzonite with disseminated sulphide specks.	4221770
W130375	NAD83z16	443556	5813006	Dup of H755537 (1/2) 2012 - Boulder	DB	Quartz Monzonite	ser	(M8)QMNZ	trace to 1% py	Rusty, slabby, 1m, grey and black stained orange vfg qtz ser biotite with diss and fracture pyrite	4217102

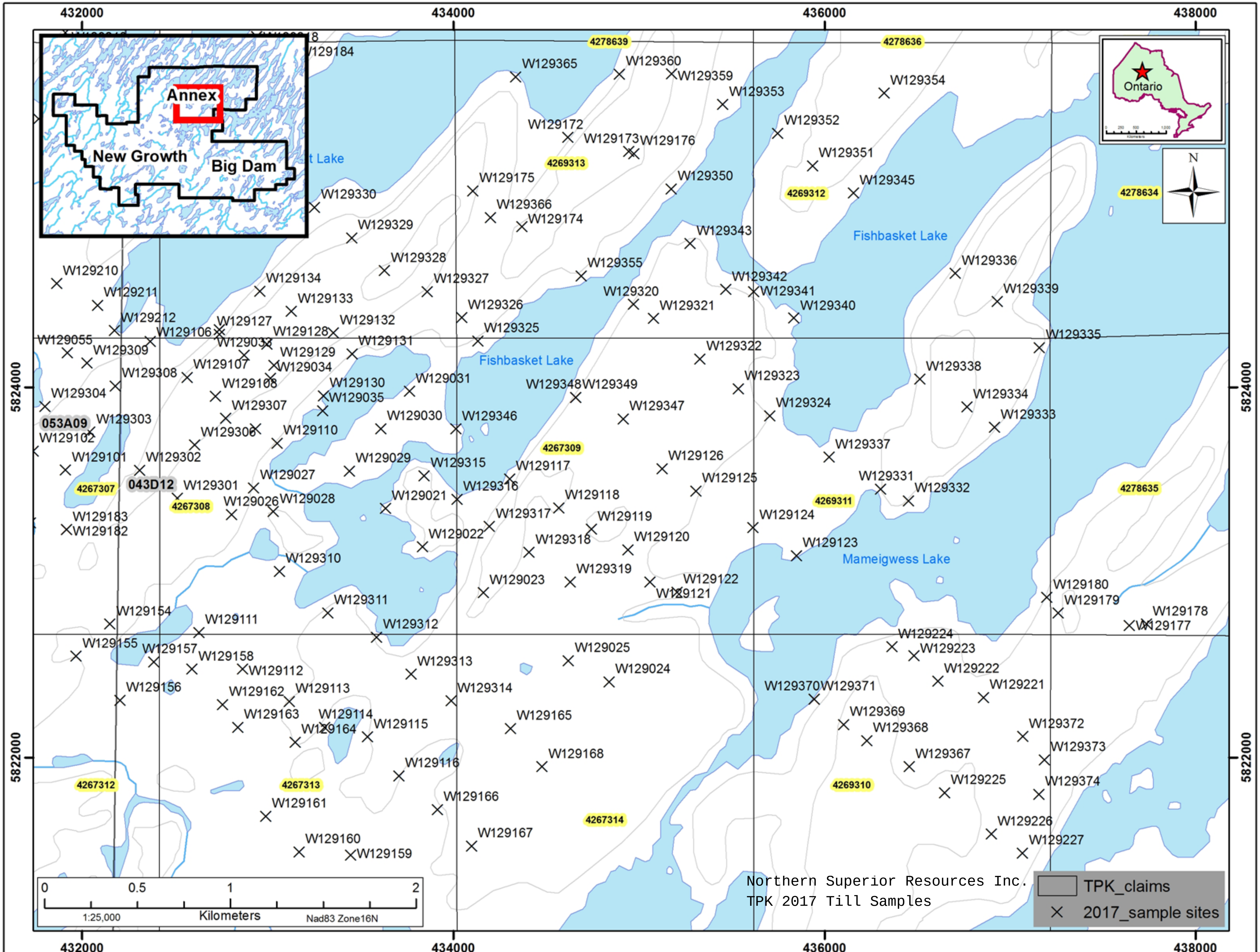
W130376	NAD83z16	443556	5813006	Dup of H755537 (2/2) 2012 - Boulder	DB	Quartz Monzonite	ser	(M8)QMNZ	trace to 1% py	Rusty, slabby, 1m, grey and black stained orange vfg qtz ser biotite with diss and fracture pyrite	4217102
W130377	NAD83z16	430937	5817015	Boulder	JO'C	Mafic volcanic	Silicified	V3	2Py	Fine grained, green, non-magnetic mafic volcanic with hairline chlorite-actinolite fractures and associated grey silicic alteration. Blebby and disseminated pyrite.	4227236
W130451	NAD83z16	431404	5823530	Boulder	DM	Quartz vein		QV	1Py	grab of 2-5cm wide qtz vein 1-2% py, in a qtz monz w/ mafic volcanic on one edge. Qtz vein // to contact	4267307
W130452	NAD83z16	431962	5823228	Boulder	DM	Quartz Monzonite	Mod sheared	(M8)QMNZ	7Py	5cm qtz vein w/ 5-10% py in sheared intr (Qmonz) 1m SA bldr	4267307
W130453	NAD83z16	431973	5823259	Boulder	DM	Quartz Vein	Mod sheared	QV	0.5Py	qtz vn 20-30cm across, little to no sulph in qtz, country rock is sheared volc, chlor near qtz vn has some py;	4267307
W130454	NAD83z16	431973	5823259	Boulder	DM	Amphibolite		I3	5Py	amphibolite, 2-5% py 2-4mm cubes; strong fabric looks much like edge of ssample 13053.	4267307
W130455	NAD83z16	432151	5823523	Boulder	DM	Mafic volcanic		V3	1Py	1cm wide qtz vn; little to no sulph - sample had a 1cm py clot; host rock is a vf grained mafic volc? SA bldr 2-3m wide	4267307
W130456	NAD83z16	432932	5823208	Boulder	DM	Mafic volcanic		V3	5Py	bldr of stockworked volcanicupto 5 % py; vn 2-3cm wide.	4267308
W130457	NAD83z16	432484	5822912	Grab	DM	Intermediate Lapilli		TU2		lapilli tuff; strong fabric; 0.5cm qtx vn strike 84 dip 70 to S; little to no py but 4 veins sub parallel, 1 blows out to 5cm wide	4267308
W130458	NAD83z16	432465	5822922	Grab	DM	Mafic volcanic		V3	8Py, 1As	drk green volc w/ 7cm wide qtz vein; sugary 0-tr py; country rock next to vein has 5-10% py // to banding; also observe wk stockwork; vein = strike of 86 dip 73 to south	4267308
W130459	NAD83z16	432482	5823130	Boulder	DM	Mafic volcanic		V3	3Py	float bldrs 2m x 1.5m mafic volc bldrs' 2.5cm qtz vein; 0-5% py; strong fabric in rock qtz vein is not // to fabric; it is cross cut and offset a cm or so by fabric parallel shears.	4267308
W130460	NAD83z16	432460	5823160	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ	5Py	qtz monz bldrs (2.5X3X1m S. ang) , strongly sheared; 5% py' biot xtals aligned but plag looked fresh;	4267308
W130461	NAD83z16	430212	5822731	Boulder	DM	Quartz Monzonite	Silicified	QMNZ	2Py	protolith Qmonz; strongly silicified, with1-2%py - upto 2mm	4267306
W130462	NAD83z16	430214	5822735	Boulder	DM	Mafic volcanic	Strongly sheared	V3	5Py	Mvolc; w/ strong fabric; 5% py 2-3mm cubes;	4267306
W130463	NAD83z16	430025	5822881	Boulder	DM	Mafic volcanic		V3	1Bn, 1Cpy	beside lake in M.Volc; 2x2x1m; strong Bn / Cpy along fracts; rock looks fresh unaltered.	4267306
W130464	NAD83z16	430067	5822915	Boulder	DM	Mafic volcanic		V3	2Py	2mX2mX1+m, SA, Mvolc, w/ strong 1-2% py; but 3-4mm in size	4267306
W130465	NAD83z16	430250	5822855	Boulder	DM	Mafic volcanic		V3	5Py, 5Cpy, 0.5Bor	retake of 755268; 2x2x1m SA sheared Mvolc; py+cpy locally 5% w/ tr bn all along shears; dissem and in blebs some upto 1cm	4267306
W130466	NAD83z16	430348	5822846	Boulder	DM	Mafic volcanic		V3	1Py, 1Cpy, 0.5Bor, 0.5 Mal	2x2x1+mSA M.Volc; cpy, py, bn, upto 1cm wide, with stains of mal, az; odd 1cm scale chevron like fold / mega crenulation.	4267306
W130467	NAD83z16	430510	5822922	Boulder	DM	Mafic volcanic		V3	1Py	Sparsely mineralized Mvolc / Diorite? ; <1% cpy as scatterd grains; this bouler was sampled - high graded a 1cm wide crck rich in cpy I am interested to see if wall rock carries gold.	4267306
W130468	NAD83z16	444505	5814183	Boulder	DM	Quartz Monzonite	Wk sheared	QMNZ	1Py	large ridge of boulders many are 3mX3mX2m, SA; here is a boulder of weakly sheared Qmonz, w/ 1cm qtz vn w/ clot of py	4221770
W130469	NAD83z16	444617	5814118	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ		Strongly sheared-protomylonitic quartz monzonite with quartz-feldspar-chlorite vein. Sulphides absent. 079/55N	4221770
W130470	NAD83z16	444695	5813677	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ	1Py	Strongly sheared, rusty boulder of quartz monzonite with disseminated pyrite specks and brown, discoloured quartz veins.	4221770
W130471	NAD83z16	444666	5813681	Boulder	DM	Monzonite		MNZ	0.5Py	Unsheared monzonite with fine grained, disseminated pyrite	4221770
W130472	NAD83z16	444592	5813532	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ		Strongly sheared, fine grained quartz monzonite. Sulphides	4221770
W130473	NAD83z16	442133	5813485	Boulder	DM	Quartz Monzonite	Wk sheared	QMNZ	1Py, 0.5As	Qmonz bldr ang 1.5X1X2m 1cm wide qtz-aspy vein samples ; coarse aspy grains 1cm across (5%) Q Monz wkly to unsheared except weak bleaching near qtz vein vein (1-2cm f bleaching)	4221771
W130474	NAD83z16	442282	5813486	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ	4Py	Qmonz strongly sheared nearly schist w/ qtz sweats and 3-5% py scattered grains to 2mm; rock is 30cmX 5cm X10 cm sitting on other boulders; I took 1/2 fr assay 1/2 for rep.	4221771
W130475	NAD83z16	442275	5813481	Boulder	DM	Quartz vein	Strongly sheared	(M8)QMNZ	30As	Qtz / Aspy vn; 20X30X10cm nearly massive aspy; 30% Aspy, 30% qtz; 40% sheared Qmonz - took entire bldr to camp for slabbing	4221771
W130476	NAD83z16	442051	5814071	Boulder	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ	3Py	Qmonz; sheared; 20X60X80cm V ang bldr; strong to very strongly sheared py 2-3% upto 3mm tarnished looking; rock is nearly a	4221771
W130477	NAD83z16	428574	5823355	Grab	DM	Mafic intrusive	Wk sheared	I3	0.5Py	Diorite / Mvolc?; dark green; weak fabric; tr-0.5% py (upto 3mm	4267305
W130478	NAD83z16	428574	5823355	Grab	DM	Quartz vein		QV		Qtz vein; 3-5cm wide (little to no sulphide); w/ dark green clotty chlorite in selvage; little to no sulph.	4267305
W130479	NAD83z16	432530	5824225	Boulder	DM	Diorite		I2	0.5Py	Diorite bldr w/ narrow 1cm tr-0.5% py upto 2mm some chlorite	4267308
W130480	NAD83z16	432521	5824228	Boulder	DM	Mafic volcanic		V3	5Py	Bldr of drk green Mvolc around py locally 5% upto 3-4mm across; no qtz vn wk chlorite.	4267308

W130481	NAD83z16	432440	5824377	Boulder	DM	Mylonite	Strongly sheared	M8	0.5Py	ang bldr 1x0.5x0.5m shear -mylonite; very ang; rock is strongly sheared w/ bands of light and dark minerals; little to no py but	4269314
W130482	NAD83z16	432285	5824385	Grab	DM	Quartz Monzonite	Strongly sheared	(M8)QMNZ	5Py	shear zone; in Qmonz, strike 240 dipping steeply; little to no py in qtz veins (rusty) but upto 5% py in selvage (Qmonz) 40cm wide	4269315

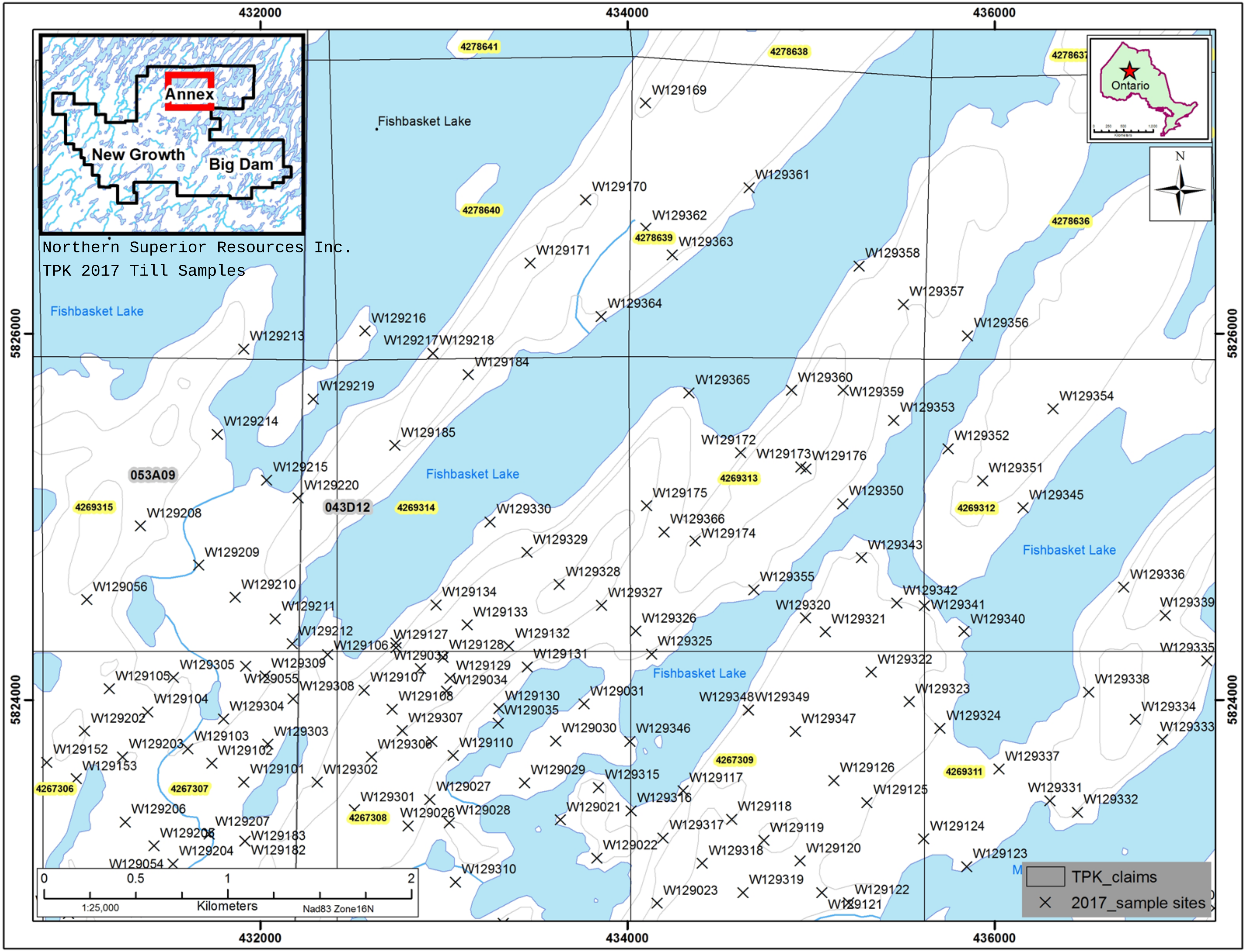


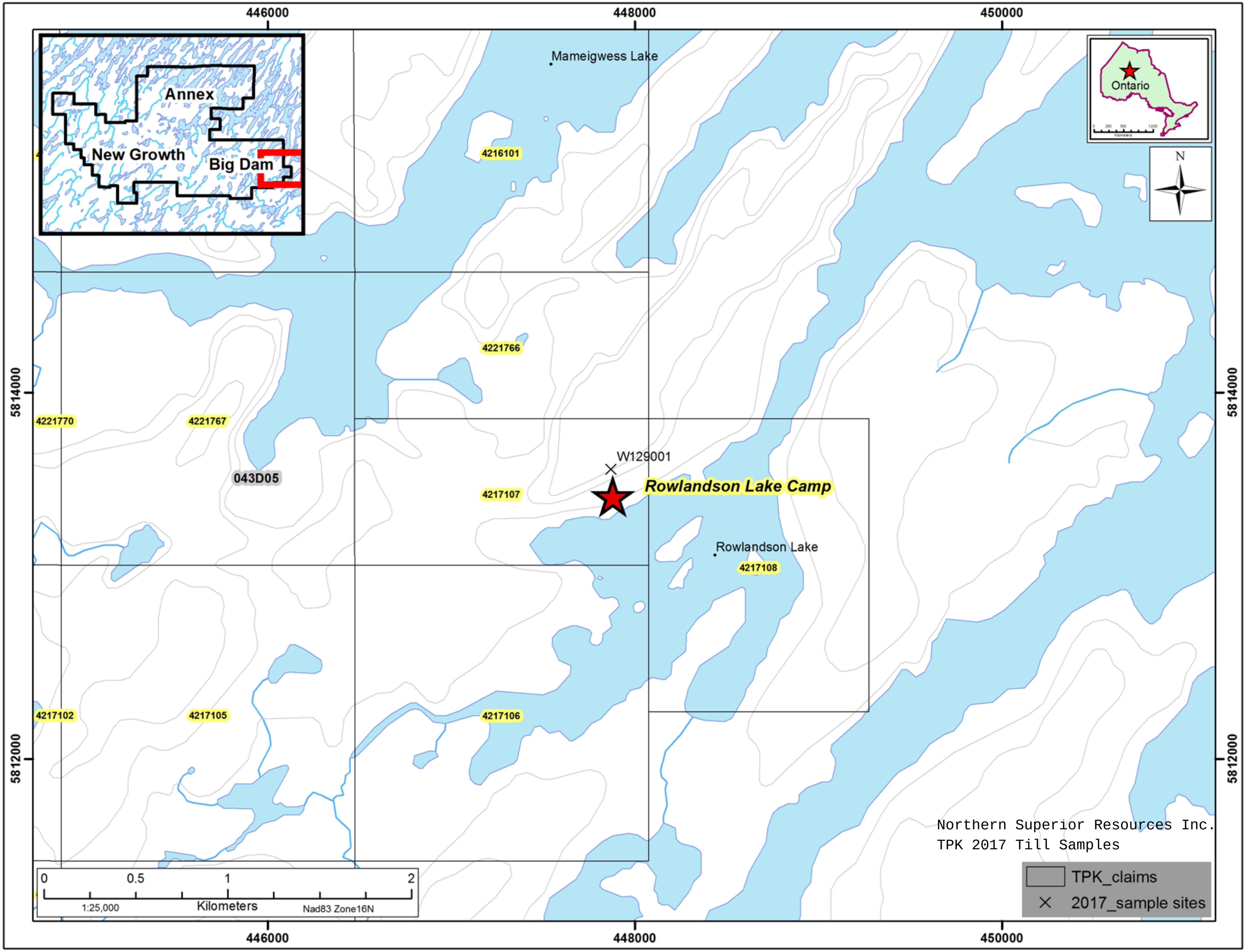
426000
428000
430000
432000
5824000
5822000
Annex
New Growth
Big Dam
Ontario
N
053A09
4269317
4269316
4269315
4269319
4267305
4267306
4267307
4269320
4267310
4267311
4267312
4267315
4243901
Northern Superior Resources Inc.
TPK 2017 Till Samples
TPK_claims
2017_sample sites
0
0.5
1
2
Kilometers
1:25,000
Nad83 Zone16N


432000
434000
436000
5826000
5824000
5822000
Annex
New Growth
Big Dam
Ontario
N
Fishbasket Lake
Fishbasket Lake
Fishbasket Lake
Mameigwess Lak
053A09
043D12
4278640
4278639
4278636
4269314
4269313
4269312
4267309
4267306
4267307
4267308
4269311
4267311
4267312
4267313
4267314
4269310
W129216
W129213
W129217
W129218
W129364
W129184
W129219
W129214
W129185
W129215
W129220
W129208
W129209
W129210
W129211
W129212
W129056
W129058
W129057
W129365
W129360
W129359
W129353
W129352
W129351
W129172
W129173
W129176
W129175
W129366
W129174
W129350
W129343
W129355
W129342
W129341
W129340
W129320
W129321
W129330
W129329
W129328
W129327
W129326
W129325
W129134
W129133
W129132
W129127
W129106
W129128
W129033
W129131
W129129
W129034
W129201
W129105
W129305
W129309
W129055
W129308
W129107
W129104
W129304
W129108
W129130
W129035
W129031
W129348
W129349
W129322
W129323
W129338
W129202
W129151
W129152
W129203
W129103
W129303
W129307
W129030
W129346
W129347
W129324
W129181
W129153
W129102
W129306
W129110
W129101
W129302
W129029
W129315
W129117
W129126
W129337
W129010
W129301
W129027
W129316
W129125
W129331
W129332
W129206
W129026
W129028
W129021
W129118
W129009
W129207
W129205
W129183
W129204
W129182
W129317
W129119
W129124
W129022
W129318
W129120
W129054
W129008
W129053
W129310
W129123
W129007
W129005
W129011
W129052
W129023
W129319
W129122
W129121
W129006
W129004
W129003
W129154
W129311
W129111
W129312
W129013
W129017
W129002
W129155
W129157
W129158
W129112
W129313
W129025
W129224
W129223
W129014
W129012
W129156
W129162
W129113
W129314
W129024
W129370
W129371
W129222
W129163
W129114
W129164
W129115
W129165
W129369
W129368
W129015
W129116
W129168
W129367
W129161
W129166
W129160
W129159
W129167
0
0.5
1
2
1:25,000
Kilometers
Nad83 Zone16N
Northern Superior Resources Inc.
TPK 2017 Till Samples
TPK_claims
2017_sample sites



432000
434000
436000
438000
5824000
5822000
Annex
New Growth
Big Dam
Ontario
N
Fishbasket Lake
Mameigwess Lake
053A09
043D12
4278639
4278636
4278634
4278635
4269313
4269312
4269311
4269310
4267309
4267307
4267308
4267312
4267313
4267314
W129184
W129365
W129360
W129359
W129353
W129354
W129352
W129351
W129345
W129172
W129173
W129176
W129175
W129350
W129330
W129366
W129174
W129329
W129343
W129328
W129355
W129336
W129210
W129134
W129327
W129320
W129342
W129341
W129339
W129211
W129133
W129326
W129321
W129340
W129212
W129127
W129132
W129106
W129128
W129325
W129055
W129033
W129131
W129322
W129335
W129309
W129129
W129034
W129338
W129308
W129107
W129130
W129031
W129348
W129349
W129323
W129304
W129108
W129035
W129334
W129307
W129347
W129324
W129303
W129030
W129346
W129333
W129102
W129306
W129110
W129337
W129101
W129302
W129029
W129315
W129117
W129126
W129027
W129125
W129331
W129332
W129301
W129316
W129118
W129026
W129028
W129021
W129317
W129119
W129124
W129183
W129182
W129022
W129318
W129120
W129123
W129310
W129319
W129023
W129122
W129121
W129180
W129179
W129311
W129154
W129111
W129178
W129177
W129312
W129224
W129155
W129157
W129158
W129025
W129223
W129112
W129313
W129024
W129222
W129156
W129162
W129113
W129314
W129370
W129371
W129221
W129163
W129114
W129369
W129164
W129115
W129165
W129368
W129372
W129373
W129367
W129168
W129116
W129225
W129374
W129166
W129161
W129226
W129160
W129167
W129227
W129159
0
0.5
1
2
1:25,000
Kilometers
Nad83 Zone16N
Northern Superior Resources Inc.
TPK 2017 Till Samples
TPK_claims
2017_sample sites


Northern Superior Resources Inc.
TPK 2017 Till Samples
Annex
New Growth
Big Dam
Ontario
N
432000
434000
436000
5826000
5824000
Fishbasket Lake
053A09
043D12
4278641
4278638
4278637
4278640
4278639
4278636
4269315
4269314
4269313
4269312
4267306
4267307
4267308
4267309
4269311
W129169
W129170
W129361
W129362
W129363
W129171
W129358
W129357
W129364
W129356
W129216
W129213
W129217
W129218
W129184
W129219
W129365
W129360
W129359
W129353
W129354
W129214
W129185
W129172
W129173
W129176
W129352
W129351
W129215
W129220
W129175
W129350
W129345
W129208
W129330
W129366
W129174
W129329
W129343
W129209
W129336
W129328
W129355
W129056
W129210
W129134
W129327
W129342
W129341
W129339
W129211
W129133
W129320
W129340
W129326
W129321
W129212
W129127
W129132
W129106
W129128
W129325
W129033
W129131
W129335
W129305
W129309
W129322
W129105
W129055
W129129
W129107
W129034
W129338
W129308
W129031
W129104
W129108
W129130
W129348
W129349
W129323
W129304
W129035
W129334
W129202
W129307
W129347
W129324
W129103
W129303
W129030
W129346
W129333
W129152
W129203
W129102
W129306
W129110
W129153
W129101
W129302
W129029
W129315
W129117
W129126
W129337
W129027
W129125
W129331
W129301
W129316
W129206
W129021
W129118
W129332
W129026
W129028
W129207
W129317
W129119
W129124
W129205
W129183
W129204
W129182
W129022
W129318
W129120
W129123
W129054
W129310
W129319
W129122
W129023
W129121
0
0.5
1
2
1:25,000
Kilometers
Nad83 Zone16N
TPK_claims
2017_sample sites



446000
448000
450000
5814000
5812000
Mameigwess Lake
Annex
New Growth
Big Dam
Ontario
N
4216101
4221766
4221770
4221767
043D05
W129001
Rowlandson Lake Camp
4217107
Rowlandson Lake
4217108
4217102
4217105
4217106
0
0.5
1
2
1:25,000
Kilometers
Nad83 Zone16N
Northern Superior Resources Inc.
TPK 2017 Till Samples
TPK_claims
2017_sample sites

Appendix 6: Overburden sample sites wt claims

Sample_Number	Project_Area	Datum	utm_East	utm_North	Sample_Material	Sediment_Type	Landform	comment	Claim_Number
W129001	Annex	NAD83Z16	447872	5813582	Till	Till Blanket	till plain		4217107
W129002	Annex	NAD83Z16	431468	5822498	Till	Till Blanket	till plain		4267312
W129003	Annex	NAD83Z16	431258	5822631	Till	Till Blanket	till plain		4267312
W129004	Annex	NAD83Z16	431108	5822720	Till	Till Blanket	till plain		4267307
W129005	Annex	NAD83Z16	430956	5822835	Till	Till Blanket	till plain		4267307
W129006	Annex	NAD83Z16	430544	5822726	Till	Till Blanket	till plain		4267306
W129007	Annex	NAD83Z16	430352	5822855	Till	till veneer	till plain		4267306
W129008	Annex	NAD83Z16	430716	5822988	Till	Till Blanket	till plain		4267306
W129009	Annex	NAD83Z16	430291	5823225	Till	Till Blanket	till plain		4267306
W129010	Annex	NAD83Z16	430704	5823433	Till	Till Blanket	till plain		4267306
W129011	Annex	NAD83Z16	431325	5822843	Till	Till Blanket	till plain		4267307
W129012	Annex	NAD83Z16	431098	5822313	Till	Till Blanket	till plain		4267312
W129013	Annex	NAD83Z16	430740	5822554	Till	Till Blanket	till plain		4267311
W129014	Annex	NAD83Z16	430610	5822356	Till	Till Blanket	till plain		4267311
W129015	Annex	NAD83Z16	430504	5822115	Till	Till Blanket	till plain		4267311
W129016	Annex	NAD83Z16	430079	5822423	Till	Till Blanket	till plain		4267311
W129017	Annex	NAD83Z16	430343	5822478	Till	Till Blanket	till plain		4267311
W129018	Annex	NAD83Z16	429894	5822505	Till	Till Blanket	till plain		4267311
W129019	Annex	NAD83Z16	429894	5822505	Till	Till Blanket	till plain	dup-W129018	4267311
W129020	Annex	NAD83Z16	429714	5822493	Glaciofluvial	Glaciofluvial	kame		4267311
W129021	Annex	NAD83Z16	433637	5823346	Till	Till Blanket	till plain		4267308
W129022	Annex	NAD83Z16	433835	5823138	Till	Till Blanket	till plain		4267308
W129023	Annex	NAD83Z16	434163	5822891	Till	Till Blanket	till plain		4267309
W129024	Annex	NAD83Z16	434841	5822409	Till	Till Blanket	till plain		4267314
W129025	Annex	NAD83Z16	434622	5822523	Till	Till Blanket	till plain		4267314
W129026	Annex	NAD83Z16	432806	5823313	Till	till blanket	till plain		4267308
W129027	Annex	NAD83Z16	432926	5823457	Till	Till Blanket	till plain		4267308
W129028	Annex	NAD83Z16	433032	5823329	Till	Till Blanket	till plain		4267308
W129029	Annex	NAD83Z16	433441	5823548	Till	Till Blanket	till plain		4267308
W129030	Annex	NAD83Z16	433611	5823777	Till	Till Blanket	till plain		4267308
W129031	Annex	NAD83Z16	433765	5823979	Till	Till Blanket	till plain		4267308
W129032	Annex	NAD83Z16	432741	5824311	Till	Till Blanket	till plain		4269314
W129033	Annex	NAD83Z16	432874	5824173	Till	Till Blanket	till plain		4267308
W129034	Annex	NAD83Z16	433017	5824050	Till	Till Blanket	till plain		4267308
W129035	Annex	NAD83Z16	433298	5823874	Till	Till Blanket	till plain		4267308
W129036	Annex	NAD83Z16	426233	5822460	Till	Till Blanket	till plain		4269320
W129037	Annex	NAD83Z16	426349	5822370	Till	Till Blanket	till plain		4269320
W129038	Annex	NAD83Z16	426584	5822223	Till	Till Blanket	till plain		4269320
W129039	Annex	NAD83Z16	426752	5822067	Till	Till Blanket	till plain		4269320
W129040	Annex	NAD83Z16	426980	5821906	Till	Till Blanket	till plain		4269320
W129041	Annex	NAD83Z16	427150	5821745	Till	Till Blanket	till plain		4269320
W129042	Annex	NAD83Z16	427255	5821660	Till	Till Blanket	till plain		4269320
W129043	Annex	NAD83Z16	427255	5821660	Till	Till Blanket	till plain	dup-W129042	4269320

W129044	Annex	NAD83Z16	427396	5821512	Till	Till Blanket	till plain		4269320
W129045	Annex	NAD83Z16	427449	5824371	Till	Till Blanket	till plain		4269318
W129046	Annex	NAD83Z16	427610	5824192	Till	Till Blanket	till plain		4269319
W129047	Annex	NAD83Z16	427770	5823989	Till	Till Blanket	till plain		4267305
W129048	Annex	NAD83Z16	428003	5823863	Till	Till Blanket	till plain		4267305
W129049	Annex	NAD83Z16	428178	5823719	Till	Till Blanket	till plain		4267305
W129050	Annex	NAD83Z16	428403	5823640	Till	Till Blanket	till plain		4267305
W129051	Annex	NAD83Z16	428566	5823488	Till	Till Blanket	till plain		4267305
W129052	Annex	NAD83Z16	431342	5822866	Till	Till Blanket	till plain		4267307
W129053	Annex	NAD83Z16	431285	5822961	Till	Till Blanket	till plain		4267307
W129054	Annex	NAD83Z16	431144	5823034	Till	till veneer	till plain		4267307
W129055	Annex	NAD83Z16	431923	5824186	Till	till veneer	till plain		4267307
W129056	Annex	NAD83Z16	431056	5824548	Till	Till Blanket	till plain		4269315
W129057	Annex	NAD83Z16	430496	5824247	Till	Till Blanket	till plain		4267306
W129058	Annex	NAD83Z16	430293	5824416	Till	Till Blanket	till plain		4269316
W129059	Annex	NAD83Z16	429922	5824064	Till	Till Blanket	till plain		4267306
W129060	Annex	NAD83Z16	430107	5823796	Till	Till Blanket	till plain		4267306
W129061	Annex	NAD83Z16	429799	5823353	Till	Till Blanket	till plain		4267306
W129062	Annex	NAD83Z16	429601	5823458	Till	Till Blanket	till plain		4267306
W129063	Annex	NAD83Z16	429377	5823587	Till	Till Blanket	till plain		4267306
W129064	Annex	NAD83Z16	428253	5821615	Till	Till Blanket	till plain		4267310
W129065	Annex	NAD83Z16	428092	5821770	Till	Till Blanket	till plain		4267310
W129066	Annex	NAD83Z16	427828	5821393	Till	Till Blanket	till plain		4267310
W129067	Annex	NAD83Z16	428814	5821958	washed till	Till Blanket	till plain		4267310
W129068	Annex	NAD83Z16	428597	5821107	Till	Till Blanket	till plain		4267310
W129069	Annex	NAD83Z16	429038	5822421	Till	Till Blanket	till plain		4267310
W129070	Annex	NAD83Z16	429226	5822195	Till	Till Blanket	till plain		4267311
W129071	Annex	NAD83Z16	429477	5822060	Till	outwash	esker		4267311
W129072	Annex	NAD83Z16	429477	5822060	Till	outwash	esker	dup-W129071	4267311
W129101	Annex	NAD83Z16	431912	5823553	Glaciofluvial	Till Blanket	outwash plain?		4267307
W129102	Annex	NAD83Z16	431738	5823656	Glaciofluvial	glaciofluvial	esker		4267307
W129103	Annex	NAD83Z16	431607	5823733	Glaciofluvial	glaciofluvial	esker		4267307
W129104	Annex	NAD83Z16	431388	5823936	Glaciofluvial	glaciofluvial	esker		4267307
W129105	Annex	NAD83Z16	431179	5824062	Glaciofluvial	glaciofluvial	outwash plain?		4267307
W129106	Annex	NAD83Z16	432368	5824248	Glaciofluvial	glaciofluvial	outwash plain?		4267307
W129107	Annex	NAD83Z16	432567	5824054	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129108	Annex	NAD83Z16	432721	5823951	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129109	Annex	NAD83Z16	432936	5823775	glaciolacustrine?	glaciolacustrine	outwash plain?		4267308
W129110	Annex	NAD83Z16	433052	5823698	glaciolacustrine?	glaciolacustrine	outwash plain?		4267308
W129111	Annex	NAD83Z16	432632	5822676	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129112	Annex	NAD83Z16	432866	5822478	Glaciofluvial	glaciofluvial	esker		4267313
W129113	Annex	NAD83Z16	433117	5822303	Glaciofluvial	glaciofluvial	outwash plain?		4267313
W129114	Annex	NAD83Z16	433309	5822164	Glaciofluvial	glaciofluvial	outwash plain?		4267313
W129115	Annex	NAD83Z16	433540	5822112	Glaciofluvial	glaciofluvial	esker		4267313
W129116	Annex	NAD83Z16	433708	5821901	Glaciofluvial	glaciofluvial	outwash plain?		4267313

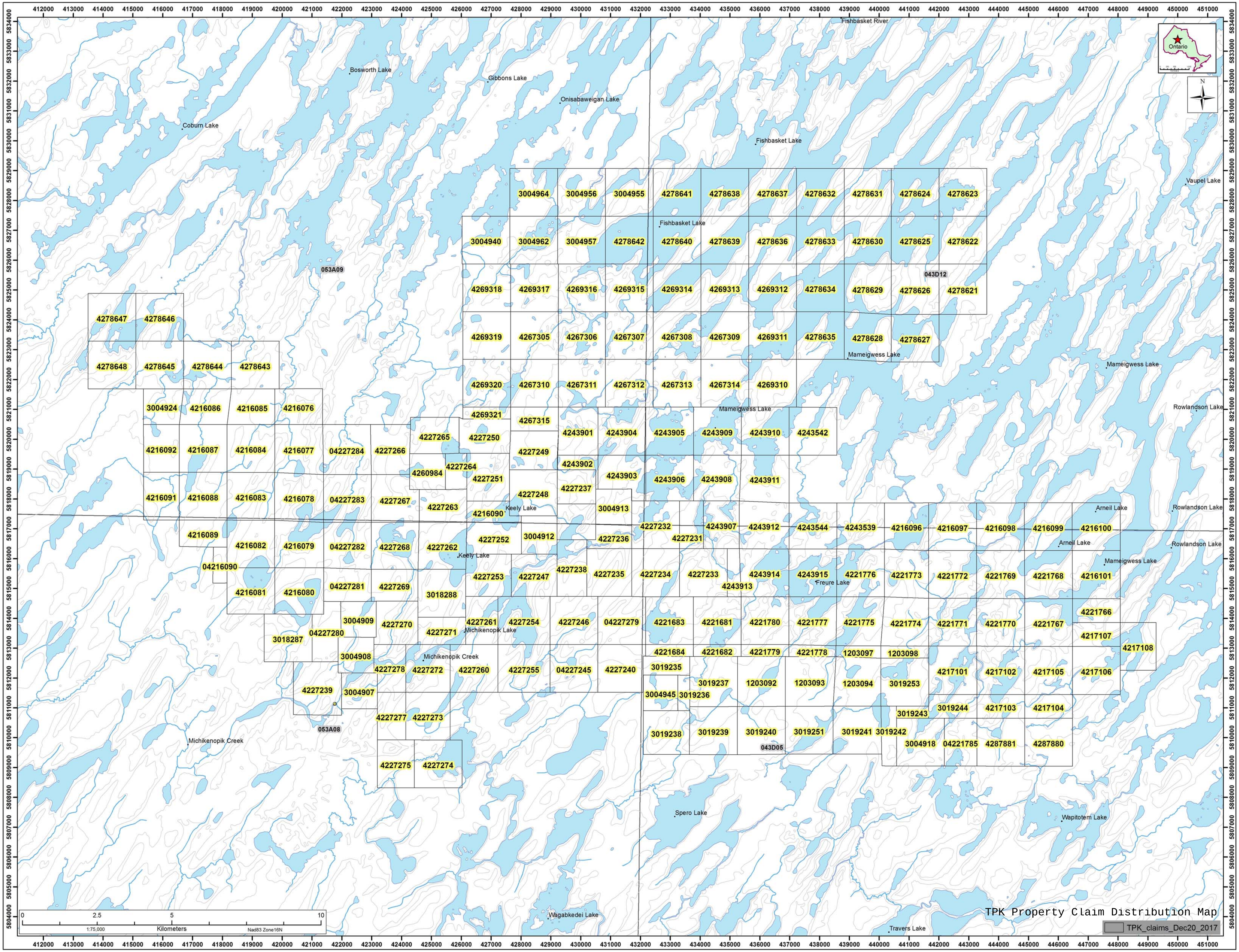
W129117	Annex	NAD83Z16	434305	5823506	Glaciofluvial	glaciofluvial	esker		4267309
W129118	Annex	NAD83Z16	434571	5823349	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129119	Annex	NAD83Z16	434746	5823234	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129120	Annex	NAD83Z16	434942	5823122	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129121	Annex	NAD83Z16	435061	5822949	Glaciofluvial	glaciofluvial	esker		4267309
W129122	Annex	NAD83Z16	435207	5822894	Glaciofluvial	glaciofluvial	esker		4267309
W129123	Annex	NAD83Z16	435850	5823091	Glaciofluvial	glaciofluvial	outwash plain?		4269311
W129124	Annex	NAD83Z16	435617	5823242	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129125	Annex	NAD83Z16	435308	5823440	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129126	Annex	NAD83Z16	435126	5823561	Glaciofluvial	glaciofluvial	outwash plain?		4267309
W129127	Annex	NAD83Z16	432741	5824287	Glaciofluvial	glaciofluvial	esker		4269314
W129128	Annex	NAD83Z16	432997	5824233	Glaciofluvial	glaciofluvial	esker		4267308
W129129	Annex	NAD83Z16	433035	5824119	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129130	Annex	NAD83Z16	433302	5823954	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129131	Annex	NAD83Z16	433457	5824181	Glaciofluvial	glaciofluvial	outwash plain?		4267308
W129132	Annex	NAD83Z16	433356	5824294	Glaciofluvial	glaciofluvial	esker		4269314
W129133	Annex	NAD83Z16	433129	5824411	Glaciofluvial	glaciofluvial	esker		4269314
W129134	Annex	NAD83Z16	432959	5824520	Glaciofluvial	glaciofluvial	esker		4269314
W129135	Annex	NAD83Z16	426548	5822940	Glaciofluvial	glaciofluvial	esker		4269319
W129136	Annex	NAD83Z16	426621	5822912	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129137	Annex	NAD83Z16	426906	5822687	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129138	Annex	NAD83Z16	427149	5822457	Glaciofluvial	glaciofluvial	esker		4269320
W129139	Annex	NAD83Z16	427321	5823239	Glaciofluvial	glaciofluvial	esker		4269319
W129140	Annex	NAD83Z16	427394	5822286	Glaciofluvial	glaciofluvial	esker		4269320
W129141	Annex	NAD83Z16	427660	5822062	Glaciofluvial	glaciofluvial	esker		4267310
W129142	Annex	NAD83Z16	427211	5823863	Glaciofluvial	glaciofluvial	esker		4269319
W129143	Annex	NAD83Z16	427392	5823679	Glaciofluvial	glaciofluvial	esker		4269319
W129144	Annex	NAD83Z16	427516	5823567	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129145	Annex	NAD83Z16	427866	5823349	Glaciofluvial	glaciofluvial	esker		4267305
W129146	Annex	NAD83Z16	427971	5823248	Glaciofluvial	glaciofluvial	outwash plain?		4267305
W129147	Annex	NAD83Z16	428210	5823149	Glaciofluvial	glaciofluvial	esker		4267305
W129148	Annex	NAD83Z16	428220	5823093	Glaciofluvial	glaciofluvial	esker		4267305
W129149	Annex	NAD83Z16	428220	5823093	Glaciofluvial	glaciofluvial	esker	dup-W129148	4267305
W129150	Annex	NAD83Z16	427850	5824665	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129151	Annex	NAD83Z16	430697	5823761	Till	Till Blanket	till plain		4267306
W129152	Annex	NAD83Z16	430839	5823661	Till	Till Blanket	till plain		4267307
W129153	Annex	NAD83Z16	430999	5823570	Till	Till Blanket	till plain		4267307
W129154	Annex	NAD83Z16	432151	5822721	Till	Till Blanket	till plain		4267307
W129155	Annex	NAD83Z16	431969	5822548	Till	Till Blanket	till plain		4267312
W129156	Annex	NAD83Z16	432205	5822310	Till	Till Blanket	till plain		4267312
W129157	Annex	NAD83Z16	432387	5822517	Till	Till Blanket	till plain		4267312
W129158	Annex	NAD83Z16	432594	5822478	Till	Till Blanket	till plain		4267313
W129159	Annex	NAD83Z16	433448	5821473	Till	till veneer	till plain		4267313
W129160	Annex	NAD83Z16	433170	5821490	Till	Till Blanket	till plain		4267313
W129161	Annex	NAD83Z16	432991	5821683	Till	Till Blanket	till plain		4267313

W129162	Annex	NAD83Z16	432759	5822286	Till	Till Blanket	till plain		4267313
W129163	Annex	NAD83Z16	432840	5822164	Till	Till Blanket	till plain		4267313
W129164	Annex	NAD83Z16	433149	5822083	Till	Till Blanket	till plain		4267313
W129165	Annex	NAD83Z16	434310	5822157	Till	Till Blanket	till plain		4267314
W129166	Annex	NAD83Z16	433916	5821719	Till	Till Blanket	till plain		4267313
W129167	Annex	NAD83Z16	434100	5821522	Till	Till Blanket	till plain		4267314
W129168	Annex	NAD83Z16	434480	5821951	Till	Till Blanket	till plain		4267314
W129169	Annex	NAD83Z16	434101	5827260	Till	Till Blanket	drumlin		4278639
W129170	Annex	NAD83Z16	433775	5826732	Till	Till Blanket	till plain		4278640
W129171	Annex	NAD83Z16	433471	5826386	Till	Till Blanket	till plain		4278640
W129172	Annex	NAD83Z16	434619	5825351	Till	till veneer	till plain		4269313
W129173	Annex	NAD83Z16	434948	5825274	Till	Till Blanket	drumlin		4269313
W129174	Annex	NAD83Z16	434371	5824869	Till	Till Blanket	till plain		4269313
W129175	Annex	NAD83Z16	434107	5825061	Till	Till Blanket	drumlin		4269313
W129176	Annex	NAD83Z16	434974	5825263	Till	Till Blanket	drumlin		4269313
W129177	Annex	NAD83Z16	437645	5822713	Till	Till Blanket	drumlin		4278635
W129178	Annex	NAD83Z16	437737	5822721	Till	Till Blanket	till plain		4278635
W129179	Annex	NAD83Z16	437261	5822781	Till	Till Blanket	drumlin		4278635
W129180	Annex	NAD83Z16	437200	5822865	Till	Till Blanket	drumlin		4269311
W129181	Annex	NAD83Z16	430434	5823616	Till	Till Blanket	till plain		4267306
W129182	Annex	NAD83Z16	431917	5823231	Till	till veneer	till plain		4267307
W129183	Annex	NAD83Z16	431917	5823231	Till	till veneer	till plain	dup-W129182	4267307
W129184	Annex	NAD83Z16	433136	5825776	Till	Till Blanket	till plain		4269314
W129185	Annex	NAD83Z16	432734	5825391	Till	Till Blanket	drumlin		4269314
W129201	Annex	NAD83Z16	430735	5824073	Till	Till Blanket	drumlin		4267306
W129202	Annex	NAD83Z16	431044	5823831	Till	Till Blanket	till plain		4267307
W129203	Annex	NAD83Z16	431252	5823690	Till	Till Blanket	till plain		4267307
W129204	Annex	NAD83Z16	431526	5823106	Till	Till Blanket	till plain		4267307
W129205	Annex	NAD83Z16	431422	5823204	Till	Till Blanket	till plain		4267307
W129206	Annex	NAD83Z16	431266	5823335	Till	Till Blanket	till plain		4267307
W129207	Annex	NAD83Z16	431723	5823268	Till	Till Blanket	till plain		4267307
W129208	Annex	NAD83Z16	431349	5824951	Till	Till Blanket	till plain		4269315
W129209	Annex	NAD83Z16	431666	5824737	Till	Till Blanket	till plain		4269315
W129210	Annex	NAD83Z16	431865	5824561	Till	Till Blanket	till plain		4269315
W129211	Annex	NAD83Z16	432084	5824443	Till	Till Blanket	till plain		4269315
W129212	Annex	NAD83Z16	432176	5824307	Till	Till Blanket	till plain		4269315
W129213	Annex	NAD83Z16	431911	5825917	Till	Till Blanket	till plain		4278642
W129214	Annex	NAD83Z16	431768	5825451	Till	Till Blanket	till plain		4269315
W129215	Annex	NAD83Z16	432037	5825202	Till	Till Blanket	till plain		4269315
W129216	Annex	NAD83Z16	432573	5826016	Till	Till Blanket	till plain		4278640
W129217	Annex	NAD83Z16	432943	5825894	Till	Till Blanket	till plain		4278640
W129218	Annex	NAD83Z16	432943	5825894	Till	Till Blanket	till plain		4278640
W129219	Annex	NAD83Z16	432291	5825644	Till	Till Blanket	till plain		4269315
W129220	Annex	NAD83Z16	432208	5825103	Till	Till Blanket	till plain		4269315
W129221	Annex	NAD83Z16	436858	5822324	Till	Till Blanket	till plain		4269310

W129222	Annex	NAD83Z16	436612	5822412	Till	Till Blanket	till plain		4269310
W129223	Annex	NAD83Z16	436484	5822551	Till	Till Blanket	till plain		4269310
W129224	Annex	NAD83Z16	436365	5822599	Till	Till Blanket	till plain		4269310
W129225	Annex	NAD83Z16	436649	5821810	Till	Till Blanket	till plain		4269310
W129226	Annex	NAD83Z16	436900	5821587	Till	Till Blanket	till plain		4269310
W129227	Annex	NAD83Z16	437069	5821484	Till	Till Blanket	till plain		4269310
W129301	Annex	NAD83Z16	432514	5823401	Till	till veneer	till plain		4267308
W129302	Annex	NAD83Z16	432311	5823552	Till	til veneer	till plain		4267307
W129303	Annex	NAD83Z16	432043	5823759	Till	Till Blanket	till plain		4267307
W129304	Annex	NAD83Z16	431801	5823897	Till	till veneer	till plain		4267307
W129305	Annex	NAD83Z16	431529	5824123	Till	Till Blanket	till plain		4267307
W129306	Annex	NAD83Z16	432608	5823689	Till	till veneer	till plain		4267308
W129307	Annex	NAD83Z16	432775	5823833	Till	Till Blanket	till plain		4267308
W129308	Annex	NAD83Z16	432181	5824007	Till	till blanket	till plain		4267307
W129309	Annex	NAD83Z16	432028	5824131	Till	till veneer	till plain		4267307
W129310	Annex	NAD83Z16	433065	5823006	Till	Till Blanket	till plain		4267308
W129311	Annex	NAD83Z16	433326	5822782	Till	till veneer	till plain		4267308
W129312	Annex	NAD83Z16	433589	5822650	Till	Till Blanket	till plain		4267313
W129313	Annex	NAD83Z16	433774	5822450	Till	Till Blanket	till plain		4267313
W129314	Annex	NAD83Z16	433990	5822306	Till	till veneer	till plain		4267313
W129315	Annex	NAD83Z16	433845	5823523	Till	till veneer	till plain		4267308
W129316	Annex	NAD83Z16	434022	5823396	Till	till veneer	till plain		4267309
W129317	Annex	NAD83Z16	434196	5823248	Till	Till Blanket	till plain		4267309
W129318	Annex	NAD83Z16	434410	5823109	Till	till veneer	till plain		4267309
W129319	Annex	NAD83Z16	434631	5822949	Till	till veneer	till plain		4267309
W129320	Annex	NAD83Z16	434973	5824449	Till	Till Blanket	till plain		4269313
W129321	Annex	NAD83Z16	435080	5824373	Till	Till Blanket	till plain		4269313
W129322	Annex	NAD83Z16	435331	5824153	Till	till veneer	till plain		4267309
W129323	Annex	NAD83Z16	435537	5823992	Till	Till Blanket	till plain		4267309
W129324	Annex	NAD83Z16	435706	5823846	Till	till veneer	till plain		4269311
W129325	Annex	NAD83Z16	434134	5824251	Till	till veneer	till plain		4267309
W129326	Annex	NAD83Z16	434047	5824377	Till	till veneer	till plain		4269313
W129327	Annex	NAD83Z16	433862	5824517	Till	till veneer	till plain		4269314
W129328	Annex	NAD83Z16	433631	5824631	Till	till veneer	till plain		4269314
W129329	Annex	NAD83Z16	433454	5824807	Till	till veneer	till plain		4269314
W129330	Annex	NAD83Z16	433254	5824973	Till	till veneer	till plain		4269314
W129331	Annex	NAD83Z16	436305	5823451	Till	till veneer	till plain		4269311
W129332	Annex	NAD83Z16	436454	5823387	Till	till veneer	till plain		4269311
W129333	Annex	NAD83Z16	436918	5823784	Till	till veneer	till plain		4269311
W129334	Annex	NAD83Z16	436770	5823894	Till	till veneer	till plain		4269311
W129335	Annex	NAD83Z16	437160	5824215	Till	till veneer	till plain		4269311
W129336	Annex	NAD83Z16	436707	5824616	Till	till veneer	till plain		4269312
W129337	Annex	NAD83Z16	436026	5823623	Till	till veneer	till plain		4269311
W129338	Annex	NAD83Z16	436515	5824044	Till	till veneer	till plain		4269311
W129339	Annex	NAD83Z16	436933	5824463	Till	till veneer	till plain		4269312

W129340	Annex	NAD83Z16	435837	5824375	Till	till veneer	till plain		4269312
W129341	Annex	NAD83Z16	435621	5824516	Till	till veneer	till plain		4269312
W129342	Annex	NAD83Z16	435469	5824529	Till	till veneer	till plain		4269313
W129343	Annex	NAD83Z16	435278	5824777	Till	till veneer	till plain		4269313
W129345	Annex	NAD83Z16	436158	5825050	Till	till veneer	till plain		4269312
W129346	Annex	NAD83Z16	434015	5823775	Till	till veneer	till plain		4267308
W129347	Annex	NAD83Z16	434917	5823829	Till	till veneer	till plain		4267309
W129348	Annex	NAD83Z16	434662	5823946	Till	till veneer	till plain		4267309
W129349	Annex	NAD83Z16	434662	5823946	Till	till veneer	till plain	dup-W129348	4267309
W129350	Annex	NAD83Z16	435176	5825072	Till	till veneer	till plain		4269313
W129351	Annex	NAD83Z16	435937	5825197	Till	till veneer	till plain		4269312
W129352	Annex	NAD83Z16	435750	5825373	Till	till veneer	till plain		4269312
W129353	Annex	NAD83Z16	435454	5825528	Till	till veneer	till plain		4269313
W129354	Annex	NAD83Z16	436322	5825590	Till	till veneer	till plain		4269312
W129355	Annex	NAD83Z16	434690	5824602	Till	till veneer	till plain		4269313
W129356	Annex	NAD83Z16	435856	5825989	Till	till veneer	till plain		4278636
W129357	Annex	NAD83Z16	435506	5826161	Till	till veneer	till plain		4278639
W129358	Annex	NAD83Z16	435264	5826370	Till	till veneer	till plain		4278639
W129359	Annex	NAD83Z16	435178	5825693	Till	till veneer	till plain		4269313
W129360	Annex	NAD83Z16	434897	5825692	Till	till veneer	till plain		4269313
W129361	Annex	NAD83Z16	434665	5826798	Till	till veneer	till plain		4278639
W129362	Annex	NAD83Z16	434103	5826576	Till	till veneer	till plain		4278639
W129363	Annex	NAD83Z16	434247	5826431	Till	till veneer	till plain		4278639
W129364	Annex	NAD83Z16	433860	5826095	Till	till veneer	till plain		4278640
W129365	Annex	NAD83Z16	434338	5825678	Till	till veneer	till plain		4269313
W129366	Annex	NAD83Z16	434202	5824918	Till	Till Blanket	till plain		4269313
W129367	Annex	NAD83Z16	436458	5821951	Till	Till Blanket	till plain		4269310
W129368	Annex	NAD83Z16	436229	5822092	Till	till veneer	till plain		4269310
W129369	Annex	NAD83Z16	436104	5822178	Till	till veneer	till plain		4269310
W129370	Annex	NAD83Z16	435947	5822316	Till	till veneer	till plain		4269310
W129371	Annex	NAD83Z16	435947	5822316	Till	till veneer	till plain	dup-W129370	4269310
W129372	Annex	NAD83Z16	437070	5822114	Till	Till Blanket	till plain		4269310
W129373	Annex	NAD83Z16	437187	5821988	Till	Till Blanket	till plain		4269310
W129374	Annex	NAD83Z16	437157	5821802	Till	Till Blanket	till plain		4269310
W129401	Annex	NAD83Z16	427968	5824598	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129402	Annex	NAD83Z16	428245	5824509	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129403	Annex	NAD83Z16	429451	5824406	Glaciofluvial	glaciofluvial	outwash plain?		4269316
W129404	Annex	NAD83Z16	429633	5824157	Glaciofluvial	glaciofluvial	outwash plain?		4267306
W129405	Annex	NAD83Z16	429709	5824065	Glaciofluvial	glaciofluvial	outwash plain?		4267306
W129406	Annex	NAD83Z16	429935	5823864	Glaciofluvial	glaciofluvial	outwash plain?		4267306
W129407	Annex	NAD83Z16	429117	5823778	Glaciofluvial	glaciofluvial	esker		4267305
W129408	Annex	NAD83Z16	429217	5825251	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129409	Annex	NAD83Z16	429372	5825199	Glaciofluvial	glaciofluvial	outwash plain?		4269316
W129410	Annex	NAD83Z16	428528	5824927	Glaciofluvial	glaciofluvial	esker		4269317
W129411	Annex	NAD83Z16	428701	5824842	Glaciofluvial	glaciofluvial	esker		4269317

W129412	Annex	NAD83Z16	428903	5824644	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129413	Annex	NAD83Z16	429066	5824609	Glaciofluvial	glaciofluvial	outwash plain?		4269317
W129414	Annex	NAD83Z16	429198	5824481	Glaciofluvial	glaciofluvial	esker		4269317
W129415	Annex	NAD83Z16	429776	5824815	Glaciofluvial	glaciofluvial	esker		4269316
W129416	Annex	NAD83Z16	429592	5824939	Glaciofluvial	glaciofluvial	esker		4269316
W129417	Annex	NAD83Z16	429403	5825082	Glaciofluvial	glaciofluvial	esker		4269316
W129418	Annex	NAD83Z16	429226	5825131	Glaciofluvial	glaciofluvial	outwash plain?		4269316
W129419	Annex	NAD83Z16	426099	5823355	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129420	Annex	NAD83Z16	427190	5823132	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129421	Annex	NAD83Z16	427299	5823083	Glaciofluvial	glaciofluvial	esker		4269319
W129422	Annex	NAD83Z16	427384	5823012	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129423	Annex	NAD83Z16	427575	5822846	Glaciofluvial	glaciofluvial	outwash plain?		4269319
W129424	Annex	NAD83Z16	427853	5822666	Glaciofluvial	glaciofluvial	outwash plain?		4267310
W129425	Annex	NAD83Z16	428800	5823333	Till	washed till	washed till		4267305
W129426	Annex	NAD83Z16	429150	5823021	Till	washed till	washed till		4267305
W129427	Annex	NAD83Z16	429436	5822829	Till	Till Blanket	till plain		4267306
W129428	Annex	NAD83Z16	428661	5822647	Till	washed till	washed till		4267310
W129429	Annex	NAD83Z16	429430	5824393	Till	Till Blanket	till plain		4269316
W129430	Annex	NAD83Z16	429067	5825247	Glaciofluvial	glaciofluvial	esker		4269317
W129431	Annex	NAD83Z16	428891	5825540	Till	Till Blanket	till plain		4269317
W129432	Annex	NAD83Z16	428645	5825538	Till	Till Blanket	till plain		4269317
W129433	Annex	NAD83Z16	428483	5825722	Till	Till Blanket	till plain		4269317


TPK Property Claim Distribution Map
TPK_claims_Dec20_2017
Ontario
N
Kilometers
1:75,000
Nad83 Zone16N
0
2.5
5
10
Fishbasket River
Bosworth Lake
Gibbons Lake
Onisabaweigan Lake
Coburn Lake
Fishbasket Lake
Vaupel Lake
Mameigwess Lake
Rowlandson Lake
Arneil Lake
Keely Lake
Freure Lake
Michikenopik Lake
Michikenopik Creek
Spero Lake
Wapitotem Lake
Wagabkedei Lake
Travers Lake
053A09
053A08
043D12
043D05
3004964
3004956
3004955
4278641
4278638
4278637
4278632
4278631
4278624
4278623
3004940
3004962
3004957
4278642
4278640
4278639
4278636
4278633
4278630
4278625
4278622
4269318
4269317
4269316
4269315
4269314
4269313
4269312
4278634
4278629
4278626
4278621
4278647
4278646
4269319
4267305
4267306
4267307
4267308
4267309
4269311
4278635
4278628
4278627
4278648
4278645
4278644
4278643
4269320
4267310
4267311
4267312
4267313
4267314
4269310
3004924
4216086
4216085
4216076
4269321
4267315
4227265
4227250
4243901
4243904
4243905
4243909
4243910
4243542
4216092
4216087
4216084
4216077
04227284
4227266
4227249
4260984
4227264
4243902
4227251
4243903
4243906
4243908
4243911
4227237
4216091
4216088
4216083
4216078
04227283
4227267
4227263
4227248
4216090
3004913
4227232
4243907
4243912
4243544
4243539
4216096
4216097
4216098
4216099
4216100
4216089
4227231
4227252
3004912
4227236
4216082
4216079
04227282
4227268
4227262
04216090
4227238
4227235
4227234
4227233
4243914
4243915
4221776
4221773
4221772
4221769
4221768
4216101
4227253
4227247
4243913
4216081
4216080
04227281
4227269
3018288
4221766
3004909
4227270
4227261
4227254
4227246
04227279
4221683
4221681
4221780
4221777
4221775
4221774
4221771
4221770
4221767
3018287
04227280
4227271
4217107
4217108
4221684
4221682
4221779
4221778
1203097
1203098
3004908
4227278
4227272
4227260
4227255
04227245
4227240
3019235
3019237
1203092
1203093
1203094
3019253
4217101
4217102
4217105
4217106
4227239
3004907
3004945
3019236
3019243
3019244
4217103
4217104
4227277
4227273
3019238
3019239
3019240
3019251
3019241
3019242
3004918
04221785
4287881
4287880
4227275
4227274

THUNDER BAY Mining Division - 400872 - NORTHERN SUPERIOR RESOURCES INC.									
Township / Area	**Claim Number**	**Recording Date**	**Claim Due Date**	**Status**	**Percent Option**	**Work Required**	**Total Applied**	**Total Reserve**	**Claim Bank**
WAPITOTEM LAKE AREA	1203092	2001-Oct-29	2019-Oct-29	A	100%	$6,400	$96,000	$0	$0
WAPITOTEM LAKE AREA	1203093	2001-Oct-29	2019-Oct-29	A	100%	$6,400	$96,000	$357,777	$0
WAPITOTEM LAKE AREA	1203094	2001-Oct-29	2019-Oct-29	A	100%	$6,400	$96,000	$40,779	$0
WAPITOTEM LAKE AREA	1203097	2001-Oct-29	2019-Oct-29	A	100%	$1,600	$24,000	$17,896	$0
WAPITOTEM LAKE AREA	1203098	2001-Oct-29	2019-Oct-29	A	100%	$1,600	$24,000	$124,511	$0
MICHIKENOPIK LAKE AREA	3004907	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
MICHIKENOPIK LAKE AREA	3004908	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
MICHIKENOPIK LAKE AREA	3004909	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
BOSWORTH LAKE AREA	3004912	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
BOSWORTH LAKE AREA	3004913	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
WAPITOTEM LAKE AREA	3004918	2017-Sep-25	2019-Sep-25	A	100%	$6,400	$0	$0	$0
BOSWORTH LAKE AREA	3004924	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
WAPITOTEM LAKE AREA	3004945	2003-Mar-10	2019-Oct-31	A	100%	$3,600	$46,800	$0	$0
MICHIKENOPIK LAKE AREA	3018287	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
MICHIKENOPIK LAKE AREA	3018288	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019235	2006-Dec-01	2018-Dec-01	A	100%	$2,400	$24,000	$0	$0
WAPITOTEM LAKE AREA	3019236	2006-Dec-01	2018-Dec-01	A	100%	$1,200	$12,000	$0	$0
WAPITOTEM LAKE AREA	3019237	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019238	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019239	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019240	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019241	2006-Dec-01	2018-Dec-01	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019242	2006-Dec-01	2018-Dec-01	A	100%	$2,000	$20,000	$0	$0
WAPITOTEM LAKE AREA	3019243	2006-Dec-01	2018-Dec-01	A	100%	$1,200	$12,000	$0	$0
WAPITOTEM LAKE AREA	3019244	2006-Dec-01	2018-Dec-01	A	100%	$3,200	$32,000	$206	$0
WAPITOTEM LAKE AREA	3019251	2006-Dec-29	2018-Dec-29	A	100%	$6,400	$64,000	$0	$0
WAPITOTEM LAKE AREA	3019253	2006-Dec-29	2018-Dec-29	A	100%	$6,400	$64,000	$1,975,035	$0
BOSWORTH LAKE AREA	4216076	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4216077	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4216078	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4216079	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4216080	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4216081	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4216082	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4216083	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4216084	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4216085	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4216086	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4216087	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4216088	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4216089	2008-Feb-04	2019-Feb-04	A	100%	$3,200	$25,600	$0	$0
BOSWORTH LAKE AREA	4216090	2008-Feb-04	2019-Feb-04	A	100%	$3,200	$25,600	$0	$0
MICHIKENOPIK LAKE AREA	04216090	2008-Feb-04	2019-Feb-04	A	100%	$1,200	$9,600	$0	$0
BOSWORTH LAKE AREA	4216091	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4216092	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
MAMEIGWESS LAKE AREA	4216096	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4216097	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4216098	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4216099	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4216100	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4216101	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4217101	2007-Mar-14	2019-Mar-14	A	100%	$6,400	$57,600	$1,784,460	$0
WAPITOTEM LAKE AREA	4217102	2007-Mar-14	2019-Mar-14	A	100%	$6,400	$57,600	$157,863	$0

WAPITOTEM LAKE AREA	4217103	2007-Mar-14	2019-Mar-14	A	100%	$3,200	$28,800	$0	$0
WAPITOTEM LAKE AREA	4217104	2007-Mar-14	2019-Mar-14	A	100%	$3,200	$28,800	$0	$0
WAPITOTEM LAKE AREA	4217105	2007-Mar-14	2019-Mar-14	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4217106	2007-Mar-14	2019-Mar-14	A	100%	$6,400	$57,600	$361,754	$0
WAPITOTEM LAKE AREA	4217107	2007-Mar-14	2019-Mar-14	A	100%	$3,200	$28,800	$190,539	$0
SPRINGER LAKE AREA	4217108	2007-Mar-14	2019-Mar-14	A	100%	$4,800	$43,200	$0	$0
WAPITOTEM LAKE AREA	4221681	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221682	2007-Nov-07	2018-Nov-07	A	100%	$1,600	$14,400	$0	$0
WAPITOTEM LAKE AREA	4221683	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221684	2007-Nov-07	2018-Nov-07	A	100%	$1,600	$14,400	$0	$0
WAPITOTEM LAKE AREA	4221766	2007-Nov-07	2018-Nov-07	A	100%	$3,200	$28,800	$0	$0
WAPITOTEM LAKE AREA	4221767	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221768	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221769	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221770	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$137,525	$0
WAPITOTEM LAKE AREA	4221771	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$1,840,816	$0
WAPITOTEM LAKE AREA	4221772	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221773	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221774	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$690,932	$0
WAPITOTEM LAKE AREA	4221775	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$10,883	$0
WAPITOTEM LAKE AREA	4221776	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221777	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	4221778	2007-Nov-07	2018-Nov-07	A	100%	$1,600	$14,400	$0	$0
WAPITOTEM LAKE AREA	4221779	2007-Nov-07	2018-Nov-07	A	100%	$1,600	$14,400	$0	$0
WAPITOTEM LAKE AREA	4221780	2007-Nov-07	2018-Nov-07	A	100%	$6,400	$57,600	$0	$0
WAPITOTEM LAKE AREA	04221785	2007-Nov-07	2018-Nov-07	A	100%	$4,800	$43,200	$0	$0
MAMEIGWESS LAKE AREA	4227231	2008-Feb-04	2019-Feb-04	A	100%	$3,200	$25,600	$0	$0
MAMEIGWESS LAKE AREA	4227232	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4227233	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4227234	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227235	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227236	2008-Feb-04	2019-Feb-04	A	100%	$2,800	$22,400	$0	$0
BOSWORTH LAKE AREA	4227237	2008-Feb-04	2019-Feb-04	A	100%	$3,600	$28,800	$0	$0
MICHIKENOPIK LAKE AREA	4227238	2008-Feb-04	2019-Feb-04	A	100%	$4,000	$32,000	$0	$0
MICHIKENOPIK LAKE AREA	4227239	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4227240	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	04227245	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227246	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227247	2008-Feb-04	2019-Feb-04	A	100%	$5,600	$44,800	$0	$0
BOSWORTH LAKE AREA	4227248	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4227249	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4227250	2008-Feb-04	2019-Feb-04	A	100%	$5,600	$44,800	$0	$0
BOSWORTH LAKE AREA	4227251	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227252	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
MICHIKENOPIK LAKE AREA	4227253	2008-Feb-04	2019-Feb-04	A	100%	$6,000	$48,000	$0	$0
MICHIKENOPIK LAKE AREA	4227254	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227255	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227260	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227261	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
MICHIKENOPIK LAKE AREA	4227262	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4227263	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4227264	2008-Feb-04	2019-Feb-04	A	100%	$2,400	$19,200	$0	$0
BOSWORTH LAKE AREA	4227265	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4227266	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
BOSWORTH LAKE AREA	4227267	2008-Feb-04	2019-Feb-04	A	100%	$6,000	$48,000	$0	$0
MICHIKENOPIK LAKE AREA	4227268	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0

MICHIKENOPIK LAKE AREA	4227269	2008-Feb-04	2019-Feb-04	A	100%	$4,000	$32,000	$0	$0
MICHIKENOPIK LAKE AREA	4227270	2008-Feb-04	2019-Feb-04	A	100%	$5,600	$44,800	$0	$0
MICHIKENOPIK LAKE AREA	4227271	2008-Feb-04	2019-Feb-04	A	100%	$3,200	$25,600	$0	$0
MICHIKENOPIK LAKE AREA	4227272	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227273	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227274	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	4227275	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
MICHIKENOPIK LAKE AREA	4227277	2008-Feb-04	2019-Feb-04	A	100%	$4,000	$32,000	$0	$0
MICHIKENOPIK LAKE AREA	4227278	2008-Feb-04	2019-Feb-04	A	100%	$4,400	$35,200	$0	$0
WAPITOTEM LAKE AREA	04227279	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MICHIKENOPIK LAKE AREA	04227280	2008-Feb-04	2019-Feb-04	A	100%	$4,000	$32,000	$0	$0
MICHIKENOPIK LAKE AREA	04227281	2008-Feb-04	2019-Feb-04	A	100%	$4,800	$38,400	$0	$0
MICHIKENOPIK LAKE AREA	04227282	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	04227283	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	04227284	2008-Feb-04	2019-Feb-04	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243539	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243542	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243544	2008-Jul-23	2019-Jul-23	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4243901	2008-Jul-21	2019-Jul-21	A	100%	$6,000	$48,000	$0	$0
BOSWORTH LAKE AREA	4243902	2008-Jul-21	2019-Jul-21	A	100%	$1,600	$12,800	$0	$0
MAMEIGWESS LAKE AREA	4243903	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243904	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243905	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243906	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243907	2008-Jul-21	2019-Jul-21	A	100%	$4,800	$38,400	$0	$0
MAMEIGWESS LAKE AREA	4243908	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243909	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243910	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243911	2008-Jul-21	2019-Jul-21	A	100%	$6,400	$51,200	$0	$0
MAMEIGWESS LAKE AREA	4243912	2008-Jul-23	2019-Jul-23	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4243913	2008-Jul-23	2019-Jul-23	A	100%	$1,600	$12,800	$0	$0
WAPITOTEM LAKE AREA	4243914	2008-Jul-23	2019-Jul-23	A	100%	$6,400	$51,200	$0	$0
WAPITOTEM LAKE AREA	4243915	2008-Jul-23	2019-Jul-23	A	100%	$6,400	$51,200	$0	$0
BOSWORTH LAKE AREA	4260984	2010-Dec-30	2018-Dec-30	A	100%	$3,600	$21,600	$0	$0
BOSWORTH LAKE AREA	4267305	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4267306	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4267307	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$1,352,444	$0
MAMEIGWESS LAKE AREA	4267308	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4267309	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4267310	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4267311	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$38,400	$0	$0
MAMEIGWESS LAKE AREA	4267312	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4267313	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4267314	2011-Oct-24	2019-Oct-24	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4267315	2011-Oct-24	2019-Oct-24	A	100%	$3,200	$16,000	$0	$0
MAMEIGWESS LAKE AREA	4269310	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4269311	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4269312	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4269313	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4269314	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
MAMEIGWESS LAKE AREA	4269315	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4269316	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4269317	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4269318	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4269319	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0
BOSWORTH LAKE AREA	4269320	2011-Nov-14	2018-Nov-14	A	100%	$6,400	$32,000	$0	$0

BOSWORTH LAKE AREA	4269321	2011-Nov-14	2018-Nov-14	A	100%	$1,600	$8,000	$0	$0
MAMEIGWESS LAKE AREA	4278621	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278622	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278623	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278624	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278625	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278626	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278627	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278628	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278629	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278630	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278631	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278632	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278633	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278634	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278635	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278636	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278637	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278638	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278639	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278640	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278641	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
MAMEIGWESS LAKE AREA	4278642	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOSWORTH LAKE AREA	4278643	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOSWORTH LAKE AREA	4278644	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOSWORTH LAKE AREA	4278645	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOSWORTH LAKE AREA	4278646	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOWMAN LAKE AREA	4278647	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0
BOWMAN LAKE AREA	4278648	2015-Apr-07	2019-Apr-07	A	100%	$6,400	$0	$0	$0

VANPETRO
VANCOUVER PETROGRAPHICS LTD

Report for: Northern Superior Resources

Sent to: Mr. Jon O'Callaghan

Report 170584

September 28, 2017

Petrographic Report on 19 Rock Samples from TPK Gold-Silver-Copper Property, Northern Ontario for Northern Superior Resources

Fabrizio Colombo, Ph.D., P.Geo.
fab.petrologic@gmail.com

Table of Contents

1. Introduction

Mr. Mr. Jon O'Callaghan of Northern Superior Resources submitted 19 rock samples to Vancouver Petrographics for petrographic analysis. From the TPK Gold-Silver-Copper Property, Northern Ontario.

The attached “Petrographic Descriptions” section provides the following for each sample: (i) the petrographic rock classification; (ii) a brief microstructural description; (iii) a table with the modal percentage and average grain size for each mineral; and (iv) a detailed description of the minerals in decreasing order of abundance.

Samples 1–19 (see Table 1) were cut and prepared as ~20 × 40 mm polished thin sections (see the image of the billet on the first page of each description).

The petrographic classification follows the recommendations of Gillespie et al. (2011), Gillespie and Styles (1999), and Robertson (1999).

The microstructural terminology used in this report follows the recommendations and definitions of Vernon (2004), Passchier and Trouw (2005), and Ramdohr (1980). Some of the petrographic and microstructural terms are defined in the glossary.

The magnetic susceptibility (see Table 1) was measured with a hand-held KT Magnetic Susceptibility Meter, and is intended to provide only an approximate estimate of the relative content of magnetic minerals within each sample.

2. Summary of Results

Sample 1: TPK-12-038 26.55–26.75—Microquartz-syenite—Medium-grained anhedral to subhedral crystals of plagioclase are immersed within a fine-grained and in some cases granophyric aggregate of quartz and K-feldspar, subordinate aggregates of quartz, and irregular clusters of biotite. The clusters of biotite define a subtle to weak foliation within this leucocratic aggregate. In the field, an accurate quantification of plagioclase and K-feldspar—essential for the distinction between quartz-syenite and quartz-monzonite—is not possible. The fine intergrowths between the K-feldspar and quartz make this distinction almost impossible even with the use of the staining. The occurrence of subhedral feldspars and pseudomorphs of biotite-chlorite after the magmatic biotite differentiate mesoscopically this sample from Sample 16.

Sample 2: TPK-12-038 71.8–72—Garnet-white mica-quartz-dolomite hornfels—Irregularly shaped patches of white mica-quartz-garnet-dolomite are dispersed within a very fine-grained aggregate of K-feldspar, quartz, and chlorite.

Sample 3: TPK-12-038 51.45–51.66—Orthomylonite—Xenoblastic porphyroclasts of plagioclase (Photomicrograph 3a) are wrapped by (Photomicrographs 3c and 3d) a sub-planar schistosity defined by very fine- to fine-grained layers of K-feldspar; quartz and biotite; and quartz-rich microlithons.

Sample 4: TPK-12-038 125.32–125.52—Biotite schist—Very fine- to fine-grained layers of K-feldspar-quartz and lenticular domains of randomly oriented biotite define an undulose schistosity, in which subordinate calcite, pyrite and pyrrhotite, and epidote are dispersed.

Sample 5: TPK-12-038 171.36–171.56—Plagioclase-phyric andesite and **Biotite-quartz schist**—This polished thin section consists of a plagioclase-phyric andesite in contact with a biotite-quartz schist. The lava shows a magmatic-flow foliation parallel to the contact and defined by the iso-orientation of very fine-grained lamellae of biotite. The contact between the lava and the metamorphic rock is irregular.

Sample 6: TPK-12-038 165.92–166.15—Biotite-plagioclase schist—A weak layering and a weak foliation are defined by clusters of biotite alternated with inequigranular aggregates of plagioclase and quartz. Medium-grained xenoblastic crystals of calcite, magnetite, and epidote are dispersed within the foliated microstructure. Because of the metamorphic recrystallization and the destruction of the microstructural relicts, a mafic protolith can be only tentatively put forward.

Sample 7: TPK-10-004 93.43–93.57—Monzogranite—Medium- to coarse-grained subhedral crystals of plagioclase are immersed within anhedral quartz, interstitial K-feldspar, and pseudomorphs of chlorite after probable biotite. The occurrence of subhedral feldspars and pseudomorphs of biotite-chlorite after the magmatic biotite differentiate this sample from Sample 16.

Sample 8: TPK-10-004 187.04–187.27—Monzogranite(?) and **Pseudotachylite**—Subhedral to euhedral crystals of plagioclase and interstitial crystals of quartz and K-feldspar define a granular microstructure, which is fractured and crosscut by an irregular anastomosing pseudotachylite.

Sample 9: TPK-11-013 190.8–190.90—Quartz-white mica ortho(?)schist—Alternating quartz microlithons and white mica cleavage domains define an undulose schistosity. Medium-grained crystals of pyrite and xenoblastic crystals of K-feldspar form irregular clusters spatially associated with the quartz-rich domains wrapped by the schistosity. Therefore, I interpret the pyrite (and the gold) as having crystallized during the ductile deformation event. I interpret this sample as derived from the deformation of a magmatic rock because of the occurrence of porphyroclasts of K-feldspar.

Sample 10: TPK-10-011 72.15–72.33—Quartz-white mica orthoschist—Irregular crystal aggregates of quartz define a prevailing granular microstructure, in which a weak foliation is defined by the preferred orientation of very fine-grained flakes of white mica intergrown with fine-grained quartz, xenoblastic K-feldspar, rare xenoblastic crystals of garnet, and magnetite. In this sample, the quartz is more abundant than in the non-sheared and less sheared monzogranite.

Sample 11: TPK-12-056 115.96–116.05—**Quartz-white mica-K-feldspar-plagioclase granofels**—An irregular layer is defined by irregularly shaped to sub-tabular domains of quartz (up to 5 mm thick); thin layers of tourmaline, pyrrhotite, and pyrite; and fine-grained xenoblastic aggregates of quartz, white mica, K-feldspar, and plagioclase. Despite the anisotropy defined by sub-tabular infill domains of quartz and thin layers of tourmaline, sulphides, and biotite, the microstructure within the prevailing quartzofeldspathic domains is granular as a consequence of an intense recrystallization after the deformation. This microstructural feature hampers the understanding of the timing of the sulphide crystallization. The pyrrhotite is dispersed within the quartzofeldspathic domains and along the boundaries between the quartzofeldspathic and the quartz-rich domains. The pyrrhotite is weakly altered, and it is overprinted by subidioblastic crystals of pyrite. I tentatively interpret the deposition of the pyrrhotite as syntectonic to late tectonic.

Sample 12: TPK-12-056 117.26–117.36—**Metagranite**—This polished thin section consists of three different compositional domains. In the upper part, albite forms a fine-grained polycrystalline aggregate, and together with anhedral quartz and K-feldspar defines a medium-grained granular microstructure resembling a recrystallized monzonitic rock. In the middle part, a sub-tabular domain is dominated by a fine-grained aggregate of albite and subordinate white mica. In the lower part, medium-grained anhedral quartz prevails over subordinate K-feldspar and plagioclase. The three domains probably represent the incipient metamorphic differentiation—a plagioclase-rich domain in the middle part, and a quartz-rich domain in the lower part—produced by the metamorphic recrystallization of the monzonitic rock, of which the upper part represents a low strained relict. The sulphides probably crystallized during the latest stages of the deformation and/or reactivated the discontinuity generated during the deformation (i.e., late tectonic to post-tectonic). Similarly with Sample 11, the pyrite probably overprinted the subtly altered crystals of pyrrhotite and formed subidioblastic crystals.

Sample 13: TPK-12-056 117.26–117.36—**Orthoschist**—Lenticular and preferentially iso-oriented domains of fine-grained quartz are immersed within a fine-grained polygonal aggregate of plagioclase, quartz, biotite, and heterogeneously dispersed clusters of K-feldspar, all of which define an irregular schistosity. Rare pyrrhotite and pyrite are spatially associated with the quartz-rich lenticular domains, and because of their equant xenoblastic shape, I tentatively interpret their crystallization as post-tectonic.

Sample 14: TPK-12-056 29.3–29.4—**Monzogranite**—Subhedral to euhedral crystals of plagioclase, anhedral to interstitial quartz and K-feldspar, and subordinate crystals of biotite define a granular isotropic microstructure. The occurrence of relatively abundant crystals of feldspar and the interstitial crystals of biotite differentiate this sample from Sample 16.

Sample 15: TPK-12-056 185.37–185.49—**Monzogranite**—Subhedral to euhedral crystals of plagioclase are randomly oriented within medium-grained subhedral to anhedral K-feldspar and anhedral quartz, and they define a granular isotropic and slightly porphyritic microstructure.

Sample 16: H755585—**Silicified white mica-schist**—Inequigranular xenoblastic crystals of quartz overprinted a very fine-grained matrix of white mica, quartz, and K-feldspar. The very fine-grained flakes of white mica are preferentially iso-oriented within the interstitial matrix. The crystallization of abundant quartz and the absence of biotite clusters render this rock type very different from Samples 1 and 7.

Sample 17: H755545—**Quartz-white mica schist**—Irregular to lenticular aggregates of quartz and xenoblastic crystals and crystal aggregates of K-feldspar are immersed within a fine-grained matrix of quartz, white mica, plagioclase(?), and biotite. The white mica within the granoblastic aggregate shows a weak preferred dimensional orientation and defines a weak schistosity. No gold was detected. Fine-grained xenoblasts of pyrite are spatially associated with the quartz-rich domain and show a subtle alteration by iron oxides. The gold is probably dispersed within the pyrite lattice. Because some of the pyrite crystals are surrounded by probable strain shadows filled in by quartz, I tentatively interpret its crystallization as syntectonic.

Sample 18: W129984—**Albite-dolomite/ankerite-biotite alteration zone**—A fine-grained xenoblastic aggregate of plagioclase and subordinate dolomite and biotite define an inequigranular xenoblastic microstructure, which is crosscut by an irregular pyrite-K-feldspar-dolomite vein and irregular dolomite veinlets.

Sample 19: W130465—**Albite-quartz-biotite schist**—An irregular layering is defined by medium-grained quartz-chalcopyrite-pyrite±epidote±chlorite±biotite domains, and fine-grained quartz-chlorite-pyrite-biotite-epidote-albite domains. A weak foliation is defined by the biotite within the biotite-epidote-chlorite-pyrite-albite domains.

Table 1: List of samples with their magnetic susceptibility and petrographic classification. [1]

Sample No.	BHID	From–To	Lithology (Classified in the Field)	Rock Code	Magnetic Susceptibility (SI $\cdot 10^{-3}$)	Rock Type (After Petrographic Analysis)	Hydrothermal Alteration or Contact Metamorphism (*)
1	TPK-12-038	26.55–26.75	Quartz monzonite	QMNZ	0.187	Leucocratic microsyenogranite	biotite: weak; white mica: subtle to weak; pyrite-iron oxides: subtle
2	TPK-12-038	71.8–72.00	Metasediment	SED	0.074	Garnet-white mica-quartz-dolomite hornfels	*K-feldspar: moderate to strong(?); white mica-garnet-quartz-chlorite: weak
3	TPK-12-038	51.45–51.66	Sheared and potassic altered quartz monzonite	(M8)QMNZ	0.248	Orthomylonite	K-feldspar(?): moderate; white mica: weak; pyrite-magnetite: subtle
4	TPK-12-038	125.32–125.52	Schist	M8	0.186	Biotite schist	K-feldspar-calcite: weak; magnetite(?)-pyrite-chalcopyrite-epidote: subtle
5	TPK-12-038	171.36–171.56	Intermediate volcanic with feldspar phenocrysts	V2	2.72	Plagioclase-phyric andesite; Biotite-quartz schist	K-feldspar: weak within the andesite; clay and/or epidote: weak within the plagioclase; white mica: subtle
6	TPK-12-038	165.92–166.15	Mafic volcanic	V3	1.98	Biotite-plagioclase schist	
7	TPK-10-004	93.43–93.57	Potassic altered quartz monzonite	QMNZ	1.55	Monzogranite	chlorite: strong after biotite(?); clay and/or white mica: subtle to weak after plagioclase; calcite-pyrite: subtle
8	TPK-10-004	187.04–187.27	Pseudotachylite (in quartz monzonite)	QMNZ	0.99	Monzogranite(?); Pseudotachylite	chlorite: strong after biotite; epidote-magnetite: subtle after biotite; clay and/or white mica: subtle to weak after plagioclase
9	TPK-11-013	190.8–190.90	Au-bearing sheared quartz monzonite	(M8)QMNZ	0.006	Quartz-white mica ortho(?)schist	
10	TPK-10-011	72.15–72.33	Sheared quartz monzonite	(M8)QMNZ	16	Quartz-white mica orthoschist	
11	TPK-12-056	115.96–116.05	Sheared-protomylonitic quartz monzonite	(M8)QMNZ	0.537	Quartz-white mica-K-feldspar-plagioclase granofels	

1 Rock classification after Gillespie et al. (2011), Gillespie and Styles (1999), and Robertson (1999).

Sample No.	BHID	From–To	Lithology (Classified in the Field)	Rock Code	Magnetic Susceptibility (SI $\cdot 10^{-3}$)	Rock Type (After Petrographic Analysis)	Hydrothermal Alteration or Contact Metamorphism (*)
12	TPK-12-056	117.26–117.36	Sheared quartz monzonite	(M8)QMNZ	0.782	Metagranite	
13	TPK-12-056	149.90–150.05	Strongly sheared and silicified, Au-bearing QMNZ	(M8)QMNZ	0.143	Orthoschist	
14	TPK-12-056	29.3–29.4	Quartz monzonite with weak potassic alteration	QMNZ	3.23	Monzogranite	white mica: subtle within the plagioclase; titanite: subtle within the biotite
15	TPK-12-056	185.37–185.49	Leucogranite with weak potassic alteration	I1B	4.88	Monzogranite	white mica and/or clay: subtle to weak within the plagioclase; titanite-epidote: subtle to weak after biotite
16	H755585	Grab	Strongly sheared and silicified, Au-bearing schist	M8	0.006	Silicified white mica-schist	quartz: strong; K-feldspar(?): weak; pyrite: subtle
17	H755545	Grab	Strongly sheared and silicified, Au-bearing schist	M8	0.01	Quartz-white mica schist	iron oxides: subtle after pyrite
18	W129984	Grab	Fine grained, quartz-feldspar porphyry	QFP	1.37	Albite-dolomite/ankerite-biotite alteration zone; Pyrite-dolomite/ankerite-K-feldspar-biotite vein; Dolomite/ankerite-calcite vein	albite: strong; dolomite/calcite-biotite: weak
19	W130465	Grab	Silicified metasediment with replacement sulphides	SED	0.116	Albite-quartz-biotite schist	

3. Bibliography

Deer WA, Howie RA, Zussmann J (1992) An introduction to the rock-forming minerals. Longman, London

Delvigne JE (1998) Atlas of micromorphology of mineral alteration and weathering. The Canadian mineralogist, special publication 3. Mineralogical Association of Canada, Ottawa

Gillespie MR, Barnes RP, Milodowski A (2011) British Geological Survey scheme for classifying discontinuities and fillings. In: British Geological Survey research report RR/10/05. http://www.bgs.ac.uk/downloads/start.cfm?id=1982. Accessed September 2017

Gillespie MR, Styles MT (1999) Classification of igneous rocks. British Geological Survey research report RR 99/06 (2nd edn), vol 1. http://www.bgs.ac.uk/downloads/start.cfm?id=7. Accessed September 2017

Hallsworth CR, Knox RWO'B (1999) Classification of sediments and sedimentary rocks. British Geological Survey research report (2nd edn), vol 3. http://www.bgs.ac.uk/downloads/start.cfm?id=9. Accessed January 2017

Passchier CW, Trouw RAJ (2005) Microtectonics (2nd edn). Springer, Heidelberg

Ramdohr P (1980) The ore minerals and their intergrowths (2nd edn), vol 1/2. Pergamon Press, Oxford

Robertson S (1999) Classification of metamorphic rocks. British Geological Survey research report RR 99/02, vol 2. http://www.bgs.ac.uk/downloads/start.cfm?id=8. Accessed September 2017

Tröger WE (1979) Optical determination of rock-forming minerals, part 1: determinative tables. Schweizerbart Science Publishers, Stuttgart

Vernon RH (2004) A practical guide to rock microstructure. Cambridge University Press, Cambridge

This report consists of 61 pages and is signed by

F. Colombo, Ph.D., P.Geo.

E-mail: fab.petrologic@gmail.com

Tel: +1-778-855-3196

Web: www.petrographically.com

4. Petrographic Descriptions

Sample 1: TPK-12-038 26.55–26.75

Microsyenogranite

Medium-grained anhedral to subhedral crystals of plagioclase are immersed within a fine-grained and in some cases granophyric aggregate of quartz and K-feldspar, subordinate aggregates of quartz, and irregular clusters of biotite. The clusters of biotite define a subtle to weak foliation within this leucocratic aggregate.

Alteration: biotite: weak; **white mica**: subtle to weak; **pyrite-iron oxides**: subtle.

Mineral	***Alteration and Weathering Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
quartz		40–42	0.02–0.7	low relief, birefringence up to first-order white
K-feldspar		35–37	0.02–0.4	low relief, low birefringence (up to first-order grey)
plagioclase	clay(?)-white mica	14–16	up to 1.5 long	low relief, first-order grey birefringence, albite twinning
[biotite?]	biotite-white mica-epidote	5–7	up to 0.1	bt: moderate relief, green to brown pleochroism, straight extinction
	white mica	1–2	up to 0.1	moderate relief, birefringence up to third-order blue, straight extinction
	calcite	tr	up to 0.02	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
	pyrite	tr	up to 0.02	high reflectance, creamy white, isotropic
	iron oxides	tr	<0.01	

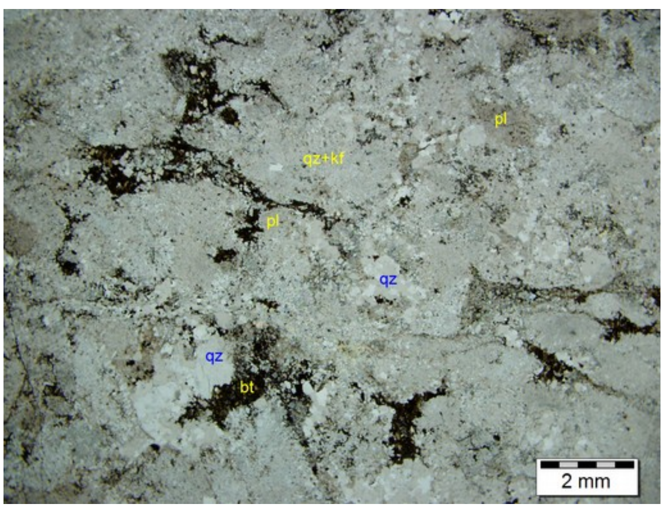
Quartz forms very fine- to fine-grained intergrowths associated with comparable amounts of K-feldspar. In some cases, the intergrowths are granophyric (i.e., one crystal of quartz and one of K-feldspar, each in optical continuity) and indicate that they crystallized contemporaneously from the magma. Fine-grained crystals of quartz form irregularly shaped aggregates, which probably derive from the recrystallization of anhedral crystals up to 1 mm across. Photomicrograph 1c shows a rare relict of subhedral quartz, which was only partially recrystallized.

K-feldspar is very fine to fine grained and is mostly intergrown with the quartz. In rare cases, the crystals reach 0.5 mm and show albite-pericline twinning. The relatively homogeneous distribution of the K-feldspar is shown by the yellow staining in the image above.

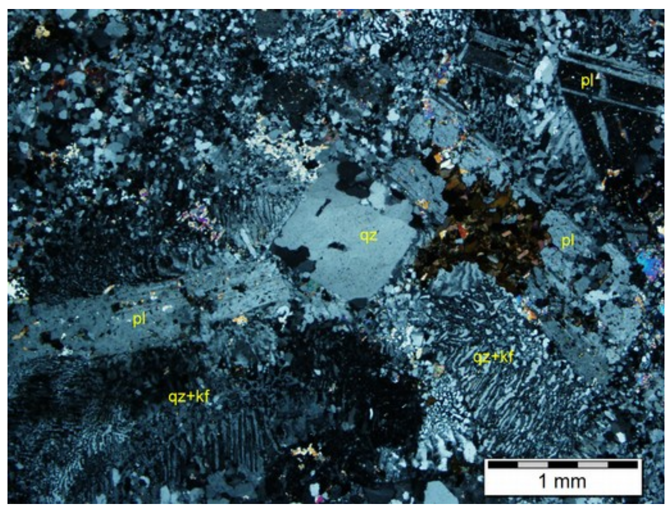
Plagioclase is subordinate to the quartz and the K-feldspar intergrowths, and it forms medium-grained (up to 1 mm long) anhedral to subhedral crystals, which are immersed within the quartz-K-feldspar intergrowths (Photomicrographs 1b and 1c). The plagioclase crystals are subtly altered by a very fine-grained unresolved aggregate (clay?) and rare dispersions of very fine-grained white mica. Most of the crystals of plagioclase show albite twinning, and their refractive indexes are lower than those of the quartz, thus indicating that the plagioclase is albite-oligoclase.

Biotite is fine grained. In association with subordinate lamellae of white mica and rare subhedral epidote, it forms irregular clusters occupying the interstices between the plagioclase and the quartz-K-feldspar intergrowths (Photomicrograph 1a). In some parts of the polished thin section, the biotite clusters define a weak foliation.

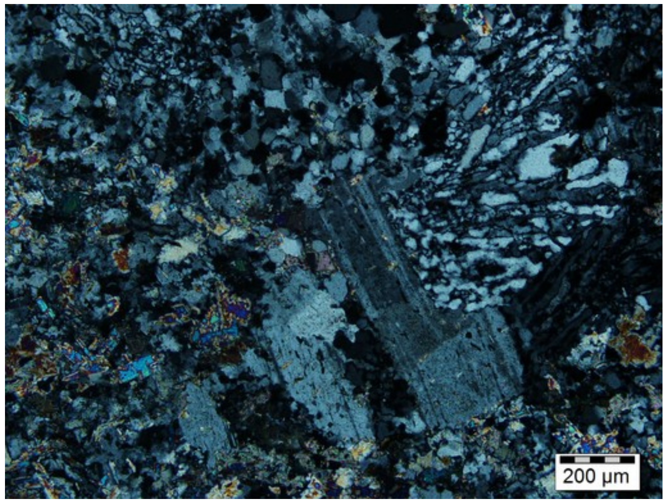
White mica is very fine to fine grained and is heterogeneously dispersed within the plagioclase and the quartz-K-feldspar aggregates.



***Photomicrograph 1a**: Dark clusters of biotite define a weak foliation and are concentrated within the interstices between the plagioclase crystals and the quartz-K-feldspar intergrowths. Plane-polarized transmitted light.*



***Photomicrograph 1b**: Subhedral crystals of plagioclase (pl) and quartz (qz) are immersed within fine-grained intergrowths of quartz and K-feldspar (qz-kf). Crossed Nicols transmitted light.*



***Photomicrograph 1c**: Subhedral crystals of plagioclase (pl) and quartz (qz) are immersed within fine-grained intergrowths of quartz and K-feldspar (qz-kf). Crossed Nicols transmitted light.*

Sample 2: TPK-12-038 71.8–72

Garnet-white mica-quartz-dolomite hornfels

Irregularly shaped patches of white mica-quartz-garnet-dolomite are dispersed within a very fine-grained aggregate of K-feldspar, quartz, and chlorite (Photomicrographs 2a and 2b).

Contact metamorphism: K-feldspar: moderate to strong(?); **white mica-garnet-quartz-chlorite**: weak.

Mineral	***Contact Metamorphism Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
K-feldspar		45–47	up to 0.05	low relief, low birefringence (up to first-order grey)
quartz		40–42	0.02–0.5	low relief, birefringence up to first-order white
	white mica	5–7	0.05–0.8	moderate relief, birefringence up to third-order blue, straight extinction
	chlorite	4–5	up to 0.05	moderate relief, very weak pleochroism with pale-green tints, straight extinction, low birefringence
	quartz	2–4	up to 0.25	low relief, birefringence up to first-order white
	garnet	0.2–0.4	up to 0.25	high relief, isotropic
	magnetite	tr	up to 0.1	low reflectance, dark grey, isotropic
	pyrite	tr	up to 0.1	high reflectance, creamy white, isotropic

K-feldspar forms a very fine-grained aggregate intergrown with quartz and lesser chlorite (Photomicrographs 2a and 2b), which prevails over the overprinting patches. The similar composition and microstructure of the K-feldspar-quartz aggregate with the aggregate described in Sample 1 suggests that this sample may have originated by the recrystallization of a quartz-syenite or quartz-monzonite.

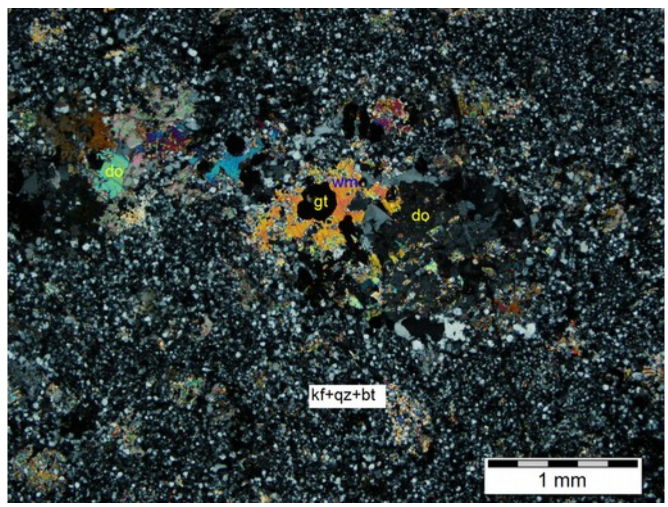
Quartz is very fine grained, and it occurs in association with fine-grained K-feldspar in most of this sample. The quartz is fine grained (up to 0.25 mm) within irregular patches of white mica, garnet, and dolomite. I interpret this second type of quartz as having crystallized during an alteration or contact metamorphic event replacing probable plagioclase.

White mica is concentrated as xenoblastic crystals within the irregularly shaped patches hosting subordinate garnet, quartz, and dolomite. Fine-grained flakes of white mica overprinted the fine-grained aggregate of K-feldspar-quartz, in which they probably replaced, also in this case, the finer-grained crystals of plagioclase.

Garnet forms inequigranular (up to 0.25 mm) xenoblastic crystals concentrated within the white mica, dolomite, and quartz replacement patches. The occurrence of garnet indicates that the recrystallization occurred at a relatively high temperature. The absence of foliation indicates that the recrystallization is probably the result of a contact metamorphic event.

Chlorite is very fine to fine grained, and the xenoblastic flakes are randomly oriented within the very fine-grained aggregate of K-feldspar and quartz (Photomicrograph 2a). In some cases, the chlorite forms irregular clusters, which probably replaced clusters of biotite (see Photomicrograph 1a).

***Photomicrograph 2a**: Irregular replacement patches (alteromorphs?, see details in Photomicrograph 2b) after probable plagioclase host fine-grained garnet (high relief and colourless) and are immersed within a very fine-grained matrix. Plane-polarized transmitted light.*



***Photomicrograph 2b**: Probable alteromorphs after plagioclase(?) consist of white mica (wm), dolomite (do), garnet (gt), and quartz (qz) and are immersed within a very fine-grained aggregate of K-feldspar-quartz and chlorite (kf+qz+ch). Crossed Nicols transmitted light.*

Sample 3: TPK-12-038 51.45–51.66

Orthomylonite

Xenoblastic porphyroclasts of plagioclase (Photomicrograph 3a) are wrapped by (Photomicrographs 3c and 3d) a sub-planar schistosity defined by very fine- to fine-grained layers of K-feldspar; quartz and biotite; and quartz-rich microlithons (Photomicrograph 3b).

Alteration: K-feldspar(?): moderate; **white mica**: weak; **pyrite-magnetite**: subtle.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		45–45	0.02–0.3	low relief, birefringence up to first-order white
K-feldspar (?)	K-feldspar(?)	35–32	0.05–0.8	low relief, low birefringence (up to first-order grey)
biotite		7–8	up to 0.1	moderate relief, green to brown pleochroism, straight extinction
plagioclase		5–7	up to 1.6 long	low relief, first-order grey birefringence, albite twinning
	white mica	5–7	up to 0.1	moderate relief, birefringence up to third-order blue, straight extinction
	calcite	tr	up to 0.1	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
	pyrite	tr	up to 0.1	high reflectance, creamy white, isotropic
	magnetite	tr	up to 0.1	high reflectance, creamy white, isotropic

Quartz is very fine to fine grained and forms quartz-K-feldspar, quartz-plagioclase layers, and quartz-rich microlithons, all of which define a mylonitic schistosity. In some of the layers, the quartz is finely intergrown with xenoblastic crystals of K-feldspar (Photomicrograph 3f), which I interpret as an alteration event overprinting the schistosity. The quartz forms blocky to polygonal crystal aggregates within the sub-parallel lenticular microlithons. I interpret some of the microlithons (Photomicrographs 3b) as recrystallized ribbon-quartz microstructure generated during the mylonitic deformation.

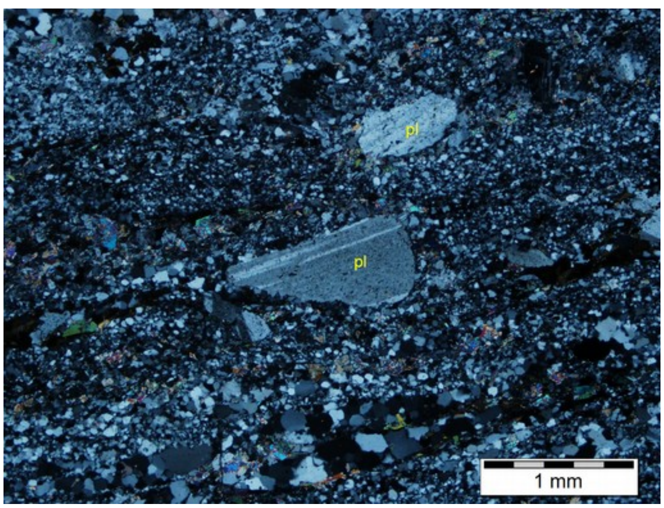
K-feldspar is very fine to medium grained, and it occurs within some of the quartz-bearing layers and probably reactivated the inter-layer interstices of this rock. Some xenoblastic medium-grained crystals up to 0.8 mm long (Photomicrograph 3e) are intergrown with calcite and white mica around the quartz-rich layers. The distribution of the K-feldspar can be observed in the stained billet in the image above. The interlobate microstructures shown by the K-feldspar intergrowths with the quartz indicate that the K-feldspar post-dated the mylonitic event.

Fine-grained flakes of **biotite** are concentrated within some of the quartz-K-feldspar layers. The biotite defines irregular clusters within the quartz-rich strain shadows surrounding some of the porphyroclasts of plagioclase (Photomicrographs 3c and 3d), and it is concentrated within lenticular domains wrapped by the schistosity.

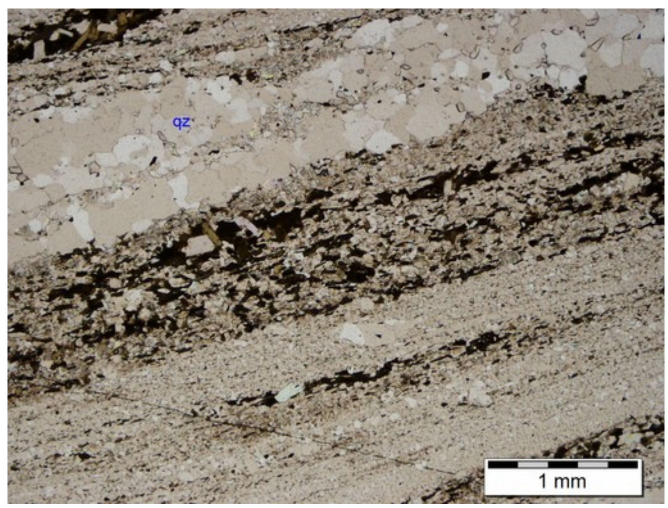
Plagioclase forms medium-grained (up to 1.6 mm long) xenoblastic porphyroclasts, which are rotated in and wrapped by the schistosity defined by quartz and biotite (Photomicrographs 3c and 3d). The plagioclase is subtly altered by very fine-grained unresolved dispersions and shows albite twinning.

White mica is subordinate to the biotite, with which is intergrown within the biotite-rich clusters. Very fine-grained to fine-grained white mica overprinted the schistosity as randomly oriented flakes, and it is dispersed within the quartz-rich microlithons.

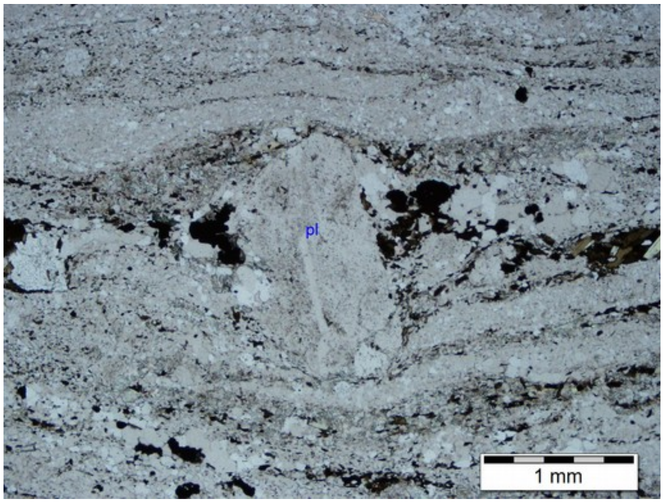
Very rare xenoblastic crystals of **pyrite** and **magnetite** are dispersed within the strain shadows of quartz and biotite around the plagioclase porphyroclasts and within the quartz-rich domains.



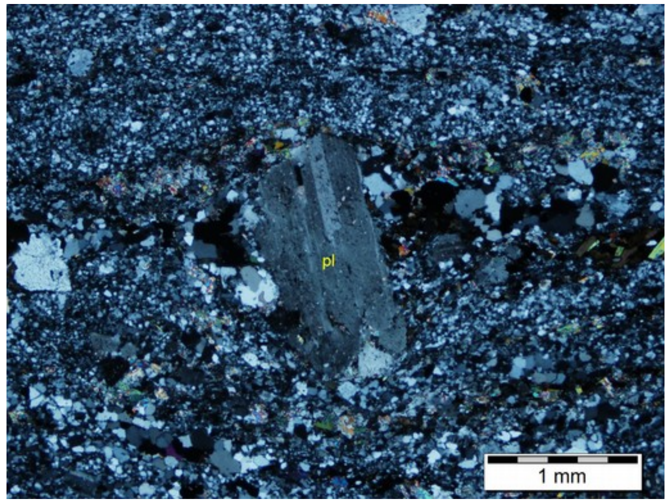
***Photomicrograph 3a**: Xenoblastic porphyroclasts of plagioclase (pl) are immersed within a very fine- to fine-grained matrix. Crossed Nicols transmitted light.*



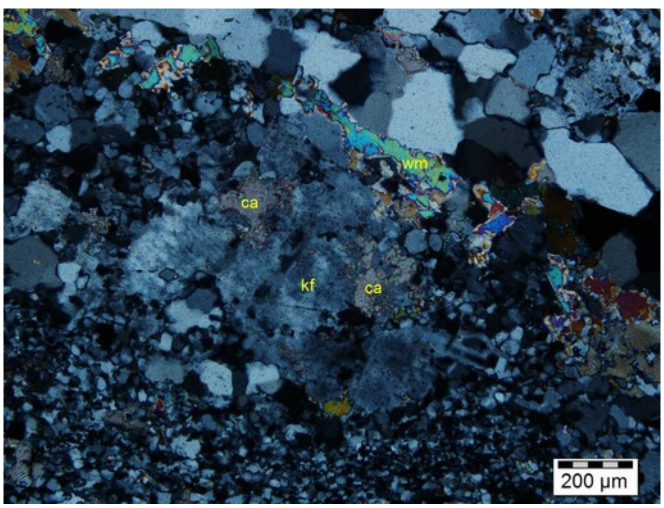
***Photomicrograph 3b**: The matrix consists of a very fine-grained aggregate of K-feldspar, quartz, biotite (brown), and ribbon-like domains of quartz (qz). Plane-polarized transmitted light.*



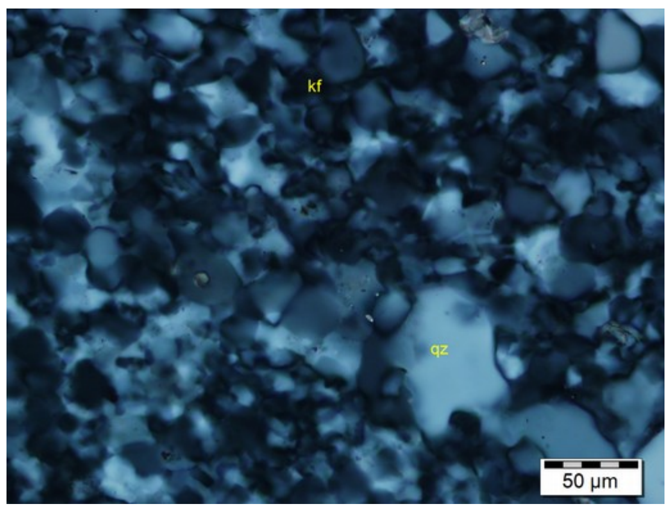
***Photomicrograph 3c**: A subidioblastic porphyroclast of plagioclase (pl) is wrapped by the schistosity defined by quartz and biotite, and it is surrounded by strain shadows of quartz, biotite (brown), pyrite (opaque), and magnetite (opaque). Plane-polarized transmitted light.*



***Photomicrograph 3d**: Same area as shown in Photomicrograph 3c. The plagioclase (pl) is rotated and immersed within a schistose matrix dominated by a very fine-grained aggregate of quartz and K-feldspar. Crossed Nicols transmitted light.*

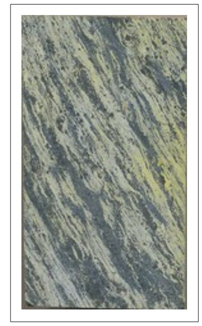


***Photomicrograph 3e**: Some crystals of K-feldspar are up to 0.8 mm long and are intergrown with xenoblastic calcite (ca) and white mica (wm). Crossed Nicols transmitted light.*



***Photomicrograph 3f**: In most of its occurrences, the K-feldspar (kf) is finely intergrown with the quartz (qz) within the sub-parallel layers. Crossed Nicols transmitted light with convergent lens.*

Sample 4: TPK-12-038 125.32–125.52



Biotite schist

Very fine- to fine-grained layers of K-feldspar-quartz and lenticular domains of randomly oriented biotite define an undulose schistosity, in which subordinate calcite, pyrite and pyrrhotite, and epidote are dispersed.

Alteration: K-feldspar-calcite: weak; **magnetite(?)-pyrite-chalcopyrite-epidote**: subtle.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		60–62	up to 0.4	
biotite		24–25	up to 0.4	moderate relief, green to brown pleochroism, straight extinction
K-feldspar		7–9	up to 0.05	low relief, low birefringence (up to first-order grey)
	calcite	5–7	up to 0.2	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
ilmenite(?)		1–1.2	up to 0.05	low reflectance, dark grey, anisotropic
magnetite		0.5	up to 0.5	low reflectance, dark grey, isotropic
	pyrite	0.2	up to 0.2	high reflectance, creamy white, isotropic
	pyrrhotite	0.1	up to 0.2	high reflectance, light brown, anisotropic
	chalcopyrite	tr	up to 0.1	high reflectance, yellow
	epidote	tr	up to 0.1	high relief, high birefringence, yellow to green pleochroism, heterogeneous distribution of the birefringence colours
	zircon	tr	up to 0.01	high relief, high birefringence, straight extinction

Quartz forms very fine- to fine-grained polygonal domains, which are intergrown with subordinate K-feldspar. Most of the crystals of quartz show polygonal shapes, and in some cases they define irregular to lenticular domains oriented parallel to the schistosity.

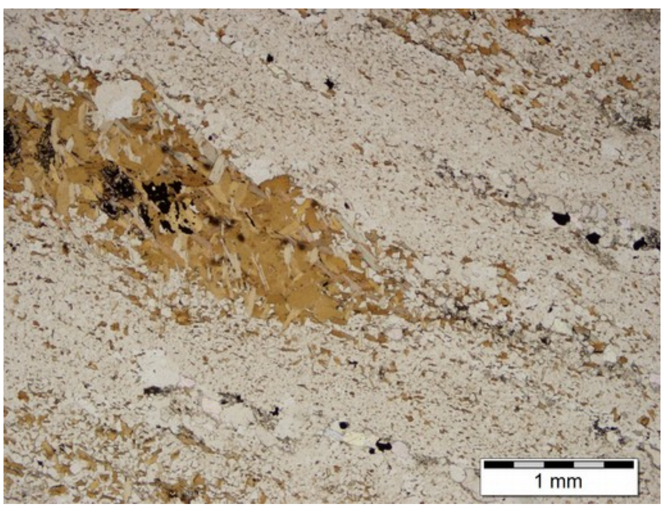
Biotite is concentrated within sub-parallel lenticular domains defining the schistosity (see dark domains in the billet); however, the biotite crystals are randomly oriented within these domains (Photomicrographs 4a and 4b) and show a low degree of iso-orientation parallel to the schistosity. The biotite hosts very fine-grained crystals of **zircon**, which are distinguished by their high relief and the pleochroic halos generated within the hosting biotite. I interpret the randomly oriented crystals of biotite as having crystallized or recrystallized(?) after the mylonitic(?) event generating the schistosity.

K-feldspar is subordinate to the quartz and is concentrated within the interstices between the quartz-rich and the biotite-rich domains.

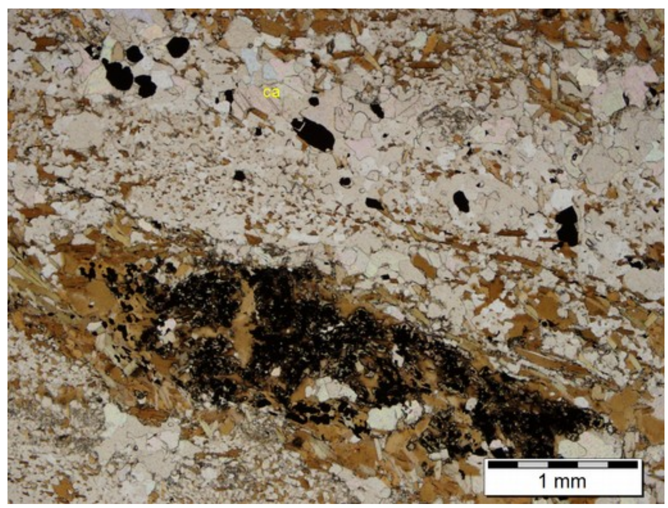
Calcite tends to form lenticular domains oriented parallel to the schistosity and is heterogeneously dispersed within the biotite and the quartz. In some cases, the calcite overprinted the biotite and forms irregular rims around subhedral lamellae of **ilmenite**.

Rare crystals of **pyrite** and **pyrrhotite**, **epidote**, and very rare **chalcopyrite** form xenoblastic crystals spatially associated with fine-grained dispersions of calcite.

Rare **magnetite** forms medium-grained xenoblastic crystals dispersed within one of the biotite-rich domains.



***Photomicrograph 4a**: A lenticular domain of randomly oriented biotite (light brown) hosts subordinate ilmenite (opaque) and calcite, and it is associated with very fine-grained domains of quartz, K-feldspar, and biotite. Plane-polarized transmitted light.*



***Photomicrograph 4b**: The ilmenite (opaque) is rimmed by fine-grained calcite within the biotite-rich domain. In the upper part of the photomicrograph, anhedral crystals of pyrite and pyrrhotite (opaque) are spatially associated with a lenticular domain of calcite and lesser quartz. Plane-polarized transmitted light.*

Sample 5: TPK-12-038 171.36–171.56

Plagioclase-phyric andesite

Biotite-quartz schist

This polished thin section consists of a plagioclase-phyric andesite in contact with a biotite-quartz schist. The lava shows a magmatic-flow foliation parallel to the contact and defined by the iso-orientation of very fine-grained lamellae of biotite. The contact between the lava and the metamorphic rock is irregular (see image above).

Alteration: K-feldspar: weak within the andesite; **clay and/or epidote**: weak within the plagioclase; **white mica**: subtle.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
andesite (~73% of PTS)				
phenocrysts				
plagioclase	clay and/or epidote	12–14	up to 2	low relief, first-order grey birefringence, albite twinning
groundmass				
plagioclase		35–40	up to 0.05	low relief, first-order grey birefringence
quartz		10–12	0.02–0.2	low relief, birefringence up to first-order white
K-feldspar		7–8		low relief, low birefringence (up to first-order grey)
biotite		5–6	up to 0.1	moderate relief, green to brown pleochroism, straight extinction
magnetite		2–3	up to 0.2	low reflectance, dark grey, isotropic
white mica		0.5	up to 0.1	moderate relief, birefringence up to third-order blue, straight extinction
schist (27% of PTS)				
biotite		15	up to 0.2	moderate relief, green to brown pleochroism, straight extinction
quartz		12	up to 0.15	low relief, birefringence up to

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
				first-order white
zircon		tr	up to 0.02	high relief, high birefringence, straight extinction

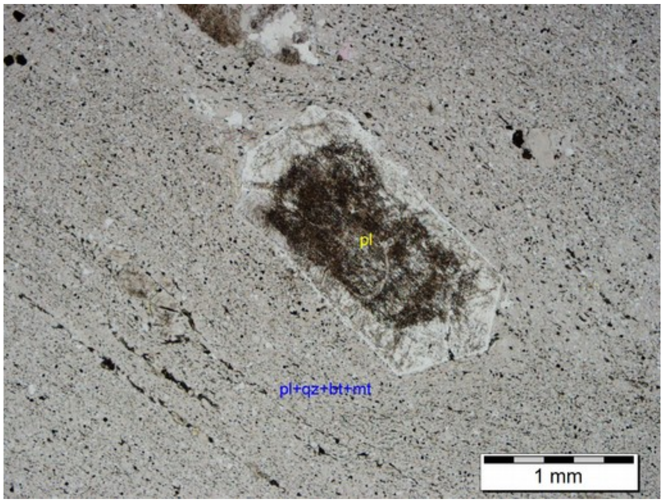
Plagioclase forms euhedral to subhedral phenocrysts (up to 2 mm long; see Photomicrographs 5a and 5b). Some of the phenocrysts show euhedral growth zoning highlighted by very fine-grained alteration products (probable clay and/or epidote) in the core of the crystals. In some cases, the plagioclase phenocrysts are elongate parallel to the foliation (Photomicrographs 5a and 5b); in other cases, the plagioclase phenocrysts form clusters surrounded by quartz and rare white mica, and are wrapped by the foliation. The plagioclase phenocrysts are immersed within a foliated groundmass of plagioclase, quartz, and biotite. Within the groundmass, the plagioclase is very fine grained and forms interlobate aggregates intergrown with very fine-grained quartz.

Quartz is very fine grained within most of the groundmass and forms fine-grained crystal aggregates dispersed within the groundmass and surrounding the plagioclase phenocrysts as infills of the strain shadows. The fine-grained quartz is intergrown with subordinate randomly oriented flakes of **white mica**. Within the schist, the quartz forms fine-grained blocky crystals intergrown with the abundant biotite (Photomicrograph 5c).

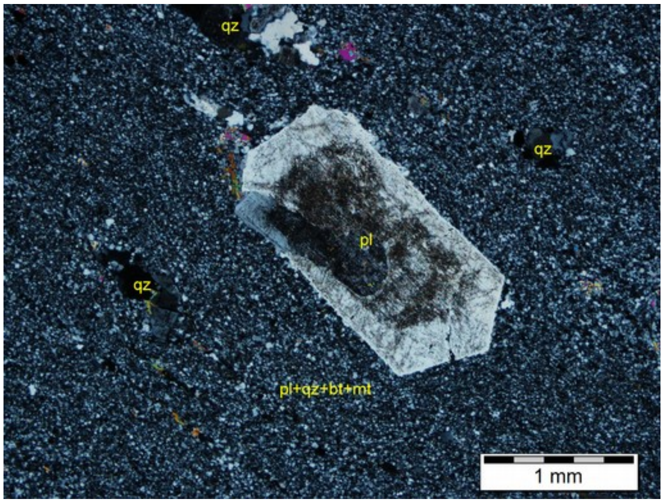
K-feldspar is very fine grained and forms irregular alteration patches within the groundmass in the lower right part of the billet (see yellow domains in the image above).

Biotite is very fine to fine grained (up to 0.1 mm long) and is iso-oriented, defining a magmatic flow foliation within the groundmass. Within the schist, the biotite forms spaced cleavage domains, in which its lamellae are iso-oriented, and it is randomly oriented within irregular domains and associated with the quartz (Photomicrograph 5c). The biotite is concentrated at the contact with the schist, and its concentration defines a chilled margin in the andesite (Photomicrograph 5d).

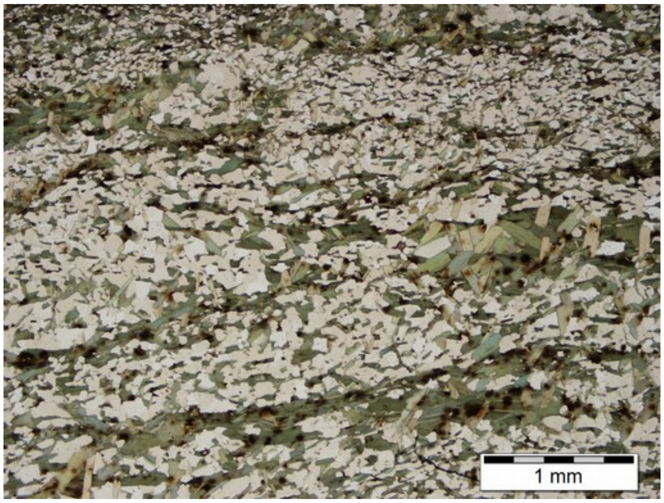
Magnetite is very fine to fine grained (up to 0.2 mm), and it is dispersed within the groundmass.



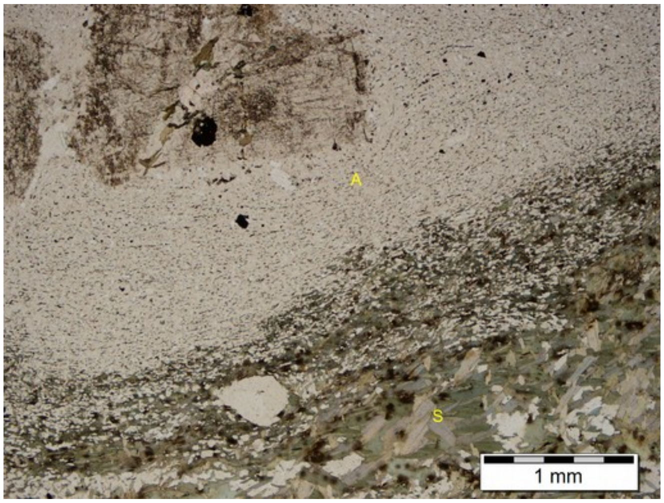
***Photomicrograph 5a**: A euhedral phenocryst of plagioclase (pl) shows euhedral growth zoning and is immersed within a foliated groundmass of plagioclase, quartz, iso-oriented lamellae of biotite, and subordinate magnetite (pl+qz+bt+mt). Plane-polarized transmitted light.*



***Photomicrograph 5b**: Same area as shown in Photomicrograph 5a. Together with the plagioclase phenocryst, sparse aggregates of quartz are dispersed within the very fine-grained groundmass of plagioclase, quartz, biotite, and magnetite (pl+qz+bt+mt), Crossed Nicols transmitted light.*



***Photomicrograph 5c**: Within the schist, the biotite (brown) forms spaced cleavage domains, and it is randomly oriented in association with the quartz (white). Plane-polarized transmitted light.*



***Photomicrograph 5d**: The very fine-grained biotite is concentrated at the contact with the schist (S), and its concentration defines a chilled margin in the plagioclase-phyric andesite (A). Plane-polarized reflected light.*

Sample 6: TPK-12-038 165.92–166.15

Biotite-plagioclase schist

A weak layering and a weak foliation are defined by clusters of biotite alternated with inequigranular aggregates of plagioclase and quartz. Medium-grained xenoblastic crystals of calcite, magnetite, and epidote are dispersed within the foliated microstructure.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
biotite		40–42	up to 0.6	moderate relief, green to brown pleochroism, straight extinction
plagioclase		28–30	up to 2.2	low relief, first-order grey birefringence, albite twinning
quartz		20–22	up to 0.3	low relief, birefringence up to first-order white
epidote		5–6	up to 0.1	high relief, high birefringence, yellow to green pleochroism, heterogeneous distribution of the birefringence colours
calcite		2–2.5	up to 0.3	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
magnetite		1.5–2	up to 0.5	low reflectance, dark grey, isotropic
titanite		0.5	up to 1 long	high relief, extreme birefringence

Biotite is fine to medium grained and tends to form irregular to lenticular clusters, which define the foliation. Within the clusters, the biotite is decussate to weakly iso-oriented. Fine-grained flakes of biotite are dispersed within the fine-grained quartzofeldspathic aggregate.

Plagioclase forms xenoblastic (up to 2.15 mm long) to subidioblastic crystals, which are wrapped by the foliation defined by the biotite. Finer-grained subidioblastic to xenoblastic crystals of plagioclase are intergrown with the quartz within pseudo-microlithons alternated with the biotite-rich clusters.

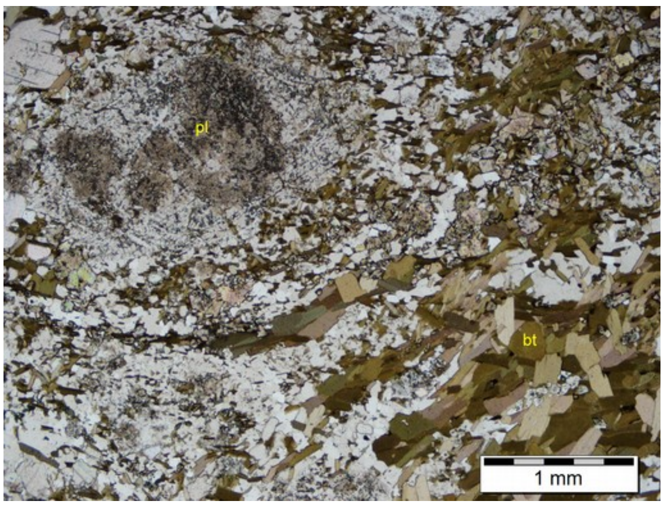
Quartz is fine grained and xenoblastic and is intergrown with the plagioclase and the biotite. In some cases, the quartz forms irregularly shaped monomineralic patches dispersed within the quartzofeldspathic aggregate.

Calcite is dispersed within the quartzofeldspathic aggregate as xenoblastic crystals of up to 0.3 mm.

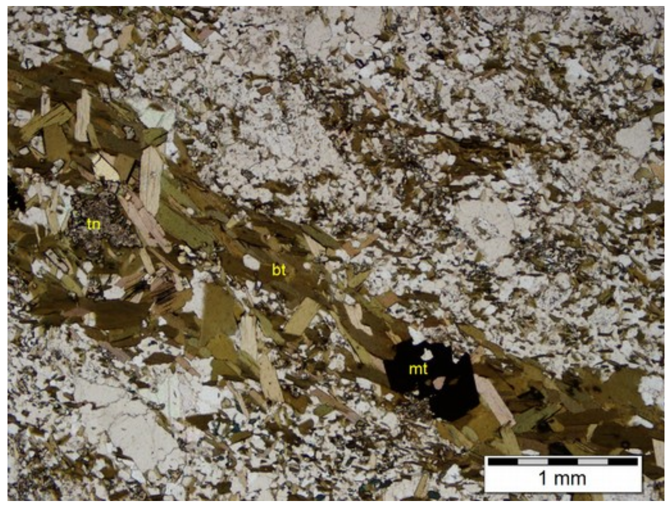
Epidote forms very fine-grained to fine-grained xenoblastic crystals, which overprinted the biotite-rich clusters and, to a lesser degree, the quartzofeldspathic aggregate.

Magnetite forms subidioblastic crystals dispersed within the biotite-rich clusters (Photomicrograph 6b).

Titanite is xenoblastic. Similarly to the magnetite, it is spatially associated with the biotite-rich clusters (Photomicrograph 6b).



***Photomicrograph 6a**: A xenoblastic crystal of plagioclase (pl) is wrapped by a weak foliation defined by irregular clusters of biotite (bt) and fine-grained aggregates of quartz, plagioclase, and biotite. Plane-polarized transmitted light.*



***Photomicrograph 6b**: The biotite (bt) forms irregular clusters, in which its lamellae are decussate and preferentially iso-oriented parallel to the main foliation. Subidioblastic crystals of magnetite (mt) and xenoblastic titanite are spatially associated with the biotite-rich clusters. Plane-polarized transmitted light.*

Sample 7: TPK-10-004 93.43–93.57

Monzogranite

Medium- to coarse-grained subhedral crystals of plagioclase are immersed within anhedral quartz, interstitial K-feldspar, and pseudomorphs of chlorite after probable biotite.

Alteration: chlorite: strong after biotite(?); **clay** and/or **white mica**: subtle to weak after plagioclase; **calcite-pyrite**: subtle.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz-monzonite (~99% of PTS)				
quartz		40–44	up to 1; rare up to 2.5	low relief, birefringence up to first-order white
plagioclase	clay and/or white mica	30–32	up to 2.5; rare up to 4	pl: low relief, first-order grey birefringence, rare albite twinning
K-feldspar		17–18	up to 4	low relief, low birefringence (up to first-order grey)
[biotite?]	chlorite	5–6	up to 0.2	ch: moderate relief, very weak pleochroism with pale-green tints, straight extinction, low birefringence
magnetite		1–1.5	up to 0.25	low reflectance, dark grey, isotropic
	calcite	tr	up to 0.1	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
	pyrite	tr	up to 0.4	high reflectance, creamy white, isotropic
calcite veinlets (~1% of PTS)				
calcite		1	up to 0.2	high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl

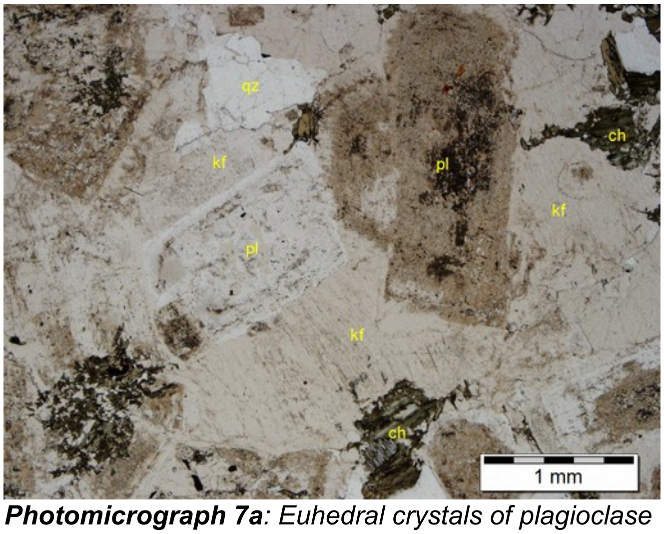
Quartz forms anhedral to interstitial crystals (up to 1 mm; rare up to 2.5 mm) and crystal aggregates intergrown with the plagioclase and the K-feldspar. The coarser crystals of quartz show moderate undulose extinction acquired during the crystallization of the magma. Most of the quartz occurs as recrystallized polygonal aggregates within the interstices between the feldspars.

Plagioclase is the most abundant among the feldspar and forms medium- to coarse-grained subhedral to euhedral crystals (up to 4 mm long). The plagioclase is subtly to weakly altered by a very fine-grained dispersion of clay and/or white mica, and in some cases these very fine-grained alteration products define subhedral growth zoning (Photomicrographs 7a, 7b, and 7c). The rims of the plagioclase show refractive indexes lower than those of the quartz, indicating that the outer rim of the plagioclase is albite.

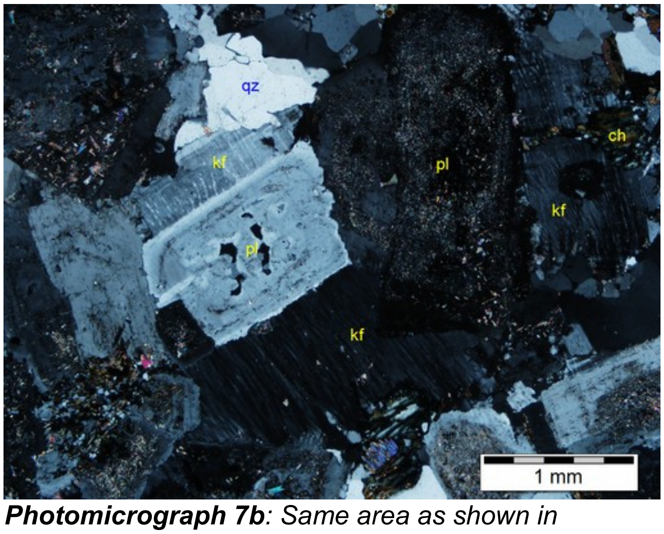
K-feldspar forms anhedral crystals occupying the interstices between the plagioclase, and in rare cases, it forms anhedral crystals up to 4 mm long (e.g., Photomicrograph 7c). The K-feldspar is fresh and hosts very fine- to fine-grained blebs and stringlets of perthite. Some of the fine-grained crystals show albite-pericline twinning. The transparent nature of the K-feldspar under plane-polarized transmitted light, the occurrence of twinning, and the occurrence of perthite indicate that the K-feldspar was crystallized during the magmatic phase.

Very fine- to fine-grained aggregates of **chlorite** completely replaced the magmatic biotite (Photomicrographs 7a and 7d). Within the coarser pseudomorphs (up to 1.2 mm long), the fine-grained flakes of chlorite are associated with fine-grained quartz (Photomicrograph 7d).

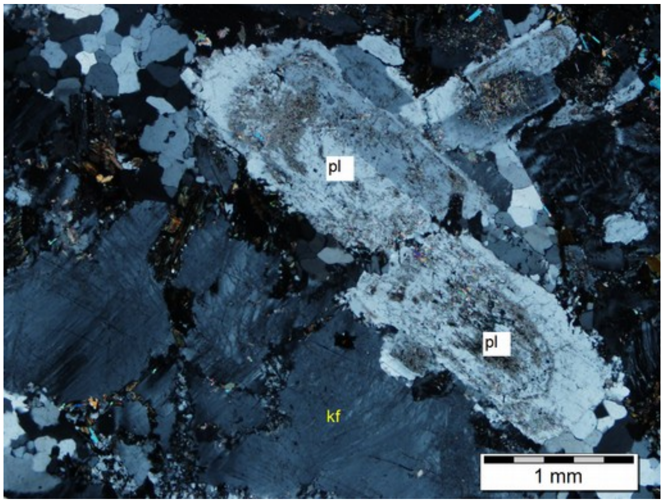
Magnetite is fine grained (up to 0.25 mm), and its anhedral to subhedral crystals are dispersed within the interstices between the plagioclase.



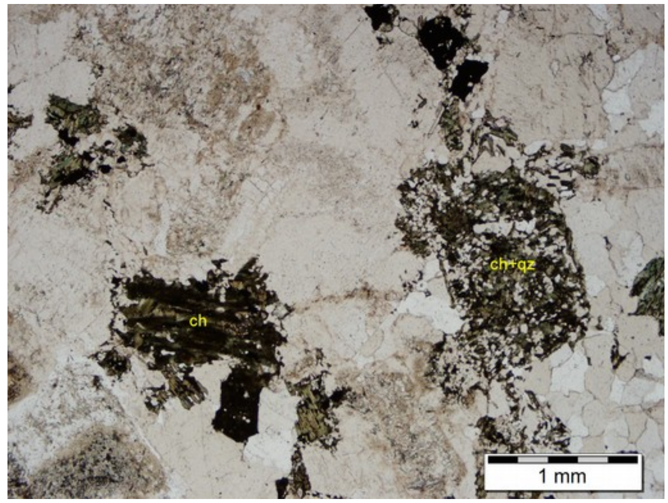
***Photomicrograph 7a**: Euhedral crystals of plagioclase (pl) are variably altered and are intergrown with interstitial crystals of K-feldspar (kf) and quartz (qz). Plane-polarized transmitted light.*



***Photomicrograph 7b**: Same area as shown in Photomicrograph 7a. The interstitial crystals of K-feldspar (kf) show fine-grained perthitic stringlets. Crossed Nicols transmitted light.*



Photomicrograph 7c*: A subhedral crystal of plagioclase (pl) is fractured and intergrown with a coarse-grained crystal of K-feldspar (kf). Crossed Nicols transmitted light.*



Photomicrograph 7d*: Pseudomorphs of chlorite (ch) and chlorite and quartz (ch+qz) replaced subhedral crystals of probable biotite. Plane-polarized transmitted light.*

Sample 8: TPK-10-004 187.04–187.27

Monzogranite(?)

Pseudotachylite

Subhedral to euhedral crystals of plagioclase and interstitial crystals of quartz and K-feldspar define a granular microstructure, which is fractured and crosscut by an irregular anastomosing pseudotachylite (Photomicrographs 8a and 8b).

Alteration: chlorite: strong after biotite; **epidote-magnetite**: subtle after biotite; **clay and/or white mica**: subtle to weak after plagioclase.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
monzogranite (~80% of PTS)				
plagioclase (albite)	clay and/or white mica	32–34	up to 3.5	low relief, first-order grey birefringence, albite twinning
quartz		25–28	up to 1.2	low relief, birefringence up to first-order white
K-feldspar		17–19	up to 3.5	low relief, low birefringence (up to first-order grey)
[?]	chlorite-epidote-magnetite	3–5	[up to 0.7]	ch: moderate relief, very weak pleochroism with pale-green tints, straight extinction, low birefringence
pseudotachylite (~20% of PTS)				
very fine-grained K-feldspar-bearing flour		20	<0.01	refractive indexes greater than those of the quartz, mostly isotropic

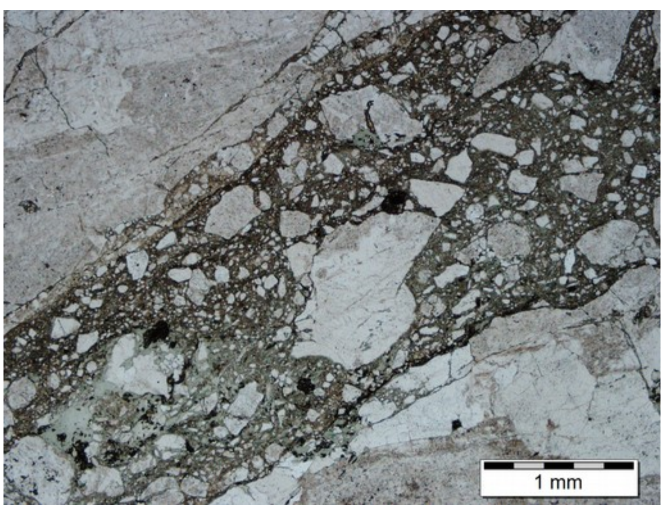
Plagioclase forms subhedral to euhedral crystals (up to 3.5 mm across), which are randomly oriented and are intergrown with interstitial crystals of quartz and K-feldspar. The plagioclase is subtly altered by very fine-grained dispersions of white mica and/or clay (Photomicrograph 8c), and in some cases, myrmekitic microstructures are developed along the boundaries between the plagioclase and the K-feldspar. The plagioclase shows refractive indexes lower than those of the quartz; therefore, the plagioclase is albite.

Quartz forms anhedral crystals occupying the interstices between the plagioclase and the K-feldspar. Most of the quartz is recrystallized. The quartz crystals reach a maximum size of 1.2 mm within the interstitial aggregates and anhedral microstructural relicts. Most of the crystals of quartz show moderate undulose extinction.

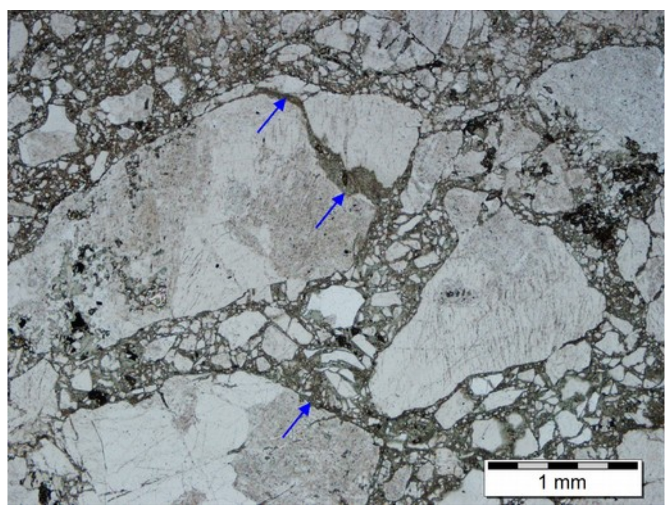
K-feldspar forms interstitial to euhedral crystals (Photomicrograph 8c), which are characterized by the occurrence of very fine- to fine-grained perthites or albite-pericline twinning. The perthites are a feature that I interpret as a magmatic relict. The twinning occurred during the brittle deformation event that generated the pseudotachylite and involved the destruction of the perthites in some of the crystals.

Chlorite and subordinate **epidote** and **magnetite** form irregular to subhedral pseudomorphs (up to 0.7 mm) after biotite, which are randomly oriented within the interstices between the plagioclase.

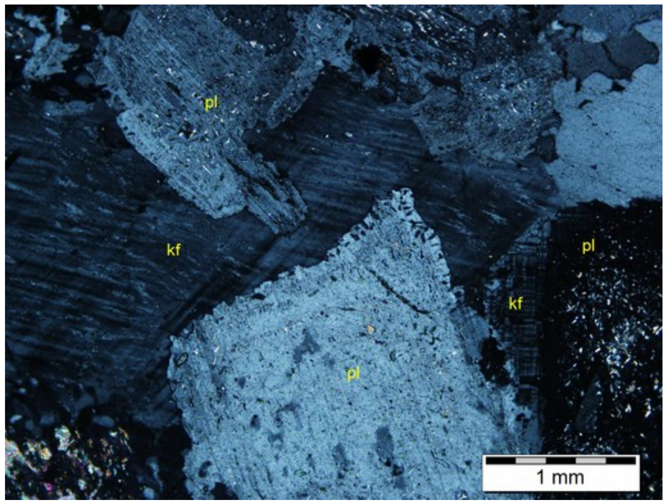
Very fine-grained unresolved and in most cases isotropic material is dispersed within some of the fractures branching off the irregular brittle deformation zone (up to 10 mm wide in the polished thin section). I interpret the isotropic aggregate as the glassy matrix of a **pseudotachylite**. Within the pseudotachylite, the angular fragments of plagioclase, quartz, and K-feldspar (Photomicrographs 8a and 8b) are derived from the fracturing of the host rock, and are chaotically dispersed. Neither the matrix nor the orientation of the angular fragments define a foliation. The stained billet (see image above) shows that some of the very fine-grained matrix hosts K-feldspar. The high fragment-to-matrix ratio (see Photomicrographs 8a and 8b) and the very angular shape of the fragments indicate a low degree of mechanical wearing.



Photomicrograph 8a*: An irregular vein-like domain consists of a very fine-grained matrix hosting angular fragments with the same composition of the host rock. Plane-polarized transmitted light.*



Photomicrograph 8b*: Within the interstices between some of the fragments, the matrix is isotropic, suggesting the occurrence of glass (blue arrows). Plane-polarized transmitted light.*



***Photomicrograph 8c**: Subhedral crystals of plagioclase (pl) are intergrown with interstitial crystals of K-feldspar (kf). A myrmekitic rim is developed between the plagioclase and the K-feldspar crystal hosting fine-grained stringlets of perthite. In the right part of this photomicrograph, a triangular crystal of K-feldspar shows albite-pericline twinning. Crossed Nicols transmitted light.*

Sample 9: TPK-11-013 190.8–190.90

Quartz-white mica ortho(?)schist

Alternating quartz microlithons and white mica cleavage domains (Photomicrograph 9) define an undulose schistosity. Medium-grained crystals of pyrite and xenoblastic crystals of K-feldspar form irregular clusters spatially associated with the quartz-rich domains parallel to the schistosity.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		55–57	0.05–1.5	low relief, birefringence up to first-order white
white mica		40–42	0.05–0.5	moderate relief, birefringence up to third-order blue, straight extinction
pyrite		2–2.5	up to 0.8 long	high reflectance, creamy white, isotropic
K-feldspar		0.5–1	0.02–0.8	low relief, low birefringence (up to first-order grey)
rutile		tr	up to 0.1	high relief, brown under plane-polarized light, anisotropic

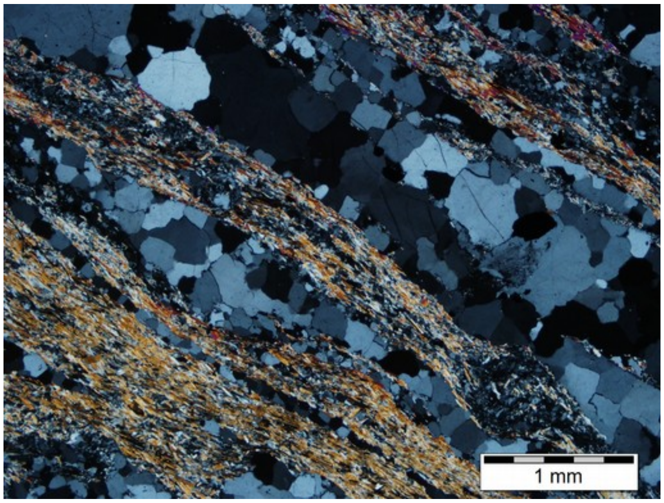
Fine- to medium-grained crystals of **quartz** define lenticular microlithons, in which the quartz crystals are blocky to polygonal. In most of the polished thin section, the microlithons alternate rhythmically with white mica-rich cleavage domains and define an undulose spaced schistosity. In the upper left of the polished thin section, the quartz is inequigranular (up to 1.5 mm long) and forms an irregular domain (~9 mm in diameter) wrapped by the schistosity.

White mica is fine grained and defines irregular cleavage domains (up to 1.2 mm thick), in which the lamellae are preferentially iso-oriented and define the schistosity of this sample.

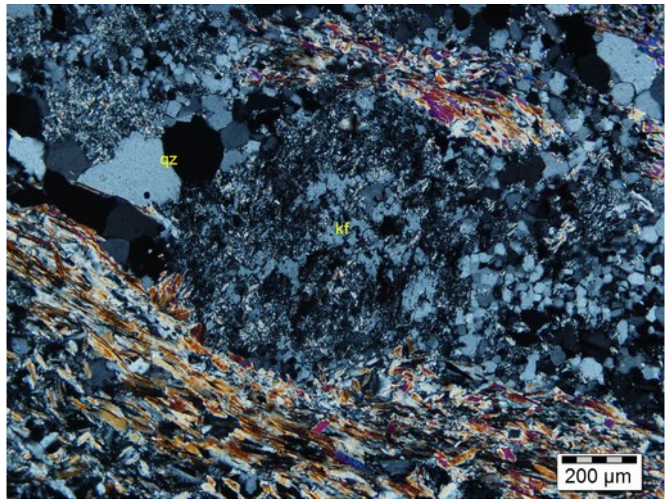
Pyrite is very fine to medium grained (up to 0.8 mm long). Its coarser crystals are iso-oriented parallel to the schistosity. In most cases, the pyrite crystals are fractured and form elongate clusters dispersed along the boundaries between the quartz microlithons and the white mica cleavage domains.

K-feldspar is very fine to medium grained and forms rare porphyroclasts (up to 0.8 mm in diameter), which are partially replaced by very fine-grained white mica and are wrapped by the schistosity (Photomicrograph 9b). The K-feldspar is a mineral relict probably derived from a magmatic protolith.

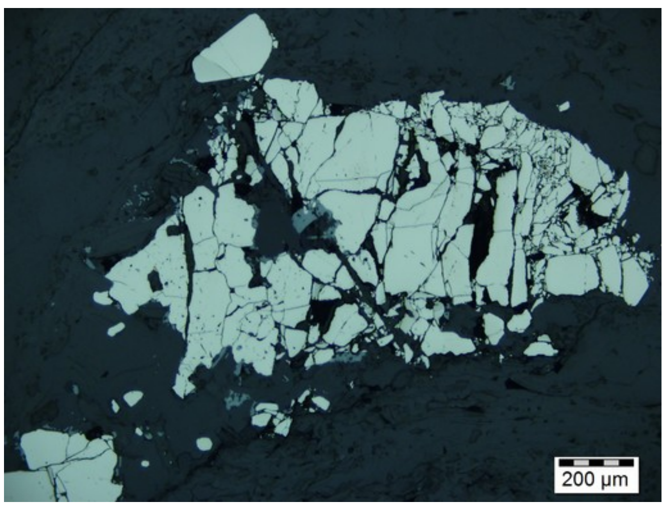
Rare crystals of **rutile** are dispersed within the white mica-rich cleavage domains and are spatially associated with the pyrite.



***Photomicrograph 9a**: Quartz microlithons (qz) and cleavage domains of iso-oriented white mica (wm) define the schistosity. A relict porphyroclast of K-feldspar (kf) is hosted within one of the cleavage domains. Crossed Nicols transmitted light.*



***Photomicrograph 9b**: A relict porphyroclast of K-feldspar (kf) is partially replaced by very fine-grained white mica and is wrapped by the schistosity. Crossed Nicols transmitted light.*



***Photomicrograph 9c**: Most of the pyrite crystals (white) are strongly fractured. Very fine- to fine-grained crystals of rutile (grey) are spatially associated with the pyrite. Plane-polarized reflected light.*

Sample 10: TPK-10-011 72.15–72.33

Quartz-white mica orthoschist

Irregular crystal aggregates of quartz define a prevailing granular microstructure, in which a weak foliation is defined by the preferred orientation of very fine-grained flakes of white mica intergrown with fine-grained quartz, xenoblastic K-feldspar (Photomicrograph 10a), rare xenoblastic crystals of garnet (Photomicrograph 10b), and magnetite.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		75–77	0.05–1	low relief, birefringence up to first-order white
white mica		12–15	up to 0.5	moderate relief, birefringence up to third-order blue, straight extinction
K-feldspar		5–8	up to 1 long	low relief, low birefringence (up to first-order grey)
magnetite		3–4	up to 0.5	low reflectance, dark grey, isotropic
garnet		1.5–2	up to 1.2	high relief, isotropic
plagioclase		1	up to 0.3	low relief, first-order grey birefringence, rare albite twinning
pyrite		tr	up to 0.5	high reflectance, creamy white, isotropic
rutile		tr		high relief, brown under plane-polarized light, anisotropic
pyrrhotite		tr	up to 0.5	high reflectance, light brown, anisotropic

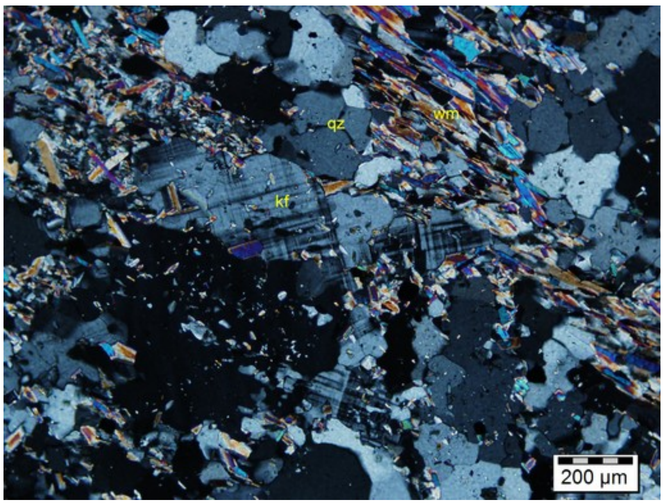
Quartz forms irregularly shaped relatively homogeneously distributed domains, in which the quartz crystals are medium grained (up to 1 mm) and define blocky to polygonal crystal aggregates. The monomineralic quartz domains are associated with fine-grained domains of quartz; white mica; and subordinate K-feldspar, garnet, and magnetite.

White mica is fine grained and shows a weak preferred dimensional orientation within irregularly shaped domains. A lower amount of deformation than occurred in Sample 9 generated the low anisotropy shown by the microstructure in this sample. The fine-grained white mica-quartz aggregates host xenoblastic relicts of **K-feldspar** (up to 1 mm long), and lesser **plagioclase** (up to 0.3 mm), which in some cases shows albite-pericline twinning

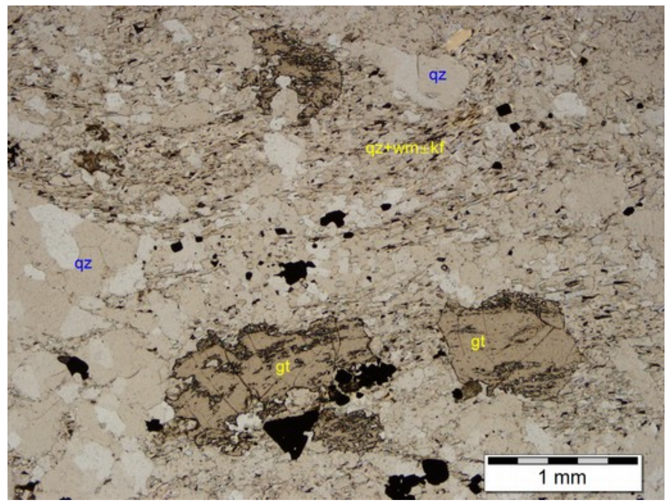
(Photomicrograph 10a). The occurrence of K-feldspar is consistent with the interpretation of a magmatic protolith for this sample.

Xenoblastic crystals of **garnet** overprinted the weak foliation and host very fine-grained inclusions of white mica and quartz defining an internal foliation parallel to the main foliation of this sample (Photomicrograph 10b).

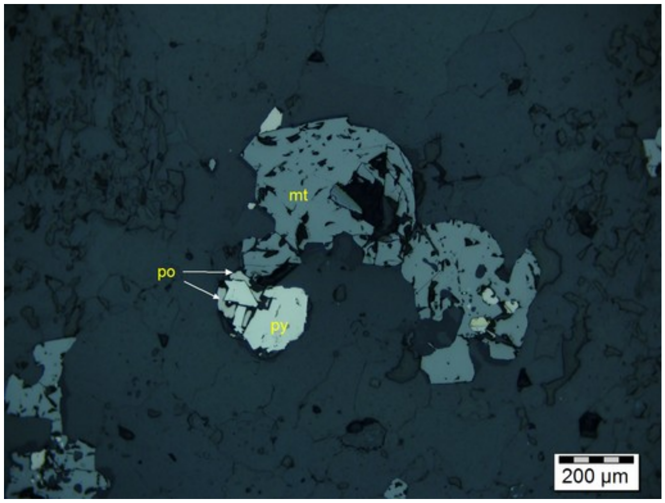
Magnetite is dispersed within the fine-grained white mica-bearing aggregates. In some cases (e.g., Photomicrograph 10c), it is intergrown with rare crystals of **pyrite** and very rare crystals of **pyrrhotite**.



***Photomicrograph 10a**: Xenoblastic crystals of K-feldspar (kf) and weakly iso-oriented flakes of white mica (wm) are intergrown with fine-grained quartz (qz). Crossed Nicols transmitted light.*



***Photomicrograph 10b**: Xenoblastic crystals of garnet (gt) host very fine-grained inclusions of quartz and white mica, which define an internal foliation oriented parallel to the main foliation defined by the white mica within the fine-grained aggregates of quartz, white mica, and K-feldspar (qz+wm±kf). Plane-polarized transmitted light.*



***Photomicrograph 10c**: Xenoblastic crystals of magnetite (mt) are associated with xenoblastic crystals of pyrite (py) and pyrrhotite (po). Plane-polarized reflected light.*

Sample 11: TPK-12-056 115.96–116.05

Quartz-white mica-K-feldspar-plagioclase granofels

An irregular layer is defined by irregularly shaped to sub-tabular domains of quartz (up to 5 mm thick); thin layers of tourmaline, pyrrhotite, and pyrite (Photomicrographs 11a and 11b); and fine-grained xenoblastic aggregates of quartz, white mica, K-feldspar, and plagioclase (Photomicrograph 11c). Despite the anisotropy defined by sub-tabular infill domains of quartz and thin layers of tourmaline, sulphides, and biotite, the microstructure within the prevailing quartzofeldspathic domains is granular.

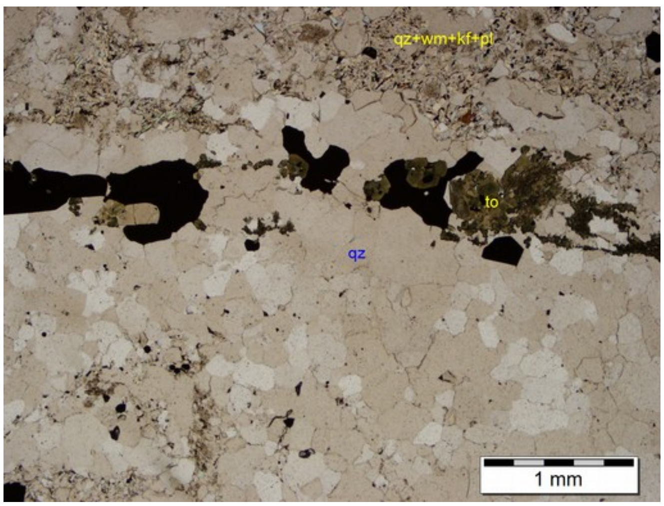
Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		45–50	0.05–0.8	low relief, birefringence up to first-order white
white mica		20–22	up to 0.1	moderate relief, birefringence up to third-order blue, straight extinction
K-feldspar		15–17	up to 0.4	low relief, low birefringence (up to first-order grey)
plagioclase		12–14	up to 0.5	low relief, first-order grey birefringence, albite twinning
pyrrhotite		3–4	0.1–1	high reflectance, light brown, anisotropic
tourmaline		2–3	up to 0.2	moderate relief, high birefringence, stronger absorption when the crystals are elongate perpendicular to the direction of polarization
pyrite		1–2	0.1–1	high reflectance, creamy white, isotropic
biotite		tr	up to 0.2	moderate relief, green to brown pleochroism, straight extinction

Quartz is concentrated within irregularly shaped to sub-tabular domains of fine- to medium-grained interlobate to polygonal aggregates (Photomicrograph 11a), and it forms inequigranular aggregates intergrown with very fine-grained to fine-grained replacement patches of white mica and xenoblastic crystals of K-feldspar and plagioclase. The sub-tabular domain of quartz probably represents a quartz-rich infill associated with sulphides and tourmaline crystallization.

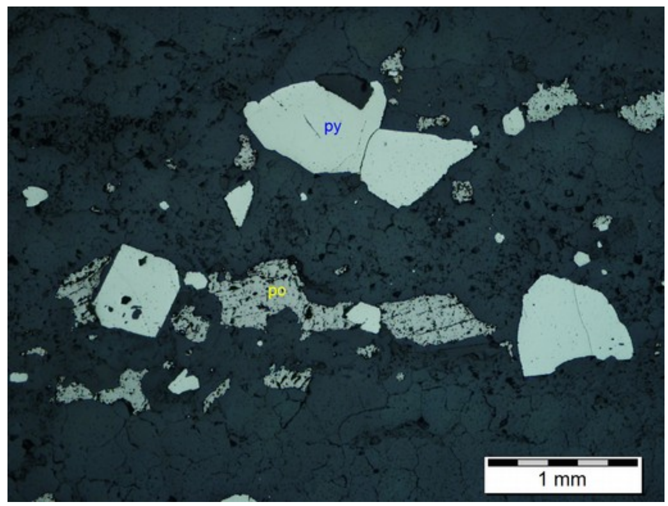
White mica is very fine to fine grained, and it forms irregular replacement patches, probably replacing K-feldspar and/or plagioclase. Because of the occurrence of xenoblastic crystals of **K-feldspar** (up to 0.4 mm) and **plagioclase** (up to 0.5 mm), I tentatively interpret the white mica as the incipient replacement of the feldspar in a low strain environment.

Pyrrhotite forms xenoblastic crystals (0.1–1 mm) dispersed within the quartzofeldspathic domains and along the boundaries between the quartzofeldspathic and the quartz-rich domains. The pyrrhotite is weakly altered, and it is overprinted by subidioblastic crystals of pyrite, which in some cases reach 1 mm across (Photomicrograph 11b).

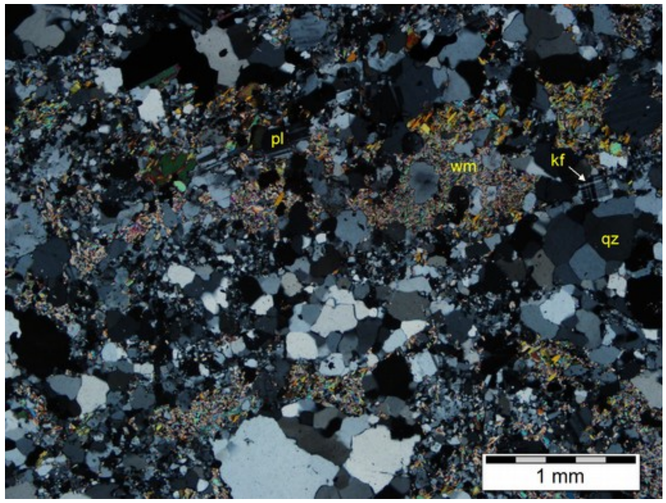
Tourmaline and rare biotite are fine grained and form thin layers along the boundaries between the quartzofeldspathic and the quartz-rich domains. In the billet, these domains are dark and are associated with sulphides. The fine-grained crystals of tourmaline and biotite are randomly oriented and do not define a foliation.



Photomicrograph 11a*: Thin layers of randomly oriented tourmaline, and layers of xenoblastic sulphides (opaque) are concentrated near the boundaries between the quartz-rich domains (qz) and the quartz-white mica-K-feldspar-plagioclase domains (qz+wm+kf+pl). Plane-polarized transmitted light.*

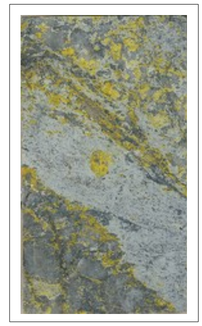


Photomicrograph 11b*: The sulphides consist of xenoblastic crystals of pyrrhotite (po) and subidioblastic to xenoblastic crystals of pyrite (py). Plane-polarized reflected light.*



Photomicrograph 11c*: Within the quartz-white mica-K-feldspar-plagioclase domains (qz+wm+kf+pl), the microstructure is granular and isotropic. Crossed Nicols transmitted light.*

Sample 12: TPK-12-056 117.26–117.36



Metagranite

This polished thin section consists of three different compositional domains. In the upper part, albite forms a fine-grained polycrystalline aggregate and together with anhedral quartz and K-feldspar defines a medium-grained granular microstructure resembling a recrystallized monzonitic rock. In the middle part, a sub-tabular domain is dominated by a fine-grained aggregate of albite and subordinate white mica. In the lower part, medium-grained anhedral quartz prevails over subordinate K-feldspar and plagioclase.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
plagioclase (albite)		40–43	up to 1	low relief, first-order grey birefringence, albite twinning
quartz		30–32	up to 1.2	low relief, birefringence up to first-order white
K-feldspar		22–24	up to 1.2	low relief, low birefringence (up to first-order grey)
biotite		2–3	up to 0.2; rare up to 0.5	moderate relief, green to brown pleochroism, straight extinction
white mica		1.5–2	up to 0.1	moderate relief, birefringence up to third-order blue, straight extinction
pyrite		1.5–2	up to 1.2 × 8	high reflectance, creamy white, isotropic
pyrrhotite		0.5–0.7	up to 1.2	high reflectance, light brown, anisotropic
apatite		tr	up to 0.6	moderate relief, birefringence up to first-order grey, straight extinction, negative elongation

Plagioclase (albite) is concentrated within a 10 mm thick sub-tabular domain, in which it forms a fine-grained polygonal aggregate associated with very fine-grained white mica, very fine- to fine-grained biotite, quartz, and K-feldspar. The albite forms fine- to medium-grained (up to 1 mm) polycrystalline pseudomorphs after up to 3 mm long crystals of plagioclase. In the quartz-rich domain, the pseudomorphs are rare and are immersed within the prevailing quartz.

Quartz is concentrated in the lower part of the polished thin section. In this domain, the quartz forms inequigranular (up to 1.2 mm) interlobate monomineralic crystal aggregates, and it is intergrown with subordinate xenoblastic crystals of K-feldspar and plagioclase. In the upper domain, the quartz forms inequigranular irregularly shaped crystal aggregates dispersed within the plagioclase and K-feldspar.

K-feldspar is more abundant in the monzonitic domain, which is microstructurally and compositionally more similar to the original magmatic rock. In this domain, the K-feldspar forms xenoblastic crystals (up to 2.5 mm long) randomly oriented within the plagioclase and the quartz. The K-feldspar shows albite-pericline twinning and is fresh. A 3 mm sub-rounded aggregate of K-feldspar-albite-quartz is immersed within the plagioclase-rich domain, and it is fine grained and interstitial between the quartz-rich domains in the lower part of the polished thin section.

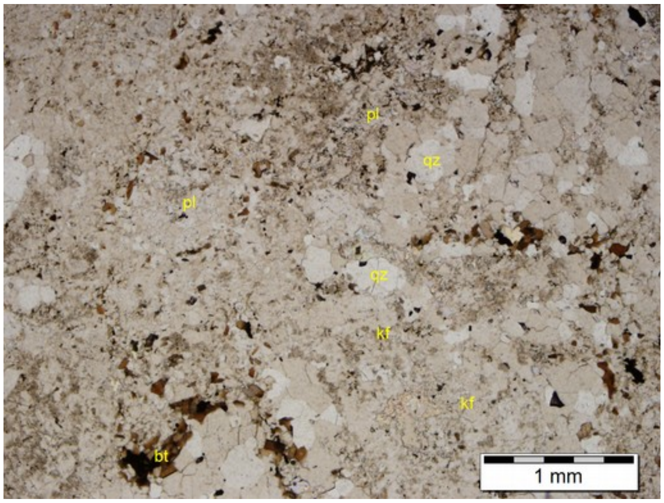
Biotite is fine grained and forms irregular clusters within the plagioclase-rich domain (Photomicrograph 12c). The clusters are roughly elongate parallel to the domain boundaries. The biotite is fine grained, and it forms irregular clusters concentrated within the interstices between the quartzofeldspathic domains in the upper and lower part. In one case, the biotite is concentrated within a thin irregular veinlet crosscutting the quartz-rich domain.

White mica is very fine to fine grained, and its flakes are homogeneously dispersed and show a weak preferred dimensional orientation within the plagioclase-rich domain (Photomicrograph 12c).

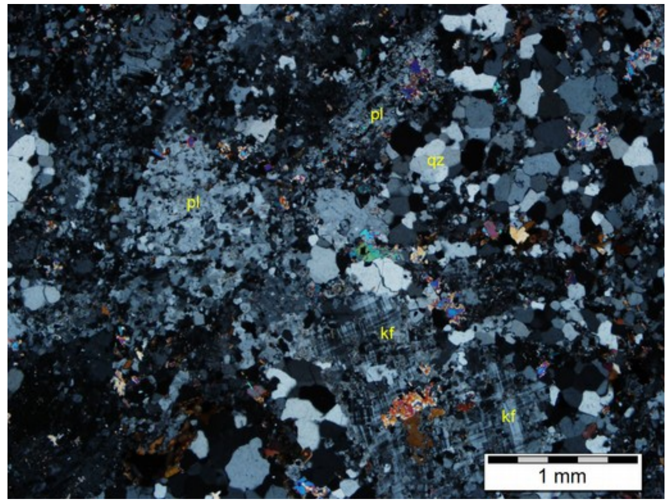
The three domains probably represent the incipient metamorphic differentiation—a plagioclase-rich domain in the middle part, and a quartz-rich domain in the lower part—produced by the metamorphic recrystallization of the monzonitic rock, of which the upper part represents a low strained relict.

Fine-grained anhedral crystals of **pyrrhotite** and **rare** pyrite are dispersed within the granular monzonitic domain.

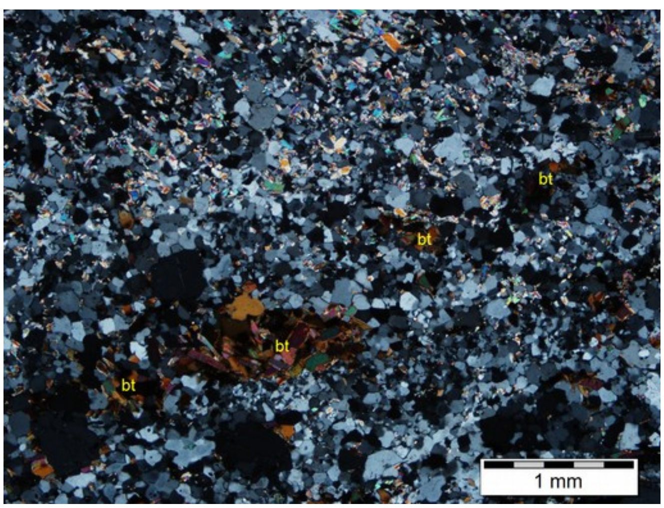
A 1.2 × 8 mm massive domain of pyrite filled in the boundary between the monzonitic domain and the plagioclase-rich domain. I interpret this domain of pyrite as having crystallized immediately after the end of the deformation, as well as the other fine- to medium-grained crystals dispersed within this sample. Xenoblastic pyrrhotite and subidioblastic pyrite are concentrated near and within the biotite-bearing veinlet (Photomicrograph 12d) crosscutting the quartz-rich domain. The sulphides were probably crystallized during the latest stages of the deformation and/or reactivated the discontinuity generated during the deformation (i.e., late tectonic to post-tectonic). Similarly with Sample 11, the pyrite probably overprinted the subtly altered crystals of pyrrhotite and formed subidioblastic crystals.



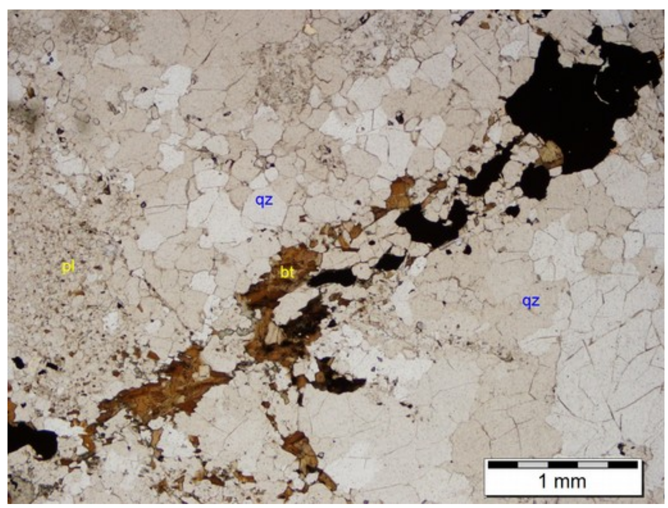
***Photomicrograph 12a**: Inequigranular xenoblastic aggregates of quartz (qz), albite (pl), and K-feldspar together with clusters of biotite recrystallized a monzonitic protolith in the upper part of the polished thin section. Plane-polarized transmitted light.*



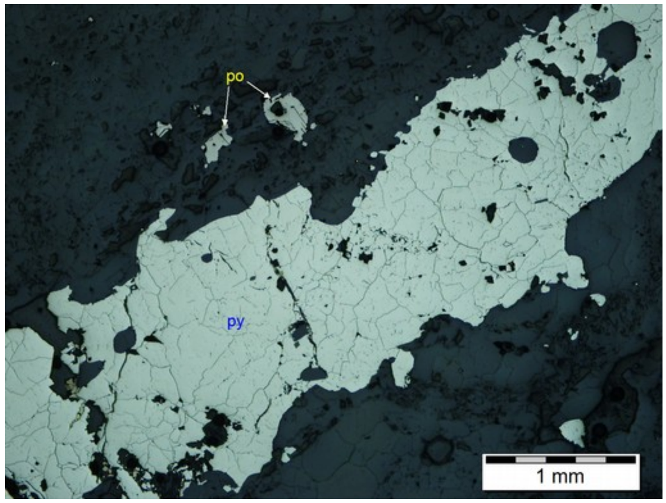
***Photomicrograph 12b**: Same area as shown in Photomicrograph 12a. Inequigranular xenoblastic aggregates of quartz (qz), albite (pl), and K-feldspar, together with clusters of biotite recrystallized a monzonitic protolith in the upper part of the polished thin section. Crossed Nicols transmitted light.*



***Photomicrograph 12c**: A fine-grained aggregate of plagioclase and lesser quartz prevails over fine-grained and weakly iso-oriented flakes of white mica (highly birefringent) and clusters of biotite (bt) in the median zone of the polished thin section. Crossed Nicols transmitted light.*



***Photomicrograph 12d**: An irregular veinlet of biotite (bt), sulphides (opaque), and apatite crosscut the quartz-rich domain in the lower part of the polished thin section. Plane-polarized transmitted light.*



***Photomicrograph 12e**: A massive aggregate of pyrite filled in the boundary between the plagioclase-rich domain (in the upper part of this photomicrograph) and the quartz-rich (in the lower part). Plane-polarized reflected light.*

Sample 13: TPK-12-056 117.26–117.36

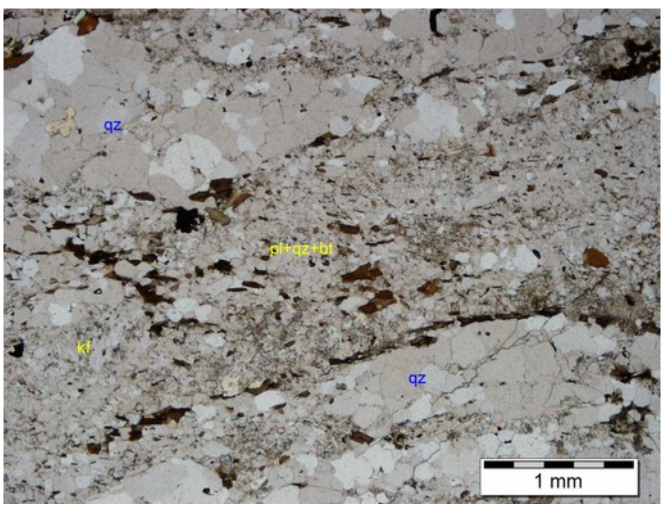
Orthoschist

Lenticular and preferentially iso-oriented domains of fine-grained quartz are immersed within a fine-grained polygonal aggregate of plagioclase, quartz, biotite, and heterogeneously dispersed clusters of K-feldspar, all of which define an irregular schistosity.

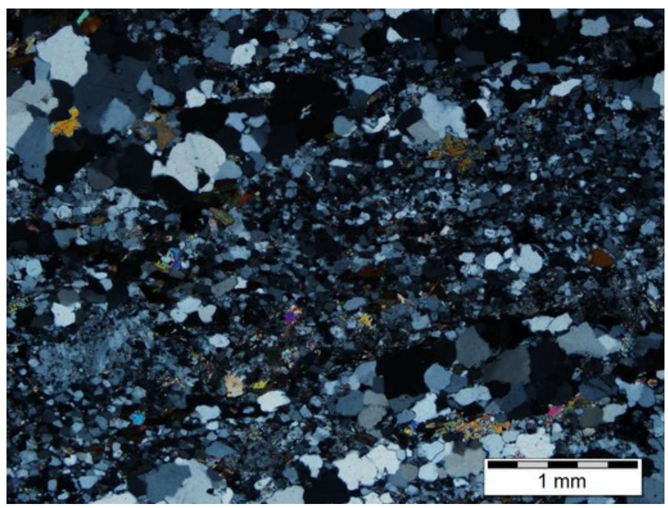
Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
plagioclase (albite)		58–60	up to 0.2	low relief, first-order grey birefringence, albite twinning
quartz		25–30	0.05–1	low relief, birefringence up to first-order white
K-feldspar		10–12	up to 0.1 long	low relief, low birefringence (up to first-order grey)
biotite		3–4	0.02–0.4	moderate relief, green to brown pleochroism, straight extinction
white mica		0.5–0.6	0.02–0.4	moderate relief, birefringence up to third-order blue, straight extinction
pyrite		tr	up to 0.4 long	high reflectance, creamy white, isotropic
pyrrhotite		tr	up to 0.5 long	high reflectance, light brown, anisotropic
titanite		tr	up to 0.1	high relief, extreme birefringence
rutile		tr	up to 0.05	high relief, brown under plane-polarized light, anisotropic
zircon		tr	up to 0.01	high relief, high birefringence, straight extinction

Plagioclase (albite) forms fine-grained interlobate to polygonal aggregates intergrown with subordinate quartz, biotite, and K-feldspar within the matrix of this sample. The refractive indexes of the plagioclase are smaller than those of the quartz; therefore, the plagioclase is albite. The albite crystals were generated from destabilized and smeared crystals of plagioclase in a ductilely deformed magmatic rock.
Quartz is concentrated within lenticular domains, which are iso-oriented and define the schistosity of this sample. The monomineralic domains consist of interlobate to polygonal crystals of quartz, and are wrapped by the foliated matrix, in which the fine-grained quartz is

subordinate to the plagioclase. In the upper part of the polished thin section, the quartz forms an irregular monomineralic domain, probably a lenticular domain crosscut at low angle by the surface of the polished thin section.
Biotite is very fine to fine grained, and it is dispersed within the plagioclase-quartz matrix. The biotite shows a preferred dimensional orientation parallel to the orientation of the monomineralic quartz domains, defining a continuous foliation within the matrix (Photomicrograph 13a). In some cases, the biotite forms clusters and thin cleavage domains parallel to the schistosity.
K-feldspar is subordinate to the quartz and the plagioclase and forms fine- to medium-grained xenoblastic crystals (Photomicrographs 13a and 13b) and crystal clusters oriented parallel to the schistosity.
White mica is heterogeneously dispersed within the schistosity as very fine-grained preferentially iso-oriented flakes and medium-grained xenoblasts overprinting the quartzofeldspathic aggregate, and to a lesser extent the quartz.
Rare **pyrrhotite** and **pyrite** are spatially associated with the quartz-rich lenticular domains, and because of their equant xenoblastic shape, I tentatively interpret their crystallization as post-tectonic.



***Photomicrograph 13a**: Lenticular domains of quartz (qz) are iso-oriented within a fine-grained aggregate of plagioclase, quartz, biotite (pl+qz+bt), and K-feldspar (kf). Plane-polarized transmitted light.*



***Photomicrograph 13b**: Same area as shown in Photomicrograph 13a. Xenoblastic crystals of K-feldspar (kf) are dispersed within the fine-grained aggregate of plagioclase, quartz, and biotite (pl+qz+bt). Crossed Nicols transmitted light.*

Sample 14: TPK-12-056 29.3–29.4

Monzogranite

Subhedral to euhedral crystals of plagioclase, anhedral to interstitial quartz and K-feldspar, and subordinate crystals of biotite define a granular isotropic microstructure (Photomicrographs 14a and 14b).

Alteration: white mica: subtle within the plagioclase; **titanite**: subtle within the biotite.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		40–42	up to 1; rare up to up to 2.5	low relief, birefringence up to first-order white
plagioclase	white mica	32–33	up to 2.5	low relief, first-order grey birefringence, albite twinning
K-feldspar		20–21	up to 2.5	low relief, low birefringence (up to first-order grey)
biotite	titanite	3–4	up to 0.5	moderate relief, green to brown pleochroism, straight extinction
magnetite		tr	up to 0.2	low reflectance, dark grey, isotropic
zircon		tr	up to 0.01	high relief, high birefringence, straight extinction

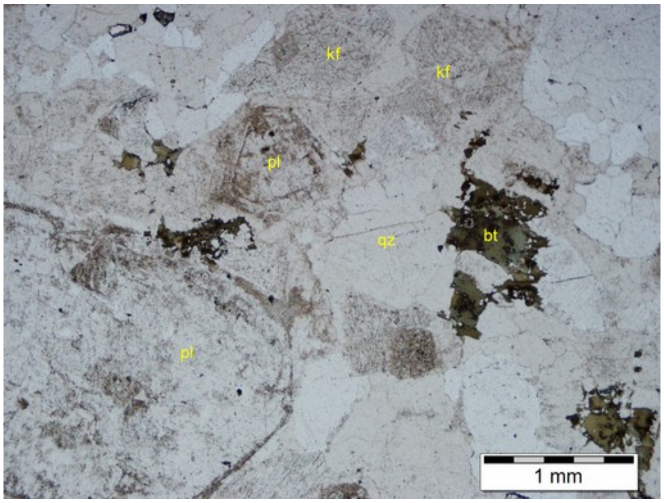
Plagioclase forms subhedral to euhedral crystals (up to 2.5 mm) randomly oriented within the quartz and K-feldspar. The plagioclase is subtly altered by very fine-grained flakes of **white mica**, which are concentrated along euhedral growth zoning edges within the crystals.

Quartz is anhedral to interstitial and occupies the interstices between the feldspars. The coarser crystals (up to 2.5 mm) show undulose extinction. The finer-grained crystals are the result of recrystallized coarser quartz.

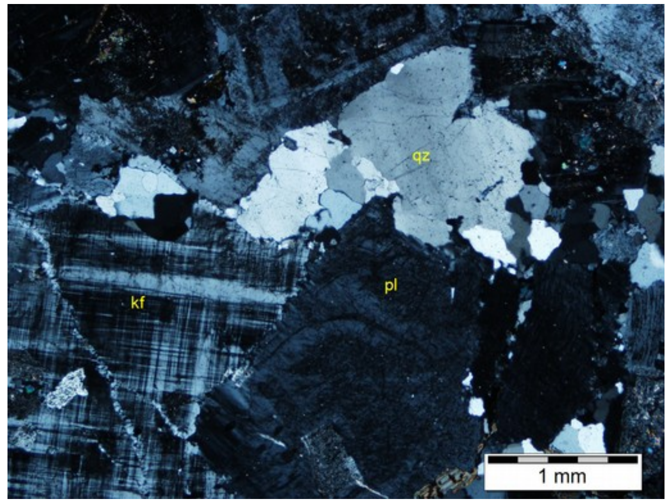
K-feldspar is anhedral to interstitial. It reaches 2.5 mm across, and its crystals are fresh. Most of the K-feldspar shows albite-pericline twinning, and in some cases the lesser twinned crystals host very fine- to fine-grained perthites.

Biotite occurs as rare books (up to 0.5 mm) and irregular clusters of fine-grained flakes, probably recrystallized from coarser crystals of biotite. The biotite crystals and crystal aggregates are dispersed within the quartz and the interstices between the quartz and the feldspars.

Very fine- to fine-grained alteration products of **titanite** are spatially associated with the biotite, which also host rare anhedral crystals of **magnetite** and very fine-grained **zircon**.



***Photomicrograph 14a**: Euhedral crystals of plagioclase (pl) are characterized by euhedral growth zoning and are intergrown with anhedral quartz (qz), K-feldspar (kf), and subordinate biotite (bt). Plane-polarized transmitted light.*



***Photomicrograph 14b**: Subhedral crystals of plagioclase are intergrown with interstitial K-feldspar (kf) and quartz (qz). Crossed Nicols transmitted light.*

Sample 15: TPK-12-056 185.37–185.49

Monzogranite

Subhedral to euhedral crystals of plagioclase are randomly oriented within medium-grained subhedral to anhedral K-feldspar and anhedral quartz, and they define a granular isotropic and slightly porphyritic microstructure.

Alteration: white mica and/or clay: subtle to weak within the plagioclase; **titanite-epidote**: subtle to weak after biotite.

Mineral	*Alteration and Weathering Mineral*	*Modal %*	*Size Range (mm)*	*Distinguishing Features*
quartz		37–39	up to 2 long	low relief, birefringence up to first-order white
plagioclase	white mica and/or clay?	31–33	up to 6 long	low relief, first-order grey birefringence, albite twinning
K-feldspar		25–27		low relief, low birefringence (up to first-order grey)
biotite	titanite	3–4	up to 0.5	moderate relief, green to brown pleochroism, straight extinction
magnetite		1–2	up to 0.4	low reflectance, dark grey, isotropic
	titanite	tr	up to 0.05	high relief, extreme birefringence
	epidote	tr	up to 0.1	high relief, high birefringence, yellow to green pleochroism, heterogeneous distribution of the birefringence colours
zircon		tr	<0.01	high relief, high birefringence, straight extinction

Quartz prevails over the plagioclase and the K-feldspar and forms inequigranular anhedral crystals occupying the interstices between the feldspars. The coarsest crystals (up to 2 mm long) show moderate undulose extinction. The finer-grained crystals form interlobate crystal aggregates (Photomicrograph 15).

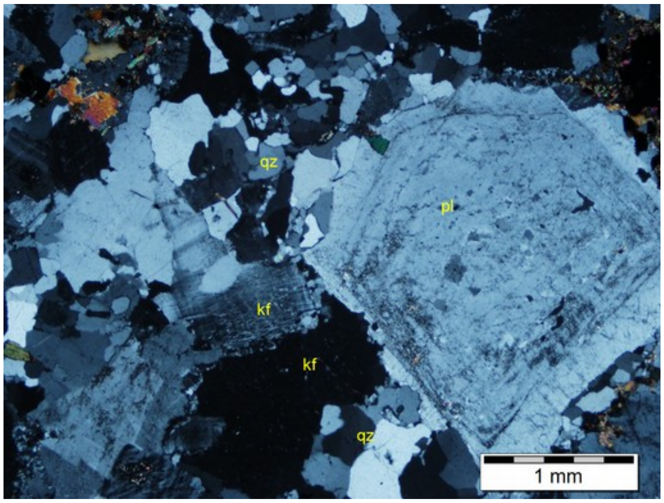
Plagioclase forms subhedral to euhedral crystals up to 6 mm long. The plagioclase is randomly oriented and defines a granular, slightly porphyritic microstructure. The plagioclase is subtly altered by very fine-grained unresolved aggregates (white mica and/or clay?) defining euhedral growth zoning within the plagioclase. In some cases, the plagioclase is interlobate with the quartz and the K-feldspar, indicating that a reaction occurred among these three minerals in the latest stages of the magmatic crystallization.

K-feldspar occurs as anhedral to subhedral crystals (up to 2 mm across). In some cases, the K-feldspar shows albite-pericline twinning; in other cases, it hosts very fine to fine-grained perthitic exsolutions. The twinning and the perthites were generated during the late crystallization stage. Both features indicate that the K-feldspar is of magmatic origin and was not generated by an alteration event.

Biotite forms rare books (up to 0.5 mm) and irregular clusters of fine-grained flakes after coarser lamellae (up to 1.5 mm long).

Subhedral crystals of **magnetite** (up to 0.4 mm) are spatially associated with the fine-grained clusters of biotite.

Very fine-grained **titanite**, **epidote**, and **zircon** are dispersed within the biotite crystals. The titanite and the epidote are alteration products, but the zircon is an inclusion, which despite its very fine grain size is distinguished by the pleochroic halo generated within the hosting biotite.



***Photomicrograph 15**: A subhedral crystal of plagioclase (pl) is immersed within anhedral and interstitial quartz (qz) and K-feldspar (kf). Crossed Nicols transmitted light.*

Sample 16: H755585

Silicified white mica-schist

Inequigranular xenoblastic crystals of quartz overprinted a very fine-grained matrix of white mica, quartz, and K-feldspar. The very fine-grained flakes of white mica are preferentially iso-oriented within the interstitial matrix.

Alteration: quartz: strong; **K-feldspar(?)**: weak; **pyrite**: subtle.

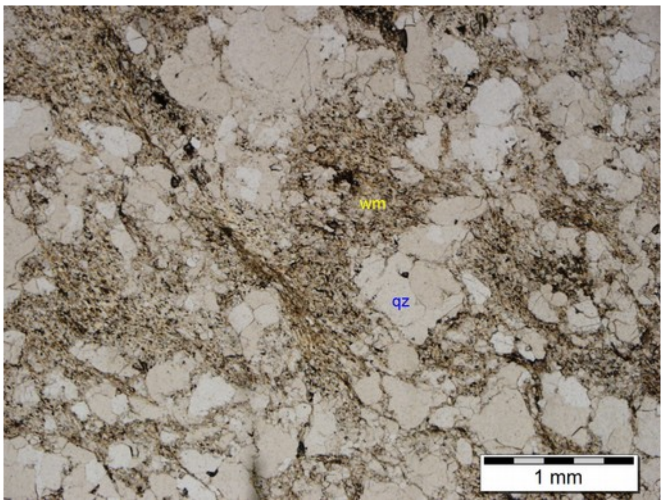
Mineral	***Alteration and Weathering Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
	quartz	80–82	0.01–0.6	low relief, birefringence up to first-order white
white mica		15–20	up to 0.5	moderate relief, birefringence up to third-order blue, straight extinction
	K-feldspar(?)	2–4	up to 0.4	low relief, low birefringence (up to first-order grey)
	pyrite	tr	0.08–0.5	high reflectance, creamy white, isotropic
	rutile	tr	up to 0.01	high relief, brown under plane-polarized light, anisotropic

Quartz occurs as inequigranular (0.01–0.6 mm) xenoblastic crystals overprinting the foliated matrix. The quartz shows weak and only in some cases moderate undulose extinction, indicating that its crystallization post-dated the deformation occurred within the very fine-grained matrix. Further, the quartz forms blocky to polygonal crystal aggregates within some of the aggregates. The quartz forms a u-shaped infill crosscutting the foliation in the upper part of this polished thin section. Within the monomineralic infill, the quartz forms a fine- to medium-grained (up to 0.5 mm) polygonal aggregate.

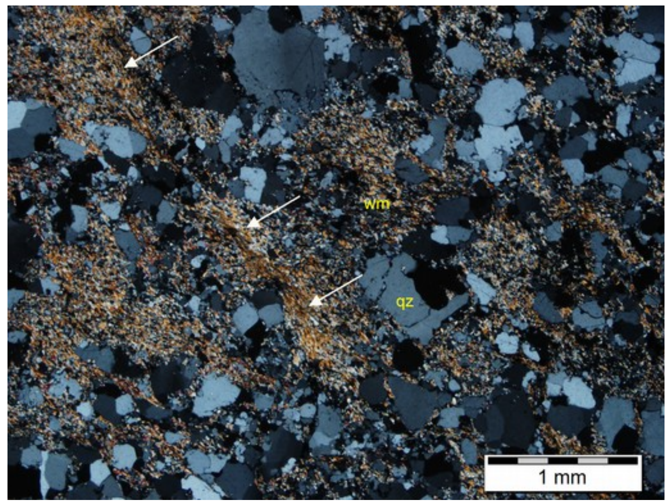
White mica is very fine to fine grained and is concentrated within the interstices between the fine- to medium-grained quartz (Photomicrographs 16b and 16c). The very fine-grained flakes are preferentially iso-oriented and define a continuous foliation within the interstitial matrix. In some cases (e.g., Photomicrograph 16b), they define irregular cleavage domains, which in rare cases wrap the xenoblastic crystals of quartz (Photomicrograph 16c) that recrystallized after the deformation. The white mica is intergrown with very fine-grained quartz, probable plagioclase, and K-feldspar. I interpret the white mica as having been, at least in part, produced by the destabilization of plagioclase.

K-feldspar is fine grained, and its xenoblasts are fresh and clustered within an irregular infill domain, which probably post-dated the deformation.

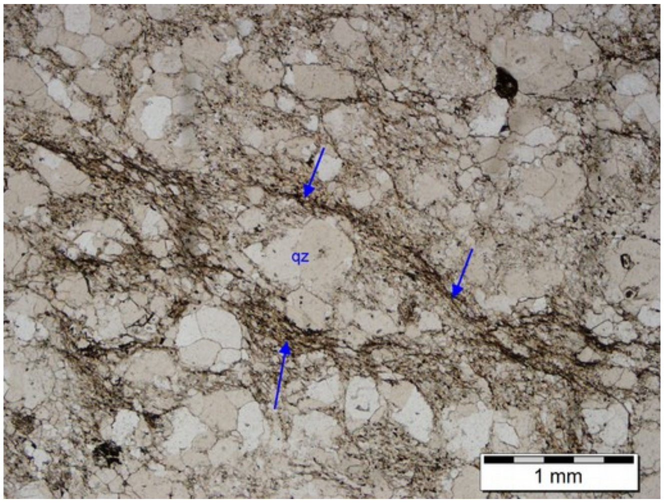
The only sulphide crystals in this polished thin section are two crystals of **pyrite** (Photomicrograph 16e) immersed within the matrix and spatially associated with the white mica and K-feldspar. The bigger crystal (~0.5 mm across) hosts abundant inclusions, which are mostly unresolved and are probably made up of white mica and quartz.



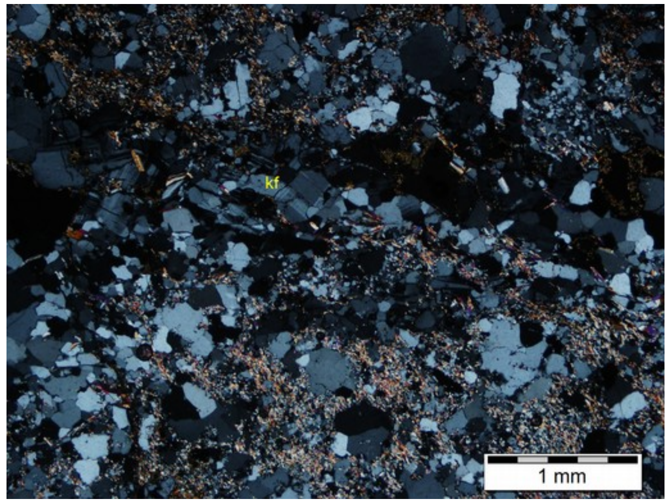
Photomicrograph 16a*: Xenoblastic crystals of quartz are associated with a very fine-grained matrix dominated by white mica (wm). Plane-polarized transmitted light.*



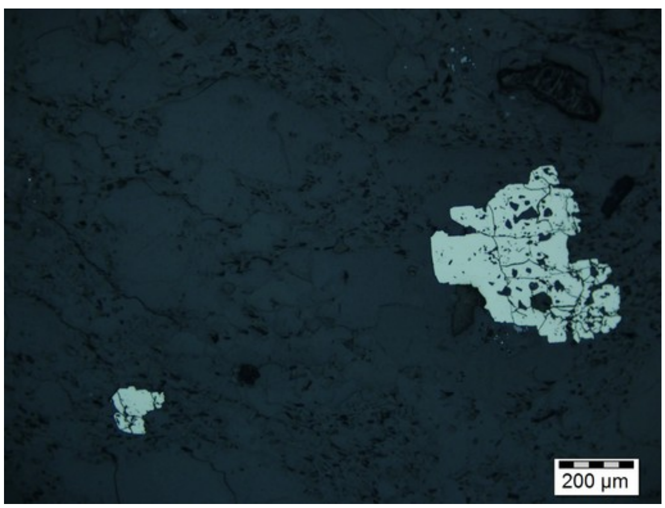
Photomicrograph 16b*: Same area as shown in Photomicrograph 16a. The white mica forms rare cleavage domains (white arrows), and the quartz forms relatively undeformed blocky to polygonal aggregates. Crossed Nicols transmitted light.*



Photomicrograph 16c: *Only in rare cases do the cleavage (blue arrows) domains wrap the crystals of quartz (qz). Plane-polarized transmitted light.*



Photomicrograph 16d: *Fine- to medium-grained crystals of K-feldspar are clustered within and around an irregular infill domain. Crossed Nicols transmitted light.*



Photomicrograph 16e: *One of the two crystals of pyrite hosts abundant mostly unresolved mineral inclusions. Plane-polarized transmitted light.*

Sample 17: H755545

Quartz-white mica schist

Irregular to lenticular aggregates of quartz and xenoblastic crystals and crystal aggregates of K-feldspar are immersed within a fine-grained matrix of quartz, white mica, plagioclase(?), and biotite. The white mica within the granoblastic aggregate shows a weak preferred dimensional orientation and defines a weak schistosity.

Alteration: iron oxides: subtle after pyrite.

Mineral	***Alteration and Weathering Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
quartz		75–77	up to 0.2; rare up to 0.5	low relief, birefringence up to first-order white
K-feldspar		8–9	up to 1.8 long	low relief, low birefringence (up to first-order grey)
white mica		7–8	up to 0.2	moderate relief, birefringence up to third-order blue, straight extinction
plagioclase(?)		5–10	up to 0.1	low relief, first-order grey birefringence, albite twinning
pyrite	iron oxides	1.2–1.5	up to 0.4	high reflectance, creamy white, isotropic
biotite		0.2	up to 0.2	moderate relief, green to brown pleochroism, straight extinction
ilmenite		tr	up to 0.05	low reflectance, dark grey, anisotropic
epidote		tr	up to 0.1	high relief, high birefringence, yellow to green pleochroism, heterogeneous distribution of the birefringence colours

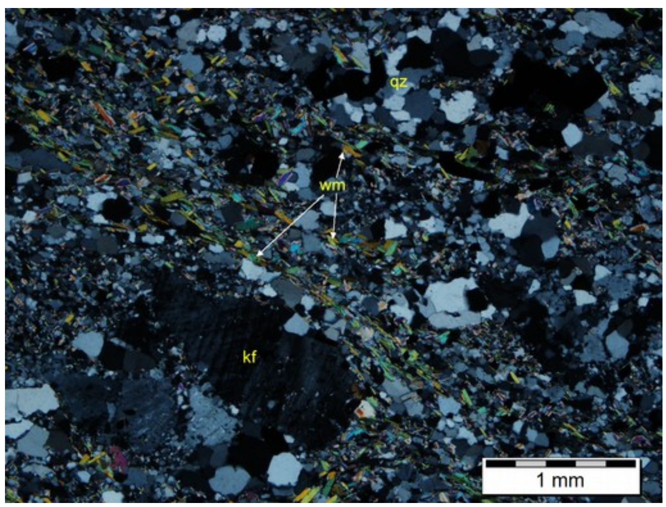
Quartz is fine grained (up to 0.2; rare up to 0.5 mm) and forms blocky to polygonal aggregates within irregular to lenticular monomineralic aggregates. Fine-grained crystals of quartz are intergrown with fine-grained white mica, K-feldspar, probable plagioclase, and biotite within the matrix.

K-feldspar forms medium-grained xenoblastic crystals defining porphyroclastic aggregates in association with subordinate quartz, and are wrapped by the weak foliation defined by the white mica (Photomicrograph 17). The K-feldspar is dispersed, probably together with subordinate **plagioclase**, within the quartz-white mica-bearing foliated matrix.

White mica is fine grained and defines a continuous foliation within the fine-grained matrix. In some cases, the white mica defines thin, discontinuous cleavage domains; however, most of the foliation can be classified as weak and continuous (see definition in Passchier and Trouw 2005).

Fine-grained xenoblastic **pyrite** (up to 0.2; rare up to 0.4) is spatially associated with the quartz-rich domain and shows a subtle alteration by **iron oxides**. Because some of the pyrite crystals are surrounded by probable strain shadows filled in by quartz, I tentatively interpret its crystallization as syntectonic.

Biotite is subordinate to the white mica and occurs as sparse fine-grained lamellae within the matrix. In some cases, the biotite and the white mica form irregular clusters elongate parallel to the schistosity.



***Photomicrograph 17**: A porphyroclastic aggregate of K-feldspar (kf) and quartz, and a lenticular aggregate of quartz (qz) are wrapped by the weak foliation defined by the fine-grained white mica (wm). Crossed Nicols transmitted light.*

Sample 18: W129984

Albite-dolomite/ankerite-biotite alteration zone

Pyrite-dolomite/ankerite-K-feldspar-biotite vein

Dolomite/ankerite-calcite vein

A fine-grained xenoblastic aggregate of plagioclase and subordinate dolomite and biotite (Photomicrograph 18a) define an inequigranular xenoblastic microstructure, which is crosscut by an irregular pyrite-K-feldspar-dolomite vein and irregular dolomite veinlets.

Alteration: albite: strong; **dolomite/calcite-biotite**: weak.

Mineral	***Alteration and Weathering Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
albite alteration zone (~73% of PTS)				
	plagioclase (albite)	65–67	up to 1	low relief, first-order grey birefringence, albite twinning
	dolomite	2–3	up to 0.5	high relief, extreme birefringence, slow reaction to cold dilute (10%) HCl
	biotite	1–1.5	up to 0.2; rare up to 0.5	moderate relief, green to brown pleochroism, straight extinction
	K-feldspar	0.5	up to 0.4	low relief, low birefringence (up to first-order grey)
pyrite-dolomite/ankerite-K-feldspar-biotite vein (~20% of PTS)				
pyrite		9.5	9	high reflectance, creamy white, isotropic
dolomite		9	up to 3.5 long	high relief, extreme birefringence, slow reaction to cold dilute (10%) HCl
K-feldspar		5	up to 4 long	low relief, low birefringence (up to first-order grey)

Mineral	***Alteration and Weathering Mineral***	***Modal %***	***Size Range (mm)***	***Distinguishing Features***
biotite		0.5	up to 1.2 long	moderate relief, green to brown pleochroism, straight extinction
dolomite/ankerite-calcite vein (~3% of PTS)				
dolomite/ankerite		2.5		
calcite		0.5		high relief, extreme birefringence, brisk reaction to cold dilute (10%) HCl
oxidized biotite(?)		tr		

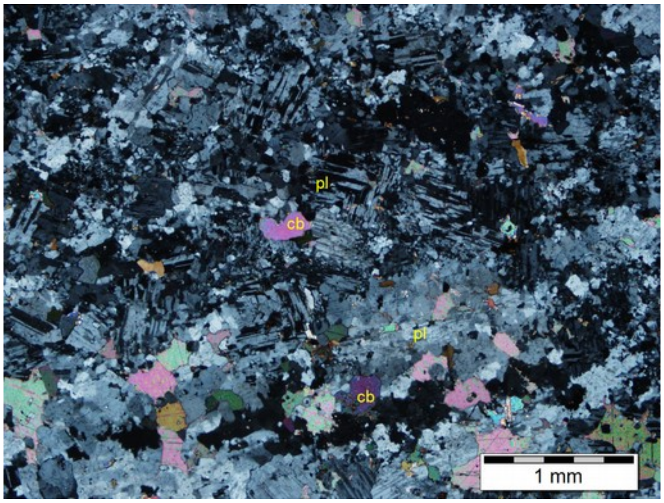
Plagioclase (**albite**) forms a fine to medium-grained interlobate aggregate, which dominates the composition of the host rock (Photomicrograph 18a). The plagioclase shows albite twinning, and its crystals are fresh. The plagioclase is intergrown with subordinate xenoblastic crystals of dolomite (up to 0.5 mm) and fine-grained randomly oriented biotite (up to 0.2; rare up to 0.5 mm). I interpret the albite as the product of an intense alteration event, which completely destroyed the pre-existing microstructure and mineralogy in the host rock.

Dolomite/ankerite is concentrated within irregular veinlets crosscutting the host rock, in which it forms inequigranular (up to 0.8 mm) polygonal crystal aggregates associated with subordinate **calcite** (Photomicrograph 18c) within the dolomite/ankerite-calcite vein (up to 1.5 mm thick). The dolomite/ankerite is subordinate to the pyrite and the K-feldspar within the irregular vein, and it is dispersed as xenoblastic crystals of up to 0.5 mm across within the albite-rich host rock. The dolomite/ankerite is associated with subordinate calcite, which occur within the dolomite/ankerite's interstices.

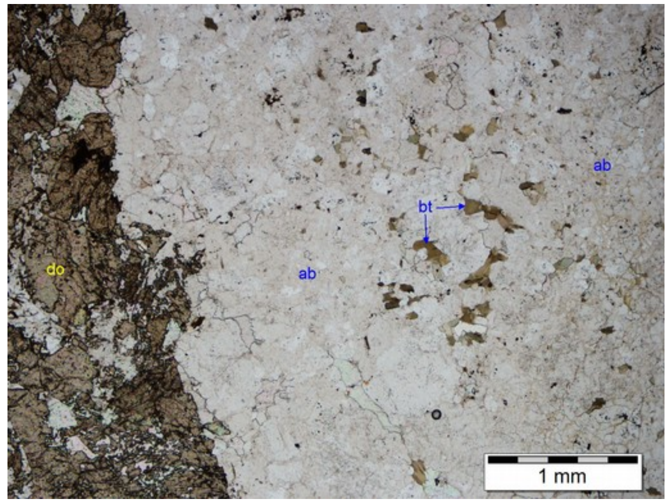
K-feldspar is concentrated within the irregular (up to 2 mm thick) vein as xenoblastic crystals up to 4 mm long. The K-feldspar is dispersed within the host rock as fine-grained xenoblastic crystals.

Pyrite forms a coarse (9 mm in diameter) xenoblastic crystal at the intersection between the dolomite/ankerite pyrite-K-feldspar vein and the dolomite/ankerite-calcite vein. The pyrite is poikiloblastic and hosts inclusions of K-feldspar, dolomite/ankerite, and biotite.

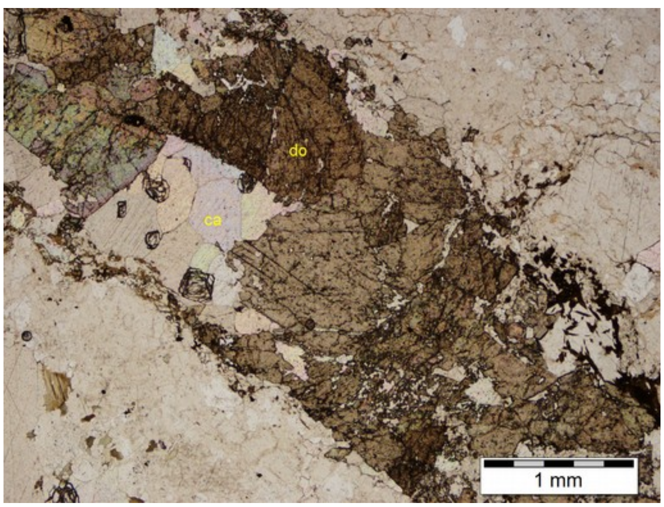
Biotite is dispersed within the albite-rich alteration zone as fine- to medium-grained lamellae and forms irregular clusters and lamellae up to 1.2 mm long within the pyrite-dolomite/ankerite-K-feldspar-biotite vein. Probable oxidized flakes of biotite occur along the veinlet walls dolomite-ankerite-calcite vein. Also because of its occurrence within the vein, I interpret the biotite dispersed within the host rock as an alteration mineral.



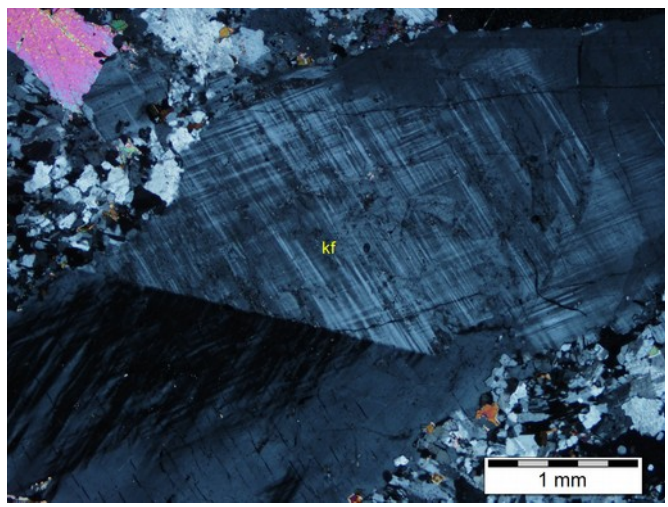
***Photomicrograph 18a**: Xenoblastic crystals of albite (pl) dominate the composition of the host rock and define an inequigranular xenoblastic microstructure. Crossed Nicols transmitted light.*



***Photomicrograph 18b**: The dolomite/ankerite-calcite vein (do) crosscuts the albite-rich host rock (ab), in which fine-grained flakes of biotite (bt) are dispersed. Plane-polarized transmitted light.*



***Photomicrograph 18c**: Dolomite/ankerite (do) crystals prevail over the calcite (ca) within one of the irregular veins. Plane-polarized transmitted light.*



***Photomicrograph 18d**: Coarse-grained crystals of K-feldspar (kf) occur in the vein crosscutting the albite-rich host rock. Crossed Nicols transmitted light.*

Sample 19: W130465

Albite-quartz-biotite schist

An irregular layering is defined by medium-grained quartz-chalcopyrite-pyrite±epidote±chlorite±biotite domains (Photomicrograph 19a), and fine-grained quartz-chlorite-pyrite-biotite-epidote-albite domains (Photomicrograph 19b). A weak foliation is defined by the biotite within the biotite-epidote-chlorite-pyrite-albite domains.

Mineral	Alteration and Weathering Mineral	Modal %	Size Range (mm)	Distinguishing Features
quartz		35–37	up to 0.6	low relief, birefringence up to first-order white
chlorite		18–20	up to 1	moderate relief, very weak pleochroism with pale-green tints, straight extinction, low birefringence
biotite		14–15	up to 0.1	moderate relief, green to brown pleochroism, straight extinction
chalcopyrite		12–14	up to 0.8 long	high reflectance, yellow
pyrite		8–10	up to 1.2	high reflectance, creamy white, isotropic
epidote		8–10	up to 0.25	high relief, high birefringence, yellow to green pleochroism, heterogeneous distribution of the birefringence colours
albite		5–6	0.02–0.2	low relief, first-order grey birefringence, albite twinning
ilmenite(?)		tr	up to 0.2	low reflectance, dark grey, anisotropic

Quartz forms inequigranular interlobate to polygonal crystals (up to 0.6 mm) concentrated within irregular infill domains, which are associated with chalcopyrite and pyrite (Photomicrograph 19a). In some cases, the quartz occupies the strain shadows around the pyrite in association with lamellae of biotite (Photomicrograph 19c). These microstructures indicate that the quartz, together with some of the biotite crystals, crystallized during a ductile deformation event, which triggered the emplacement of the quartz-chalcopyrite-pyrite±epidote±chlorite±biotite domains.

Chlorite is spatially associated and overprinted the biotite. The chlorite post-dated the crystallization of biotite as indicated by the more abundant randomly oriented crystals and the epitaxial replacements of the fine-grained lamellae of biotite. The chlorite forms fine- to medium-grained crystals (up to 1 mm) and shows negative elongation, indicating its high aluminum content.

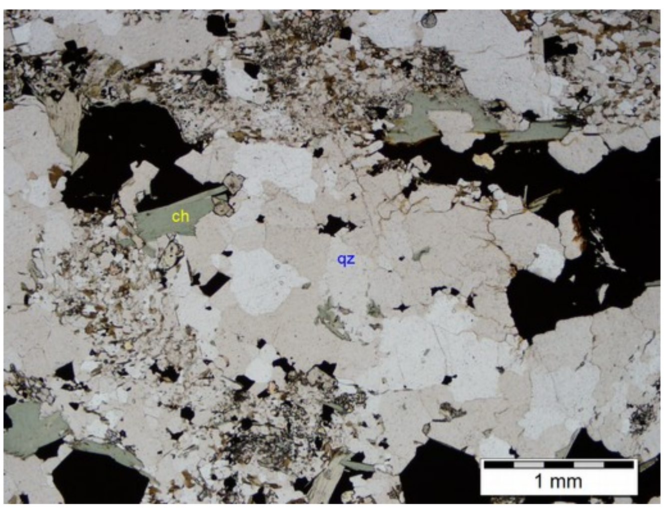
Biotite forms very fine- to fine-grained flakes concentrated within weakly foliated irregular domains, which probably represent a sedimentary protolith. Within these domains, the biotite is preferentially iso-oriented and defines weak continuous foliation. The biotite is variably altered by fine-grained chlorite. The biotite's weak iso-orientation within the phyllosilicate-rich domains and the occurrence of biotite within the strain shadows around the pyrite indicate that the biotite crystallized during the ductile deformation event and was part of the infill paragenesis, as already observed in Sample 18.

Chalcopyrite forms xenoblastic crystals (Photomicrograph 19e) within the quartz-rich infill domains, and it is intergrown with subidioblastic crystals of pyrite and quartz.

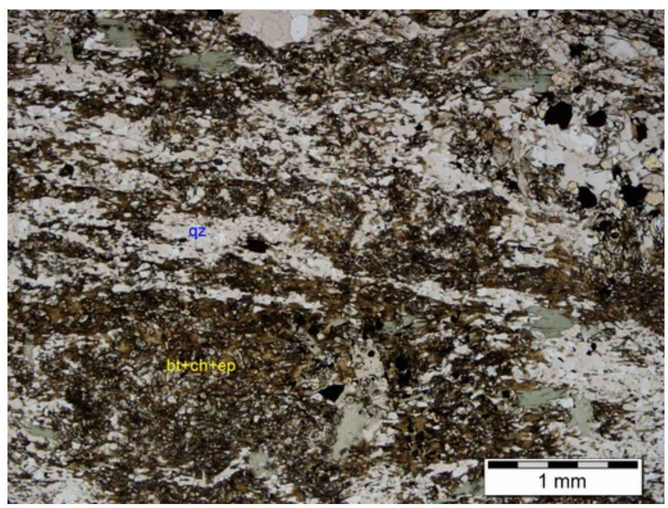
Pyrite is subordinate to the chalcopyrite and tends to form xenoblastic crystals dispersed within the quartz, subidioblastic crystals intergrown with the chalcopyrite, and crystal clusters dispersed within the albite-phyllosilicate-rich domains.

Epidote is very fine to fine grained (up to 0.25 mm), and it forms irregular clusters associated with the albite and the phyllosilicates (Photomicrograph 19d).

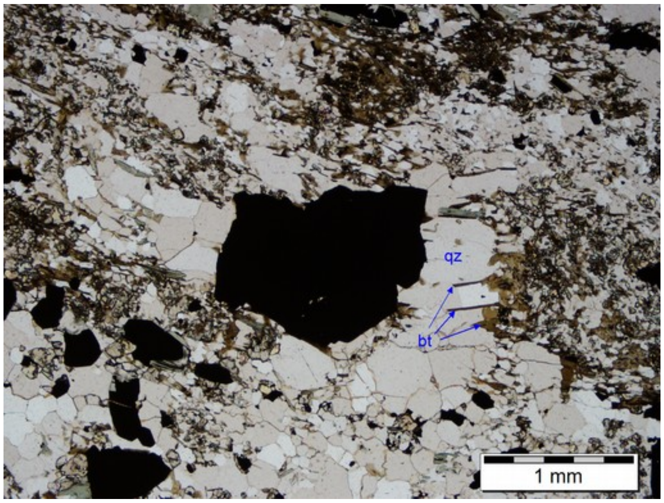
Plagioclase (albite) forms fine-grained crystal aggregates associated with very fine- to fine-grained crystals of quartz; flakes of biotite and chlorite; epidote; and subordinate sulphides (Photomicrograph 19b).



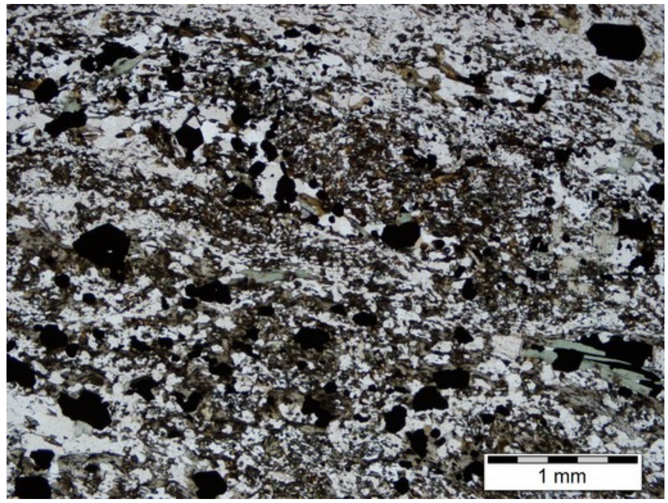
***Photomicrograph 19a**: A quartz-rich infill domain (qz) hosts abundant sulphides (opaque) and subordinate chlorite (ch). Plane-polarized transmitted light.*



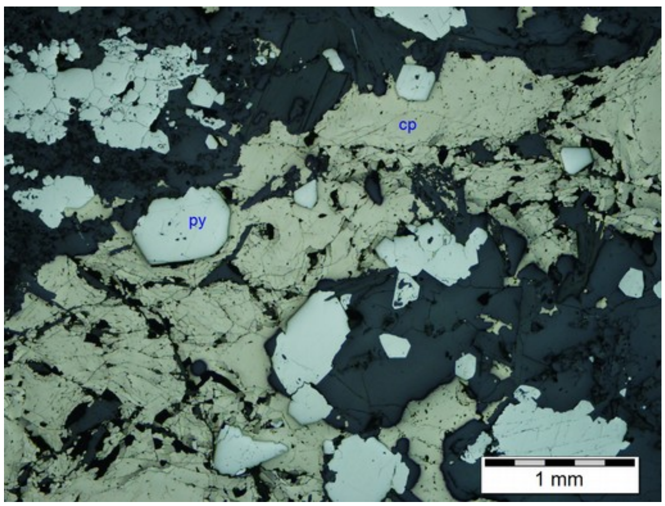
***Photomicrograph 19b**: Very fine- to fine-grained crystal aggregates of quartz (qz) are intergrown with biotite, chlorite, and epidote (bt-ch+ep). Plane-polarized transmitted light.*



Photomicrograph 19c*: Quartz (qz) and biotite (bt) crystals filled in the strain shadows surrounding some of the crystals of pyrite within the infill domains. Plane-polarized transmitted light.*



Photomicrograph 19d*: Fine-grained crystals of pyrite (opaque) are dispersed within the quartz-epidote-chlorite-biotite clusters. Plane-polarized transmitted light.*



Photomicrograph 19e*: Xenoblastic chalcopyrite (cp) is intergrown with subordinate and subhedral crystals of pyrite within the quartz-rich infill domains. Plane-polarized transmitted light.*

7. Glossary of Microstructural and Petrologic Terms Used in the Text

a, b, c: Symbols used to describe the crystallographic axes of the crystals.

alteromorph: Mineral or group of minerals developed by partial to complete alteration or weathering of a primary mineral. An alteromorph does not always preserve the shape, size, and volume of the mineral that it has replaced.

amoeboid: With strongly curved and lobate interlocking grain boundaries; like an amoeba.

anhedral: Describes irregular grains showing no crystal-face boundaries.

cleavage domain: Layer or lens with a relatively high content of elongate grains (such as micas or amphiboles) and low content of equidimensional grains (such as quartz, feldspar, or carbonate). Together with microlithons they make up a spaced foliation. Micas in cleavage domains commonly have a preferred orientation parallel to or at a small angle to the domain.

decussate: Describes a microstructure characterized by criss-cross (random) arrangement of elongate mineral grains dominated by crystal faces (rational-impingement boundaries); common in sheet silicate minerals (e.g. biotite, muscovite) and wollastonite, especially in contact metamorphic aureoles.

euhedral: Describes a mineral with crystal faces.

foliation: Planar microstructural element that occurs penetratively on a mesoscopic scale in a rock. Primary foliation includes bedding and igneous layering; secondary foliations are formed by deformation-induced processes.

groundmass: Aggregate that is distinctly finer grained than the phenocrysts in an igneous rock.

interlobate: With irregular lobate grain boundaries.

interstitial: Describes a mineral occupying angular cavities or interspace fillings between other minerals.

matrix: Aggregate that is distinctly finer grained than the crystals, clasts, and lithic fragments in a metamorphic and volcaniclastic rock. The usage is similar to that of “groundmass” in an igneous rock.

microlithon: Layer or lens with a relatively small degree of preferred orientation compared to cleavage domains. A crenulated older foliation may be present in microlithons. Together with cleavage domains, microlithons make up a spaced foliation.

phenocryst: Crystal (commonly euhedral) that is distinctly larger than the other minerals around it.

pleochroism: A property of certain crystals of absorbing light to an extent that depends on the orientation of the vector of the light with respect to the optic axes of the crystal.

poikilitic: Describes a crystal with numerous, randomly oriented inclusions of other minerals.

pseudomorph: Mineral or group of minerals developed by partial to complete alteration or weathering of a primary mineral. The pseudomorph preserves the shape, size, and volume of the mineral that it has replaced.

relict (residual structure): Structure remaining after a deformation or metamorphic event, such as a porphyroclast in a mylonite, a phenocryst in a metamorphosed volcanic rock, or a partially replaced porphyroblast in a retrograde metamorphic rock. “Relict” is sometimes used as a synonym for “residual.”

strain shadow: Region adjacent to a clast or porphyroblast that is protected from deformation, such that it may preserve earlier microstructures that have been obliterated from the rest of the matrix.

undulose (undulatory) **extinction**: Wavy, nonuniform extinction in a single grain, owing to slight bending of the crystal. Patchy, irregular undulose extinction can be due to submicroscopic fractures, kinks, and dislocation angles.

X, Y, Z: Symbols used to describe the optical indicatrix of the crystals.