DESCRIPTIVE NOTES

INTRODUCTION

This map is one of a set of two 1:125 000 scale colour Open File maps (Heninga Lake - Kogtok River area, Hanmer et al., 1998a; Carr-Kaminak-Quartzite lakes area, Irwin et al., 1998), published as contributions to the Western Churchill NATMAP project. These maps present the results of bedrock mapping by the Geological Survey of Canada and the Government of the Northwest Territories in parts of the Kaminak Lake (NTS 55 L), Henik Lakes (65 H) and Ferguson Lake (NTS 65- I) map areas, Kivalliq region, Northwest Territories. Previous work in the area includes bedrock mapping at 1:250 000 scale by Davidson (1970a, 1970b) and Bell (1971), 1:50 000 by Aspler et al. (1992), Irwin (1994, 1995, 1996, 1997) and Relf (1995), and 1:30 000 by Laporte et al. (1981). Fieldwork by the Geological Survey of Canada in 1997 was divided between upgrading the geoscience knowledge base in the areas of recent detailed mapping north and east of Kaminak Lake, and new mapping in adjacent areas to the south and west. The Carr-Kaminak-Quartzite lakes map is a compilation of new data and interpretations from the 1997 mapping, and the above cited 1:50 000 scale data of Irwin and Relf. Detailed descriptions of the lithological and structural characteristics of the Archean Kaminak Group and associated plutonic rocks within the map area are presented elsewhere (Irwin, 1995, 1996; Relf 1995; Hanmer et al., 1998b, 1998c). Descriptions of the extensive Quaternary surficial deposits (**Q**) will be presented in another publication (McMartin, in prep.). The principal mineral occurrences are located on the maps and useful information on these occurrences is summarized on the accompanying table. More information on the metal endowment of the Kaminak greenstone belt will be presented in another publication (Goff and Kerswill, in prep.)

Kaminak greenstone belt

The Kaminak greenstone belt is a segment of the ca. 500 km long "Ennadai-Rankin greenstone belt". The latter extends from Pistol Bay on the Hudson Bay coast to northern Saskatchewan (Miller and Tella, 1995; Aspler and Chiarenzelli, 1996). In the Kaminak Lake area, the Kaminak Group was defined as an assemblage of volcanic rocks, flanked to the north by clastic sedimentary rocks (Davidson, 1970a).

In the present study, field determination of the compositions of volcanic and volcaniclastic rocks was based on colour and phenocryst content. At low metamorphic grade (chlorite-albite), black to dark green rocks ± plagioclase phenocrysts were called mafic, grey-green to grey rocks ± plagioclase and/or hornblende phenocrysts were termed intermediate, and light grey, cream to white rocks ± potassium feldspar and/or quartz phenocrysts were mapped as felsic. However, locally pervasive silicification, or the growth of metamorphic minerals, make such field determinations difficult. Segments of distinct lithological associations, described below, can be traced over tens of kilometres along strike, but are invariably truncated by large plutons, and inferred faults. The highly discontinuous map pattern obscures the relative age of lithological packages. Three U-Pb zircon ages (2697 ±1.4, 2692 ±1, 2682 ±3 Ma) have been obtained from felsic volcanic rocks from Spi Lake to Quartzite Lake (Mortensen and Thorpe, 1987; Patterson and Heaman, 1990). No basement to the Kaminak Group has been identified.

KAMINAK GROUP

Mafic to intermediate volcanic rocks

Homogeneous, massive mafic flows (**Amm**) are fine grained, dark green and generally featureless, except for local, small plagioclase phenocrysts, and minor interflow siltstones. The interiors of thicker flows (>5 m) tend to be coarser than the margins, and can be confused with microgabbro sills. Pillowed flows (**Amp**) occur throughout the map area, locally forming homoclinal panels up to 4 km thick. Undifferentiated volcanic rocks (**Amu**) represent fine grained homogeneous rocks of uncertain origin, but may include massive and locally pillowed flows, as well as thinly banded rocks which may represent epiclastic rocks or tuffs. However, in at least some cases, the presence of strain gradients indicates that the banded rocks are highly deformed pillowed flows. All three mafic to intermediate volcanic map units may contain sheets of fine grained, apparently synvolcanic, gabbro. Thin, laterally discontinuous siliceous beds occur episodically throughout the volcanic sequences. They comprise white to light grey, featureless horizons, rarely exceeding 2-3 m in thickness. In the field it is difficult to determine whether these rocks are quartzose epiclastic rocks, silicified tuffs, or recrystallised cherts.

Intermediate to mafic volcanic rocks

Massive intermediate flows (**Aim**) are commonly interlayered with intermediate pillow lavas (**Aip**). Large volumes of intermediate volcanic breccia, conglomerate and arenite (**Aiv**) occur throughout the study area, particularly between Heninga and Turquetil lakes, south of Kaminak Lake, and at Quartzite Lake. The volcanic arenites are composed of variable proportions of small (<5 mm) fragments of feldspar crystals set in a fine grained, grey-green intermediate matrix. The conglomerates and breccias are composed of mafic to felsic volcanic rock fragments, locally with diorite, tonalite, quartz arenite and jasper clasts, set in a fine grained, grey-green intermediate matrix; locally the matrix is volcanic arenite. Lack of obvious bedding, the coarse grain size and overall textural immaturity of the conglomerate, combined with recognition of local source-rock types in the principal clast populations, suggest that some of these rocks were derived from nearby volcanoes of variable composition, and deposited as sedimentary gravity flows. It was not possible to unequivocally differentiate epiclastic from pyroclastic rocks.

Felsic volcanic rocks

Map-scale units of felsic volcanic rocks (**Af**) are well developed between Kaminak and Quartzite lakes. Banded, quartz- and K-feldspar-phyric rhyolites form autoclastic breccias along the northwestern margin of a 10 km by 5 km quartz-feldspar porphyry body (**Ap**), interpreted as a large felsic dome. The dome is mantled by a carapace of felsic breccias and fine grained quartz-phyric rhyolite. The former comprise angular rhyolite fragments, 2-20 cm in diameter, set in a matrix of similar composition. The latter are fine grained, homogeneous layers, some times with feldspar phenocrysts, which are commonly difficult to identify as either flows or sediments. The felsic volcanic rocks are overlain by coarse volcaniclastic rocks, interpreted as locally reworked flows and pyroclastic detritus.

Mixed volcanic rocks

A distinct lithological association with relatively high proportions of felsic vs intermediate to mafic materials (1:2 - 1:3) occurs from Spi Lake to Tootyak Lake, and in a number of areas along the northern side of Kaminak Lake between Carr and Quartzite lakes. In general, the intermediate to mafic rocks range from pillow lavas, massive flows, and gabbro sills to volcanic breccias and arenites. Interspersed within them are 5 m to 1 km thick horizons of felsic volcanic rocks similar to **Af**. This "bimodal" assemblage (**Av**) is associated with abundant magnetite-chert-carbonate banded iron formations southwest of the Kam deposit, central Kaminak Lake, and magnetite-hematite-chert facies iron formation northwest of Tootyak Lake.

Clastic sedimentary rocks

A distinct and mappable facies of clastic sedimentary rock (**As**) occurs around Kaminak and Quartzite lakes. North and south of Kaminak Lake this unit is characterised by normally graded, lithic arenite-siltstone rhythmites with average bed thickness of 20-30 cm. This map unit is particularly well exposed along the west side of a peninsula on the northeast side of Quartzite Lake, where it occurs in a continuous section more than 500m thick. The section youngs to the north and comprises texturally mature polymictic conglomerate overlain by coarse, bedded sandstones, massive sandstone and graded sandstone/siltstone rhythmites. These rocks are in fault contact with banded iron formation (see below) and quartz-feldspar porphyry; however, locally derived volcanic clasts in the conglomerate suggest an unconformable relationship with underlying Kaminak Group rocks, as suggested by Davidson (1970a). Preliminary analysis of the lithofacies and their associations suggest a submarine to alluvial fan origin for most of the coarse grained section. Finer grained siltstone/sandstone lithofacies are interpreted as distally equivalent turbidites. This map unit overlies felsic to intermediate volcanic flows and breccias (**Aiv**) on the west side of Quartzite Lake and on northern Kaminak Lake and therefore appears to be uppermost in the Kaminak Group. Very coarse breccias, interpreted as proximal equivalents to the rocks just described, occur between Quartzite and Kaminak lakes.

Iron formation

Banded iron formation (BIF) occurs southwest of Kaminak Lake, where it is associated with normally graded volcanic arenite/siltstone (**As**) within thick sequences of massive to pillowed mafic to intermediate volcanic rocks. BIF consists of thickly laminated to thinly bedded magnetite, pigmentary hematite and grey chert, interlayered with thin to thick beds of grey-green volcanic arenite. The distribution of these rocks is clearly defined by pronounced linear anomalies in the regional aeromagnetic field (Geological Survey of Canada, 1987). However, outcrops are small and sparse. Oxide layers exhibit very thin, rhythmic, parallel lamination, with no tractional sedimentary structures, attesting to deposition in quiet water. In the northern part of Kaminak Lake, opposite the Kam deposit, Fe-carbonate interlayers occur with the oxide layers, chert and possible felsic tuff. North of Tootyak Lake, iron oxide is interbedded with 10-40 cm thick, normally graded beds of felsic lithic arenite. Some beds contain 5-50 cm rip-ups of iron oxide rhythmite, confirming their origin as gravity flows. Other potential indicators of slope instability include syn-sedimentary folds and clastic dykes. The iron formations display many attributes of the Algoma type (Gross, 1966), deposited in a quiet water basinal setting, below storm wave base (>100m). Intercalated felsic volcaniclastic sediments, tuffs and magmatic dykes are interpreted to indicate proximity to an active volcanic arc. Pyrite and/or pyrrhotite are locally abundant in iron-formation.

PLUTONIC ROCKS

The central part of Kaminak Lake is underlain by at least four texturally distinct units of diorite (**Ad**): (i) medium- to fine-grained, equigranular, hornblende leucodiorite, (ii) plagioclase-phyric to megacrystic diorite, (iii) hornblende oikocrystic (<3 cm) diorite, and (iv) intimately admixed components of all three. They are collectively called the central Kaminak diorite suite. Locally, these diorite units appear to both intrude and grade into adjacent hypabyssal and extrusive units of the Kaminak Group. They commonly contain abundant centimetre- to metre-scale xenoliths of locally derived supracrustal rocks. These include mafic to silicic volcanic and sedimentary rocks that have been deformed into foliated schlieren, lending a gneissose appearance to the diorite. Rarely, the diorites cross-cut a medium- to coarse-grained, probably syn-volcanic biotite tonalite, but more typically they are themselves cross-cut by silicic granitoids. The diorites are also cross-cut by intermediate dikes with chilled margins, apparently similar in composition to parts of the Kaminak Group. These observations suggest that at least some of the diorites are synvolcanic.

Southeast of Kaminak Lake, the Kaminak pluton ranges in composition from granodiorite to gabbro, but is predominantly medium-grained, hornblende-biotite granodiorite (**Agd**) to tonalite. The pluton has a disruptive, net-vein contact along its northeastern margin, where it incorporates rafts and blocks of volcanic rocks of the Kaminak Group. In contrast, its western margin is characterized by hornfelsed, highly-strained, banded metavolcanic rocks. There, variably deformed veins emanating from the pluton suggest that the wallrock was deformed as a consequence of the pluton emplacement. To the south and east, the Kaminak pluton intrudes slightly older, probably comagmatic, quartz diorite (**Aqd**), diorite (**Ad**), magnetite-bearing diorite (**Admt**), and rare gabbro (**Agb**). North of Kaminak Lake, the Ferguson pluton is similarly diverse in composition, ranging from rare gabbro through diorite and quartz diorite, to predominantly tonalite (**At**) and locally granodiorite. The pluton is extensively altered and plutonic textures are poorly preserved.

East of Carr Lake, the Carr pluton ranges from diorite to granite (**Ag**), but is predominantly a homogeneous, medium-grained, biotite-hornblende granodiorite. Diffuse, gradational contacts, mechanical incorporation of potassium feldspar and quartz phenocrysts from tonalite into diorite, and hornblende reaction coronas around incorporated quartz grains, are indicative of magma co-mingling/mixing relationships. On the northern and southern margins of the pluton, veins and dykes of granitoid locally cross-cut the country rock, although the northern contact has subsequently been faulted. Tonalite on the western shore of Carr Lake may be equivalent to the Carr pluton. The eastern margin of the pluton comprises a series of margin-parallel, schlieren zones alternating with clean tonalite and granodiorite that, over a distance of ca. 4 km, pass into the central Kaminak diorite suite.

North of Heninga Lake, large plutons of medium grained, equigranular biotite granite (**Ag**) contain inclusions of mafic material, similar to the mafic volcanic rocks of the Kaminak Group (**Amu**), as well as rafts of dioritic gneiss. The granite is mildly foliated to isotropic. West of the Kogtok River, granite with abundant semipelitic metasedimentary inclusions has a distinctive gneissic aspect (**Agn**). A large body of massive, megacrystic granite (**Amg**) is poorly exposed southeast of Snug Lake. It forms a magnetic high in the regional potential field (Geological Survey of Canada, 1987) from which its extent and shape have been inferred. Smaller bodies of similar granite occur northeast of Carr Lake.

East of Southern Lake, gabbro is pervasively injected by quartz diorite, tonalite and granite, forming a megabreccia or agmatite (**Agbx**).

SPI LAKE GROUP

The Spi Group (**Asp**; Patterson, 1991) is confined to a six kilometre long, north-northeast trending belt, north of Spi Lake. It is essentially composed of steeply dipping, mildly foliated, tonalite breccia and tonalite pebble conglomerate, polymictic conglomerate and trough cross-bedded arenites (Old Boot Formation). The breccia is composed of angular to semi-rounded clasts of tonalite in a matrix of weathered tonalite debris that preserves the original texture of the tonalite, and is interpreted as a *paleogruss*. The tonalite pebble conglomerate contains rare clasts of foliated mafic volcanic rock. The sedimentary rocks are separated from well foliated mafic volcanic rocks that contain scattered, 1-2 cm plagioclase phenocrysts by a surface showing up to 1 m of paleotopographic relief which appears to be an unconformity. Foliations in the volcanic and sedimentary rocks are mutually parallel, and broadly concordant with their contact. Lithologically, the volcanic rocks correspond to the Spi Lake Formation (Patterson, 1991), but structurally they appear to share the same foliation as the adjacent Kaminak Group volcanic rocks (**Av**). It remains to be determined whether the unconformity occurs within the Spi Group, or between the Spi and Kaminak groups. The lithological association and stratigraphic setting of the Spi Group resemble those of Temiskaming-type deposits of the Superior Province.

HURWITZ GROUP

In the map area, the Hurwitz Group (**Pu**; see Bell, 1971; Davidson, 1970a; Aspler and Chiarenzelli, 1997a) comprises the Padlei, Kinga and Ameto formations. The Padlei Formation (**Pp**) comprises a basal micaceous arenite conformably overlain by quartz-pebble and polymictic conglomerate, capped by a well-foliated argillite. The Kinga Formation conformably overlies the Padlei Formation, and comprises a lower Maguse (**Pkm**) Member and an upper White Rock (**Pkw**) Member. The Maguse Member is a light-purple to maroon arenite with minor beds of conglomerate and siltstone, with millimetre-scale jasper and quartz clasts, and centimetre-scale hematite nodules near the base. The Maguse Member grades upwards into supermature, massive, white, quartz arenite of the White Rock Member, with locally well preserved ripples and minor heavy mineral bands. The White Rock Member is overlain by the Ameto Formation which includes, from oldest to youngest, pink stromatolitic dolostone beds with black mudstone to siltstone interbeds (**Pad**), pillowed to massive mafic volcanic rocks (**Pav**) and gabbro (**Pag**). Panels of black slate derived from argillite and siltstone are locally preserved (**Paa**). A magnetite-rich chlorite schist (**Pcs**), 10 to 100 m wide, cuts the lower part of the Kinga Formation. Where not strongly sheared, it appears to be derived from a plagioclase-phyric diabase dyke.

An erosional unconformity between the Hurwitz Group and its underlying basement is exposed northeast of Carr Lake. The contact typically places the Maguse Member of the Kinga Formation above granitoid rocks or Kaminak Group volcanic rocks. In places, the interface is recognizable as a narrow sericite-quartz schist, foliated sub-parallel to the unconformity. However, in an embayment along the contact, the rocks are less strained and a possible regolith produced by primary chemical and physical weathering of a granodiorite protolith is preserved. The sericite-quartz schist along strike to the northeast is considered to represent the deformed equivalent of the regolith.

DYKES

Four sets of dykes are recognised in the field area. They include the locally porphyritic north-northeast trending Kaminak dyke swarm (**Pkd**; ca. 2.45 Ga; Heaman, 1994), cut by variably oriented phlogopite-phyric minette dykes (**Pmd**) and rare east-southeast striking mafic dykes which are comparable with the Tulemalu dyke swarm (**Ptd**; ca. 2.19 Ga; Tella et al., 1997). Other dykes include a single example of the northwest- trending Mackenzie dyke swarm (**Pmkd**; ca. 1.27 Ga; LeCheminant and Heaman, 1989) northeast of Quartzite Lake, and numerous, variably oriented undifferentiated dykes (**Pud**). The latter includes dykes of intermediate composition, apparently similar in composition to some of the volcanic rocks of the Kaminak Group. With the exception of the Kaminak and Mackenzie examples, the width of most dykes does not exceed several metres.

STRUCTURE AND METAMORPHISM

Within the Kaminak Group, compositional layering varies from cm-scale banding to packages of homogeneous pillow lavas. Most outcrop scale lithological contacts are interpreted as bedding (S_0), or the margins of bedding-parallel sills. Smaller scale banding, for example in mafic to intermediate rocks of uncertain parentage, may either be primary or tectonometamorphic in origin. Most rocks of the Kaminak Group exhibit a variably developed, layer-parallel foliation. The foliation is axial planar to rare, small scale (< 50 cm) intrafolial folds of layering. Although it could represent a composite tectonic fabric, this early foliation is referred to as S_1. The strike of S_1 and S_0 varies from 045-135°, with steep to vertical dips. A steeply pitching extension lineation is regionally developed on S_1, but its intensity is variable. Although the lineation is best developed in sheared zones of sericite alteration (Hanmer et al., 1998c), this association is not exclusive. For the most part, S_1 is developed in lower greenschist facies chlorite-albite ± sericite mineral assemblages. Locally, hornblende, garnet, staurolite, cordierite and clinopyroxene occur in close proximity to the principal plutonic bodies, and appear to be the product of contact metamorphism. Garnet is locally wrapped around by S_1, and hornblende is an S_1 foliation-forming mineral. Isograds are discontinuous, but are consistently oriented hot-side facing the major plutons. S_1 also tends to be concordant to major tonalite and granodiorite plutons. North of Heninga Lake, there is a spatial coincidence between the hornblende isograd and the three dimensional deflection of S_1 around major granite plutons. A similar pattern at Snug Lake suggests that there is a buried pluton beneath the lake. Taken together, these observations suggest that the major tonalite, granodiorite and granite plutons are synkinematic.

The S_1 foliation is locally deformed by structures which, with few exceptions, are only developed at a small scale (<50 cm). Isolated, asymmetrical folds, and oblique crenulation cleavage parallel to their axial planes, are heterogeneously distributed, but not necessarily together. These structures are referred to as F_2 and S_2, but their lateral discontinuity, and the rare occurrence of demonstrable S_3 foliation, caution against rigid correlation. Most folds are steeply plunging, and coaxial with the extension lineation. Very locally, moderately plunging kink folds are seen to deform the lineation. Most importantly, the development of the steeply plunging/pitching lineation is independent of the presence of macroscopic folding. These observations suggest that, in general, the steep extension lineation is an L_1 structure, contemporaneous with the development of S_1.

The discontinuous preservation of the Kaminak Group stratigraphy makes it difficult to map major folds. Nonetheless, the presence of younging reversals in pillowed flows and turbidites in the Quartzite-Snug lakes area suggests that the Kaminak Group is isoclinally folded on a wavelength of several kilometres. However, the relative age of these structures remains unconstrained. East of Heninga Lake, the thick homoclinal package of southeast-facing pillowed flows, flanked on either side by intermediate volcaniclastic rocks and massive flows, demonstrates the absence of folding. Thus, the degree to which the Kaminak Group is extensively isoclinally folded, either by F_1 or post-S_1 structures, remains unresolved.

Paleoproterozoic Kaminak dykes cross-cut deformation structures in the Kaminak Group, thereby establishing that regional deformation and metamorphism in the Kaminak Group occurred in the late Archean. The granite pluton (**Amg**) southeast of Snug Lake cross-cuts S_1 in the amphibolitic wallrocks and, when dated, will further constrain the timing of deformation. The Hurwitz Group is preserved in a synclinorium, and deformed by generally upright, subhorizontal folds, though overturned limbs are locally present. An upright axial planar cleavage is developed in volcanic and pelitic sedimentary lithologies. In addition to that reported here, other segments of intact unconformity at the base of the Hurwitz Group occur along strike to the northeast and southwest, beyond the map area (Park and Ralser, 1992; Aspler and Chiarenzelli, 1997b). The Carr Lake unconformity pins the Hurwitz Group in this middle section of its regional outcrop extent, thereby eliminating the possibility of significant Paleoproterozoic displacements between basement and cover. Localised deformation adjacent to the Hurwitz Group likely indicates strain incompatibility or partitioning at the basement-cover contact during Paleoproterozoic shortening. Phyllosilicate alteration and narrow, semi-brittle shear zones developed in the Ferguson pluton north of the Hurwitz Group, and similar alteration associated with extensive quartz veining adjacent to the Hurwitz Group at Kinga Lake, are the best examples of Paleoproterozoic reworking of the Archean basement noted in the map area.

The presence of foliated mafic volcanic clasts suggests that deformation of the Spi Group is younger than that in the Kaminak Group. However, the deformation fabric in the Spi Group is discordant to that in the Hurwitz Group, and thereby appears to be older than the Hurwitz Group itself. For simplicity, the S_1 symbol has been employed to represent the foliation and cleavage in the Spi and Hurwitz Groups; however they should not be confused with the older foliation in the Kaminak Group.

ALTERATION

Volcanic and volcaniclastic rocks of the Kaminak Group appear to be extensively altered, particularly along the north side of Kaminak Lake and around Quartzite Lake. Alteration around Spi Lake may be less extensive, and west of Turquetil Lake it appears to be focused in a fault zone. The local aspects of the alteration comprise variable components of silicification, carbonatisation, sericitisation, chloritization and sulphidation.

Silicification is common in volcaniclastic conglomerates and breccias, but also occurs in massive and pillowed intermediate flows. Carbonatisation appears to be more localised than silicification. For example, southeast of Quartzite Lake, a 30-40 m thick sequence of boulder to granule conglomerates, overlain by trough cross-bedded lithic arenite, was extensively replaced by recessive, brown-weathering ankeritic dolomite, most likely during diagenesis. Similar, carbonate-altered lithic arenites occur in the northwest corner of Kaminak Lake, and northwest of Tootyak Lake. In other cases, carbonate replacement in cleaved or massive volcanic and volcaniclastic rocks occurred by infiltration along a network of penetrative fractures. Progressive replacement can be traced into massive, featureless, fine grained brown carbonate, with a few isolated volcanic relics. Sericitisation may occur as concordant zones of well cleaved, steeply lineated, sericitised volcanic and volcaniclastic rock, up to several tens of metres thick. In some locales, sericitisation is localised in narrow, regularly spaced (5-10 cm), foliation-parallel bands. Within such sericite bands, a penetrative sericite-quartz foliation makes a uniform, anticlockwise angle (10-15°) with the band boundaries. An extension lineation marked by sericite aggregates and elongate chlorite grains is everywhere steeply pitching to vertically plunging. The sericite alteration is localised by initial fracturing, and subsequently deformed by limited dextral shear. East of Heninga Lake, the complete alteration sequence appears to include early silicification, followed by formation of S_1, carbonatisation, and finally sericitisation accompanied by transpressive dextral shearing and quartz veining (Hanmer et al., 1998c).

MINERAL OCCURRENCES

The principal mineral occurrences of the Spi-Kaminak-Quartzite lakes area and the Heninga-Kogtok area of the Kaminak greenstone belt, as compiled from a variety of public sources, are listed in Table 1 and plotted on the accompanying 1:125 000 scale maps. Only those occurrences with reported reserves or those that have been drilled were selected from an evolving database that includes information on more than 180 occurrences in the Kaminak greenstone belt. Much of this mineral occurrence information is available in NORMIN.DB, DIAND's comprehensive relational database of mineral showings in the NWT.

Four principal types of occurrences have been recognized based on metal endowment. Those containing Zn and/or Pb (generally at concentrations of greater than 500 ppm), but lacking significant Au are designated as base metal occurrences; those containing significant Au (generally at concentrations of greater than 500 ppb), but lacking Zn and/or Pb are designated as gold occurrences, those containing significant Au as well as Zn and/or Pb are designated as polymetallic occurrences, and those containing uranium are designated as uranium occurrences. Ag and Cu are present in numerous examples of the gold, base metal and polymetallic types, but their presence is not diagnostic of any particular type. This classification scheme is empirical rather than genetic, but has genetic implications (see below). There are no producing or past producing mines in the mapped areas, but exploration potential can be considered high. Although it is commonly difficult to assign deposit types to occurrences, all three polymetallic occurrences appear to be largely synvolcanic massive sulphide and/or feeder zone accumulations (VMS-style). Four of the base metal occurrences are examples of VMS-style mineralization; two of the base metal occurrences are classified as vein-related but may be parts of synvolcanic hydrothermal systems. All of the gold occurrences included in Table 1 appear to be structurally controlled and linked to quartz-bearing veins. The presence of strongly deformed veins and alteration zones in some gold occurrences, combined with both "early" and "late" stages of carbonate alteration associated with numerous gold, base metal and polymetallic occurrences, are consistent with a multi-stage hypothesis for gold concentration. The uranium occurrences are classified as paleoplacers.

SUMMARY

The discontinuous nature of map units in the metal-rich Kaminak Group does not allow elaboration of a robust stratigraphy based upon field observation alone. Nevertheless, the abundance of intermediate to felsic extrusive lithologies, and the high proportion of volcaniclastic rocks, much of which may represent subaqueous reworking of material eroded from subaerial volcanoes, suggests that the Kaminak Group contains the remains of a calc-alkaline magmatic arc with high exploration potential.

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