COMMISSION GÉOLOGIQUE DU CANADA

GEOLOGICAL SURVEY OF CANADA

OVERVIEW, LEGEND AND MINERAL DEPOSIT TABULATIONS FOR:

GEOLOGICAL SURVEY OF CANADA

O.F. 2188
GEOLOGY OF SW KLUANE LAKE MAP AREA
(115G & F[E½]), YUKON TERRITORY

O.F. 2189
GEOLOGY OF MOUNT ST. ELIAS MAP AREA
(115B & C[E½]), YUKON TERRITORY

O.F. 2190
GEOLOGY OF SW DEZADEASH MAP AREA
(115A), YUKON TERRITORY

O.F. 2191
GEOLOGY OF NE YAKUTAT (114O) AND TATSHENSHINI RIVER (114P)
MAP AREAS, BRITISH COLUMBIA

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GEOLOGY OF SW KLUANE LAKE (115G & F(E1/2) (O.F. 2188), MOUNT ST. ELIAS (115B & C(E1/2) (O.F. 2189), SW DEZADEASH (115A) (O.F. 2190), & NE YAKUTAT (114O) AND TATSHENSHINI RIVER (114P) (O.F. 2191) MAP AREAS, SOUTHWESTERN YUKON AND NORTHWESTERN BRITISH COLUMBIA

INTRODUCTION

These open files are the result of geological investigations during Operation Saint Elias, a project undertaken by the Geological Survey of Canada intermittently during the 1970s and 1980s to complete geological mapping of the Saint Elias Mountains of Canada. They update and revise previously issued open files on the area (Campbell and Dodds, 1982a,b,c, and 1983a,b), and include 1:250 000 scale geological maps with fossil and numerical age data locations accompanied by a single comprehensive legend common to all sheets, and mineral deposit locations and data tabulations.

The map areas are located in southwesternmost Yukon and northwesternmost British Columbia (Fig. 1) and encompass the entire Saint Elias Mountains within Canada. The mountains are the highest and among the youngest in North America, and contain the world's largest nonpolar icefields. Much of the region is extremely rugged with 20 peaks cresting 4200 m. (14 000 ft.) which include Canada's highest Mount Logan (5951 m.; 19 525 ft.). Most of Saint Elias Mountains in Yukon are within Kluane National Park Reserve and Kluane Game Sanctuary and the area as a whole affords spectacularly beautiful mountain scenery and a wide variety of fauna and flora (Theberge, 1980). The Alaska Highway and Haines Road bound the map areas to the northeast, however there are no roads in the region and access is by aircraft, boat or foot only.

Previous geological mapping in Saint Elias Mountains was undertaken mainly in the more accessible, easternmost parts of the region. Earlier exploratory mapping was carried out in various parts of SW Kluane Lake by Brooks (1900), McConnell (1905), Cairnes (1915a), Sharp (1943) and Bostock (1952), followed by the first regional geological synthesis of about half of the area by Muller (1967). The major past contribution to geological mapping in Mount St. Elias was that in the northeasternmost corner of the sheet by Wheeler (1963). Initial geological explorations were undertaken in SW Dezadeash by Cockfield (1928) and Mandy (1933), however the first regional geological map and synthesis of the area was that of Kindle (1953). Earlier geological mapping in Tatshenshini River sheet were conducted by Mandy (1933) and Watson (1948) in Squaw Creek and Rainy Hollow areas, whereas no previous mapping has been recorded from NE Yakutat.

Prior to Operation Saint Elias more than seventy percent of the region was essentially unstudied. The objective of the project was to update previous work and complete geological mapping of Saint Elias Mountains in Canada. Helicopter supported field work was undertaken approximately during 2 weeks in 1973, 3 months in 1974 and 1977, 2 months in 1978, 1 month in 1979, 2 weeks in 1981 and 1983, and 3 weeks in 1986 and 1987. Due to the extremely rugged, and extensively ice-covered and remote terrane, most of the Icefield and Alsek ranges were reconnaissance-mapped by R.B. Campbell from helicopter fly-by and landing-site observations. Detailed ground coverage was

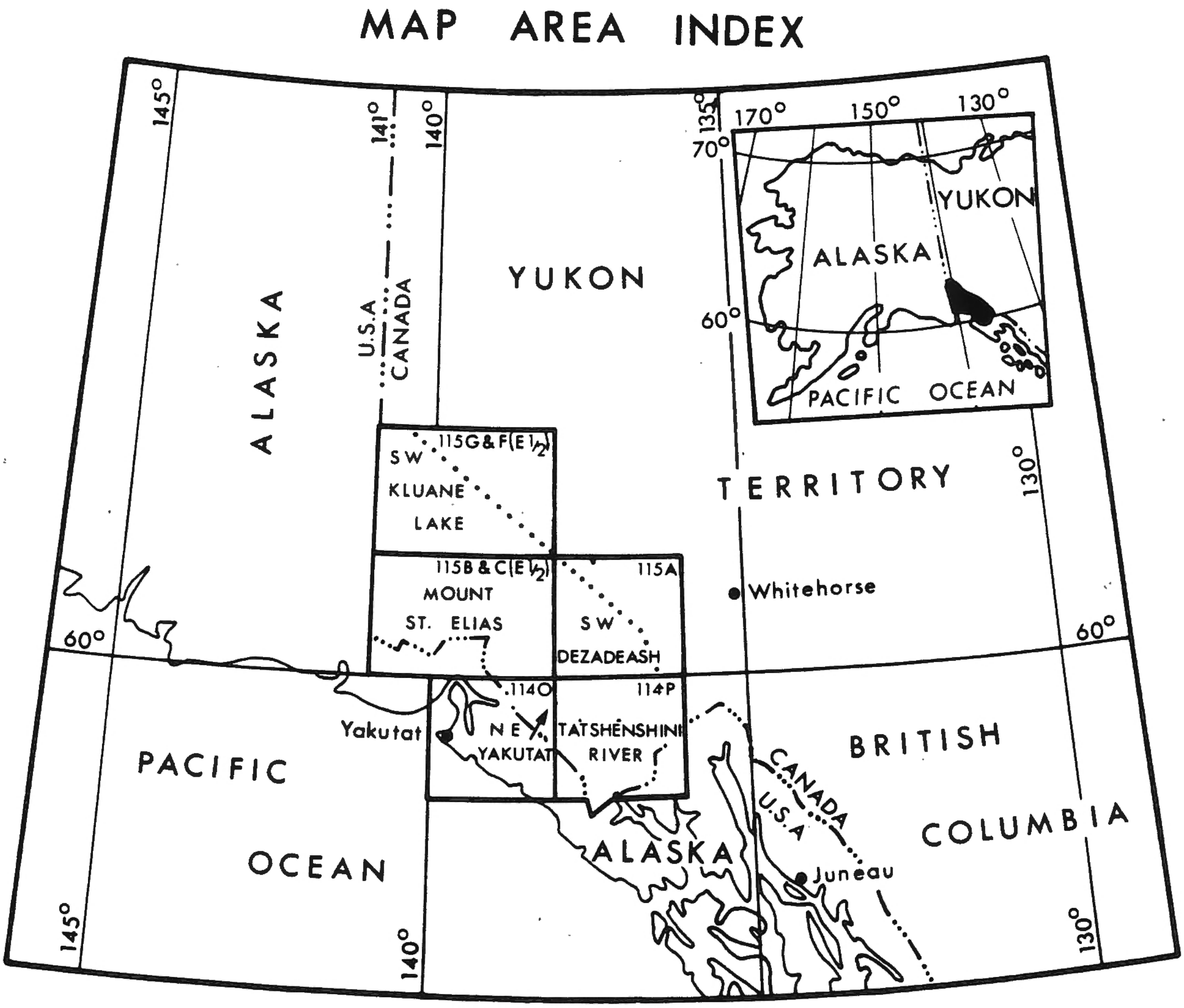

Figure 1. O.F. 2188 SW Kluane Lake (115G & F(E1/2)); O.F. 2189 Mount St. Elias (115B & C(E1/2)); O.F. 2190 SW Dezadeash (115A); and O.F. 2191 NE Yakutat (114O) and Tatshenshini River (114P) map areas.

restricted mainly to the relatively accessible eastern perimeter of the region (for major contributors see Mapping Sources). Much of the data involved in the compilation of these open files is from the many participants in Operation Saint Elias: geological mapping and special studies (Campbell and Dodds, 1975, 1978, 1979, 1982a,b,c, and 1983a,b; Campbell and Eisbacher, 1974; Dodds, 1988; Dodds and Campbell, 1988; Eisbacher, 1975, 1976; Eisbacher and Hopkins, 1977; Read, 1976; Read and Monger, 1975, 1976; Souther, 1974; and Souther and Stancui, 1975), and thesis studies (Campbell, 1981; Downey, 1978; Downey et al., 1980; Jacobson, 1979; Jacobson et al., 1980; Lowey, 1980; Sturrock, 1975, Sturrock et al., 1980). Only a few mineral deposits were visited by the authors. Data on them was mostly from literature surveys and where possible from discussions with government, university and mining industry geologists.

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GEOLOGICAL OVERVIEW

Geological Setting

The Saint Elias Mountains in Canada comprise the Icefield, Donjek, Kluane, Fairweather, Alsek, Squaw, Datlasaka and Kusawak ranges. Large valley glaciers including the Klutlan, Donjek, Logan, Seward, Hubbard, Kaskawulsh, Lowell, Fisher, and Tweedsmuir, flow from the vast ice-cover of the Icefield Ranges. Major, heavily-laden, milky, extensively braided rivers such as the White, Donjek, Alsek and Tatshenshini, transect the region. The mountains lie along the southwestern edge of the Coast Belt and are within the northern extension of the Insular Belt in southwestern Yukon and northwestern British Columbia and adjacent Alaska (Fig. 2, inset). For the most part they are southwest of Denali Fault System. The Saint Elias Mountains are divisible into six northwest-trending, major-fault bounded geological terranes with differing cover rock sequences, all of which extend into adjoining Alaska (Fig. 2 and Table 1). These comprise the Alexander Terrane, three segments of Wrangellia (W1, W2, and W3), the Chugach Terrane and a small sliver of the Yakutat Terrane. The Saint Elias Mountains are dominated by the Alexander Terrane. Wrangellia segments (W2 and W3) may have been moved northeast of Alexander Terrane by large dextral displacements along Duke River and Denali faults (Campbell and Dodds, 1983c). The terranes are characterized by distinctive plutons, metamorphic rocks, structural styles and their accretion is believed to have occurred mostly in Mesozoic to Cenozoic time (Berg et al., 1972, 1978; Coney et al., 1980; Campbell and Dodds, 1983c; Monger and Berg, 1984; Wheeler et al., 1988; Plafker et al., 1989). Large scale, both syn- and post-accretion, mainly dextral transcurrent faulting, has further complicated the geology of the region.

The Saint Elias Mountains are predominantly underlain by the Alexander Terrane, which is also extensively exposed throughout adjacent southeastern Alaska (Gehrels and Berg, 1984; Gehrels and Saleeby, 1987). It consists of thick sequences of mainly Paleozoic strata, but which range in age from Late Cambrian and earlier (?) to latest Triassic. Cambrian to lowermost Ordovician and older (?) rocks comprise abundant mainly marine basic volcanics, volcaniclastics and minor carbonate. Those of Ordovician-Silurian age include widespread laminated and thicker bedded carbonates, calcareous clastics and rare basic volcanics. Devonian rocks consist of shallow-marine carbonate, fine clastics and local basic volcanics. Undifferentiated mostly marine Devonian to latest Triassic age strata include fine clastics, basic volcanics, carbonates, and rare evaporites.

TERRANES, MAJOR FAULTS, COVER ROCKS, PLUTONIC ROCKS, AND MORPHOGEOLOGICAL BELTS (INSET MAP), SAINT ELIAS MOUNTAINS AND ADJOINING AREAS (modified from Wheeler and McFeely, 1987)

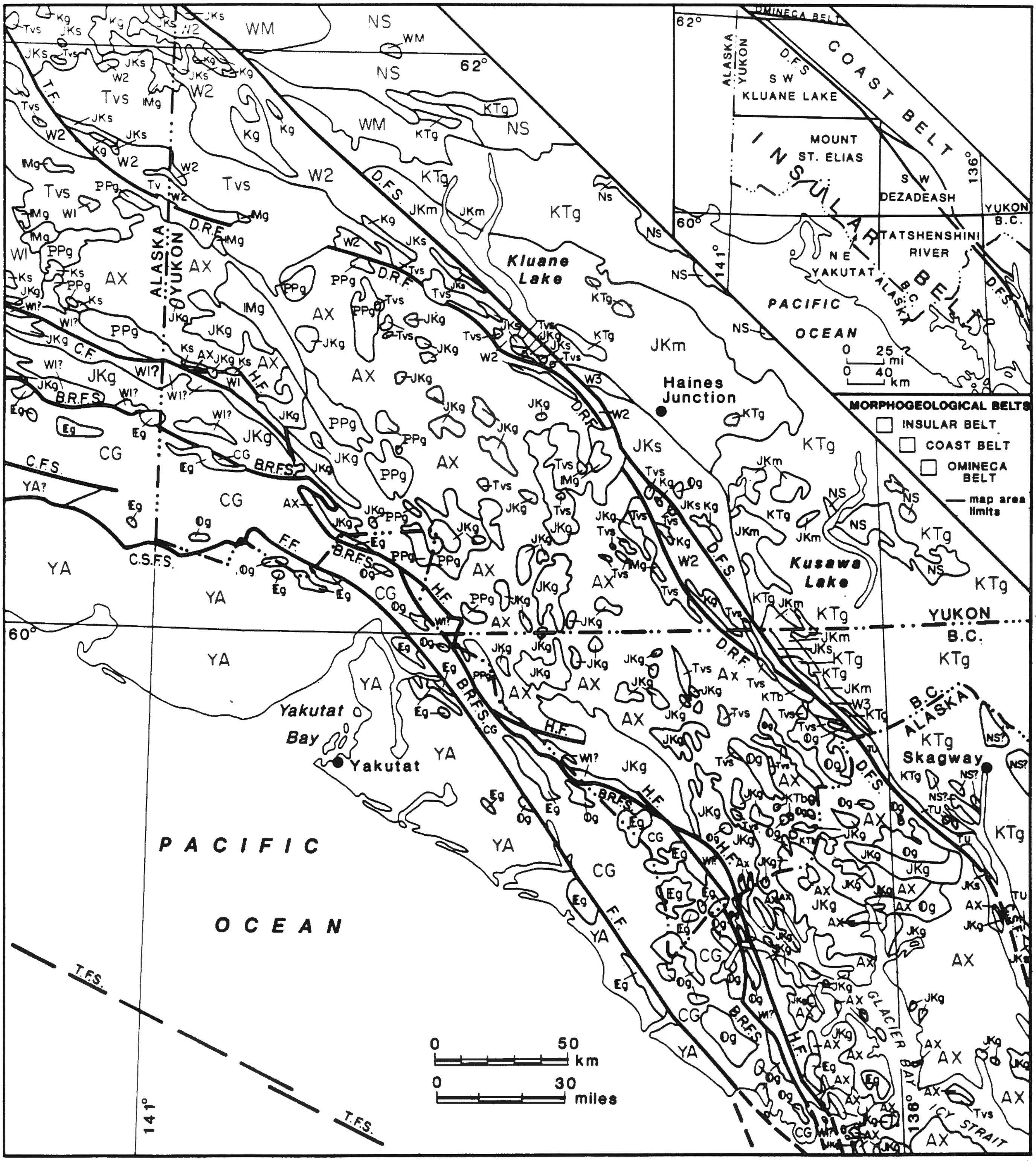


Figure 2.

LEGEND

COVER ROCKS

Tertiary

Symbol	Description
Tvs	nonmarine volcanics and sediments (mostly Wrangell Lava).

Cretaceous

Symbol	Description
Ks	shallow marine sediments.

Upper Jurassic-Lower Cretaceous

Symbol	Description
JKs	flysch, local volcanics (Gravina-Nutzotin).
JKm	metasediments ("Kluane schist", and older rocks).

PLUTONIC ROCKS

Tertiary

Symbol	Description
Mg	Wrangell suite (6-16 Ma): subvolcanics and granitoids.
Og	Tkope suite & others (23-33 Ma): granitoids and subvolcanics.
Eg	Seward suite (41-52 Ma).

Cretaceous-Tertiary

Symbol	Description
KTg	Coast Plutonic Complex (undivided).
KTb	gabbro-diabase plutons.

Late Early Cretaceous

Symbol	Description
Kg	Kluane Ranges suite (106-121 Ma), & Alaskan-type mafic-ultramafics.

Late Jurassic-earliest Cretaceous.

Symbol	Description
JKg	Saint Elias suite (130-160 Ma).

Late Pennsylvanian-Early Permian

Symbol	Description
PPg	Icefield Ranges suite (270-290 Ma).

TERRANES

Symbol	Description
YA	YAKUTAT (local Prince William).
CG	CHUGACH.
W1,W2	WRANGELLIA (W1, W2).
W3,TU	WRANGELLIA (W3), TAKU.
W1?	WRANGELLIA (W1)?
WM	WINDY-MCKINLEY.
NS	NISLING (local undivided rocks).
AX	ALEXANDER.

MAJOR FAULTS

T.F.S.	-	Transition Fault System.
C.F.S.	-	Contact Fault System.
C.S.F.S.	-	Chugach-St. Elias fault system.
F.F.	-	Fairweather Fault.
B.R.F.S.	-	Border Ranges Fault System.
C.F.	-	Chitina Fault.
H.F.	-	Hubbard Fault.
D.R.F.	-	Duke River Fault.
T.F.	-	Totschunda Fault.
D.F.S.	-	Denali Fault System.
C.S.F.	-	Chatham Strait Fault.

OCCURRENCE OF MAP UNITS IN TERRANES AND COVER ROCKS

TERRANES	STRATIFIED UNITS	INTRUSIVE UNITS		STRATIFIED AND INTRUSIVE UNITS IN VARIOUS COVER ROCKS			
				JURA-CRETACEOUS COVER ROCKS		TERTIARY COVER ROCKS	
		GRANITOID	MAFIC/ ULTRAMAFIC	STRATIFIED UNITS	INTRUSIVE UNITS	STRATIFIED UNITS	INTRUSIVE UNITS
YAKUTAT (YA)	KY	Eg, Oggb				EK	
CHUGACH (CG)	KV, KVm, KVgn, KVv, KVvm	Eg	Oggb				
WRANGELLIA (WI?)	PMm, PMsv	PPy, JKg, JKgr, JKgd, Eg					
WRANGELLIA (WI)	PPs, Pc, uTRN, uTRC, uTRM	PPy?, JKg		Ks			
ALEXANDER (AX)	lPgn, lPvm, lPvs, lPcs, Psa, Pvb, Ꞓv, Ꞓc, Ꞓvs, ꞒOc, ꞒOwb, ꞒOs, ꞒOw, ꞒOwv, ODcs, OSwp, SDc, Dp, Dc, Psp, uPs, uPv, uPvs, uPc, uPpc, uPp, uPcs, uPcp, uPe	PPgd, PPqdi, PPydi, PPy, PPdi, PPg, JKg, JKgd, JKgr, Eg, Ogb, Oqd, Ogdp, Ogd, Ogr, Ogp, Og, Of, Mg, Mf	ꞒOb, uPbv?, PTRub?, PTRb?, Mb, KTb,	Ks		Pvs, Ps, Os, Nv, NW, NW1, NW2, NW3, NW4, NWL, NWpy, NWcg, NWm, NWu	Mf
WRANGELLIA (W2)	Pv, Pvx, Psv, Pc, Ps, PMvs, PTRv, mTRp, uTRN, uTRe, uTRC, uTRM, TRKp?	Kg, Kgd, Kqd, Kdi, Kqm, Of, Mdi, Mf	uPb, uPbv?, PTRub, PTRb, KTb	JKD, TRKp	Kg	Os, Nv, NW, NW2, NWL, NWpy, NWcg, NWm, NWu, Pt	Mf
WRANGELLIA (W3, TAKU)	PMvs			JKD	lKub, lKb, Kgd, Of,	Os	
"COAST BELT" (?TERRANES(S))	PMgn, Msm (in part), Mc	KTg		Msm (in part)	KTg	Pv	

Table 1.

Several unconformities, such as documented in southeastern Alaska (Gehrels and Saleeby, 1987), are suspected but unproven within the successions. Two distinct episodes of plutonism occurred in the Alexander Terrane of Saint Elias Mountains during Late Pennsylvanian to Early Permian (270-290 Ma) and Late Jurassic to earliest Cretaceous (130-160 Ma) time. Mafic plutonism also accompanied volcanism during the Cambrian-Ordovician, mid to late Paleozoic and Permo-Triassic (Dodds and Campbell, 1988) periods. Strata mostly are regionally metamorphosed to sub- or low-greenschist facies, but in the western parts the grade locally reaches upper greenschist to mid-amphibolite facies. The Alexander Terrane has been complexly deformed and rocks generally exhibit a pervasive cleavage or foliation. The dominant structural and metamorphic grain is northwest-southeast and along the eastern perimeter large northwest-trending, northeast-verging synclinoria and anticlinoria have been outlined. In the northern and central parts of the terrane, large folds, some of which are recumbent and southeast-verging, trend northeasterly. The widespread metamorphism and deformation seems to be post-Late Triassic and pre-earliest Cretaceous. Upright and overturned west-northwest-trending folds, locally superimposed on the major structures, are probably related to major, mostly Cenozoic strike-slip faulting. The Alexander Terrane is bounded by the Hubbard and Duke River faults; the former possibly a pre-mid-Pennsylvanian terrane boundary or suture of unknown displacement (Gardner et al., 1988), the latter a post-Triassic dextral transcurrent fault with large displacements offsetting terrane boundaries.

Segments of Wrangellia with their Mesozoic cover sequences (Berg et al., 1972; Monger and Berg, 1984) flank the Alexander Terrane on the west and southwest (W1) and north and northeast (W2, W3). W1 is confined by the Border Ranges and Hubbard faults and in Saint Elias Mountains only locally includes the weakly metamorphosed late Paleozoic and Triassic rocks typical of Wrangellia in the McCarthy area Alaska (MacKevett, 1978). In Canada, W1 largely comprises pervasively deformed argillite, schist, greenstone, amphibolite and marble, which have been interpreted as a deeper, more metamorphosed equivalent of Wrangellia (Plafker et al., 1989). W1 is intruded by syenitic dykes and small plutons (270-290 Ma) and large elongate batholithic complexes (130-160 Ma) (Dodds and Campbell, 1988). The Jurassic-Cretaceous cover rocks to W1 are shallow marine sediments (MacKevett, 1978), but these have only locally been recognized in Yukon. Wrangellia W2 is bounded by the Duke River and Denali faults. It consists of Pennsylvanian oceanic arc volcanics and sediments, Lower Permian shallow marine sediments, and mid to Upper Triassic basic rift volcanics and variable amounts of shallow marine evaporite, carbonate, and argillite (Muller, 1967; Read and Monger, 1976). The strata of W2 are generally in the sub-greenschist grade and have been deformed into upright to northeast verging folds. W2 is intruded by upper Paleozoic (?) and Upper Triassic mafic and ultramafics probably related to the mafic volcanism, and by large, elongate, syn- or post-tectonic, granitic plutons (106-117 Ma; Dodds and Campbell, 1988). In the narrow belt between the Duke River and Denali faults, W2 is cut by anastomosing networks of faults, which bound lenses of folded rocks with coherent stratigaphy in a fault melange. Wrangellia W3, which lies northeast of Denali Fault System along the western margin of the Coast Plutonic Complex, comprises little known pervasively deformed greenschist to amphibolite grade metasediments, metavolcanics and local mafic-ultramafic intrusions. In adjacent southeast Alaska W3 abuts the northern part of the Taku Terrane, which has been correlated with rocks of Wrangellia in the eastern Alaska Range (Plafker and Hudson, 1980; Davis and Plafker, 1985; Plafker et al., 1989). The Jurassic-Cretaceous cover rocks to W2 and W3 consist of weakly metamorphosed and deformed deep marine flysch and local basic volcanics (Eisbacher, 1976; Richter, 1976). The cover is intruded by an Alaskan-type concentric ultramafic complex (Sturrock, 1975; Sturrock et al., 1980) and granitic plutons of Late Early Cretaceous age (Richter et al., 1975; Dodds and Campbell, 1988). Northeast trending folds of probable Cretaceous age in the cover rocks were refolded, presumably the result of dextral-strike-slip displacements along Denali Fault System which during latest Mesozoic to latest Cenozoic time amounted to some 300 km. (Eisbacher, 1976). Wrangellia W3 and its metamorphosed Jurassic-Cretaceous cover rocks are intruded along their east flank by the Coast Plutonic Complex (Kindle, 1953; Wheeler, 1963; Muller, 1967; Tempelman-Kluit, 1974; Eisbacher, 1976; Erdmer, 1989, 1990), which locally includes part of the "Tonalite Sills" (of Brew and Ford, 1978, 1981, 1985).

The Chugach Terrane is bounded on the northeast by the Border Ranges Fault System (MacKevett and Plafker, 1974; Plafker et al., 1976; Plafker and Campbell, 1979; Plafker et al., 1985) and on the south and southwest by Chugach-Saint Elias and Fairweather faults. It is an accretionary prism consisting of variably metamorphosed and deformed Cretaceous and older (?) deep-marine flysch and oceanic crustal rocks (Plafker et al., 1977b; Hudson and Plafker, 1982; Plafker et al., 1989). In the Seward Glacier area and adjacent Alaska the terrane is partitioned by the Columbus Fault into two north-dipping thrust sheets in which metamorphic grade and deformation increases downward. These comprise a northern high temperature-low pressure assemblage of subgreenschist to amphibolite-grade metasediments, granitoid gneisses and pegmatite, and a southern assemblage of low grade basic volcanics and foliated crystalline amphibolite. The metasedimentary and metavolcanic division of the terrane is also recognizable in the Fairweather Ranges (G. Plafker, pers. comm., 1979). The Chugach Terrane is intruded by Eocene (41-52 Ma) and Oligocene granitic plutons (Hudson et al., 1977; Hudson, 1983; Dodds and Campbell, 1988), and by mid Tertiary layered gabbros (Loney and Himmelberg, 1983). Accretion and deformation of the terrane commenced in the Early Jurassic and continued into the latest Cretaceous and/or earliest Tertiary (Plafker et al., 1989).

The Yakutat Terrane is mostly bounded on the north and northeast by the Chugach-St. Elias and Fairweather faults, and on southwest by the Transition Fault System. It is a composite terrane and comprises an eastern upper Mesozoic flysch and melange assemblage and a western sequence of Eocene oceanic crustal rocks, which are basement to an Eocene to Quaternary dominantly marine clastic cover (Plafker et al., 1989). The terrane is believed to have been transported to its current position from a site some 600 km to the southeast, by dextral strike slip along the Fairweather-Queen Charlotte transform fault system during Neogene to present time (Plafker, 1987). Only a very narrow sliver of the Yakutat terrane occurs in Saint Elias Mountains of Canada adjacent to Newton and Seward glaciers. There the terrane is represented by north-dipping thrust sheets of low grade metamorphosed and folded late Mesozoic flysch, melange, and minor early Tertiary clastics within the lower plate of the St. Elias fault. It is intruded by small granitic plutons of Eocene and Oligocene age (Hudson et al., 1977).

Tertiary nonmarine clastic sediments and volcanics unconformably overlie the deformed rocks of the Alexander Terrane and segments of Wrangellia. The sedimentary sequences consist of Eocene (?) and Oligocene mostly fluvial deposits with local landslide, debris flow, lacustrine and pull-apart basin deposits, and rarer volcanics (Eisbacher and Hopkins, 1977; Dodds, 1987; Ridgway et al., 1989). These clastic rocks were apparently deposited on a gently undulating low elevation surface, and once were distributed extensively over the eastern Saint Elias Mountains (Eisbacher and Hopkins, 1977). They now mostly remain only in small faulted, erosional remnants. Overlying and overlapping the sedimentary strata are locally very thick Miocene-Pliocene subaerial calc-alkaline volcanics of the Wrangell Lava, which occur in widely scattered deposits on the Alexander Terrane and segments of Wrangellia (Souther and Stancui, 1975; Souther, 1977; MacKevett, 1978). Where mapped in detail, the Wrangell Lava has been subdivided into the Canyon Mountain, St. Clare and Alsek provinces (Souther and Stanciu, 1975). The clastic strata are only locally openly to tightly folded close to faults (Eisbacher and Hopkins, 1977; Dodds, 1988; Ridgway et al., 1989). The Wrangell Lava is mostly fairly flat lying or shallow dipping. However, in the northern Saint Elias Mountains they have been openly folded and locally overturned adjacent to a group of reverse faults (Muller, 1967; Souther and Stancui, 1975). Oligocene (24-31 Ma) plutonism present in southeasternmost Saint Elias Mountains and adjoining southeastern Alaska (MacKevett et al., 1974; Brew et al., 1978; Jacobson, 1979; Jacobson et al., 1980; Brew and Morrell, 1983; Brew and Ford, 1985; Dodds and Campbell, 1988) may be coeval with volcanics similar to those in the O'Connor River area. This granitoid plutonism and also felsite, latite and crowded feldspar porphyry subvolcanic intrusion widespread in Kluane and Kusawak ranges are both probably strike-slip fault related. Miocene (6-16 Ma) basic to acidic subvolcanics and local deeper-level granitoid plutons (Downey, 1978; Downey et al., 1980; Dodds and Campbell, 1988) within or close by Wrangell Lava are considered comagmatic to the volcanics, and related to the northward oblique subduction of the Pacific Plate beneath the continent (MacKevett, 1978). Pliocene and younger (?) diamictite and fluvial clastics occur in the Bull Creek area and also along the White River in Alaska. They have been variously interpreted as subglacial tillite deposits (Denton and Armstrong, 1969), lahars derived from glaciated volcanic cones (Plafker et al., 1977c), or subaerial slope and lacustrine fan-delta deposits in a strike-slip setting (Eyles and Eyles, 1989). These clastics have been locally tilted and faulted. Latest Pliocene and Pleistocene (?) volcanics are speculated to be present within parts of the Wrangell Lava sequence and also in the Blanchard River area on the westernmost flanks of the Coast Belt. Large-scale strike-slip faults, such as the Denali (Eisbacher, 1976; Eisbacher and Hopkins, 1977; Clague, 1979a), Fairweather (Plafker et al., 1978; Carlson et al., 1985; and others) and Totschunda (Richter and Matson, 1971; Plafker et al., 1977a) faults, were active during mid- to latest Cenozoic time in Saint Elias Mountains and closely adjacent parts of Alaska. Dextral displacements along Denali Fault System may have been transferred to Totschunda Fault during latest Cenozoic time, by folds and reverse faults displayed in the Wrangell Lava of St. Clare Province. Linear ponds and mounds along sections of Denali Fault System suggest that some movements may be Pleistocene, but evidence for post latest Pleistocene strike-slip displacements is lacking (Clague, 1979a). However, Holocene dip-slip fault scarps occur (Eisbacher and Hopkins, 1977; Clague, 1979a) and a zone of microseismicity has been outlined (Boucher and Fitch, 1969; Horner, 1983) along the Denali-Totschunda fault linkage. Late Cenozoic faults and related deformation are suspected elsewhere in the Alexander Terrane of the region.

These include a major reverse fault (southwest side up) between Klutlan and Kaskawush glaciers which produced the Wood-Steele-Walsh mountain front, and strike-slip-fault related brittle deformation in O'Connor River and Tats Creek areas (Dodds, 1988). Dextral strike-slip displacements along Fairweather Fault coupled with underthrusting on St. Elias and adjacent faults during latest Cenozoic time resulted in the spectacular relief of the Mt. St. Elias-Mt. Augusta and Mt. Logan fronts. The rise of the Saint Elias Mountains was probably initiated during the Miocene with most of the tectonism concentrated in the Pliocene and Pleistocene, and has resulted largely from the oblique subduction of the Yakutat Terrane and the Pacific Plate.

Regional studies of surficial geology and geomorphology have been undertaken in the Saint Elias Mountains (Rampton, 1979a,b,c,d, 1981, 1982a,b,c). More detailed investigations have been made in the mountains of surge-type glaciers (Stanley, 1969; Clarke et al., 1986), ice damned lakes and related glacial outburst flood hazards (Clague, 1979b; Clarke and Mathews, 1981; Clarke, 1982; Clague and Rampton, 1982), and landslides (Clague, 1981). The White River ash eruptions of about 1200 and 1500 to 1800 years age close to the Alaska-Yukon boundary (Lerbekmo and Campbell, 1969; Hughes et al., 1972; Lerbekmo et al., 1975; MacKevett, 1978; and others), represent the last known major volcanic activity in the region. Large historical earthquakes have occurred in Saint Elias Mountains and immediately adjacent parts of Alaska, with several major events concentrated along the Fairweather and related faults. These include the 1899-1900 sequence of great earthquakes of the Yakutat Bay area estimated at magnitudes (M) of 8.5, 7.8, 8.4 and 8.1 during a thirteen month interval (Tarr and Martin, 1912; Thatcher and Plafker, 1977); the 1958 Lituya Bay earthquake magnitude (M) 7.9 (Stauder, 1960; Tocher, 1960; Tobin and Sykes, 1968; Plafker et al., 1978), which resulted in the landslide induced giant tidal wave at Lituya Bay (Miller, 1960); and the 1979 St. Elias earthquake (M) magnitude 7.5 (Lahr et al., 1979, 1980; Stephens et al., 1980; Stover et al., 1980), which triggered landslides in the Seward, Tweedsmuir, Towagh and Jarvis glaciers areas. Recent seismic monitoring (Horner, 1983, 1989; and others) attests to the continuing tectonic instability and uplift in the Saint Elias Mountains.

Economic Geology

Following white man's first visit in 1891, the recorded history of mineral exploration and development in Saint Elias Mountains as elsewhere has been cyclical. Mineral occurrences discovered to date include a variety of deposit types, however many seem to be minor showings. Placers are probably all fluvial deposits. Lode types include assorted skarn, magmatic, volcanic red bed, volcanogenic massive sulphide, porphyry, and vein and/or replacement deposits. Nonmetallic sedimentary types include lignite coal, gypsum-anhydrite evaporite, and bentonite clay deposits. Until now placers (gold ± minor platinum, silver, copper) have been the dominant producers with Burwash Creek recording much of the yield. To date production from lode deposits amounts to relatively small tonnages of high-grade copper, lead, zinc, nickel (± precious metals), while no production has been recorded from nonmetallic sedimentary deposits. Currently placer gold operations in the Burwash Creek area and Squaw Creek account for all mineral production from the region. By far the most important known lode occurrences are Windy Craggy volcanogenic massive sulphide (Cu,Co,Au,Ag) and Wellgreen magmatic

(Ni,Cu,Co,PGE,Au) deposits. The more significant nonmetallic mineral prospects outlined are O'Connor (gypsum, anhydrite) and Datlasaka (bentonite) deposits. Only a few of the mineral deposits in Saint Elias Mountains have been visited by the authors, and tabulation by map sheet of information on them (Tables 2, 3, 4, and 5) is largely from literature surveys.

History

Placer copper was known and utilized by local native Indians, prior to white man's arrival in 1891 (Hayes, 1892). During 1896-1900 pack-horse-access on the Dalton Trail opened up the area resulting in the first recorded discoveries of placer gold in Dezadeash map area (Brooks, 1900; Tyrrell, 1901), vein copper on Kletsan Creek (Brooks, 1900) and skarn copper at Rainy Hollow. In 1903 placer gold finds near Silver City, precipitated the initial discoveries of placers and lignite coal in Kluane Ranges between Donjek and Dezadeash rivers (McConnell, 1905). Between 1905-1908 the earliest staking took place of vein copper showings in White River and Burwash Creek areas (Cairnes, 1915a; Muller, 1967). From 1908 to 1911 other copper finds were made in the Rainy Hollow area and small tonnages of high-grade ore shipped. The Chisana Gold Rush in 1913-14 kindled placer prospecting in the White River area (Cairnes, 1915a). In 1915 lode gold was found at Gold Cord west of Pleasant Camp (Fraser, 1915). During 1920-22 development work was done at Maid of Erin with some shipment of high-grade ore (Watson, 1948). In 1927 coarse gold was discovered on Squaw (Dollis) Creek (Cockfield, 1928; Mandy, 1933, 1934). Except for small scale placer operations little mining activity took place in the area between 1930-44. Public access to Alaska Highway-Haines Road in 1944 and World War II technology, significantly enhanced placer production and lode exploration in the region. Fixed-wing and later helicopter supported mineral exploration and Government geological mapping in the 1950s led to discoveries of significant deposits of lode copper at Bornite Creek in 1950 (Kindle, 1953) and at Johobo in 1959 (Read and Monger, 1976), magmatic nickel-copper-platinum group elements at Wellgreen in 1952 and at Canalask (Micro) in 1953 (Muller, 1967; Read and Monger, 1976)), and massive copper sulphides at Windy Craggy in 1957-58 (MacIntyre, 1983). Exploration immediately following these finds, resulted in the location of many of the smaller lode copper and nickel showings now known in the eastern parts of the region. During 1959-61 some high-grade ore was shipped from Johobo. Between the 1960s and mid 1970s improved geophysical and geochemical survey techniques helped to better outline many of the known deposits and to target other bodies or areas for assessment. During this period development work was done on Wellgreen, Canalask, White River, Airways, Lynda, Cork, Glen, Dickson, Kloo, Jackpot and other deposits. Between 1968-1971 Kane, Lunar and Hum Bird lead-zinc-precious metal vein, and Lep, Taylor, Sanpete and Bornite skarn deposits among others, were staked and worked on. Around 1970 some evaluation was made of Niamodlaoc Mtn. and other lignite coal deposits (Cameron and Birmingham, 1970). In 1973 underground mining problems resulted in closure of Wellgreen Mine; stockpiled concentrates to that date amounted to 33 924 tonnes grading 7.4% nickel and 6.6% copper. In 1974 authorization of Kluane National Park reserve resulted in some 22 015 km^2 (8500 miles^2) of Saint Elias Mountains in Yukon Territory being set aside as a National Heritage Site, and restriction of mining activities to areas outside park-limits. Mid- to late 1970s exploration in Alsek Ranges by Swiss Aluminum Mining Company of Canada led to discoveries of small massive sulphide deposits including Mus (X) and a subglacial magnetic anomaly near Windy Craggy, and to Alu skarn deposit above Tarr Inlet. Between 1980-83 an intensive drilling, sampling and airborne geophysical program was undertaken at Windy Craggy by Falconbridge Ltd. and Geddes Resources Ltd., which outlined for the first time the potential size of the massive sulphide deposits (MacIntyre, 1983, 1984; Gammon and Chandler, 1986). In 1983 St. Joe Canada Inc. acquired lapsed Swiss Aluminium claims in East Arm glacier area. They revealed promising precious metal values in volcanogenic copper-zinc-cobalt mineralization at Rime showings (MacIntyre, 1984), substantiated the subglacial anomaly and postulated a hidden subglacial source for abundant massive sulphide glacial erratics in Henshi Creek valley (Day, 1985; Day et al., 1987). In 1987 on-ice drilling of the anomaly intersected massive sulphides just beneath the glacier. Mid-1980s exploration by Stryker-Freeport Resources Ltd. in Tsirku-Jarvis glaciers area resulted in discoveries of volcanogenic copper ± barite deposits and to significant float boulderados on the flanks of Mount Henry Clay (Still, 1984; MacIntyre and Schroeter, 1985). Also during that time regional programs by Noranda Exploration Co. Ltd. led to among others small finds of copper skarns and copper-precious metal veins at Red Mountain, and in the upper Klehini and Kelsall rivers areas. Between 1984-87 Haines Gypsum Inc. and Queenstake Resources Ltd. did extensive work on O'Connor gypsum deposits (White, 1986). During 1986-88 Kluane Joint Venture (All-North Resources Ltd. and Chevron Minerals Ltd.) optioned and reassessed Wellgreen and Canalask properties particularly for platinum group elements (PGE). Kluane Joint Venture restaked other known magmatic nickel-copper prospects including Onion, Cats and Dogs, Airways, Lynda, Duke South, Frohberg, and C and E North, and under option agreements with a variety of companies, also explored them for PGE potential (INAC, 1988; R. Carne, pers. comm.). During 1985 to late 1989 Geddes Resources Ltd., operating from an all-weather camp and a DC3 airstrip in Tats valley flats, undertook major underground exploration and first phase mine feasibility studies at Windy Craggy. Early in 1987 work began on a 1852-meter adit system accessible from Tats Camp by a road constructed on Tats Glacier. Intensive year-round work was carried out from 1987 to late 1989, by which time the adit system and an extensive underground drilling and sampling program had been completed. By early 1990 two major ore bodies had been outlined and Geddes Resources Ltd., now with Northgate Ltd. and Cominco Ltd. as large shareholders, released ore reserve estimates of 165 million tonnes grading 1.9% copper, 0.08% cobalt, 0.2 g/tonne gold and 3.9 g/tonne silver (Geddes Res. Ltd., 1990).

Placer deposits

Auriferous placer deposits in Saint Elias Mountains of Canada have been worked since about 1898 (Brooks, 1900; Tyrrell, 1901; Kindle, 1953). They are probably all fluvially derived and have accounted for almost the entire metal production from the region. Most are in unconsolidated Quaternary sediments, but one Tertiary paleoplacer has been reported (Muller, 1967). They occur mainly along the eastern parts of the region in Nutzotin, Donjek, Kluane, northern Alsek and Squaw ranges. Areas placers are known from and have been worked include: upper White River; upper Koidern River; tributaries of Donjek River; Reed Creek and closeby creeks; Burwash and adjacent creeks; Bullion and neighbouring creeks; Jarvis River and tributaries; many creeks throughout SW Dezadeash map sheet; and Squaw and nearby creeks. Gold is recorded from all past or present producers and most showings. Native copper has been obtained from some operations, platinum and/or silver from a few deposits, and tin has been reported from at least one creek.

Most of the placer deposits are located on or nearby the complexly deformed and intruded, relatively narrow belt of Wrangellia (segments W2, W3) volcanic and sedimentary rocks and their Jura-Cretaceous flyschoid and Tertiary volcanic and nonmarine clastic covers. These bedrock sequences have been intermittently and extensively intruded by a spectrum of Mesozoic and Tertiary ultramafic, mafic, intermediate, and acid plutons and subvolcanic intrusions. The belt is crudely contained and deformed by two major strike-slip faults; the Duke River Fault to the southwest and the Denali and possibly related faults abutting the Coast Belt to the northeast. Combined large-scale displacements along these faults have produced the present, fairly narrow, complex melange zone of moderately to highly deformed and altered diverse rocks types intricately bounded by anastomosing fault networks and gouges. An assortment of lode deposit types also occur throughout this fault melange belt, and most carry copper ± precious metals. These include: Late Triassic mafic-ultramafic magmatic nickel-copper-platinum ± gold; Late Triassic red bed copper ± native copper and silver; Late Triassic skarn ± precious metal; Late Early Cretaceous Alaskan concentric ultramafic chrome, platinum; Late Triassic and/or older volcanogenic copper ± precious metal; Mesozoic and Tertiary age fault- or fold-related quartz ± carbonate vein and/or replacement ± copper, gold, silver; and Oligocene and Miocene intermediate to acid subvolcanic porphyry copper, molybdenum ± gold, silver deposits. Erosion, transportation and sorting of these diverse rock types and lode deposits, and possibly also reworking of Tertiary fluvial and ubiquitous Pleistocene surficial clastics, by juvenile pre, syn and post glacial river systems, have almost certainly contributed metals to the placer deposits of the belt.

Operations undertaken on Burwash, Bullion, Squaw (Dollis), Shorty, Squirrel creeks and Reed Creek tributary account for most of the recorded placer gold, platinum, silver and native copper production from the region to date. Smaller-scale workings on Sugden, Sheep, Arch, Kimberley, Quill, Tatamagouche, Swede Johnson, Porcupine and Beloud creeks yielded much of the remaining reported production. Most of the recently past to current production and activity has come from Burwash, Squirrel, Reed (tributary), Kimberley, Swede Johnson, Porcupine, and Squaw creeks and Donjek River. The majority of other placer occurrences listed in the report, constitute minor or "panned-colours" only showings. The following are some incomplete recorded yields (in crude oz.) of gold from the more significant placer producing creeks in Saint Elias Mountains: Burwash Creek (24 322 oz., 1904-1970; 2013 oz., 1978-88); Bullion Creek (9487 oz., 1904-70); Squaw (Dollis) Creek (5077 oz., 1927-70); Shorty Creek (1863 oz., 1945-46; 2436 oz., 1947-59); Squirrel Creek (1279 oz., 1978-88); Reed Creek tributary (1082 oz., 1978-88); Sugden Creek (682 oz., 1947-59); Sheep Creek (676 oz., 1904-70); Arch Creek (540 oz., 1904-1973; 102 oz., 1978-88); Kimberley Creek (560 oz., 1978-88); Quill Creek (108 oz., 1978-88); Tatamagouche Creek (100 oz., 1904-70); Swede Johnson Creek (65 oz., 1978-88); and Porcupine Creek (35 oz., 1978-88). Placer production figures quoted are from the following sources: 1904-1973 and 1927-70 (Read and Monger, 1976); 1945-46 (Kindle, 1953); 1947-59 (Debicki, 1982); and 1978-88 (LeBarge and Morison, 1990).

Lode deposits

A fairly wide variety of lode deposit types occur in Saint Elias Mountains of Canada. However, many appear to be relatively minor showings. They include (classifications mostly after Eckstrand, 1984): lead-zinc-silver, tungsten, and iron skarn (Cu ± Au,Bi,Mo); magmatic (mafic/ultramafic-hosted) nickel, copper (± PGE, Au,Zn); magmatic (mafic/ultramafic-hosted) chromite (+ Pt,Fe,Ti); volcanic red bed copper (± native Cu,Ag); volcanogenic massive sulphide (Cu ± Co,Zn,Au,Ag,Ba); porphyry copper, molybdenum (± Au,Ag); vein and/or replacement ± (Cu,Au,Ag) and lead-zinc (± Cu,Au,Ag); and ultramafic-hosted asbestos deposits. Classifications of many of the deposits are crude or tentative due to varying degrees of alteration (hydrothermal and metamorphism) and deformation, and to lack of detailed studies. Most of the deposits are located in the less rugged and ice-covered more easily accessible eastern parts of the region. Production to date amounts to only small tonnages of high-grade copper, lead, zinc, and nickel (± precious metals). The most significant lode occurrences in the area are Windy Craggy massive sulphide (Cu,Co,Au,Ag), Wellgreen magmatic (Ni,Cu,Co,PGE,Au) and Canalask (Micro) magmatic (Ni,Cu,Co,Zn,PGE) deposits, all of Triassic age.

An assortment of lead-zinc-silver, tungsten, and iron (magnetite) type skarns (Cu ± Au,Bi,Mo) are undoubtedly present in the region. However, subdivision of most occurrences is not possible due to alteration, deformation and insufficient data. The majority of known copper skarn deposits are in the Rainy Hollow or adjoining areas, but there are a few others adjacent to White River. A good quality wollastonite skarn is also reported from the White River area (Archer, Cathro and Associates Ltd., pers. comm., 1990). Many of the deposits could be hosted by carbonates of Late Triassic age, but Alu copper-molybdenum-tungsten skarn deposit among others is in older rocks. Almost all occurrences seem to be minor, however some in the Rainy Hollow area have produced small tonnages of high-grade ore. Notable among these is Maid of Erin, which between 1911 and 1922 shipped a total of 157 tons of sorted ore to Tacoma yielding 77 658 lb. of copper, 5849 oz. of silver, and 6 oz. of gold (Watson, 1948).

Magmatic (mafic/ultramafic-hosted) nickel-copper (± PGE,Au,Zn) deposits are present along the easternmost part of the region. They occur in Triassic and possibly older mafic-ultramafic intrusions and contact host rocks, exclusively within Wrangellia segments (W2, W3). Many of the deposits have undergone some degree of deformation and alteration, due to late Mesozoic and Cenozoic folding and faulting. The most significant occurrences of this type are Wellgreen (Ni,Cu,Co,PGE,Au) and Canalask (Micro) (Ni,Cu,Co,Zn,PGE) deposits. Since its discovery in 1952, considerable development work has been done on the Wellgreen property (Campbell, 1956, 1960; Muller, 1967; Campbell, 1981; Carriere et al., 1981; Hulbert et al., 1988; INAC, 1989). Hudson Yukon Mining Co. Ltd. produced 33 924 tonnes of concentrates grading 7.4% nickel and 6.6% copper, but underground problems resulted in mine closure in 1973. Intermittent exploration work has also been carried out on Canalask following its discovery in 1953, but no ore has been produced. During 1986-88 Kluane Joint Venture (All-North Resources Ltd. and Chevron Mineral Ltd.) optioned and reassessed Wellgreen and Canalask properties particularly for PGE content. In 1989 All-North Resources Ltd. released estimated ore reserves at Wellgreen of 50 million tonnes grading 0.36% nickel, 0.35% copper, 0.51 g/tonne platinum, 0.34 g/tonne Pd with significant values of other PGE, cobalt and gold. In 1990 All-North Resources

Ltd. published a potential ore reserve at Canalask (Micro) of 1.8 million tonnes grading 0.86% nickel in a footwall replacement deposit and also reported widespread disseminated nickel-copper-PGE mineralization in a nearby mafic-ultramafic sill. Other apparently much smaller deposits of this type occurring mostly in Kluane Range include Onion, Cats and Dogs, Airways, Lynda, Wash, Glen (Tatamagouche), Destruction, Duke South, Dickson, Frohberg, and C and E North. Many of these prospects were also initially staked in the 1950s and developed for nickel-copper. In 1986-88 Kluane Joint Venture and other companies restaked most of these and other prospects and evaluated them mainly for PGE content, but there has been no production from any of them to date.

A single small magmatic (mafic/ultramafic-hosted) chromite (+ Pt,Fe,Ti) occurrence (Stride) is reported (Kindle, 1953) from the Late Early Cretaceous Pyroxenite Creek Alaskan-type concentric ultramafic complex intruding Jura-Cretaceous flysch in Kluane Ranges just west of Haines Junction (Sturrock, 1975; Sturrock et al., 1980). Pan tests of gravels on one of the creeks dissecting the intrusion revealed fine platinum (Kindle, 1953). Little work has been recorded from the Stride prospect, which now is in Kluane National Park.

Volcanic red bed copper (± native Cu,Ag) deposits are present in various parts of Wrangellia W2 of the region. They all appear to be hosted by subaerial rift volcanics of the Upper Triassic Nikolai Greenstone, and most seem to be fairly minor showings. The better documented examples occur in the White River area at Kletsan (K-CU) (Hayes, 1892; Brooks, 1900; Moffit and Knopf, 1910; Cairnes, 1915a) and at Discovery (White River) (Cairnes, 1915a; Muller, 1967; Sinclair et al., 1979; Carriere et al., 1981; Eckstrand, 1984). Native copper occurring as placers near these deposits was used and traded by local native Indians before the arrival of white man. Several very large native copper nuggets including one weighing 1175 kg (2590 lb) were found close to the adit at Discovery (Cairnes, 1915a; Muller, 1967). Other small deposits of this type also occur in the Tatamagouche Creek area (Jacquot, Mary and Teddy, Quill (Ram), Quill Creek (Fossil and Hudson Bay), Burwash, and possibly Maple Creek (Vug)), and in the Mush Lake area (Husky, Wren, and Kel). Native copper found in placers close by, almost certainly were derived from deposits such as these. The Johobo (Yukon Star) and Bornite Creek (Kindle, 1953; Warnock, 1962; Read and Monger, 1976; Carriere et al., 1981) deposits, which are both hosted by Nikolai Greenstone, are most probably originally of this type. Deformation arising from movements along the nearby Denali Fault, however has probably resulted in remobilization and redeposition of the copper sulphides in gash-vein fills. Hand-sorted ore shipped from the deposits at Johobo included 2585 tons grading 23% copper and 2 oz./ton silver to Japan in 1959-61, and 1062 tons averaging 20.2% copper and 1 oz./ton silver to Tacoma in 1962. About 150 tons of ore was high-graded from Bornite Creek. These deposits, however, now lie within Kluane National Park. Other small volcanic deposits of uncertain genesis also occur in older strata of Wrangellia in the region. These include Pickhandle (M), Sandy (Cave), Shaft, Snow (Mush) and Jackpot (Pirate Creek) (Read and Monger, 1976; Carriere et al., 1981; INAC, (1989)), which are hosted by oceanic arc volcanics of the mostly Pennsylvanian Station Creek Formation in Wrangellia W2. Minor deposits of questionable volcanic origin also occur in Wrangellia W3, and include Kloo (Ellen) (INAC Overview, (1990)) and possibly Kelsal 32 (BCMEMPR Minfile, 114P (1988)) prospects.

Other volcanogenic (Cu ± Co,Zn,Au,Ag,Ba) deposits are also present in the Alexander Terrane of Saint Elias Mountains of Canada. Most of these occurrences are in Tatshenshini River map area (BCMEMPR Minfile, 114P (1988); NBCMI, 114P (1989)). The most significant by far is the Windy Craggy massive sulphide (Cu,Co,Au,Ag) deposit (MacIntyre, 1983, 1984, 1986; Gammon and Chandler, 1986; Peter, 1989; Geddes Res. Ltd., 1990). It is hosted by a sequence of low greenschist grade, folded and faulted, Upper Triassic (Early Norian) submarine basaltic to andesitic arc volcanics and fine calcareous clastics, and is of exhalative type. Considerable underground development work by Geddes Resources Ltd. has revealed at least two major deposits containing ore reserve estimates of 165 million tonnes grading 1.9% copper, 0.08% cobalt, 0.2 g/tonne gold and 3.9 g/tonne silver with 69% of this amount classified as proven and probable and the remainder as being possible (Geddes Res. Ltd., 1990). First phase mine feasibility studies have been undertaken at Windy Craggy and are under review, but as yet there has been no production. On-ice drilling in 1987 of a sizeable magnetic anomaly beneath East Arm Glacier by St. Joe Canada Inc. in joint venture with Newmont Mines Ltd., revealed massive sulphide mineralization and the potential of another significant probably Upper Triassic exhalative copper deposit just beneath the glacier. Massive sulphide boulders are plentiful at the toe of East Arm Glacier and in Henshi Creek valley (Day, 1985; Day et al., 1987). Other apparently minor Upper Triassic volcanogenic deposits of probable exhalative type in the Windy Craggy area include among others Tats, Rime (X, Mus), Alsek (Tats Glacier), Barbican Mount, Aeolian Steeple and Pampero Ridge (MacIntyre, 1983, 1984; BCMEMPR, Minfile, 114P (1988)). Volcanic-hosted polymetallic sulphide ± barite deposits occur adjacent to Tsirku-Jarvis glaciers in Tatshenshini River map area (MacIntyre and Schroeter, 1985; Schroeter and MacIntyre, 1986; MacIntyre, 1986; BCMEMPR Minfile, 114P (1988). These deposits include Low Herbert, Low Jarvis (Jumar), High Herbert North, and Herbert (Mouth) East and West and were explored by Stryker-Freeport Resources Ltd. through the mid-1980s. Significant massive sulphide float boulderados were also discovered on the flanks of Mount Henry Clay on both sides of the international border. Most of the deposits appear to be relatively minor, and are of uncertain age and origin due largely to limited study. Although Upper Triassic occurrences are strongly suspected, all are not necessarily of that age. Some of the mineralization examined by Noranda Exploration Co. Ltd. at Red Mountain (Fair) may be in Upper Triassic volcanic and sedimentary strata (Schroeter and MacIntyre, 1986). Mineralized gossans at Valia and Mount Bigger, however, are hosted by volcanics of possibly Paleozoic age. A minor copper showing of uncertain origin is also reported in Upper Cambrian volcanics at Fenton (INAC, (1989)) adjacent to Bates River.

Porphyry copper, molybdenum (± Au,Ag) deposits are locally present in Saint Elias Mountains both in Wrangellia and the Alexander Terrane. Most appear to be related to Oligocene or Miocene subvolcanic intrusions, and almost all seem to be minor showings. Development work has been done at Cork prospect on Burwash Creek found in the mid-1960s, and which occurs in Oligocene latite porphyry subvolcanic intrusions hosted by Lower Permian sediments of Hasen Creek Formation (Christopher et al., 1972; Read and Monger, 1976; Carriere et al., 1981). Some mineralization at Glen (Burwash) on Burwash Creek (Christopher et al., 1972; Read and Monger, 1976; INAC, (1987)) may also be of porphyry type and related to Oligocene latite intrusions in mafic-ultramafic and volcanic rocks of Wrangellia W2. Small deposits possibly related to Oligocene intrusions elsewhere in Wrangellia W2 include Garlic, Tatshenshini, Dalton and some of the mineralization at Mohawk (Kane). Minor copper-gold bearing quartz stockwork and veins are also reported at Canyon Mountain (Can) in Wrangell Lava overlying Wrangell W2. Very minor insitu and float porphyry copper-molybdenum occurrences are recorded from the Alexander Terrane. These include Mineral Ridge (Sharp) and float in Steele Glacier area found by the Wood Yukon Expedition in 1941 (Sharp, 1943), and also St. Elias, Galloping and other mineralized float boulders on moraines of Steele, Spring and Donjek glaciers located by others (Muller, 1967). Elsewhere in Alexander Terrane minor copper-molybdenum mineralization with precious metal values is reported from a breccia pipe in Wrangell Lava of the Alsek Province associated with a Miocene acid subvolcanic intrusion (Souther and Stancui, 1975). All the above copper-molybdenum occurrences in the Alexander Terrane are now within Kluane National Park.

An assortment of quartz ± carbonate vein and/or replacement deposits with ± copper, gold, or silver, and lead-zinc ± copper, gold or silver are present in Wrangellia and the Alexander Terrane of the region. Many are likely fault- or fold-related, and almost all seem to be minor occurrences. In Wrangellia segments W2, W3 veins ± Cu,Au,Ag occur at Rabbit Creek (CC), Kelli (Reed Creek), Colton 1, and Watson; and veins with Pb-Zn ± Cu,Au,Ag are present at Liberty, Jackpot (Pirate Creek), Mohawk (Kane), Mount Mansfield (Bear), and Kel. Of these more exploration work has been carried out on Jackpot (Pirate Creek) (Read and Monger, 1976; Carriere et al., 1981; INAC, (1985)) and Mohawk (Kane) (Read and Monger, 1976; INAC, (1986)) prospects. In the Alexander Terrane veins ± Cu,Au,Ag occur at Jennifer 2 (Kincora), Burger King, Kud, Saddle (3/4), Klehini River (KR1, KR4, KR7), Gold Cord (Stampede), and Grizzly Heights; and veins with Pb-Zn ± Cu,Au,Ag are present at Bates (Iron Creek), Hum Bird (Discovery, Creek, South, Camp, Dome), Fault Creek, and Parton. Of these more development work has been done on Gold Cord (Stampede) (Watson, 1948; Schroeter and MacIntyre, 1986; BCMEMPR, 114P (1988)), Grizzly Heights (MacIntyre and Schroeter, 1985; BCMEMPR, 114P (1988)), and HUM BIRD (Schroeter, 1978; BCMEMPR, 114P (1988)) prospects.

Ultramafic-hosted asbestos is present in various parts of the region, but all occurrences are very minor and of low quality. Veinlets of asbestos are reported in Late Triassic ultramafics in Wrangellia W2 at Duke and Ptarmigan-Windgap, and in ultramafic rocks of unknown age in Wrangellia W3 at Decoeli. Picrolite asbestos veinlets up to one inch wide are also recorded from peridotite of unknown age in the Alexander Terrane, both on an island in Bates Lake (Kindle, 1953) and at Nadahini Mountain (Watson, 1948).

Nonmetallic Sedimentary Deposits

Sedimentary deposits of nonmetallic type in Saint Elias Mountains of Canada include lignite coal, gypsum and anhydrite, and bentonite clay. Many of the deposits are small or uneconomic, and to date there has been no recorded production from any of them. The most development work done has been on the O'Connor gypsum deposit.

Low-grade coal occurs exclusively in Tertiary sedimentary rocks in widely scattered parts of the region. Seams up to three metres thick have been reported from the Oligocene and older Amphitheatre Formation. However, the coal is mostly lignite and where tested has been ranked sub-bituminous C or lower grade and appears uneconomic

(Cameron and Birmingham, 1970). Notable seams of lignite coal have been recorded from the following areas: north of White River at McLellan (Coal Creek) and Memoir (Cairnes, 1915a); at Cement Creek, and adjacent to Duke River at Amphitheatre, Granite Creek (Hoge), and Niamodloac Mtn. (Muller, 1967; Cameron and Birmingham, 1970; Read and Monger, 1976); and nearby Slims River at Stove (1,2), and at Kimberley Creek (McConnell, 1905; Muller, 1967; Cameron and Birmingham, 1970; Read and Monger, 1976). Very minor occurrences of lignite coal have been also documented in Tatshenshini River map area on Coal Creek, Squaw Creek, Talbot Creek, in the Kusawak Range, and in several localities on Tats Creek. Thin beds of very low-grade coal and coaly siltstone also occur locally within the Wrangell Lava of St. Clare Province (Souther, 1974; Souther and Stancui, 1975).

Gypsum-anhydrite deposits of highly varying sizes are present mainly in the eastern parts of Saint Elias Mountains. They are more numerous in Wrangellia W2, but also occur in the Alexander Terrane. Most have undergone some degree of alteration and remobilization. Within Wrangellia W2 gypsum-anhydrite deposits of evaporite (possibly sabkha) type are locally known in the basal part of the Upper Triassic Chitistone Limestone. Although this relationship is not often seen, probably due to fault- and fold-related remobilization and redeposition, most deposits occur in close proximity to volcanic and carbonate strata of Late Triassic age and are believed to be of that age and of evaporite type. The largest gypsum and anhydrite deposits in Wrangellia W2 in the region occur adjacent to Bullion Creek in Kluane National Park. Variably sized smaller deposits are also present elsewhere in Wrangellia W2 in the following localities: on Wade and Burwash creeks; adjacent to Bock's Brook; along the east flanks of Kluane Ranges between Slims and Jarvis rivers; and reportedly in the lower parts of Nadahini Creek. Several gypsum-anhydrite deposits are known within the Alexander Terrane, and most of these are probably of evaporite type. They are of uncertain age, but some may be Late Triassic. The most significant of these are the O'Connor River (Snow) deposits. Exploration work done on the O'Connor River deposits during 1984-1987 by Haines Gypsum Inc. and Queenstake Resources, outlined reserves of 8.85 million tonnes of gypsum with up to 8.0% anhydrite (White, 1986; BCMEMPR Minfile, 114P (1988)). Other smaller deposits occur in Kluane Ranges between Slims and Jarvis rivers, in the northern part of Squaw Range, and in Alsek Ranges just northeast of the Windy Craggy deposit. There has been no recorded production from any of the gypsum-anhydrite occurrences.

A bentonite clay deposit is reported from Datlasaka Range in Tatshenshini River map area. The setting of the Datlasaka bentonite deposit is not well known, but it is at least 15 m thick and estimated at 135 000 cubic metres (NBCMI, 114P (1988)).

STRATIFIED ROCK MAP UNIT DESCRIPTIONS

QUATERNARY

PLEISTOCENE AND RECENT

Qs — undivided surficial deposits: includes glacial deposits, alluvium, colluvium; local landslide, lacustrine, eolian and ash deposits.

TERTIARY AND (?) YOUNGER

NEOGENE AND (?) YOUNGER

PLIOCENE AND (?) PLEISTOCENE

Pv — "BLANCHARD RIVER VOLCANICS": reddish-brown basaltic flows; minor interbedded basaltic tuff, agglomerate, and conglomerate (predominantly basaltic clasts); local basaltic neck: (114P/15,16).

Pt — "BULL CREEK DIAMICTITE": diamictite, fluvial gravel, and sand: may locally include uppermost Miocene: ? equivalent to White River ("tillite") diamictite: (115F/8,9).

MIOCENE TO PLIOCENE AND (?) YOUNGER

WRANGELL LAVA: (Nw_1 to Nw inclusive)
(subaerial, calc-alkaline basaltic andesite and andesitic lava and pyroclastics; local rhyolite, dacite, olivine basalt and nonmarine volcaniclastics: arc volcanics: 300 to 2000 m).

Nw — undivided Wrangell Lava: rusty red-brown basaltic to andesitic flows; minor creamy-white to yellow acid pyroclastics and local acid flows: may locally include Qs and/or intra-Wrangell sediments: (115G/2-6; 115F/1,7,10,15; 115B/8-10,15,16; 115A/2,4-6,12).

ST. CLARE PROVINCE: (Nw_L to Nw_u inclusive)

Nw_u — basalt, trachybasalt, andesite flows and pyroclastic rocks; minor volcanic conglomerate: (115G/5; 115F/8,10).

Nw_m — porphyritic and nonporphyritic basaltic andesite flows (minor pillow lava), interbedded with abundant felsic ash flows, acid tuff, coaly tuff, volcanic sandstone and conglomerate: acid pyroclastics may be related to intra-Wrangell (IMf) intrusions: (115G/5,12; 115F/7-10).

Nw_{cg} — volcanic conglomerate - intra-Wrangell; clasts all Wrangell derived: (115G/5,12; 115F/7-9).

Nw_{py}	acid tuff or ash flows - intra-Wrangell: (?) related to IMf subvolcanic intrusions: (115G/5; 115F/8).
Nw_{L}	thick, blocky, mainly nonporphyritic basaltic andesite flows, locally interbedded with white or light-grey clay and coaly siltstone; overlain by thin, closely stacked basaltic andesite flows: (115G/5,12; 115F/7-10).
	ALSEK PROVINCE: (Nw_1 to Nw_4 inclusive)
Nw_4	thin, uniform basaltic andesite and andesite flows: (115B/9; 115A/5,12).
Nw_3	felsic pyroclastics; locally includes acid breccia, ash flows and air fall pumice: possibly related to porphyritic rhyolite intrusion (IMf) adjacent to Dusty River: (115B/9; 115A/5,12).
Nw_2	basalt and basaltic andesite flows and pyroclastics: related to central conduit (breccia pipe): (115B/8,9; 115A/5,12).
Nw_1	locally includes rhyolite and/or dacite lava, thin to thick ash flows and pumice: (115B/8,9; 115A/5,12).

TERTIARY

NEOGENE AND (?) OLDER

MIOCENE TO PLIOCENE AND (?) OLDER

Nv	basaltic flows; minor rhyolitic flows and tuffs: probably equivalent to Nw, but may locally include Pvs: (114P/11,15).

PALEOGENE

OLIGOCENE AND, OLDER AND (?) YOUNGER

ⱷs	AMPHITHEATRE FORMATION: yellow-buff to grey-buff sandstone, pebbly sandstone, polymictic conglomerate, siltstone, mudstone; minor brown-grey carbonaceous shale and thin lignitic coal beds: (nonmarine clastics; predominantly fluvial deposits; local landslide, debris-flow, and lacustrine deposits: fault-trough clastic wedge: 0 to 1100 m): may locally include older, or intra-Wrangell: (115G/2,3,5,6; 115F/15; 115B/16; 115A/2-6,12; 114P/15).

(?) EOCENE AND OLIGOCENE

Ps sandstone, pebble conglomerate, polymictic conglomerate; minor carbonaceous shale; rarer thin coaly beds: may in part be equivalent to ODs: (114P/6,9-11,14).

Pvs "O'CONNOR RIVER VOLCANICS": volcanic breccia, tuff; locally interbedded predominantly basaltic and andesitic flows: C. meta. locally by ODg: (114P/2,7,10,11).

EOCENE AND PALEOCENE

EK KULTHIETH FORMATION: light grey partly arkosic sandstone, interbedded with dark grey siltstone, pebble conglomerate and thin coal beds: (shallow marine and nonmarine delta-beach bar deposits): (115C/7).

CRETACEOUS

LOWER CRETACEOUS AND (?) YOUNGER

Ks sandstone, conglomerate, shale, siliceous tuff: (shallow-marine shelf deposits): (115C/15).

CRETACEOUS AND (?) OLDER

YAKUTAT GROUP:
(deep marine; flysch, melange; unseparated on map: accretionary prism: 115C/1,2,7,8).

KY "melange facies": melange blocks (to several kilometres) of greenstone, oolitic limestone, marble, granitic plutonic rocks, chert, greywacke, set in pervasively sheared matrix of black cherty and tuffaceous pelite: may be U. Jurassic to L. Cretaceous: R. meta. commonly to (2b), locally to (4).
"flysch facies" (local): grey to brown lithofeldspathic greywacke and conglomerate, in thick channel deposits or interbedded with grey to black siltstone, argillite, or slate: may be U. Cretaceous: R. meta. (1) to (2).

VALDEZ GROUP: (Kv_{vm} to Kv inclusive)
(deep-marine flysch, submarine basic volcanics, and metamorphic equivalents: accretionary prism: 115C/7-10; 115B/5; 114O/8; 114P/3-6).

Kv dark grey argillite, greywacke: may locally include Ks: R. meta. (2) to low (3): (115B/5; 115C/9).

Kv_m	metamorphic equivalents of Kv: includes granitic dykes, sills, and locally plugs grades to brown schists and granitoid gneisses (Kv_{gn}): in 114O,P includes Kv and (?) Kv_{gn}: R. meta. high (3) or low (4).
Kv_{gn}	brown granitoid gneisses, minor dark brownish-grey schists; includes granitoid dykes, sills, and locally plugs.
Kv_v	green pillow lava, breccia, tuff: R. meta. (1) to (2): (115C/7).
Kv_{vm}	very dark green amphibolite: (?) metamorphic equivalent of Kv_v: R. meta. to high (3) or (4).

JURASSIC AND CRETACEOUS

UPPER JURASSIC TO LOWER CRETACEOUS

JKD	DEZADEASH GROUP: interbedded light to dark buff-grey lithic greywacke, sandstone, siltstone, thin dark grey shale, argillite and conglomerate; mass-flow conglomerate common in middle part; rare light grey tuff: (flysch; deep-marine fan deposits: ~3000 m): R. meta. (1) to (2a): (115F/15; 115B/16; 115A/2,3,5,6,11-13; 114P/15).

TRIASSIC TO CRETACEOUS

UPPER TRIASSIC TO LOWER CRETACEOUS

ŦKp	dark grey phyllite; minor greywacke and conglomerate: includes JKD and upper noncalcareous member of McCarthy Formation; may locally include uŦM: (115G/2,3,5-7; 115B/15,16).

TRIASSIC

UPPER TRIASSIC

uŦM	McCARTHY FORMATION (lower calcareous member): thin interbedded light to dark grey argillaceous limestone and dark grey argillite: (marine: 0 to 400 m): (115G/2,3,5-7; 115F/15; 115B/16; 115C/15; 114P/14,15).
uŦC	CHITISTONE and NIZINA LIMESTONES: massive light grey limestone, limestone breccia and darker grey, well-bedded limestone: (shallow marine; lowest part intertidal-supratidal, local sabkha: 0 to 700 m): may locally include uŦM: (115G/2,3,5-7,12; 115F/15; 115B/15,16; 115C/15,16; 114P/14,15).

uTRe white to creamy-white gypsum and anhydrite: (115G/2; 115B/15,16).

uTRN NIKOLAI GREENSTONE: dark green and maroon amygdaloidal basaltic and andesitic flows, locally interbedded with maroon tuff and breccia, and rarer maroon and green shales and thin-bedded bioclastic limestone; grey-green volcanic breccia, pillow lava and conglomerate at base: (subaerial, locally submarine: rift volcanics: 0 to 1000 m): may locally include uTRC, uTRM, and rare uTRe: R. meta. commonly to (2b): (115G/1-3,5-7,12; 115F/10,15; 115B/15,16; 115C/16; 115A/3,5,6; 114P/14).

MIDDLE TRIASSIC

mTRp dark grey phyllite (locally limy); minor thin grey limestone: (marine: 0 to 200 m): (115G/3,5,6; 115F/10; 115B/16).

MESOZOIC AND (?) OLDER

Msm biotite schist; minor amphibolite, gneiss: in part "Kluane Schist" (? metamorphosed JKD); includes older rocks: R. meta. to (4): (114P/9,15,16).

Mc marbles in Msm: may be U. Triassic and/or L. Permian, or older: R. meta. to (4): (114P/9,16).

PALEOZOIC AND (?) MESOZOIC

PTRv basic volcanics (locally pillowed), greenstone; rare limestone, sandstone, shale: may include Pv, uTRN, and PTRb, and locally (?) older rocks: R. meta. to low (3): (115A/3; 114P/9,14-16).

PMm schist, amphibolite, dark argillite, marble, conglomerate; may locally include basic intrusions: (?) equivalent to Strelna Metamorphics; may locally include metamorphosed PPs, and younger rocks: R. meta. to low (4): (115C/10,15).

PMsv dominantly greenstone; includes argillite, metachert; local marble, diorite, gabbro; rarer lenses serpentinite: may include PMm, PPs, and locally U. Triassic, Valdez Group, or (?) older rocks: rocks are moderately to highly deformed; mainly or all melange: R. meta. generally to low (3): (115B/2,3; 114O/8,9,14; 114P/3,5,6).

PMvs	(i) Kluane Range, Donjek to White rivers area (115G/12; 115F/9,15,16): basic metavolcanics, schist, marble; minor granitic rocks and granitoid gneiss: may be U. Paleozoic and U. Triassic; may locally include (?) older and (?) younger rocks. (ii) area NW and SE Mt. Decoeli (115B/16, 115A/13): greenstone, greenschist; minor metagreywacke-argillite: may be equivalent to rocks of areas (i) and (iii); may locally include JKD, and (?) PTRub, PTRb, lKub, lKb, or KTb. (iii) area NW and SE Kelsall Lake (114P/9,15,16): amphibolite, greenstone; minor greenschist; rare metagreywacke-argillite: may be equivalent to rocks of areas (i) and (ii); may include metamorphosed PTRv, and locally metamorphosed JKD: R. meta. to (4).

PALEOZOIC AND/OR MESOZOIC, OR (?)OLDER

PMgn	gneiss complex; minor schist: R. meta. (4): (114P/9).

CARBONIFEROUS TO PERMIAN

PENNSYLVANIAN TO LOWER PERMIAN

SKOLAI GROUP: (Pvx to PPs inclusive)

PPs	undivided Skolai Group: volcaniclastic sediments, argillite; local limestone, marble, chert: includes felsite dyke swarms, minor syenite: R. meta. (2) to low (3): (115C/9,15,16).

LOWER PERMIAN

HASEN CREEK FORMATION: (Pc, Ps)

Ps	thin-bedded siliceous argillite, siltstone; minor greywacke and conglomerate; local thin basaltic flows (some pillowed), breccia and tuff: (marine: 0 to 800 m): may locally include Pv, Pc, PTRub, PTRb; in 114P/15 may locally include U. Triassic and JKD: R. meta. to (2): (115G/2,3,5-7,12; 115F/7,15,16; 115B/15,16; 115A/3,5,6,12; 114P/15).
Pc	buff bioclastic limestone, calcarenite; local conglomerate at base: (marine: 0 to 100 m): equivalent to Golden Horn Limestone: R. meta. to (2): (115G/2,3,5,6,12; 115F/10,15; 115B/16; 115C/16; 115A/3,5,6,12,13).

PENNSYLVANIAN TO (?) LOWERMOST PERMIAN

STATION CREEK FORMATION: (Pvx, Pv, Psv)

(oceanic arc volcanics and sediments)

Psv	tuff, breccia, siliceous argillite, rare andesitic flows: may locally include Ps: R. meta. to (2): (115A/3,5,6,12; 114P/14,15).

Pv

area NW of lower Duke River (115G/5,6,12; 115F/7,9,10,15,16): predominantly pyroclastics; includes grey-green massive volcanic breccia and agglomerate (clasts basalt and plagioclase porphyry), grading into lithic-vitric tuff, and well-bedded pale green and white siliceous tuff; rare argillite and basic flows.
Duke to Slims rivers area (115G/2; 115B/16): increasing amounts of flows, lesser amounts of pyroclastics.
area NW and SE of Mush Lake (115A/3,5,6; 114P/15): predominantly flows; includes dark green massive porphyritic (augite) basaltic to andesitic flows (locally pillowed); minor volcanic breccia, rare argillite.
locally Pv unit may include PTRub, PTRb, uTRN: R. meta. commonly to (2b).

Pvx

pillowed basic flows in unit Pv: (115A/6).

UPPER PALEOZOIC AND (?) OLDER AND YOUNGER

DEVONIAN TO UPPER TRIASSIC AND (?) OLDER

Adjacent to Duke River Fault (SW side) and locally in Icefield and Alsek ranges: (uPs to uPe inclusive): (units of this grouping not necessarily in order of age: many rocks are lithologically similar to those of late Paleozoic and early Mesozoic ages closely juxtaposing, but NE of Duke River Fault: mostly, rocks are complexly deformed: R. meta. generally high (2) to mid (3)).

uPe

white to creamy-white gypsum and anhydrite; locally size of lenses are exaggerated to show on map: (?) mostly uTRe: (115B/16; 114P/10,14).

uPcp

thin-bedded, dark bluish-grey limestone or marble; local light grey, thicker bedded limestone; minor dark grey calcareous argillite: U. Triassic and (?) older: (115G/4; 115B/6-11,13,14; 115A/5).

uPcs

laminated dull ochre yellow calcareous siltstone-sandstone, silty limestone, grey phyllite; minor intercalated thin-bedded dark blue-grey limestone; may locally include uPcp: (?) Carboniferous or Permian; may include older, and locally Triassic rocks: (115G/3; 115B/8-10,13-15).

uPp

(i) Slims to Jarvis rivers area (115B/16): black siliceous argillite, argillite (locally calcareous); includes interbedded argillite, dark siltstone; rarer buff limestone or marble, black ultramafic "pods" and dykes, and local gypsum-anhydrite: (?) equivalent to mTRp, Ps, or Dp; with uPc, PTRub, uTRe.
(ii) Squaw and Datlasaka ranges area (115A/3; 114P/10,14,15): similar rocks to (i): (?) mostly U. Paleozoic; may locally include older and U. Triassic.

(iii) Donjek to Disappointment glaciers area (115B/9,10,13-15): black graphitic argillite, commonly siliceous, and dark quartz-rich argillaceous siltstone; minor sandstone and impure quartzite; local dull ochre calcareous sandstone-siltstone, dark calcareous argillite and dark grey limestone or marble: (?) U. Paleozoic, and (?) older; may locally include U. Triassic.

uPpc

(i) area adjacent to Duke River Fault (SW side), Steele Glacier to Marble Creek (115G/2-6; 115F/1,8; 115B/9,14-16; 115A/5): dark argillite (mainly calcareous, but locally siliceous) and interbedded dark siltstone-argillite (commonly calcareous); minor thin-bedded dark blue-grey limestone and phyllite: local "lenses" of more massive light grey limestone and greenstone (? massive volcanics and/or basic intrusions); rare gypsum-anhydrite: U. Paleozoic to U. Triassic; may locally include older.
(ii) "Tats Glacier" and Carmine Mountain areas (114P/12 and 114P/11): similar rocks to (i) and (iii): in part or all U. Triassic; may include older.
(iii) Squaw-Datlasaka Ranges area (115A/3; 114P/10,14,15): similar rocks to (i) and (ii): mostly U. Paleozoic to U. Triassic; may include older.

uPc

massive light grey and thin-bedded dark blue-grey limestone or marble; local buff-grey crinoidal limestone: mostly U. Paleozoic to U. Triassic; includes Devonian and (?) older, Pennsylvanian, (?) L. Permian, and U. Triassic: (115G/2-5; 115B/15,16; 115A/3; 114P/8-10,14,15).

uPvs

green and purple volcanic breccia, tuff, agglomerate: rarer cherty sediments, black argillite, grey phyllite: (?) equivalent to uPv, Pv, Psv, uTRN, or older: (115B/16).

uPv

Slims to Jarvis rivers area (115B/15,16): dark green (locally purple), porphyritic (augite and/or plagioclase), or nonporphyritic basaltic to andesitic flows; local volcaniclastic sediments, grey limestone or marble, and basic intrusions: Devonian (? Middle or Upper) or (?) younger.
Alsek River area (115A/5): green and purple basaltic to andesitic flows: (?) U. Triassic, but may be older.
"Tats Glacier" area (114P/12): dark greenish-grey basaltic to andesitic pillow lava and massive flows; includes interbedded limy argillite-siltstone and basic intrusions; local limestone, tuff and agglomerate; rare gypsum: (marine: ? arc volcanics): U. Triassic and (?) younger; may locally include older.
Carmine Mountain area (114P/11): basaltic to andesitic pillow lava and massive to fragmental dacite; locally interbedded calcareous and cherty argillite: (marine: ? bimodal rift volcanics): (?) U. Triassic, but may be older.

uPs

undivided mostly units, OSwp, Dc, uPpc, uPp, uPc, Mb: (114P/8-10).

UPPER PALEOZOIC AND OLDER AND YOUNGER

DEVONIAN TO UPPER TRIASSIC AND OLDER

Psp

"ICEFIELD RANGES PELITIC ASSEMBLAGE": black graphitic argillite, phyllite, and schist (commonly siliceous; locally dominantly calcareous), and dark quartz-rich argillaceous siltstone; lesser thin-bedded mica quartzite, mica quartz-rich sandstone-siltstone; rarer dark blue-grey platy limestone or marble, and thin-bedded grey limestone or marble; local thicker bedded grey limestone or marble, basic volcanics or intrusions, and gypsum-anhydrite: (diverse grouping mostly of dark grey, fine- to very fine-grained clastics; thickness unknown): may be mostly U. Paleozoic to U. Triassic, but include older: equivalent to Dp, uPpc, uPp, uPcs, uPcp; locally includes SDc, Dc, uPc, uPv, uPe; may include finer clastic (distal) equivalent of Psa (and Psa unit), ЄOwb, ЄOw, ЄOwv, OSwp, and ODcs (locally ODcs unit): rocks are complexly deformed: R. meta. commonly to low (3), locally to mid-(3): (115G/4; 115B/1,2,6-14; 115A/5; 114O/15,16; 114P/2,6-8,10-14).

DEVONIAN

MIDDLE DEVONIAN AND, OLDER AND YOUNGER

Dc

"BULLION CREEK LIMESTONE": massive to well-bedded light grey limestone or marble, thin-bedded dark grey limestone or marble; minor dark blue-grey calcareous argillite (locally interbedded, and at base): (marine: bank/reef carbonates: 0 to ? 300 m): mostly Devonian (Middle Devonian, but includes older and younger): R. meta. (2) to low (3): (115G/2,3; 115B/9,15,16; 115A/3,5,12,13; 114P/10,14,15).

DEVONIAN AND (?) OLDER

LOWER DEVONIAN AND (?) OLDER

Dp

dark blue-grey argillite, phyllite, and minor greywacke siltstone-sandstone; upper part more calcareous, lower part more greywacke; locally may include massive limestone (? Dc), and greenstone (uPv or uPbv): (marine): R. meta. (2) to low (3): 115G/2,3; 115B/9,15,16; 115A/12,13).

SILURIAN AND DEVONIAN, AND (?) OLDER

SDc

massive to thick-bedded light grey limestone or marble, and well-bedded dark blue-grey limestone or marble; minor calcareous argillite or phyllite: (marine: up to ~2000 m): in part Devonian, probably includes Silurian, and locally (?) Ordovician; equivalent in part to ODcs: R. meta. (2) to (3), locally to (4): (115G/4,5; 115F/1,2,7; 115B/2,3,5-8,10-14; 115C/9,15,16; 114O/16; 114P/2,3,6,7).

(?) ORDOVICIAN TO SILURIAN, AND (?) YOUNGER

OSwp

area adjacent to Duke River Fault (SW side), Steele Glacier to Marble Creek (115G/2-5; 115B/9,15,16; 115A/5,12): dull rusty-buff or green-grey greywacke siltstone-sandstone, and argillite or phyllite; minor grit; rarer limestone, pebble conglomerate, conglomerate: may locally include argillite (Dp): (marine: ? 0 to ~1000 m): R. meta. high (2) to mid-(3).

Squaw-Datlasaka ranges area (114P/10,14,15): interbedded rusty, buff to darker buff-grey greywacke siltstone-sandstone, dark grey argillite (commonly quartz-rich); locally includes quartzite and rarer conglomerate: may be partly equivalent to Psa: R. meta. low to mid (3).

ORDOVICIAN AND (?) OLDER AND YOUNGER

LOWER ORDOVICIAN TO DEVONIAN AND (?) OLDER

"GOATHERD MOUNTAIN CARBONATE ASSEMBLAGE":

ODcs

(a) laminated carbonate-calcareous mudstone-siltstone facies: dominantly interbedded yellow to ochre-buff calcareous mudstone-siltstone, grey silty limestone and platy to thicker bedded blue-grey, cryptocrystalline limestone; occurs generally in lower to middle parts of unit: includes Ordovician; (?) facies equivalent in part to Psa.

(b) thicker bedded to massive carbonate facies: thick to massive-bedded, light to medium grey limestone; local well-bedded, mid- to dark blue-grey limestone: occurs generally in middle to upper parts of unit: probably equivalent to SDc, but locally includes Ordovician.

Abrupt facies changes, diachronous and unconformable relationships suspected within this unit: locally facies (a) rapidly grades upward and laterally into (b): locally (a) grades downward into greywacke-argillite (€Owb) (Range Creek area): this unit is believed to grade rapidly into part of Psa (Marble Creek area): (marine: ? to or >1000 m): rocks are moderately to complexly deformed: R. meta. high (2) to mid (3): 115B/1,8; 115A/3-5; 114O/9,15,16; 114P/2,6-8,10-14).

CAMBRIAN TO ORDOVICIAN AND (?) YOUNGER

"DONJEK RANGE GREYWACKE-GREENSTONE ASSEMBLAGE": (€Os, €Ow, €Owv)

(marine: volcaniclastics; minor basic volcanics and intrusions: ? arc volcanic clastics: up to ~2000 m): rocks pervasively deformed: R. meta. high (2) to mid (3): 115G/2,3; 115B/9,14-16; 115A/5,12).

€Owv

massive to well-bedded, buff-green, coarse- to medium-grained greywacke and/or volcanic sandstone (clinopyroxene and plagioclase clasts abundant); minor greywacke siltstone-sandstone, argillite, phyllite or schist, and basic intrusions; rare conglomerate, basic flows and (?) pyroclastics, and thin limestone or marble.

€Ow

green to maroon-buff greywacke siltstone-sandstone, and argillite, phyllite, or schist; minor coarser greywacke and/or volcanic sandstone (with augite/plagioclase clasts); rare conglomerate, and limestone or marble.

ЄOs	undivided mainly units ЄOw, ЄOwv; may locally include OSwp.

"NORTHERN ALSEK RANGES GREYWACKE-GABBRO ASSEMBLAGE": (ЄOc, ЄOwb)
(marine: volcaniclastics; basic volcanics and intrusions: (?) arc volcanic clastics: >1000 m: (?) equivalent to ЄOwv, ЄOw, ЄOs; (?) in part facies equivalent to, or younger than Єv, Єc, Єvs: deformation only locally intense: R. meta. high (2) to low (3); C. meta. by ЄOb: 115B/1; 115A/3-5; 114P/13).

ЄOwb	greenish-grey greywacke sandstone-siltstone (volcanic derived) and dark argillite; minor laminated buff-grey silty limestone and limy siltstone, and basaltic to andesitic flows (some pillowed); rarer, more massively bedded blue-grey limestone (ЄOc): grades upwards into ODcs: includes abundant gabbro-diabase sills/dykes (ЄOb).
ЄOc	light grey laminated silty limestone and limy siltstone, and well-bedded limestone or marble: (distinct carbonate units in ЄOwb).

CAMBRIAN AND (?) YOUNGER

"FIELD CREEK VOLCANICS": (Єv, Єc, Єvs)
(marine and nonmarine: basaltic to andesitic flows; minor carbonate and volcaniclastics: (?) arc volcanics: ? >2000 m, base unobserved): deformation only locally intense: R. meta. high (2) to low (3): 115A/3,4).

UPPER CAMBRIAN AND (?) YOUNGER

Єvs	calcareous tuff, volcanic breccia; dark green and rare purple, porphyritic andesitic flows; locally intercalated with thin-bedded limestone, and "lenses" of purple and green tuffaceous sandstone and pebble conglomerate.
Єc	light grey massive limestone and thin-bedded silty limestone, or marble: ("main" limestone 0 to ? ~200 m, with several, much thinner, discontinuous beds).

UPPER CAMBRIAN AND (?) OLDER

Єv	massive dark green (rare purple) porphyritic (plagioclase) basaltic to andesitic flows (locally pillowed), volcanic breccia; minor tuff and tuffaceous sandstone; rare thin limestone or marble: (base not observed).

PALEOZOIC AND YOUNGER

Pvb massive and pillowed basaltic to andesitic flows, volcaniclastics, and gabbro-diabase intrusions; minor pyroclastics, argillite-siltstone, and limestone; rare acid volcanics: (?) mostly Paleozoic; includes Cambro-Ordovician, Devonian, and locally U. Triassic; includes units (?) Ꞓv, (?) Ꞓvs, ꞒOwb, ꞒOb, uPv, (?) Mb, (?) KTb, and locally (?) Ꞓc, ꞒOc, OSwp, Dc; may locally include intrusions related to Pvs, Og, or Nv: R. meta. low to mid (3): (114P/7,8,10,11,14).

LOWER PALEOZOIC AND (?) YOUNGER

(?) ORDOVICIAN TO (?) SILURIAN AND (?) YOUNGER

Psa "NORTHEASTERN ICEFIELD RANGES CLASTIC ASSEMBLAGE": thin to medium-bedded, fine- to medium-grained, khaki buff, quartz-rich, micaceous, variably calcareous siltstone and sandstone, mica quartzite, psammitic schist, intercalated with minor thin grey phyllite, argillite and schist; includes minor volcanic wacke and rarer thin buff ochre-orange limestone or marble, and silty limestone: (monotonous sequence of quartz-rich, calcareous, fine- to medium-grained clastics: marine: thickness unknown): may be partly equivalent to OSwp, and partly facies equivalent to ODcs; may include distal equivalents of ꞒOw, ꞒOwv: rocks complexly deformed: R. meta. low to mid (3): (115G/3,4; 115B/8-10,13-15; 115A/5).

(?) LOWER PALEOZOIC AND (?) YOUNGER

lPcs rusty brown, thin-bedded limestone, marble; minor greenstone: R. meta. variable, low (3) to (4): (115F/2; 115C/15,16).

(?) CAMBRIAN TO (?) ORDOVICIAN AND (?) YOUNGER

lPvs greenstone, amphibolite; minor schist, argillite, greywacke, mica quartzite; locally includes marble: R. meta. to low (4): (115F/1,2,7; 115B/5,6,12; 115C/8,15,16; 114O/15).

(?) CAMBRIAN AND (?) YOUNGER

lPvm massive dark green to black amphibolite: (? basic metavolcanics): R. meta. to (4): (115B/2,3,7; 114O/9,10,15,16).

(?) LOWER PALEOZOIC AND (?) OLDER

lPgn "VERN RITCHIE GLACIER GNEISSIC ASSEMBLAGE": grey gneiss and granitoid gneiss; includes amphibolite, amphibole schist, quartz mica schist, metaquartzite and marble: may be partly equivalent to lPvm, lPvs: locally complexly deformed: R. meta. to (4): (114O/9,10,15; 114P/6,11,12).

INTRUSIVE ROCK MAP UNIT DESCRIPTIONS

TERTIARY

NEOGENE

MID TO LATE MIOCENE

WRANGELL PLUTONIC SUITE: (6-16 Ma): (IMdi, IMg, IMf)
(calc-alkaline: subvolcanics; basalt, andesite, rhyolite: high-level plutons; granodiorite, diorite, gabbro: comagmatic with Wrangell Lava).

IMf — subvolcanics: (6-16 Ma): white to creamy-white hornblende and/or biotite rhyolite, rhyodacite, dacite, and trachyte; felsite: suite includes unmapped basalt, andesite, gabbro: (comprise sills, dykes, domes, small plutons): in part or all intra-Wrangell Lava: may include Φf: (115G/3,5; 115F/7,8,15; 115B/9; 115A/3-5,12).

high-level plutons: (IMdi, IMg)

IMg — Mt. Steele pluton: (8.4 Ma): fine medium grained, creamy-grey hornblende and/or biotite granodiorite, and porphyritic (K-feldspar) hornblende granodiorite; includes creamy-grey, biotite-quartz-plagioclase leucogranite porphyry (equivalent to IMf): extent of phases and pluton uncertain, due to ice cover: probably includes JKg: (115F/1,2,7; 115C/16).

IMdi — Bock's Brook stock: (12.8-13.3 Ma): includes narrow border phase of dark grey, medium grained, pyroxene gabbro, cored and intruded by light buff-grey, medium grained, uniform biotite diorite: both phases cut by younger Wrangell dykes: (rounded, discordant, concentrically zoned pluton: contacts sharp; C. meta. of gabbro by diorite): (115G/2).

PALEOGENE

OLIGOCENE

Φf — subvolcanics: (26-32 Ma): white to creamy-white felsite (? rhyolite, rhyodacite); biotite and/or hornblende quartz latite porphyry; locally crowded hornblende. plagioclase porphyry: (mainly sills, dykes; some small plutons): may include IMf: (115G/2,6; 115B/7,15,16; 115A/3,5,6,11,13; 114P/2,6,7,9,10,14,15).

TKOPE PLUTONIC SUITE: (24-31 Ma): (Φgb to Φg inclusive)
(calc-alkaline: epizonal: elongate, discordant, composite batholithic complexes and plutons: granite; lesser granodiorite, gabbro; rarer quartz diorite and granophyre: cut by diabase, quartz feldspar porphyry dykes: contacts sharp; thermal aureoles; C. meta. (1) to (2)).

Φg — undivided Tkope plutonic suite: includes light pinkish-grey, medium- to coarse-grained, homogeneous, biotite and/or hornblende granite (locally miarolitic); lesser light creamy-grey biotite hornblende granodiorite, dark grey biotite hornblende quartz diorite and gabbro-diorite: locally includes older and (?) younger plutons: (114P/7-11).

Ogb-Ogp

Tkope River batholith: (24.7-31.1 Ma): (Ogb to Ogp inclusive)

- Ogp: fresh, light pink, fine grained, homogeneous, miarolitic, biotite granophyre: (114P/11).
- Ogr: fresh, pink, medium grained, homogeneous, hornblende biotite granite: dominant phase: (114P/7,10,11).
- Ogd: altered, dark grey, massive, fine- to fine medium-grained, heterogeneous, porphyritic (plagioclase), biotite hornblende (rarer augite) granodiorite: (114P/7,10).
- Ogdp: altered, grey, massive, medium grained, biotite granodiorite porphyry (phenocrysts; plagioclase, quartz): (114P/7,10).
- Oqd: altered, white to light grey, massive, medium grained, biotite hornblende quartz diorite: (114P/11).
- Ogb: altered, dark grey to black, biotite augite hypersthene microgabbro to gabbro: (114P/7,10,11).

Other high-level plutons:

Oggb

Mt. Newton pluton: (27.4 Ma): foliated, dark greenish-grey, fine coarse grained, homogeneous, hornblende gabbro-diorite: (115C/7).

Mt. Owen pluton: light grey, fine- to medium-grained, homogeneous, biotite hornblende granite; rhyolite porphyry: composite body; may include **Eg** and/or younger: (115C/1,8).

EOCENE

Eg

SEWARD PLUTONIC SUITE: (41-52 Ma): nonfoliated to weakly foliated, light to mid-brownish-grey, medium grained, homogeneous, biotite and hornblende biotite - tonalite, granodiorite; rarer granite and quartz diorite: (calc-alkaline: epizonal: elongate, discordant and concordant, single or multiphase plutons: contacts sharp; distinct thermal aureoles): may locally include younger plutons: (115B/4,5; 115C/1,8-10; 114P/3-6).

CRETACEOUS TO TERTIARY

LATE CRETACEOUS TO EARLY TERTIARY

KTg

COAST PLUTONIC COMPLEX (Northern part): (55.5-72.4 Ma): biotite hornblende granodiorite, biotite hornblende quartz diorite; lesser biotite granite: (multiphase plutonic complex): (115B/16; 115A/2; 114P/9,15,16).

KTb

medium- to coarse-grained, dark grey hornblende pyroxene gabbro; minor hornblende quartz diorite, diabase: (?) equivalent to lKb or Tertiary: (115A/2; 114P/7,10,15).

CRETACEOUS

LATE EARLY CRETACEOUS

<u>KLUANE RANGES PLUTONIC SUITE</u>: (106-121 Ma): (Kqm to Kg inclusive) (calc-alkaline: epizonal to (?) mesozonal: elongate, discordant and concordant, batholithic complexes and single or multiphase plutons: granodiorite, quartz diorite, diorite; rarer quartz monzonite: contacts sharp; thermal aureoles; C. meta. (1) to (2): may include older and younger plutons).

Kqm-Kg

<u>undivided Kluane Ranges plutonic suite</u>:

Kg: multiphase batholithic complexes and small plutons: (115G/2,5,6,12; 115F/9,10,15,16; 115B/15,16; 115A/2,3; 114P/14,15).

<u>subdivided Kluane Ranges plutonic suite</u>: (Kqm to Kgd inclusive)

Kgd: buff to mid-grey, medium grained, biotite hornblende granodiorite: (115G/2; 115A/6).

Kqd: mid-grey, coarse medium grained, biotite hornblende quartz diorite: (115A/3,6).

Kdi: mid- to dark greenish-grey, coarse medium grained, hornblende diorite: (115B/16; 115A/3,5,6).

Kqm: buff to mid-grey, coarse medium grained, biotite hornblende quartz monzonite: (115A/5).

<u>Pyroxenite Creek Ultramafic Complex</u>: (113-124 Ma): (lKub, lKb) (Alaskan-type complex: epizonal: includes three crudely concentric clinopyroxenite phases: cut by mafic and ultramafic dykes, and small mafic plutons: contacts sharp; thermal aureole; C. meta. to (3): 115A/12)).

lKb medium grained hornblende pyroxene gabbro, and biotite hornblende diorite: small plutons intruding ultramafite.

lKub two central phases: (a) coarse grained olivine clinopyroxenite (minor biotite); (b) fine grained magnetite clinopyroxenite (minor hornblende); narrow border phase of hornblende clinopyroxenite.

JURASSIC TO CRETACEOUS

LATE JURASSIC TO EARLIEST CRETACEOUS

SAINT ELIAS PLUTONIC SUITE: (130-160 Ma): (JKgr, JKgd, JKg)
(calc-alkaline: crudely comprise (a) narrow western belt (mainly U. Jurassic); (?) mesozonal to epizonal; elongate, concordant/discordant batholithic complexes; foliated tonalite, quartz diorite, diorite, lesser granodiorite, quartz monzodiorite, rarer granite: (b) broad eastern belt (mainly L. Cretaceous); epizonal; elongate to rounded, discordant, single or multiphase plutons; granodiorite, lesser tonalite, rarer granite, quartz monzodiorite, quartz diorite, diorite: contacts sharp, thermal aureoles, C. meta. (1) to (2): may include older and younger plutons).

JKgr-JKg

undivided Saint Elias plutonic suite:

JKg: mainly batholithic complexes and multiphase plutons: (115G/4; 115F/1,2; 115B/1,2,5-9,12-15; 115C/9,10,15,16; 115A/4,5; 114O/8,9,15,16; 114P/2,3,5-7,11-14).

subdivided Saint Elias plutonic suite: (JKgr, JKgd)

JKgd: mostly nonporphyritic and porphyritic (K-feldspar), biotite hornblende granodiorite; lesser nonporphyritic biotite and/or hornblende tonalite; locally includes biotite hornblende quartz monzodiorite, biotite hornblende quartz diorite, dark green-grey diorite and hornblendite: phases mostly light to mid-grey, coarse medium grained, nonfoliated and homogeneous: (115G/3,4; 115F/1; 115B/1,8,10,11,13-15; 115C/15,16; 115A/4; 114O/16; 114P/13).

JKgr: light creamy-grey, medium grained, homogeneous, nonfoliated hornblende biotite granite, quartz monzonite: (115F/2; 115C/10,15; 115A/5).

MESOZOIC AND/OR OLDER

LATE PALEOZOIC AND/OR MESOZOIC

Mb

"SQUAW-DATLASAKA RANGES GABBRO-DIABASE SILLS": medium to dark rusty grey-green, massive to schistose greenstone: predominantly metagabbro or metadiabase sills; may locally include basic volcanics and minor sediments: (?) equivalent to PTRb: may include uPv and (?) older rocks: R. meta. high (2) to low (3): (115A/3; 114P/10,14,15).

(?) PERMIAN AND TRIASSIC

LATE TRIASSIC AND (?) OLDER

"KLUANE-TYPE MAFIC-ULTRAMAFICS": (PTRub, PTRb)

PTRb

medium grey-green, massive, medium grained, pyroxene gabbro sills: may locally include lKb: R. meta. (2) to low (3): C. meta. by larger sills (1) to (2): (115G/2,3,5,6; 115B/15,16; 114P/15).

PTRub

sheeny black peridotite; rare dunite: sills, "pods": may locally include lKub: R. meta. (2) to low (3); C. meta. by larger intrusions to (3): (115G/2,3,5,6; 115F/15,16; 115B/16; 115A/3,5,6; 114P/14,15).

LATE PALEOZOIC AND (?) YOUNGER

(?) DEVONIAN AND/OR YOUNGER

uPbv	"MT. CAIRNES GABBRO-GREENSTONE COMPLEX": complex of massive coarse medium- to coarse-grained, mid- to dark rusty grey-green hornblende pyroxene gabbro, minor medium grained gabbro-diabase and gabbro-pegmatite intrusions, and rare small black peridotite "pods"; with screens of green or lesser purple flows, pyroclastics, and volcaniclastics, minor dark siliceous argillite, and rare chert: may include PTRb, PTRub, Mb, lKb, KTb, and (?) lMdi; with screens of uPv, uPvs; similar to uPb: rocks are variably deformed: R. meta. high (2) to mid-(3): (115G/2; 115B/9,15,16; 115A/12).

LATE PALEOZOIC OR (?) OLDER

uPb	"STEELE CREEK - MT. CONSTANTINE GABBRO COMPLEXES": (364 Ma): complexes of massive, fractured, dark rusty grey-green hornblende pyroxene gabbro, gabbro-pegmatite and diabase: (115G/5; 115F/7).

CARBONIFEROUS TO PERMIAN

LATE PENNSYLVANIAN TO EARLY PERMIAN

ICEFIELD RANGES PLUTONIC SUITE: (270-290 Ma): (PPgd to PPg inclusive) (alkaline to calc-alkaline: (?) mesozonal to epizonal: elongate to rounded, concordant/discordant, agmatite or multiphase batholithic complexes and simple-phase plutons: commonly quartz monzodiorite to diorite phases are veined and intruded by leucocratic quartz syenite to granodiorite: several plutons are uniform granodiorite or syenite: contacts both complex and sharp; some thermal aureoles; C. meta. (1) to (2): may locally include JKg and (?) younger intrusions).

PPgd-PPg	undivided Icefield Ranges plutonic suite:
	PPg: multiphase batholithic complex and pluton: (115G/3-6; 115B/13).
	subdivided Icefield Ranges plutonic suite: (PPgd to PPdi inclusive)
	PPdi: mid- to dark greenish-grey, medium grained, nonfoliated and foliated, biotite hornblende quartz monzodiorite-quartz diorite-diorite, veined and intruded by leucocratic granodiorite: (agmatite complexes): (115B/2,3,6,7,12,13).
	PPy: salmon pink, uniform, medium grained, hornblende syenite: (small simple-phase plutons): (115C/9,16).
	PPydi: mid- to dark greenish-grey, medium grained, nonfoliated and foliated biotite and/or hornblende quartz monzodiorite-monzodiorite-diorite, veined and intruded by pink to creamy-grey, leucocratic quartz syenite to granodiorite: (syenodiorite complexes): (115B/6,11-14; 115C/15,16).
	PPqdi: Art Lewis Glacier pluton: complex dominantly composed of dark greenish-grey, altered, medium grained, foliated biotite hornblende quartz diorite-diorite; cut by numerous fine grained leucocratic dykes and granitic pegmatite: (114O/15).

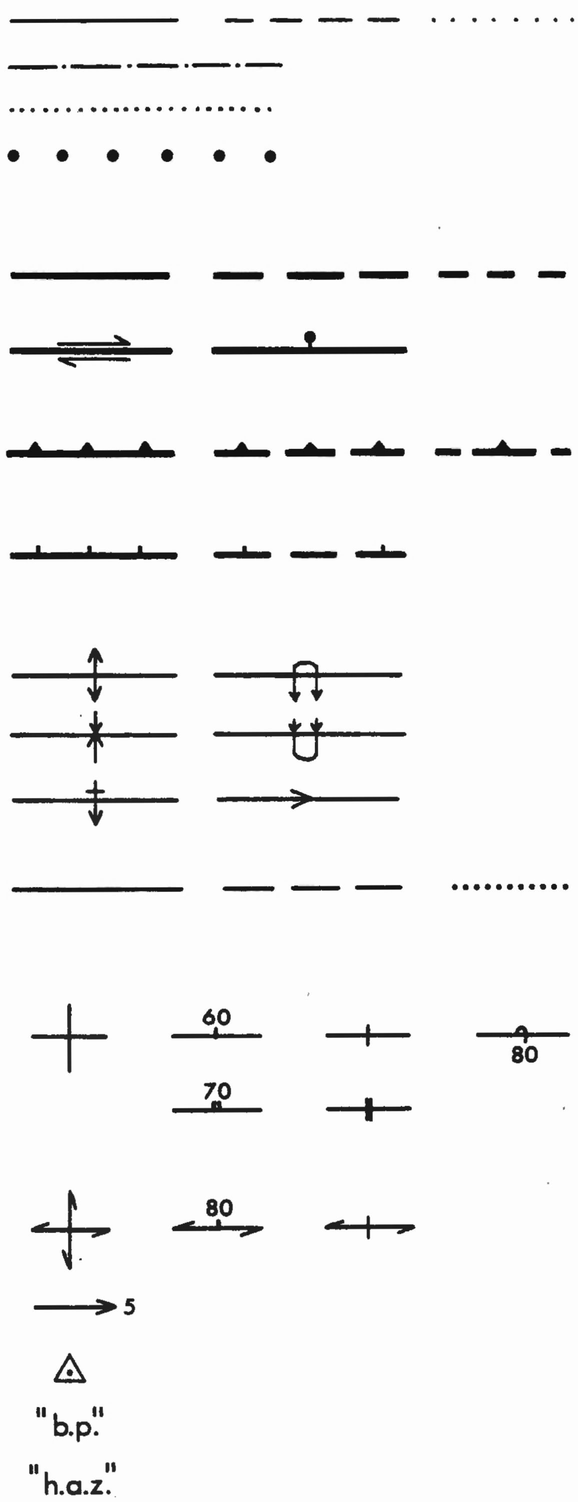
PPgd: light buffish-grey, coarse medium grained, fairly homogeneous, nonporphyritic and porphyritic (K-feldspar) hornblende and/or biotite granodiorite: includes Steele Glacier and Fisher plutons: (115G/4; 115F/1,8; 115B/2).

CAMBRIAN TO ORDOVICIAN, AND (?) YOUNGER

ЄOb

"NORTHERN ALSEK RANGES GABBRO-GREENSTONE COMPLEX": variably sized, massive, dark rusty grey green, gabbro or diabase sills and dykes (>80%), with screens of rusty ЄOwb: includes basic volcanics (? Єv, ? Єvs, and ЄOw); may include younger intrusions: R. meta. high (2) to low (3); C. meta. by larger sills (1) to (2): (115B/1; 115A/3-5; 114P/13,14).

MAP SYMBOLS



Geological boundary
- defined, approximate, assumed
- gradational
- outcrop limit/drift boundary
- limit of geological mapping

High-angle Fault
- defined, approximate, assumed
- relative displacement: strike-slip; downthrow (barb)

Thrust Fault (teeth upthrust side)
- defined, approximate, assumed

Holocene Fault Scarp
- defined, assumed

Fold
- anticline : overturned anticline
- syncline : overturned syncline
- homocline : plunge of fold
- fold axial trace defined, approximate, assumed

Bedding: strike/dip
- tops known: horiz., inclin., vert., overturned
- tops unknown: inclined, vertical

Foliation, cleavage: strike/dip
- horizontal, inclined, vertical

Lineation: minor fold axes

Eruptive centre

Breccia pipe

Hydrothermal alteration zone

Mineral deposits

Locality: map to legend reference number ⊗4

Macro and micro fossils

Locality: macro, conodont, macro and conodont ⊙, ●, ◐

Numerical age determinations
(Dodds and Campbell, 1988; Farrar et al., 1988)

Numerical age determination locality ⊡

coding:	material, method, age (multiple determinations grouped)	hK267 (e.g.)
material:	biotite, hornblende, muscovite,	b, h, m,
	zircon, whole-rock, mineral isochron	z, w, i
method:	potassium-argon, rubidium-strontium,	K, R,
	fission-track	F
age:	in millions of years	267 (e.g.)

NOTES ON MAP UNIT DESCRIPTIONS

I colours in rock descriptions, refer to weathered surfaces.

II (R. meta.; C. meta.)

Regional Metamorphism (R. meta.):
(1) unmetamorphosed.
(2) subgreenschist facies.
(2a) laumontite-prehnite-quartz facies.
(2b) pumpellyite-prehnite-quartz facies.
(3) greenschist facies.
(4) amphibolite facies.

Contact Metamorphism (C. meta.):
(1) albite-epidote - hornfels facies.
(2) hornblende - hornfels facies.
(3) pyroxene - hornfels facies.

III National Topographic System (NTS) grid, Saint Elias Mountains and adjoining areas. Location of map units are indicated (in legend) by this system: for example (115F/1); or (115F/7-10, inclusive).

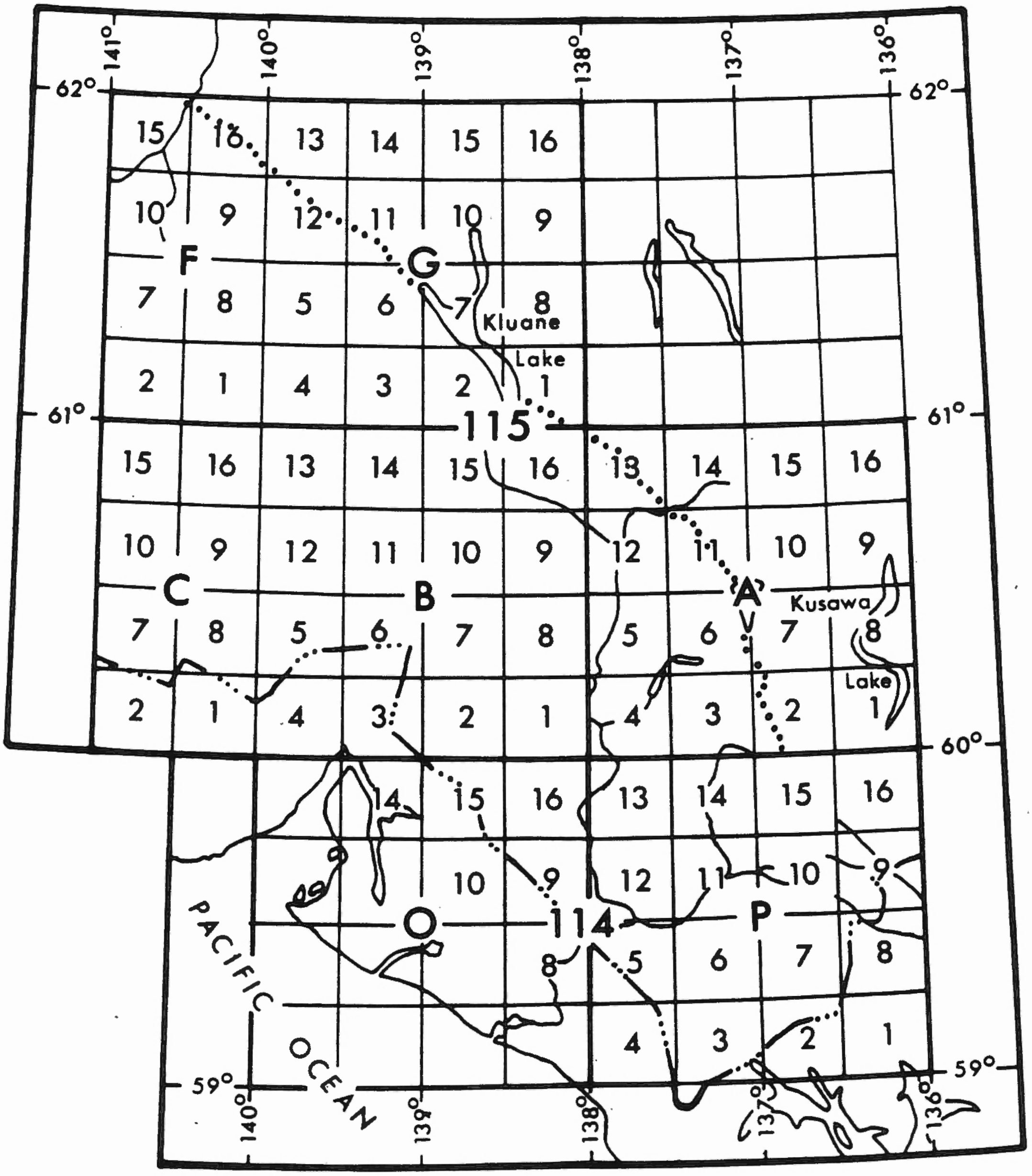


Figure 3

MAPPING SOURCES

Geology mostly from Operation Saint Elias: 1973-74, 1977-79, 1981, 1983, 1986-87

Project leaders

R.B. Campbell:	(1973-1983)
R.B. Campbell & C.J. Dodds:	(1983-1988)
C.J. Dodds:	(1988-1990)

Major contributors, Operation Saint Elias:

R.B. Campbell (1973-74,1977-79,1981,1983)	Paleozoic and younger rocks in Icefield, Fairweather, Alsek, Kusawak and Boundary ranges.
C.J. Dodds (1974,1977-79,1981,1983,1986-87)	Paleozoic and younger rocks SW of Duke River Fault in northeastern Icefield, Donjek, Kluane, northern Alsek, Squaw and Datlasaka ranges.
G.H. Eisbacher (1973-74)	Dezadeash Group and Amphitheatre Formation rocks in Kluane Ranges.
J.W.H. Monger (1974)	Pre-Cenozoic rocks in Kluane Ranges (between Denali and Duke River faults).
P.B. Read (1974-75,1977)	Pre-Cenzoic rocks in Kluane Ranges (between Denali and Duke River faults) and in northernmost Alsek Ranges.
J.G. Souther (1973-74)	Wrangell lava rocks of St. Clare, Alsek and Canyon Mountain Provinces.

Major previous mapping sources:

E.D. Kindle	(1953):	parts of SW Dezadeash map area.
J.E. Muller	(1967):	parts of SW Kluane Lake map area.
K.deP. Watson	(1948):	parts of Tatshenshini River map area.
J.O. Wheeler	(1963):	parts of Mount St. Elias map area.

Geological compilation and cartography by C.J. Dodds

Topographic bases: Surveys & Mapping Branch, Energy, Mines and Resources Canada.

Kluane Lake, 115G & F(E1/2) (edition 1, 1961); Mount St. Elias, 115B & C(E1/2) (edition 2, 1967); Dezadeash, 115A (edition 1, 1951); Yakutat, 114O (edition 1, 1966); Tatshenshini River, 114P (edition 2, 1975).

N.B. Kluane National Park Reserve and Kluane Game Sanctuary boundaries added to topographic bases from information courtesy D.E. Culham, Regional Surveyor Yukon Territory, Energy, Mines and Resources Canada (pers. comm., 1990).

Table 2. MINERAL DEPOSITS SW KLUANE LAKE MAP AREA (115G AND F [E1/2])

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
1	(1)	SUGDEN (METALLINE)	Cu	vn	hyd	Pv?	W2	IB	G/02E	(7)ip	1,p18;9;58,p35;59
2	(42)	DISCOVERY (WHITE RIVER)	Cu,Ag	dis;vn	vlc;hyd,rpl	uTRN	W2	IB	F/15W	(7)op	2,p53;3,p139;5,p108; 6,p85;10,p46;11,p247; 17;18,p138;22,p51; 27,p68;28,p40;29,p138; 30,p130;31;40,p204; 58,p35;59
3	( )	SPY	Cu,Ni;Zn,Pb,Fe	mas,dis;vn	mgm;hyd,rpl	PTRub;Ps	W2	IB	G/02W	(7)op	8,p66;9,p56;10,p56;17; 58,p35;59
4	(70)	CONGDON (I)	Cu	dis	mgm	PTRub	W2	IB	G/02W	(7)op	9;14,p247;58,p35;59;62
5	( )	DC	Ni,Cu	dis;vn	mgm;hyd,rpl	PTRub;Ps	W2	IB	G/02W	(6)ip	5,p111;9,p55;10,p47; 17;58,p35;59
6	(5)	DICKSON	Cu,Ni,PGE,Co	dis;vn	mgm;hyd,rpl	PTRub,b;Ps	W2	IB	G/02W	(6)ip	5,p111;9,p55;10,p47; 15,p165;17;58,p35;59; 62
7	(6)	DESTRUCTION (RAM)	Ni,Cu,Co,Pt	mas,dis;vn	mgm;hyd,rpl	PTRub,b;Ps	W2	IB	G/02W	(6)op[1]	14,p235;15,p165;17; 58,p35;59
8	(11)	WADE	Cu,Ag,Au	unk	unk	uTRN?	W2	IB	G/06W	(7)op	9,p63;10,p59;13,p314; 16;17;58,p35;59
9	(12)	CORK	Cu,Mo	stw,bx,dis	prp	Of,Ps	Og:W2	IB	G/06W	(5)op	7,p101;9,p64;10,p49; 13,p315;16;17;27,p73; 32,p918;58,p35;59; 60,p1
10	(13)	GLEN (TATAMAGOUCHE)	Ni,Cu,PGE;Pb,Zn	mas,dis;vn	mgm;hyd,rpl	PTRub;Ps	W2	IB	G/06W	(6)op[1]	9,p56;10,p49;11,p246; 12,p178;13,p315; 15,p165;16;17;27,p72; 58,p35;59
11	(13)	GLEN (BURWASH)	Cu,Au,Mo	dis,vn	prp?	Of,Pv	Og:W2	IB	G/06W	(6)op[1]	9,p56;10,p49;11,p246; 12,p178;13,p315; 15,p165;16;17;58,p35; 59;60,p1

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
12	( )	GLEN (MARY)	Cu,Ni,Co,Au,Ag	dis,stg	mgm	PTRub,Ps	W2	IB	G/06W	(6)op[1]	8,p65;9,p56;10,p56;17; 58,p35;59
13	(15)	JACQUOT	Cu,Ag	stb;vn,dis	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(7)op[1]	4,p30;5,p109;6,p85; 7,p103;9,p60;10,p49; 17;29,p65;58,p35;59
14	(15)	MARY AND TEDDY	Cu	stb;vn,dis	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(7)op[1]	5,p109;6,p85;7,p103; 9,p60;10,p49;17; 29,p65;58,p35;59
15	(14)	BURWASH	Cu	stg	vlc;rpl	uTRN	W2	IB	G/06E	(7)op[1]	4,p31;15,p164;17; 58,p35;59
16	(16)	QUILL (RAM)	Cu,Ag	stb;vn,dis	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(5)op	5,p109;9,p61;10,p47; 15,p166;17;22,p53; 27,p70;58,p35;59
17	(17)	LINDA (LOWER)	Ni,Cu,PGE	mas,dis;vn	mgm;hyd,rpl	PTRub,b,Pv	W2	IB	G/06W	(6)op	5,p109;6,p85;9,p61; 10,p48;14,p237; 15,p166;17;22,p53; 27,p70;34,p195;35; 36,p662;37;58,p35;59; 62
18	(17)	LINDA (UPPER)	Ni,Cu,PGE	mas,dis	mgm	PTRub,b,Pv	W2	IB	G/06W	(7)op	5,p109;6,p85;9,p61; 14,p237;15,p166; 22,p53;27,p70;58,p35; 59;62
19	(18)	WELLGREEN (EAST ZONE)	Ni,Cu,Co,PGE,Au	mas,dis	mgm	PTRub,b,Pv	W2	IB	G/05E	(3)op	5,p110;7,p100;8,p64; 9,p57;10,p48;13,p317; 14,p252;15,p166;17; 19,p36;22,p52;28,p43; 34,p184;35;36,p662;37; 38,p41;39,p55;44; 45,p96;58,p35;59;62
20	(18)	WELLGREEN (WEST ZONE)	Ni,Cu,Co,PGE,Au	mas,dis	mgm	PTRub,b,Pv	W2	IB	G/05E	(3)op	5,p110;9;8,p64;9,p57; 10,p48;17;34,p184; 37,p11;39,p55;58,p35; 59;62

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
21	(18)	WELLGREEN (NORTH ZONE)	Ni,Cu,PGE,Au	mas,dis	mgm	PTRub,b,Pv	W2	IB	G/05E	(6)op	9;10,p48;17;34,p184; 37,p11;39,p55;58,p35; 59;62
22	( )	NICKEL CREEK (MULLER)	Ni,Cu	dis	mgm	PTRub,b,Pv	W2	IB	G/05E	(7)op	5,p110,map;9;10,p48; 17;34,p184;37,p11; 39,p55;58,p35;59
23	(19)	AIRWAYS (ARCH)	Cu,Ni,PGE,Co	mas,dis	mgm	PTRub,b	W2	IB	G/05E	(6)op	5,p110;9,p54;10,p47; 11,p245;12,p179; 13,p317;14,p238; 15,p167;34,p192;35; 37,p7;58,p35;59;62
24	(19)	AIRWAYS (FW)	Cu,Ni,PGE,Co	mas,dis	mgm	PTRub,b	W2	IB	G/05E	(6)op	5,p110;9,p54;10,p47; 11,p245;12,p179; 14,p238;15,p167;17; 34,p192;35;37,p7; 58,p35;59;62
25	(20)	MUSKETEER	Cu	dis	hyd,rpl	Pv	W2	IB	G/12E	(7)op	9;14,p240;17;58,p35; 59;62
26	(22)	ST. ELIAS	Mo	vn,dis	hyd,rpl	uPpc	AX	IB	G/05W	(7)ip	15,p164;17;19,p36; 58,p35;59
27	(23)	MINERAL RIDGE (SHARP)	Mo,Cu	vn,dis	prp	PPgd?;Of? Mf?	Mg? Og?: PPg:AX	IB	F/01E	(7)ip	5,p112;15,p164; 10,p46;17;19,p36; 41,p636;42,p41;58,p35; 59;60,p1
28	(24)	GALLOPING	Mo	dis	prp?	?	?:AX	IB	F/01E	(7?)ip	5,map;15,p164; 17;19,p36;58,p35;59; 60,p1
29	(26)	GARLIC	Cu,Au,Mo,Fe	vn	prp?	PMvs?,?	?:W2	IB	F/09E	(7)op	11,p245;16;17;58;59; 60,p1
30	(27)	LIBERTY	Au,Cu,Pb,Zn	vn	hyd	Pv	W2	IB	F/16E	(7)op	15,p167;58,p35;59
31	(29)	CATS AND DOGS	Cu,Ni	dis	mgm	PTRub	W2	IB	F/16W	(7)op	11,p245;14,p241;34;37; 58,p35;59;62
32	(30)	MEXICO	Cu,Fe	stg	skn	Pc?	W2	IB	F/16W	(7)op	15,p164;17;58,p35;59; 60,p1

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
33	(57)	PICKHANDLE LAKE (M)	Cu	stf;vn,dis	vlc;hyd,rpl	Pv?	W2	IB	F/16W	(7)op	6,p85;10,p47;11,p246; 17;30,p130;34,p180; 43,p165;58,p35;59;62
34	(44)	KLETSAN (K-CU)	Cu,Ag	dis;vn	vlc;hyd	uTRN	W2	IB	F/10W	(7)op	2,p51;3,p133;5,p108; 10,p46;11,p246;17; 28,p42;57,p379;58,p35; 59
35	(33)	CANALASK (MICRO)	Ni,Cu,Co,Zn,PGE,Fe	dis,mas;vn,stg	mgm;hyd,rpl	Pv,PTRub,b	W2	IB	F/15E	(2)op	5,p111;8,p60;10,p46; 14,p242;15,p169;17; 28,p39;34,p197;35; 36,p662;37,p8;44,p81; 58,p35;59;62
36	(34)	CANALASK (EPIC)	Cu,Mo	vn	hyd	Pv	W2	IB	F/15E	(7)op	10,p46;11,p245;17;58; 59;62
37	(35)	TAYLOR (ARN)	Au,Cu,Mo,Fe	unk	skn	uTRN	Kg?:W2	IB	F/15E	(7)op	11,p245;58,p35;59; 60,p1;62
38	(36)	RAY (SANPETE)	Cu,Fe	dis	skn	uTRc	Kg?:W2	IB	F/15W	(7)op	10,p47;11,p245;17; 38,p37;58,p35;59;60,p1
39	(40)	RABBIT CREEK (CC)	Cu,Ag	vn,stg	hdy,rpl	Pv	W2	IB	F/15W	(7)op	3,p123;10,p47;11,p245; 17;58,p35;59
40	(41)	LEP	Cu,Zn,Pb,Fe,Ag	mas,pod	skn	Pc?	Kg:W2	IB	F/15E	(7)op	10,p47;11,p245;17; 28,p73;33;38,p38; 58,p35;59;60,p1
41	( )	WHITE RIVER (MULLER)	Cu,Ag	stb;vn,dis	vlc;hyd,rpl	uTRN	W2	IB	F/15W	(6)op	5,p108,map;58,p35;59
42	( )	MUS	Ni,Cu	dis	mgm	PTRub	W2	IB	G/05E	(7)op	9;58,p35;59;62
43	( )	SHARE	Cu,Fe	dis	unk	Pv	W2	IB	F/15E	(6)op	58,p35;59;62
44	(56)	NICK	Ni,Cu	unk	mgm?	?	AX	IB	G/05W	(7)ip	15,p165;58,p35;59
45	(25)	MT. STEELE (ICEFIELD)	Cu,Mo,Fe	vn,dis	prp?	lMg	lMg:AX	IB	F/01W	(7)ip	5,map;58,p35;59;60,p1
46	(58)	CANYON MOUNTAIN (CAN)	Cu,Au	stw,vn,dis	hyd,rpl,prp?	Nw,lMf	lMg:Tvs/W2	IB	F/15W	(7)op	11,p246;58,p35;59; 60,p1

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
47	(69)	ONION	Ni,Cu,PGE	mas,dis;vn	mgm;hyd,rpl	PTRub,b,Pv	W2	IB	F/15E	(6)op	13,p318;14,p245; 15,p169;58,p35;59;62
48	(80)	DUKE SOUTH	Cu,Ni,PGE	pod,mas,dis;vn	mgm;hyd,rpl	PTRub,b,Ps	W2	IB	G/02W	(7)op	9;14,p249;58,p35;59;62
49	(89)	WASH	Cu,Ni,PGE	dis	mgm	PTRub,b	W2	IB	G/06W	(7)op	9;14,p250;58,p35;59;62
50	( )	TECK	Au,Ag	dis,vn	hyd,rpl	PTRub,Pv	W2	IB	G/06E	(7)op[1]	9,p68;58,p35;59
51	( )	PAT	Cu	dis	mgm?;hyd?,rpl?	PTRub,b, uTRN?	W2	IB	G/06W	(7)ip	9,p63;10,p59;17; 58,p35;59
52	( )	PTARMIGAN-WINDGAP	Ab	vn	hyd,rpl	PTRub	W2	IB	G/06E	(7)op[1]	9,p68;17;58,p35;59
53	(8)	DUKE	Ab	vn	hyd,rpl	PTRub	W2	IB	G/06E	(7)op[1]	9;17;58,p35;59
54	( )	MAPLE CREEK (VUG)	Cu	vn	hyd,rpl	uTRN	W2	IB	G/05E	(7)op	9;10,p49;17;58,p35;59
55	(68)	KELLI (REED CREEK)	Au,Cu,As	vn	hyd	Pv, Φf	Φg?:W2	IB	G/12E	(7)op	9;13,p318;15,p169; 58,p35;59;60,p1;61,p9
56	(17)	VERSLUCE (LINDA)	Cu,Ag	dis,vn	unk	Pv	W2	IB	G/06W	(7)op	9,p61;14,p237;15,p166; 58,p35;59
57	(64)	SWEDE JOHNSON (SJ)	Au,Cu	dis;flt	unk	?	W2	IB	G/12E	(7)op	9;11,p247;13,p317; 14,p248;58,p35;59
58	(74)	SWEDE	Au,PGE	unk	unk	?	W2	IB	G/12E	(7)op	9;14,p248;15,p170; 58,p35;59
59	(66)	WADE CREEK	Au	unk	unk	?	Tvs/W2?;W2?	IB	G/05E	( )op	9;12,p179;58,p35;59
60	( )	SEXSMITH	Cu	dis	mgm	PTRub	W2	IB	G/12W	(6)op[1]	58,p35;59;62
61	( )	QUILL CREEK (FOSSIL #1)	Cu	dis;vn	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(7)op	9;10,p48;17;28,p70; 58,p35;59
62	( )	QUILL CREEK (FOSSIL #2)	Cu	dis;vn	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(7)op	9;10,p48;17;28,p70; 58,p35;59
63	( )	QUILL CREEK (HUDSON BAY)	Cu	dis;vn	vlc;hyd,rpl	uTRN	W2	IB	G/06W	(7)op	9;10,p48;17;22,p53; 58,p35;59
64	(37)	HUMP	Au,As	flt,(vn,dis)	(hyd)	?	/W2	IB	F/15W	(8)op	46,p193;58,p35;59
65	(31)	PICKHANDLE	Cu,Ni	flt,(unk)	(mgm)	PTRub	/W2	IB	F/16W	(8)op	15,p164;58,p35;59

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
66	( )	STEELE GLACIER (SHARP)	Mo,Cu,Fe	flt,(vn,dis)	(prp?)	IMf?	/AX	IB	G/05W	(8)ip	5,p112;19,p36;41,p636; 42,p41;58,p35;59;60,p1
67	( )	NIAMODLAOC MOUNTAIN 1	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/06E	(7)op[1]	3,p141;4,p32;5,p113; 7,p153;9,p71;17; 25,p20;26,p18;47,p19; 48,p319;58,p35;59
68	( )	NIAMODLAOC MOUNTAIN 2	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/03E	(7)ip[1]	3,p141;4,p32;5,p113; 7,p153;9,p71;17; 25,p20;26,p18;47,p19; 48,p319;58,p35;59
69	(9)	GRANITE CREEK (HOGE)	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/06W	(7)ip[1]	5,p113;9,p69;11,p245; 17;25,p20;26,p18; 48,p319;47,p19; 49,pA50;58,p35;59
70	(10)	AMPHITHEATRE	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/06W	(7)op[1]	4,p32;5,p113;7,p9; 9,p69;11,p245;17; 25,p20;26,p18;42,p42; 48,p319;49,pA50; 58,p35;59
71	(21)	CEMENT	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/05W	(7)op	5,p113;7,p9;9,p69; 11,p245;17;25,p20; 47,p21;26,p18;47,p19; 48,p319;49,pA50; 58,p35;59
72	(39)	MCLELLAN (COAL CREEK)	coal	cnc,stf	sed	Os	Tvs/W2	IB	F/15W	(7)op	3,p141;11,p245;17; 58,p35;59
73	(38)	MEMOIR	coal	cnc,stf	sed	Os	Tvs/W2	IB	F/15W	(7)op	3,p141;11,p245;17; 58,p35;59
74	(2)	STOVE 1	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/02E	(7)ip	1,p18;4,p32;5,p113; 9,p71;11,p245;17; 26,p17;42,p42;48,p319; 58,p35;59
75	( )	STOVE 2	coal	cnc,stf	sed	Os	Tvs/W2	IB	G/02E	(7)ip	1,p18;4,p32; 5,p113,map;9;26,p17; 42,p42;48,p319;58,p35; 59

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
76	( )	WADE CREEK (MAPLE)	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/05E	(7)op	5,p115,map;9,p73; 58,p35;59
77	( )	BURWASH CREEK GYPSUM	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/06W	(7)ip	5,p115;9;58,p35;59
78	( )	"I"	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/02W	(7)op	5,p115,map;9;58,p35; 59
79	( )	TONY	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/02W	(7)op	5,p115,map;9;58,p35; 59
80	( )	METALLINE (BULLION CREEK)	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/02E	(7)ip	5,p115,map;9,p73;17; 58,p35;59
81	( )	BOCK'S BROOK	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	G/02W	(7)op	5,p115,map;9,p73; 58,p35;59
82	( )	WOLLI	Wo	mas	skn	uTRc	Kg:W2	IB	F/15W	(7)op	58,p35;59;62
83	( )	BULLION CREEK 1	Au,Pt,Cu	flv,unc	plc	Qs	/AX	IB	G/02E	(4)ip	1,p13;4,p14,p19; 5,p105;7,p152;8,p141; 9,p47;10,p46;17; 19,p17;20,p21;21,p62; 22,p87;27,p113;28,p65; 38,p139;42,p40;47,p23; 50,p4;51,p6;52,p5; 53,p9;54,p17;58,p35; 59;64
84	( )	TATAMAGOUCHE CREEK	Au,Pt,Cu	flv,unc	plc	Qs	/W2	IB	G/06W	(4)op[1]	4,p22;8,p105;9,p52; 18,p184;27,p112; 29,p120;47,p23;58,p35; 59;64;65,p87
85	( )	ARCH CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/05E	(1)op	4,p10;5,p107;8,p143; 9,p46;17;19,p18; 20,p17;47,p23;54,p18; 55,p360;58,p35;59;64; 65,p87;66,p69;67,p42
86	( )	DUKE RIVER	Au	flv,unc	plc	Qs	/JKs/W2;/W2	IB	G/06E	(1)op[1]	8,p141;9,p49;23,p81; 58,p35;59;63

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
87	( )	BURWASH CREEK	Au,Pt,Ag,Cu,Sn,Fe	flv,unc	plc	Qs	/W2;/Tvs/W2	IB	G/06W	(1)op[1]	1,p15;4,p14;5,p105; 7,p152;8,p143;9,p48; 10,p49;17;18,p184; 19,p16;20,p20;21,p63; 22,p86;23,p80;24,p82; 29,p120;27,p112; 28,p65;38,p138;42,p41; 47,p23;51,p6;58,p35; 59;63;64;65,p87; 66,p66;67,p40
88	( )	QUILL CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/06W	(4)op	9;58,p35;59;65,p87; 66,p70;67,p44
89	( )	PORCUPINE CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/05E	(4)op	9;58,p35;59;66,p69;67
90	( )	PTARMIGAN CREEK	Au	flv,unc	plc	Qs	/W2;/Tvs/W2?	IB	G/06E	(7)op[1]	9;58,p35;59;65,p90; 66,p65
91	( )	GRANITE CREEK	Au	flv,unc	plc	Qs	/Kg:W2	IB	G/06W	(7)op[1]	9;58,p35;59;60,p1; 65,p90;66,p65
92	( )	KLETSAN CREEK	Cu	flv,unc	plc	Qs	/W2;/Tvs/W2?	IB	F/10W	(7)op	2,p51;3,p133;5,p108; 10,p46;11,p246;17; 28,p42;47,p25;56,p143; 57,p379;58,p35;59
93	( )	SHEEP CREEK 1	Au	flv,unc	plc	Qs	/W2;/Tvs/W2	IB	G/02E	(4)ip	1,p15;4,p21;5,p106; 9,p50;17;19,p18; 42,p41;58,p35;59;64
94	( )	WHITE RIVER	Cu	flv,unc	plc	Qs	/W2	IB	F/15W	(7)op	2,p53;3,p139;5,p109; 10,p46;17;58,p35;59
95	( )	PAN CREEK 1	Au	flv,unc	plc	Qs	/W2;/JKs/W2	IB	F/15W	(7)op	3,p124;5,p107;58,p35; 59;64
96	( )	PAN CREEK 2	Au	flv,unc	plc	Qs	/W2;/JKs/W2	IB	F/15W	(7)op	3,p124;5,p107;58,p35; 59;64
97	( )	BOWEN CREEK	Au	flv,unc	plc	Qs	/Kg:W2;/W2	IB	F/15W	(7)op	3,p124;5,p107;58,p35; 59;60,p1
98	( )	HIDDEN CREEK	Au	flv,unc	plc	Qs	/Kg:W2;/W2	IB	F/15W	(7)op	3,p124;5,p107;58,p35; 59;60,p1

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
99	( )	EDITH CREEK (KOIDERN RIVER)	Au	flv,unc	plc	Qs	/W2;/Kg:W2	IB	F/09E	(7)op	3,p124;5,p107;42,p40; 58,p35;59;60,p1
100	( )	HOGE CREEK 1	Au,Pt	flv,unc	plc	Qs	/W2;/AX	IB	G/05E	(7)ip	8,p141;9,p49;17; 58,p35;59;67,p40
101	( )	HOGE CREEK 2	Au	flv	ppl	Qs	Tvs/W2	IB	G/05E	(7)ip	5,p108;8,p141;9,p49; 17;58,p35;59
102	( )	SQUIRREL CREEK	Au	flv,unc	plc	Qs	/JKs/W2;/W2	IB	G/06E	(4)op[1]	9;58,p35;59;65,p89; 66,p66;67
103	( )	REED CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/12E	(1)op	9;58,p35;59;61,p9;63; 65,p86;66,p70;67,p43
104	( )	BADLANDS CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/06E	(7)op[1]	9;58,p35;59;65,p90
105	( )	SWEDE JOHNSON CREEK	Au,Pt	flv,unc	plc	Qs	/W2	IB	G/12E	(1)op	9;58,p35;59;63;65,p86; 66,p65;67
106	( )	JODY CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/12E	(1)op	9;58,p35;59;63;65,p86; 66,p65
107	( )	WADE CREEK	Au	flv,unc	plc	Qs	/W2;/Tvs/W2	IB	G/05E	(4)op	9;58,p35;59;66,p65; 67,p43
108	( )	QUILL, NICKEL CREEKS	Au	flv,unc	plc	Qs	/W2	IB	G/06W	(7)op	9;58,p35;59;66,p65; 67,p40
109	( )	MAPLE CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/05E	(7)op	9;58,p35;59;66,p65
110	( )	WOLVERINE CREEK	Au	flv,unc	plc	Qs	/W2;/Tvs/W2	IB	G/12W	(7)op	58,p35;59;64;65,p86
111	( )	LYNX CREEK	Au	flv,unc	plc	Qs	/W2	IB	G/12W	(7)op	58,p35;59;65,p86; 66,p65
112	( )	HALFBREED CREEK	Au	flv,unc	plc	Qs	/JKs/W2;/W2	IB	G/06E	(7)op[1]	9;58,p35;59;65,p86
113	( )	LEWIS CREEK	Au	flv,unc	plc	Qs	/W2;/JKs/W2	IB	G/02W	(7)op[1]	9;58,p35;59;65,p86

Explanation of Mineral Deposit Information for SW Kluane Lake (115G / F (E1/2)) map area

⊗ 4 mineral deposit(s) locality and map reference number (on map): location accuracy may vary.
N.B. locations of placers (plc) mostly are very approximate and are "spot placed" only to indicate creeks or sections of creeks where placers have been mined or occur.

OF. No. map reference number.
INAC (No) INAC (Indian and Northern Affairs Canada) mineral occurrence file number.
Deposit(s) Name(s) name (alternate name) of deposit(s). N.B. for placers (plc) only; name is creek or river where deposit(s) occur.

Commodity(s) Abbreviations elements present are listed in decreasing order of abundance; elements present in trace amounts are included, but not specified.

Ab	asbestos	Au	gold	Gy	gypsum	Pt	platinum	Zn	zinc
Ag	silver	Co	cobalt	Mo	molybdenum	PGE	platinum gp. elements		
An	anhydrite	Cu	copper	Ni	nickel	Sn	tin		
As	arsenic	Fe	iron	Pb	lead	Wo	wollastonite		

Deposit(s) Form Abbreviations

cnc	concordant	stf	stratiform	mas	massive	bx	breccia	flt	float
dsc	discordant	stg	stringer	dis	disseminated	flv	fluvial deposit	unk	unknown
stb	stratabound	stw	stockwork	vn	vein	unc	unconsolidated		

Deposit(s) Type Abbreviations

hyd	hydrothermal	skn	skarn	prp	porphyry	sed	sedimentary	plc	placer
rpl	replacement	vlc	volcanic	evp	evaporite	ppl	paleoplacer	unk	unknown
mgm	magmatic								

Host Unit(s) 1:250 000 scale map unit(s) host to mineral deposit(s).

Plut.:Cov./Terrane

(Fig. 2 map unit(s) host to mineral deposit(s). **Plut.** = Plutonic Rocks: : = intruded into: **Cov.** = Cover Rocks: / = deposited on: **Terrane** = Terrane.
e.g. Mg? Φg?: PPg:AX = Mg? or Φg?: = intruded into PPg: = intruded into AX.
N.B. for placer deposits and float only; e.g. /W2:/Kg:W2 = Qs (not depicted in Fig. 2) / = deposited on W2 and on Kg : = intruded into W2.

Mg = Miocene granitoids and or subvolcanics: Φg = Oligocene subvolcanics: Kg = Late Early Cretaceous granitoids: PPg = Late Pennsylvanian-Early Permian granitoids: Tvs = Tertiary volcanics and or sediments: JKs = Jura-Cretaceous flysch (Gravina-Nutzotin Belt): W2 = Wrangellia Terrane, segment W2: AX = Alexander Terrane.

Mgeo Belt Morphogeological Belts (Fig. 2 inset) in which mineral deposit(s) occur (IB = Insular Belt).

NTS National Topographic System map sheet reference.
(115) = 1:1 000 000 scale: G / F = 1:250 000 scale: 01 to 16 = 1:50 000 scale; E = East, or W = West half.

Status Abbreviations

(1) Being produced: commodity(s) is (are) being extracted for sale.
(2) Never produced: reserves (grade + 3 dimens.) or resources known.
(3) Past producer : reserves (grade + 3 dimens.) or resources known.
(4) Past producer : reserves or resources exhausted, or not known.
(5) Grade, 2 dimensions (length and width) known: reserves unknown.
(6) Grade, 1 dimension (length or width) known : by drill or chip sample.
(7) Outcrop showing; or commodity(s) known, but unpublished: ± grab sample assays.
(8) Float; provenance known or unknown: ± grab sample assays.

ip = inside, or op = outside of Kluane National Park Reserve: op^1 = op, but on lands withdrawn from staking due to Native Land Claims.

References (e.g. 9,p50 = Read and Monger (1976) page 50; NB. p = initial page of reference cited; (1976) = year of publication.
N.B. references listed are main sources only; for references such as INAC publications (not given), individual assessment report numbers and summaries, and claims information, the reader should see INAC (1989) or literature cited there.

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Table 3. MINERAL DEPOSITS MOUNT ST. ELIAS MAP AREA (115B AND C [E1/2])

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
1	(2)	KASKAWULSH	Cu,Ag	unk	unk	uPbv?	W2?;AX?	IB	B/09E	(7)ip	11,p162;17,p35;18
2	(11)	JENNIFER 1 (KINCORA)	Zn	dis?	skn	uPvs?	Og?: (W2?;AX?)	IB	B/16W	(7)op	9,p310;17,p35;18; 19,p1;22,p10
3	(11)	JENNIFER 2 (KINCORA)	Cu,Ag	stw,vn	hyd,rpl	Dc?	AX	IB	B/16W	(7)op	9,p310;17,p35;18; 22,p10
4	(6)	GIBBONS (VULCAN)	Ni,Cu	unk	mgm	PTRub,b	W2?;AX?	IB	B/15E	(7)ip	4;7,p55;11,p162;12; 17,p35;18
5	(7)	FROHBERG (ULTRA)	Cu,Ni,PGE,Zn	stw,vn,dis	mgm;hyd,rpl	PTRb,ub, uPp	W2?	IB	B/16W	(6)op	10,p230;13;17,p35;18; 23
6	(7)	TELLURIDE	Zn,Cu,Pb,Ag	stb,mas,dis	vlc,exh?	uPbv	W2?;AX?	IB	B/16W	(7)op	10,p229;11,p162;12;13; 17,p35;18;23
7	(7)	CUB (TELLURIDE)	Zn,Cu,Pb,Ag	flt,(stb)	(vlc,exh?)	uPbv?	/W2	IB	B/16E	(8)op	4;7,p67;8,p61;10,p229; 12;13;17,p35;18;23
8	(1)	PLUG	Cu,Ag	flt,(unk)	(unk)	?	/AX	IB	B/01E	(8)ip	11,p162;17,p35;18;23
9	(5)	DULUTH	Ni,Cu	flt,(unk)	(mgm?)	uPbv?	/(W2?;AX?)	IB	B/15E	(8)ip	4;11,p162;17,p35;18
10	(8)	BULLION	Gy,An	dsc,mas	sed,evp;hyd	uTRe	W2	IB	B/15E	(7)ip	5,p115;7,p73;11,p162; 17,p35;18
11	(3)	KIMBERLEY CREEK COAL	coal	cnc,stf	sed	Os	Tvs/JKs/W3	IB	B/16E	(7)op[1]	1,p18;2,p32;3,p58; 6,p20;7,p70;11,p162; 12;17,p35;18;21,p17
12	( )	TELLURIDE CREEK COAL	coal	cnc,stf	sed	Os	Tvs/W3	IB	B/16E	(7)op	2,p32;7,p72;11,p162; 12;17,p35;18
13	( )	BULLION CREEK 2	Au,Ag,Pt,Cu,Pb	flv,unc	plc	Qs	/AX	IB	B/15E	(4)ip	1,p13;2,p14;5,p105; 7,p47;8,p46;12;14,p17; 15,p113;16,p152; 17,p35;18;20,p65;24
14	(9)	SHEEP CREEK 2	Cu	flv,unc	plc	Qs	/W2	IB	B/15E	(7)ip	1,p17;7;17,p35;18
15	( )	TELLURIDE CREEK	Au	flv,unc	plc	Qs	/W3	IB	B/16E	(7)op	1,p16;7;17,p35;18; 25,p85
16	( )	VULCAN CREEK	Au	flv,unc	plc	Qs	/W2	IB	B/15E	(7)ip	1,map 894;7;17,p35;18

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
17	( )	KIMBERLEY CREEK 2	Au	flv,unc	plc	Qs	/JKs?/W3	IB	B/16E	(4)op[1]	1,p16;3,p55;4;7,p50;12; 17,p35;18;25,p85
18	(4)	JARVIS	Cu	flv,unc	plc	Qs	/JKs?/W3	IB	B/16E	(7)op[1]	1,p17;7;17,p35;18
19	( )	CANADA CREEK	Au	flv,unc	plc	Qs	/AX	IB	B/15W	(7)ip	1,p1;17,p35;18

Explanation of Mineral Deposit Information for Mount St. Elias (115B / C [E1/2]) map area

⊗4 mineral deposit(s) locality and map reference number (on map): location accuracy may vary.
N.B. locations of placers (plc) mostly are very approximate and are "spot placed" only to indicate creeks or sections of creeks where placers have been mined or occur.

OF. No. map reference number.
INAC (No) INAC (Indian and Northern Affairs Canada) mineral occurrence file number.
Deposit(s) Name(s) name (alternate name) of deposit(s). N.B. for placers (plc) only; name is creek or river where deposit(s) occur.

Commodity(s) Abbreviations elements present are listed in decreasing order of abundance; elements present in trace amounts are included, but not specified.

Ag	silver	Au	gold	Gy	gypsum	Pb	lead	PGE	platinum group elements
An	anhydrite	Cu	copper	Ni	nickel	Pt	platinum	Zn	zinc

Deposit(s) Form Abbreviations

cnc	concordant	stb	stratabound	stw	stockwork	dis	disseminated	flv	fluvial deposit	flt	float
dsc	discordant	stf	stratiform	mas	massive	vn	vein	unc	unconsolidated	unk	unknown

Deposit(s) Type Abbreviations

hyd	hydrothermal	mgm	magmatic	exh	exhalative	evp	evaporite	unk	unknown
rpl	replacement	vlc	volcanic	sed	sedimentary	plc	placer		

Host Unit(s) 1:250 000 scale map unit(s) host to mineral deposit(s).

Plut.:Cov./Terrane

(Fig. 2 map unit(s) host to mineral deposit(s). **Plut.** = Plutonic Rocks: : = intruded into: **Cov.** = Cover Rocks: / = deposited on: **Terrane** = Terrane.
e.g. Tvs/JKs/W3 = Tvs / = deposited on JKs / = which was deposited on W3.
N.B. for placer deposits and float only; e.g. /JKs?/W3 = Qs (not depicted in Fig. 2) / = deposited on JKs?/ = which was deposited on W3.

Og = Oligocene subvolcanics: Tvs = Tertiary sediments: JKs = Jura-Cretaceous flysch (Gravina-Nutzotin Belt): W2,W3 = Wrangellia Terrane, segments 2, 3:
AX = Alexander Terrrane.

Mgeo Belt Morphogeological Belts (Fig. 2 inset) in which mineral deposit(s) occur (IB = Insular Belt).

NTS National Topographic System map sheet reference.
(115) = 1:1 000 000 scale: B / C = 1:250 000 scale: 01 to 16 = 1:50 000 scale; E = East, or W = West half.

Status Abbreviations

(1) Being produced: commodity(s) is (are) being extracted for sale.
(2) Never produced: reserves (grade + 3 dimens.) or resources known.
(3) Past producer : reserves (grade + 3 dimens.) or resources known.
(4) Past producer : reserves or resources exhausted, or not known.
(5) Grade, 2 dimensions (length and width) known: reserves unknown.
(6) Grade, 1 dimension (length or width) known : by drill or chip sample.
(7) Outcrop showing; or commodity(s) known, but unpublished: ± grab sample assays.
(8) Float; provenance known or unknown: ± grab sample assays.

ip = inside, or op = outside of Kluane National Park Reserve: op^1 = op, but on lands withdrawn from staking due to Native Land Claims.

References (e.g. 7,p50 = Read and Monger (1976) page 50; NB. p = initial page of reference cited; (1976) = year of publication.
N.B. references listed are main sources only; for references such as INAC publications (not given), individual assessment report numbers and summaries, and claims information, the reader should see INAC (1989) or literature cited there.

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Table 4. MINERAL DEPOSITS SW DEZADEASH MAP AREA (115A)

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
1	(1)	JACKPOT (PIRATE CREEK)	Cu,Ag,Zn,Pb	vn,bx,mas,dis	hyd,rpl	PTRv	W2	IB	A/03E	(6)op	7,p108;8,p72;9,p62; 10,p44;11,p241;17; 27,p43;43,p35;44;45,p1
2	(3)	MOHAWK (KANE)	Ag,Pb,Zn,Au,Sb,Cu	stw,vn,bx	hyd,rpl	Of?,Pv	Og?:W2	IB	A/03E	(4)op[1]	9,p65;10,p60;12,p166; 16;17;18,p140;43,p35; 44;45,p1;47
3	(6)	SNO (MUSH)	Cu,Au	vn,bx	hyd,rpl	Pv	W2	IB	A/03W	(7)ip	3,p56;9,p64;10,p45;17; 19,p37;43,p35;44
4	(7)	BATES (IRON CREEK)	Pb,Ag,Au	vn	hyd,rpl	Єv?	AX	IB	A/04E	(6)ip	3,p56;9,p65;15,p159; 16;17;43,p35;44
5	(8)	FENTON	Cu	vn	hyd?,rpl?	Єv	AX	IB	A/04W	(7)ip	9;15,p159;17;43,p35; 44;47
6	(9)	SANDY (CAVE)	Cu,Ag	stb,dis;vn	vlc?;hyd,rpl	Pv?	W2	IB	A/06W	(7)ip	9,p63;10,p53;15,p159; 17;43,p35;44
7	(10)	SHAFT	Cu	dis	unk	Psv	W2	IB	A/05E	(6)ip	9;15,p159;17;43,p35; 44;47
8	(12)	HUSKY	Cu	stb,dis;vn	vlc?;hyd?,rpl?	uTRN	W2	IB	A/06W	(7)ip	9,p59;10,p56;15,p159; 17;43,p35;44
9	(13)	WREN	Cu	vn	unk	uTRN	W2	IB	A/06W	(7)ip	9;15,p159;43,p35;44;47
10	(14)	KEL	Cu	stb,dis;vn	vlc;hyd?,rpl?	uTRN	W2	IB	A/06W	(7)ip	9,p60;10,p45;15,p159; 17;43,p35;44
11	(20)	JOHOBO (YUKON STAR)	Cu,Ag	mas,dis;vn	vlc;hyd,rpl	uTRN	W2	IB	A/05E	(3)ip	6,p85;7,p10;9,p59; 10,p45;15,p159;17; 19,p28;20,p27;21,p24; 22,p55;23,p35;24,p1; 25,p29;43,p35;44
12	(20)	BORNITE CREEK (KINDLE)	Cu,Ag	dis;vn	vlc;hyd,rpl	uTRN	W2	IB	A/05E	(7)ip	3,p57;9,p59;15,p159; 43,p35;44
13	(26)	DECOELI	Cu,Ab	vn	hyd,rpl	PMvs	W3	IB	A/13W	(7)op	15,p159,17;43,p35;44; 47

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
14	(27)	KLOO (ELLEN)	Cu,Au	stf?,mas	vlc?,exh?	PMvs	W3	IB	A/13W	(5)op	10,p46;15,p159;17; 22,p54;43,p35;44;46,p7
15	(28)	SOUTHER-STANCUI	Cu,Mo,Pb,Zn,Ag,Au	stw,bx,vn	prp,rpl?	"b.p.":Nw2	Mg:(Tvs,AX)	IB	A/12W	(7)ip	10,p59;15,p159;17; 26,p66;43,p35;44;45,p1
16	(5)	MIKE (PHOTO)	Cu,Co,Au,Sb	vn,bx	hyd,rpl	Pv	W2	IB	A/03W	(6)op[1]	4,p73;9,p62;10,p45; 15,p159;17;43,p35;44
17	( )	BATES LAKE (ISLAND)	Ab	vn	hyd,rpl	Kg?;€Ob?	Kg?:AX;AX?	IB	A/05E	(7)ip	3,p38;9,p67;15,p159; 17;43,p35;44;45,p1
18	(23)	STRIDE	Cr,Fe,Pt,Ti	stf,pod,dis	mgm	l Kub,b?	Kg:JKs/W3	IB	A/12W	(7)ip	3,p37;15,p159;17; 28,p1;29,p185;41; 43,p35;44;45,p1
19	(2)	DALTON	Cu	bx,vn,dis	prp?,hyd?,rpl?	Of?,Pv?	Og?:W2	IB	A/03E	(6)op	9;15,p159;43,p35;44; 45,p1
20	(35)	BURGER KING	Au,Ag	vn	hyd?,rpl?	Of?,?, uPp?	Og?,?:AX;AX	IB	A/03E	(7)op	12,p169;13,p306;16; 43,p35;44;45,p1
21	(25)	FERGUSON	Au	vn	hyd,rpl?	?	AX	IB	A/12W	(7)ip	9;15,p159;43,p35; 30,p12;31,p11;47
22	( )	TATSHENSHINI	Cu,Mo	dis	prp	Kg?	Kg?:W2	IB	A/03E	(7)op[1]	9;43,p35;44;45,p1;47
23	(11)	BELOUD	Cu	vn	hyd?,rpl?	Pv	W2	IB	A/06W	(7)ip	9;15,p159;43,p35;44
24	(15)	SHORTY	Fe	vn	hyd,rpl	Kgd	Kg:JKs/W3	IB	A/06E	(7)ip	3,p49;15,p159; 43,p35,44
25	( )	COLTON 1	Cu,Au	vn	hyd?,rpl?	PMvs	W3	IB	A/13W	(7)op	15,p159;43,p35;44; 46,p10
26	( )	COLTON 2	Cu	flt,(unk)	(unk)	PMvs?	/W3	IB	A/13W	(8)op	15,p159;43,p35;44
27	(19)	MILLHOUSE	Cu,Ag,Au	flt,(unk)	(unk)	?	/JKs/W3	IB	A/11W	(8)ip	15,p159;43,p35;44;47
28	(24)	SUGDEN	coal	cnc,stf	sed	Os	Tvs/(W2,AX?)	IB	A/12W	(7)ip	2,p17;3,p58;5,p70; 9,p72;15,p195;17; 42,pA50;43,p35;44
29	( )	SUGDEN CREEK	Au,Pt	flv,unc	plc	Qs	/Tvs/AX;/AX	IB	A/12W	(4)ip	3,p54;9,p52;17;43,p35; 44;48
30	( )	CONTACT CREEK	Pt	flv,unc	plc	Qs	/Kg:JKs/W3	IB	A/12W	(7)ip	3,p37;41;43,p35;44; 45,p1

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
31	( )	GOAT CREEK	Au	flv,unc	plc	Qs	/JKs/W3	IB	A/11W	(4)ip	3,p48;43,p35;44;45,p1;48
32	( )	VICTORIA CREEK	Au	flv,unc	plc	Qs	/Φg?:JKs/W3	IB	A/11W	(4)ip	3,p48;43,p35;44;45,p1
33	( )	DOLLIS (SQUAW) CREEK	Au,Cu,Ag,Pb	flv,unc	plc	Qs	/W2,/AX	IB	A/03E	(1)op	3,p50;9,p51;17;30,p6;31,p5;32,p6;33,p4;34,p10;35,p18;36,p7;37,p2;38,p74;39,p90;40,p36;43,p35;44;49,p83;50
34	( )	BATES RIVER 1	Au	flv,unc	plc	Qs	/AX	IB	A/04E	(7)ip	3,map;9;43,p35;44
35	( )	MUSH CREEK	Au	flv,unc	plc	Qs	/W2	IB	A/06W	(7)ip	3,p48;9;43,p35;44
36	( )	SHAFT CREEK	Au	flv,unc	plc	Qs	/Tvs?/AX	IB	A/05E	(7)ip	3,map;9;43,p35;44
37	( )	GOATHERD CREEK	Au	flv,unc	plc	Qs	/AX	IB	A/05W	(7)ip	3,p54;9;43,p35;44
38	( )	MARBLE CREEK	Au	flv,unc	plc	Qs	/AX	IB	A/05W	(7)ip	3,p54;9;43,p35;44
39	( )	PARK CREEK	Au	flv,unc	plc	Qs	/Mg:(Tvs,AX)	IB	A/12W	(7)ip	3,map;9;43,p35;44;45,p1
40	( )	ARCHIBALD CREEK	Au	flv,unc	plc	Qs	/JKs/W3;/W3	IB	A/13W	(7)op	3,map;43,p35;44;45,p1
41	( )	KIMBERLEY CREEK 1	Au	flv,unc	plc	Qs	/JKs/W3;/W2	IB	A/13W	(4)op[1]	1,p16;3,p55;9,p50;43,p35;44;49,p83;50
42	( )	WOLVERINE CREEK	Au	flv,unc	plc	Qs	/AX	IB	A/04E	(4)ip	3,p48;9;43,p35;44
43	( )	TATSHENSHINI RIVER	Au	flv,unc	plc	Qs	/W2	IB	A/03E	(7)op	3,p52;9,p53;43,p35;44
44	( )	SILVER CREEK	Au	flv,unc	plc	Qs	/AX;/W2	IB	A/03E	(7)ip	3,p50;9,p51;17;43,p35;44
45	( )	IRON CREEK	Au	flv,unc	plc	Qs	/AX	IB	A/04E	(7)ip	3,p53;9,p50;17;30,p6;31,p5;43,p35;44
46	( )	BATES RIVER 2	Au	flv,unc	plc	Qs	/AX	IB	A/04E	(4)ip	3,p53;9,p47;17;19,p19;20,p22;43,p35;44
47	( )	BELOUD CREEK	Au,Cu	flv,unc	plc	Qs	/W2	IB	A/06W	(4)ip	3,p49;9,p47;10,p45;17;43,p35;44
48	( )	ALDER CREEK	Au	flv,unc	plc	Qs	/JKs/W3	IB	A/06E	(7)ip	3,map;43,p35;44

OF. No.	INAC (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (115)	Status	References
49	( )	SHORTY CREEK	Au,Cu	flv,unc	plc	Qs	/JKs/W3	IB	A/06E	(4)ip	3,p49;10,p45;17; 43,p35;44;48
50	( )	DALTON POST (TATSHENSHINI RIVER)	Au	flv,unc	plc	Qs	/W2	IB	A/03E	(7)op	3,p52;9,p53;43,p35;44

Explanation of Mineral Deposit Information for SW Dezadeash (115A) map area

⊗4 mineral deposit(s) locality and map reference number (on map): location accuracy may vary.
N.B. locations of placers (plc) mostly are very approximate and are "spot placed" only to indicate creeks or sections of creeks where placers have been mined or occur.

OF. No. map reference number.
INAC (No) INAC (Indian and Northern Affairs Canada) mineral occurrence file number.
Deposit(s) Name(s) name (alternate name) of deposit(s). N.B. for placers (plc) only; name is creek or river where deposit(s) occur.

Commodity(s) Abbreviations elements present are listed in decreasing order of abundance; elements present in trace amounts are included, but not specified.

Ab asbestos	Co cobalt	Fe iron	Pt platinum	Zn zinc
Ag silver	Cr chromium	Mo molybdenum	Sb antimony	
Au gold	Cu copper	Pb lead	Ti titanium	

Deposit(s) Form Abbreviations

cnc concordant	stf stratiform	mas massive	bx breccia	flv fluvial deposit
dsc discordant	stw stockwork	dis disseminated	vn vein	unc unconsolidated
stb stratabound	pod podiform			

Deposit(s) Type Abbreviations

hyd hydrothermal	mgm magmatic	exh exhalative	sed sedimentary	unk unknown
rpl replacement	vlc volcanic	prp porphyry	plc placer	

Host Unit(s) 1:250 000 scale map unit(s) host to mineral deposit(s).

Plut.:Cov./Terrane

(Fig. 2 map unit(s) host to mineral deposit(s). **Plut.** = Plutonic Rocks: : = intruded into: **Cov.** = Cover Rocks: / = deposited on: **Terrane** = Terrane.
e.g. Mg:(Tvs,AX) = Mg: = intruded into (,) = both Tvs and AX.
N.B. for placer deposits only; e.g. /Kg:JKs/W3 = Qs (not depicted in Fig. 2) / = deposited on Kg : = intruded into JKs which was / = deposited on W3.

Mg = Miocene subvolcanics: Og = Oligocene subvolcanics: Kg = Late Early Cretaceous granitoids or Alaskan-type, ultramafic complexes:
Tvs = Tertiary volcanics or sediments: JKs = Jura-Cretaceous flysch (Gravina-Nutzotin Belt): W2, W3 = Wrangellia Terrane; segments 2, 3: AX = Alexander Terrane.

Mgeo Belt Morphogeological Belts (Fig. 2 inset) in which mineral deposit(s) occur (IB = Insular Belt).

NTS National Topographic System map sheet reference.
(115) = 1:1 000 000 scale: A = 1:250 000 scale: 01 to 16 = 1:50 000 scale; E = East, or W = West half.

Status Abbreviations

(1) Being produced: commodity(s) is (are) being extracted for sale.
(2) Never produced: reserves (grade + 3 dimens.) or resources known.
(3) Past producer : reserves (grade + 3 dimens.) or resources known.
(4) Past producer : reserves or resources exhausted, or not known.
(5) Grade, 2 dimensions (length and width) known: reserves unknown.
(6) Grade, 1 dimension (length or width) known : by drill or chip sample.
(7) Outcrop showing; or commodity(s) known, but unpublished: ± grab sample assays.
(8) Float; provenance known or unknown: ± grab sample assays.

ip = inside, or op = outside of Kluane National Park Reserve: op^1 = op, but on lands withdrawn from staking due to Native Land Claims.

References (e.g. 9,p50 = Read and Monger (1976) page 50; NB. p = initial page of reference cited; (1976) = year of publication.
N.B. references listed are main sources only; for references such as INAC publications (not given), individual assessment report numbers and summaries, and claims information, the reader should see INAC (1989) or literature cited there.

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Table 5. MINERAL DEPOSITS TATSHENSHINI RIVER (114P) AND NE YAKUTAT (114O)[1]

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
1	(1)	DUCK'S FACE	Gy	unk	unk	uPv, uPpc?	AX	IB	P/13E	(7)op	7;8,p17;9;13,p173; 23,p70;24,p1
2	(2)	WINDY CRAGGY	Cu,Co,Au,Ag	stf,mas,stw,stg	vlc,exh	uPv, uPpc	AX	IB	P/12E	(2)op	8,p17;9;11,p159; 13,p173;14,p131; 16,p109;17,p195; 18,p197;19,p1;20,p723; 23,p65;24,p2;25,p455; 33,p3
3	(3)	TATS	Cu,Ag,Co,Zn,Au	stb,mas	vlc,exh	uPv	AX	IB	P/12E	(6)op	8,p17;9;11,p159; 13,p173;14,p135; 16,p109;23,p65;24,p5
4	( )	ALSEK RIVER (TURNBACK)	Cu	unk	unk	Psp?	AX	IB	P/13W	(7)op	8,p17;9
5	(5)	O'CONNOR RIVER (SNOW)	Gy,An	dsc,mas	sed,evp;hyd	uPe	AX	IB	P/10E	(2)op	8,p17;9;21,p279; 23,p65;24,p9
6	(6)	KIM (AUNT JEMIMA)	Zn	dis;vn	skn?;hyd,rpl	Dc?	Og?:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p11
7	(7)	MAID OF ERIN (L722)	Cu,Ag,Au,Zn,Bi,Fe	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/10E	(4)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p12; 29,p117;30,p237;32
8	(8)	STATE OF MONTANA (L283)	Cu,Ag,Au,Bi	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/10E	(4)op	1,p29;3,p40;5,p14; 8,p17;9;22,p1;23,p65; 24,p14;29,p117; 30,p237;32
9	(9)	VICTORIA (L903)	Zn,Pb,Ag,Cu,Au	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p16;32
10	(10)	ADAMS (L286)	Pb,Zn,Ag,Cu,Mo	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p18;32
11	(11)	LAWRENCE (L955)	Zn,Pb,Ag,Cu,Au	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/09W	(6)op	1,p29;3,p40;8,p17;9; 22,p1;24,p20;32
12	(12)	SIMCOE (THREE GUARDSMEN)	Cu,Fe,Au,Mo	pod,mas,dis	skn;rpl	uPs	Og:AX	IB	P/09W	(6)op	1,p29;3,p40;8,p17;9; 22,p1;24,p22;32

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
13	(13)	MILDRED (THREE GUARDSMEN)	Cu,Ag,Fe	pod,mas,dis	skn;rpl,hyd?	uPs	Og:AX	IB	P/09W	(6)op	1,p29;3,p40;8,p17;9; 22,p1;24,p24;32
14	(14)	CANADIAN VERDEE	Ag,Cu,Zn,Bi,Au,Fe	pod,mas,dis	skn;rpl,hyd?	uPs	Og:AX	IB	P/09W	(7)op	1,p29;3,p40;8,p17;9; 22,p1;24,p26;32
15	(15)	GOLD CORD (STAMPEDE)	Au,Ag,Cu,Zn	vn,dis	hyd	Og	Og:AX	IB	P/07E	(6)op	2,p14;3,p59;8,p17;9; 17,p191;22,p1;24,p28; 26,p40
16	( )	CALLISON	Pb,Cu	unk	unk	?	AX	IB	P/10W	(7)op	8,p17;9
17	(17)	WINDSOR L804	Cu,Zn	dis?	skn?;rpl?	uPs	Og:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p32;32
18	(18)	HUM BIRD - DISCOVERY	Ag,Pb,Zn,Cu	vn,bx,dis	hyd,rpl	Pvb	AX	IB	P/10W	(7)op	8,p17;9;23,p65;24,p33; 27,p71
19	(19)	BORNITE (CAT)	Cu,Pb,Zn;Mo	dis;bx	skn;prp?	uPs; Og, Of?	Og:AX	IB	P/10E	(6)op	8,p17;9;22,p1;23,p65; 24,p36;32
20	(20)	WAR EAGLE L901	Fe	dis?	skn?;rpl?	uPs	Og:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p36;32
21	(21)	SHEEP	Cu,Zn	unk	unk	PTRv?	W2?;AX?	IB	P/14E	(6)op	8,p17;9;24,p37;32
22	(22)	KELSAL 24	Cu,Zn,Mo	vn,dis;flt	hyd	PMvs	W3,TU?	IB?	P/16W	(6)op	8,p17;9;24,p38;32
23	(23)	KELSAL 32	Cu	vn,dis;flt	hyd	PMvs	W3,TU?	IB?	P/16W	(6)op	8,p17;9;24,p39
24	(24)	HUM BIRD - CREEK	Ag,Zn,Pb,Cu	vn,dis	hyd,rpl	Pvb	AX	IB	P/10W	(6)op	8,p17;9;23,p65;24,p40; 27,p71
25	(25)	HUM BIRD - SOUTH	Ag,Cu,Zn,Pb	vn,dis	hyd,rpl	Pvb	AX	IB	P/10W	(6)op	8,p17;9;23,p65;24,p42; 27,p71
26	(26)	HUM BIRD - CAMP	Ag,Cu,Zn,Pb	vn,dis	hyd,rpl	Pvb	AX	IB	P/10W	(6)op	8,p17;9;23,p65;24,p44; 27,p71
27	(27)	LUNAR (MAG)	Ag,Pb,Zn,Fe	dis?;vn	skn;hyd,rpl	uPc?	AX?;Og:AX	IB	P/10E	(6)op	8,p17;9;23,p65;24,p46
28	(28)	NADAHINI MOUNTAIN	Cu,Ab,Fe	vn,dis?	hyd,rpl	Mb, PTRub?,b?	AX	IB	P/10E	(7)op	3,p25;8,p17;9;23,p65; 24,p47;32
29	(29)	HIBERNIAN	Cu,Ag,Pb,Zn,Fe	stg,vn,dis	skn;rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;8,p17;9;23,p65; 24,p48;32

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
30	(30)	MOUNT MANSFIELD (BEAR)	Cu,Pb,Au	vn,dis;flt	hyd,rpl	PMvs	W3,TU?	IB?	P/15E	(7)op	3,p59;8,p17;9;24,p50
31	(31)	C AND E NORTH	Ni,Cu,PGE,Zn	dis;vn	mgm;hyd,rpl	PTRb,ub, PTRv	W2	IB	P/15W	(7)op	8,p17;9;24,p51;32
32	(32)	C AND E SOUTH	Zn,Sb,Pb,Sr	dis	unk	PTRv	W2	IB	P/15W	(7)op	8,p17;9;24,p52;32
33	(33)	WC 17 (TATS LAKE)	Ag,Au	unk	unk	ODcs	AX	IB	P/12E	(7)op	8,p17;9;24,p53
34	(34)	TATS CREEK (ALSEK)	Cu,Ag,Au	unk	unk	JKg	JKg:AX	IB	P/12E	(7)op	8,p17;9;23,p65;24,p54
35	(35)	BARBICAN MOUNT	Ag,Cu,Ag	vn,stg,dis	hyd,vlc?	uPpc,v?	AX	IB	P/12E	(7)op	8,p17;9;13,p174; 14,p135;24,p56
36	(36)	KLEHINI RIVER SW	Zn,Ag,Cd	vn	hyd	Φg	Φg:AX	IB	P/10E	(7)op	8,p17;9;24,p58
37	(37)	ALSEK TRIBUTARY	Cu,Au,Ag	unk	unk	ODcs?	AX	IB	P/12W	(7)op	8,p17;9;13,p174; 14,p135;23,p65;24,p60
38	(38)	FAULT CREEK (TARR)	Pb,Zn,Ag,Au	vn	hyd	ODcs	AX	IB	P/10W	(7)op	8,p17;9;24,p61
39	(39)	CAMP CREEK	Cu,Ag,Au	unk	skn;hyd	uPs	Φg:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p63;29,p117; 30,p237
40	(40)	KLEHINI RIVER NE	Zn,Cu,Pb,Ag	unk	skn;hyd?	uPs	Φg:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p65;29,p117; 30,p237
41	(41)	ALSEK (TATS GLACIER)	Cu,Ag,Au,Fe	mas,vn	vlc?;hyd?	uPv	AX	IB	P/12E	(7)op	8,p17;9;13,p173; 14,p135;24,p67;32
42	(42)	INSPECTOR CREEK	Cu,Ag	mas	skn;rpl?	uPs	Φg:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p68;32
43	(43)	BASEMENT - JUNE 24	Ba,Ag,Cu,Pb,Zn,Au	stb,dis	unk	Psp?	AX	IB	P/06W	(7)op	8,p17;9;24,p70
44	(44)	BASEMENT - JUNE 21	Au,Cu,Ag	stb,vn,stg,dis	unk	Psp?	AX	IB	P/06W	(7)op	8,p17;9;24,p72
45	(45)	BASEMENT MAIN	Cu,Co	mas,pod	vlc	Psp?	AX	IB	P/06W	(6)op	8,p17;9;24,p74
46	(46)	HUM BIRD - DOME	Ag,Cu,Zn,Pb,Au	vn,dis	hyd,rpl	Pvb	AX	IB	P/10W	(6)op	8,p17;9;23,p65;24,p76; 27,p71

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
47	(47)	SAM - NORTH GLACIER	Cu,Zn,Pb,Au,Ag	pod,dis	skn;hyd?	Pvb	Og?:AX	IB	P/10W	(7)op	8,p17;9;22,p1;23,p65; 24,p78;32
48	(48)	SAM - MAIN GLACIER	Cu,Pb,Zn,Ag,Au	flt(stg,mas,dis)	(skn;rpl,hyd?)	Pvb?	/AX	IB	P/10W	(8)op	8,p17;9;22,p1;23,p65; 24,p79;32
49	(49)	KEL	Cu,Ag,Au,Zn	vn	hyd,rpl?	PMvs	W3,TU?	IB?	P/09W	(6)op	8,p17;9;24,p81
50	(50)	VALIA	Cu,Pb,Zn,Ag,Fe	stf,mas,stg	vlc	Pvb	AX	IB	P/07W	(7)op	8,p17;9;24,p83
51	(51)	MOUNT BIGGER	Pb,Zn,Cu,Ag	vn,stg	hyd,rpl	Pvb	AX	IB	P/07W	(6)op	8,p17;9;24,p84
52	(52)	PENDANT GLACIER	Zn,Cu,Ag,Au,Pb	mas,vn,dis	exh?	ODcs?	AX	IB	P/12E	(7)op	8,p17;9;24,p86
53	(53)	PAMPERO RIDGE	Zn,Cu,Ag	dis?,vn	vlc?,hyd?	uPv	AX	IB	P/13E	(7)op	8,p17;9;13,p173; 14,p135;24,p88
54	(54)	GRAMPS CRAG	Cu,Zn,Ag	dis?	unk	uPv, uPpc?	AX	IB	P/13E	(7)op	8,p17;9;13,p173;24,p90
55	(55)	AEOLIAN STEEPLE	Zn,Ag,Cu	unk	vlc?	uPv	AX	IB	P/12E	(7)op	8,p17;9;13,p173; 14,p135;23,p65;24,p92
56	(56)	VEGA (L145)	Cu,Ag,Zn,Au	dis	skn;rpl,hyd?	uPs	Og:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p94;32
57	(57)	ALU	Cu,Mo,Wo	dis,stw,vn	skn;rpl,hyd?	SDc	JKg:AX	IB	P/03E	(7)op	8,p17;9;22,p1;24,p96
58	(58)	SAC	Cu,Pb	dis	unk	Of?	Og?:JKg:AX	IB	P/06E	(7)op	8,p17;9;22,p1;24,p98
59	(59)	HAINES ROAD	Ba	vn	hyd?,rpl?	uPs?	AX?;W2?	IB	P/15E	(7)op	8,p17;9;24,p99
60	(60)	SQUAW VALLEY	Ab	vn?	hyd?,rpl?	Mb?, PTRb,ub?	AX?;W2?	IB	P/14E	(7)op	8,p17;9;24,p100
61	(61)	RIME (X, MUS)	Au,Ag,Cu,Zn,Co	stb,mas,dis?	vlc?,exh?	uPpc, uPv?	AX	IB	P/12E	(6)op	8,p17;9;11,p159; 13,p173;14,p135; 16,p109;18,p197;19,p1; 20,p723;24,p101
62	(62)	HERBERT (MOUTH) WEST	Au,Ag,Cu,Co,Pb	dsc,pod,mas,dis	vlc;hyd?	Pvb	AX	IB	P/07E	(7)op	8,p17;9;12;15,p365; 16,p109;17,p191; 18,p197;23,p65; 24,p103
63	(63)	HERBERT (MOUTH) EAST	Ag,Cu,Zn,Au,Co,Pb	stb,mas,dis	vlc	Pvb	AX	IB	P/07E	(7)op	8,p17;9;12;15,p365; 16,p109;17,p191; 18,p197;23,p65; 24,p105

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
64	(64)	LOW HERBERT	Cu,Ag,Au,Zn,Pb,Ba	stf?,dis	vlc	Pvb	AX	IB	P/07E	(6)op	8,p17;9;12;15,p365; 16,p109;17,p191; 18,p197;23,p65; 24,p107
65	(65)	HIGH HERBERT NORTH	Ba,Cu,Ag,Au,Pb,Zn	vn,stg,dis	vlc;hyd,rpl	Pvb	AX	IB	P/08W	(6)op	8,p17;9;12;15,p365; 16,p109;17,p191; 18,p197;23,p65; 24,p109
66	(66)	JARVIS SOUTH	Cu	unk	unk	Pvb	AX	IB	P/08W	(7)op	8,p17;9;15,p365; 24,p111
67	(67)	HIGH JARVIS	Zn,Ag,Au,Cu,Pb	stf,mas	hyd?	ODcs	AX	IB	P/07E	(6)op	8,p17;9;15,p365; 24,p112
68	(68)	GRIZZLY HEIGHTS 1	Au,Ag	vn,bx	hyd,rpl	Pvb,(Dc,p)	AX	IB	P/07E	(6)op	8,p17;9;15,p365; 23,p65;24,p114
69	(69)	KUD	Cu,Ag,Au	vn?,dis?	hyd?,rpl?	uPp?	AX	IB	P/14E	(7)op	8,p17;9;24,p116
70	(70)	RED MOUNTAIN (FAIR)	Cu,Pb,Zn,Ag,Au,As	mas;stg;vn,dis	skn;vlc?;hyd	uPpc;v; Mf?	Mg: (AX;Tvs/AX)	IB	P/11E	(6)op	8,p17;9;17,p191;22,p1; 24,p117;29,p117; 30,p237
71	(71)	LOW JARVIS (JUMAR)	Cu,Zn,Ag,Ba	stf,mas,dis	vlc,exh	Pvb	AX	IB	P/08W	(6)op	8,p17;9;12;15,p365; 16,p109;17,p191; 18,p197;22,p1;23,p65; 24,p119;31,p1
72	(72)	EMPIRE (L288)	Cu,Ag	dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p120; 32
73	(73)	ARIZONA (L285)	Cu,Ag,Pb	dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p122; 32
74	(74)	GILROY (L730)	Cu,Ag,Zn,Fe	mas?,dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p124; 32
75	(75)	MOCKING BIRD (HARTFORD)	Cu,Ag,Zn	dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p126; 32

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
76	(76)	NEW YORK (L287 (CARIBOO))	Cu,Ag,Au	mas,dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p128; 32
77	(77)	EVENING (WHITE HORSE)	Ag,Cu,Zn	dis	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p130; 32
78	(78)	FRISCO (L154)	Ag,Zn,Cu,Pb,Au	dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p132; 32
79	(79)	COLUMBIA (FAIRFIELD)	Cu,Ag,Au	mas,dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;24,p134; 32
80	(80)	SADDLE 3/4	Au,Ag	vn,dis	hyd	Og	Og:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p136;32
81	(81)	SADDLE 2	Cu,Ag,Au,Fe	dis	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	8,p17;9;22,p1;23,p65; 24,p138;32
82	(82)	KLEHINI RIVER (KR1) (BETA)	Au,Ag,Cu	vn,dis	hyd,rpl?	Og	Og:AX	IB	P/10E	(6)op	8,p17;9;22,p1;23,p65; 24,p140;32
83	(83)	KLEHINI RIVER (KR4) (BETA)	Au,Ag,Cu	vn,stw,dis	hyd,rpl?	Og	Og:AX	IB	P/10E	(6)op	8,p17;9;22,p1;23,p65; 24,p142;32
84	(84)	KLEHINI RIVER (KR7) (DELTA)	Cu,Ag,Au	vn,dis	hyd	Og	Og:AX	IB	P/10E	(6)op	8,p17;9;22,p1;23,p65; 24,p144
85	( )	JARVIS	Pb,Ag,Au	pod?,dis?	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
86	( )	EAST ARM GLACIER	Cu	stf?,mas,dis	vlc,exh?	uPpc?v?	AX	IB	P/12E	(6)op	8,p17;9;19,p1;20,p723
87	( )	TORONTO (L289)	Zn,Cu,Ag	unk	skn	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
88	( )	WOODCHOPPER	Pb,Zn,Ag	unk	skn	uPs	Og:AX	IB	P/09W	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
89	( )	PANTHER (CAT)	Cu,Ag,Mo	bx,stw,stg	hyd,rpl?,prp?	Og	Og:AX	IB	P/10E	(6)op	3,p40;8,p17;9;22,p1; 23,p65;32
90	( )	TIKKE GLACIER	Au,Cu,Ag	vn,stg,dis	unk	Psp?	AX	IB	P/06W	(7)op	8,p17;9;32
91	( )	WATSON	Cu,Au	vn,dis;flt	hyd,rpl	PMvs	W3,TU?	IB?	P/15E	(7)op	3,p60;8,p17;9;32

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
92	( )	BLANCHARD LAKE	Cu	dis;flt	skn	Mc	W3,TU?	CB	P/16W	(7)op	3,p60;8,p17;9;32
93	( )	SONORA L727	Zn,Pb,Cu,Fe	mas,dis	skn	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
94	( )	CALGARY	Fe	vn,dis	hyd,rpl?	uPs	AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 23,p65;32
95	( )	WONDERFUL L726	Pb,Zn,Cu,Ag	pod?,mas	skn	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
96	( )	CUSTER	Zn,Pb,Cu,Ag,Au	unk	skn?	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
97	( )	BLUE BIRD	Cu,Ag	unk	skn?	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
98	( )	TAGISH	Pb	unk	skn?	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
99	( )	SOLDIERS THREE	Pb,Zn,Cu,Ag	mas?	skn?	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
100	( )	ELISE L902	Cu	mas,vn	skn;hyd,rpl	uPs	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
101	( )	HORRIBLE L810	Cu,Au,Ag	dis	hyd?,rpl?	Of?	Og:AX	IB	P/10E	(7)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
102	( )	LE ROI	Pb,Ag	mas,vn	skn?;hyd?,rpl?	uPs	Og:AX	IB	P/09W	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
103	( )	ATLIN L904	Cu,Zn	unk	skn?	uPs	Og:AX	IB	P/10E	(6)op	1,p29;3,p40;8,p17;9; 22,p1;23,p65;32
104	( )	PARTON	Au,Zn	vn	hyd?	OSwp?	AX	IB	P/10E	(6)op	8,p17;9;32
105	( )	MULE CREEK	Au,Ag,Cu	mas?	unk	Ps,PTRv?	W2	IB	P/15E	(6)op	8,p17;9;32
106	( )	JOE	Zn,Pb	unk	unk	uPv?,pc?	AX	IB	P/11E	(7)op	8,p17;9;17,p194;32
107	( )	STONE	Cu,Zn,Pb,Fe	pod,vn	skn	uPs	Og:AX	IB	P/09W	(7)op	3,p40;8,p17;9;32
108	( )	CHILKAT	Cu,Ni,PGE	dis	mgm	PTRub	W2	IB	P/15W	(7)op	3,p25;8,p17;9;32
109	( )	GRIZZLY HEIGHTS 2	Zn,Pb,Ag,Ba	flt,(mas)	(unk)	?	/AX	IB	P/07E	(8)op	8,p17;9;15,p365

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
110	( )	BUCKWELL GLACIER	Cu,Zn,Pb,Co,Ag,Au	flt,(stf,mas)	(vlc)	?	/AX	IB	P/07E	(8)op	8,p17;9;15,p365;32
111	( )	HENSHI CREEK 1	Cu,Zn,Co,Ag	flt,(stf,mas)	(vlc)	uPpc;v	/AX	IB	P/11W	(8)op	8,p17;9;13,p173;19,p1; 20,p723
112	( )	HENSHI CREEK 2	Cu,Zn,Co,Ag	flt,(stf,mas)	(vlc)	uPpc;v	/AX	IB	P/11W	(8)op	8,p17;9;19,p1;20,p723
113	( )	HENSHI CREEK 3	Cu,Zn,Co,Ag	flt,(stf,mas)	(vlc)	uPpc;v	/AX	IB	P/11W	(8)op	8,p17;9;19,p1;20,p723
114	( )	SOUTH RANGE CREEK	Cu	flt,(mas?)	(vlc?)	?	/AX	IB	P/13E	(8)op	8,p17;9;19,p1;20,p723
115	( )	PARTON RIVER	Cu,Ag,Au	flt,(dis)	(unk)	?	/AX	IB	P/15W	(8)op	8,p17;9;32
116	( )	SELTAT PEAK	Cu	flt,(unk)	(skn)	?	/AX	IB	P/09W	(8)op	8,p17;9;32
117	( )	GP	Au	flt,(unk)	(unk)	PMsv?	/W1?	IB	P/03E	(8)op	8,p17;9;32
118	( )	CANADIAN BOULDERADO	Cu,Zn,Pb,Ag,Ba	flt,(stf,mas)	(vlc)	Pvb?	/AX	IB	P/08W	(8)op	8,p17;9;15,p365; 17,p191
119	( )	COAL CREEK	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/14W	(7)op	7;8,p17;9
120	( )	KUSAWAK RANGE	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/10E	(7)op	8,p17;9
121	( )	SQUAW CREEK COAL	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/14E	(7)op	3,p61;8,p17;9;28,p7
122	( )	TATS CREEK COAL 1	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/12E	(7)op	7;8,p17;9
123	( )	TATS CREEK COAL 2	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/12E	(7)op	7;8,p17;9
124	( )	TATS CREEK COAL 3	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/12E	(7)op	7;8,p17;9
125	( )	TATS LAKE COAL	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/12E	(7)op	7;8,p17;9
126	( )	TALBOT CREEK	coal	cnc,stf	sed	Ps	Tvs/AX	IB	P/15W	(7)op	3,p61;8,p17;9
127	( )	DATLASAKA	bentonite	stf	sed	Qs?	/AX	IB	P/15W	(7)op	8,p17;9;32
128	(4)	SQUAW (DOLLIS) CREEK	Au,Cu,Ag,Fe,Pb	flv,unc	plc	Qs	/(AX,W2)	IB	P/14E	(1)op	3,p36;4,p50;6,p51; 8,p17;9;24,p7;28,p7; 34,p74;35,p90

OF. No.	MINF (No)	Deposit(s) Name(s)	Commodity(s)	Deposit(s) Form	Deposit(s) Type	Host Unit(s)	Plut.:Cov. /Terrane	Mgeo Belt	NTS (114)	Status	References
129	(16)	GOLD RUN (BLIZZARD) CREEK	Au	flv,unc	plc	Qs	/(AX,W2?)	IB	P/15W	(4)op	3,p39;8,p17;9;24,p30; 35,p93
130	( )	KLEHINI RIVER	Au	flv,unc	plc	Qs	/AX	IB	P/08W	(7)op	3,p39;8,p17;9

[1] No mineral deposits have been recorded from NE Yakutat map area; (reference; 8,p17;10).

Explanation of Mineral Deposit Information for Tatshenshini River (114P) map area

⊗4 mineral deposit(s) locality and map reference number (on map): location accuracy may vary.
N.B. locations of placers (plc) mostly are very approximate and are "spot placed" only to indicate creeks or sections of creeks where placers have been mined or occur.

OF. No. map reference number.
MINF (No) MINF (MINFILE: British Columbia Ministry of Energy Mines and Petroleum Resources) No (number) for NTS 114P Tatshenshini River, Dec. 1988 edition.
Deposit(s) Name(s) name (alternate name) of deposit(s). N.B. for placers (plc) only; name is creek or river where deposit(s) occur.
N.B. e.g. L727 = Crown-granted mineral claim lot number; e.g. (L722) = original lot number, now reverted.

Commodity(s) Abbreviations elements present are listed in decreasing order of abundance; elements present in trace amounts are included, but not specified.

Ab asbestos
An anhydrite
Ag silver
As arsenic
Au gold
Ba barium
Bi bismuth
Cd cadmium
Co cobalt
Cu copper
Fe iron
Gy gypsum
Mo molybdenum
Ni nickel
Pb lead
PGE platinum gp. elements
Sb antimony
Sr strontium
Wo tungsten
Zn zinc

Deposit(s) Form Abbreviations

cnc concordant
dsc discordant
stb stratabound
stf stratiform
pod podiform
bx breccia
stw stockwork
stg stringer
vn vein
mas massive
dis disseminated
flv fluvial deposit
unc unconsolidated
flt float
unk unknown

Deposit(s) Type Abbreviations

hyd hydrothermal
rpl replacement
vlc volcanic
exh exhalative
prp porphyry
skn skarn
sed sedimentary
evp evaporite
plc placer
unk unknown

Host Unit(s) 1:250 000 scale map unit(s) host to mineral deposit(s).

Plut.:Cov./Terrane

(Fig. 2 map unit(s) host to mineral deposit(s). **Plut.** = Plutonic Rocks: : = intruded into: **Cov.** = Cover Rocks: / = deposited on: **Terrane** = Terrane.
e.g. Mg:(AX;Tvs/AX) = Mg: = intruded into (;) = both AX and Tvs which was / = deposited on AX.
N.B. for placer deposits and float only; e.g. /(AX,W2) = Qs (not depicted in Fig. 2) / = deposited on (,) = both AX and W2.

Mg = Miocene subvolcanics: Og = Oligocene granitoids and or subvolcanics: JKg = Late Jurassic to Earliest Cretaceous granitoids: Tvs = Tertiary volcanics and or sediments: W1?, W2, W3 = Wrangellia Terrane; segments 1?, 2, 3: TU = Taku Terrane: AX = Alexander Terrane.

Mgeo Belt Morphogeological Belts (Fig. 2 inset) in which mineral deposit(s) occur (IB = Insular Belt; CB = Coast Belt).

NTS National Topographic System map sheet reference.
(114) = 1:1 000 000 scale: O / P = 1:250 000 scale: 01 to 16 = 1:50 000 scale; E = East, or W = West half.

Status Abbreviations

(1) Being produced: commodity(s) is (are) being extracted for sale.
(2) Never produced: reserves (grade + 3 dimens.) or resources known.
(3) Past producer : reserves (grade + 3 dimens.) or resources known.
(4) Past producer : reserves or resources exhausted, or not known.
(5) Grade, 2 dimensions (length and width) known: reserves unknown.
(6) Grade, 1 dimension (length or width) known : by drill or chip sample.
(7) Outcrop showing;or commodity(s) known, but unpublished: ± grab sample assays.
(8) Float; provenance known or unknown: ± grab sample assays.

ip = inside, or op = outside of Kluane National Park Reserve.

References (e.g. 6,p50 = Read and Monger (1976) page 50; N.B. p = initial page of reference cited; (1976) = year of publication.
N.B. references listed are main sources only; for references such as BCMEMPR publications (not given), newspaper releases (e.g. Northern Miner), and individual assessment reports, etc., the reader should see BCMEMPR Minfile 114P (1988), or Northern B.C. Mineral Inventory (Archer, Cathro & Associates (1981) Limited).

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