Table 1. Mineral and Coal Occurrences in SW Dawson Map Area

	Style	Host Lithology	Commodities	Examples
1a.	Stratabound (syngenetic?) - sediment-hosted	DPqsc	Pb + Zn (+ Ba)	MICKEY(1), CLIP(2), HOLLY(3), unnamed(4)
1b.	Stratabound (syngenetic?) - volcanic-hosted	Pks	Zn + Pb + Cu	PUB(5), BALDY(6), BOUNDARY(7)
2.	Porphyry	eTqfp, lKgd	Mo + W	PLUTO(8), SWEDE(9)
3a.	Copper-lead-silver skarn (and related veins)	PPc, eTdi	Cu + Pb (+ Ag)	WEST DAWSON(10)
3b.	Tungsten skarn	PPc	W (+ Cu + Mo)	RAIL, ROAD, TRACK(11)
3c.	Lead-zinc skarn	PPc	Pb + Zn	ROAL(12)
4.	Asbestos stockwork	Pu	asbestos	Clinton Creek mine(13), Caley mine(14), others
5a.	Mesothermal vein	various metamorphic units	Pb + Zn + Cu + As +Ba (+ Ag + Au)	VIRGIN(15), BEN LEVY(16), BOUNDARY LODE(17), MILLER(18)
5b.	Epithermal vein	various schists, lKqfp, lKva	Pb + Zn or Hg + Ba	GUCH(19), YAREMCIO(20), Sixtymile R./PER(21)
6.	Vein/disseminated Pb-Zn-Ag	carbonatized Pu	Pb + Zn + Cu + Ag (+ Au + Sb)	SILVER CITY(22), SUBMARINE(23), FORTYMILE(24), Clinton Cr.(25)
7.	Disseminated U-F	eTqfp and wall rocks	U + F + Sn (+ Au)	SURPRIZE(26), GERMAINE(27)
8.	Podiform chromite	Pu	chromite	Clinton Cr.(28), Wolverine Cr.(29)
9.	Coal	PEst, lKst	lignite	Lower Yukon R.(30), JEPHSON(31), Cliff Cr.(32), LEDUC(33), CHAIN(34), Coal Cr. (north)(35), BARETTE(36), THANE(37), JEROME(38), Coal Cr. (south)(39), MORRISON(40), Sixtymile(41)
10.	Placer (alluvial, eluvial)	Quaternary, Recent seds.	Au + Ag (no PGM's)	Klondike District, Sixtymile District, Fortymile District

LEGEND

Late Tertiary or Quaternary

TQvb fresh, brown weathering olivine basalt

Early Tertiary

eTt felsic lapilli tuff and volcanic breccia

eTqfp tan to rusty weathering, unfoliated quartz-feldspar porphyry

eTdi brown weathering fine-grained diabase and plagioclase-phyric basalt

eTv mafic to intermediate volcanic rocks

PEst brown weathering conglomerate, argillite, minor tuffs

Late Cretaceous

lKva massive andesite flows, breccias and plugs

lKst quartz pebble conglomerate, sandstone, shale, minor tuffs

lKgd massive unfoliated hornblende-biotite granodiorite and quartz monzonite

lKqfp massive unfoliated quartz-feldspar porphyry

Triassic

Rs weakly deformed, thinly bedded argillite, sandstone, argillaceous limestone

middle and upper Paleozoic

Pv massive and sheared greenstone and diabase

Pu serpentinite, serpentinized harzburgite, carbonatized ultramafic rocks, talc-carbonate schist

Klondike Schist

- Pqm rusty weathering quartz-muscovite schist
- Psa quartz and/or feldspar augen-bearing quartz-muscovite (chlorite) schist
- Pks Klondike Schist undifferentiated (includes units Pqm, Psa, also chloritic schist and minor graphitic quartz-muscovite schist)

Nasina Series

- DPc marble
- DPsa quartz and/or feldspar augen-bearing quartz-muscovite schist
- DPasc dark green weathering chlorite (+ biotite) schist, amphibolite and garnet amphibolite
- DPsc Nasina Series undifferentiated (mainly grey to black graphitic quartzite and quartz-muscovite (+ biotite) schist; locally garnetiferous)

DMgdg massive to strongly foliated dioritic to granodioritic gneiss

Proterozoic(?) and Paleozoic

PPsg tan to pale green to medium brown weathering quartz-muscovite-chlorite schist, micaceous fine-grained quartzite, and banded quartz-feldspar-amphibole gneiss; includes locally abundant chlorite schist, metagabbro and marble

PPc marble

PPsa feldspar augen-bearing quartz-muscovite schist

- lithological contact (deefined, approximate, assumed)
- thrust fault or slide (approximate, assumed)
- steep fault (defined, approximate, assumed)
- compositional layering in metamorphic rocks
- bedding (upright, tops uunknown)
- u altered ultramafic rock occurrence
- c stretched pebble conglommerate occurrence
- q quartz-feldspar porphyryy dyke (unit eTqfp)
- m mafic dyke (unit eTdi)
- p granitic pegmatite occurrence
- ●31 mineral or coal occurrence (numbers correspond to Table 1)
- • (K,R,U; b,m,h,a,w,z) isotopic age determination (K-Ar,Rb-Sr,U-Pb; biotite, muscovite, hornblende, actinolite, whole-rock, zircon)

DESCRIPTIVE NOTES

Dawson map area (NTS 116 B,C) southwest of the Tintina Fault Zone (Mortensen, 1988) is underlain mainly by greenschist to lower amphibolite facies metamorphic rocks of the Yukon-Tanana Terrane (Monger and Berg, 1987). These rocks can be divided into two main assemblages: 1) schists and gneisses derived from a variety of sedimentary and igneous protoliths and displaying a penetrative ductile deformation fabric; and 2) massive to brittlely sheared greenstone, diabase and serpentinized harzburgite. Assemblage 1 corresponds generally to rocks originally included in Green's (1972) units A, B and D (Nasina Series, Klondike Schist and Pelly Gneiss, respectively), but here has been further sub-divided based on compositional, textural and limited isotopic age criteria. Assemblage 2 corresponds to Green's units C (greenstone = unit Pv) and E (ultramafic rocks = unit Pu). The two assemblages are now imbricated along low-angle brittle faults that may include thrust faults and tectonic slides along original stratigraphic contacts. These faults are rarely well exposed (e.g. in Clinton Creek mine open pit and at several localities along Yukon River between Dawson and Fortymile), but they can commonly be traced as lithological contacts marked by the discontinuous occurrence of massive to sheared greenstone and/or serpentinite in felsenmeer and float.

A limited amount of fossil and isotopic age data is available for rocks of Assemblages 1 and 2 in the study area. These data are summarized in Mortensen (1988, in preparation). Together they indicate that the ductilely deformed metamorphic rocks of Assemblage 1 are largely of middle and late Paleozoic age. Orthogneiss of unit DMgdg from a locality 22 km south of the study area (Fiftymile Batholith) has yielded a Late Devonian-Early Mississippian U-Pb zircon age (Mortensen, 1986). Metaporphyry within Klondike Schist (units Pks and Psa) in the northern Sixtymile District and northern Klondike District have been dated at mid-Permian (U-Pb zircon ages), as has a sample of quartz augen schist (unit DPsa) within Nasina Series metasediments on the southwestern side of Cassiar Dome. Ductile deformation occurred between mid-Permian and latest Triassic time; however hornblende, biotite and muscovite from the metamorphic rocks yield K-Ar cooling ages as young as Late Jurassic. Greenstone and altered ultramafic rocks in the study area have not been directly dated. A Middle or Upper Triassic conodont age has been obtained from weakly deformed sediments of unit Rs that are associated with the greenstone and ultramafic rocks in the Clinton Creek open pit (Abbott, 1983).

Several phases of undeformed intrusive rocks occur in the area. Granodioritic to quartz monzonitic plutons (unit lKgd) probably represent the intrusive equivalents of the andesitic volcanics (unit lKva) which underlie much of the Sixtymile District. One such pluton (Swede Dome pluton) has yielded a U-Pb zircon age of 69.8 + 1.3 Ma, and a quartz-feldspar porphyry plug (unit lKqfp) cutting the volcanics along Sixtymile Road has yielded a U-Pb zircon age of 68.7 + 0.3 Ma. The volcanics and interbedded clastic sediments (unit lKst) are tentatively correlated on compositional and age grounds with the Carmacks Group in the Dawson Range farther to the south, and with similar strata on Indian River and lower Sixtymile River. Narrow undeformed granitic pegmatites crosscut amphibolite facies orthogneiss (unit DMgdg) along Sixtymile River and lower Miller Creek. Muscovite from one of these pegmatite bodies yields a K-Ar age of 180 Ma. A bimodal suite of mafic and quartz-feldspar porphyry dykes and small plugs (units eTdi and eTqfp) occur sporadically in a band within 10-20 km of the Tintina Fault Zone. Samples of unit eTqfp in northern Klondike District, lower Yukon River, and northeast of Cassiar Dome have yielded Eocene K-Ar, U-Pb and Rb-Sr ages. Along the Yukon River 24 km downstream from Dawson, the quartz-feldspar porphyry dykes cross-cut interlayered immature clastic sediments and mafic flows that are probably related to fossiliferous Paleocene-Eocene siltstones, sandstones and conglomerates that occupy the Tintina Fault Zone itself (unit PEst).

At least four distinct phases of deformation are recognized in the metamorphic rocks in the study area; however, scarcity of outcrop precludes a detailed structural analysis. The penetrative ductile deformation fabric present in Assemblage 1 rock units are not observed in Assemblage 2, indicating that this early tectonism pre-dated thrust faulting. At least one, and commonly two or more crenulation cleavages are present in both assemblages. Minor folds related to these cleavages locally appear to deform the thrust surfaces. Late, low-amplitude warping and small-scale steep faulting have affected all of the rock units in the area. Little evidence for large-scale normal or strike-slip fault structures in the study area (with the exception of Tintina Fault Zone) has been found either during field mapping or by aerial photograph and satellite imagery analysis. Some of the late folds and small-scale, northeast-trending steep faults appear to be localized along the Tintina Fault Zone and may be genetically related to it.

ECONOMIC GEOLOGY

A great variety of styles of mineralization occur within the study area (Table 1), including stratiform, porphyry, and skarn base metal occurrences, base and precious metal-bearing mesothermal and epithermal vein occurrences, and asbestos deposits in serpentinite. Also present are numerous lignite occurrences in Eocene sediments of unit PEst along Tintina Fault Zone and in sediments of unit lKst in the Sixtymile District, as well as portions of the Klondike, Sixtymile and Fortymile placer gold districts. The large number and variety of known mineral occurrences, together with the relatively limited mineral exploration activity that the area has attracted and the presence of extensive placer gold deposits for which no lode sources have yet been discovered, all underscore the substantial remaining mineral potential of the area.

REFERENCES

Abbott, J.G.
1983: Origin of the Clinton Creek asbestos deposit; in Yukon Exploration and Geology 1982, Indian and Northern Affairs Canada, Whitehorse, p. 18-25.

Archer, Cathro and Associates (1981) Ltd.
1984: Dawson map area, in Northern Cordillera Mineral Inventory, 1984 edition.

D.I.A.N.D.
1987: Dawson map-area (NTS 116 B,C); in Yukon Exploration and Geology 1985-86, Indian and Northern Affairs Canada, Whitehorse, p. 388-399.

Green, L.H.
1972: Geology of Nash Creek, Larsen Creek, and Dawson map-areas, Yukon Territory; Geological Survey of Canada, Memoir 364, 157 p.

Htoon, M.
1981: Isotopic age determinations of some metamorphic and igneous rocks from the Clinton Creek area, Yukon; in Yukon Geology and Exploration 1979-80, Indian and Northern Affairs Canada, Whitehorse, p. 65-67.

Monger, J.W.H. and Berg, H.C.
1987: Lithotectonic terrane map of western Canada and southeastern Alaska; U.S. Geological Survey, Miscellaneous Field Studies Map MF-1847-B.

Mortensen, J.K.
1986: U-Pb ages of granitic orthogneiss in the Yukon-Tanana terrane in west-central Yukon; in Current Research, Part B, Geological Survey of Canada, Paper 86-1B, p. 141-146.

1988: Geology of southwestern Dawson map area, Yukon Territory; in Current Research, Part E, Geological Survey of Canada, Paper 88-1E, p. 73-78.

____ in preparation. Bedrock geology and U-Pb geochronology of the Klondike District, west-central Yukon Territory.

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GEOLOGY

SOUTHWESTERN DAWSON MAP AREA

YUKON

Scale 1:250 000 - Échelle 1/250 000

Kilometres 5 0 5 10 15 20 Kilometres

Universal Transverse Mercator Projection

Projection transverse universelle de Mercator

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DOSSIER PUBLIC
1927
GEOLOGICAL SURVEY OF CANADA
COMMISSION GEOLOGIQUE DU CANADA
OTTAWA
1988