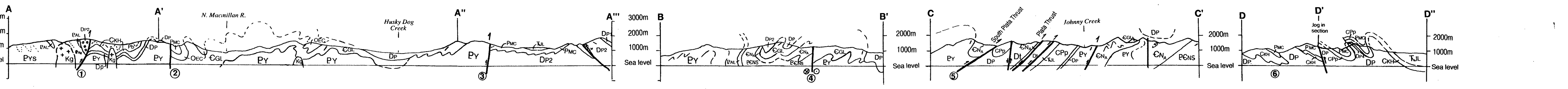
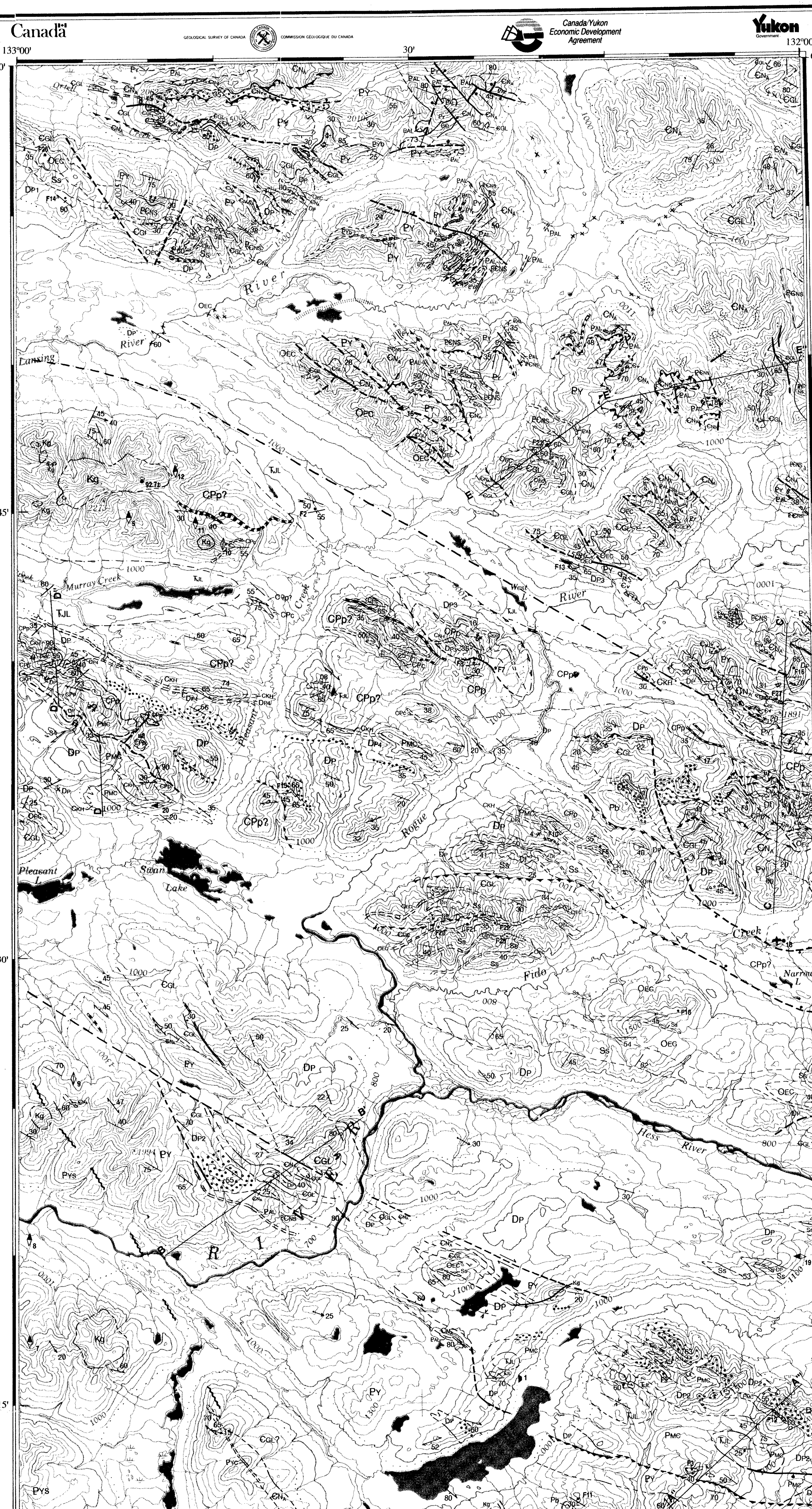




LEGEND

CRETACEOUS

Kg — **Tombstone Intrusive Suite:** White-weathering, fine grained hornblende +/- biotite granodiorite, quartz diorite.

White and rusty weathering, biotite-quartz-feldspar porphyry rhyolite dykes and sills.

TRIASSIC

TJL — **Jones Lake Formation:** Brown and grey weathering, fine grained calcareous and micaceous sandstone and siltstone, ripple crosslaminated; interbedded orange-brown weathering, olive green siliceous shale and recessive grey shale. Thin bedded blue-grey platy limestone contains late Carnian conodonts and *Minotis* ammonites in adjacent 105O/12 map area (M. Cecile and M. Orchard, pers comm., 1995).

PERMIAN

PMC — **Mount Christie Formation:** Orange brown, buff and pink weathering, green argillite and siliceous siltstone, laminated and burrowed with trace fossils on undersides of beds with locally abundant, grey barite nodules. Ribboned black and grey chert contains late Permian radiolarians near Mt. Osgoode.

Pb — Rust-brown weathering, black siliceous siltstone with deep orange weathering sandstone and dolostone; barite nodules and veins.

CARBONIFEROUS to PERMIAN

Probably equivalent to **Tsichu Group** (Cecile, in press; Tsichu formation of Gordey and Anderson, 1993).

CPp — Orange-brown and dark grey weathering, weakly calcareous, bioturbated and micaceous, black siltstone, fine grained brown sandstone, green shale and chert. Brown weathering, dark grey sandy limestone bed contains Early Carboniferous conodonts 5 km south of West Lake and cross-laminated limy sandstone contains early Permian conodonts 5 km west of Plata mineral occurrence.

CPc — White-weathering, grey and black chert and medium bedded siliceous argillite. Contains Permian radiolaria 4 km south of West Lake.

LOWER CARBONIFEROUS

CKH — **Keno Hill quartzite:** Grey-brown weathering, banded dark grey and black, fine-grained quartzite, thin interbeds of black shale and silicious argillite.

DEVONIAN to LOWER CARBONIFEROUS

Earn Group (probably **Portrait Lake Formation,** Gordey and Anderson, 1993)

DP4 — Brown-weathering micaceous quartz sandstone, parallel and ripple crosslaminated; minor siltstone. Equivalent to **Itsi Member** of Abbott and Turner (1990).

DP3 — Silver- and blue-weathering, well-bedded siliceous mudstone, platy and graphitic. South of Hess River grades downward from black argillaceous chert with minor centimetre-thick black limestone beds, to more recessive black, fissile siliceous shale.

Dt — Gossanous, white and yellow weathering, thin to medium bedded, white, light grey and black chert. Described by Abbott (1986).

DP2 — Dark blue-grey weathering, siliceous carbonaceous siltstone and mudstone; thin bedded black chert; conglomerate and grit with chert clasts (o o o). Minor white weathering limestone (≡) and amygdaloidal mafic flows (Dv) occur east of Fairweather Lake.

DP1 — Blue-brown weathering, siliceous shale; grades upward to thin- to medium-bedded, white, yellow weathering black chert; concretions and grey barite lenses common at Plata mineral occurrence. *Monograptus* found 9 km north of Plata occurrence.

DP — Earn Group undivided: includes some or all rock types described above.

SILURIAN

Road River Group

Ss — **Steel Formation:** Orange-brown weathering, green silicious argillite; orange weathering, thin-bedded beige dolostone, tan weathering limestone and black calcareous shale.

ORDOVICIAN (to LOWER DEVONIAN?)

OEC — White weathering, thick bedded grey, bottle-green and blue chert; grey and brown shale. Isolated beds of light grey weathering limestone contain Early to Late Ordovician conodonts and radiolarians are present in chert. Equivalent to **Elmer Creek Formation** (Cecile, in press).

UPPER CAMBRIAN to LOWER ORDOVICIAN

€GL — **Gull Lake Formation:** Green, brown, and olive laminated mudstone and siltstone; dark brown nodular shale; minor fine grained sandstone and grit. White weathering, nodular silty limestone (**CGL1**; brick pattern) contains protoconodonts 16 km southeast of West Lake, oolites on south slope of Mount Ortell. Local mafic flows and tuffs and volcanic sandstone (**Cv**) near Rogue River.

UPPER PROTEROZOIC to MIDDLE CAMBRIAN

Hyland Group (Gordey and Anderson, 1993)

Narchilla Formation

€NA — Maroon, brown, black and green argillite and siltstone. In 105N/16 contains thick beds of grey weathering laminated quartz sandstone (stippled). Equivalent to **Arrowhead Lake Member,** Narchilla Formation (Cecile, in press).

P€NS — Light brown weathering grit, sandstone, thin-bedded sandstone interbedded with grey and brown shale in fining-upward succession; load casts common. In 105N/15 maroon to brick-red argillite constitutes 3-5 beds, each about 10 m thick, separated by green sandstone. Equivalent to **Senoah Member,** Narchilla Formation (Cecile, in press).

PAL — Thin, well-bedded, buff sandy limestone and white weathering, thick-bedded grey-white limestone. Equivalent to **Algae Lake Formation** (Cecile, in press) and upper limestone member of Yusezyu Formation (Gordey and Anderson, 1993).

PY — **Yusezyu Formation:** Brown weathering calcareous sandstone, quartz grit with interbedded dark grey shale and siltstone, locally graded. Includes thick bed of yellow-brown limestone (**Py1**; =).

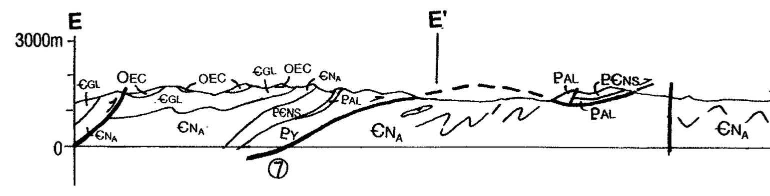
PYb — Dark brown weathering graphitic shale, minor maroon slate and fine grained dark grey quartzite.

PYS — Strained rocks equivalent of Py, PAL and Ps: Quartz-muscovite schist with minor chlorite schist and quartz-feldspar gritty schist. Boudins and healed *en echelon* fractures are common.

PYc — Pale weathering, fine grained chloritic schist with laminar quartz-feldspar segregations, foliated metavolcanic siltstone.

- Limit of outcrop, isolated outcrop
- Geological boundary (defined, approximate)
- Major contact projected beneath overburden
- Minor intrusions (felsic dykes); smaller than shown
- Bedding, top known (inclined, vertical, overturned)
- Bedding, top unknown (inclined, vertical)
- Regional folds (anticline, syncline, overturned anticline, overturned syncline)
- Cleavage, foliation (inclined, vertical)
- Schistosity, mylonitic fabric
- Strain gradient (approximate limit of penetratively deformed rocks)
- Mineral lineation (inclined rodding of quartz segregations)
- Fault (defined, assumed, extrapolated beneath overburden; solid circle indicates downthrown side)
- Thrust fault (defined, assumed, extrapolated beneath overburden; teeth indicate upthrust side)
- Fault, transcurrent (defined, assumed, extrapolated beneath overburden; arrows indicate relative movement)
- Line of cross-section — C ______ C'
- Displacement on transcurrent fault in cross-section (+ indicates displacement of block away from viewer; · indicates displacement of block towards viewer)
- Mineral occurrence (vein deposits: Ag-Pb-Au, Cu-Pb; stratabound Ba, Ag-Pb lode) — 3
- Fossil locality (number corresponds to table; dot shows precise location) — F1
- Plutonic rock date in millions of years (U-Pb zircon geochronology) — 92.7+/-

Geology by C. F. Roots and D. Brent in 1993, and J. G. Abbott, M.P. Cecile, S.P. Gordey and C. F. Roots in 1994.



CROSS-SECTION NOTES

The thickness of units depicted in cross section is greater than their true thickness as measured in less deformed areas (e.g. Gordey and Anderson, 1993; Cecile, in press) as a result of structural imbrication, isoclinal folds and stacking of folds too detailed to show at this scale. Inclined short lines at the surface of the profile are true dips where measured near the line of section. Steep attitudes may result from minor folds which cannot be portrayed at this scale, and thus some bedding dips portrayed on parts of the cross section are shallower than those indicated on the geologic map. Thin, solid form lines schematically indicate folded bedding whereas dotted form lines indicate orientation of foliation (S1). This foliation is folded by small and large scale folds.

The following notes refer to areas indicated by circled numbers on the cross section:

1 This fault is the northeast limit of penetratively deformed Hyland Group. Rocks on the northeast side are tightly folded and thermally metamorphosed, but lack the sheared fabric present on the west side. Further northwest, the boundary of highly strained rocks is an indistinct strain gradient within the Hyland Group. The fault and strain gradient may be the northeastern edge of the Robert Service Thrust panel which underwent northwestward translation during Early Cretaceous time (Roots and Murphy, 1992a; D. Murphy, pers. comm., 1994). All granitic rocks in Lansing map area are post-tectonic.

2 Absence of Road River Group (Elmer Creek Formation; Cecile, in press) suggest pre-Middle Devonian uplift and erosion northeast of this fault, resulting in Earn Group deposition.

3 This steeply dipping fault extends from Fairweather Lake at least 35 km eastward and juxtaposes Hyland Group against Triassic strata. Displacement vectors are unknown but it could be a transpressional thrust.

4 Transcurrent displacement is interpreted on this fault because of its straight trace (aligned with topographic lows for 35 km northwest) and reversals in apparent vertical offset along it. Dextral translation of at least 16 km is implied by offset of the contact between Hyland Group and overlying units.

5 The South Plata Thrust (Roots and Brent, 1994b) and Plata Thrust (Abbott, 1986) juxtapose tectonically thinned, imbricated slices of maroon shale (Narchilla Formation) over Earn Group as well as Permian and Triassic strata in the footwall. Neither thrust can be traced westward and the resulting displacement must be accomodated along the northwest-trending shear faults. The large area to the west along strike and northwest of the Rogue River, shown here as underlain by Carboniferous and/or Permian strata and may be underlain by similar thrusts.

6 The Wilson Range differs from the rest of the map area in prevalence of southerly verging structures and common occurrence of overturned bedding.

7 Yuseyu grit and younger rocks are thrust over tightly folded and cleaved Narchilla and Gull Lake argillaceous rocks, and this footwall deformation extends 25 km to the northwest. The thin-skinned deformation style implied by the low-angle thrust (displacement unknown) suggest a basal detachment to most or all folds and thrusts within the map area. The depth to this detachment and the thickness of sediment beneath the detachment and above the crystalline basement is unknown.

FOSSIL DETERMINATIONS and AGE ASSIGNMENTS

from internal G.S.C. fossil reports, identified by: M.J. Orchard (MJO), B.S. Norford (BSN) and Fabrice Cordey (FC).

No.	GSC Loc.	Age	Ident. by	Faunal List	Location	UTM coordinates
1.	C-108166	Late Carnian, Late Triassic	MJO 1994-27	*Metapolygnathus* ex. gr. *nodosus* (Hayashi 1968)	63°36'10"N;131°59'20"W	9 351580E 7056145N
2.	C-302203	Early? Triassic	MJO 1995	*Neogondolella* sp., *Neospathodus?* sp.	63°44'42"N;132°37'00"W	8 617610E 7070600N
3.	C-302233	Permian-Triassic	MJO 1995	*Neogondolella* sp.	63°12'24"N;132°09'50"W	8 642610E 7011585N
4.	C-302160	Late Permian?	FC 1994-1	*Entactina* sp., ?*Follicucullis* sp., *Pseudoalbaillella*	63°00'12"N;132°25'54"W	8 630045E 6988372N
5.	C-300480	Leonardian?, Early Permian	MJO 1994-25	*Neogondolella* sp. cf. *N. idahoensis* (Youngquist, Hawley & Miller 1951)	63°35'03"N;132°04'52"W	8 644850E 7053800N
6.	C-301303	Leonardian, Early Permian	MJO 1994-25	*Neogondolella* sp. cf. *N. intermedia* (Igo 1981) *Sweetognathus* sp.	63°33'31"N;132°16'23"W	8 635450E 7050550N
7.	C-302219	Permian?	FC-1994-1	?*Latentifistula* sp., ?*Quadricaulis* sp., ?*Quinqueremis* sp.	63°39'46"N;132°23'45"W	8 628840E 7061760N
8.	C-301307	Visean-Serpukovian, Early Carboniferous	MJO 1995 1994-25	*Vogelgnathus* sp. cf. *V. campbelli* (Rexroad 1957) *Rhachistognathus?* sp.	63°39'10"N;132°25'32"W	8 627450E 7060700N
9.	C-302234	Tournaisian Early Carboniferous	MJO 1995	*Bispathodus* sp. *Pseudopolygnathus* sp. *Siphonodella* sp.	63°16'07"N;132°12'44"W	8 639875E 7018380N
10.	C-302239	Late Devonian-Early? Carboniferous	MJO 1995	*Rhachistognathus?*, *Bispathodus?* sp.	63°34'05"N;132°20'01"W	8 632400E 7051460N
11.	C-302214	Late Devonian?	FC-1995	*Astroentactina* sp., *Entactina* sp., *Tetraentactina barisphaera* (Foreman)	63°11'29"N;132°18'41"W	8 635260E 7009560N
12.	C-302204	Famennian Late Devonian	MJO 1995	*Palmatolepis glabra* (Ulrich & Bassler 1926) *Polygnathus* sp.	63°14'22"N;132°03'34"W	8 647682E 7015483N
13.	C-301309	Middle Famennian, Late Devonian	MJO 1994-25	*Palmatolepis glabra pectinata* (Ziegler 1962) *Palmatolepis marginifera* (Helms 1959) *Palmatolepis tenuipunctata* (Sannemann 1955)	63°42'57"N;132°17'43"W	8 633600E 7068000N
14.	C-302241	Middle Devonian	MJO 1995	*Polygnathus* sp. cf. *P. serotinus* (Telford, 1975)	63°55'45"N;132°55'57"W	8 601360E 7090590N
15.	C-302202	Early-Mid Devonian	MJO 1995	*Polygnathus serotinus* (Telford, 1975)	63°35'30"N;132°39'35"W	8 616120E 7053460N
16.	C-203018	Pragian, Early Devonian	D-3 BSN 1994	*Monograptus yukonensis* (Jackson and Lenz 1963)	63°39'35"N;132°01'30"W	8 647247E 7062326N
17.	C-302246	Emsian, Early	MJO 1995	*Icriodus* sp., *Polygnathus* sp. cf. *P. inversus* (Klapper & Johnson, 1975), *Pseudooneotodus* sp.	63°10'25"N;132°01'53"W	8 649435E 7008199N
18.	C-203020	Ashgill?, prob. Late Ordovician	O-8 BSN 1994	*Arachniograptus* sp., ?*Climacograptus* sp., *Dicellograptus* sp., *Orthograptus* sp.	63°28'10"N;132°11'30"W	8 639932E 7040766N
19.	C-302163	Silurian-Devonian	FC	Spumellarians, no *Latentifistula*	63°05'55"N;132°10'55"W	8 642230E 6999510N
20.	C-300496	Llanvirn-Caradoc, Ordovician	MJO 1994-25	*Belodella?* sp., *Drepanoistodus* sp., *Periodon* sp., *Eoplacognathus?* sp., *Protopanderodus* sp., *Spinodus* sp., *Walliserodus?* sp	63°30'52"N;132°28'20"W	8 625750E 7045200N
21.	C-300497	Llanvirn-Caradoc, Ordovician	MJO 1994-25	*Periodon* sp., *Protopanderodus* sp., *Pygodus* sp. cf. *P. serra* (Hadding 1913)	63°31'07"N;132°24'16"W	8 629100E 7045800N
22.	C-300498	Arenig-Caradoc, Ordovician	MJO 1994-25	*Periodon* sp.	63°30'53"N;132°23'56"W	8 629400E 7045375N
23.	C-300599	Ordovician	FC	?*Futobari* sp., *Inanguilla* sp.	63°47'08"N;132°19'51"W	8 631525E 7075686N
24.	C-302162	Ordovician	FC	*Futobari* sp., *Inanguilla* sp.	63°05'57"N;132°12'00"W	8 641452E 6999535N
25.	C-300494	Arenig, Early Ordovician	MJO 1994-25	*Drepanoistodus* sp., *Oepikodus?* sp., *Walliserodus* sp.	63°30'17"N;132°23'05"W	8 630150E 7044300N
26.	C-302240	Early Ordovician	MJO 1995	*Cordylodus?* sp., *Hirsutodontus?* sp., *Protopanderodus?* sp.	63°56'49"N;132°58'15"W	8 599425E 7092505N
27.	C-300173	Cambrian-Ordovician	MJO 1994-25	Proteonodont?	63°38'35"N;132°02'45"W	8 646300E 7060450N
28.	C-302237	Cambrian-Ordovician	MJO 1995	coniform elements	63°02'49"N;132°02'35"W	8 649501E 6994070N
29.	C-302210	?Late Cambrian	MJO 1995	coniform element	63°05'52"N;132°17'23"W	8 636795E 6999195N

REGIONAL SETTING

Lansing map area lies within the Selwyn Basin, a succession of Late Proterozoic to mid-Devonian deep water sandstone, limestone, shale and chert (Hyland Group, Gull Lake Formation and Road River Group). In eastern Lansing map area these strata are overlain by late Devonian turbiditic submarine fan complexes (Earn Group) and Early Carboniferous to Triassic shallow marine shelf clastic sediments (Tsichu Group and Mount Christie and Jones Lake formations).

Selwyn Basin was brought to a close by extensional or transtensional tectonism (indicated by pre-Middle Devonian structures in the Macmillan Pass (Abbott and Turner, 1990) and Nahanni (Gordey and Anderson, 1993) map areas. Erosion of uplifted regions was the source of clastic fans within the Earn Group, and some inferred pre-Earn faults are indicated on the cross-sections.

Early Cretaceous northeast-southwest contraction resulted in upright folding of upper Paleozoic strata, and both high- and low-angle thrusts within Proterozoic and lower Paleozoic rocks. Slaty cleavage pervades incompetent units such as the Narchilla and Gull Lake formations. Overturned strata and southwest-verging folds in the Wilson Range (south of Murray Creek; cross section D) suggest a fundamental, but as yet unrecognized, structural break that connects the Tombstone thrust (see Abbott, 1990) and the Hess Fault (Abbott and Turner, 1990). Late large scale northwestward movement of the Robert Service Thrust sheet probably imparted the northwesterly cleavage and recrystallization to footwall rocks in the southwestern corner of the eastern Lansing map area.

Granodiorite and quartz diorite stocks of the mid-Cretaceous Tombstone Intrusive suite are the only undeformed rocks in the map area.

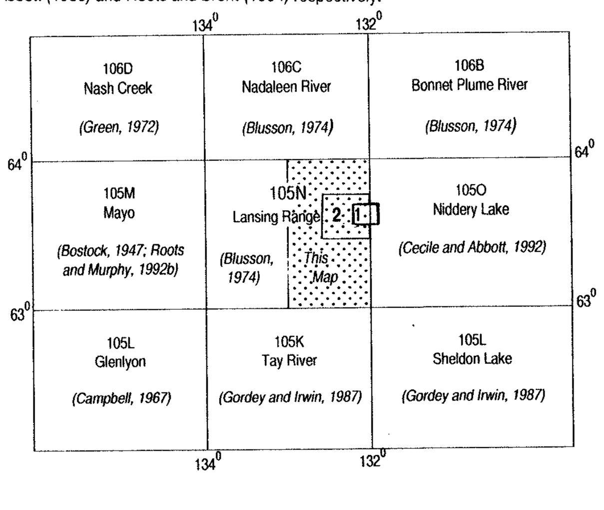
All sedimentary rocks are deformed and most units are equivalent to tectono-stratigraphic map units as described by Cecile and Abbott (1992; prefix 't'). A large region north and east of Lansing Pluton is underlain by undistinctive fine grained clastic rocks are here interpreted as Carboniferous-Permian based upon sparse localities with upper Paleozoic microfossils.

MINERAL OCCURRENCES from INAC (1992)

Minfile #	Name	Class	Major (minor) metals	status (last activity)
1	**Hugo**	unknown (general loc. only)	Pb, Ag	reported 1929
3	**Plata**	14 veins	Ag, Pb Au (Zn, Cu, Co)	mined 1976-85
4	**Rogue**	geochem anomaly	Zn (Fe)	sampled 1991 (Kennecott)
5	**Joy**	copper skarn	Cu in quartz vein	no remains of activity
6	**Golf**	skarn	Cu	sampled; no claims
7	**Etzel**	vein	Cu	unstaked
8	**Cartier**	vein	Cu (Pb, Zn, Ag)	unstaked
9	**Pebble**	unknown	Pb float	unstaked
10	**Dean**	vein (skarn?)	Pb in shears	unstaked
11	**Aureole**	vein	Cu	unstaked
12	**Bloom**	vein	Cu, Mo, Pb	unstaked
16	**Andrea**	stratiform	Ba	Prism Resources, 1981
17	**Flatasa (Aho)**	silt anomaly	Ag, Pb	staked 1992
18	**Strip**	land protection	none	former campsite
19	**Dog**	veins	Ba	noted in 1984 (GSC)
20	**Jagowerite**	vein	Ba	Noranda checked Au nearby
u1	unnamed	stratiform	Ba	Abbott, 1986
u2	**Caribou, Flower, Red (D'or Aztec)**		Zn, Ag geochem anomalies	staked 1992
u3	unnamed	stratiform	Ba	Roots and Brent, 1993

(u1, u2 and u3 are new occurrences, submitted to DIAND for next Minfile).

INDEX to GEOLOGICAL MAPS of surrounding areas. Insets 1, 2 are by *Abbott (1986)* and *Roots and Brent (1994)* respectively.



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Indian and Northern Affairs Canada
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Yukon Region

Natural Resources Canada
Geological Survey of Canada
Cordilleran Division

Open File 1995-7 (G)

Open File 3171

Bedrock Geology of Lansing Range map area (105N) east half, Hess Mountains, Yukon

by

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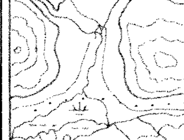
[3] Calgary, Alberta
[4] Vancouver, British Columbia

Copies of this map and **Yukon Minfile** may be purchased from Geoscience Information and Sales, Exploration and Geological Services Division, Indian and Northern Affairs Canada, Room 102, 300 Main St., Whitehorse Yukon, Y1A 2B5. Tel.. (403) 667-3204.



CONTOUR INTERVAL 100 METRES
Elevations in Metres above mean sea level

North American Datum 1927
Transverse Mercator Projection

Topographic base: 1986 (Edition 2)
Surveys and Mapping Branch, Geomatics Canada
Natural Resources Canada

LANSING RANGE (East Half)

YUKON TERRITORY TERRITOIRE DU YUKON

Scale 1:125 000

Miles 5 0 5
Kilometres 5 0 5 10

Contour Interval: 100 METRES (328 feet)

The 1986 MAGNETIC BEARING is 32°14' East of North. Annual change: DECREASING 16.1'.

Information on names for geographic features on this map is welcomed by the Yukon Board of Geographic Names, Heritage Branch, Department of Tourism, Yukon Government