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~~BITUMINOUS RECONNAISSANCE~~ PROGRAM - 1983

CHILCOTIN PROSPECT

H.E. Hopkins

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BRITISH COLUMBIA

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CHILCOTIN PROSPECT

Harold E. Hopkins
April 30, 1984

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ABSTRACT

Early in 1983, the Tyaughton Trough was identified as a prime target area for grassroots coal exploration. The Tyaughton Trough is a little known, large Jurassic-Cretaceous depostional basin occurring in central to southern B.C. The objective of the Chilcotin reconnaissance was to locate the sedimentary sequence which represents the transition between the marine and terrestrial environments and which, ideally, would hold the greatest potential for coal accumulation in the Tyaughton Trough depositional system.

The cursory field work and subsequent reports done by the G.S.C indicated that the Jackass Mountain Group would most likely contain this marine/terrestrial transition. The main body of the Jackass Mountain Group underlies an area 140 kilometers long and 30 kilometers wide and exhibits a thickness of 4.8 kilometers of vertical section. The G.S.C. reports were not specific in pinpointing the transition zone either stratigraphically or geographically.

During June and July of 1983, an attempt was made to build a stratigraphic column of the entire 4.8 kilometers of Jackass Mountain section. The purpose of this was twofold. Firstly, the sedimentary structures and lithologies would indicate the zones within the section that favor coal development. Secondly, varying lithological characteristics recorded could be used as reference points when tracking the geographic locations of the zones of interest.

A stratigraphic column of the upper three-quarters of the formation was completed. This upper portion of the Jackass Mountain Group was essentially barren of any sedimentary features which would give any clue to it's depositional history and indicates a low coal-bearing potential. This lithological column, however, did help in establishing the stratigraphic relationship of two outcrops which contained numerous plant fragments and very thin coal stringers. At the conclusion of this program, it was established that these two outcrops represent a very small portion of the lowest quarter of the formation which to date, is essentially 1220 meters of unstudied section.

A 4 to 6 week reconnaissance program is recommended to further assess the coal-bearing potential of the Jackass Mountain Group and Kingsvale Group.

INTRODUCTION

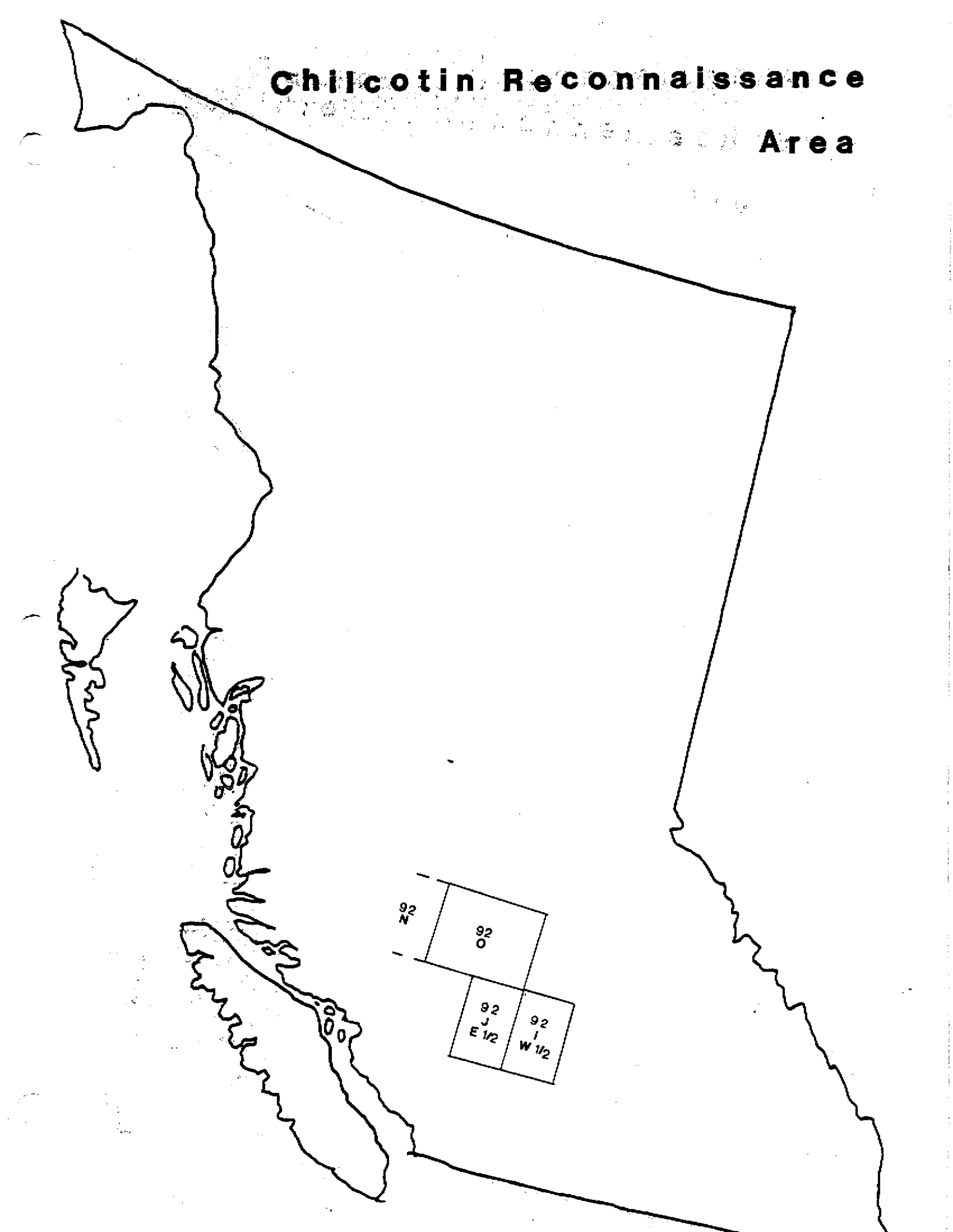
On the southwest edge of the intermontane belt of British Columbia there exists the remnants of a depositional system which was active for 90 million years. These sedimentary rocks range in age from Mid-Jurassic to Lower Cretaceous and form a 10 kilometer thick sequence. The coal potential of this basin has never been investigated and, therefore, never been realized. Furthermore, the age inferred that any existing coal could fall within a high rank. The basin is severely deformed by complex faulting and is located directly west of the Hat Creek Coalfield. The factors which made this area attractive were, short distance to tidewater, potential for higher rank coals and potential for fault induced coal accumulations similar to Hat Creek.

The Jackass Mountain Group was the primary formation target and the Kingsvale Group was the secondary target which would be investigated if time permitted.

Figure 1 shows the general area of the Chilcotin Reconnaissance.

This report discusses the regional geology and stratigraphy of the Tyaughton Trough and reports the results of the 1983 reconnaissance; recommendations for further work are included.

Chilcotin Reconnaissance Area



THE REGIONAL GEOLOGY

The Chilcotin area lies on the western boundary of the Intermontane Belt of British Columbia. The sedimentary sequences are bounded to the west by the coastal intrusions and to the east by the Central British Columbia Plateau Lavas. Table 1 shows the stages of the Mesozoic Era used in this report. Figure 2 shows the regional distribution of plutonic, volcanic, sedimentary and metamorphic rock units. Table 2 is a condensed table of formations encountered in the four map sheets which were investigated during 1983.

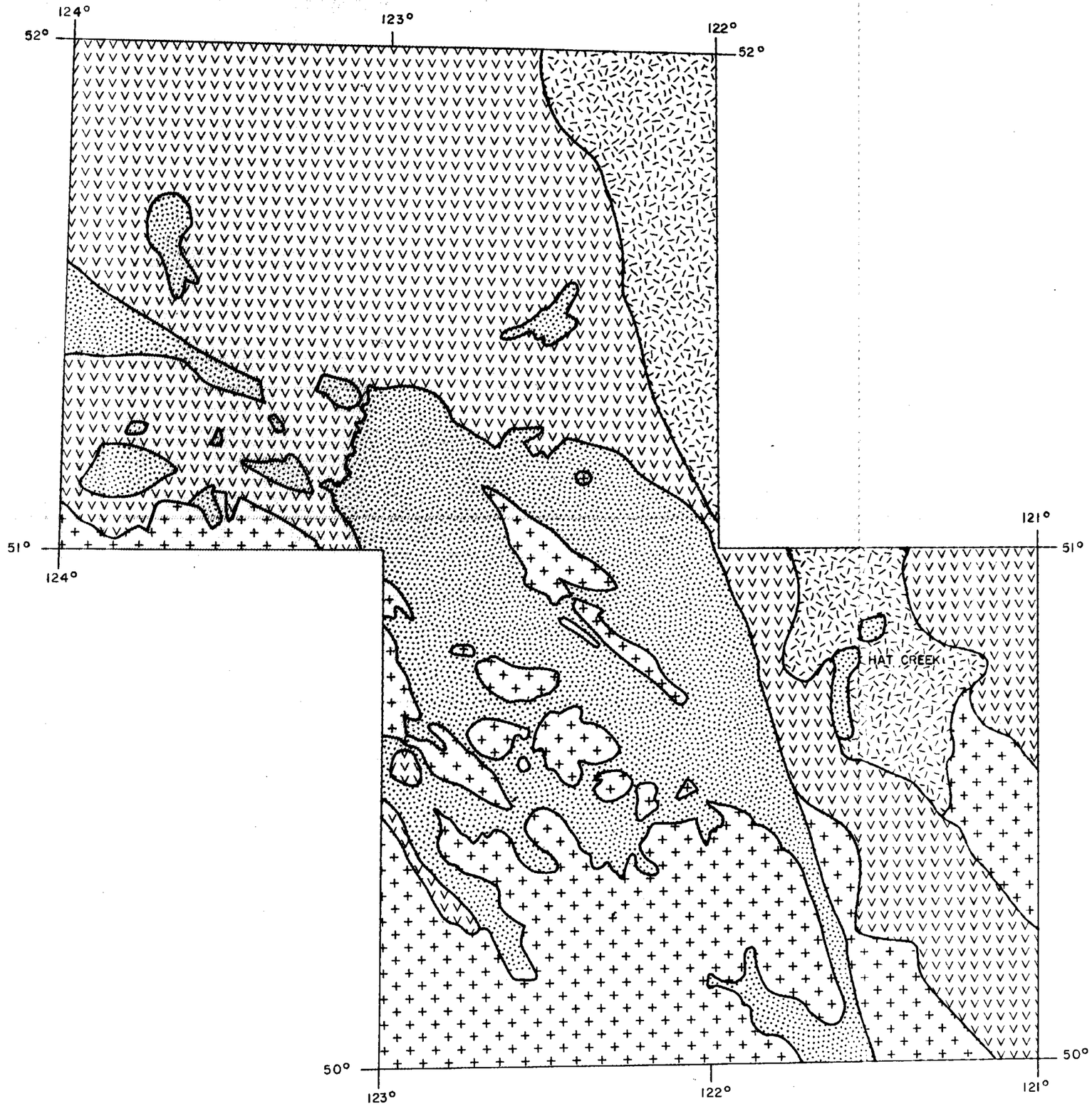
SEDIMENTARY GEOLOGY

Prior to the development of the Tyaughton Trough, three basic periods of sedimentation occurred in the geologic history of the area. The Permian Cache Creek Group, which includes the Marble Canyon Limestone, outcrops west of the Fraser River in N.T.S. map sheet 92 I E 1/2. Clastic deposition occurred during the Triassic with these unnamed rock units occurring east of Mount Waddington in 92 N E 1/2 and along the Fraser River in 92 I E 1/2. The Mid-Jurassic marked the initial development of the Tyaughton Trough. This depositional system remained active for approximately 90 million years.

The Tyaughton Trough is represented in the rock record by the Relay Mountain Group, the Taylor Creek Group and the Jackass Mountain Group. The Relay Mountain Group is a marine sequence deposited between Upper Jurassic (Oxfordian Stage 160 m.y.) and Lower Cretaceous (Barremian Stage 117 m.y.). Faulted portions of this sequence outcrop with great frequency in N.T.S. map sheets 92 I, 92 O, 92 N and vary in total thickness from 1006 meters (3300 feet) to over 2743 meters (9000 feet). During the Lower Cretaceous (Aptian Stage 112 m.y.) this sequence was uplifted causing the Tyaughton Trough to shift eastward with resumed deposition produced the 1524 meter (5000 feet) to 3048 meter (10,000 feet) thick section of marine beds called the Taylor Creek Group and 4877 meter (16,000 feet) thick section of the non-marine Jackass Mountain Group. Figure 3 shows the relationships between these three geological groups. The subsequent faulting which has deformed the Tyaughton

Table I Stages of the Mesozoic Era as used in the report.

CRETACEOUS	Upper	Senonian: Maestrichtian, Campanian, Santonian, Coniacian Turonian Cenomanian
	Lower	Albian Aptian Barremian Hauterivian Valanginian Berriasian
JURASSIC	Upper	Upper Tithonian Portlandian Kimmeridgian Oxfordian
	Middle	Callovian Bathonian Bajocian
	Lower	Toarcian Pliensbachian Sinemurian Hettangian
TRIASSIC	Upper	Rhaetian Norian Karnian
	Middle	Ladinian Anisian
	Lower	Spathian Smithian Dienerian Griesbachian



LEGEND

- SEDIMENTARY UNITS
- PLUTONIC UNITS
- VOLCANIC UNITS
- METAMORPHIC UNITS

0 10 20 km

DRAWN BY: HAL HOPKINS	ESSO RESOURCES CANADA LIMITED OIL SANDS, COAL AND MINERALS DEPARTMENT
CHECKED BY:	COAL DIVISION
DATE: APRIL, 1984	CHILCOTIN PROSPECT 1983
FILE NO.: 92-I-J-O-N	DISTRIBUTION OF ROCK TYPES
DRAWING NO.: 1	FIGURE 2

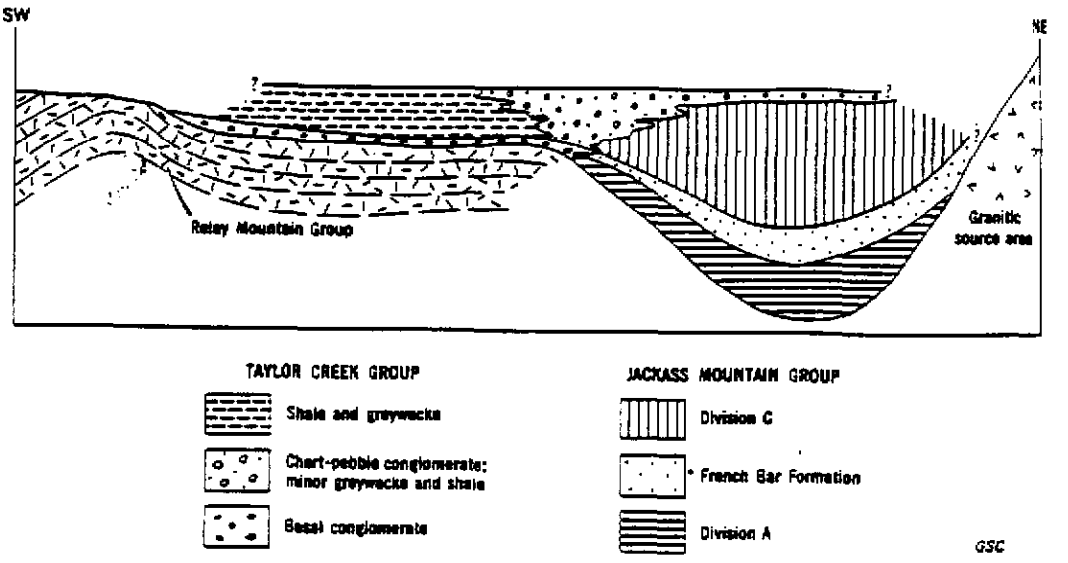


Figure 3 Diagrammatic section showing relationship of Taylor Group to Jackass Mountain Group.

TABLE 3

NTS MAP SHEET	THICKNESS OF RELAY MOUNTAIN GROUP	THICKNESS OF THE TAYLOR MOUNTAIN GROUP	THICKNESS OF THE JACKASS MOUNTAIN GROUP
92 N	2254 m (7396')	914+m (3000+')	2073+m (6800+')
92 O	2743+m (9000+')	3231+m (10,600+')	4877+m (16,000+')
92 J	2743+m (9000+')	1219+m (4000')	1448+m (4750+')
92 I	Not Present	Not Present	2743+m (9000+')

Trough is reflected in the incomplete sections measured by the G.S.C. Table 3 compares the measured thicknesses of these three groups throughout the search area. The Kingsvale Group is one of the most predominant coal bearing units in south central British Columbia. Activity within the Tyaughton trough ceased just prior to the sedimentation marked by Division A of the Kingsvale Group.

PLUTONIC ACTIVITY

At least five distinct periods of plutonic activity occurred in the search area, with time equivalents not being fully understood. Ultrabasic and basic plutons developed on the west flank of the Tyaughton Trough between Late Triassic to Mid-Jurassic. The Guichon Creek Batholith intruded to the southeast during Mid-Jurassic. The suggestion that these events contributed

ERA	PERIOD	92 N	92 O	92 J	92 I	
	Miocene or Younger	Unnamed		Unnamed	Unnamed	Vesicular basalt, andesite, rhyolite, with related breccia and tuff.
	Oligocene or Older	Unnamed		Unnamed	Kamloops Gp	Andesite, dacite with related breccia and tuff.
	Paleocene			Unnamed	Coldwater Beds (Kamloops Gp.)	Sandstone, shale, siltstone and conglomerate.
	U. Cret.	Coastal Intrusives		Scuzzy Pluton	Coastal Intrusives	Quart diorite, granodiorite diorite, albite syenite, and hornblendite.
	U. Cret.		Division D			Andesitic and basaltic tuffs and breccias.
			Division C			Volcanic conglomerates, greywacke, conglomerate and shale.
		Division B	Division B		Division B	Andesite, Basalt with related agglomerate, breccia and tuff.
		Division A	Division A	Division A	Division A	Siltstone, greywacke, arkose, shale and conglomerate.
	L. Cret.				Spences Bridge Gp.	Andesite, dacite, basalt and ryolite with related breccias and tuffs; sandstone and conglomerate.
	L. Cret.	Taylor Creek Gp.	Taylor Creek Gp.	Taylor Creek Gp.		Shale, banded limey shale, siltstone, greywacke, chert pebble conglomerate.
	L. Cret.	Jackass Mountain Gp.	Jackass Mountain Gp.	Jackass Mountain Gp.	Jackass Mountain Gp.	Greywacke, argillite, arkose, and conglomerate.
	M. Jur. To L. Cret.	Relay Mountain Gp.	Relay Mountain Gp.	Relay Mountain Gp.	Relay Mountain Gp.	Shale, siltstone, mudstone, greywacke, conglomerate minor minor volcanics, minor limestones.
	L. Cret.				Coast Intrusions West of Fraser R.	Granodiorite
	L. Cret.				Lillooet Gp.	Argillite, volcanic conglomerate tuffaceous sandstone, conglomerate.
	L. Cret.				Brew Gp.	Argillite, quartzite, conglomerate.
	U. Jur.				Mount Lytton Batholith	Granodiorite, quartz diorite and gabbro.
	M. Jur.			Unnamed	Unnamed	Shale, conglomerate, siltstone and sandstone.
	L. Jur.				Guichon Creek Batholith	Granite, granodiorite, diorite
	U. Triassic				Nicola Gp.	Basalt, andesite, limestone, sandstone, schist and gneiss.
	U. Triassic				Unnamed	Ultrabasic Rocks
	U. Triassic	Unnamed		Hurley Fm. Pioneer Fm. Noel Fm.	Unnamed	Shale, greywacke, siltstone, conglomerate, limestone, greenstone, tuffs, breccia schist and gneiss.
	M. Triassic			Bridge River		Argillite, phyllite, greenstone
	Palaezoic				Unnamed	Phyllite, quartzite, limestone slate, schist and gneiss.
	Permian				Cache Creek Gp.	Greenstone, argillite, minor limestone and quartzite shist (Marble canyon limestone).
		(Tipper, 1968)	(Jeletzky and Tipper, 1967)	(Roddick and Hutchison, 1973)	(Duffell and McTaggart, 1952)	

to the initial development of the Tyaughton Trough is purely speculative, though the timing seems appropriate. The Scuzzy Pluton complex with its associated stocks intruded the Jackass Mountain Group during Upper Cretaceous. A smaller syenodiorite complex developed on the southwestern flank of the Tyaughton Trough early in the Tertiary.

VOLCANIC ACTIVITY

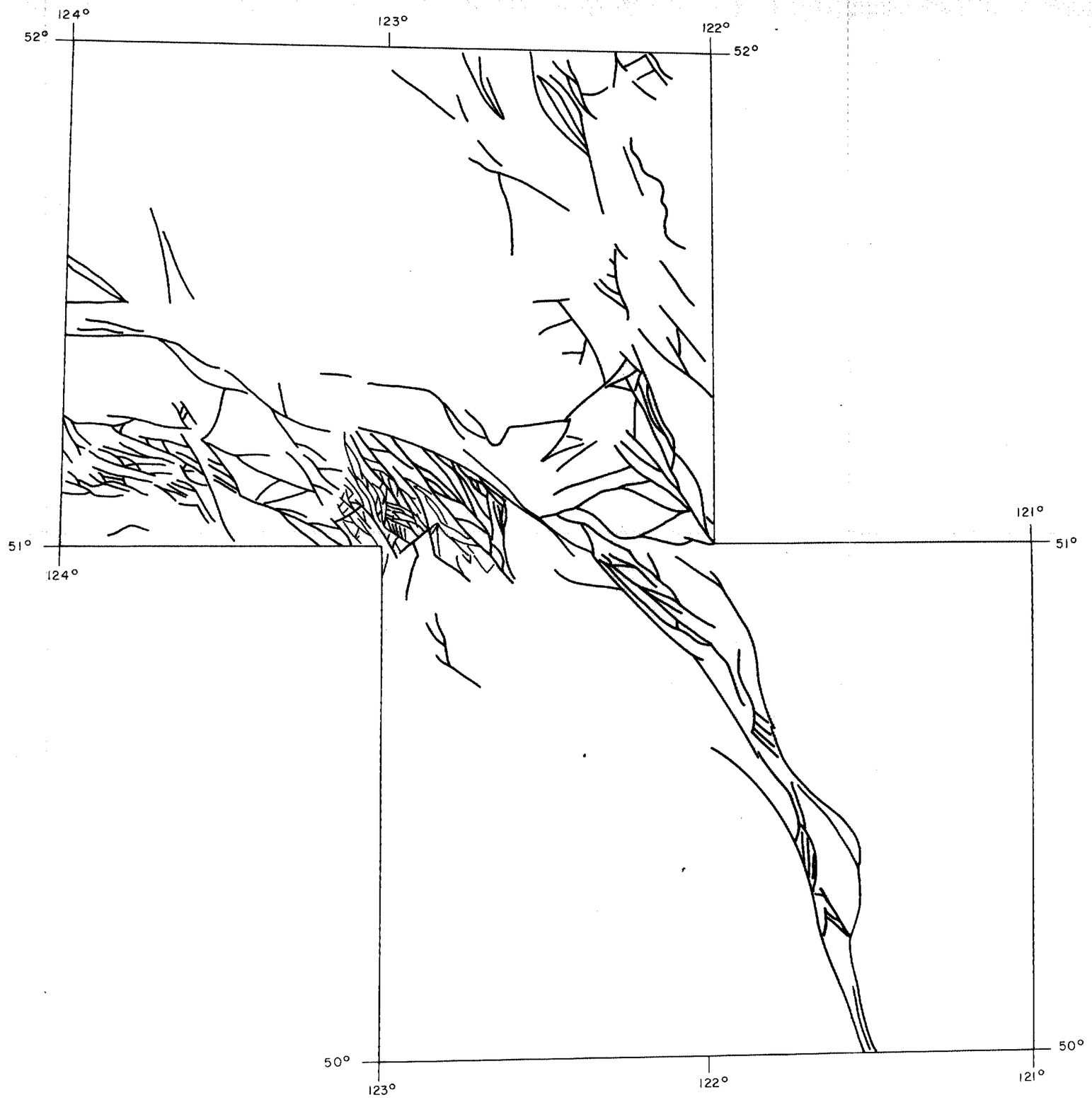
A total of six volcanic events occurred during the Mesozoic and Cenozoic Eras. The Pioneer Formation, Bridge River Group and Lilloet Group were extruded to the west, while the Nicola Group was extruded to the east, all prior to the development of the Tyaughton Trough. Non-marine sedimentation of the Kingvale Group along with widespread volcanism marked the end of the Tyaughton Trough as a depositional basin during the Upper Cretaceous. During the Tertiary, the central Intermontane Belt was covered by plateau lavas.

METAMORPHISM

The rocks which are older than Mid-Jurassic display varying grades of metamorphism. The general trend seems to indicate that the rank of metamorphism decreases with distance from the coastal intrusions. The Triassic sequences which lie east of the Fraser River fall within the greenstone facies. Northwest of the Tyaughton Trough, the Triassic clastics become phylites and schists. To the southwest, towards the central part of the coast mountains, the grade of metamorphism increases and the rocks are garnetiferous schist and gneiss.

STRUCTURAL GEOLOGY

The Tyaughton Trough is situated on the boundary between the Crystalline Belt and the Intermontane Belt. As a result, this area was subjected to long and continuous periods of severe tectonic activity.



LEGEND

FAULT (UNDIFFERENTIATED)

0 10 20 km

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An outstanding structural feature of the search area is the multitude of closely spaced faults. Figure 4 illustrates the complex fault system within the Chilcotin Reconnaissance Area. Three types of faulting are included in this fault complex.

Long, straight to gently curved, right lateral transcurrent faults are the dominant fault style in this area. These northwesterly trending faults are presumed to dip steeply to the southwest. The Yalakom, Tchaikazan, and Fraser Faults appear to form a rough boundary of the highly disturbed zone. The largest transcurrent fault, the Yalakom, has a known length of more than 225 kilometers (140 miles) and some suggest it could have an actual length in excess of 402 kilometers (250 miles). Although the length of these faults is considerable, the brecciated zones are quite narrow, seldom exceeding 100 meters.

Relay Mountain Group lithologies (the youngest rocks are 124 million years old) are displaced by 190 kilometers while Kingsvale rocks (90 million years old) have been displaced by less than 30 kilometers. The time of movement is not known precisely but these lithological displacements indicate that the transcurrent faults were active during the depositional period marked by the Tyaughton Trough. Field evidence indicates movement on these faults ceased before the outpouring of the Tertiary plateau lavas.

Just south of the main body of the Jackass Mountain Group, is a fault swarm predominantly composed of thin (1 to 2 kilometers wide) north to northwest trending thrust sheets. These thrusts have variable southwesterly dips ranging from 10° to 60°. The timing of this thrusting is unknown but field evidence indicates that more than one period of thrusting has occurred. For instance, in some areas Tertiary volcanics are cut by thrust faults while in other areas Tertiary volcanics overlay this style of fault. Also, all the thrust faults are truncated by the bounding transcurrent faults. This indicates that thrusting started prior to or during the time of transcurrent movement. The largest fault of this style is the Hungry Valley Fault which forms the northeast boundary of the main body of the Jackass Mountain Group.

Normal faults recognized in several parts of the search area, are late structural features. They are generally distinguished by their northeasterly to easterly trends. These normal faults are nearly vertical and cut the thrust faults. Their relationship with the transcurrent faults cannot be established from the available data.

No regional fold pattern has been recognized in the search area. The main body of the Jackass Mountain Group features broad open folds with warped fold axis. Any fold pattern which did exist has since been confused and masked by the numerous faulting events which took place during or after the folding episode.

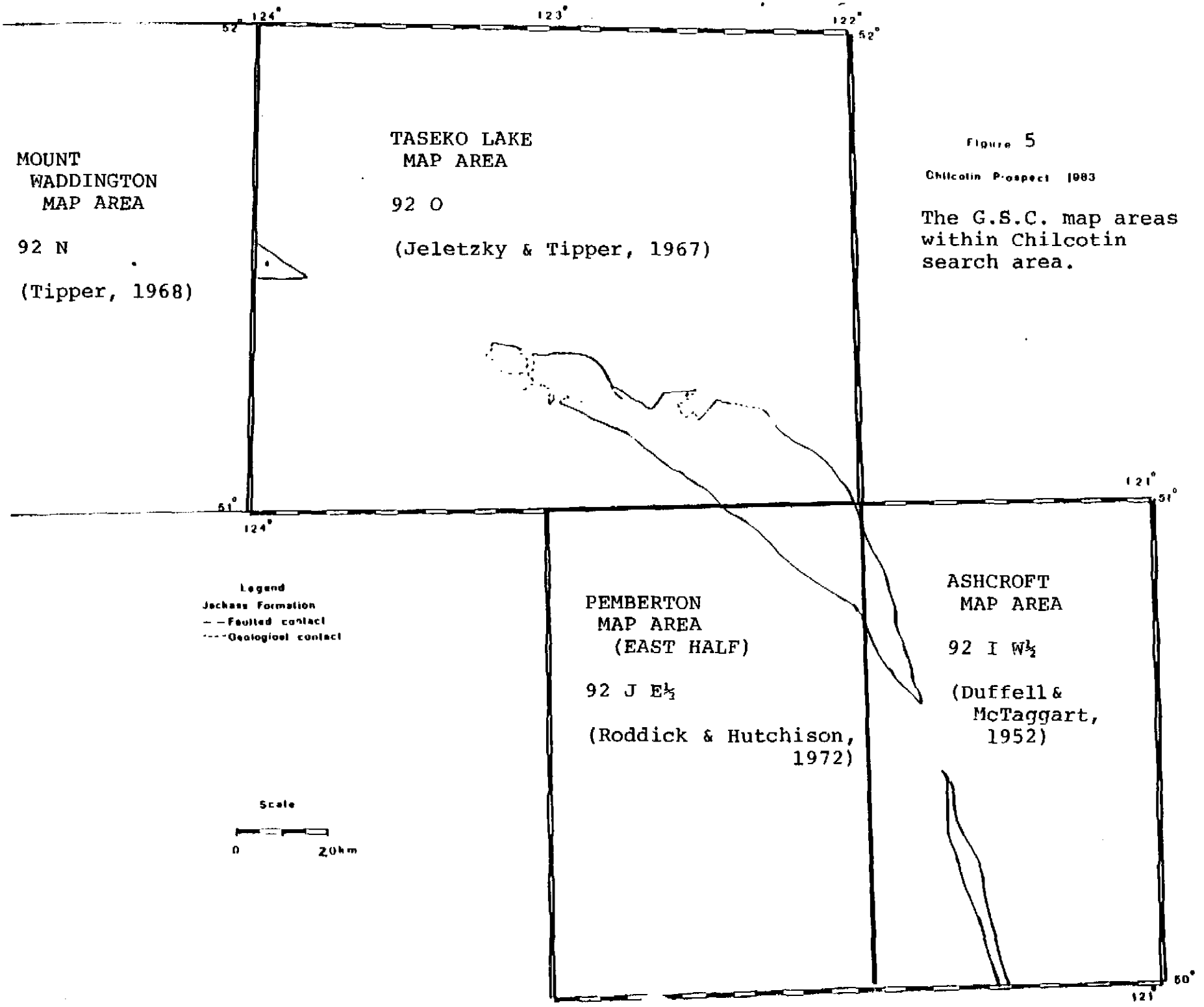


Figure 5

Chilcotin Prospect 1983

The G.S.C. map areas within Chilcotin search area.

THE JACKASS MOUNTAIN GROUP

The cursory field work and subsequent reports done by the G.S.C. indicated that the Jackass Mountain Group would most likely contain the sedimentary sequence which represents the transition between marine and terrestrial environments. This transitional sequence would ideally hold the greatest potential for coal accumulation in the Tyaughton Trough Depositional System.

Figure 5 shows the four different G.S.C. map areas covered by the Jackass Mountain Group.

NOMENCLATURE

Over the years, the Jackass Mountain Group has been studied by at least four different authors. Unfortunately these investigations were always map-area studies intended to gain a geological understanding of a region as opposed to understanding a geological system such as the Tyaughton Trough Depositional Basin. Also, these studies were all very limited in duration and were also limited by various means and amounts of transportation. No attempt has been made, thus far, to correlate and streamline the various criteria and basic assumptions used by the different authors to define the Jackass Mountain Group.

ASHCROFT MAP-AREA (92I WEST HALF)

Duffell and McTaggart (1952) mapped the Ashcroft Map-Area (92IE 1/2) and described the type section of the Jackass Mountain Group. They divided the group into three divisions. Their descriptions of Division A, B and C are listed below.

"The lowest known part of Division A consists largely of non-marine arkose, conglomerate and shale rich in carbonaceous matter, and is at least 400 feet thick. The arkose is a buff, coarse-grained, highly felspathic rock, in places seamed by 1/2 inch layers of bright coal.

The upper part is composed mainly of massive, fine-grained greywacke, with some coarse greywacke, argillite and congolomerate. A complete section was not found, but this upper part is at least 1800 feet thick (Duffell & McTaggart, 1952). The upper portion is thought to be of marine origin.

The strata of Division B is composed of 75% granite boulder conglomerate, 23% greywacke and 2% argillite. "Interstratified argillite beds of Division B which contain marine fossils were evidently laid down in marine waters. These beds, however, may have been deposited during temporary incursions of the sea, and most of the division (P. 47)...", as indicated by the size and roundness of the boulders, was deposited by running water, namely a series of subaerial fans. The conglomerate boulders range from 1 in. to 18 in. in diameter and are composed of leucocratic, quartz rich granitic rocks. Cut-and-fill structures are rare. The greywacke is massive and bedding structures are rare (P. 41) (Duffell and McTaggart, 1952)."

Division C "consists largely of greywacke, thinly interbedded greywacke and argillite, conglomerate and argillite . Massive greywacke, forming 60 to 70% of the division, occurs in beds averaging 60 feet in thickness that are continuous along strike for great distances. Sections composed of alternating laminae of fine grained greywacke and argillite, averaging about 1.5 inches in thickness often form varve-like laminae. The greywacke grades upward into argillite (page 41)." Division C yielded 12 marine fossil locations. "The local presence of coarse conglomerate and intraformational breccia suggests deposition in fairly shallow water, perhaps near shore. Beds rich in carbonaceous matter are, apparently either freshwater or near shore marine deposits (p. 48). The top of the division is not exposed, but a minimum of 5,000 feet of strata is represented. (p. 41) (Duffell and McTaggart, 1952)."

TASEKO LAKES MAP-AREA (92O)

Jeletzky and Tipper (1967) described the Jackass Mountain Group underlying the Taseko Lakes map-area (92O) and because different sets of lithologies were encountered, they modified the criteria for Divisions A, B and C.

They concluded that Division A did not outcrop in their area, rather "a non-marine section, composed predominately of greywacke which underlies division B (P. 44)." This unit is thought to represent a non-marine facies of the marine upper section of Division A described by Duffell and McTaggart (1952). "This unit is mainly interbedded light greenish grey to grey greywacke, buff-coloured greywacke, pebble conglomerate and soft dark grey siltstone and shale. Carbonareous plant fragments are abundant (p. 44)." This part of the section is over 4000 feet thick (Jeletzky and Tipper, 1967).

"In Taseko Lakes map-area, Divisions B and C were recognized and showed little variation from" Duffell and McTaggart's description. One important deviation, however, is that there were no indications of any marine interventions (Jeletzky and Tipper, 1967).

MOUNT WADDINGTON MAP-AREA (92N)

Tipper (1968) encountered the northern most remanents of the Jackass Mountain Group while mapping the Mount Waddington map-area (92N)." The Jackass Mountain Group is distinguished by its massive, resistant greywacke beds that stand out as ridges and cliffs (p.65)." Tipper, however, does not venture to say to which division he would correlate this sequence. Of the 6,700 foot section he measured, 1,400 feet of section contained abundant plant fragments. From the available information it appears that this section could belong to either Division A or C. Tipper concluded that "...the bulk of the beds are believed to be non-marine, however, there are apparently marine beds within the section (p. 62)".

PEMBERTON MAP-AREA (92J)

The lithologies encountered in the Pemberton map-area (92J East Half) by Roddick and Hutchison (1972) were sufficiently different from the previously mapped areas to dictate redefining the Jackass Mountain Group. They divided the group into the Coaly Clastic Unit, Variegated Clastic Unit, Grey Siltstone - Shale Unit and Massive Greywacke Unit.

The Coaly Clastic Unit is practically identical to the lowest portion of Division A as described by Duffell & McTaggart (1952). This unit is considered to be completely non-marine and is considerably thicker than the type section.

The Variegated Clastic Unit "consists mainly of a regular alternation of thick beds of siltstone and shale, with arenaceous rocks. Minor beds of coarser clastic rocks are intercalated at irregular intervals. The middle and lower parts of the unit contain marine fossils but no diagnostic forms were found (p. 7). The Variegated Clastic Unit appears to be in part, a marine facies of the predominately conglomeratic, non-marine Division B of the Ascroft and Taseko Lakes map-areas (Duffell and McTaggart, 1952, and Jeletzky and Tipper, 1967). The unit includes, however, some beds that are equivalent to the marine upper part of Division A in Ashcroft, map-area (Duffell and McTaggart, 1952), judging by the presence of Barremian fossils in both units.

The Grey Siltstone-Shale Unit "consists of thinly bedded intercalated siltstone and shale. The rock is made up of 1 inch to 4 inch thick beds of very fine, light grey siliceous greywacke interbedded with siltstone and shale so as to give the rock a strikingly banded appearance. The unit is at least 1,713 feet and may be more than 2000 feet thick (P. 7) . No unit lithologically similar to the grey siltstone-shale unit was recorded in the Jackass Mountain Group in Ashcroft map-area (Duffell and McTaggart, 1952)" or Taseko Lake map-area (Jeletzky & Tipper, 1967). "But it may represent an offshore facies of the lower part of Division C (P. 8) (Roddick & Hutchison, 1972)."

"The massive greywacke unit consists mainly of greenish grey greywacke, grit, pebble conglomerate and minor sandy mudstone. About 4,750 feet of the unit was measured, but both the lower and upper contacts are faults, therefore, its total thickness is greater (p. 8). The massive greywacke unit seems to be a rapidly deposited, probably entirely marine unit owing to the absence of plant remains or coaly particles and the presence of rare marine fossils (P. 9) (Roddick & Hutchison, 1972)."

AGE DISCREPANCIES

Confusion over classifying and defining the Jackass Mountain Group does not end with lithologies and depositional environment but extends into the actual age of the unit.

Duffell and McTaggart (1952) have concluded from marine fossil collections, that both Divisions A and B are Barremian in age. The age of the overlying Division C is not as straight forward. Mollusc and ammonite fragments indicate a Hauterivian age, while intact ferns and conifers indicate an Aptian age. One can conclude that the Aptian and Barremian ages are in error and that the Hauterivian age is correct or that the Havtervian shell fragments are actually retransported clastic debris deposited during the Aptian or that the stratigraphic relationships have been miscorrelated. The second alternative seems the most likely solution, therefore, the Hauterivian age date can be discounted.

Based on non-marine ferns and conifers, Jeletzky and Tipper (1967), concluded that Division B and the section below Division B are Aptian to mid-Albian in age. Even though Division C is unfossiliferous, it is thought to be older than upper Albian, due to its stratigraphic relationship.

Tipper (1968) concluded that "the age of (this portion of) the group is probably late middle to late Albian as it conformably overlies the Taylor Creek Group containing middle Albian fauna (P. 65)".

The Jackass Mountain Group underlying the Pemberton Map-Area appears to span a much greater age range than the other three map-areas. The lowest unit, the Coaly Clatic Unit, contains no diagnostic fossils but due to stratigraphic relationships it is probably Hauterivian in age. Barremian marine fossils where found at the base and midway up section of the Variegated Clastic Unit, while the top of the section yielded Aptian marine fossils. Late lower Albian marine fossils were found midway up the grey siltstone-shale unit. Albian marine fossils were found at the base of the massive greywacke unit, therefore, this was given a middle to late Albian time designation.

SUMMARY

Table 4 summaries the various age ranges of the Jackass Mountain Group within the four map-areas. The above discussions imply that the criteria used to define the group, both lithological and geological time, are nonrigid. Two ambiguities arise from the above sited discrepancies. The break between marine (Taylor Creek Group) and non-marine (Jackass Mountain group) sequences is inconsistant. Portions of the Jackass Mountain Group could be included, by some authors, within the Taylor Creek Group. This is truely unfortunate because the zone of interest for the 1983 program included the transition between marine and terrestrial environments. As seen in Table 4, time discrepancies indicate that the stratigraphic position of the lower contact of the Jackass Mountain Group arbitrarily changes from one map-area to the next. Again zones of interest, in some map-areas, may have been misclassified and as a result included within an adjacent unit. This may well be the case in the Mount Waddington Map-Area, as demonstrated in Table 4, where Hauterivian age Relay Mountain Group sediments contain abundant plant fragments and carbonaceous material.

STAGE	M.A. AGE	ASHCROFT 92I (DUFFELL AND MCTAGGART, 1952)	PEMERTON 92J (RODDICK AND HUTCHISON, 1972)	TASEKO LAKE (JELETSKY AND TIPPER, 1967)	MOUNT WADDINGTON (TIPPER, 1968)
	100				
-BIAN		DIVISION C	MASSIVE GREYWACKE UNIT	DIVISION C	DIVISION C(?)
	106		GREY		
PTIAN		DIVISION B DIVISION A	SILTSTONE-SHALE UNIT VARIEGATED	DIVISION B DIVISION A	
	112				
ARREMIAN			UNIT		
	118				
AUTERIVIAN			COALY CLASTIC UNIT		RELAY MOUNTAIN GROUP (CARBONACEOUS ZONE)
	125				
ALANGINIAN					
	130				
ERRIASIAN					
	141				

TABLE 4 AGE DISTRIBUTION WITHIN THE JACKASS MOUNTAIN GROUP

PRE-FIELD HYPOTHESES

Regardless of the conflicting criteria cited above, it was evident that Division C held moderate to high coal potential while the section below the conglomerate, regardless of the differences, exhibited a very high coal potential. This means that five sixths of the total section should be investigated for coal potential. It was also concluded, because of the vast area of the Taseko Lake map-area underlain by the Jackass Mountain Group, (approximately 4,500 Km^2) that the concentration of work should be centered in this area. The Taseko Lake Geological map outlines the area underlain by the Jackass Mountain Group but does not sub-divide the area into its perspective divisions.

The recommended approach was to build a stratigraphic column of the entire 4.5 kilometers of section, the purpose of this is threefold. First the sedimentary structures and lithologies would indicate the zones within the section that favor coal accumulation. Second, various lithological characteristics recorded could be used as marker beds which would facilitate regional correlations. All this information should be applied to build a geologic map of the Jackass Mountain Group which will aid in tracking the geographic locations of the zones of interest.

RECONNAISSANCE APPROACH

The Chilcotin search area is characterized by steep-sloped, forested mountains divided by v-shaped valleys. The area is penetrated by rare, very poor quality road access. The vastness of the area coupled with the lack of road access deemed a dependance upon helicopter mobilization. The distance from the closest helicopter base (200 to 320 kilometers, one way) plus budgetary restraints made a fly-camp exploration program the most practical approach.

By using fly camps three to four hours of helicopter time would be used per week to ferry the crew as opposed to daily drop-offs which would cost 3 to 4 hours per day. Cost aside, this ferry time would have severely decreased the amount of productive work done per day. By staying in one camp for a week it

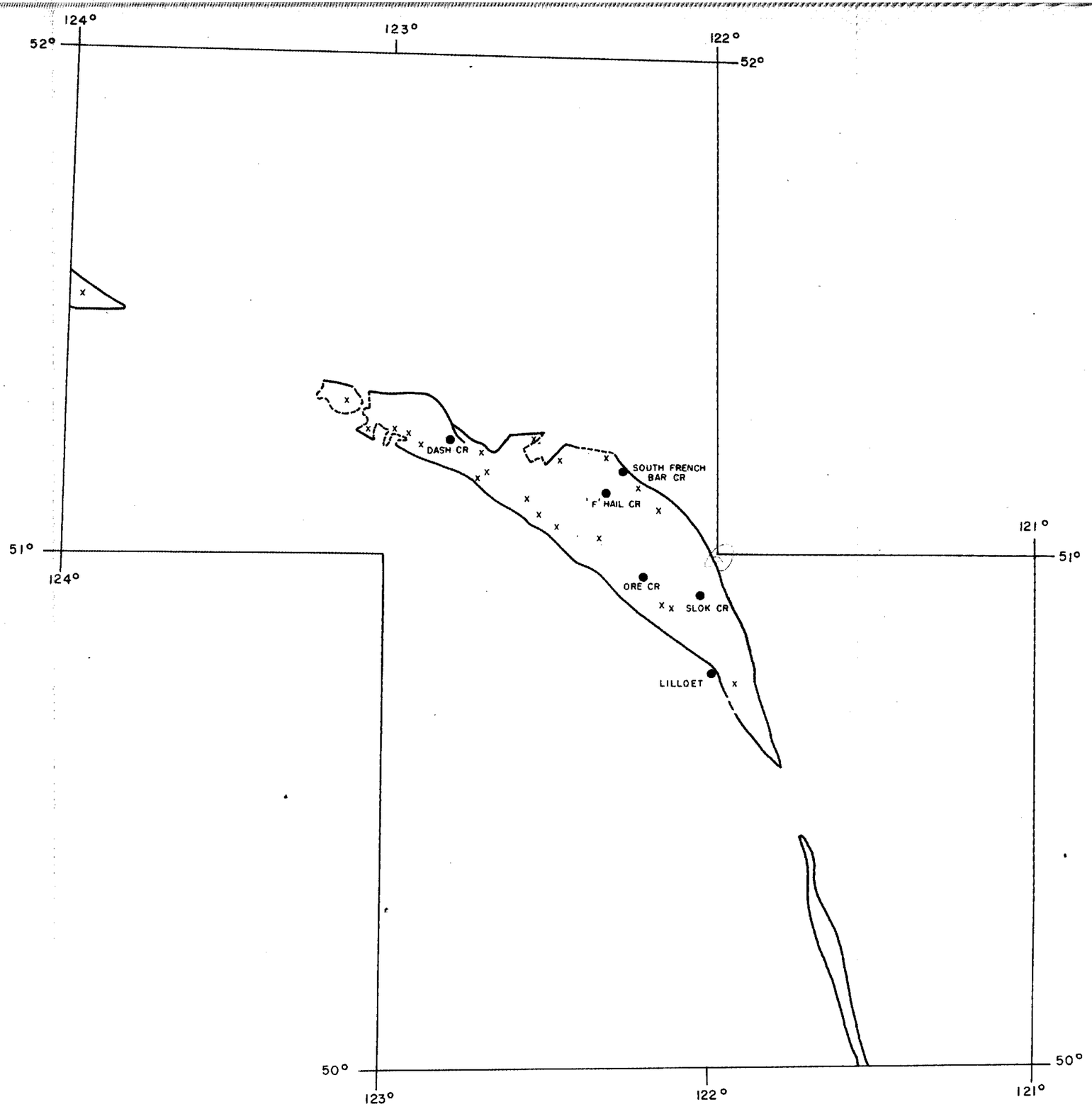
enabled the crew to concentrate a day or two on recording detailed stratigraphic columns along with the regular surface mapping. The clues which aid in understanding depositional environments and clues to assigning coal potential are very subtle, therefore, this high degree of scrutiny was warranted.

This fly camp approach resulted in concentrated areas of highly detailed information separated by large gaps with no information (Figure 6). This problem was alleviated as the program progressed. After a comprehensive stratigraphic column was built and marker beds and divisons were recognized, spot outcrops were investigated and identified by helicopter hopping, thus filling the gaps void of information.

RECONNAISSANCE RESULTS

A total of 1,750 meters of section was measured during June and July of 1983. These stratigraphic sections along with regular field mapping data yielded a detailed understanding of areas in the immediate vicinity of the camp locations. These endeavors allowed for the assessment of the coal potential of the upper three quarters of the Jackass Formation. Also, from this data, mappable units were identified and this knowledge was applied, with the aid of a helicopter to build a geological map of main body of the Jackass Mountain Group.

One primary objective of this program was to construct a geological map which represents the geographical distribution of the various divisions which make up the Jackass Mountain Group. By applying the division thicknesses obtained during the program with the outcrop locations and orientations, general division boundaries were extrapolated. The resulting map (See Figure 8) shows the general surface traces of the contacts between the various divisions. This process, however, was severely hampered by the lack of structural orientations encountered during the program. For this reason, G.S.C. orientations have been combined with those obtained during 1983.



LEGEND

JACKASS FORMATION

——— FAULTED CONTACT

----- GEOLOGICAL CONTACT

● CAMP LOCATIONS

× HELICOPTER RECON LOCATIONS

0 10 20 km

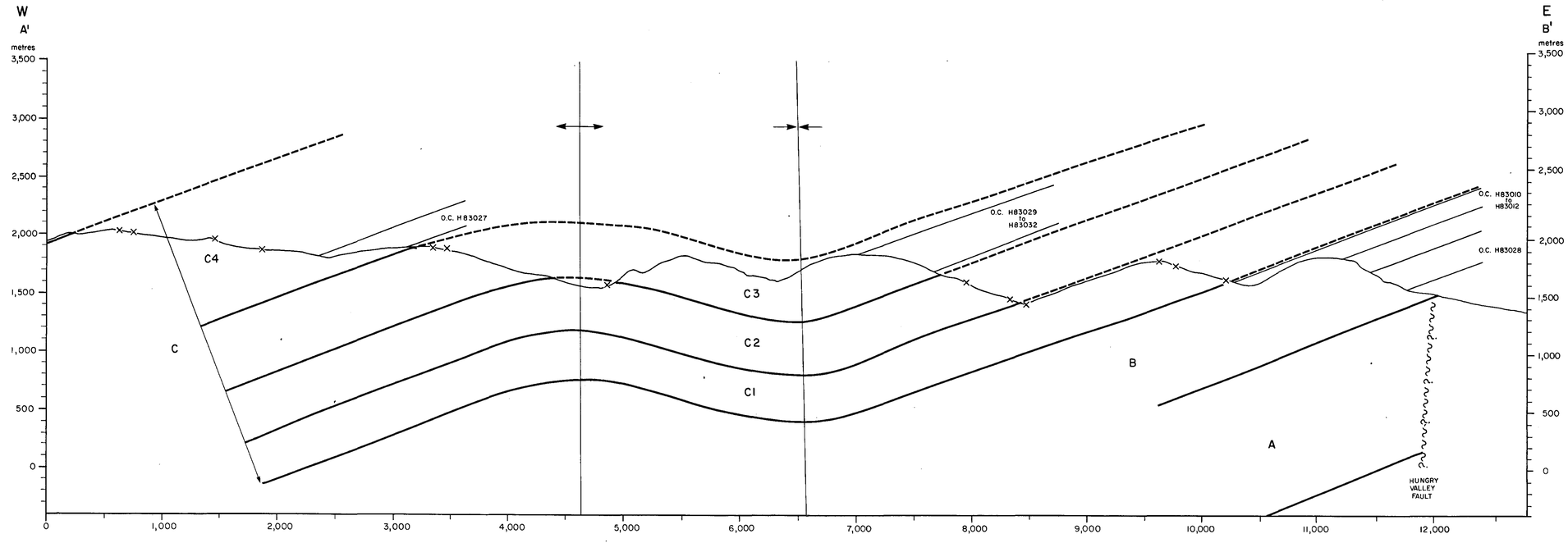
DRAWN BY: HAL HOPKINS	ESSO RESOURCES CANADA LIMITED OIL SANDS, COAL AND MINERALS DEPARTMENT COAL DIVISION
CHECKED BY:	CHILCOTIN PROSPECT 1983 TARGET AREA WITH CAMP LOCATIONS
DATE: APRIL, 1984	
FILE NO.: 92-I-J-O-N	
DRAWING NO.: 3	FIGURE 6

This geological map is an imperative tool in identifying the geographical locations of the stratigraphic zones of interest.

These fly camp activities also yielded a 30m thick section (o/c H83014) which indicated a very high coal potential. Unfortunately this outcrop was located at the junction of three faults and its stratigraphic position could not be established until the detailed stratigraphic column was complete.

Figure 7 shows the cross section of area in the vicinity of the South French Bar and "F" Hail Creek camps. This area in particular was regarded as an ideal place to gain an indepth understanding of the stratigraphic divisions of the Jackass Mountain Group. This is a section of a long, narrow fault block flanked by two normal(?) faults and the regional strike within the block is perpendicular to the fault trends. Strikes near the fault zones tend to bend and align with the faults, therefore, a transcurrent component to these faults is implied. To check the lateral consistancy of the unit, camp locations other than South French Bar and "F" Hail creek, were established to study and evaluate laterally equivalent sections to those shown in Figure 7. This was done in an attempt to establish if zones of high coal potential existed along strike to barren zones.

The following is a systematic breakdown of the data gathered during the 1983 reconnaissance program.



LEGEND

- GEOLOGICAL CONTACT
- FAULT
- ANTICLINE
- SYNCLINE
- × OUTCROP LOCATIONS

LITHOLOGICAL UNITS

- C4 INTERBEDDED SILTSTONE AND VERY FINE GRAIN SANDSTONE
- C3 MASSIVE MEDIUM GRAINED ARKOSIC SANDSTONE
- C2 INTERBEDDED SILTSTONE AND VERY FINE GRAINED SANDSTONE
- C1 MASSIVE MEDIUM GRAINED SANDSTONE
- B GRANITE BOULDER CONGLOMERATE
- A INTERBEDDED CARBY SANDSTONE, CARBY SILTSTONE AND SHALE WITH ABUNDANT PLANT FRAGMENTS AND COAL STRINGERS

NOTE: SEE FIGURE 8, FOR CROSS SECTION LOCATION

0 500 1000 metres

EXAGGERATION 1X

00797 (1)

DRAWN BY: HAL HOPKINS

RECORD BY:

DATE: APRIL, 1984

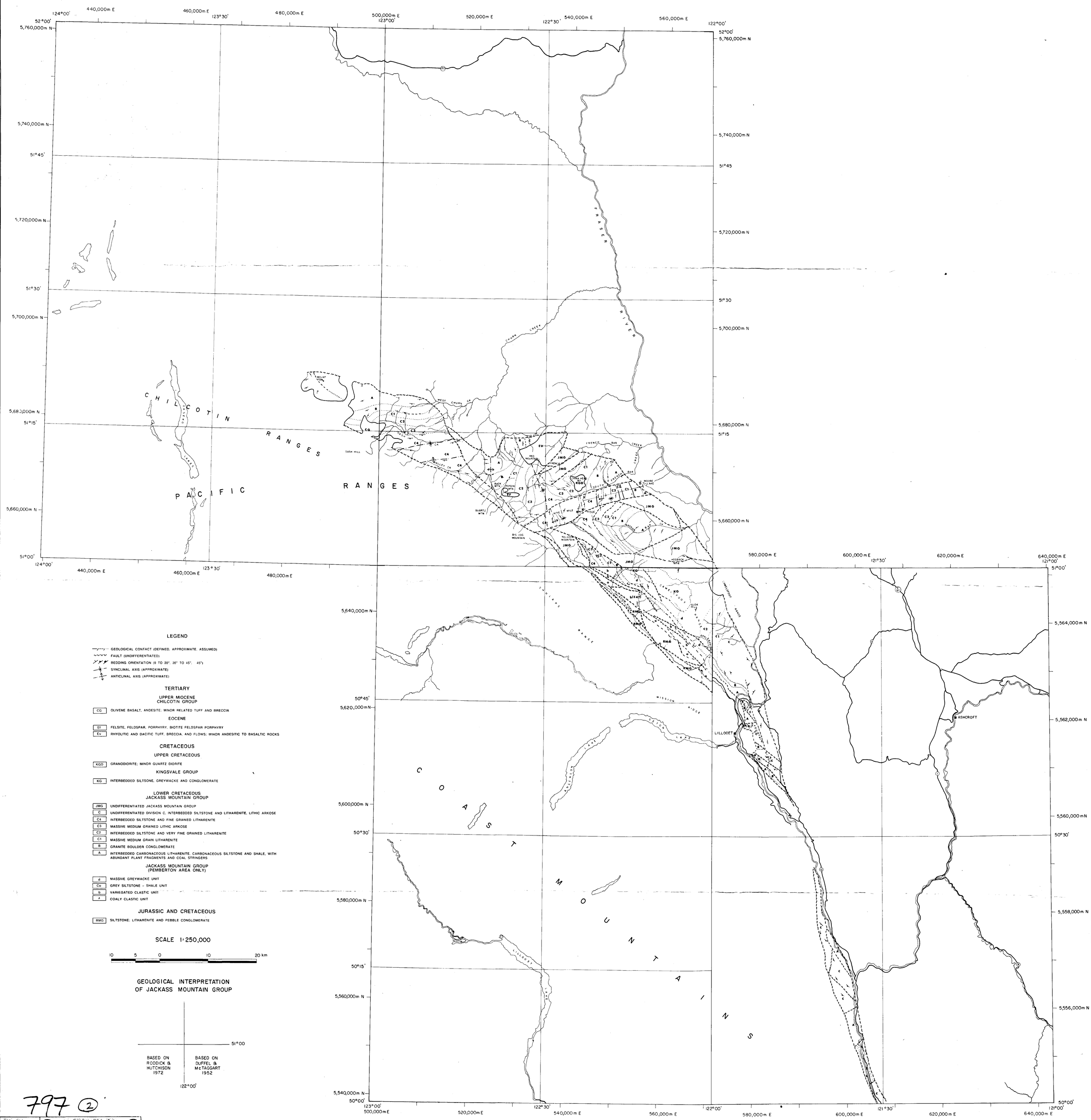
FILE NO.: 1921-JON

DRAWING NO.: 4

ESSO RESOURCES CANADA LIMITED
OIL SANDS, COAL AND MINERALS DEPARTMENT
COAL DIVISION

CHILCOTIN PROSPECT 1983
CROSS SECTION THROUGH THE JACKASS MOUNTAIN GROUP

FIGURE 7



LEGEND

GEOLOGICAL CONTACT (DEFINED, APPROXIMATE, ASSUMED)
FAULT (UNDIFFERENTIATED)
BEDDING ORIENTATION (0 TO 20°, 20° TO 45°, 45°)
SYNCLINAL AXIS (APPROXIMATE)
ANTICLINAL AXIS (APPROXIMATE)

TERTIARY

UPPER MIOCENE
CHILCOTIN GROUP

CG — OLIVENE BASALT, ANDESITE; MINOR RELATED TUFF AND BRECCIA

EOCENE

Ef — FELSITE, FELDSPAR, PORPHYRY, BIOTITE FELDSPAR PORPHYRY
Ev — RHYOLITIC AND DACITIC TUFF, BRECCIA, AND FLOWS; MINOR ANDESITIC TO BASALTIC ROCKS

CRETACEOUS

UPPER CRETACEOUS

KGD — GRANODIORITE; MINOR QUARTZ DIORITE

KINGSVALE GROUP

KG — INTERBEDDED SILTSONE, GREYWACKE AND CONGLOMERATE

LOWER CRETACEOUS
JACKASS MOUNTAIN GROUP

JMG — UNDIFFERENTIATED JACKASS MOUNTAIN GROUP
C — UNDIFFERENTIATED DIVISION C. INTERBEDDED SILTSTONE AND LITHARENITE, LITHIC ARKOSE
C4 — INTERBEDDED SILTSTONE AND FINE GRAINED LITHARENITE
C3 — MASSIVE MEDIUM GRAINED LITHIC ARKOSE
C2 — INTERBEDDED SILTSTONE AND VERY FINE GRAINED LITHARENITE
C1 — MASSIVE MEDIUM GRAIN LITHARENITE
B — GRANITE BOULDER CONGLOMERATE
A — INTERBEDDED CARBONACEOUS LITHARENITE, CARBONACEOUS SILTSTONE AND SHALE, WITH ABUNDANT PLANT FRAGMENTS AND COAL STRINGERS

JACKASS MOUNTAIN GROUP
(PEMBERTON AREA ONLY)

d — MASSIVE GREYWACKE UNIT
Co — GREY SILTSTONE – SHALE UNIT
b — VARIEGATED CLASTIC UNIT
a — COALY CLASTIC UNIT

JURASSIC AND CRETACEOUS

RMG — SILTSTONE; LITHARENITE AND PEBBLE CONGLOMERATE

SCALE 1:250,000

10 5 0 10 20 km

GEOLOGICAL INTERPRETATION
OF JACKASS MOUNTAIN GROUP

51°00

BASED ON RODDICK & HUTCHISON 1972

BASED ON DUFFEL & McTAGGART 1952

122°00'

797 (2)

HAL HOPKINS

ESSO RESOURCES CANADA LIMITED
COAL DIVISION

CHILCOTIN PROSPECT 1983

GEOLOGY OF THE MAIN BODY
OF THE JACKASS MOUNTAIN GROUP

FIGURE 8

DATE: APRIL, 1984
FILE NO.: 192-1-J-0-M
DRAWING NO.: 5A

(3) 797

HAL HOPKINS	Esso RESOURCES CANADA LIMITED COAL DIVISION Esso
DATE: APRIL, 1984	CHILCOTIN PROSPECT 1983 STRATIGRAPHIC SECTION LOCATION MAP
DRAWING NO.: 92-IJ-ON	FIGURE 9
SHEET NO.: 6	

DIVISION A

This unit is described by Jeletzky & Tipper (1967) as the "sedimentary rocks underlying Division B (P. , 44)". Mapped outcrops of the units were characterized by alternating beds of fine to medium grained carbonaceous litharenite and beds of interlaminated very fine grained carbonaceous litharenite, dark carbonaceous siltstone and carbonaceous shale. Large (up to 6 cm) pieces of carbonaceous wood and high concentrations of plant fragments occur in abundance throughout the section investigated. This unit was seen twice during the program; once on the bank of South French Bar Creek and also along both banks of Dash Creek. The Dash Creek occurrance was located at the end of the program, through regional extrapolations using the data collected during 1983 and was a practical exercise intended to test the assumptions used to compile the final geological map. Figure 8 shows the areas which are thought to be underlain by Division A of the Jackass Mountain Group. No thickness can be assigned to this unit through the collected data, therefore, Jeletzky and Tipper's (1967) thickness of 4000' should be assumed for the time being.

A stratigraphic section was recorded for the South French Bar outcrop but due to snow covered intervals and treacherous footing at Dash Creek, a detailed section could not be measured. Several very thin coal stringers and seams were exposed along Dash Creek.

DIVISION B

Duffell and McTaggart (1952) and Jeletzky and Tipper (1967) described Division B as a thick succession of massive beds of granitic boulder conglomerate. The data collected during this program confirmed their findings. Approximately 90% of the boulder clasts are composed of leucocratic granite and range from 10 cm to 70 cm in diameter. The remaining 10% of the clasts are composed of andesitic and dacite volcanic rocks, chert, siltstone, and sandstone. The granitic boulders are usually well rounded and semi-spherical while the non-granitic clasts are very well rounded and spherical. The matrix is medium to

coarse grained litharenite which is poorly sorted and angular. This conglomerate, which is matrix supported, is moderately consolidated as the clasts have a higher relief than the matrix. This unit is poorly stratified, but in places lenticular beds up to 35 meters thick of pebble conglomerate and litharenite are present. These litharenite beds are usually 1 to 2 meters thick and are quite similar in composition to the conglomerate matrix.

Division B was found to be a good mapable unit which generally stands out as long, broad rugged ridges. Division B was located on Mount Tom, on the northern slope of Red Mountain, northwest of Buck Mountain and northeast of the eastern end of Nine-Mile Ridge. It is approximately 800 meters thick, judging from data collected during the 1983 program. Stratigraphic Section o/c H83028 (see Appendix I) represents a 250 m thick portion of this unit.

Roddick and Hutchison (1972) could not locate this conglomeratic unit within their map-area, but did suggest that the "Variegated Clastic Unit" was a marine equivalent of the conglomeratic Division B. Stratigraphic Sections o/c H035-39, o/c H83041-42, o/c H83043 represent this Variegated Clastic Unit. In outcrop, this unit is suspiciously similar to Division C, namely C2 and C4. The Jackass Mountain Group represented in the Pemberton map-area is completely composed of fault bounded sections and no stratigraphic unit contacts are present. For this reason the stratigraphic relationships described by Roddick and Hutchison are speculative and the confidence of these relationships are questionable.

DIVISION C

Jeletzky and Tipper (1967) described Division C as a 10,000 foot thick sequence of interbedded green greywacke, brown greywacke, arkose, siltstone, shale and pebble conglomerate. During 1983 Division C was the subject of an indepth investigation designed to evaluate its coal potential. During this time it became evident that this division was composed of four zones which could be utilized as mapable units. These units are described below.

Division C1

This unit is composed of a thick sequence of dark green siliceous litharenite. It is very well consolidated and is characterized by its very siliceous nature. The clasts are very fine to fine grained, angular and well sorted. This unit is completely massive and exhibits no visible bedding planes or sedimentary structures except in the lowest 50 meters which is composed of moderately (50 cm to 90 cm thick) bedded, medium grained litharenite.

This unit was found to be a moderately good marker bed which usually outcropped as long, low vertical cliffs associated with large blocky step talus fields. Division C1 was located along the Slok Creek Valley, along the ridge immediately west of Roderick Creek and at the eastern end of Nine-Mile Ridge. This unit is thought to be approximately 400 meters thick. Due to its monotonous nature, no stratigraphic sections were recorded for this unit.

Division C2

This unit is composed almost entirely of interbedded siltstone and fine grained litharenite with minor thin beds of feldspathic litharenite. This unit is moderately consolidated but recessive, usually only outcropped along stream cuts. The siltstone is usually medium green in color, while the sandstone is usually light brown. This unit is characterized by its very thinnly bedded (1.0-2.0 cm thick) nature and banded appearance. The bedding planes are exclusively planar with occassional layers of rip-up clasts, rare soft-sediment folding and convolute bedding. No plant fragments were observed.

This unit was found to be a poor marker unit due to its recessive nature and also because of its similarity to Division C4. Areas underlain by this unit are characterized by soft contoured, gently sloping hills and also by the absence of outcrop. Division C2, however, did outcrop along the headwaters of Slok Creek, near the east end of Nine-Mile Ridge and along west bank of Roderick Creek. Through extrapolations, the thickness of this unit is estimated to be approximately 450 meters. The extreme amount of covered

intervals prohibited the recording of any stratigraphic sections for this unit. However, all the rock float and talus material encountered was thoroughly studied in an effort to detect any possible coal environment indicators.

As implied earlier, sections identified as the marine equivalent of Division B could possible belong to this unit.

Division C3

This unit is composed of very thickly bedded medium to coarse grained lithic arkose and sub-arkose. This green coarse clastic rock has a much higher feldspar content than the rest of the Jackass Mountain Group. The feldspar clasts most likely originate from the same source area as the leucocratic boulder clasts found in the conglomeratic Division B. These lithologies are moderately resistant and are usually poorly sorted and angular. The unit is poorly stratified with abundant gradational contacts occasional visible bedding planes, occasional soft-sediment folding, rare convolute bedding, rare pebble bands, very rare flame structures and bioturbation traces. No plant fragments were observed. The rounded slab type fragments of this unit made a very distinctive noise when walked on, in fact, it was identical to the sound produced when two cinder blocks are rubbed together. This rather unusual characteristic became very useful when correlating this unit.

This unit was found to be an excellent marker unit due to its unique nature and high feldspar content. Division C3 was found to outcrop in the region between Roderick Creek and Mosquito Creek, along the eastern third of Nine-Mile Creek, east of Yalakom Mountain, and south of the central region of Nine-Mile Ridge. This unit often formed rounded, long, broad, talus covered ridges. Small Late Cretaceous diorite plugs were found intruded within the unit, but this was not a useful correlation tool. Due to its unique nature it was necessary to record only one stratigraphic section of this unit (o/c 83029-32). The unit is approximately 500 meters thick.

Division C4

Of all the units of the Jackass Mountain Group, Division C4 was found to outcrop most frequently. This is only natural sinse it is the upper most (youngest) unit. This unit is a continuous sequence of interbedded dark grey siltstone and green fine grained litharenite. It is well consolidated, siliceous, moderately resistant and therefore, has a tendancy to remain exposed a lot more often than the similar unit, Division C2. Like Division C2, this unit is characterized by its very thinly bedded (1.0-3.0 cm thick) nature and banded appearance. This unit exhibits sharp planar bedding, occasional convoluted beds and localized zones of plant fragment concentrations. Unlike Division C2, occasional thick beds of massive, medium grained light brown arkose occur within this unit. These beds were very useful in distinguishing this unit from Division C2.

This division was found to be a very good marker unit, however, its usefulness was lessened considerably due to its very thick nature. Rocks from this division outcropped west of Mosquito Creek, along the central portion of Nine-Mile Ridge, east of Yalakom Mountain, at western end of Nine-Mile Ridge, east of Poison Mountain, and south of Nine-Mile Ridge. This unit was found to occur as long, low cliffs on the flanks of ridges and along stream cuts. Due to the presence of plant fragments, this unit was thoroughly investigated.

As mentioned earlier, it is possible that the sections identified as the marine equivalent of the conglomeratic Division B could possibly belong to this unit.

KINGSVALE GROUP

The coal potential of the Kingsvale Group was briefly investigated late in the season when excess contract helicopter time became available at the end of the Iskut Program. The Kingsvale Group was identified as a high priority target prior to the Chilcotin program and was to be explored if time permitted.

During September 7th & 8th of 1983, two areas underlain by the Kingsvale Group were flown and outcrops were checked on a random basis. The area south of Fish Lake is underlain by a folded sequence of interbedded pebble conglomerate and carbonaceous siltstone, while the area west of Taseko Lake yielded a thick section of interbedded sub-litharenite, claystone and siltstone. The second outcrop location yielded abundant examples of flazer bedding, convolute laminations, crossbedding and soft-sediment folding. Occasional plant fragments were found in the talus but this zone was not located in outcrop.

DEPOSITIONAL ENVIRONMENTS

All the G.S.C. authors agree that the Jackass Mountain Group represents a major non-marine sequence with only minor incursions of marine sedimentation. This is supported by the extreme lack of marine fossil evidence and the abundance of plant fragment debris which occurs throughout the entire sequence. No author, however, has ventured to suggest specifically what terrestrial environments were involved in this non-marine sedimentation. The homogeneous nature of the lithologies involved has contributed greatly to this lack of speculation with respect to depositional origin.

In general, the lithologies of the Jackass Mountain Group can be expressed in terms of energy of deposition, which in turn imply the degree of relief. Deposition occurred from the east with the restricted sea situated immediately west of Jackass Mountain Group and is represented in the stratigraphic record by the Taylor Creek Group.

Of the six units and sub-units of the Jackass Mountain Group studied during 1983, only Division A, C1 and C4 showed any significant sedimentary features, but even these units failed to yield any diagnostic primary sedimentary structure. Evidence such as planar cross bedding, trough cross-bedding, channel scours and bioturbation traces were conspicuously absent. The only structures which can be used to traced the depositional environment of these units are interlaminated siltstone and very fine sandstone, rare rip-up clasts, occasional plant fragments, rare convolute bedding and very rare soft sediment folding. The interlaminated units, Division C1 and C4 represent times when the depositional energy was low, the paled relief was very gentle and the sediment source area was very distant. Also, these units lack any of the heterogenous lithological components which usually occur within non-marine environments. Scour zone, channel cuts, point bar sequences along with the associated primary structures are all absent. A paralic environment could possibly have erased any diagnostic structures. These units could quite possibly represent an environment which oscillated between a sheltered coastal bay environment and a brackish lacustrine environment. The depositional environment of Division A cannot be pinpointed simply because of the lack of data.

The coarse clastics of Division B, along with its cyclic nature indicates that this unit represents a proximal alluvial fan series. This unit indicates that an abrupt change in relief, probably a fault induced high to the east, caused this coarse clastic dumping.

Division C2 and C3 failed to yield any sedimentary structure at all. The homogenous nature of these units has masked all sedimentary features including all bedding planes. The very siliceous nature of Division C2, which is probably the result of a post sedimentary event, has obliterated any internal features which may have existed. The lack of stratification and homogenous nature of these units indicate a constant and rapid rate of deposition. A moderate relief and moderate distance from the source area are also indicated by the clast angularity, poor sorting and size.

As the results indicate, the depositional environment of Division A is important to delinate. Further field work will be needed to do this.

POST-FIELD CONCLUSION

The 1983 Chilcotin was not successful in locating new coal locations, however, it was successful in establishing the stratigraphic zone within the Tyaughton Trough which shows indications of having a high coal potential. The small portion of Division A investigated during 1983 showed all the indications of belonging to major coal measure sequence. The presence of thin coal seams along Dash Creek is an especially positive indication of the high coal potential of this division.

The data collected during 1983 yielded sufficient information to build a rough geological map of the Jackass Mountain Group which can be utilized to locate the areas underlain by Division A.

This program also established that the coal potential of Division C, on the whole, was low. The presence of localized plant fragment concentrations within Division C indicated the possible exsistence of small localized coal seams along stike, but these would probably be very limited in nature and very difficult to locate.

The results of the Kingsvale Group investigation were somewhat inconclusive. However, the presence of plant fragments implies a potential of coal accumulation.

RECOMMENDATIONS

A 4 to 6 week mapping program utilizing one crew is highly recommended for the 1984 field season. The purpose of this exercise would be to test the reliablity of the geology map and in turn thoroughly investigate Division A for any economic coal occurrences. This program would complete the Jackass Mountain Group investigation which would have been concluded during 1983, if the crew had not been diverted mid-season. The scope of this 1984 program should also be increased to include an investigation of the Kingsvale Group.

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1968 Upper Jurassic and Cretaceous rocks of Taseko Lakes Map-Area and their bearing on the Geological History of South Western British Columbia; Geol. Sur. Can., Paper 67-54.

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SUMMARY OF THE NOMENCLATURE USED IN COMPILING THE STRATIGRAPHIC SECTION

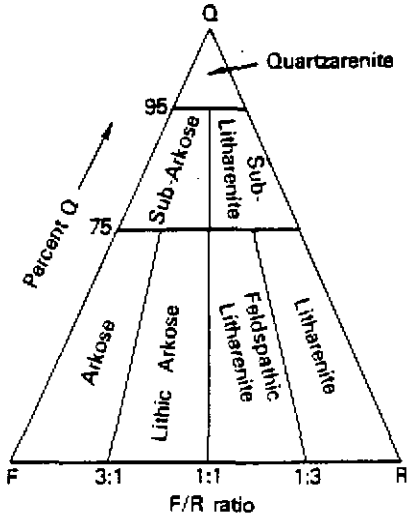
The lithological terminology used in this report was based upon the clastic composition as seen through a hand lens. The composition was then plotted on the following chart.

CLASSIFICATION OF CLASTIC ROCKS

Q = All types of quartz, including metaquartzite (but not chert)

F = All single feldspars plus granite and gneiss fragments

R = All other rock fragments: chert, slate, schist, volcanics, limestone, shale, etc.



after Folk, 1974

Greywacke is a term used extensively by all the G.S.C. authors who studied the Jackass Mountain Group. Unfortunately the definition of greywacke has been defined and redefined so many times that it is impossible to ascertain which definition was applied by the G.S.C. Furthermore, the term is very non-specific and tends to mask unique lithological details which are essential when conducting detailed stratagraphic investigations.

The term greywacke has been included in brackets to maintain compatability between the G.S.C. information and the data collected during 1983. The term greywacke is included when the described lithology exhibited:

1) Poor Sorting
2) Angular Clasts
3) A Dirty Matrix (high clay content)

Stratigraphic Section O/C H83014

Lithological Unit: Jackass Group Division A

Map Sheet: 920-1

Elevation: 1295.5 meters (4250 feet) to 1311 meters (4300 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

551450 East
5669250 North

Location: 1.4 kilometers west of South French Bar Camp on the south side of French Bar Creek.

H83014

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Litharenite, coarse to medium grained finning upward, medium green-grey, weathering light to medium green-grey; thickly bedded (80cm to 100cm), siliceous, very resistant.....	1 m	29.5 m
2	Siltstone, medium greenish brown, weathering medium dark brown; thickly laminated (0.3-1cm), moderately siliceous, moderately recessive, gradational contact with unit 1, abundant plant fragments.....	2.5 m	28.5 m
3	Shale, light brown, weathering medium to dark brown; thinly bedded (1 to 5cm), siliceous, recessive, strong fissility, distinct contact with unit 2, abundant plant fragments.....	0.5 m	26 m

H83014

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
4	Litharenite, fine to medium grained greenish grey, weathering medium dark grey; thickly bedded (50cm tol00 cm), siliceous, resistant, gradational contact with the unit 3, occasional shaley clasts, unknown white crumbly mineral, abundant plant fragments, a 2cm thick thin shaley bed was found.....	2 m	25.5 m
5	Interlaminated dark brown to black shale and medium grained, light greenish brown, litharenite, weathering dark brown and rusty yellow; thickly laminated (0.3 to lcm), siliceous, recessive, strong fissility, occasional fractures, gradational contact with unit 4, abundant plant fragments.....	0.5 m	23.5 m
6	Litharenite, medium grained, greenish grey, weathering medium grey with whitish staining; thickly bedded (20 to 100cm), siliceous, resistant, unknown white crumbly mineral, occasional slickensides, abundant plant fragments.....	3 m	23 m
7	Interbedded dark brown black siltstone and medium mud brown claystone, weathering dark rusty brown; thinly bedded to tnickly bedded (3 to 50cm), recessive, occasional veins of white mineral, abundant plant fragments.....	0.5 m	20 m

H83014

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
8	Interlaminated medium brown siltstone and bluish brown litharenite, weathering dark brown grey to very dark brown grey, medium bedded (10 to 50cm), siliceous recessive, sharp contact with unit 7 abundant veins of sugary white minerals, occasional plant fragmenrs.....	0.5 m	19.5 m
9	Interlaminated dark greenish grey siltstone and light rusty grey litharenite (greywacke), weathering rusty grey to light rusty grey, medium bedded (10 to 50cm), siliceous, resistant, sharp contact with unit 8, occasional veins of white mineral and slickenslides, abundant plant fragments.....	1 m	19 m
10	Litharenite (greywacke), fine grained, light brownish green, weathering medium brown; thickly bedded (30 to 100cm), moderately siliceous, moderately resistant, sharp contact with unit 9, convolute bedding and irregular chippy fractures, abundant plant fragments.....	2 m	18 m
11	Interlaminated dark green siltstone and medium grained light grey litharenite (greywacke), weathering black to dark brown; thickly bedded (20 to 100cm), moderately siliceous, moderately resistant, sharp contact with unit 8, cubey to large blockly fractures, occasional small to medium sized plant fragments, carbonaceous near the top.....	1.5 m	16 m

H83014

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
12	Claystone, dark grey, weathering black; thickly laminated (0.3 to 1cm), recessive, sharp contact with unit 9, cubey fractues, abundant plant fragments, carbonaceous near the top.....	0.5 m	14.5 m
13	Litharenite, very fine grained, medium green, weathering to dark grey; very thinly bedded (1 to 5cm), recessive sharp contact with unit 10 cubey fractures occasional convoluted bedding, occasional small carbonaceous plant fragments....	1 m	14 m
14	Litharenite (greywacke), very fine grained, medium green, weathering dark grey, very thinly bedded (1 to 5cm); recessive, occasional convolute bedding and cubey fractures, abundant carbonaceous plant fragments, a very thin fine grained carbonaceous bed near base.....	1 m	13 m
15	Litharenite (greywacke), coarse grained, medium green, weathering light green; very thickly bedded, siliceous, resistant, sharp contact with unit 14, abundant slickensides and non quartz veins.....	5.5 m	12 m
16	Litharenite (greywacke), medium grained, medium green, weathering light green; very thickly bedded, siliceous, resistant, very gradational contact with unit 15, abundant slickensides and quartz veins, abundant wood fragments.....	1.5 m	6.5 m

H83014

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
17	Litharenite (greywacke), pebbly coarse grained, dark green; weathering dark green, very thickly bedded, siliceous, resistant, very gradational contact with unit 6, abundant quartz veins, abundant carbonaceous wood fragments and impressions.....	1 m	5 m
18	Litharenite (greywacke), coarse grained, dark green; weathering light brownish green, siliceous, resistant, gradational contact with unit 17.....	3 m	4 m
19	Litharenite (greywacke), medium grained, medium green, weathering medium brown; very thickly bedded, siliceous, resistant, sharp contact with unit 16, 2 pebble band, medium green, weathering medium brown, pebbles (1 to 3cm).....	1 m	1 m

Stratigraphic Section O/C H83028

Lithological Unit: Jackass Group Division B

Map Sheet: 920-1

Elevation: 2027 meters (6650 feet) to 1676.5 metres (5500 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

554450 East
5665800 North

Location: 4 kilometers south of South French Bar Creek Camp, on the east fracing slope of the ridge directly southwest of Moore Lake.

H83028

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Boulder conglomerate, clasts range 35 to 45 cm, well rounded, granitic boulders, coarse grained litharenite matrix. Medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	26 m	254 m
2	Sub-arkose, medium grained, light to medium green, weathering mottled medium and dark green; thickly bedded (70 to 100 cm), moderately resistant, crumbly irregular fragments.....	6 m	228 m
3	Boulder conglomerate, clasts range 30 to 40 cm, well rounded, granitic boulders, coarse grained litharenite matrix, medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	29 m	222 m

H83028

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
4	Litharenite, coarse grained, light green, weathering mottled brown and green; medium bedded (20 to 30 cm), recessive, very crumbly irregular fragments.....	2 m	193 m
5	Boulder conglomerate, clasts range 30 to 40 cm, well rounded, granitic boulders, coarse grained with arenite matrix, medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	17 m	191 m
6	Litharenite, coarse grained, light green, weathering mottled brown and green; medium bedded (20 to 30 cm), recessive, very crumbly irregular fragments.....	1 m	174 m
7	Boulder conglomerate, clasts range 35 to 45 cm, well rounded, grantic boulders, coarse grained litharenite matrix, medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	9 m	173 m
8	Cobble conglomerate, clast range 10 to 15 cm, very well rounded, granitic cobbles, medium grained litharenite matrix, medium green, weathering rusty grey brown; indistinct bedding, siliceous, very resistant; matrix supported, in distinct upper and lower contacts.....	1 m	164 m

H83028

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
9	Boulder conglomerate, clast range 35 to 45 cm, very well rounded, granitic boulders, coarse grained litharenite matrix, medium green grey, weathering rusty grey brown; massive bedding siliceous, very resistant; matrix supported.....	9 m	163 m
10	Cobble conglomerate, clast range 10 to 15 cm, very well rounded, granitic cobbles, medium grained litharenite matrix, medium green, weathering rusty grey brown; indistinct bedding, siliceous, very resistant; matrix supported, indistinct upper and lower contacts.....	3 m	154 m
11	Boulder conglomerate, clast range 35 to 45 cm, well rounded, grantic boulders, coarse grained litharenite matrix, medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	9 m	151 m
12	Covered interval.....	75	142 m
13	Boulder conglomerate, clast range 35 to 45 cm, well rounded, granitic boulders, coarse grained litharenite matrix, medium green grey, weathering rusty grey brown; massive bedding, siliceous, very resistant; matrix supported.....	22 m	67 m

H83028

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
14	Conglomerate, coarse grained, litharenite, 50 or 60% matrix, medium grey, weathering rusty brown, granitic cobble size (10 12 cm) clasts, very well rounded; thickly bedded (80 to 110 cm), resistant, crumbly irregular fragments.....	13 m	45 m
15	Covered interval.....	6 m	32 m
16	Conglomerate, coarse grained, litharenite, 50 or 60% matrix, medium grey, weathering rusty brown, granitic cobble size (10 12 cm) clasts, very well rounded; thickly bedded (80 to 110 cm), resistant, crumbly irregular fragments.....	13 m	26 m
17	Covered interval.....	4 m	13 m
18	Conglomerate, coarse grained, litharenite, 50 or 60% matrix, medium grey, weathering rusty brown, granitic cobble size (10 12 cm) clasts, very well rounded; thickly bedded (80 to 110 cm), resistant, crumbly irregular fragments.....	9 m	9 m

Stratigraphic Section O/C H83035 through H83038

Lithological Unit: Jackass Group Division B (Marine Equivalent)

Map Sheet: 92J-16

Elevation: 1219 meters (4000 feet) to 1493.5 metres (4900 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

554700 East
5642100 North

Location: 1 kilometers south of Ore Creek Camp, on the east facing slope directly west of Ore Creek.

H83035 through H83038

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Interbedded very fine grained litharenite and siltstone, dark greenish grey, weathering light brownish yellow; thickly laminated (0.5 to 1.0 cm), siliceous, resistant, long knife blade fragments; occasional quartz veins.....	10 m	233 m
2	Sub-quartzite, fine grained, light green, weathering medium yellowish brown; thickly bedded (30 to 70 cm), resistant, sharp irregular fragments.....	20 m	223 m
3	Interbedded, very fine grained litharenite and siltstone, dark greenish grey, weathering light brownish yellow; thickly laminated (0.5 cm to 10 cm), siliceous, resistant, long knife blade fragments; occasional quartz veins.....	20 m	203 m
4	Covered interval.....	10 m	183 m

H83035 through H83035

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
5	Siltstone, black, weathering dark brown; thinly laminated (0.1 to 0.4 cm), very siliceous, resistant, blocky fragments; convolute laminations	25 m	173 m
6	Covered interval.....	35 m	147 m
7	Interbedded, very fine grained litharenite and siltstone, dark greenish grey, weathering light brownish yellow; thickly laminated (0.5 cm to 1.0 cm), siliceous, resistant, long knife blade fragments; occasional quartz veins, occasional slicken sides.....	112 m	112 m

Stratigraphic Section O/C H83041 through H83042

Lithological Unit: Jackass Group Division B (Marine Equivalent) or (C2 or C4?)

Map Sheet: 92J-16

Elevation: 1463 meters (4800 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

555500 East
5643500 North

Location: 1 kilometer northeast of Ore Creek camp, on the south facing slope of the ridge just East of Mount Birch.

H83041 & H83042

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Sub-Quartzite, fine grained, light grey, weathering dark greenish grey; thickly bedded (50 to 60 cm) very siliceous, small block fragments; all upper contact bedding planes are badly pitted (bioturbation?).....	3 m	150 m
2	Siltstone, black, weathering dark grey; thickly bedded (40 to 70 cm), moderately siliceous, moderately recessive, knife blade fragments.....	4 m	147 m
3	Covered interval.....	10 m	143 m
4	Litharenite, fine to medium grained, dark grey weathering dark brown with rusty spots; medium bedded (201.30 cm), very siliceous, very resistant, small blocky fragments, numerous quartz veins.....	5 m	133 m

H83041 & H83042

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
5	Interbedded fine grained, light grey litharenite and dark grey silkstone, weathering medium to dark rusty brown; thickly laminated to thinly bedded (0.5 to 4 cm), moderately siliceous, moderately recessive; occasional iron concretions.	3m	127 m
6	Covered interval.....	15 m	124 m
7	Litharenite, medium grained to coarse grained, dark grey weathering dark brown with rusty spots; medium bedded (20 to 30 cm), very siliceous, very resistant, small blocky fragments; numerous quartz veins.....	25 m	109 m
8	Covered interval.....	10 m	84 m
9	Litharenite (greywacke), coarse grained, dark grey weathering dark brown with rusty spots; thinly to medium bedded (5 to 20 cm), very siliceous, very resistant, small blocky fragments; numerous quartz veins.....	25 m	74 m
10	Litharenite (greywacke), coarse grained, black, weathering medium brown; very thickly bedded (2 to 4 m), resistant, sharp knife blade fragments.....	10 m	49 m
11	Shale, black, weathering dark brown; thinly bedded (1 to 4 cm), siliceous, recessive, strong fissility, small blocky fragments; occasional quartz veins...	2 m	39 m

H83041 & H83042

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
12	Crystal tuff, medium crystalline, light grey; very resistant.....	4 m	37 m
13	Covered interval.....	5 m	33 m
14	Litharenite, medium grained, greenish black, weathering dark brown; medium bedded (10 to 20 cm), siliceous, very resistant; very dense.....	2 m	28 m
15	Shale, black, weathering dark brown, weathering dark brown; thinly bedded (1 to 4 cm), siliceous, recessive, strong fissility, small blocky fragments; occasional quartz veins.....	1 m	26 m
16	Covered interval.....	10 m	25 m
17	Litharenite (greywacke), coarse grained, thickly bedded (2 to 4 cm), resistant, sharp knife blade fragments.....	15 m	15 m

Stratigraphic Section O/C H83043

Lithological Unit:	Jackass Group Division B (Marine Equivalent) or (C2 or C4?)
Map Sheet:	92J-16
Elevation:	1615.5 meters (5300 feet) to 1829 metres (6000 feet)
U.T.M. Coordinates:	Grid Zone 10U-EM 556800 East 5644100 North
Location:	2.2 kilometers northeast of Ore Creek Camp, on the south facing slope of the ridge just east of Mount Birch.

H83043

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Pebble conglomerate, clasts range 0.5 cm to 1.5 cm, well rounded, white quartz and granitic pebbles, coarse grained litharenite matrix, medium grey, weathering grey with rusty spots; massive bedding, siliceous, very resistant; matrix supported.....	210 m	457 m
2	Covered interval.....	80 m	241 m
3	Interbedded siltstone and very fine grained dirty litharenite (greywacke), medium to dark grey, weathering light brown with rustry spots; thinly bedded (3 to 10 cm), resistant, siliceous, cubey fragments; occasional beds of rip-up clast (none 2 cm bed every 2 metres).....	136.5 m	161 m
4	Litharenite (greywacke), medium grained, medium grey, weathering rusty dark brown; thickly laminated, thick platey fragments.....	2.0 m	24.5 m

H83043

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
5	Litharenite (greywacke), very fine grained, greenish grey, weathering medium brown; thinly bedded (4 to 6 cm). Moderately resistant, cubey fragments; occasional soft sediment folding, abundant convolute lamination and occasional thin beds of rip-up clasts.....	4 m	22.5 m
6	Interbedded medium grey siltstone and fine grained medium green dirty litharenite (greywacke), weathering medium to dark brown; thinly bedded (3 to 6 cm), siliceous, resistant, sharp irregular fragments...	4 m	18.5 m
7	Litharenite (greywacke), very fine grained, medium grey, weathering medium brown; very thinly bedded (1 to 3 cm), siliceous badly sheared, small cubey fragments.....	4 m	14.5 m
8	Interbedded medium grey siltstone and fine grained medium green dirty litharenite (greywacke), weathering dark brown; thinly bedded (3 to 6 cm),siliceous, resistant, sharp irregular fragments.....	10.5 m	10.5 m

Stratigraphic Section O/C H83033

Lithological Unit: Jackass Group Division C and 2

Map Sheet: 920-1

Elevation: 2286 meters (7500 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

549700 East
5661100 North

Location: 3.5 kilometers east of "F" Hail Creek Camp, at the east end of Nine Mile Ridge, on the cliffs above a unnamed cirque lake.

H83033

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Interbedded siltstone and very fine grained litharenite (greywacke), dark grey, weathering dark grey; thinly bedded (1 to 10 cm), very siliceous, cubey fragments.....	46 m	80 m
2	Sub-litharenite, medium grained, dark grey, weathering dark green; thickly bedded (1 to 3 m), siliceous, resistant, irregular blocky fragments..	34 m	34 m

Lowest 100 to 130 meters of section is inaccessible

Stratigraphic Section O/C H83029 through H83032

Lithological Unit: Jackass Group Division C3

Map Sheet: 920-1

Elevation: 1920 meters (6300 feet) to 2042 metres (6700 feet) to 1859 meters (6100 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

55100 East
5665200 North

Location: 5.5 kilometers southwest of South French Bar Camp, across the ridge west of Roderick Creek.

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Lithic arkose (greywacke), medium grained, medium green, weathering medium brown; very thickly bedded (3 m), poorly consolidated, recessive, very crumbly fragments.....	180 m	341 m
2	Sub-arkose (greywacke), medium to coarse grained light green, weathering medium brown; no visible bedding planes, moderately resistant, crumbly round slab type fragments; coarsening up, abundant 2 cm pebbles near top.....	5 m	161 m
3	Covered interval.....	3 m	156 m
4	Sub-arkose (greywacke), medium to coarse grained, light green, weathering medium brown; no visible bedding planes, moderately resistant, crumbly round slab type fragments; coarsening up, abundant 2 cm pebbles near top.....	9 m	153 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
5	Covered interval.....	3 m	144 m
6	Sub-arkose (greywacke), medium to coarse grained, light green, weathering medium brown; no visible bedding planes. Moderately resistant, crumbly round slab type fragments; coarsening up, abundant 2 cm pebbles near top.....	9 m	141 m
7	Covered interval.....	7 m	132 m
8	Sub-arkose (greywacke), coarse grained, light green, weathering medium brown; no visible bedding planes, resistant, crumbly round slab type fragments.....	10 m	125 m
9	Sub-arkose (greywacke), medium grained, light green, weathering medium brown; no visible bedding planes, lightly resistant, crumbly round slab type fragments; gradation upper contact with unit 8....	6 m	115 m
10	Covered interval.....	5 m	109 m
11	Lithic arkose (greywacke), coarse grained, medium green, weathering dark grey; very thickly bedded, slightly resistant, very crumbly round slab, type fragments.....	3 m	104 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
12	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark brown; thinly bedded, siliceous, resistant, irregular blocky fragments.....	1 m	101 m
13	Lithic arkose (greywacke), coarse grained, medium green, weathering dark grey; very thick bedded, slightly resistant, very crumbly round slab type fragments.....	5 m	100 m
14	Interbedded fine grained sub-litharenite and siltstone, medium grey, weathering medium brown to dark grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slaby fracture and small cubey fragments; numerous flame structures, soft sediment folding and convolute laminations; rare plant fragments.....	4 m	95 m
15	Covered interval.....	3 m	91 m
16	Lithic arkose (greywacke), coarse grained, medium green, weathering dark grey; very thickly bedded, slightly resistant, very crumbly round slab type fragments.....	4 m	88 m
17	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark; thinly bedded (2 to 9 cm), siliceous, resistant, irregular blocky fragments.....	6 m	80 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
18	Interbedded fine grained, sub-litharenite and siltstone, medium grey, weathering medium brown to dark grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slab type fragments; numerous soft sediment folding and convolute laminations, occasional flame structures; rare plant fragments.....	6 m	80 m
19	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark brown; thinly bedded (2 to 9 cm), siliceous, resistant, irregular blocky fragments.....	5 m	74 m
20	Interbedded fine grained sub-litharenite and siltstone, medium grey, weathering medium brown to dark grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slab type fragments; numerous convolute bedding, occasional soft sediment folding, rare flame structure; rare plant fragments.....	3 m	69 m
21	Covered interval.....	6 m	66 m
22	Interbedded silestone and fine grained sub-litharenite, medium grey, weathering medium brown to dary grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slab and small cubey fragments; occasional convolute laminations, rare soft sediment folding and flame structure; very rare plant fragments.....	3 m	60 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
23	Covered interval.....	2 m	57 m
24	Sub arkose (greywacke), coarse grained, light green, weathering medium brown; no visible bedding planes, resistant, crumbly round slat type fragments.....	6 m	55 m
25	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark brown; thinly bedded (2 to 5 cm), siliceous, resistant, irregular blocky fragments.....	1 m	49 m
26	Sub-arkose (greywacke), medium grained, light green, weathering medium brown; no visible bedding planes, slightly resistant, crumbly round slab type fragments.....	5 m	48 m
27	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark brown; thinly bedded (2 to 5 cm), siliceous, resistant, irregular blocky fragments.....	2 m	43 m
28	Interbedded fine grained, sub-litharenite and siltstone, medium grey, weathering medium brown to dark grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slab and small cubey fragments; rare convolute laminations.....	4 m	41 m
29	Covered interval.....	3 m	37 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
30	Lithic arkose (greywacke), coarse grained, medium grey, weathering dark grey; very thickly bedded, slightly resistant, very crumbly round slab type fragments; discordant lower contact, baked lower margin.....	3 m	34 m
31	Diorite, medium crystalline, equigranular, light grey, weathering white; moderately recessive, sharp irregular fragments; plugs ranging 2 to 12 m in diameter, badly fractured.....	3 m	31 m
32	Sub-arkose (greywacke), medium grained, light green, weathering medium brown; no visible bedding planes, slightly resistant, crumbly round slab type fragments; discordant uuper contact, baked margin.....	2 m	28 m
33	Covered interval.....	6 m	26 m
34	Sub-arkose (greywacke), coarse to medium grained, light green, weathering medium brown; no visible bedding planes, resistant, crumbly round slab type fractures.....	2 m	20 m
35	Sub-arkose (greywacke), medium grained, light green, weathering medium brown; no visible bedding planes, slightly resistant, crumbly round slab type fragments; gradational upper contact with unit 34.	4 m	18 m

29, 30, 31, 32
H83032

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
36	Sub-litharenite (greywacke), very fine grained, medium grey, weathering rusty dark brown; thinly bedded (2 to 5 cm), siliceous, resistant, irregular blocky fragments.....	2 m	14 m
37	Sub-arkose (greywacke), medium grained, light green, weathering medium brown; no visible bedding planes, slightly resistant, crumbly round slab type fragments.....	3 m	12 m
38	Interbedded fine grained sub-litharenite and silkstone, medium grey, weathering medium brown to dark grey; thinly bedded (2 to 6 cm), very siliceous, moderately recessive, sharp slab and small cubey fragments.....	4 m	9 m
39	Sub-arkose (greywacke), coarse grained, light green, weathering medium brown; no visible bedding planes, resistant, crumbly round slab type fragments.....	5 m	5 m

Stratigraphic Section O/C H83021

Lithological Unit: Jackass Group Division C4

Map Sheet: 920-1

Elevation: 1859.5 meters (6100 feet) to 1829 meters (6000 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

546525 East
5662525 North

Location: 100 meters south of "F" Hail Creek Camp, along the bank of the upper part of "F" Hail Creek.

H83021

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Litharenite (greywacke), cobbly coarse grained, brown, weathering grey, very thickly bedded, siliceous, resistant, occasional large pebbles...	2 m	89 m
2	Covered interval.....	2 m	87 m
3	Litharenite, medium grained, light green, very thickly bedded, siliceous, resistant.....	37 m	85 m
4	Interbedded dark grey siltstone and medium grained, light green litharenite, weathering black, very thinly bedded (1 to 3cm), siliceous, resistant, sharp contact, sharp fractures, occasional plant fragments.....	10 m	48 m
5	Litharenite (greywacke), medium grained, light green, thinly bedded (3 to 10cm), siliceous, resistant sharp fractures.....	2.5 m	38 m

H83021

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
6	Litharenite (greywacke), fine grained, buff, weathering buff; thinly bedded (3 to 10cm), siliceous, resistant, brumbly and calcic.....	05. m	35.5 m
7	Interbedded dark grey siltstone and medium grained, light green litharenite weathering black, very thinly bedded (1 to 3cm), very siliceous, resistant very crumbly irregular fragments.....	4.5 m	35 m
8	Covered interval.....	2 m	30.5 m
9	Interlaminated dark green siltstoe and very fine grained greywacke, weathering dark rusty grey, very thinly bedded (1 to 3cm), siliceous, resistant, fractures in flat sharp slabs and blocks.....	1 m	28.5 m
10	Litharenite, coarse grained, light green very thickly bedded, siliceous, resistant, crumbly and calcic.....	1 m	27.5 m
11	Interlaminated dark green siltstone and very fine grained greywacke, weathering dark rusty grey, very thinly bedded (1 to 3cm), siliceous, resistant, fractures in flat sharp slabs and blocks.....	4 m	26.5 m

H83021

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
12	Interbedded dark grey siltstone and very fine grained, dark grey green greywacke, weathering black to rusty grey, very thinly bedded (1 to 3cm), siliceous, resistant, sharp contact with unit 11, fractures in flat sharp slabs and blocks.....	3 m	22.5 m
13	Feldspathic litharenite, medium grained, lightgreen, thickly bedded, siliceous resistant, occasional crossbeds, crumbly irregular fragments.....	10 m	19.5 m
14	Covered interval.....		
15	Litharenite, medium grained, light green, very thickly bedded, siliceous, resistant.....	0.5 m	9.5 m
16	Interbedded dark grey siltstone and fine grained, medium blue green greywacke, weathering black to light grey green, thinly bedded (3 to 10cm), siliceous, resistant, sharp contact with unit 15, sharp fractures.....	3 m	9 m
17	Interbedded dark grey siltstone and fine grained, buff litharenite, weathering black to buff, thinly bedded (3 to 10cm), siliceous, resistant, sharp contact with unit 16, sharp fractures.....	2.5 m	6 m

H83021

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
18	Interbedded dark grey siltstone and very fine grained, dark grey green greywacke, weathering black to rusty grey, very thinly bedded (1 to 3cm), siliceous, resistant, sharp contact with unit 17, fractures in flat sharp slabs and blocks.....	3.5 m	3.5 m

Stratigraphic Section O/C H83027

Lithological Unit: Jackass Group Division C4

Map Sheet: 920-1

Elevation: 1829 meters (6000 feet)

U.T.M. Coordinates: Grid Zone 10U-EM

546400 East
5662900 North

Location: 0.500 kilometers northwest of "F" Hail Creek Camp, on the west facing slope.

H83027

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
1	Arkose, medium grained, light brown, weathering medium brown; thickly bedded (80 to 100 cm), moderately recessive, smooth convex weathered surface, crumbly fragments; irregular shaped concretions.....	6 m	92 m
2	Covered interval.....	8 m	86 m
3	Arkose, medium grained, light brown, weathering medium brown; thickly bedded (80 to 100 cm), moderately recessive, smooth convex weathered surface, crumbly fragments; irregular shaped concretions.....	1 m	78 m
4	Covered interval.....	8 m	77 m

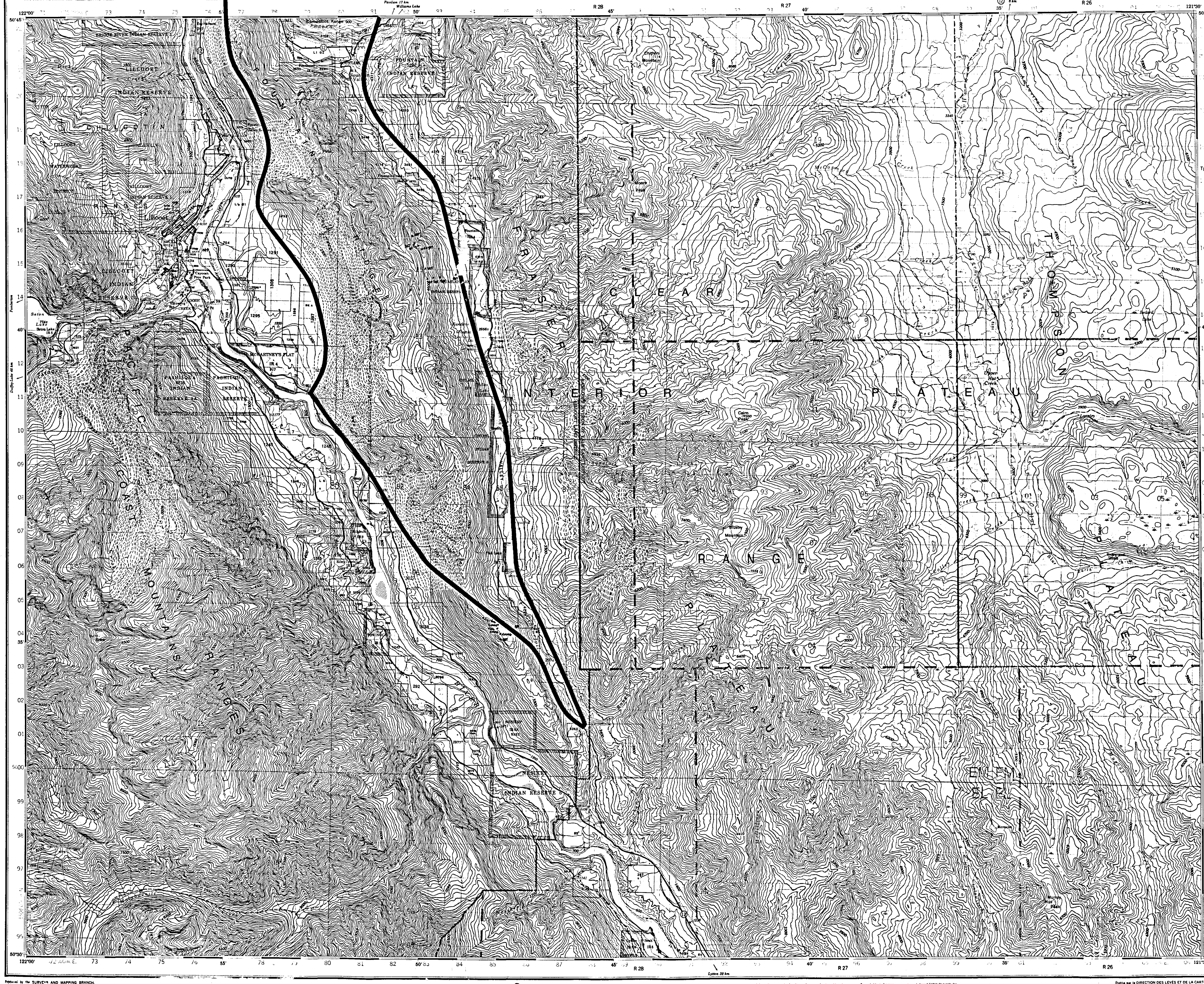
H83027

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
5	Arkose, medium grained, light brown, weathering medium brown; thickly bedded (80 to 100 cm), moderately recessive, smooth convex weathered surface, crumbly fragments; irregular shaped concretions.....	1 m	71 m
6	Covered interval.....	4 m	70 m
7	Arkose, medium grained, light brown, weathering medium brown; thickly bedded (80 to 100 cm), moderately recessive, smooth convex weathered surface, crumbly fragments; irregular shaped concretions.....	10 m	66 m
8	Interlaminated dark grey siltstone and fine to medium grained, light buff, sub-arkose, weathering dark reddish brown and medium brown; thickly laminated (0.3 to 0.9 cm), moderately siliceous, resistant, sharp flat fragments; abundant convolute laminations and cross-laminations, occasional load-casts, rare plant fragments.....	7 m	56 m
9	Feldspathic litharenite (greywacke), fine to medium grained, greenish brown, weathering medium green; medium bedded (15 to 35 cm), recessive, crumbly sediments.....	3 m	49 m

H83027

UNIT	LITHOLOGY	THICKNESS UNIT	(METERS) TOTAL FROM BASE
10	Interlaminated dark grey siltstone and fine to medium grained, light buff, sub-arkose, weathering dark reddish brown and medium brown; thickly laminated (0.3 to 0.9 cm), moderately siliceous, resistant, sharp flat fragments; abundant convolute laminations and cross-laminations, occasional load-casts, rare plant fragments.....	16 m	46 m
11	Covered interval.....	4 m	30 m
12	Interlaminated dark grey siltstone and fine to medium grained, light buff, sub-arkose, weathering dark reddish brown and medium brown; thickly laminated (0.3 to 0.9 cm), moderately siliceous, resistant, sharp flat fragments; abundant convolute laminations and cross-laminations, occasional load-casts, rare plant fragments 8 m from base, a 75 cm thick medium grained lithic arkose bed was found.	26 m	26 m

92-I/12 1:50 000 **CANADA** EDITION 2 92-I/12



Military users, refer to this map as: Référence de cette carte pour usage militaire	SERIES A 721 SÉRIE MAP 92-I/12 CARTE EDITION 2 MCE ÉDITION

GLOSSARY GLOSSAIRE

Airfield	Terrain d'aviation
Arena	Aréna
City Limits	Limites de ville
Customs	Douane
Ditch	Fossé
Dugout	Abreuvoir
Dump	Dépotoir
Filtration Plant	Usine de filtration
Gas	Gaz
Golf Course	Terrain de golf
Junk Yard	Ferraille
Kiln	Four
Lookout	Belvédère
Mine Waste	Déblai de mine
Oil Wells	Puits de pétrole
Park	Parc
Rink	Patinoire
Senior Citizens Home	Foyer de l'âge d'or
Ski Area	Station de ski
String Bog	Fondrière à filaments
Surveyed Line	Ligne arpentée
Tank	Réservoir
Water	Eau
Winter Road	Chemin d'hiver

For a complete glossary see reverse side
Pour un glossaire complet, voir au verso

ABBREVIATIONS ABRÉVIATIONS

Aband	Abandoned	Abandonné, ée
C	Cemetery	Cimetière
CO	County	Comté
E	Elevator	Élévateur
Fy	Ferry	Traversier
IR	Indian Reserve	Réserve indienne
H	Hospital	Hôpital
L	Lot	Lot
Micro	Microwave	Micro-ondes
Mun	Municipality	Municipalité
P	Post Office	Bureau de poste
PH	Power House	Centrale électrique
RCMP	Royal Canadian Mounted Police	Gendarmerie Royale Canadienne
Res	Reservoir	Réservoir
Trans Sta	Transformer Station	Poste de transformateurs
TFL	Tree Farm Licence	Licence de sylviculture

TN NG
0°58' or/ou 17 Mils
22°07' or/ou 393 Mils
Grid north — Nord du quadrillage
Magnetic north — Nord magnétique

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1979
FOR CENTRE OF MAP
Annual change decreasing 4.4'

N'utiliser le diagramme que pour obtenir les valeurs numériques
DÉCLINAISON MOYENNE APPROXIMATIVE
AU CENTRE DE LA CARTE EN 1979
Variation annuelle décroissante 4.4'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10
QUADRILLAGE DE MILLE MÈTRES
TRANSVERSE UNIVERSEL DE MERCATOR

GRID ZONE DESIGNATION: DÉSIGNATION DE LA ZONE DU QUADRILLAGE:	100 000 m SQUARE IDENTIFICATION IDENTIFICATION DU CARRÉ DE 100 000 m
10U	EM FM EL FL 56 6

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
EXEMPLE DE LA MÉTHODE EMPLOYÉE POUR FIXER DES REPÈRES À 100 MÈTRES PRÈS

REFERENCE POINT / POINT DE REPÈRE	CHURCH - ÉGLISE (as above) (ci-dessus)
EASTING: Read number on grid line immediately to left of point. ABSCISSE: Noter le chiffre de la ligne du quadrillage immédiatement à gauche du repère:	97
Estimate tenths of a square from this line eastward to point: Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est:	5 / 975
NORTHING: Read number on grid line immediately below point. ORDONNÉE: Noter le chiffre de la ligne du quadrillage immédiatement en-dessous du repère:	98
Estimate tenths of a square from this line northward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord:	4 / 984
GRID REFERENCE. RÉFÉRENCE AU QUADRILLAGE:	975984

Nearest similar grid reference 100 000 metres (about 63 miles)
La prochaine référence similaire est à 100 000 mètres (environ 63 milles)

TABLEAU D'ASSEMBLAGE DU SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE

92 J/16	92-I/13	92-I/14
92 J/9	92-I/12	92-I/11
92 J/8	92-I/5	92-I/6

122°30' 51°00' 121°00' 51°00' 50°15' 122°30' 50°15' 121°00'

INDEX TO ADJOINING MAPS OF THE NATIONAL TOPOGRAPHIC SYSTEM

00797 (4)
797

Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES.

Roads Routes

92I/12 **LILLOOET**

Information concerning location and precise elevation of bench marks can be obtained by writing to the Geodetic Survey, Surveys and Mapping Branch, Ottawa.

On peut obtenir des renseignements sur le lieu et l'altitude exacte des repères de nivellement en écrivant aux Levés géodésiques, Direction des levés et de la cartographie, Ottawa.

Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Mise à jour à l'aide de photographies aériennes prises en 1977. Vérification ... en 1978. Publiée en 1981.

PROVISIONAL MAP
92-O/6
1:50,000

CANADA

Joins 92-O/11

EDITION 1

CARTE PROVISOIRE
92-O/6

Refer to this map as: 92-O/6 EDITION 1 MCE SERIES A 721

Joins 92-O/7

Joins 92-O/3

NADILA CREEK

CONVERSION SCALE FOR ELEVATIONS

Use diagram only to obtain numerical values.
APPROXIMATE MEAN DECLINATION 1968
FOR CENTRE OF MAP
Annual change decreasing 3.2'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10

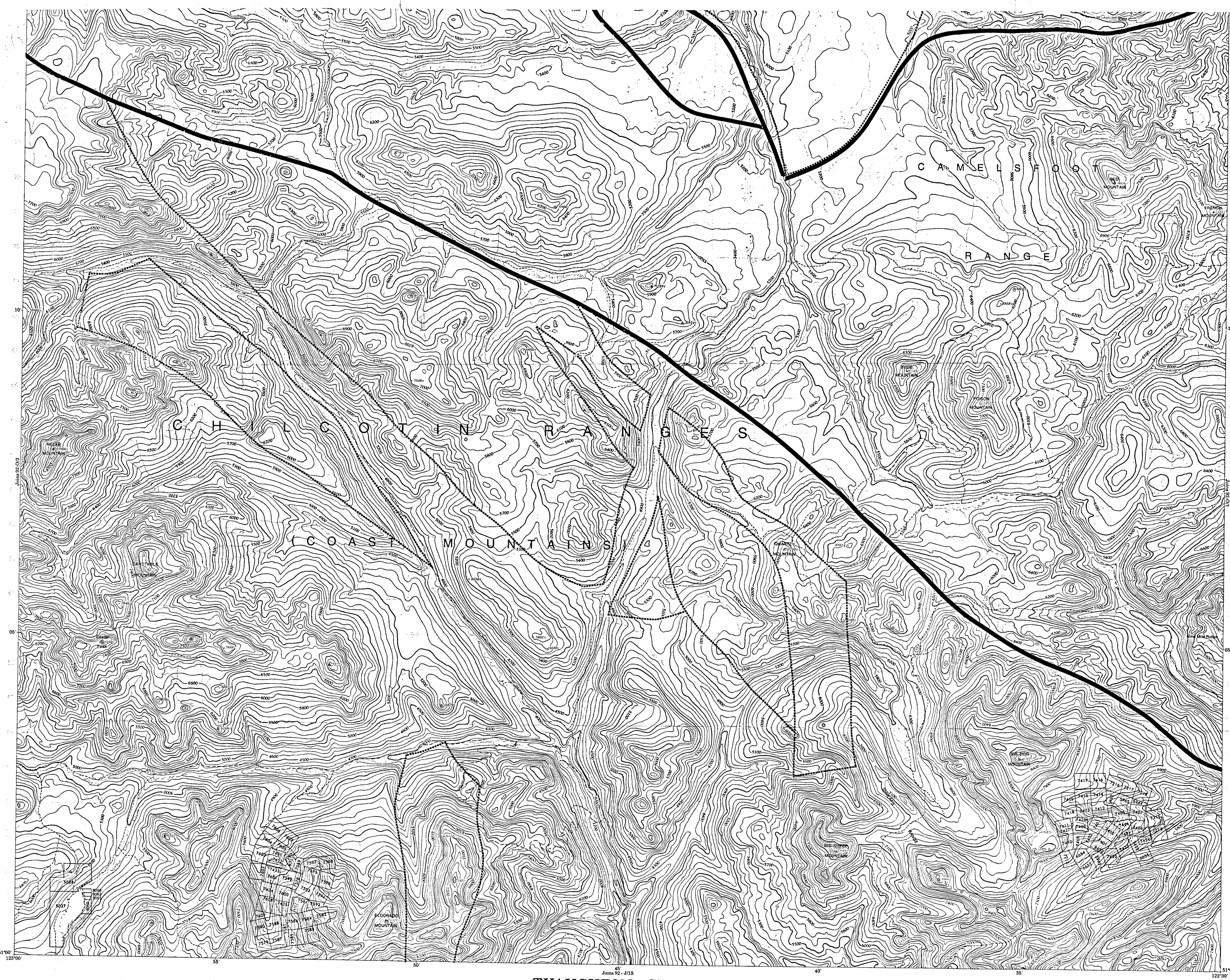
GRID ZONE DESIGNATION	100 000 M. SQUARE IDENTIFICATION
10U	DN / DM

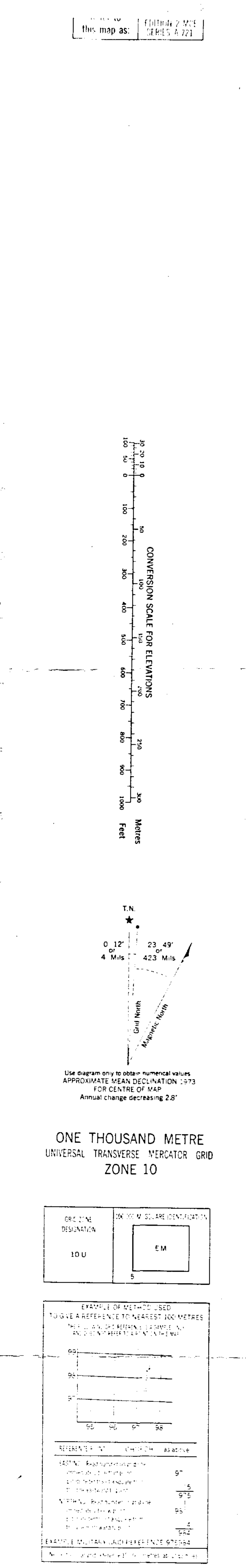
EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
THE FOLLOWING GRID REFERENCE IS A SAMPLE ONLY AND DOES NOT REFER TO A POINT ON THIS MAP

REFERENCE POINT	CHURCH (as above)	
EASTING	Read number on grid line immediately to left of point	97
	Estimate tenths of a square from this line eastward to point	9
NORTHING	Read number on grid line immediately below point	98
	Estimate tenths of a square from this line northward to point	7
EXAMPLE MILITARY GRID REFERENCE 979984		

Nearest similar grid reference (10 000 metres (about 6) miles)

00797 (5)





TYAUGHTON CREEK

LILLOOET LAND DISTRICT

BRITISH COLUMBIA

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Milles
Metres 1000 0 1000 2000 3000 4000 Mètres
Yards 1000 0 1000 2000 3000 4000 Verges

Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Updated from aerial photographs taken in 1965-1967. Printed 1974.

Copies may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, or your nearest map dealer.

Roads.	Routes:	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose or stabilized surface, all weather	gravier aggloméré, toute saison		
loose surface, dry weather and unclassified streets	de gravier, temps sec et rues hors classe		
cart track	de terre		
trail or portage	sentier ou portage		

This Provisional Map is equivalent to a standard map in accuracy of content.

Some names on this map are not yet official. Corrections or additions are invited by the Surveys and Mapping Branch.

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Transverse Mercator Projection

Cette carte provisoire équivaut une carte régulière au point de vue précision de l'information

Certains noms inscrits sur cette carte ne sont pas encore officiels. La Direction des levés et de la cartographie saurait gre au public de lui signaler corrections et additions.

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au-dessus du niveau moyen de la mer
Système de référence géodésique nord-américain, 1927
Projection transverse de Mercator

Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Mise à jour à l'aide de photographies aériennes prises en 1965-1967. Imprimée en 1974

Ces cartes sont en vente au Bureau des Cartes du Canada, ministère de l'Énergie, des Mines et des Ressources, Ottawa, ou chez le vendeur le plus près.

00747 (6)

92-O/2
EDITION 2

92 J/16 1:50,000

CANADA

EDITION 1

92 J/16

Military users, refer to this map as	SERIES	A 721	SERIE
Référence de cette carte pour usage militaire	MAP	92 J/16	CARTE
	EDITION	1 MCE	EDITION

CONVERSION SCALE FOR ELEVATIONS
ECHELLE DE CONVERSION DES ELEVATIONS

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1975
FOR CENTRE OF MAP
Annual change decreasing 2.8'

N'utiliser le diagramme que pour obtenir les valeurs numériques
DÉCLINAISON MOYENNE APPROXIMATIVE
AU CENTRE DE LA CARTE EN 1975
Variation annuelle décroissante 2.8'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10
QUADRILLAGE DE MILLE MÈTRES
TRANSVERSE UNIVERSEL DE MERCATOR

GRID-ZONE DESIGNATION / DÉSIGNATION DE LA ZONE DU QUADRILLAGE	100,000 M. SQUARE IDENTIFICATION / IDENTIFICATION DU CARRÉ DE 100,000 M.
10 U	EM

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
EXEMPLE DE LA MÉTHODE EMPLOYÉE POUR FIXER DES RÉPÉRES À 100 MÈTRES PRÈS

REFERENCE POINT / POINT DE REPÈRE	CHURCH - ÉGLISE	(as shown / ci-dessus)
EASTING. Read number on grid line immediately to left of point. LONGITUDE EST. Noter le chiffre de la ligne du quadrillage immédiatement à gauche du repère		97
Estimate tenths of a square from this line eastward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est.		5
		975
NORTHING. Read number on grid line immediately below point. LATITUDE NORD. Noter le chiffre de la ligne du quadrillage immédiatement en dessous du repère		98
Estimate tenths of a square from this line northward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord		4
GRID REFERENCE / RÉFÉRENCE AU QUADRILLAGE		9754

Nearest similar grid reference 100,000 metres (about 62 miles)
La prochaine référence similaire est à 100,000 mètres (environ 62 milles)

BRIDGE RIVER.

797

TABLEAU D'ASSEMBLAGE DU SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE

92 J/2	92 J/1	92 P/4
92 J/15	92 J/16	92 I/13
92 J/10	92 J/9	92 I/12

INDEX TO ADJOINING MAPS OF THE NATIONAL TOPOGRAPHIC SYSTEM

00797 (7)

Produced by the SURVEYS AND MAPPING BRANCH,
DEPARTMENT OF ENERGY, MINES AND RESOURCES.

Military users, refer to this map as: Référence de cette carte pour usage militaire:
SERIES A 721 SÉRIE
MAP 92 I/13 CARTE
EDITION 2 MCE ÉDITION

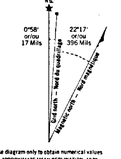
GLOSSARY GLOSSAIRE

Airfield	Terrain d'aviation
Arena	Arène
City Limits	Limites de ville
Customs	Douane
Ditch	Fossé
Dugout	Abreuvoir
Dump	Dépotoir
Filtration Plant	Usine de filtration
Gas	Gaz
Golf Course	Terrain de golf
Junk Yard	Ferraille
Kiln	Four
Lookout	Belvédère
Mine Waste	Débris de mine
Oil Wells	Puits de pétrole
Park	Parc
Rink	Patinoire
Senior Citizens Home	Foyer de l'âge d'or
Ski Area	Station de ski
Strong Beg	Fondrière à filaments
Surveyed Line	Ligne arpentée
Tank	Réservoir
Water	Eau
Winter Road	Chemin d'hiver

For a complete glossary see reverse side
Pour un glossaire complet, voir au verso

ABBREVIATIONS ABRÉVIATIONS

Aband.	Abandoned	Abandonné, ée
C.	Cemetery	Cimetière
CO.	County	Comté
E.	Elevator	Elévateur
Fy.	Ferry	Traversier
IR.	Indian Reserve	Réserve indienne
H.	Hospital	Hôpital
L.	Lot	Lot
Micro.	Microwave	Micro-ondes
Mun.	Municipality	Municipalité
P.	Post Office	Bureau de poste
PH.	Power House	Centrale électrique
RCMP.	Royal Canadian Mounted Police	Gendarmerie Royale Canadienne
Res.	Reservoir	Réservoir
Trans.Sta.	Transformer Station	Poste de transformateurs
TFL.	Tree Farm Licence	Licence de tyrviculture



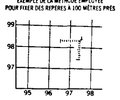
Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1979
FOR CENTRE OF MAP
Annual change decreasing 4.4'

Utiliser le diagramme que pour obtenir les valeurs numériques
DÉCLINAISON MOYENNE APPROXIMATIVE
AU CENTRE DE LA CARTE EN 1979
Variation annuelle décroissante 4.4'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10
QUADRILLAGE DE MILLE MÈTRES
TRANSVERSE UNIVERSEL DE MERCATOR

GRID ZONE DESIGNATION DÉSIGNATION DE LA ZONE DU QUADRILLAGE:	100 000 m SQUARE IDENTIFICATION IDENTIFICATION DU CARRÉ DE 100 000 m
10U	EM FM S

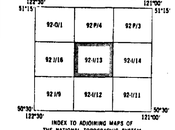
EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES
EXEMPLE DE LA MÉTHODE EMPLOYÉE POUR FIXER DES REPÈRES À 100 MÈTRES PRÈS



REFERENCE POINT POINT DE REPÈRE	CHURCH - ÉGLISE	(as above) (ci-dessus)
EASTING: Read number on grid line immediately to left of point. ABSCISSE: Noter le chiffre de la ligne du quadrillage immédiatement à gauche du repère.		97
Estimate tenths of a square from this line eastward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction est.		5 975
NORTHING: Read number on grid line immediately below point. ORDONNÉE: Noter le chiffre de la ligne du quadrillage immédiatement en dessous du repère.		98
Estimate tenths of a square from this line northward to point. Estimer le nombre de dixièmes du carré entre cette ligne et le repère en direction nord.		4 984
GRID REFERENCE RÉFÉRENCE AU QUADRILLAGE		975984

Nearest similar grid-references (100 000 metres (about 63 miles)
La prochaine référence similaire est à 100 000 mètres (environ 63 milles)

TABLEAU D'ASSEMBLAGE DU SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE



INDEX TO ADJOINING MAPS OF THE NATIONAL TOPOGRAPHIC SYSTEM

Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES.
Updated from aerial photographs taken in 1977. Culture check
Roads: Routes:
Information concerning location and precise elevation of bench marks can be obtained by writing to the Geodetic Survey, Surveys and Mapping Branch, Ottawa.
On peut obtenir des renseignements sur le lieu et l'altitude exacte des repères de nivellement en écrivant aux Levés géodésiques, Direction des levés et de la cartographie, Ottawa.
Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES.
Mise à jour à l'aide de photographies aériennes prises en 1977. Vérification

"TO FILE" 92I/13 PAVILION

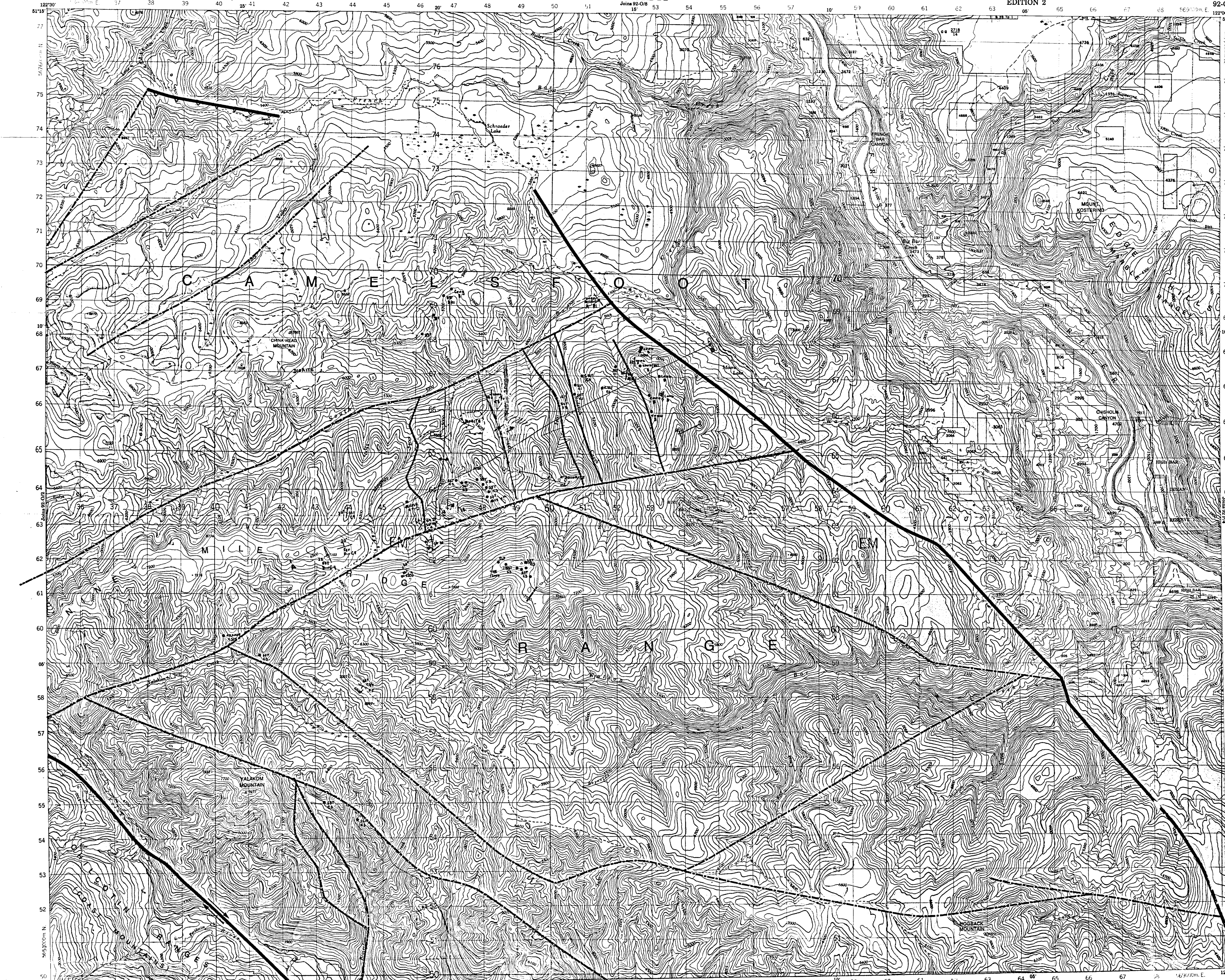
92-O/1 1:50,000

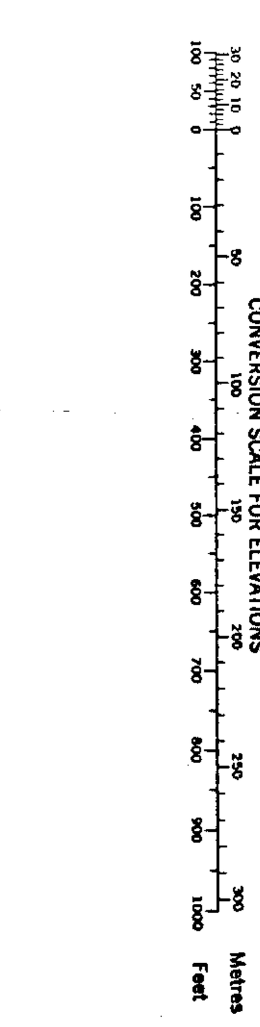
CANADA

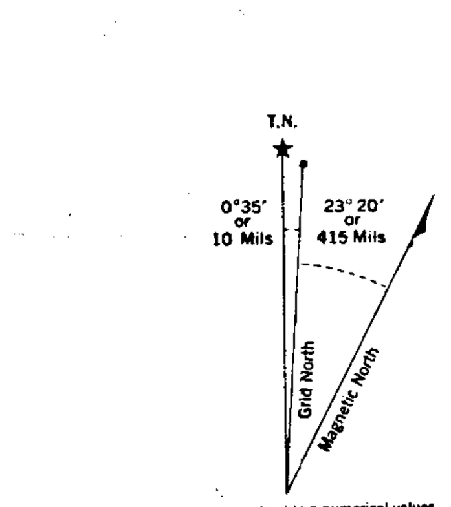
Joins 92-O/8

EDITION 2 92-O/1

Refer to this map as:	92-O/1 EDITION 2 MCE SERIES A 721







Use diagram only to obtain numerical values.
APPROXIMATE MEAN DECLINATION 1973
FOR CENTRE OF MAP
Annual change decreasing 2.8'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10

GRID ZONE DESIGNATION	100,000 M. SQUARE IDENTIFICATION
10 U	EM

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES

THE FOLLOWING GRID REFERENCE IS A SAMPLE ONLY AND DOES NOT REFER TO A POINT ON THIS MAP

REFERENCE POINT	CHURCH (as above)
EASTING: Read number on grid line immediately to left of point. Estimate tenths of a square from this line eastward to point	97 5 975
NORTHING: Read number on grid line immediately below point. Estimate tenths of a square from this line northward to point	98 4 984

EXAMPLE MILITARY GRID REFERENCE 975984

Nearest similar grid reference 100,000 metres (about 63 miles)

797

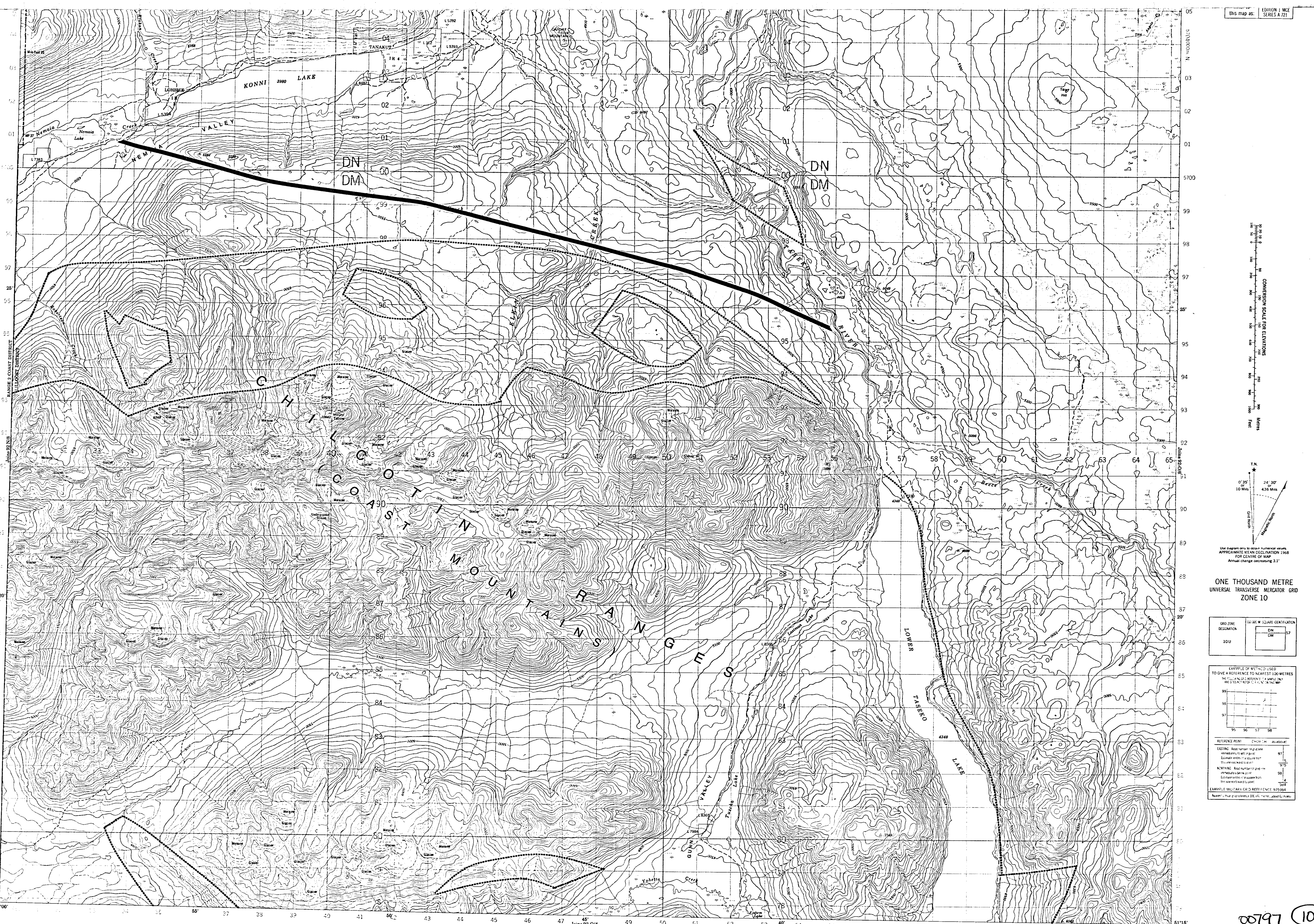
00797 (9)

Joins 92 J/16

YALAKOM RIVER

Produced by the SURVEYS AND MAPPING BRANCH,

Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE.



797

MOUNT TATLOW

LILLOOET DISTRICT

BRITISH COLUMBIA

Scale 1:50,000 Échelle

Compiled 1965 by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF LANDS, FORESTS AND WATER RESOURCES, BRITISH COLUMBIA, from aerial photographs taken in 1951-53. Field surveys 1958. Culture check 1965. Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Printed 1970

Copies may be obtained from the Map Distribution Office, Department of Energy, Mines and Resources, Ottawa

Roads: cart track .... / trail or portage ....

Routes: de terre .... / sentier ou portage ....

This Provisional Map is equivalent to a standard map in accuracy of content.

Some names on this map are not yet official. Corrections or additions are invited by the Surveys and Mapping Branch.

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Polyconic Projection

Cette carte provisoire équivaut une carte régulière au point de vue précision de l'information.

Certains noms inscrits sur cette carte ne sont pas encore officiels. La Direction des levés et de la cartographie saurait gré au public de lui signaler corrections et additions.

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au-dessus du niveau moyen de la mer
Système de référence géodésique nord-américain 1927
Projection polyconique

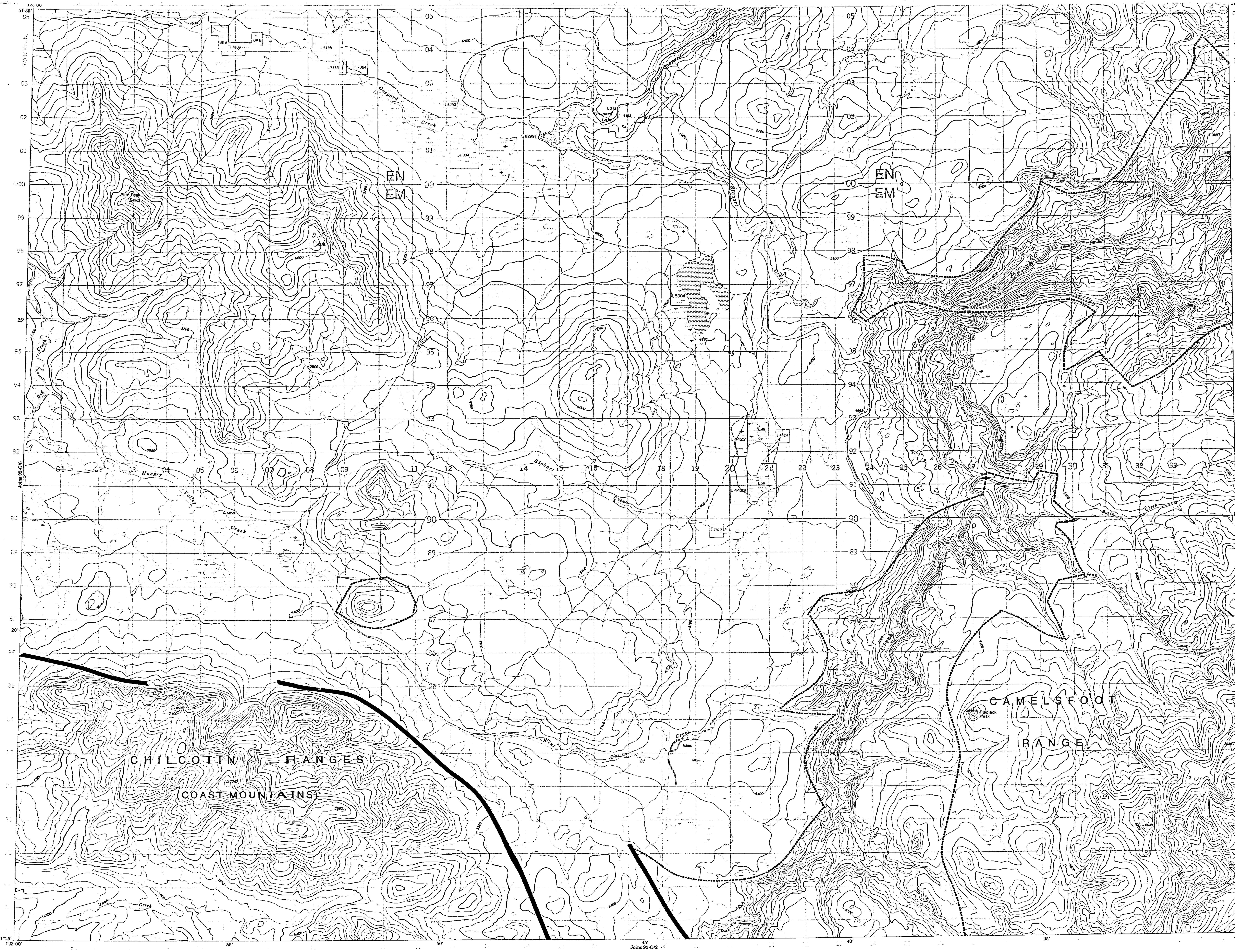
Rédigée en 1965 par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DES TERRES, FORÊTS ET RESSOURCES HYDRAULIQUES DE LA COLOMBIE-BRITANNIQUE d'après des photographies aériennes en 1951 et 1953. Levés sur le terrain en 1958. Vérification des ouvrages en 1965. Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Imprimée en 1970.

Ces cartes sont en vente au Bureau de distribution des cartes, ministère de l'Énergie, des Mines et des Ressources, Ottawa

00797 (10)

92-O/5
EDITION 1

Refer to this map as:	92-O/7 EDITION 1 MCE SERIES A 721



797

00797 (11)

CHURN CREEK

LILLOOET DISTRICT

BRITISH COLUMBIA

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Milles

Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

cart track........................ de terre........................

trail or portage........................ sentier ou portage........................

Compiled, 1963, by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF LANDS, FORESTS AND WATER RESOURCES, BRITISH COLUMBIA, from aerial photographs taken in 1951. Field Surveys 1958. Culture check 1967. Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Printed 1970.

Copies may be obtained from the Map Distribution Office, Department of Energy, Mines and Resources, Ottawa.

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CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Polyconic Projection

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ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au dessus du niveau moyen de la mer
Système de référence géodésique nord-américain 1927
Projection Polyconique

Rédigée en 1963 par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DES TERRES, FORÊTS ET RESSOURCES HYDRAULIQUES DE LA COLOMBIE-BRITANNIQUE, d'après des photographies aériennes prises en 1951. Levés sur le terrain en 1958. Vérification des ouvrages en 1967. Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Imprimée en 1970.

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CONVERSION SCALE FOR ELEVATIONS

0°12' or 4 Mils — 23°33' or 419 Mils — Grid North — Magnetic North

Use diagram only to obtain numerical values.
APPROXIMATE MEAN DECLINATION 1968
FOR CENTRE OF MAP
Annual change decreasing 3.2'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10

GRID ZONE DESIGNATION	100,000 M. SQUARE IDENTIFICATION
10U	EN / EM 57

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES

THE FOLLOWING GRID REFERENCE IS A SAMPLE ONLY AND DOES NOT REFER TO A POINT ON THIS MAP

REFERENCE POINT CHURCH (as above)

EASTING Read number on grid line

92-O/7
EDITION 1

25' 20' 15' 10' 05'

Joins 92-O/1

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EMPIRE VALLEY

LILLOOET LAND DISTRICT

BRITISH COLUMBIA

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Miles

Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Updated from aerial photographs taken in 1965-1967. Printed 1974.

Copies may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, or your nearest map dealer.

Roads:	Routes:		
loose or stabilized surface, all weather	gravier aggloméré, toute saison	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose surface, dry weather and unclassified streets	de gravier, temps sec et rues hors classe		
cart track	de terre		
trail or portage	sentier ou portage		

Some names on this map are not yet official. Corrections or additions are invited by the Surveys and Mapping Branch.

CONTOUR INTERVAL 100 FEET

Elevations in Feet above Mean Sea Level

North American Datum 1927

Certains noms inscrits sur cette carte ne sont pas encore officiels. La Direction des levés et de la cartographie saurait gré au public de lui signaler corrections et additions.

ÉQUIDISTANCE DES COURBES 100 PIEDS

Élévations en pieds au-dessus du niveau moyen de la mer

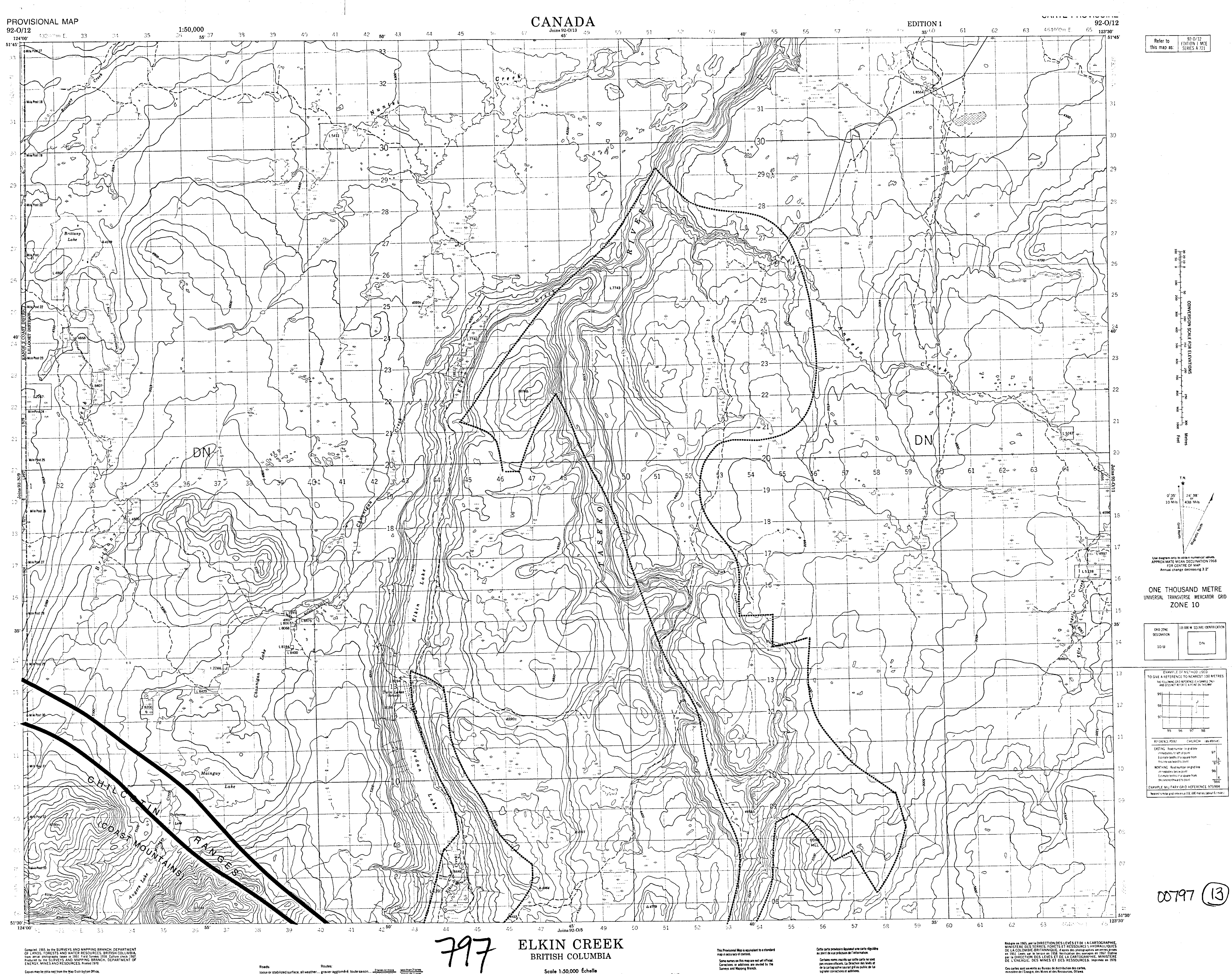
Système de référence géodésique nord américain, 1927

Établie par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Mise à jour à l'aide de photographies aériennes prises en 1965-1967. Imprimée en 1974.

Ces cartes sont en vente au Bureau des Cartes du Canada, ministère de l'Énergie, des Mines et des Ressources, Ottawa, ou chez le vendeur le plus près.

00797 (12)

92-O/8



PROVISIONAL MAP
92-O/12
CANADA
1:50,000
EDITION 1
92-O/12
Refer to this map as: 92-O/12 EDITION 1 MCE SERIES A 721
Joins 92-O/13
Joins 92-O/5
Joins 92-O/11
Brittany Lake
Brittany Creek
Nuntsi Creek
TASEKO RIVER
Angela Creek
Elkin Lake
Vedan Lake
Chaunigan Lake
Maingay Lake
Augers Lake
DN
DN
CHILCOTIN RANGES
COAST MOUNTAINS
CONVERSION SCALE FOR ELEVATIONS
ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10
ELKIN CREEK
BRITISH COLUMBIA
Scale 1:50,000 Échelle

797

00797 (13)

WARNER PASS

LILLOOET DISTRICT

BRITISH COLUMBIA

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Miles

Metres 10000 0 1000 2000 3000 4000 Metres

Yards 1000 0 1000 2000 3000 4000 Yards

Joins 92 J/14

Joins 92-O/6

Joins 92-O/2

Joins 92-O/7

123°30' 25' 20' 15' 10' 05' 123°00'

51°15' 51°00'

Refer to this map as: 92 O/3 EDITION 1 MCE SERIES A 721

CONVERSION SCALE FOR ELEVATIONS

Metres 0 50 100 150 200 250 300 350 400 450 500 550 600

Feet 0 100 200 300 400 500 600 700 800 900 1000 1100 1200

T.N.

0°12' or 4 Mils

23°53' or 425 Mils

GRID NORTH

MAGNETIC NORTH

Use diagram only to obtain numerical values.
APPROXIMATE MEAN DECLINATION 1968
FOR CENTRE OF MAP
Annual change decreasing 3.1'

ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 10

GRID ZONE DESIGNATION	100 000 M SQUARE IDENTIFICATION
10 U	DM 5

EXAMPLE OF METHOD USED TO GIVE A REFERENCE TO NEAREST 100 METRES

THE FOLLOWING GRID REFERENCE IS A SAMPLE ONLY AND DOES NOT REFER TO A POINT ON THIS MAP

REFERENCE POINT CHURCH (as above)	
EASTING Read number on grid line immediately to left of point	97
Estimate tenths of a square from this line east and to point	5
	975
NORTHING Read number on grid line immediately below point	98
Estimate tenths of a square from this line northward to point	4
	984

EXAMPLE MILITARY GRID REFERENCE 975984

Nearest similar grid reference 100 000 metres (about 63 miles)

Compiled, 1965, by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF LANDS, FORESTS AND WATER RESOURCES, BRITISH COLUMBIA, from aerial photographs taken in 1951. Field Surveys 1958. Culture check 1965. Produced by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES. Printed 1970.

Copies may be obtained from the Map Distribution Office, Department of Energy, Mines and Resources, Ottawa.

Roads
cart track
trail or portage

Routes
de terre
sentier ou portage

This Provisional Map is equivalent to a standard map as accuracy of contents.

Some names on this map are not yet official. Corrections or additions are invited by the Surveys and Mapping Branch.

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927

Cette carte provisoire équivaut une carte régulière au point de vue précision de l'information.

Certains noms inscrits sur cette carte ne sont pas encore officiels. La Direction des levés et de la cartographie serait plé au plaisir de lui signaler corrections et additions.

EQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au dessus du niveau moyen de la mer
Système de référence géodésique nord américain 1927

Rédigée en 1965, par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DES TERRES, FORÊTS ET RESSOURCES HYDRAULIQUES DE LA COLOMBIE-BRITANNIQUE, d'après des photographies aériennes prises en 1951. Levés sur le terrain en 1958. Vérification des ouvrages en 1965. Publiée par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES. Imprimée en 1970.

Ces cartes sont en vente au Bureau de distribution des cartes, ministère de l'Énergie, des Mines et des Ressources, Ottawa.

92-O/3
EDITION 1

00797 (14)

797

FLY CAMPS

During the summer six Fly Camp locations were established as centers of activity as shown of Figure 9. The camp activities are catalogued below.

Lilloet

Durations	:	June 9 to 13
Map Sheet	:	92J/16
Elevation	:	305 meters (1000 feet)
UTM Coordinates	:	Grid Zone IOU-EM 575500 East 5616000 North
Utilization	:	Mobilization (and Demob) 0.5 days
		Traverses 2.5 days
		Down time (2 flat tires) 1.0 days
Access	:	Used available road access to investigate area.
Average Traverse Day	:	A couple of 1500 foot climbs (2:3 slope) off road.
Partner	:	Allen Dibb

Slok Creek

Duration	:	June 14th to 21st
Map Sheet	:	92I 4
Elevation	:	1371.5 meters (4500 feet)
UTM Coordinates	:	Grid Zone IOU-EM 573500 East 5638250 North
Utilization	:	Mobilization (and Demob) 1 day
		Traverses 6 days
		Weather Day (Snow Storm) 1 day
Access	:	35 kilometer north of Lilloet via old (poor) logging road.
Average Traverse Day	:	2500 foot climb (2:3 slope) and 6 kilometer round trip.
Partner	:	Allen Dibb

South French Bar

Duration	:	June 22nd to 29th
Map Sheet	:	920-I
Elevation	:	1524 meters (5000 feet)
UTM Coordinates	:	Grid Zone IOU-EM 552800 East 5669225 North
Utilization	:	Mobilization (and Demob) 2 days
		Traverses 6 days
		Down Time 0 days
Access	:	120 kilometer of poor logging road which is parrallel and just west of Fraser River.
Average Traverse	:	1500 to 2000 foot climb (1:3 slope) and 10 to 14 kilometer round trip.
Field Partner	:	Allen Dibb

Interim time spend trading partners and dealing with truck breakdown.

"F" Hail Creek

Duration	:	July 1st to July 7th
Map Sheet	:	920-I
Elevation	:	1829 meters (6000 feet)
UTM Coordinates	:	Grid Zone IOU-EM 546500 East 5662650 North
Utilization	:	Mobilization (and Demob 1 day
		Traverses 5 days
		Clearing chopper pad with axe and swede saw 1 day
Access	:	Helicopter, 2.3 hour round trip from Kamloops Base.
Average Traverse Day	:	4000 to 5000 foot climb (2:3 slope) over 10 kilometers.
Partner	:	Bob Martin

July 8th, 9th and 10th spent compiling and interpretting data

Ore Creek

Duration	:	July 11 to 17
Map Sheet	:	92J-16
Elevation	:	1158 meters (3800 feet)
UTM Coordintes	:	Grid Zone IOUOEM 5550255 East 5643075 North
Utilization	:	Mobilization (and Demob) 1 day
		Traverses 5 days
		Field Injury (B. Martin), 2 days
		time spend trying to fix SSB Radio
Access	:	Helicopter, 2.5 hour round trip from Kamloops base
Average Traverse Day	:	3000 foot climb (1:1 slope) over 5 kilometers
Field Patner	:	Bob Martin

Helicopter Hopping

Duration	:	July 18th and 19th
Partner	:	Bob Martin

July 21, 24 through 29th spent in Calgary interpretting data and exchanging partners.

Helicopter Hopping

Duration	:	July 31st through August 6th
Partner	:	Eric Soprovich

August 7 program terminated, crew moved to Iskut camp.

Dash Creek

Duration	:	Sept. 15 to 19
Map Sheet	:	920-2
Elevation	:	1463 meters (4800 feet)
UTM Coordinates	:	Grid Zone IOU-EM 517775 East 5676200 North
Utilization	:	Mobilization (an Demob) 2 days
		Traverses 3 days
Access	:	Helicopter, 2.7 hour round trip from Kamloops Base
Average Traverse Day	:	Walking creek bed complicated by heavy snow.
Partner	:	Bob Tamaki

Sept. 21 the program was terminated due to early heavy snow.