ANGLO-SWISS INDUSTRIES INC.

SLOCAN VALLEY GEM PROJECT, BRITISH COLUMBIA

(82F/12)

by

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EXECUTIVE SUMMARY

The property, 100% held by Anglo-Swiss Industries Inc., is located in the Selkirk Mountains of southeastern British Columbia, at the confluence of the Little Slocan River and the Slocan River, near the city of Nelson. The property covers the Passmore dome, a secondary domal structure that is part of the Valhalla metamorphic core complex, which in turn belongs to a north-south trending belt of domal metamorphic complexes extending from central British Columbia to New Mexico. The Valhalla complex is roofed by the ductile Valkyr Shear zone on its west, north and south margins, and by the ductile/brittle Slocan Lake fault zone on its east side. The hanging walls of the Valkyr Shear zone and the Slocan Lake fault include low grade metamorphic rocks mostly of the Nelson batholith and its satellites.

The Valhalla complex is composed of three paragneiss sheets of uncertain age and three granitic sheets: the middle Cretaceous Mulvey orthogneiss, the Eocene Airy quartz monzonite and the Paleocene-Eocene Ladybird granite suites. The latter of which is not exposed on the property.

Anglo-Swiss' property is located in the lowest paragneiss sheet of the Valhalla complex. The base of the exposed section hosts two corundum occurrences: the Blu Moon showing located one kilometre northwest of the confluence of the Slocan and Little Slocan rivers; and the Blu Starr showing located east of the confluence. Cabochoned sapphires from these two areas produce black, gray and gray-blue stones with six-rayed asterism. The property also hosts blue-green beryls (aquamarine) found in pegmatites outcropping in the upper section of the Passmore dome. Two beryl-bearing pegmatites are known in the areas, of which one is on Anglo-Swiss property. Approximately ten more similar pegmatites that could potentially contain beryl are located on Anglo-Swiss property.

At the Blu Starr showing, corundum occurs in felsic paragneiss layers. This mineral is usually found in augens less than 15 centimetres long. Corundum can account for up to 50 % of the augen but often accounts for no more than 10%. White feldspar is the predominant mineral in the augens. Corundum crystals found at the Blu Starr deposit are usually medium to dark gray in colour and opaque. Crystals vary in size from 1 millimetre to 1.5 centimetres (>35 carats). There are no statistics available at present on the relative abundance of size fractions, but field observations indicate that stones between 5 and 8 millimetres in diameter (>4 and >10 carats, respectively) are common. Corundum grains found at the road cut are in general more purplish in

colour and sometimes slightly more translucent than those from the railroad cut. Most of the stones so far cut into cabochons show good to sharp stars on an opaque dark background. Preliminary heat treatment results indicate that Blu Starr stones usually turn medium to dark blue after treatment, although confirmation is pending whether they retain their star after treatment. The sharpness of the stars of untreated stones suggests a high titanium content, in the form of rutile (TiO_2), as such, proper heat treatment could yield blue stones without dissolving the star.

At the Blu Moon showing the host rock for corundum is a coarse-grained white syenitic gneiss. Corundum crystals there show a greater variability in size, colour and transparency than those at the Blu Starr. As well, the Blu Moon crystals are generally better in colour and transparency with colour ranging from gray to gray-blue, occasionally with a purple hue. Transparency ranges from translucent to semi-translucent with size ranging from 2 millimetres to 2 centimetres in diameter. Some crystals are partially replaced by a violet-pink mica inferred to be margarite. The reaction of Blu Moon corundums to heat treatment is unknown at this time, although as the transparency of a stone is often increased by heat treatment, some of the translucent stones are possible facet grade material. Corundum crystals from the Blu Moon do not star as well as those from the Blu Starr showing.

A rough evaluation of the Blu Starr deposit indicates a significant quantity of corundum crystals present in outcrops (~60,000 carats of cut stones/metre deep of outcrop). It is also likely that corundum will be found in placer environments as the deposit is traversed by the Slocan river. The volume of mineralization of the Blu Moon deposit could not be determined due to very limited data on mineralized areas.

The property has significant potential with placer deposits as both the corundum and the beryl showings are located at close proximity to the rivers. The large meanders of the Slocan River seen in the southern section of the property indicates a reduction in flow speed and therefore, deposition of the coarser grained particles carried by the flow. The gravels of the river bed could host beryl and corundum eroded from outcrops up stream. The southernmost meander contains an abandoned river bed which would also be a good placer target. Paleoplacers are also potential targets for these resistant minerals. Terraces of glacio-fluvial origin can be seen on both sides of the Little Slocan and Slocan Rivers, but are particularly pronounced on the south side of the Little Slocan River. Surficial deposits were delineated inside the property boundary, and areas of potential placer gemstone collection were examined. Paleoplacers represent a reduced environmental hazard as they are located away from current water drainages. As well, the higher rate of sedimentation during glaciation could also mean a greater number of corundum crystals deposited. Placer deposits derived from the Blu Moon host rock could yield facet grade material or good quality cabochon grade.

More study on heat treatment is necessary in order to determine the reaction of both the Blu Starr and Blu Moon corundum to the treatment. Notably, it is important to known if the treatment produces a blue-colouration in the crystals, if the stones retain their asterism after treatment, and if not, if the star can be reintroduced by proper cooling of the heat-treated stones. Factors such as colour, transparency and presence or absence of a star will greatly affect the value of the stones.

The economic significance of the pegmatites for aquamarine could not be ascertained, but it is recommended that the exploration of placers and paleoplacers for corundum also include examination for beryl. Some of the beryl-bearing pegmatites are located proximal to the Slocan River, therefore beryl could have been included in the placer deposits. The gemstone potential of this mineral while *in situ* in pegmatites is hard to evaluate due to the lack of gemstone applicable prospecting tools. A survey of the placer deposits for beryl concurrently with corundum could be a cost effective alternative. If beryl of economical quality is found, the more expensive *in situ* evaluation could be pursued.

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1. INTRODUCTION

1.1 Location, access, and topography

The property held by Anglo-Swiss Industries Inc. is located in the Selkirk Mountains of southeastern British Columbia, at the confluence of the Little Slocan river and the Slocan river, approximately 27 kilometres west-northwest of the city of Nelson and 25 kilometres north of Castlegar. The nearest airport is located in the town of Castlegar.

The property discussed in this report forms the southern part of the Valhalla Range, at its junction with the northeast trending Kokanee Range and the northwest trending Norms Range. These Ranges lie between Lower Arrow and Slocan Lakes in the West Kootenay District west of Nelson, in map area 82F/12 (figure 1).

Elevation varies from 500 metres along the Little Slocan River to 1800 metres in the southwest corner and the northern section of the property.

The property is readily accessed from Castlegar by highway 3A northbound, and then highway 6 towards Slocan. Access from Nelson is by highway 3A southbound, and then west on highway 6. The property encompasses the villages of Passmore and Vallican, with the nearest amenities at Slocan Park, located about 4.5 kilometres south of the Little Slocan and Slocan confluence.

The eastern section of the property is traversed by Highway 6, from which two secondary roads trend westward following both sides of the Little Slocan river. The central, low elevation, portion of the property is easily accessed by these two roads. The Airy creek and Yolanda creek drainage systems west of the property were logged in the early 1990's. This area is criss-crossed by numerous logging roads, some of which penetrate the southwest corner of the property, at elevations between 1300 and 1600 metres. These roads have been deactivated by numerous trenches spaced from 10 to 100 metres interval, and accessible with a 4WD only. The rest of the property area can be accessed by foot, with the exception of a few areas on Slocan Ridge that would required a helicopter and/or rock climbing equipment.

The property is located at the junction of three topographic features: the northeast trending Perry Ridge, reaching 2100 metres north of the map area; the northwest trending Slocan Ridge (1887 metres); and the northwest trending Norms Range, with summits of 2200 metres southwest of the property. The Little Slocan River and the Slocan River flow in the valleys located

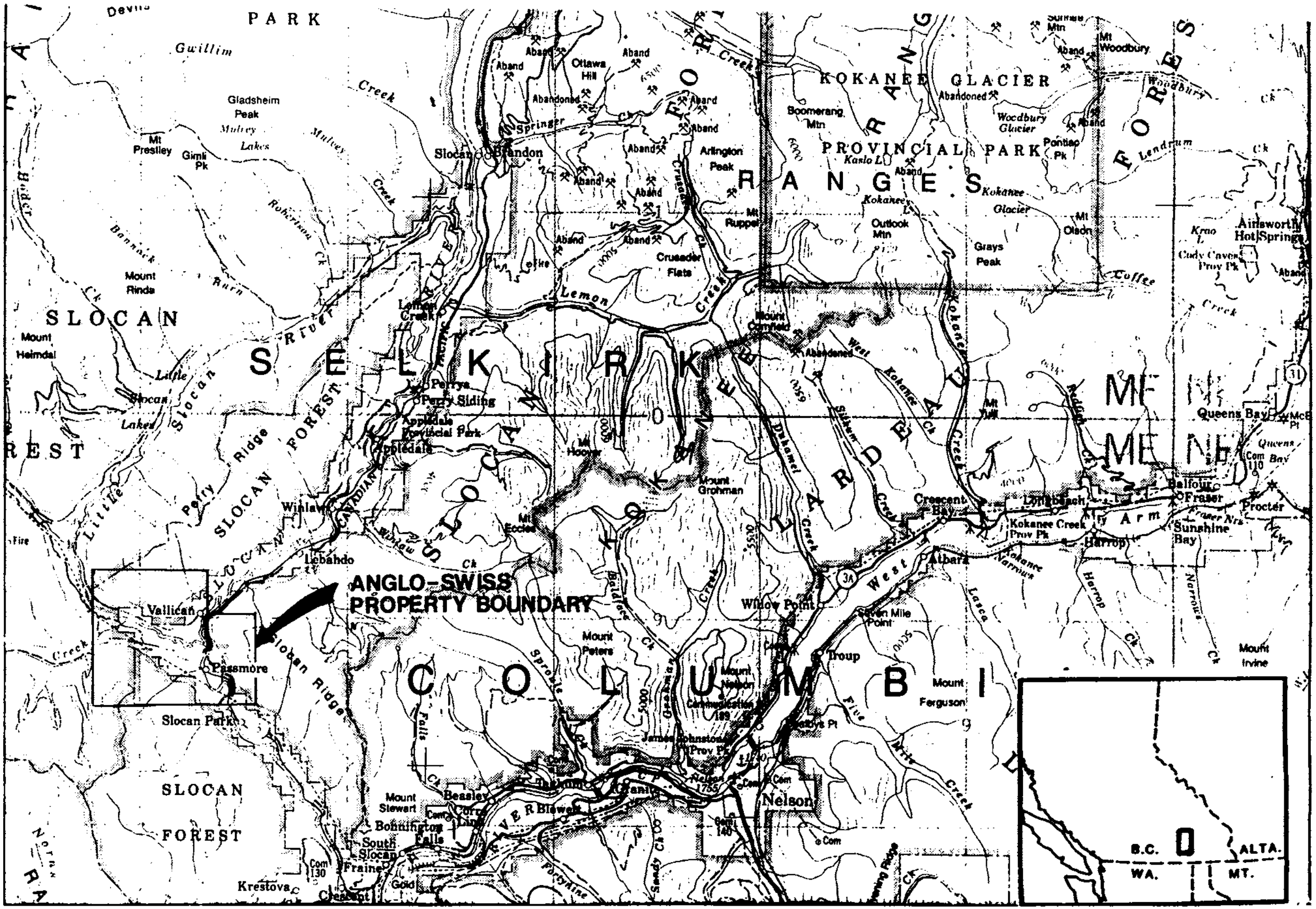

Fig. 1: General location of the study area. Scale 1:250,000

between these mountains. The highest summits in the southern part of the Valhalla complex are located in the Norms Range. Airy Mountain (2600 metres), and Mount Wilton (2312 metres) are the most prominent summits visible from the south-west corner of the property.

Topography of the property varies from gentle to extreme. The hillside south of the Little Slocan river has a gentle to moderate topography, with rock outcrops largely limited to major creeks. The west facing slope of Slocan Ridge is moderately steep to extreme and rocks outcrop on most of its surface. The south face of Perry Ridge has a more gentle topography with rock exposures more limited, especially at low to moderate elevation where they are mostly found in major creeks. Quaternary deposits cover most of the property surface, except for the steep face of Slocan Ridge. Quaternary deposits of 1 to 10 metres thickness cover the hillside south of the Little Slocan River. Slocan Ridge is mostly devoid of these recent sediments.

1.2 Property description and claim status

The property is 100% owned by Anglo-Swiss Industries Inc. and includes 198 units covering approximately 45 square kilometres. It forms a rough square (shown on Map 3) for which UTM coordinates are given in Table 1. A list of the block of claims with tenure numbers is given in Table 2.

Table 1: UTM coordinates of property corners

Corners	UTM longitude	UTM latitude
NW	448000	5493200
NE	454900	5493200
SE	454900	5486400
SW	447900	5486400

Table 2 List of claims with tenure number

Name	Tenure	Number of units
Vallican 1	325949	20
Vallican 2	325952	20
Vallican 3	325950	20
Vallican 4	325951	20
Vallican 5	325955	20
Slocan 1	325953	20
Slocan 2	325954	20
Sultan 1	326087	16
Sultan 2	326088	16
1 Mo	338581	1
2 Mo	338582	1
3 Mo	338584	1
4 Mo	338585	1
5 Mo	338586	1
6 Mo	338587	1
No Mo	338583	1
Blu Starr #5	320503	1
Blu Starr #6	335598	1
Blu Starr #7	335599	1
		~~197~~ 182

Anglo-Swiss holds the mineral rights to the entire surface lying within the corners of this block of claims, except for two units (B.Q.1 and B.Q.2) located in the center of VALLICAN 5, held by two prospectors.

1.3 History of work

The area lying between latitudes 49° and 50° north and longitudes 117° and 118° west, which includes the Valhalla Complex, was surveyed by Little (1960) at a scale of 1:253,440, and by Little (1973) at a scale of 1:125,000. The section of the Complex between New Denver and Passmore was mapped in more detail (1:63, 360) by J.E. Reesor between 1958 and 1960 and his report was published in 1965. The study area is located in the southern section of Reesor's map. There is no mention in his report of any corundum occurring in the Passmore area.

The first mention of corundum from the area is given by Hoy *et al.* (1993). Pell (1994) mentioned the discovery of blue corundum crystals (star sapphires) in the Slocan Valley within a syenitic phase of the Valhalla complex. The only geological study specifically encompassing the corundum occurrence described in this report is by Coyle (1995). The occurrence was described and analyzed in relationship with the tectonic and plutonic setting of the Valhalla metamorphic complex and adjoining rocks.

1.4 Geological work

1.4.1 Introduction

The property was mapped at a scale of 1: 20, 000. Topographic map 82F052 (TRIM map) produced by the Ministry of Crown Lands, Survey and Resources Mapping Branch, was used. This map was enlarged to a scale of 1:10, 000 for the plotting of geological contacts and measurements. A forest cover map at 1:20, 000 scale, produced by the Ministry of Forests, Inventory Branch Province of British Columbia, was useful in providing the locations of recent logging roads.

The geological map resulting from the regional survey of Reesor (1965) was used as a basis for further mapping.

Positioning during mapping of the property, outside the detailed areas of the Blu Moon and Blu Starr prospects, was done using traditional methods: bearing and chaining for the most part, and triangulation.

The 1996 field work was performed by a team of two people, except for a few occasions when three people were required. The authors surveyed the property together for a period of two and a half weeks. The rest of the time, the project geologist worked with one of the following prospectors: Brian Meszaros, Rod Luchansky, John Demers and, Marc Goldenberg.

1.4.2 Scope of present study

The present study was undertaken to determine the economical potential of the corundum (star sapphire) and beryl (aquamarine) occurrences located on the property. The first phase of the project involved detailed mapping of the Blu Starr and Blu Moon corundum occurrences to determine the extent of mineralization. The second phase involved regional mapping of the property and location of granite-pegmatites, with emphasis on the beryl-pegmatite occurrences to determine the potential for gem quality aquamarine. The third part of the field work investigated potential areas for paleoplacer deposits. This encompassed a literature search, airphoto interpretation, and field visits.

Approximately 10% of the property area was mapped during the summer 1996 field work. Sections of the property covered include: detailed geology at a scale of 1:500 of the Blu Starr and Blu Moon prospects; regional mapping at a scale of 1:10,000 of the northern section of SLOCAN 1, south-east corner of SLOCAN 2, southern half of VALLICAN 5, and southwest corner of VALLICAN 1 encompassing an area approximately 600 metres by 50 metres. Two beryl pegmatites were known to occur in the area; one in the southeastern section of SLOCAN 2, and the one in the B.Q. claim that is held by two prospectors. These two areas were targeted first for prospecting and mapping of the pegmatites.

1.5 Acknowledgments

The authors would like to thank prospectors Rod Luckanski, Brian Meszaros, and Mark Goldenberg (Moses) for their help during field work. They provided valuable information on the location and geology of both the corundum and beryl occurrences.

We would also like to thank Ed Varney and Dave Barclay for allowing access to their pegmatite prospect.

2. GEOLOGY

2.1 Regional geology

The property held by Anglo-Swiss Industries Inc. in the Slocan Valley area is part of the Valhalla metamorphic core complex, located within the Omineca belt of the Canadian Cordillera. The Valhalla complex belongs to a belt of domal metamorphic complexes trending north-south and extending from central British Columbia to New Mexico (Eaton *et al.*, 1990). In Canada, these complexes include, from north to south, The Pinnacles, the Frenchman cap dome, the Thor Odin complex, the Malton complex, and the Valhalla complex (Parrish *et al.*, 1988). They all share similar characteristics: high grade metamorphic rocks bordered by major ductile/brittle shears or faults, with low grade metamorphic rocks exposed in the hanging walls of these outward dipping faults (Parrish *et al*, 1988, Carr *et al.* 1987).

The overall pattern of regular foliation throughout the Valhalla complex defines two roughly domal masses: the Valhalla and Passmore domes (Reesor, 1965). The complex consists in its northern part of rugged east-west trending ridges reaching 2500-2800 metres elevation. Gladsheim Peak (2898 metres), is the highest summit of the Range. The southern part of the complex, in the Passmore area, is not as rugged.

The property area is separated from the major part of the complex by the northeast trending Perry Ridge, which is drained on its north side by the Little Slocan river, and by the Slocan river on its southern side.

Reesor's report (1965) remains the most comprehensive study on the Valhalla dome complex to date. More recent geological and tectonic studies on the complex include, among others, Parrish (1984), Parrish *et al* (1985), Carr (1985, 1986), Bevier (1987), Carr *et al.* (1987), Eaton and Cook (1989), Liu and Furlong (1993). Carr *et al.* (1987), summarized the references available on the complex to that date.

The Valhalla complex is approximately 100 kilometres long by 30 kilometres wide and trends roughly north-south (Figure 2). It is composed of sheets of granitic orthogneiss ranging in age from 100 to 59 Ma and paragneiss of uncertain age (Carr *et al.*, 1987). The complex is roofed by the ductile Valkyr Shear zone on its west, north and south margins, and, by the ductile/brittle Slocan Lake fault zone on its east side. The hanging walls of the Valkyr Shear zone and the Slocan Lake fault include low grade metamorphic rocks mostly of the Nelson batholith and its satellites. The

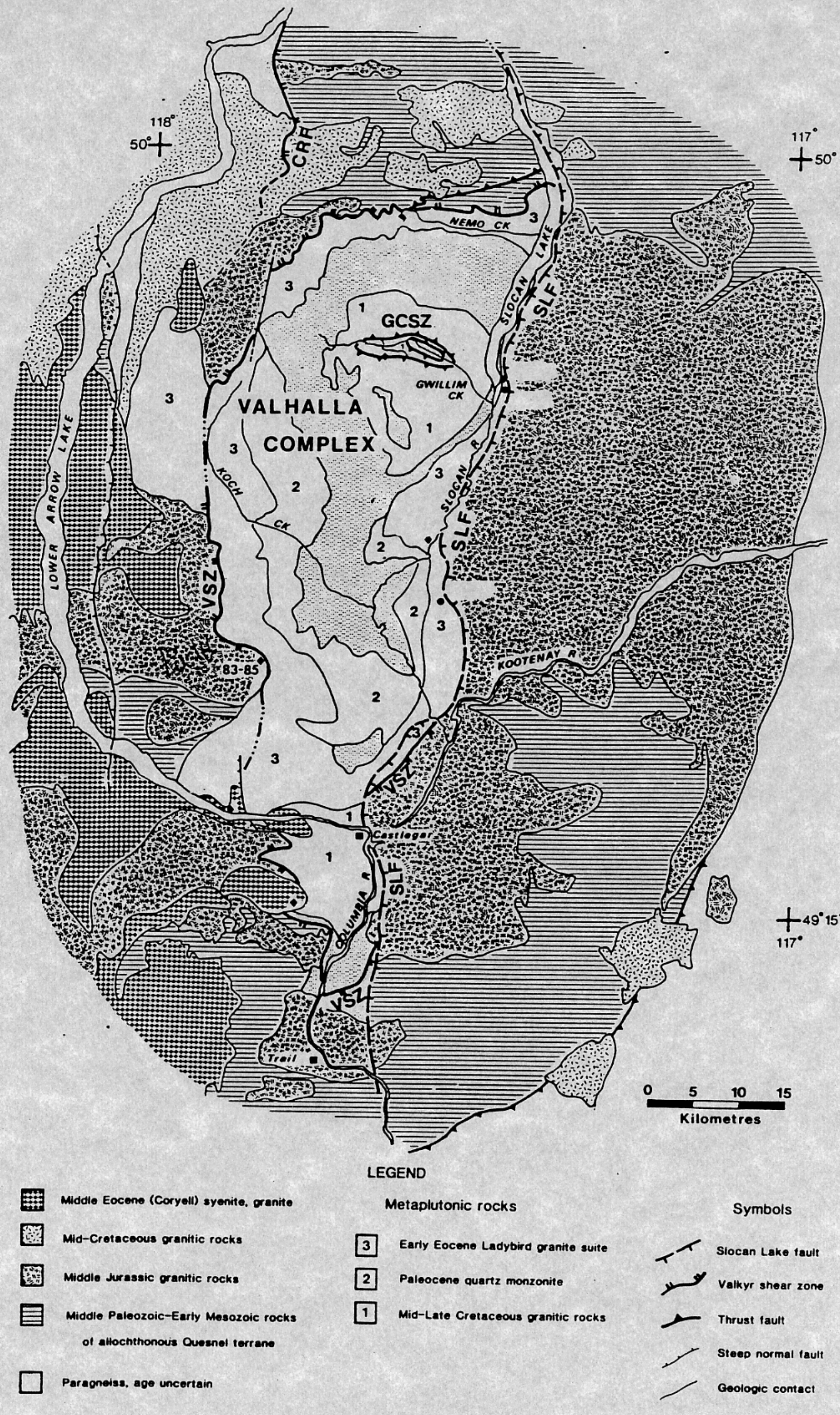

Fig. 2: Geological map of Valhalla Complex, unmodified from Parrish *et al.*, 1988

northern end of the complex is overlaid by metasedimentary rocks of the Paleozoic and Triassic Nemo Lakes belt and upper Triassic Slocan Group (Carr *et al.*, 1987). The southern portion of the complex is overlaid structurally by lower grade greenschist volcaniclastic and volcanic rocks of the early Jurassic Rossland Group, as well as metasedimentary rocks thought to be correlative with the Pennsylvanian (?) Mount Roberts Formation (Carr *et al.*, 1987). The lower plate of the complex includes the Castlegar gneiss complex and the Trail gneiss (Carr *et al.*, 1987).

The Slocan Lake fault is a north-south trending low angle (30°), easterly directed, normal fault. The Valkyr Shear is an inferred eastward rooting ductile normal fault (Carr *et al.*, 1987), active between 59 and 54 Ma (Carr *et al.*, 1987). The footwall rocks of the Valkyr Shear zone have accommodated most of the strain, as mylonitic fabrics are penetrative over a 2 to 2.5 kilometres thick zone. The hanging wall only shows strain over 500 metres (Carr *et al.*, 1987). The Slocan Lake fault zone is slightly younger (54 to 45 Ma) and shows brittle to ductile deformation. Both are significant structures with large displacements (Carr *et al.*, 1987). Extensive U-Pb and Rb-Sr dating on Eocene granitic rock units (Bevier, 1987; *Carr et al.*, 1987; Parrish *et al.*, 1988) involved in and cross-cutting these structures, demonstrated their Eocene age of displacement. Furthermore, these authors proposed an extensional origin for these structures. The Valkyr Shear zone was previously thought to have been active in Middle Jurassic to Early Cretaceous time (Gabrielse *et al.*, 1989) during the compressional phase that resulted in accretion of terranes to the western north America continental margin. The Valkyr Shear zone dips west, and a reversal of dip from eastward to westward is required for the structure to be east rooting, as proposed by Carr *et al.*, (1987). Arching of the complex might be responsible for such a dip reversal.

The last period of extension beginning in Eocene time caused a rapid uplift and denuadation of the complex. Metamorphic grade reached by the gneisses of the Valhalla complex indicates that extensional uplift exhumed the complex from a depth between 10 to 20 kilometres (Parrish *et al.*, 1988). For a comprehensive review of extensional tectonics of the Valhalla complex, readers are referred to studies mentioned earlier.

The complex includes three paragneiss sheets of uncertain age and three granitic sheets dated by the U-Pb zircon method: the late Cretaceous Mulvey granodioritic gneiss (100 ± 5 Ma), the Paleocene Airy quartz-monzonite (62 ± 1 Ma), and the Paleocene-Eocene Ladybird granite suites (59 ± 1 Ma) (Carr *et al.*, 1987). Displacement on the Valkyr Shear zone closely followed, or was synchronous, with emplacement of Ladybird granitic rocks. (Parrish *et al.*, 1988). Nomenclature of the rock units referred to in recent studies differs from the one set up by Reesor (1965). Nomenclature correlation is detailed in Table 3.

Table 3: Nomenclature correlation between Reesor (1965) and recent studies

Reesor (1965)	Recent studies [1]	Age (Ma) [1]
Unit 1 or, Veined gneiss	Mulvey orthogneiss	100 ± 5
Unit 2 or, Hybrid gneiss	Paragneiss	uncertain
Unit 3 or, Mixed gneiss	Airy quartz monzonite	62 ± 1
Unit 7, 8	Ladybird granite suites	58 ± 1
Unit 9, 10	Coryell syenite	51.7 ± 0.5
Unit 10a, 6, 6a	Nelson batholith	169 ± 3

[1] Data from Carr *et al.*, 1987 and Parrish *et al.*, 1988.

The ages and correlations of the three paragneiss sheets are uncertain. The uppermost paragneiss sheet, exposed around the periphery of the Valhalla dome and in the core of Passmore dome, comprises quartzofeldspathic gneisses with minor amphibolite, calc-silicates, and quartzite, and, is intruded by leucogranite, pegmatites, and migmatites. The two lower paragneiss sheets are exposed north of the study area, in the lower reaches of Gwillim Creek in the Mulvey gneiss core of the Valhalla dome (Carr *et al.*, 1987). In both cases, their upper boundaries are in sheared contact with the Mulvey gneiss in the Gwillim Creek shear zones.

The paragneiss and Mulvey gneiss are overlain by early Tertiary granitic rocks which occur around the periphery of the Valhalla dome and throughout Passmore dome (Carr *et al.*, 1987). The Airy quartz-monzonite borders the hybrid gneiss on all but the eastern side of the complex, along the Slocan river. The Airy quartz monzonite is 2 kilometres thick in the Passmore dome area. It pinches out to the north and south (Carr *et al.*, 1987). This unit is in turn mantled by the Ladybird granite, which is structurally the highest and most extensive granitoid sheet of the complex. It lies in the immediate footwalls of both the Valkyr Shear and Slocan Lake fault zones. It is a 0.5 to 3 kilometres thick variably foliated sheet of biotite leucocratic granite (Parrish *et al.*, 1988).

Displacement on the Valkyr Shear zone closely followed, or was synchronous with, emplacement of Ladybird granitic rocks. Slightly younger late kinematic to post kinematic granite and pegmatite of the Ladybird intrusion suite intruded deformed rocks of the Valkyr Shear zone and have a U-Pb zircon lower intercept age of 56.5 ± 1.5 Ma.

The last phase of plutonism to occur in the Valhalla complex is represented by the post-kinematic syenitic Coryell intrusions (51.7 ± 0.5 Ma). They outcrop in the upper and lower plate of the Valkyr Shear zone.

metamorphic grade

The Valhalla complex is composed of high-grade metamorphic rocks of the garnet-amphibolite sub-facies. The paragneiss sheets are at sillimanite-potassium-feldspar grade and are polydeformed (Carr *et al.*, 1987).

2.2 Property geology

The property is part of the Passmore dome, which is a secondary domal structure located south of the Valhalla dome. The hybrid gneiss (unit 1 of Reesor, 1965) is the most extensive rock unit exposed on the property. The Airy quartz monzonite (unit 3b or mixed gneiss of Reesor, 1965) is exposed at the eastern perimeter of the property at the top of Slocan Ridge and north of the Little Slocan river on Perry Ridge. This rock unit outcrops less than a kilometre west of the south-west corner of the property. The property also includes unit 1d (hornblende-granodiorite gneiss) of Reesor (1965), exposed at the Blu Moon and the Blu Starr claims, and west of the Blu Moon claim. This unit does not outcrop in the Valhalla dome.

Reesor's map shows unit 1d extending on both sides of the Little Slocan river from approximately 700 metres elevation on the southern side of the river to 925 metres north of the river. No outcrop of this unit was seen on the southern side of the river due to the thick overburden coverage.

Units 7 and 8 of Reesor (1965), now part of the Ladybird granitic suites (Carr *et al.*, 1987; Parrish *et al.*, 1988) range in composition from granite to quartz monzonite (Reesor, 1965). This unit is the lithology forming the prominent summits of Mount Wilton (2312 metres) and Airy Mountain (2618 metres), which are part of Norms Range, and that can be seen from the south-west corner of the property.

2.2.1 Description of the hybrid gneiss (unit 1)

It is important to mention here that the main goal during mapping of the property was not to produce a detailed geological description of the hybrid gneiss which covers most of the property surface, but to provide a general picture of this unit while prospecting for beryl-pegmatites. The stratigraphic position of the pegmatites in the gneiss was also noted. The hybrid gneiss is in itself a unit of low economical potential and, with that perspective in mind, it was described only summarily when encountered. An exception was made for the hornblende- granodiorite gneiss unit found at low elevation, which is locally corundum-bearing.

On Reesor's (1965) map, the hybrid gneiss unit located in the southern section of the Valhalla complex is poorly subdivided compared to the same unit in the northern section of the complex. This is due to poor rock exposure, principally on the hillside south of the Little Slocan river. Recent logging in the south-west corner of Vallican 5 facilitates access and provides better exposure of this unit at high elevation (1300-1600 metres).

2.2.1.1 Undivided hybrid gneiss (unit 1)

The southeastern corner of SLOCAN 2 was traversed up to an elevation of approximately 800 metres. The hybrid gneiss is the only rock unit outcropping in this section of the property. It is an heterogeneous rock unit showing finely interlaminated pale and dark layers composed of variable amounts of quartz, feldspars and biotite, occasionally with garnet. Interlayering of garnet amphibolite is not uncommon in this area. This lithology generally forms fairly homogeneous thick layers (up to 1.5 metres). Garnet reaches up to 1 centimetre in diameter and comprises up to 40% of the modal content of the rock.

The hybrid gneiss is exposed in the western section of VALLICAN 1, in Talbot creek. This unit was first recognized at an elevation of approximately 750 metres and could be observed almost continuously up to 860 metres where the creek splits into two. It is more felsic in this area than in SLOCAN 2; amphibolite and hornblende-rich layers occur rarely. The paragneiss is mostly composed of alternating pale and dark thin quartzofeldspathic layers with variable amounts of biotite. Four small pegmatites were found along the creek (see section 5.1). The bottom section of Talbot creek exposes unit 1d (hornblende-granodiorite gneiss).

Schorl tourmaline is a common accessory mineral found in the hybrid gneiss, both in leucocratic orthogneiss and in paragneiss layers. It occurs as single crystals less than 5 millimetres long, but occasionally forms radiating clusters 1 to 3 centimetres in length.

2.2.1.2 Unit 1b

This unit was not recognized by Reesor (1965) in the Passmore area during his survey due to poor exposure. The hillside is buried by Quaternary deposits reaching many metres thick in most places and outcroppings are scarce outside the logged areas, although logging roads have created significant rock exposure.

The hybrid gneiss observed in the southern section of Vallican 5 is significantly more felsic than that found in the southeastern section of SLOCAN 2. At Vallican 5, at least 75% of the rock is felsic in character, and is comprised of concordant quartz-feldspar-biotite paragneiss layers (locally with sillimanite) alternating with coarse grained leucogranite gneiss layers and, locally, granite pegmatites. Intermediate to mafic units such as amphibolites and biotite-hornblende-quartz-plagioclase paragneiss amount to less than 25% of the total rock exposed. This description corresponds to unit 1b of Reesor (1965) and, consequently, the area was remapped as unit 1b. The whole area mapped in this section of the property belongs to unit 1b, and the geological contact between this unit and the undivided part of the hybrid gneiss was not seen during mapping. Consequently, the contact was approximated on the geological map, at the margin of the area covered during mapping.

Between 1500 and 1600 metres elevation, paragneiss and orthogneiss form individual homogeneous layers many metres thick (10-20 metres). Orthogneissic layers are white to cream in colour, coarse grained, with relic igneous textures partially obliterated by sub-horizontal penetrative foliation. The paragneissic layers weather buff in colour and are composed of quartz, feldspars, biotite, and locally, sillimanite. The horizontal foliation is cut by sub-vertical east-west shear zones, which are locally very penetrative and where mineral grains have been strongly elongated parallel to the structures. Although both the pararagneiss and the orthogneiss have similar composition, the paragneiss layers are significantly more affected by the first stage of deformation than the leucocratic orthogneiss. The orthogneisses are coarser grained and thus would be less affected by deformation, but grain size alone can not adequately explain the large difference in strain between the paragneiss and the orthogneiss. This seems to indicate that the leucocratic sheets are syn-tectonic to post-tectonic, with respect to the Eocene deformation and therefore do not record the

Mesozoic compressional phase that has affected the paragneiss. The vertical foliation is not as pervasive in the orthogneiss and movement is most often expressed as discrete brittle faults.

Reesor (1965) observed that the hybrid gneiss becomes progressively more felsic upward in the sequence. This was also observed by the authors: the gneisses observed between 1300 and 1600 metres elevation are noticeably more felsic than the ones seen at lower elevation. Unit 1b was not observed at any other areas of the property, but is likely more widespread in the Passmore dome area than Reesor's map indicates, especially at higher elevations in the south-western part of the dome where rock exposure is poor.

2.2.1.3 Hornblende granodiorite gneiss (unit 1d)

Reesor (1965) describes this unit as "garnet-hornblende augen gneiss; some garnetiferous leucogranite-gneiss and some amphibolite". This unit is highly heterogeneous. The base of the sequence predominantly shows melanocratic gneiss, grading upward into more felsic material. The basal sequences are also more finely interlaminated and are similar in appearance to the undivided part of the hybrid gneiss. The hornblende content serves as a criterion to subdivide the hybrid gneiss into hornblende granodiorite gneiss. However, its modal content is sometimes very low and in some layers totally absent, making field recognition of the unit on a mineralogical basis difficult. Hornblende is also present in the undivided hybrid gneiss, especially in the mafic gneiss often associated with amphibolite layers. The change from intermediate-mafic to felsic in the hornblende-granodiorite gneiss occurs progressively across approximately 30 metres (see stratigraphic section of the Blu Starr outcrop, section 3) and it is not impossible that such a short stratigraphic sequence could be repeated upward inside the hybrid gneiss. A syenitic layer (~10 metres wide) was observed at approximately 1700 metres elevation in the southwest corner of the property.

Unit 1d was observed in a small exposure in Talbot creek at approximately 600 metres elevation. It is medium gray in colour and comprises quartz-feldspar-biotite ± hornblende layers interlayered with thin amphibolite gneiss and underlaid by cream colour, coarse-grained feldspar-quartz ± biotite ± hornblende gneiss.

This rock unit also outcrops west of the Blu Moon prospect. It forms a line of steep cliff faces that extend for a distance of approximately 2 kilometres parallel to the Little Slocan River. Some of these outcrops were visited by the first author, to determine the potential for corundum. Although corundum was not found, the host-rock shares many similarities with the corundum bearing rock of the Blu Moon prospect. At roughly 1.5 kilometres west of the eastern margin of the Blu Moon outcrop, the face is about 50 metres high. The lower 25-30 metres of the outcrop exposes finely interlaminated pale and dark gray paragneiss while the upper 20 metres is comprised of coarse grained (1 to 2 centimetres) white syenitic gneiss, locally rich in hornblende and/or magnetite. This rock is very similar in texture, colour and composition to the rock exposed at the top of Blu Moon. Both this western location and the Blu Moon are located at approximately the same elevation, and as the foliation is mostly sub-horizontal in this unit, rocks from these two areas are correlative. This indicates that this outcrop could also be corundum-bearing.

At the outcrop 1.5 kilometres west of the Blu Moon, paragneiss and syenitic gneiss are separated by two sills approximately one metre wide. These are pegmatitic in texture and composed of feldspars and hornblende. Visual examination indicates that they are probably similar in composition to the pegmatites found at Blu Moon.

The contact between the overlying undivided hybrid gneiss and unit 1d was not seen at this locality, nor at any other place on the property. This rock unit will be further described in section 3.2: Geology of the Blu Moon prospect.

2.2.2 Airy Quartz Monzonite (Unit 3e)

The contact between unit 1b and the overlying Airy quartz monzonite (unit 3e of Reesor, 1965) was not seen. This younger rock unit was observed outside the property boundary at approximately 1850 metres elevation, probably close to the contact with hybrid gneiss unit 1b. The rock is pinkish-gray in colour, fine to medium grained and highly foliated to mylonitic with local augen of potassium feldspar.

3.0 GEOLOGY OF THE BLU STARR PROPERTY

The Blu Starr corundum occurrence is exposed along three sections located near the confluence of the Little Slocan River and the Slocan River, approximately 4.5 kilometres north of the town of Passmore.

The Blu Starr property was mapped in detail at a scale of 1:500 to determine the extent of mineralization. Sapphire-bearing layers outcrop discontinuously along the three north-northwest (340°) trending sections (Map 2). The best exposures occur along the east side of the abandoned Canadian Pacific Railroad line and along highway 6, 17 metres above the railroad cut. Corundum-bearing layers can also be seen near the river. Outcroppings at this last section by the river are small, weathered and obscured by river sediments. The three sections expose approximately 30 metres of the hornblende-granodiorite gneiss, unit 1d of Reesor (1965), between 500 and 530 metres elevation.

The corundum-bearing layers were traced (Map 3 and 4) and their widths recorded. The different lithologies encountered on outcrops are described on Map 4, which was drawn with a vertical exaggeration of 5 (scale 1:100). The foliation is horizontal to sub-horizontal along most of the length of the outcrops. The base of the sequence exposed at the Blu Starr showing comprises interlayered feldspathic gneisses, with or without quartz, amphibolite and biotite schist grading upward into more felsic layers. Layers increase in width from the base to the top of the stratigraphic section. Each section will be described in detail in the following paragraphs.

Corundum-bearing layers outcrop discontinuously along approximately 65 metres total of the 340 metres long outcroppings (Map 3). In some areas, more than one corundum-bearing layer is present. No corundum was found in the middle outcrop section. Table 4 gives the total length of corundum-bearing layers versus total length of outcropping for the railroad cut, the road cut and the river section. Table 5 details the position, length, and width of the corundum layers traced on the three sections.

3.1 Railroad section

The railroad section is composed of three outcrops as shown on Maps 5 and 6. The base of the section is mostly felsic gneiss (quartz-feldspar ± bioite ± hornblende to feldspar-biotite-hornblende ± corundum) interlayered to interlaminated with amphibolite (unit 12 of Map 6). Migmatites and small pegmatites (<10 centimetres) are present in amphibolite-rich zones. This sequence is overlain by 0.5 to 2.5 metres wide augen gneiss layers that grade upward from intermediate to felsic in composition. Unit 12 (Map 6) shows intense deformations and migmatites. Grain size and quartz content increase upward within the layers.

Unit 9 is cut by an orange weathering sill/dyke. The rock is pale orange on a fresh surface and composed of coarse grained feldspar (probably potassium feldspars) and green to black amphibole crystals. One corundum grain was found in the quartz-poor middle section of Unit 7, located less than a metre away from the orange layer. The lowermost gneiss units found by the river also have a similar mineralogy: orange feldspars and green amphibole. It is uncertain if both intrusions have similar composition.

Table 4: Length of corundum-bearing layers *versus* total length of exposure for the three sections: railroad, road and river sections.

Section	Total length of outcrop (in metres)	Length of corundum-bearing layers (in metres).
Railroad cut	175	32
Road cut	100	17
River	64	15
Total	339	64

Corundum-bearing layers were seen on the northern and southern outcroppings of the railroad cut at the base of the section. They vary in width from a few centimetres to about half a metre, but generally are less than 15 centimetres. They are normally within a pegmatitic augen, pale gray in colour, and fine to medium grained. The mineralized layers are often sandwiched between amphibolite and/or biotite schist layers, showing upward and lateral variability in composition. The layers are sometimes quartz-bearing at their tops, and where quartz is present, corundum will be absent, as these two minerals are mutually exclusive. Corundum can form up to 50% of the augen in which they are found, although these augens rarely reach more than 20 centimetres long by 10 to 15 centimetres wide. Typically, they are less than 10 centimetres long by 5 centimetres wide (Table 5a). Corundum-rich augens were found in almost every layer examined.

Table 5: Position, length and width of corundum-bearing layers.

a) Railroad section

Location on line (m)	Layer 1		Layer 2		Layer 3		Layer 4	
	Length (m)	Width (cm)	Length (m)	Width (cm)	Length (m)	Width (cm)	Length (m)	Width (cm)
32-35			3	10				
32-38	6	10						
32-41					9	10		
22-43							11	10
55-58					3	8		
58-65	7	17	7	17	7	18	7	18
208-215			7	15				
215-220	5	15	5	25				
220-240	20	35	20	20				
240-245	5	30						

Table 5b: Road cut section

Position on line (m)	Length (m)	Width (cm)
95-98	3	10
115	0.5	15
125-135	10	30

Table 5: Position, length and width of corundum-bearing layers (continued)

c) River section

Position on line (m)	Length (m)	Width (cm)	Length (m)	Width (cm)
105-110	5	15	5	30
155-170	15	10		

Corundum layers are laterally heterogeneous in composition. Corundum can suddenly disappear, and quartz appear within a few centimetres, as demonstrated between 58 and 72 metres on the section. At this location, four distinct corundum layers can be traced eastward to the end of the outcrop at 72 metres. At 65 metres corundum disappears suddenly, with quartz appearing. This is repeated at 210 metres where a 15 centimetres wide corundum-rich layer suddenly becomes corundum barren westward. Because of the discontinuous nature of the corundum bearing layers, it would be unrealistic to extrapolate the corundum-bearing layers beyond what has been observed on the outcrop.

The richest corundum exposures are located between 58 to 65 metres and 220 to 245 metres. A small corundum grain of 5 millimetres in diameter was found at 220 metres in unit 7 of Map 4, 8 metres above the railroad cut.

3.2 Road section

The road section is approximately 100 metres long by 13 metres high. It is obscured on more than half of its surface due to weathering and/ or road dust and could only be examined between 80 and 140 metres along the the oad line (Map 3 and 4). Only the first four metres of the face could be observed closely enough for mineralogical identification, as well as the top eastern section (Map 3) which can be reached *via* a short trail.

The outcrop is in general significantly more felsic than the railroad and river sections. The eastern part of the outcrop is cream in colour. The rock is medium to coarse-grained and consists of layers less than 0.5 metre wide. Corundum-bearing layers are mostly composed of feldspar with variable modal content of biotite and minor garnet. The top layer is overlain by interlayered amphibolite and biotite schist while underlying rock is too obscure for proper identification.

The outcrop seems to become more mafic westward and contains paragneiss interlaminations composed of feldspars-biotite ± quartz. The foliation dips gently southeast and exposes lower stratigraphic units westward. No corundum was found west of the 95 metres mark of the line (Map 3 and 4).

The top of the outcrop (between 140 to 150 metres) is very coarse-grained. The eastern section shows intense deformations grading into mylonite across a 1 to 1.5 metres wide section. Rock at this location is medium gray with cream coloured feldspar augens, and a higher biotite content. A few corundum grains (< 5 millimetres) were found in the mylonitic zone. Rod Luchanski (personal communication) reported finding large stones in this area.

Corundum was only found on the easternmost 50 metres section of the outcrop. The most significant corundum-bearing layer was traced between 125 and 135 metres (Map 4). A smaller layer was found between 95 and 100 metres; and a short exposure at about 115 metres. A large (1.5 centimetres) corundum grain was seen in the rock face at 125 metres, 10 metres above the road.

3.3 River section

The river section contains two outcrops located between the two mineralized outcrops of the railroad cut. Outcrops found near the river are small, usually less than a metre high and often obscured by overburden. Two outcrops located between 100 and 110 metres and 155 and 165 metres contained corundum layers. The first one shows interlayering of quartzofeldspathic gneiss and amphibolite gneiss underlying the corundum-bearing layers, overlain by amphibolite. The easternmost outcrop shows a corundum layer sandwiched between two amphibolite-rich layers. A 30-50 centimetres felsic gneiss (unit AB) immediately underlying the corundum layer is very similar to the unit AB found between 210 and 245 metres, and could be correlative. The foliation dips gently to the south-east and consequently, the same layers are exposed higher in the stratigraphic sequence westward. The two corundum-bearing layers seen between 100 and 110 metres by the river could be the same as those outcropping along the railroad cut at 70 metres; although these could also represent lower stratigraphic layers.

Mineralogy of these layers is very similar to the railroad cut level: white to cream colour augens of coarse feldspar interstitial to corundum crystals, 0.3 to 1 centimetre in diameter.

The lowest stratigraphic unit is exposed for 90 metres towards the northern end of the river section (Map 3 and 4). It comprises orange feldspar-hornblende gneiss interlayered with gray quartz-feldspar-biotite gneiss. The orange colour of the rock suggests that the feldspar is probably potassic, and this unit is possibly correlative to unit 18 exposed on the railroad cut. At the 165 metre mark of the railroad cut, this rock unit shows clear cross-cutting relationships (Map 4), whereas on the outcrop located between metres 200 and 245, the lower contact of the same rock unit is concordant. A similar rock was used as a marker layer in the western section of the railroad cut due to its characteristic orange colour. It is slightly coarser-grained at this location but of similar mineralogy to that seen above.

An unusual occurrence of corundum was found by the river in a float block at 120 metres. The block is angular and measured approximately 40 x 30 x 30 centimetres. Corundum here occurs associated with pegmatitic hornblende, white feldspar crystals (1-3 centimetres), and minor epidote. The texture and high hornblende content of the boulder is not typical of the mineralization found in the lower portion of the railroad cut, as hornblende is rarely present in such considerable amounts. Similar rock was seen at 220 metres (Map 3 and 4) and 8 metres elevation relative to the railroad level. The basal unit (~40 centimetres wide) is composed mostly of white pegmatitic feldspars (plagioclase?) and biotite; the middle 30 to 40 centimetres section of the layer contains large (20 centimetres) augens composed of blue-green amphibole, biotite and white feldspars. A small corundum grain was found in the sample taken from the lower 50 centimetres section. The upper 60 centimetres of the layer is quartz-bearing. The similarity in texture and mineralogy between the float and the middle section of the layer suggests that the former originates from that level.

3.4 Sapphire description

The corundum found at the Blu Starr outcrop occur as hexagonal, barrel-shaped crystals with stubby terminations, typical of most corundum formed in a metamorphic environment. They are usually medium to dark gray in colour and opaque; rarely are they translucent. They are very similar in habit to the pink corundum from Mysor, India and the blue-gray to pink corundum crystals from the Madison County, Montana. Their colour varies from to bluish-gray to purplish-gray. Crystals vary in size from 1 millimetre to 1.5 centimetres. Stones between 5 and 8 millimetres in diameter (>4 and >10 carats, respectively) are common. Crystals of 1.5 centimetres (> 35 carats) are occasionally found, especially in corundum-rich augen. There are no statistics available at present on the relative abundance of the different size fractions.

Corundum grains found at the road cut are in general more purplish in colour and sometimes slightly more translucent (better quality) than the ones from the railroad. The short exposure at 115 metres is very rich in corundum. This mineral forms up to 30% of the augen in which it is found, with feldspars forming the remainder.

The modal content of corundum in the gneiss is low. The irregular occurrence of this mineral in the gneiss layers renders estimate of the mode difficult. Corundum can account for up to 50 % of the augen in which it is usually found, but often accounts for no more than 10%. The corundum-bearing layers probably contains less than 1% of this mineral.

Most of the stones cut into cabochons (Luchansky, personal communication) show good to sharp stars on an opaque dark background. A significant portion of corundum crystals found would cut 0.5 ct cabochons or more.

Preliminary results of heat treatment indicate that Blu Starr stones usually turn medium to dark blue after treatment. It is unknown at this time if they retain their asterism after treatment. The heat treatment process usually obliterates the asterism by dissolving the rutile crystals (see Appendix A) into the corundum structure. The titanium (or rutile) content is usually too low (see Appendix B) to produce both a blue colour and a star. The sharpness of the Blu Starr asterism suggests a high titanium content; this hypothesis should be verified by analyzing the corundum crystals. A high titanium content would be favorable as the asterism could probably be reintroduced into heat treated stones by a second heat-treatment involving heating the stones over a long period of time (Hughes, 1990).

4. GEOLOGY OF THE BLU MOON PROPERTY

This corundum occurrence outcrops approximately one kilometre northwest of the junction of the Little Slocan and Slocan Rivers and is easily accessed by a gravel road to Vallican.

The Blu Moon property was mapped at a scale of 1:500 (Map 5 and 6). The outcrop trends roughly east-west and can be followed for approximately 350 metres. Discontinuous outcroppings extend westward for another 2 kilometres, at elevation ranging from 520 to 600 metres. These outcrops belong to unit 1d, the hornblende-granodiorite gneiss (see the geology map, Map 1). The Blu Moon outcrop exposes approximately 50 metres of this unit at elevations between 530 and 580 metres.

Corundum was found only in the eastern 30 metres of the outcrop. Although corundum does not occur in well-defined layers as at the Blu Starr property, corundum-rich areas appear to have a vertical component, parallel to the outcrop face. Foliation in this section of the outcrop is not well defined, however, 15 metres further west, at metre 125 of the line (Map 5 and 6), the foliation is sub-horizontal and gently dipping west to northwest.

Corundum mineralization is hosted by a leucocratic syenitic gneiss, best exposed in the eastern section of the outcrop. This rock unit is underlain by an interlaminated paragneiss (Map 6). The upper level of the outcrop comprises a 5 to 8 metres section of augen gneiss, which is overlain by syenitic gneiss. A coarse-grained intrusion cross-cuts the gneisses in the southernmost portion of the Blu Moon property, and pegmatitic dykes of similar composition can be seen north of the contact. The different lithologies encountered on the outcrop are described in more detail below.

4.1 Leucocratic syenitic gneiss

The leucocratic syenite gneiss (unit A of Map 7 and 8) is the host rock for corundum mineralization. It is white to cream in colour, medium to coarse grained and composed mostly of white feldspars (plagioclase), biotite and variable amounts of hornblende, and is locally calcite rich. Magnetite is a common accessory mineral and in some areas accounts for as much as 5% of the mode, forming large (up to 1.5 centimeters) blobs. The rock is consequently very magnetic in those areas. Zircon is another accessory mineral locally found on the outcrop, with crystals reaching 1 centimetre in diameter (~ 15 carats). The syenitic gneiss is exposed in the eastern and central portion of the outcrop as well as along the top. A 5 metres zone of felsic to intermediate augen gneiss separates the central syenitic gneiss from the one located at the top. The augen gneiss is highly foliated, and locally mylonitized, foliation horizontal to sub-horizontal.

4.2 Syenitic pegmatitic intrusion

A felsic intrusion outcrops at the southernmost part of the Blu Moon showing (Map 5) and may be associated with the more regional Coryell intrusion. It is coarse grained to pegmatitic, cream in colour and contains large (up to 4 centimetres long) elongated black amphibole crystals. Quartz is totally absent. The intrusion is the youngest phase noted and shows cross-cutting relationships with the host gneiss with the gneiss highly fenitized at the contact, suggesting that the intrusion is alkaline in character. South of the contact the intrusion is exposed for only 2 metres, making it difficult to discern if it is a dyke or something more sizable.

Numerous felsic pegmatitic dykes with similar mineralogy are found north of the contact with the intrusion (Map 5). The southeast section of the outcrop is cross-cut by several of these dykes. Large green amphibole crystals (reaching 2 to 3 centimetres long) are present in the dykes making them easily recognizable. The dykes are particularly abundant in the eastern corundum-rich area, located less than half a metre from this zone. The closest trends east-west, is 1 to 1.5 metres wide, and is sub-vertical. The pegmatitic dykes are probably apophysis of the felsic intrusion found in the southernmost portion of the Blu Moon (Unit C of Map 5). It is uncertain at this time if there is any relationship between the pegmatites and the presence of corundum in the gneiss. If so, there is a large area that could potentially be corundum-bearing, located north of the pegmatite-rich zone as delineated on the geology map.

At 227 metres, 1-1.5 metres below the line on a narrow ledge, an intrusive contact exposes a hornblende-feldspar syenite in contact with an interlaminated augen gneiss. The intrusion is approximately 50 centimetres wide and includes an amphibolite xenolith.

Neither petrography nor geochemistry have been performed on the intrusive's samples. The colour of the amphibole and the high potassium-feldspar content suggest an alkaline character of syenitic composition.

Because of the spatial relationship between the syenitic pegmatites and the occurrence of corundum at Blu Moon, geochemistry and petrography will be conducted on the intrusive to try to determine the origin of the corundum. It is well known that quartz-deficient intrusions desilicify their host rocks when intruding. If the host is already quartz-poor, this can have the effect of altering the rock chemistry from quartz saturated to undersaturated and trigger the crystallization of silica-deficient minerals such as corundum (Al_2O_3) or spinel ((Mg, Fe)Al_2O_4). If there is a genetic relationship between the intrusion and corundum crystallization then due to the recognizable character of the intrusive, this could be used as a prospecting tool. Moreover, a number of similar dykes and sills exist west of the Blu Moon outcrop and represent good exploration targets.

4.3 Interlaminated paragneiss

This rock unit occurs in the southernmost section of the outcrop, and is the lowest stratigraphic level observed. It is comprised of alternating felsic and mafic quartzofeldspathic layers with variable amount of biotite gneiss.

Foliation is sub-horizontal on most of the outcrop, dipping gently west to north-west. The top section of the exposure shows the augen gneiss in contact with the leucocratic syenitic gneiss. The contact is highly deformed to mylonitized across approximately 5 metres. This highly deformed zone has recessive weathering. Smaller shear zones are found lower in the stratigraphic sequence. Some are discrete structures affecting only a few centimetres of the host rock, while others are penetrative across 1 to 3 metres. Most of these structures are sub-horizontal, except for an east-west discrete shear with variable sub-vertical dip. The western section of the outcrop also exposes minor folds of half a metre wavelength as well as two folds of 10 to 12 metres wavelength. A north-south isoclinal fold is found at 240 metres, at the southernmost portion of the outcrop while a north-northeast open synform can be seen at about 245 metres, 20 metres north of the line.

4.4 Sapphire description

Corundum crystals found at the Blu Moon property show a greater variability in size, colour and transparency than the ones from the Blu Starr and in general, are better quality. Most of the crystals found at the Blu Moon between 100 and 110 metres are gray-blue in colour, sometimes with a purple hue, and are translucent to semi-translucent. Size varies from about 2 millimetres to 2 centimetres in diameter. Some large stones were recovered from this area. One is 1.5 centimetres in diameter by 2.5 centimetres long (approximately 75 carats).

Crystals often occur as hexagonal, barrel-shaped crystals with tapered terminations. Crystals 3 to 4 centimetres long were found. Some of the crystals are partially replaced by a violet-pink mica inferred to be margarite ($CaAl_2(Al_2Si_2)O_{10}(OH)_2$), which is a common alteration of corundum.

It is unknown at this time if corundum crystals from the Blu Moon property will be colour enhanced or retain their star after heat treatment. It is the opinion of the author that some of the translucent stones from this deposit will react favorably to this treatment and become facet grade material.

Corundum crystals examined to date from Blu Moon do not produce as high quality stars as those from the Blu Starr showing (Luchansky, personal communication).

5. PEGMATITES

Little (1960) reported the occurrence of beryl-bearing pegmatites associated with granitic intrusions of the Valhalla complex. Little observed that "in some places, a little biotite and small garnet are present, and in a few dykes small crystals of beryl occur." At the beginning of the 1990's, blue-green beryl crystals reaching 3 centimetres in diameter by 3 centimetres long were discovered south-west of Passmore on the B.Q. 2 claim (Map 1). These claims are now encircled by Anglo-Swiss bloc of claims VALLICAN 5. A pegmatite hosting aquamarine crystals was found in 1995 south-east of Cowie creek. This occurrence is now part of the SLOCAN 2 block of the claim (PEG1 on Map 1).

This beryl occurrence was mapped in the summer of 1996 to determine the potential for gem quality beryl, i.e. aquamarine. The property was also explored for beryl-pegmatites. The field work survey was concentrated around the known occurrences of beryl-pegmatites, in the eastern section of SLOCAN 2 and in central VALLICAN 5 (Map 1).

5.1 Distribution

Table 5 gives the location, width, attitude and elevation of the pegmatites found during partial coverage of the property during the summer of 1996. Pegmatites were not observed below 700 metres elevation.

PEG1 to PEG6 of Table 5 are located in the southeast corner of SLOCAN 2, at elevations ranging from 700 to 820 metres. They trend northwest to north-northwest and dip northeast at 45° to 82°. These pegmatites are scattered along a distance of half a kilometre.

They occur as both concordant, deformed prekinematic intrusions and discordant cross-cutting, postkinematic intrusions. Some pegmatites show both styles of kinematics indicating that they were intruded both at the end of the tectonic event and at some later time. They locally form large boudins, and show clear cross-cutting relationships with their host rock. At this time it is unknown if the cross-cutting pegmatites belong to the same intrusive system as the concordant ones.

Table 6: Pegmatite location in UTM, width, attitude and elevation

NAME	Claim Block	UTM Longitude	UTM Latitude	Width (metres)	Attitude (°)	Elevation (metres)
PEG1	SLOCAN 2	452,650	5,486,510	2-2.5	335/70	700
PEG2	SLOCAN 2	452,670	5,486,470	> 1	~ 330	700
PEG3	SLOCAN 2	452,680	5,486,510	> 0.20	344/77	695
PEG4	SLOCAN 2	452,310	5,486,630	0.5	164/76 334/82	820
PEG5	SLOCAN 2	452,480	5,486,590	1-1.5	340/62	730
PEG6	SLOCAN 2	452,730	5,486,390	< 0.5	153/51	710
PEG7	VALLICAN 5	448,950	5,486,710	> 0.2	068/82	1620
PEG8	VALLICAN 5	449,060	5,485,960	–	–	1790
PEG9	VALLICAN 5	448,740	5,487,620	< 0.4	Float	1370
PEG10	VALLICAN 5	449,000	5,486,650	1.5	070/46	1520
PEG11	VALLICAN 5	449,210	5,487,500	2	270/87	1530
PEG12	VALLICAN 1	448,970	5,491,330	< 0.3	122/44	800
PEG13	VALLICAN 1	449,100	5,491,150	<0.1	132/61	860
PEG14	VALLICAN 1	448,980	5,491,350	> 0.05	Float	870

The main beryl occurrence (PEG1) located on Anglo-Swiss property is found at approximately 700 metres elevation on the southeast corner of SLOCAN 2. This pegmatite occurs as a large boudin (2-2.5 metres wide) with concordant contact with the overlying gneiss. Its lower contact was not observed. The pegmatite outcrop strikes northwest and can be followed for about 10 metres. The texture, regularity and small size of the minerals in this outcrop indicate that it is probably the northern contact between the pegmatite and its host rock. This concordant to discordant relationship between the intrusive and host rock indicates that the pegmatite was probably intruded at the end of the tectonic episode.

New pegmatite occurrences were discovered east of PEG1, at about the same elevation. The main one is located 50 metres east of PEG1. It was obscured by soil and vegetation at the time of visitation and could be examined only summarily. Its attitude, size, mineralogy and location suggest that it is the eastern continuation of PEG1. Two other occurrences were found along the same strike between 50 and 100 metres east of PEG1 (see Map 3). Two pegmatites occur 300 to 400 metres west of PEG1. The mineralogy of these pegmatites is the same as for PEG1 except for the absence of beryl.

New pegmatite discoveries were also made in the southwestern section of the property, in VALLICAN 5. The largest one is 1.5 metres wide, trends east-northeast (70/46), and occurs at around 1500 metres. Many pegmatite floats were seen east of B.Q.1 (Map 3), approximately 300 metres southeast of the beryl-pegmatite that yielded a 3 x3 centimetres gem quality aquamarine. The floats found on Anglo-Swiss Industries property were located a few metres below B.Q.'s pegmatite. Rock outcrops are abundant east of this claim, but are covered by thick moss. Many small (<3 centimetres) pegmatitic veins were found in this area. One small (~ 2 millimetres) beryl crystal was observed in one of them. It is believed that the beryl-pegmatite of the B.Q. claim extends eastward into Anglo-Swiss property, as suggested by the numerous pegmatite floats and the short distance separating these two areas.

Only very small pegmatites were seen in VALLICAN 1, in Talbot creek.. One locality that is known to host beryl-pegmatites but which could not be visited, is the R.Q. claim located on the northwest corner of SULTAN 1 and delineated on Map 3. Pegmatite specimens containing a beryl crystal 4 centimetres x 5 centimetres long were found by a Mark Goldenberg, a prospector, in a boulder located at the base of a steep cliff near highway 6. The beryl there occurs with feldspar, smoky quartz and schorl tourmaline. The two samples seen from that pegmatite show coarser mineralogy than the pegmatites in the southern part of the property.

The R.Q. claim is located only a few hundred metres from the Slocan river, north of the Blu Starr property. Because beryl is a hard (8 on the Mohs' scale) and chemically resistant mineral, weathering of the pegmatite would liberate the beryl crystals and potentially wash them down to the river. Beryl has a low density (2.7 g/cm^3), so the crystals could travel a fair distance downstream.

5.2 Mineralogy and classification

Mineralogy of the pegmatites is simple. In orders of greatest abundance, they are composed of cream colour feldspars, smoky quartz, black schorl tourmaline, red garnet, muscovite and blue-green beryl Quartz and feldspars attain lengths of up to 20 centimetres but average 2-5 centimetres. Elongated tourmaline crystals are commonly 4-5 centimetres long, occasionally reaching 10 centimetres. Blue-green beryl occurs intermixed with quartz and feldspars. It measures up to 2.5 centimetres in diameter and 8 centimetres in length. Crystals are usually fractured and cloudy, with occasional clear areas. Interstitial quartz and feldspar often have a graphic texture. At this time beryl has been found only in the concordant pegmatites (PEG1) and the pegmatite of the B.Q. claim.

Granitic pegmatites have been classified by Cerný (1991a) into four classes (Table 6): abyssal, muscovite, rare-element, and miarolitic. Lithium hosting minerals were not observed in the property pegmatites. However, this element can be absent in the subtype NYF (Table 6) of rare-element pegmatites. This type hosts yttrium, rare earth-elements, titanium, uranium, thorium, zirconium, niobium, tantalum and fluorine. These elements can be present in very small amounts in this class of pegmatite. Most barren pegmatites of the rare-element class carry only potassic feldspar, albitic plagioclase, quartz and subordinate, if any, muscovite and/or biotite (Cerný, 1991a). Silicates compose the bulk of rare-element pegmatites, and are also the exclusive ore minerals of lithium, rubidium, cesium, beryllium, zirconium and hafnium.

Without geochemical data, it is not possible to tell if the pegmatites belong to the rare element or miarolitic class. These classes of pegmatites are found in association with granites, occurring in the granite or its margins. They are found in regional populations and are predominantly associated with late-orogenic granitic intrusions (Cerný, 1991a).

5.3 Relative age

None of these beryl-pegmatites have been dated. Their concordant or cross-cutting relationships with the host rock can be used to determine their relative age. Both concordant (synkinematic) and discordant (postkinematic) pegmatites were found, with similar mineralogies. The discordant pegmatites are younger than the final episode of deformation, the Valkyr Shear zone, which has been dated by Carr *et al.*, (1987) between 59 and 54 Ma. Carr *et al.*, (1987) reported the presence of a discontinuous belt of Eocene granitic rocks and pegmatites up to 500 metres thick obscuring the tectonic contact between the hanging wall and footwall of the Valkyr Shear zone. Some of the intrusions are deformed, concordant, and synkinematic, whereas others are cross-cutting and postkinematic. The cross-cutting intrusive rocks were dated by U-Pb methods and are 56.5 ± 1.5 Ma old (Carr *et al.*, 1987). It is not known if the pegmatites found on the property are genetically related to the pegmatites described by Carr *et al.* (1987) occurring in the lower plate of the Valkyr Shear zone, but they show similar tectonic behavior. The similar mineralogy between the

Table 2 The four classes of granitic pegmatites.

Class	Family*	Typical Minor Elements	Metamorphic Environment	Relation to Granites	Structural Features	Examples
Abyssal	—	U,Th,Zr,Nb,Ti,Y, REE,Mo poor (to moderate) mineralization	(upper amphibolite to) low- to high-P granulite facies: ~4-9 kb, ~700-800°C	none (segregations of anatectic leucosome)	conformable to mobilized cross-cutting veins	Rae and Hearne Provinces, Sask. (Tremblay, 1978); Aldan and Anabar Shields, Siberia (Bushev and Koplus, 1980); Eastern Baltic Shield (Kalita, 1965)
Muscovite	—	Li,Be,Y,REE,Ti, U,Th,Nb>Ta poor (to moderate)** mineralization; micas and ceramic minerals	high-P, Barrovian amphibolite facies (kyanite-sillimanite); ~5-8 kb, ~650-580°C	none (anatectic bodies) to marginal and exterior	quasi-conformable to cross-cutting	White Sea region, USSR (Gorlov, 1975); Appalachian Province (Jahns *et al.*, 1952); Rajahstan, India (Shmakin, 1976)
Rare-element	LCT	Li,Rb,Cs,Be,Ga,Sn, Hf,Nb≷Ta,B,P,F poor to abundant mineralization; gemstock; industrial minerals	low-P, Abukuma amphibolite (to upper greenschist) facies (andalusite-sillimanite); ~2-4 kb, ~650-500°C	(interior to marginal to) exterior	quasi-conformable to cross-cutting	Yellowknife field, NWT (Meintzer, 1987); Black Hills, South Dakota (Shearer *et al.*, 1987); Cat Lake-Winnipeg River field, Manitoba (Černý *et al.*, 1981)
	NYF	Y,REE,Ti,U,Th,Zr, Nb>Ta,F; poor to abundant mineralization; ceramic minerals	variable	interior to marginal	interior pods, conformable to cross-cutting exterior bodies	Llano Co., Texas (Landes, 1932); South Platte district, Colorado (Simmons *et al.*, 1987); Western Keivy, Kola, USSR (Beus, 1960)
Miarolitic	NYF	Be,Y,REE,Ti,U,Th, Zr,Nb>Ta,F; poor mineralization; gemstock	shallow to sub-volcanic; ~1-2 kb	interior to marginal	interior pods and cross-cutting dykes	Pikes Peak, Colorado (Foord, 1982); Idaho (Boggs, 1986); Korosten pluton, Ukraine (Lazarenko *et al.*, 1973)

Notes

* See Table 4 for explanation; ** Some Soviet authors distinguish a rare-element-muscovite class, in all respects intermediate between the muscovite and rare-element classes proper

Table 7: The four classes of granitic pegmatites. Unmodified from Cerný (1991a).

concordant and cross-cutting pegmatites indicates that they probably belong to the same intrusive phase that was emplaced at the end of, and slightly after, the last displacement along the Valkyr Shear zone.

The U-Pb date of Carr *et al.*, (1987) is statistically identical to the age of the Ladybird granitic suite dated at 58 ± 1 Ma (Parrish *et al.*, 1988). The pegmatites could be offshoots of this intrusion. The concordant, deformed pegmatites could also be related to the prekinematic Airy quartz-monzonite or could have resulted from partial melting of the rocks composing the complex (ortho-paragneiss and granitic intrusions). The southwest corner of the property is located less than 10 kilometres from the Valkyr Shear zone, and less than 1000 metres lower in the stratigraphic sequence. The footwall rocks of the Valkyr Shear zone have penetrative mylonitic fabrics 2 to 2.5 kilometres thick (Carr *et al.*, 1987). Since the foliation is mostly horizontal in this part of the complex, the southwest corner of the property is located in the high strain mylonite of the Valkyr Shear zones' lower plate. This penetrative fabric is particularly obvious in the paragneiss. Shear zones are good conduits for fluids, which can thereby travel long distances. The proximity of the property pegmatites to the Valkyr Shear zone suggests that they could be related to the pegmatites that intrude this structure. The authors believe that pegmatites are not seen at elevations below 700 metres elevation because this zone is located outside the high strain fabric of the Valkyr structure.

5.4 Economic potential

The pegmatites could have economic value if they contain significant quantities of rare earth-elements and elements such as rubidium, cesium, beryllium, zirconium and hafnium. The small size (<2.5 metres) of the pegmatites is a limiting factor. Beryl crystals found in the pegmatites could themselves be of economic value if enough are gem quality. The best crystals usually occur in cavities or pockets that are hard to detect.

Approximately 20 to 25 crystals were found in pegmatite PEG1. They are green-blue in colour and reach 5 centimetres long by 1-1.5 centimetres wide (100-125 carats), with strong hexagonal habit typical for beryl. The crystals have grown *in situ* in feldspars and quartz; removal of the sample by hammering usually results in breakage of the beryl crystals. These crystals are most often translucent to opaque with numerous fractures perpendicular to their *c*-axis (perpendicular to the long axis of the crystal). Translucent areas are produced by microscopic fluids and/or mineral inclusions in the crystal. Gem quality crystals, or even parts of crystals, are rare. Areas that appear clean to the eye are small and would produce cut stones of half a carat (0.2

gram) or less. Better quality crystals are normally those which have grown into a vug or cavity, unfortunately no cavities containing beryl crystals were found at PEG1.

It is difficult to evaluate the gemstone potential of a pegmatite. The presence of beryl in a pegmatite does not in itself give any indication of its value, since ore beryl is significantly less valuable than gem beryl. Geophysical methods are limited in their usefulness as tools for prospecting small pegmatites bodies. The contrasts of density, magnetism and electrical resistivity between the small (< 3 metres wide) pegmatites and the more mafic hybrid gneiss would not shown on a gravimetric, magnetic or electric survey, unless they were performed on a very detailed scale. Geochemical prospecting by sampling and studying the minerals composing the coarser fraction of stream sediments could be used as prospecting tool for pegmatites.

Many small (< 30 centimetres) pockets were found in the pegmatite of the B.Q. claims (Barclay, personal communication). Therefore it is possible that PEG1 also contains pockets, but impossible to ascertain without further work, including trenching and blasting.

A different evaluation scheme is proposed in section 6.3 regarding prospecting for aquamarines on Anglo-Swiss' property.

6. PLACER IMPLICATIONS

The minerals of economic interest in this project, corundum and beryl, have hardnesses of 9 and 8, respectively, on the Mohs'scale. This characteristic allows them to resist erosion better than the host rock in which they are found, and then potentially accumulate in stream beds. Transport of the crystals before their deposition contributes to the disintegration of fractured crystals, resulting in smaller grains of better quality.

The property is particularly interesting with regard to placer potential. The corundum occurrences are located at close proximity to the Little Slocan and the Slocan Rivers which have moderate flow. The Blu Starr star sapphire deposit is cross-cut by the Slocan river, whilst the beryl occurrences are located near the Slocan river and its tributaries. This river forms two large bends before exiting the property boundary. This meandering indicates a decrease in the flow speed and thus, a decrease in its particle carrying capacity resulting in sediment deposition. As the size of transported crystals decreases with distance from the source area, the areas of best potential will be located proximally to the known occurrences. Corundum, with a specific gravity of 4 g/cm^3, is slightly denser than the specific gravity of quartz or feldspars (2.6 g/cm^3), the main constituents of the gneisses and rocks in general, while beryl is similar in density (2.7g/cm^3) to these minerals.

Placer deposit gemstone mining has many advantages over hard rock mining. With placer mining, the problem of recovering the economic mineral from the silicate host rock is mostly eliminated by natural geological erosion. This is a major concern when dealing with gemstones as size is a very important factor influencing the value of the stone. Stones recovered from placer operations are also of better quality since abrasion and transport assist in breaking the fractured or weaker crystals. Placer mining is also cheaper than hard rock mining. Surficial paleoplacer deposits are the best targets as mining is not conducted on the modern course of the river, which greatly reduces environmental impact on water quality.

Glaciation greatly affected the morphology of the area in two ways, firstly, by creating a high rate of erosion and sedimentation associated with the glacial expansion during the early phase of glaciation, and secondary, due to the high volume of water produced during deglaciation. For these reasons glacial deposits are more significant than non-glacial deposits even though the non-glacial intervals were longer in duration than the glaciations. Terraces of glacio-fluvial origin can be seen on either side of both the Little Slocan and Slocan Rivers. Glacial movement and glacial stream direction are important factors in the search for paleoplacer deposits derived from known sources.

Paleoplacer deposits investigated as potential source of gemstones include till, glacial fluvial, glacial lacustrine, and, colluvial deposits. The sites of paleoplacer deposits inside the property were delineated and potential areas of gemstone accumulation examined. A short overview of the Quaternary geology of southeastern British Columbia is given below to help to illustrate the origin of these sediments.

6.1 Quaternary geology of southeastern British Columbia

Two major glacial periods are recognized in southeastern British Columbia. The first glaciation was active between 60,000 and 43,800 years BP (before present). Glacial sediments produced during this period are known as the Okanagan Center Drift. The younger glaciation spreads between 19,000 and 10,000 years BP. The Kamloops Lake Drift is the name given to sediments deposited during this glaciation. Sediments deposited between these two glacial period extending from 43,800 years BP (and possibly more than 51,000) and 19,000 years BP are named the Bessette Sediments. The oldest recognized Pleistocene deposits in southeastern British Columbia are the Westwold Sediments, which were deposited during a non-glacial period more than 60,000 years ago (Fulton et al., 1978).

An ice sheet several thousand metres thick covered most of the province during the last glacial period. It reached an elevation of 2300 metres in the southern section of the province (Ryder *et al.*, 1991). The ice sheet movement was principally south, with a small eastern component in the southeastern part of the province (Clague, 1989). Retreat of the ice sheet was accomplished mostly by downwasting and stagnation (Clague, 1991). This four step deglaciation process is explained as follows (Clagues 1991): (1) During the active ice phase, regional flow continued but diminished as the ice thinned; (2) the transitional upland phase followed: highest upland appeared through the ice sheet, but regional flow continued in major valleys; (3) During the stagnant phase, ice was confined to valleys but was still thick enough to flow, and, (4) the last step is named the dead ice phase, when valley tongues thinned to the point where plasticity was lost. Many proglacial lakes resulted from this process as the remaining ice acted as a dam.

Surficial geology studies specifically related to the property area were not found in the literature. Compilation of Quaternary geology mapping in Canada by L. Maurice (1987), indicates that this area of the province was mapped only at a small scale of 1:250,000 or smaller.

6.2 Quaternary map of the property based on airphoto interpretation

A surficial geology map of the sheet 82F052 at a scale of 1:20,000 was produced based mostly on airphoto interpretation. The map also includes the northern section of the map sheet 82F042, which is the locus of the highest mountain of the area, reaching 2400 metres. Numerous cirques were seen on the photographs and the summits of the cirques do not seem to show any Quaternary deposit, which would indicate that this highest portion of Norm Range was not covered by the ice sheet. This agrees with the 2300 metres limit reached by the ice sheet in literature (Ryder *et al.*, 1991).

Many terrace levels were seen on both sides of the Little Slocan River, as well as on the western side of the Slocan River. The highest terraces can be seen on the west side of the Slocan River from highway 6. Terraces are not as obvious on the east side of the river as the topography is steep. These terraces may vary in elevation from one area to the other; and are principally defined by their continuity in the deposit morphology. Terrace height was estimated using topographic contours and was not verified in the field. Approximate elevations between which the terraces occur are given in Table 8, with the first levels being closest to the River. The most obvious terrace (T4) seen on the airphotographs, is located between the two sub-parallel secondary roads south of the Little Slocan river, west of the Blu Starr showing. It is approximately 35 metres high, with its plateau at 555 metres elevation.

Table 8: Elevations of the different levels of terraces

At least five levels of terraces were recognized:

level	Elevation (metres)
0	river level
1	a few feet from water level
2	500-560
3	540-600
4	520-600
5	600-700

Colluvial fan deposits are ubiquitous on the airphotographs and form delta shape deposits overlying the terraces. Till is the most abundant Quaternary deposit on the property, with the Slocan Ridge being the only topographic feature devoid of this deposit due to its steep faces. Till becomes progressively thinner upward, but blankets most of the topographic irregularities at the upper limit of the property (~1700 metres). Glacial striea indicating ice movement along 340° were found at approximately 1500 metres on VALLICAN 5.

6.4 Potential areas for paleoplacers

The surficial geology map shows the areas that should be investigated. Site #2 located on Map 7 is at the centre of an abandoned stream bed. Since this terrace level is very close to the river level itself, inferred target depth is thought to be minimal. This area might not only have potential for corundum, but also for beryl, zircon and gold. This is because of the close spatial occurrence of these minerals that form in very different geological environments. The R.Q. claim is located less than a kilometre north of the Blu Starr showing. The other beryl occurrence (PEG1) is located approximately 2 kilometres downstream from the Blu Star showing, and half a kilometre west of the river. Since beryl is a relatively light mineral (2.7 g/cm3), it would be carried further downstream than corundum. Beryl, being lighter then corundum would occur slightly higher in the stratigraphy of the river sediments. If high quality beryl of significant size is found there, thus demonstrating the potential of the pegmatite for gem beryl indirectly, then further exploration could be conducted on the pegmatites themselves.

Zircon could also be found with the sapphire because it is closely associated with corundum in the outcrop.

The large glacio-fluvial terraces located on the south side of the Little Slocan River could also contain gem-bearing gravels at their bases. The high rate of erosion and sedimentation associated with glacier expansion and glacier meltwater outwash has the potential to produce larger gem-bearing deposits than contemporary placer deposits. Terraces of glacio-fluvial origin can be seen on both sides of the Little Slocan River.

7. PROPERTY EVALUATION AND RECOMMENDATIONS

7.1 Corundum deposits

7.1.1 Introduction

The value of the corundum mineralization occurring at the Blu Starr and Blu Moon deposits cannot be evaluated accurately at this stage. Proper evaluation would require knowledge of:

(1) Representative grade of the deposits, based on bulk samples;

(2) Proportion of gem quality stones; both cabochon and facet grade;

(3) Quality of the gem stones: transparency, size, colour, and sharpness of star (if present);

(4) Proportion of stones that respond well to heat treatment;

(5) Proportions of different colours obtained by heat treatment;

(6) Proportion of stones that will star after proper heat-treatment; and,

(7) Efficiency of the process of corundum recovery from the host rock.

It is not possible to evaluate the grade of the deposit at present due to small modal contents of corundum in the host rock, and due to heterogeneous distribution. Modal contents on the order of 1% to 3% are difficult to evaluate visually. The error between an estimate of 1% and 0.5% is 50%, and, similarly, 100% between an estimate of 1% and 2%. This demonstrates the importance of being accurate with modal content in evaluating the deposits.

The proportion of gem quality stones would be better described as 'proportion of potentially gem quality stones' as most corundum is near industrial grade before heat treatment. Stones excluded from gem quality would be too small, too fractured or too flat to cut.

Grade is not the main factor determining the value of gemstones because of the low proportion of gem quality stones as compared with industrial grade. The main characteristics affecting the quality of a rough stone are: clarity or transparency, size, colour, and sharpness of star (when present).

Transparency and colour are not well represented at the Blu Starr deposit as most of the crystals are opaque and gray, and therefore only cabochon grade. The authors did not find any facet grade sapphire there during the 1996 field season. The two parameters of transparency and colour are more variable for stones from the Blu Moon deposit as translucent blue stones do occasionally occur. As well, transparency and colour are often enhance after heat-treatment.

Size of stones and sharpness of star are the two most important parameters affecting stone quality before heat treatment. It has been observed that crystals from the Blu Starr deposit of significant size (>5 millimetres or approximately 4 carats) are reasonably abundant. Crystals that would cut exceptionally large stones (more than 25 carats) are not uncommon. Size is a favorable factor for both the Blu Starr and Blu Moon sapphires and statistical estimate of the sizes of gem quality crystals present is essential in evaluating the deposits.

Very little is known of the other parameters at present. Data currently being evaluated includes the proportion of stones that respond well to heat treatment, colours obtained, and possibility of reintroducing the asterism (partially or totally dissolved) after heat-treatment to enhance the colour by a second heat-treatment involving slow heating over a long period of time (Hughes, 1990). Stones showing good asterism are more common at the Blu Starr deposit. Unfortunately, most stones are dark-gray to black in colour, and not actively sought by the North American jewelry industry; thus, they are marketed at considerably lower values than their blue counterparts. However, preliminary results from heat treatment indicate that a large proportion of the dark gray to black corundum crystals from the Blu Starr turn blue after treatment. The proportion of stones that maintain their asterism after treatment is currently being investigated.

The last parameter to consider, efficiency of corundum recovery from the host rock, is also unknown at this stage. Questions as to the extent of damage to the corundum crystals during recovery, and the efficiency of recovery will be topics for future investigation.

7.1.2 Evaluation of the Blu Starr showing by Dr. Coyle

Dr. Marylou Coyle (1995) evaluated the grade of the Blu Starr outcrop in her report of the prospect. Approximately eight tonnes of high-grade material mined by prospectors Rod Luchansky and Mark Goldenburg from the railroad outcrop produced roughly 50,000 carats (or 10 kilograms) of rough sapphire crystals. This gives a corundum grade of 6,250 carats/tonne (0.125%) in the host rock. These 50,000 carats would produce, after cutting, approximately 20,000 carats (or 2,500 carats per ton), using a 60% weight reduction factor for cutting. She estimated that the stones could be sold wholesale at U.S. $50 per carat. This figure would indicate a value of $125,000 per ton.

The wholesale value of U.S. $50/ct given by Dr. Coyle (1995) is probably reasonable for stones of gray-blue, blue or yellow colours, but excessive for black or brown stones. This value may be reasonable for the local market but is unlikely to be realistic at the international level. It is also unrealistic to evaluate the Blu Starr showing based solely on its high-grade material as this material is not representative of the average quality. As well, it is impossible to commercially mine only the corundum bearing layers which are located at the base of the outcrops.

7.1.3 Evaluation of the Blu Starr showing by G. Gauthier

A tentative estimate is outlined below for the value of the Blu Starr deposit. Since the margin of error is likely to be high, a very conservative approach has been taken.

The corundum content of the Blu Starr deposit was calculated using the width and length of corundum layers measured during mapping (Map 4). Appendix C details the estimation. Table 9 gives the weight of corundum available from the three sections (railroad cut, road cut and river section) in function of the mode (proportion of corundum) and for a mode of 0.5%. Table 10 gives the weight of cuttable corundum, weight of stones after cutting and value of a one metre deep portion of the railroad outcrop for a wholesale value of $10 per carat.

Table 9: Weight of corundum available from the three sections

Section	Weight (kg) of corundum/ metre of outcrop in function of the corundum mode.	Weight of mineralized rock/ metre of outcrop. (tonnes)	Weight of corundum/ metre of outcrop (kg) for a mode of 0.5% corundum
Railroad cut	95,320 x mode	95	476.6
Road cut	13,520 x mode	13.5	67.6
River section	15,000 x mode	15	75

Table 10: Weight of rough corundum (kg and ct), weight of cut stones and value of a 1 metre deep slice of the Blu Starr outcrop.

Weight of cuttable corundum	48 (kg)
Weight of cuttable corundum	240,000 (ct)
Weight of stones after cutting	60,000 (ct)
Wholesale price of dark gray to black star	$10/ct
Value/m deep of outcrop	$600,000

Table 9 shows that the railroad cut of the Blu Starr prospect hosts 95 tonnes of mineralization per metre deep of outcrop, which is 5% of the total weight of the outcrop (equation 16, Appendix C). G. Gauthier (author) estimates that approximately 240,000 carats of rough stones could be mined from a 1 metre deep section of the outcrop. This gives a grade of approximately 2,500 carats of rough stones, or 630 carats of cut stones per ton. This value is comparable to the value given by Dr. Coyle (1995) (see section 7.1.2) of 2,500 carats of cut stones per ton if we consider that:

1) Dr. Coyle's estimate is based on high-grade material;

2) The G. Gauthier's estimate is based solely on visual approximation of the corundum content;

3) A conservative proportion of 10% of cuttable crystals (Table C3) was chosen for the evaluation and a high weight reduction of 75% after cutting (Table C3).

The wholesale price of dark gray to black star showed in Table 10 and Table C2 is low ($10/ct), but realistic. The quantity of sapphire listed in Table 10 is significant if heat treatment can be employed. In the opinion of the authors, the most important parameter to investigate is the effect of heat treatment on the star and transparency of the stones, as translucent blue star sapphires are amongst the most expensive sapphires on the market today. The value of the deposit could be multiplied by a factor of 10 to 100 if some of the heat treated stones retain their star and become translucent blue after heat treatment. For this reason, it is suggested that the next phase of the project involve heat treatment and cutting of the Blu Starr and Blu Moon corundum crystals to test their behavior under heat treatment.

7.2 Pegmatite evaluation

The quality of beryl found during the summer of 1996 does not justify further extensive exploration of the pegmatites. Pegmatites are difficult to evaluate for gemstones without actually mining them. Because of the proximity of some known beryl-bearing pegmatites to the Slocan river, it is recommended that the potential of the pegmatites for gemstones be investigated in placer deposits, at the same time and in the same areas as for corundum. Beryl is a mineral of lower density than corundum (2.7 *versus* 4 g/cm^3) and consequently would be found at higher levels in the stratigraphic section of sediments. If beryl of good quality is found in placer deposits, then further investigation of the pegmatites would be warranted.

7.3 Recommendation

The authors recommend the following steps for further evaluation of the Blu Starr and Blu Moon deposits, as well as the beryl occurrences:

1. The placer study indicates good potential for corundum (as well as beryl) to be found in placer environments within the property boundaries; the sites suggested in section 6.3 should be investigated.

2. The heat treated stones should be tested for the presence of stars. This can be accomplished by simply putting a drop of oil on the surface of the crystal perpendicular to the *c*-axis (perpendicular to the long axis of the crystal) to reveal a star, if present, in the crystal. Additionally, some of these stones should be cut and appraised. The value of the stones from the Blu Starr deposit is highly dependent on the starring characteristic. The effects of heat treatment on Blu Moon stones is presently unknown, and need further investigation.

3. It is recommended that the geochemistry of the sapphire host rock be analyzed to help to identify future targets horizons.

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9. QUALIFICATIONS OF PERSONNEL

I, Guylaine Gauthier of Vancouver, British Columbia, do hereby certify that:

1. I am a graduate of "Université du Québec à Chicoutimi", B.A. Sc. (1989), and a graduate of University of British Columbia, M.A. Sc. (1995).

2. I am the main author of this report; I visited the property described in this report between July 3rd and mid- September.

3. At present, I do not hold any shares of Anglo-Swiss Industries Inc.

Guylaine Gauthier

Guylaine Gauthier

9.0 QUALIFICATIONS OF PERSONNEL

I, Kathleen Dixon, of 119 - 24 Avenue SW, Calgary, Alberta, T2S 0J8 declare:

1. I am a geologist currently residing at the above address.

2. Graduate of Geological Sciences from the University of British Columbia, in 1990 with a Bachelor of Science (Geology) degree.

3. I worked for 3 consecutive summer seasons 1987 - 1989 with the Geological Survey of Canada.

4. I have worked as a mineral exploration geologist for various mining companies in Vancouver and Calgary since graduation.

5. I am a Professional Geologist recognized by the Alberta Association of Professional Engineers, Geologists and Geophysics as of February, 1996.

6. I currently hold no interest in Anglo-Swiss Industries Inc.

7. My contribution to this report is based on field work at the Slocan Valley claims from July 2 -15, 1996 and August 6 - 14, 1996.

Dated at Calgary, Alberta, this 15 day of December, 1996.

PROFESSIONAL GEOLOGIST
KATHLEEN DIXON
OF ALBERTA

Kathleen Dixon, P.Geol.

10. GLOSSARY

Aquamarine:: Palish blue, light blue-green or even light green varieties of beryl. The green of aquamarine is caused by minute traces of iron, unlike the beryl variety emerald, which derives its colour from chromium. (Cipriani *et al.*, 1986).

Asterism: A starlike (4, 6 or 12 rays) play of light from a polished mineral due to crystallographically arranged minute inclusions (Mottana *et al.*, 1978).

Beryl: Silicate of beryllium and aluminum, $Be_3Al_2Si_6O_{18}$. Beryl crystallizes in the hexagonal crystallographic system. Its hardness (7.5 to 8 on the Moh's scale) makes it suitable for gemstones when it occurs as transparent crystals. It occurs in many colours; the gem varieties include heliodor (yellow), aquamarine (blue or blue-green), morganite (pink to orange), emerald (green), red beryl (Mottana *et al.*, 1978; Cipriani *et al.*, 1986). Beryl occurs mostly in granite pegmatites.

Cabochon: Convex cut conventionally used for opaque or strongly colored transparent stones. Nowadays, this cut is also sometimes used for materials of high quality that were in the past faceted.

Carat: Unit of weight used for gemstones; 1 carat = 0.2 gram.

Faceting: Operation which transforms a rough stone into a gemstone by cutting and polishing small flat geometric surfaces at different angles. All diamonds are faceted, as are most transparent coloured stones. The goal of faceting is to bring out the optical properties of a gemstone.

Sapphire: Sapphire is the name given to corundum (Al_2O_3) of any colour except red, which is called ruby. Sapphires owe their colours to iron and titanium, but chromium, the same element that gives emerald its green, colours ruby. They crystallize in the trigonal system. Corundum has a hardness of 9, the highest in the mineral world after diamond. Corundum occurs in a wide variety of geological environments. It can be igneous, hydrothermal or metamorphic in origin. The most widespread host rock for sapphires and rubies is alkali basalt.

APPENDIX A

Cause of blue colour in sapphire

The blue colour of sapphire is due to a process known as "intervalence charge transfer". Charge-transfer occurs when an electron jumps from one atom to another. Intervalence charge transfer involves exchange of an electron between two metal ions separated by an oxygen ion. In blue sapphire, interactions between Fe^{2+} and Ti^{4+} gives sapphire its colour. A factor that can prevent the sapphires from taking a blue colour despite favorable chemistry is the presence of iron as Fe^{3+} instead of Fe^{2+}. Most natural sapphires are not blue since neither Fe^{3+} nor Ti^{4+} are easily incorporated into sapphire (Emmett and Douthit, 1993). The solubility of Ti^{4+} in sapphire is so low at normal temperatures that the majority of the Ti^{4+} in natural sapphires is exsolved as titanium-bearing microcrystals (Emmett and Douthit, 1993). Under certain conditions, Fe^{2+} and Ti^{4+} can enter sapphire at the same time and their solubility together is greater than the solubility of either alone (Emmett and Douthit, 1993). This is due to mutual charge compensation; that is, one Ti^{4+} ion plus one Fe^{2+} ion have a total charge of +6, which is equal to that of the two Al^{3+} ions they replace.

Rutile is one of the most common inclusions in sapphires. Although it has a melting point of 1839° Celsius, heat treatment at 1600° Celsius will dissolve rutile needles of 1 to 5 microns (Emmett and Douthit, 1993). This is possible because of the high diffusion rate of Ti^{4+}.

APPENDIX B

Star sapphire characteristics

The six-rayed star is produced by the alignment of rutile needles (titanium oxide) along the crystallographic axes of the corundum crystal. Corundum belongs to the trigonal crystal system and has three crystallographic axes that intersect each other at an angle of 60 °. When the stone is cut *en cabochon*, with its base parallel to the base of the crystal, light reflects from the rutile needles creating a star. There is rarely sufficient titanium in the stones (often less than 0.05 % TiO_2) to produce both a blue colour and a star. Stars develop when the corundum crystal cools down slowly during formation. Solubility of TiO_2 in the corundum (Al_2O_3) structure decreases as the temperature decreases, resulting in exsolution of rutile along the crystallographic axes. The arms of the star are well defined when rutile crystals are sufficiently abundant.

APPENDIX C

Blu Starr deposit evaluation

The first part of the value estimate for the Blu Starr deposit involves calculation of the volume of corundum available in the outcrops. This parameter was calculated using the width and length of corundum layers (Table 5) measured during mapping (Map 3 and 4). The parameter was computed for each segment of layer for a depth of outcrop of 1 metre. Values are listed in Table C1. An average grade of 0.5% (volume) is used.

Table C2 shows the volume and weight of mineralization for an outcrop depth of 1 metre as well as the weight of corundum for a mode of 0.5.

The evaluation of the deposit used the parameters listed in Table C3. As the effect of heat treatment on the star and transparency of the stones is not well known, the evaluation is based on untreated gray to black medium quality star. The authors would like to stress once again that the estimate given below is approximate as many parameters could only be assumed.

Table C1: Volume of mineralization of the Blu Starr deposit

a)Railroad section

Location on line (m)	**Volume of mineralization = Length x Width x Depth (1m) (m^3)**				
	1	2	3	4	Total of 4 layers (m^3)
32-35	0.00	0.30	0.00	0.00	0.30
32-38	0.60	0.00	0.00	0.00	0.60
32-41	0.00	0.00	0.90	0.00	0.90
22-43	0.00	0.00	0.00	1.10	1.10
55-58	0.00	0.00	0.24	0.24	0.48
58-65	1.19	1.19	1.26	1.26	4.90
208-215	0.00	1.05	0.00	0.00	1.05
215-220	0.75	1.25	0.00	0.00	2.00
220-240	7.00	4.00	0.00	0.00	11.00
240-245	1.50	0.00	0.00	0.00	1.50
Total					23.83

Table 9: Volume of mineralization of the Blu Starr deposit (continued)

b) Road cut section

Location on line (m)	**Volume of mineralization = Length x Width x Depth (1m) (m^3)**				
	1	2	3	4	Total of 4 layers (m^3)
95-98	0.30	0.00	0.00	0.00	0.30
115	0.08	0.00	0.00	0.00	0.08
125-135	3.00	0.00	0.00	0.00	3.00
Total					3.38

c) River section

Location on line (m)	**Volume of mineralization = Length x Width x Depth (1m) (m^3)**				
	1	2	3	4	Total of 4 layers (m^3)
105-110	0.75	1.50	0.00	0.00	2.25
155-170	1.50	0.00	0.00	0.00	1.50
Total					3.75

Table C2: Volume and Weight of corundum/ metre deep of outcrop (kg) for a mode of 0.5% corundum

Section	Volume of corundum mineralization (m^3) (1)	Weight of corundum mineralization (t) (2)	Weight of corundum/ metre of outcrop (kg) for a mode of 0.5% corundum (3)
Railroad cut	23.83	95	476.6
Road cut	3.38	13.5	67.6
River section	3.75	15	75

(1) Volume of corundum = Σ {Length x Width x Depth (1 metre)} from Table C1

(2) Weight of corundum mineralization = Volume x 4000 kg/ m^3

(3) = Weight of corundum mineralization x mode (0.005) x 1000 kg/t

Proportion of cuttable corundum (from Table C2 and C3):

477 kg x 10% = 47.7 kg or in carats: 47.7 kg x 5000 ct/kg = 238,500 ct (1)

Weight of stones after cutting:

238,500 ct x 25 % = 59, 625 ct (2)

Wholesale value of the stones:

59, 625 ct x $10/ct = $596,250 per metre deep of outcrop (3)

Table C3: Parameters used in the evaluation of the Blu Starr deposit

Parameter	Value
Density of gneiss:	~2.8 t/m^3
Percentage of crystals cuttable [1]	10%
Percentages of crystals heat treatable [1]	25%
Percentage retained after cutting	25%
Volume of corundum mineralization (from table C1)	23.83 (m^3)
Weight of corundum/m of outcrop (from Table C1)	477 (kg)
Wholesale value of the stones [2]	\$10 /ct [2]

[1] conservative estimate

[2] value of a black, medium quality, star cabochon. Price based on the pink to purple opaque star sapphire cabochons from Mysor, India. Stones under 5 ct showing a medium quality star, average cutting can be bought for under \$10/ct wholesale.

The Blu Starr mineralized outcrop is located approximately 20 metres from highway 6. If we assume that 5 metres of the Blu Starr outcrop could be mined without interfering with highway operation, the amount of stones recovered and their approximate value would be:

Weight of cut stones from 5 a metre deep section of outcrop:

59, 625 ct x 5 = 298,125 ct (4)

Wholesale value of the stones:

238,500 ct x \$10/ct = \$2,981,250 (5)

The barren portions of the outcrop are located above the mineralized layers, and would need to be removed. The volume of rock that would need to be mined in order to recover the amount of stones given in equation (4) is:

Volume of western mineralized outcrops: 5 metres high by 55 metres long x 5 metres deep
Volume of the eastern mineralized outcrops: 10 metres high by 40 metres long x 5 metres deep

$55 \times 5 \times 5 = 1375\ m^3$
$10 \times 40 \times 5 = 2000\ m^3$
$1375 + 2000 = 3375\ m^3$ of outcrop

Amount of rock removed by weight:

$3375\ m^3 \times 2.8\ t/m^3 = 9450\ t$

Average value of the rock/t:

\$2,981,250 / 9450 t = ~\$315/t before cost

This is an average value per ton for the outcrop. Heat treatment is likely to improve the quality of the stones and increase their value.

APPENDIX D

Sample descriptions

ABBREVIATIONS

Bi:	Biotite	Mag:	Magnetite
Co:	Corundum	Qtz:	Quartz
Fld:	Feldspar	Tm:	Schorl tourmaline
Hb:	Hornblende		

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-BS-1	Blu Starr	Railroad cut, 35 m	Chip, 10 cm	Corundum-bearing layer #2. Pinkish-cream rock with coarse-grained Fld and ~ 10% mafics (Hb-Bi). Co average size: 4-6 mm.
96-BS-2	Blu Starr	Railroad cut, 35 m	Chip, 10 cm	Bottom section of layer #2; coarse-grained pinkish Fld-Bi-Hb gneiss. ~ 5% mafics (Hb-Bi). Co up to 6 mm.
96-BS-3	Blu Starr	Railroad cut, 35 m	Chip, 3 cm	Corundum layer #3. 25% mafic (Hb, Bi). Co up to 8 mm.
96-BS-4	Blu Starr	Railroad cut, 35 m	Chip. 10 cm	Bottom section of layer #3. Coarse-grained sample with < 5% (Hb +Bi). Co up to 1 cm.
96-BS-5	Blu Starr	Railroad cut, 35 m	Chip. 10 cm	Corundum layer #4 (uppermost Co layer) Pinkish-cream, ~ 10 cm sample. 15-20% total coarse-grained Hb-Bi. Co average size: 4 mm.
96-BS-6	Blu Starr	Railroad cut, 208 m.	Float	10% total Hb-Bi. Small sample. Co < 6 mm.

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-BS-7	Blu Starr	Road cut, 133 m.	Float	Fine-grained to coarse-grained gneiss with well developed gneissic texture. 15% total Hb+Bi. <1% Co, < 6 mm, average ~ 4 mm.
96-BS-8	Blu Starr	Road cut, 125 m	Chip, 10 cm	Corundum layer with ~10% Co. Medium-grained Fld augen enveloped by Bi and Hb
96-PEG1-9	SLOCAN 2	PEG1, 5 m west. In fracture at ground level.	Grab	Feldspar-Qtz-tourmaline-muscovite-margarite pegmatite
96-PEG1-10	SLOCAN 2	PEG1, see Map 1	Grab	Feldspar-Qtz-tourmaline-muscovite pegmatite
96-BS-11	Blu Starr	Railroad cut, 210 m	Grab	Corundum layer #1 (?). Coarse-grained felsic gneiss with less than 5% fine-grained Hb and Bi. Co < 3 mm.
96-BS-12	Blu Starr	Railroad cut, 243 m	Grab	Corundum layer #1, good stones. ~10% Hb, fine to medium-grained Fld. Co up to 8 mm.
96-BS-13	Blu Starr	Railroad cut, 220 m	Chip, 50 cm	Bottom 50 cm of unit 7 (of Map 4). Small Co grain found in a small sample.
96-BS-14	Blu Starr	Railroad cut, 215 m	Chip, 10 cm	White corundum-bearing layer with 10-15 % Co of up to 1 cm.
96-BS-15	Blu Starr	Railroad cut, 40 m	Grab, 5 cm	Lower corundum layer (Fld-Hb-Bi gneiss) containing ~10% Co with average size 4-6 mm.
96-BS-16	Blu Starr	Railroad cut, 40 m	Grab, 5 cm	Middle corundum layer (Fld-Hb-Bi) with < 5% Co (4-6 mm). Medium-grained to fine-grained sample with well developed gneissic texture.
96-BS-17	Blu Starr	Railroad cut, 40 m	Grab, 5 cm	Upper corundum layer. Pinkish cream, fine to medium-grained Fld and fine-grained Hb and Bi (< 10% total mafics). Co occurs locally.
96-BS-18	Blu Starr	Road cut, 145 m	Grab	Cream-coloured, medium to coarse-grained gneiss. 5-7 % mafics (very fine-grained Bi-Hb). Secondary calcite.

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-BS-19	Blu Starr	Road cut, 145 m.	Grab	Dark-gray and cream-coloured augen gneiss. Augens are composed of Fld. Reported to be Co-bearing.
96-BS-20	Blu Moon	135 m, ~ 5 m north	Grab	Pink Fld pegmatite with crystals reaching 5 cm. The pegmatite is between 2 and 3 m wide.
96-BM-21	Blu Moon	170 m	Grab	Coarse-grained, locally strongly magnetic Fld-Bi±Hb-Mag gneiss. Contains magnetite crystals up to 5 mm in size. The rock contains 5 to 10% mafics. It is cut by veins of coarse calcite.
96-BM-22	Blu Moon	110 m, ~ 5 m north	Grab	Fld-Bi-Hb gneiss. < 5% mafics which are < 2 mm. Fld are between 3 and 5 mm in size.
96-BM-23	Blu Moon	120 m, ~ 8 m north	Grab	Vein of a greenish-yellow mineral (amphibole?) in Fld-Bi-Hb gneiss.
96-BM-25	Blu Moon	Locaton uncertain, ~160 m, 20 m north	Grab	Alternating dark gray and white layered (1-4 cm) gneiss. Fine-grained Bi+Fld±Hb±garnet layers. The white layers are medium-grained and composed of Fld, Qtz and a small amount of garnet
96-BM-26	Blu Moon	157 m, ~ 20 m north	Grab	White gneiss, rich in calcite. Very few mafics
96-BM-27	Blu Moon	167 m, ~ 20 m north	Grab	White gneiss with large zircons (8 mm). Locally up to 2% zircon. Mafic content < 2% (Bi). Locally calcite-rich.
96-BM-28	Blu Moon	179 m, ~ 20 m north	Grab	Felsic medium-grained gneiss above shear zone. <10% mafics (Hb+Bi)
96-BM-29	Blu Moon	182 m, ~ 20 m north	Grab	Fine-grained (< 1 mm) Fld-Bi-Hb-gneiss. ~30% mafics
96-BM-30	Blu Moon	243 m, ~5 m north	Grab	Medium-grained (< 3 mm) Fld-Hb ± Bi gneiss. ~ 30% mafics, mostly Hb.
96-BM-31a	Blu Moon	Location uncertain	Grab	Leucocratic gneiss

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-BM-31b	Blu Moon	105 m, ~ 35 m north	Grab	Fine to coarse-grained gneiss with white to cream colour augens and black discontinuous laminations (Bi) undulating between the augens. The augen texture is not well defined everywhere in the rock. Augens are up to 1 cm long and composed of Fld with locally minor Qtz
96-BM-31c	Blu Moon	190m, ~ 10 m south	Grab	Felsic syenitic (?) pegmatitic intrusion in contact with gneiss. Intrusion composed of Fld (up to 2 cm) and ~ 10-15% Hb (up to 1 cm). The intrusion is Hb-rich (25%) at the gneiss contact.
96-PEG1-32	SLOCAN 2	PEG1, 5 m west. See Map 1	Grab	Weathered pegmatite sample containing unknown alteration minerals and sericite. One of the minerals is pink, elongated, with good cleavage perpendicular to the c-axis.
96-PEG1-33	SLOCAN 2	PEG1, see Map 1	Grab	Fld-Qtz-Tm-garnet pegmatite
96-PEG1-34	SLOCAN 2	PEG1,~-111 m east.	Grab	Fld-Qtz-Tm pegmatite
96-PEG1-35	SLOCAN 2	20 m up PEG1	Float	Qtz-Fld-Bi pegmatite, no Tm
96-BS-36	Blu Starr	Road cut, 134 m	Chip, 15 cm	Fld gneiss with ± Hb. Co up to 1 cm.
96-BM -36b	Blu Moon	BM ~105m	Grab	Fld gneiss with less than 5% mafics. Rich in calcite veins. Samples contain very good Co crystals up to 1 cm.
96-BS-37	Blu Starr	Road cut, 134 m	Chip, 10 cm	Corundum-bearing white gneiss. < 5% fine-grained to coarse grained mafic (Bi-Hb). Coarse Fld. Co < 4 mm
96-BS-38	Blu Starr	Road cut, 135 m	Chip, 10 cm	Corundum-bearing white gneiss. Contains coarse Fld, fine-grained Hb and Bi (< 5 % total mafic). Co up to 7 mm
96-BS-39	Blu Starr	Road cut, 95-98 m	Chip, 10 cm	Corundum-bearing pinkish white gneiss. Contains coarse Fld, fine to coarse-grained Bi and Hb (< 10% total mafics). Co up to 1 cm
96-BS-40	Blu Starr	River section, 110 m	Grab	Corundum-bearing cream colour gneiss. < 5%, medium-grained mafics.

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-BS-41	Blu Starr	River section, 165-160 m	Chip, 5 cm	Pinkish corundum-bearing gneiss. Contains fine to medium grained Fld, fine-grained Hb and Bi (< 5 % total mafics). Co up to 1 cm.
96-BS-42	Blu Starr	River section, 120 m.	Float	Corundum in Fld-Hb-epidote±Bi pegmatitic gneiss. Hb up to 2 cm long (~ 15 % Hb). Co up to 6 mm. Possibly some small Ca-garnet and vesuvianite.
96-BS-43	Blu Starr	River section, 105m	Chip, 15 cm	Corundum-bearing pinkish-orange gneiss with coarse Fld, fine-grained Hb and Bi (~ 10-15% total mafic). Co < 6 mm.
96-PEG4-44	SLOCAN 2	PEG4, see Map 1	Grab	Fld-Qtz-Tm pegmatite
96-PEG5-45	SLOCAN 2	PEG5, see Map 1	Grab	Fld-Qtz-Tm pegmatite
96-PEG5-46	SLOCAN 2	PEG5, see Map 1	Grab	Fld-Qtz-Tm-Fluorite (?) pegmatite
96-47	VALLICAN 5	Southwest corner	Grab	White felsic rock. Composed of pure white Fld (<1 cm), greenish-gray Fld (up to 4 cm long), pinkish-grey Qtz (<10%) and Bi (~1-3%). Also garnet-Tm leucogranite gneiss (~ 3% < 5 mm garnet and < 1% Tm).
96-PEG-48	SLOCAN 2, southeast	Below PEG2.	Float	Fld-Qtz-Tm pegmatite. Tm is up to 10 cm long and forms radiating crystal clusters which are broken perpendicular to their c-axes. Fld and Qtz have crystallized between the fragments. ~ 20% Tm.
96-PEG6-50	VALLICAN 5, Southwest	East of southernmost corner of B.Q.2.	Grab	Fld-Qtz-Tm pegmatite
96-51	VALLICAN 5, Southwest	~ 500 m east of B.Q. 2	Grab	Leucogranite gneiss with Tm(~ 1%, < 1 cm clusters) and ± garnet.
96-52	VALLICAN 1	Talbot Creek, See Map 1	Grab	Foliated Qtz-Fld-Bi gneiss
96-52b	VALLICAN 1	Talbot Creek, 870 m elevation	Grab	Coarse-grained (up to 6-8 mm) leucogranite with Tm (1-3%, < 7 mm)

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
96-52c	VALLICAN 1	Talbot Creek, 850 m elevation	Grab	Qtz-Fld-Bi-garnet gneiss. Qtz and Fld are medium to coarse-grained (up to 6 mm) and form layers separated by Bi/Garnet rich interlaminations. Garnets reach 1 cm in diameter.
96-52d	VALLICAN 5	1510 m elevation, east of B.Q.2, end of logging road	Grab	Leucocratic Fld-Qtz- sillimanite-Bi-garnet gneiss. Mineral lineation well developed in schistosity plane.
96-52e	VALLICAN 5	1550 m elevation, east of B.Q.2, 400 m past fallen trees	Grab	Fld-Qtz-(Bi) leucogranite gneiss. Graphic texture. Very good mineral lineation in schistosity plane. ~ 20% Qtz
96-PEG-53	VALLICAN 5	1360 m east of B.Q.1.	Float	Fld-Qtz-Tm pegmatite
96-PEG-54	VALLICAN 5	SW of 53	Float	Fld-Qtz-Tm-Bi pegmatite. 15-20% Tm occurring as single crystals up to 5 cm long and also interstitial to Fld and Qtz.
96-PEG-55	VALLICAN 5	A few metres east of sample 54	Float	Fld-Qtz-Tm pegmatite in leucogranite gneiss
96-56	South of VALLICAN 5	1865 m elevation	Grab	Hb-Bi-Fld-Qtz- paragneiss. Fine-grained mafics (< 1 mm, ~ 40%). Fld form augens up to 8 mm long. Also fine-grained Fld and Qtz intermixed with mafics.
96-57	VALLICAN 4	~ 700 m elevation west of Blu Moon	Grab	Coarse grained Fld-Bi- Hb-Mag white gneiss
96-58	Blu Moon	~ 105 m	Grab	Margarite after Co. Also blue-green crystals (altered Co?)
A	Blu Starr	Railroad cut, 236 m	Grab	Bi schist
B	Blu Starr	Railroad cut, 236 m	Grab	Garnet amphibolite

Sample No	CLAIM	LOCATION	TYPE OF SAMPLE	DESCRIPTION
C	Blu Starr	Railroad cut, 236 m	Grab	Felsic gneiss similar to corundum-bearing layers BS-11 and BS-1, but Qtz-bearing.
D	Blu Starr	Railroad cut, 236 m	Grab	Grey and orange Qtz-Fld-Bi gneiss
E	Blu Starr	Railroad cut, 236 m	Grab	Bi schist and amphibolite
F	Blu Starr	Railroad cut, 236 m	Grab	Medium gray Qtz-rich Qtzofeldspathic gneiss (+ Bi)
G	Blu Starr	Railroad cut, 234 m	Grab	Pinkish-gray Qtz-rich Qtzofeldspathic gneiss
AB	Blu Starr	Railroad cut, 234 m	Grab	Grey Qtzofeldspathic (+ Bi) gneiss
H	Blu Starr	Railroad cut, 234 m	Grab	Interlayered Bi schist, felsic gneisses and Qtz veins
I	Blu Starr	Railroad cut, 234 m	Grab	Medium-gray, finely layered Qtz-rich gneiss with large (1-2 cm) garnet porphyroblasts at top of unit.
J	Blu Starr	Railroad cut, 233 m	Grab	Intermixed amphibolite, light to dark-coloured Qtz-Fld-Bi gneisses with small pegmatitic gneiss layers. Cut by Qtz veins.
K	Blu Starr,	Railroad cut, 230 m	Grab	Pale to medium gray Qtz-Fld-Bi- garnet gneiss.
L	Blu Starr	Railroad cut, 225 m	Grab	Felsic Qtz-Fld-Bi augen gneiss interlayered with Bi schist.
M1	Blu Starr	Railroad cut, 225 m	Grab	Fine-grained medium gray gneiss interlayered with medium-grained felsic gneiss. The gray layers are composed of Fld, Bi, and smoky Qtz. The felsic layers contain white Fld, smoky Qtz and sparse Bi. Layers are 1 to 4 cm wide.
M2	Blu Starr	Railroad cut, 225 m	Grab	Fld-Qtz-Bi± Hb augen gneiss. Augens of Fld and Qtz up to 3 cm long. ~ 20 % mafics.
AF	Blu Starr	River section, 155 m	Grab	Finely laminated, fine to medium-grained (< 2 mm) Fld-Qtz-Bi gneiss

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V6C 3B2

SLOCAN VALLEY GEM PROJECT 1996

STATEMENT OF EXPENSES

WAGES AND FEES

Guylaine Gauthier Msc.			Days	$CD
June 4 - June 28			24	4200.00
June 29 - July 23			26	4550.00
Aug. 1 - Aug. 16			14	2450.00
Aug. 18 - Sept. 30			32	5600.00
Oct. 1 - Oct. 30			20	3500.00
Nov. 1 - Nov. 30			17	2975.00
Dec. 2 - Dec. 17			12	2100.00
Jan. 1 - Jan. 20/97			11	1925.00
TOTAL DAYS	156	@ $175.00 pd.		27,300.00

Kathleen Dixon P.Geo.				
July 2 - July 14			13	2782.00
Aug. 6 - Aug. 14			9	1926.00
Nov. 26 - Nov. 30			3.5	749.00
TOTAL DAYS	25.5	@ $200.00 pd.		5457.00

TOTAL WAGES and FEES 32,757.00

FIELD ACCOMODATION

Room and Board

85 man - days @ $75.00 per day	6,375.00

AIR TRAVEL

Vancouver to Castlegar July 3		257.15
Calgary to Castlegar July 2 - Return Castlegar to Calgary July 14		233.11
Calgary to Castlegar Aug. 6 Return Castlegar to Calgary Aug. 14		476.96
Calgary to Vancouver Aug. 22 - Return Vancouver to Castlegar Aug. 25		507.89
Castlegar to Vancouver Sept. 17		265.17
	TOTAL	1740.28

4 X 4 TRUCK RENTAL

3 Months @ 1000.00	3000.00

EXPENSES

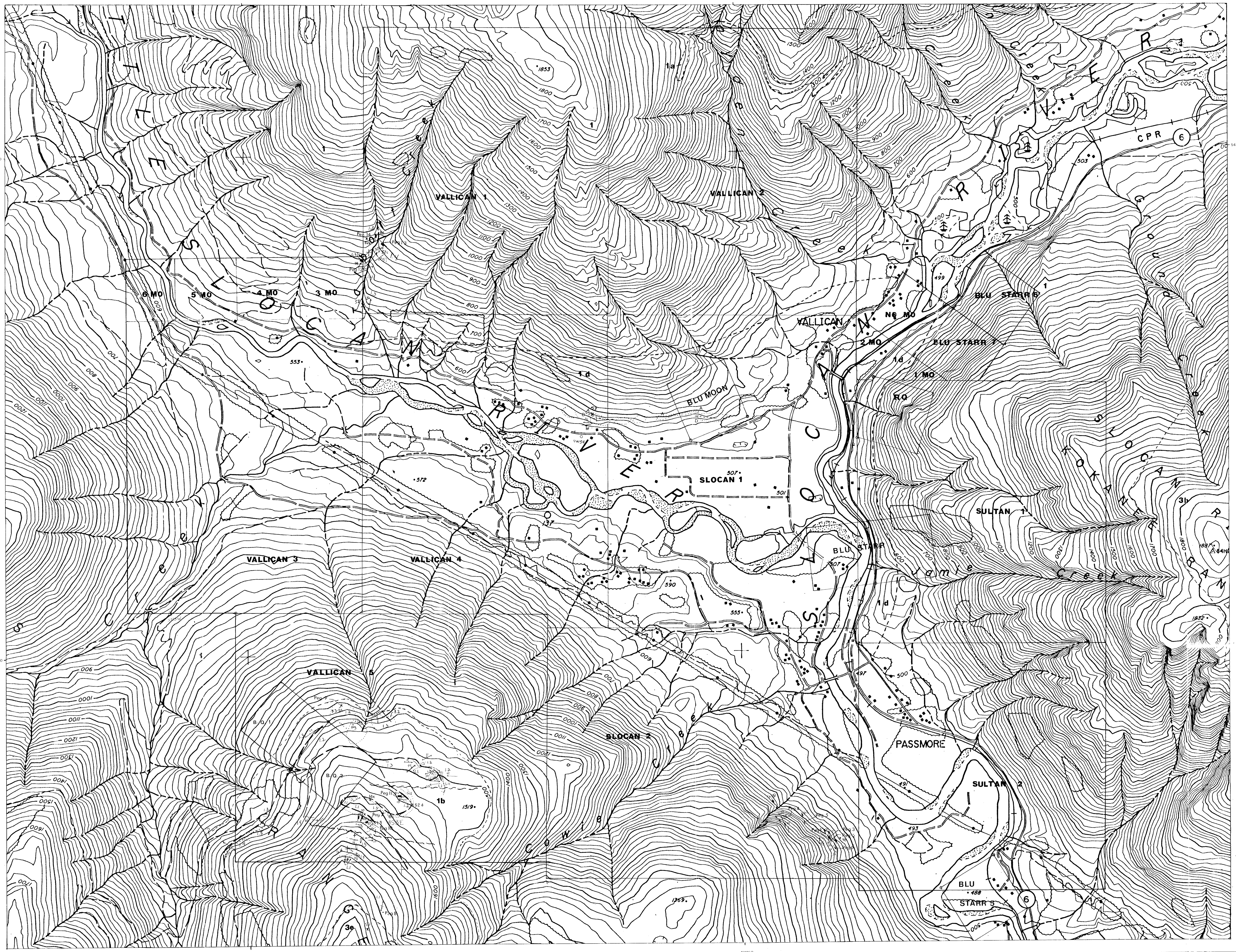
4 x 4 Fuel		1000.00
Miscellaneous Maps, Supplies, etc		2500.00
Report Costs		2500.00
	TOTAL	6,000.00

SUMMARY

Wages and Fees	$	32,757.00
Field Accomodation		6,375.00
Air travel		1,740.28
4 X 4 Truck Rental		3,000.00
Expenses		6,000.00
TOTAL	$	49,872.28

James Laird

James Laird
Exploration Manager
Canadian Sapphire Corp.



LEGEND

- × Sample locations
- Foliation
- Horizontal foliation
- Strike and dip of vein
- Peg5 Pegmatite locations
- Mineral lineation
- Shear zone
- Outcrop

1: **Hybrid gneiss:** intimately interlayered rocks consisting of a metasedimentary fraction with leucogranite-gneiss and pegmatitic interlayers, much migmatite, minor amphibolite (Reesor, 1965)

1a: Marble and/or calc-silicates (Reesor, 1965)

1b: Layers and lenses with over seventy-five per cent of quartzofeldspathic rocks ranging in composition from leucogranodiorite to granite and pegmatite, and in texture from massive to mildly foliated to gneissic (all boundaries are gradational and arbitrary with surrounding hybrid gneiss) (Reesor, 1965)

- **1.1** Coarse grained leucogranite-gneiss, with minor garnet amphibolite
- **1.2** Coarse grained to pegmatitic biotite-quartz-feldspar ± hornblende paragneiss, rusty weathering. Locally with sillimanite and garnet.
- **1.3** Biotite-quartz-feldspar ± hornblende gneiss intermixed with amphibolite, intermediate to mafic gneiss, pegmatites and migmatites.
- **1.4** Interlayered gray and white quartzofeldspathic ± biotite paragneiss intermixed with migmatites.
- **1.5** Leucogranite-gneiss (± garnet) intermixed with biotite-quartz-feldspar paragneiss, purplish black fine-grained paragneiss, minor pegmatites and amphibolite. Garnet leucogranite-gneiss cross-cutting purplish-black gneiss.
- **1.6** Quartzofeldspathic (± biotite) gneiss interlayered with minor amphibolite, some migmatites. Locally dominant amphibolite layers. ~ 10 m syenitic layer at ~ 1700 meters. (1.8)

1d: Garnet-hornblende augen gneiss; some garnetiferous leucogranite-gneiss, and some amphibolite (Reesor, 1965)

- **A**: Syenitic gneiss
- **D**: Interlaminated paragneiss

3: **Mixed gneisses**: mainly foliated leucogranodiorite, leucoquartz monzonite, and granitic gneiss (in places garnetiferous); leucogranodiorite-gneiss contains remnants and extensive layers of hornblende granodiorite-gneiss; some metasedimentary gneisses and amphibolite (Reesor, 1965)

3b: Hornblende granodiorite-gneiss (with augen of potash feldspar) (Reesor, 1965)

3e: Quartz monzonite and leucoquartz monzonite, well foliated with megacrysts of potash feldspar (Reesor, 1965).

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,032

0 500 1000

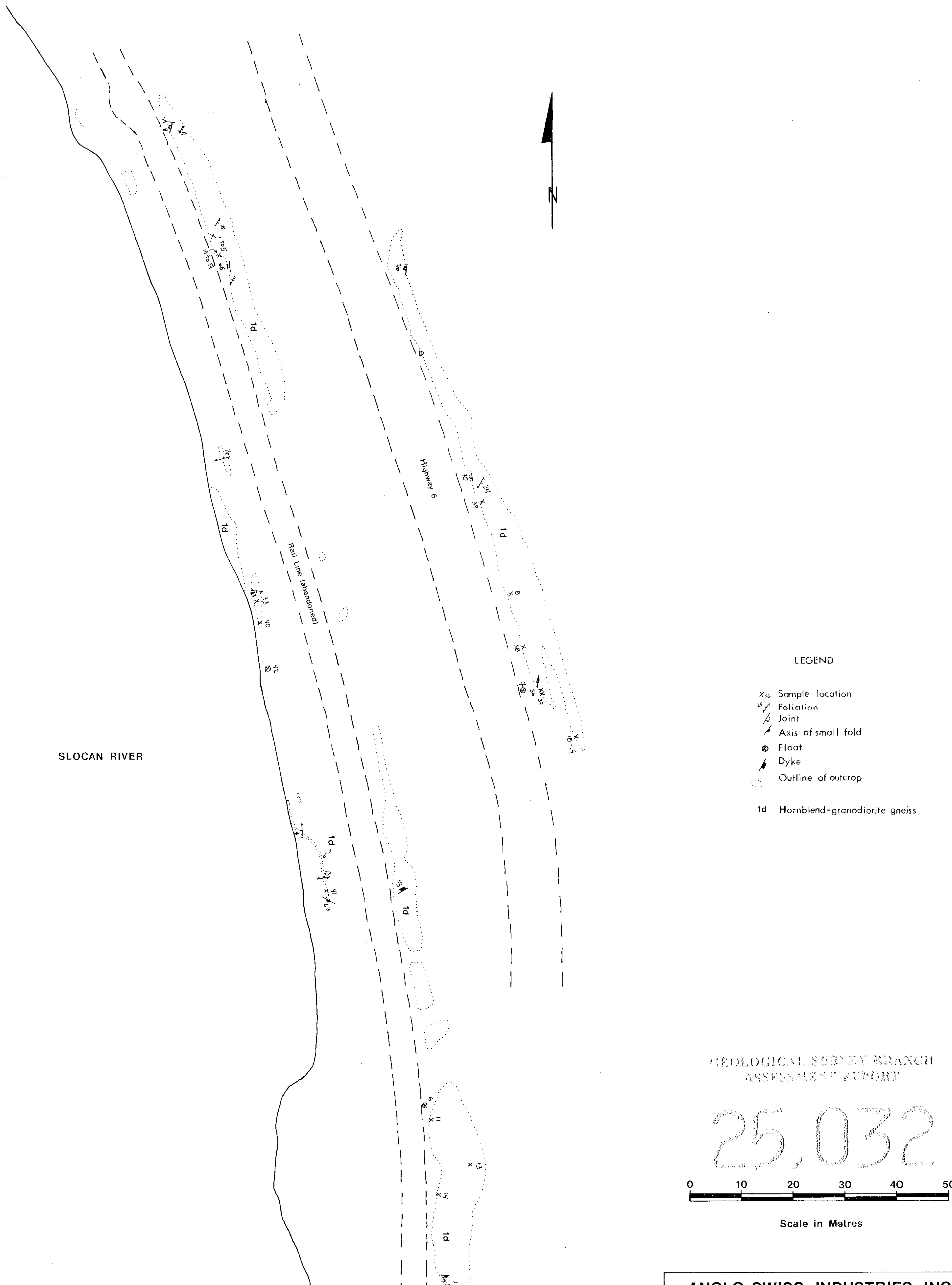
Scale in Metres

ANGLO-SWISS INDUSTRIES INC.

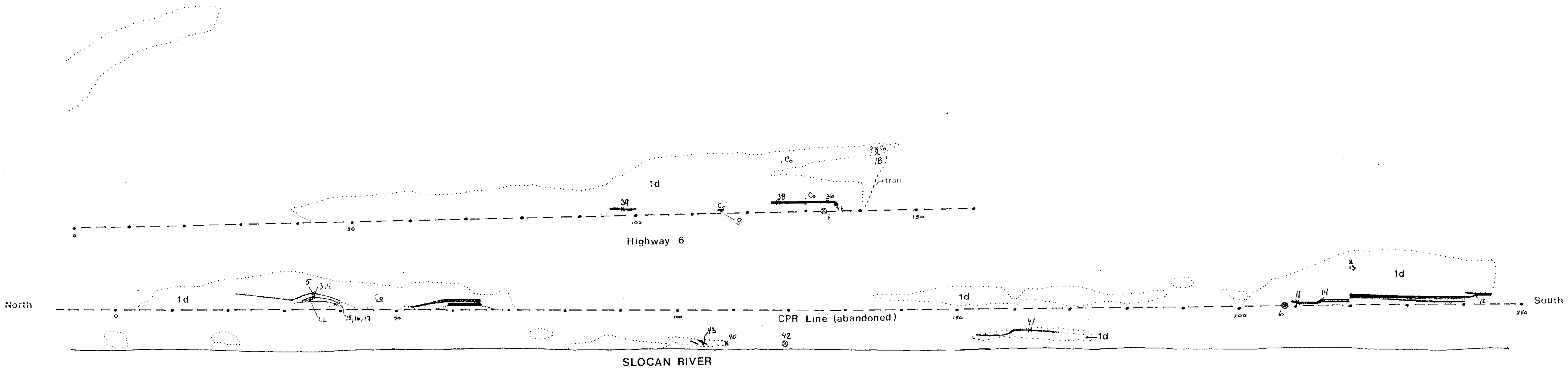
SLOCAN & NELSON M.D. PROPERTY

GEOLOGY MAP

Scale 1:10000	G. GAUTHIER	November 1996	MAP 1



ANGLO-SWISS INDUSTRIES INC.		
Blu Starr Property, B.C.		
GEOLOGY MAP		
Scale: 1:500	GAUTHIER, DIXON	November 1996
		MAP 2



LEGEND

x	Sample location
⊗	Float
.Co	Corundum
———	Corundum layer
1d	Hornblend-granodiorite gneiss

0 10 20 30 40 50

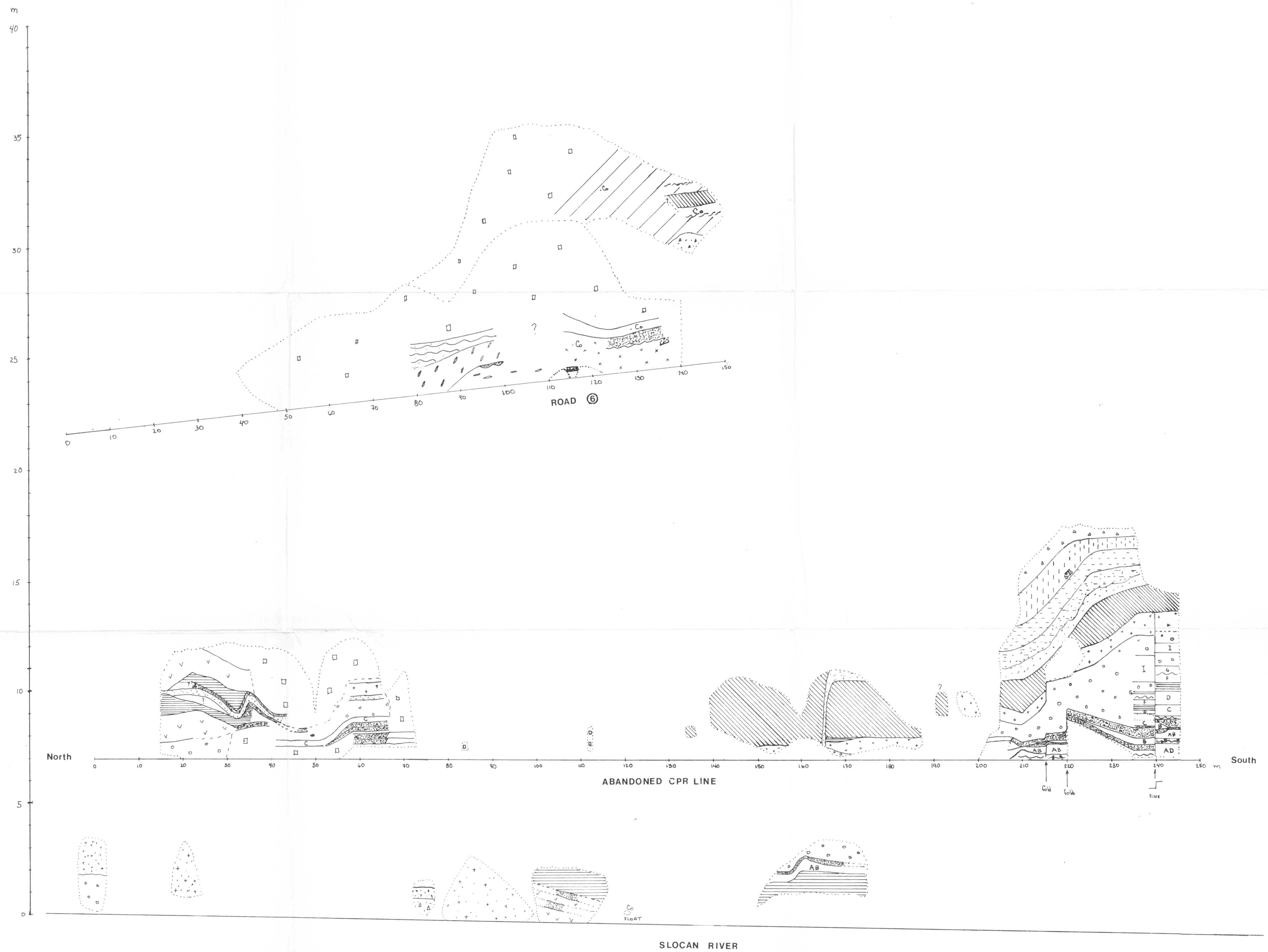
METRES

ANGLO-SWISS INDUSTRIES INC.

Blu Starr Property, B.C.

LONGITUDINAL SECTION

SCALE 1: 500	G. GAUTHIER	SEPTEMBER 1996
		MAP 3



LEGEND

1		Felsic, coarse-grained syenitic gneiss with thin discontinuous biotite layers. Locally corundum-bearing
2		Interlayered amphibolite and biotite schist
3		Feldspar-biotite-garnet gneiss grading into feldspar-quartz-biotite-(garnet) at top of section
4		Cream-coloured, fine to coarse-grained felsic gneiss. Locally with small bluish-gray crystals of unknown composition and lenses of coarse feldspar. Corundum-bearing.
5		Bluish-gray, medium-grained gneiss. Corundum-rich layer (15-20 cm) at the base of this gneiss.
6		Interlaminated biotite schist, medium-gray quartzo-feldspathic gneiss, and orange, feldspar-rich, quartz-poor gneiss.
7		Felsic, bluish-gray gneiss with undulating pegmatitic layers and discontinuous laminations of biotite and hornblende. The middle of the section is more foliated and mafic containing alkali amphibole, biotite, feldspar augens. A small (4 mm) corundum grain was found in the bottom section.
8		Medium gray augen gneiss interlayered with felsic, thinly banded quartzo-feldspathic gneiss. Top of unit grades into overlying unit.
9		Light-coloured, thinly layered gneiss. The upper section grades into overlying unit.
10		Medium to dark gray biotite-feldspars augen gneiss. Locally garnetiferous.
11		Pale to medium gray quartz-feldspar-biotite gneiss interlayered with biotite schist.
12		Intermixed amphibolite, light to dark-coloured quartz-feldspar-biotite gneisses with small pegmatitic gneiss layer. Cut by quartz veins.
	I	Medium-gray, finely layered quartz-rich gneiss with large (1-2 cm) garnet porphyroblasts at top of unit.
	G	Pinkish-gray quartz-rich felsic gneiss.
	F	Medium-gray, medium-grained garnetiferous quartz-feldspar-biotite gneiss.
	D	Gray orange quartz-feldspar-biotite gneiss
	C	Fine-grained, felsic gneiss similar in appearance to corundum-bearing gneiss, but quartz-bearing. Locally interlayered with amphibolite and biotite schist.
13		Amphibolite
14		Biotite Schist
		Corundum-bearing layers. Pale gray, felsic gneiss. Massive to slightly foliated, Corundum usually found in irregular bands or augens.
	B	Garnet amphibolite.
	AB AD	Medium-gray quartz-feldspar-biotite gneiss interlayered with biotite schist.
16		Interlayering of quartzo-feldspathic gneisses (± biotite) and amphibolite gneiss
17		Orange potash-feldspar-hornblende gneiss interlayered with gray quartz-feldspar-biotite gneiss.
18		Dyke/sill. Orange weathering, potash-feldspar-hornblende-tourmaline pegmatites.
19		Talus.
	Co	Corundum occurrences
	□	Outcrop obscured.

GEOLOGICAL SURVEY BRANCH
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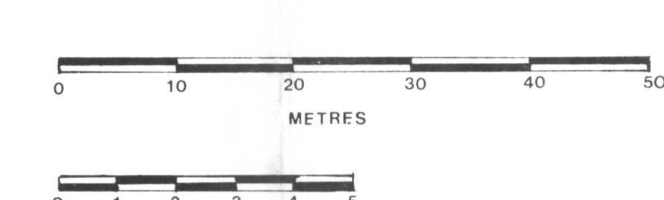
25,032

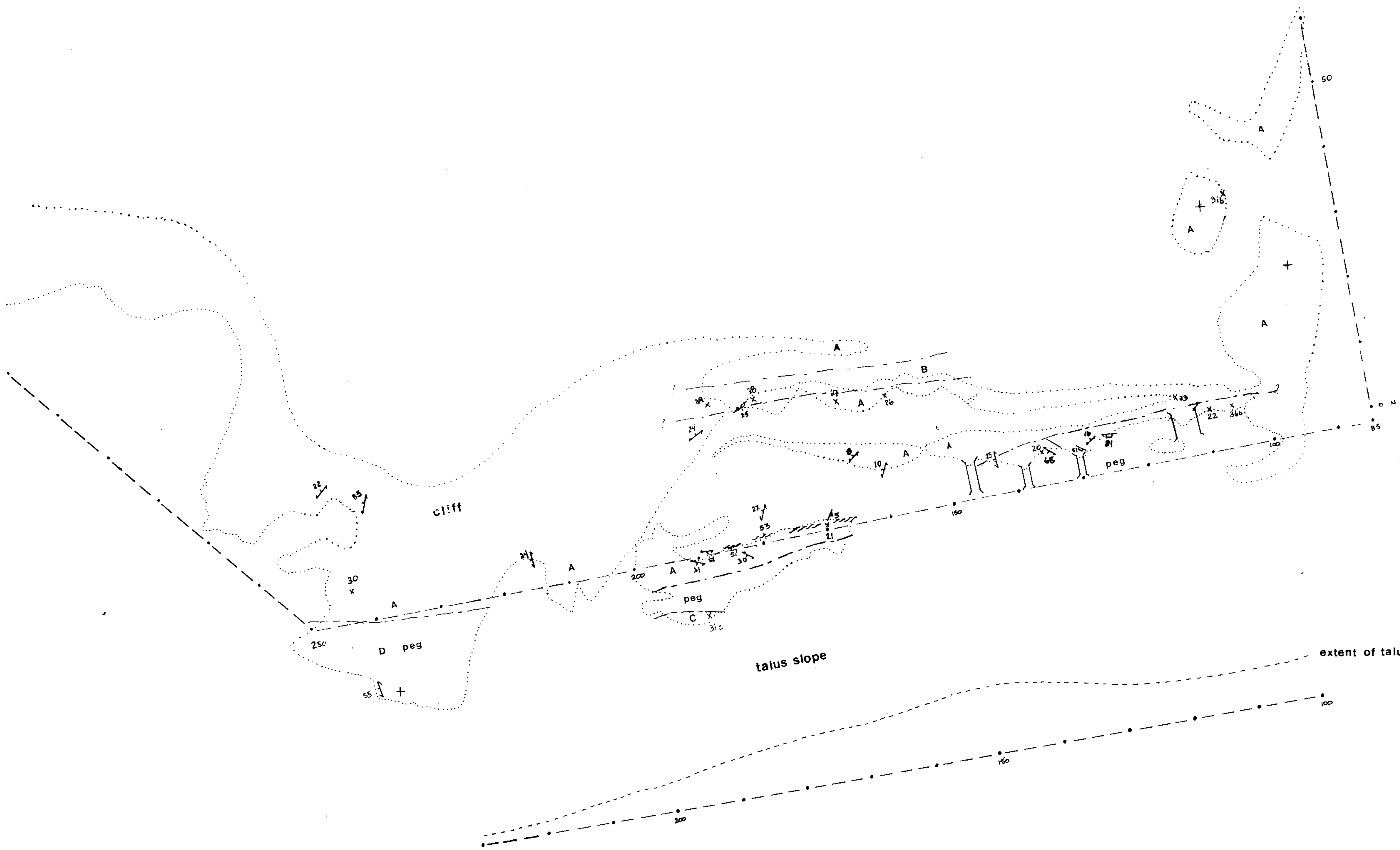


ANGLO-SWISS INDUSTRIES INC.

Blu Starr Property, B.C.

STRATIGRAPHIC SECTION

H. SCALE: 1:500	G GAUTHIER	SEPTEMBER 1996
V. SCALE: 1:100		MAP 4



LEGEND

- A Syenitic gneiss
- B Augen gneiss
- C Pegmatitic syenite
- D Interlaminated paragneiss

- x Sample location
- Foliation
- Shear zone
- Joint
- Trench
- Geological contact
- Outline of outcrop

0 10 20 30 40 50

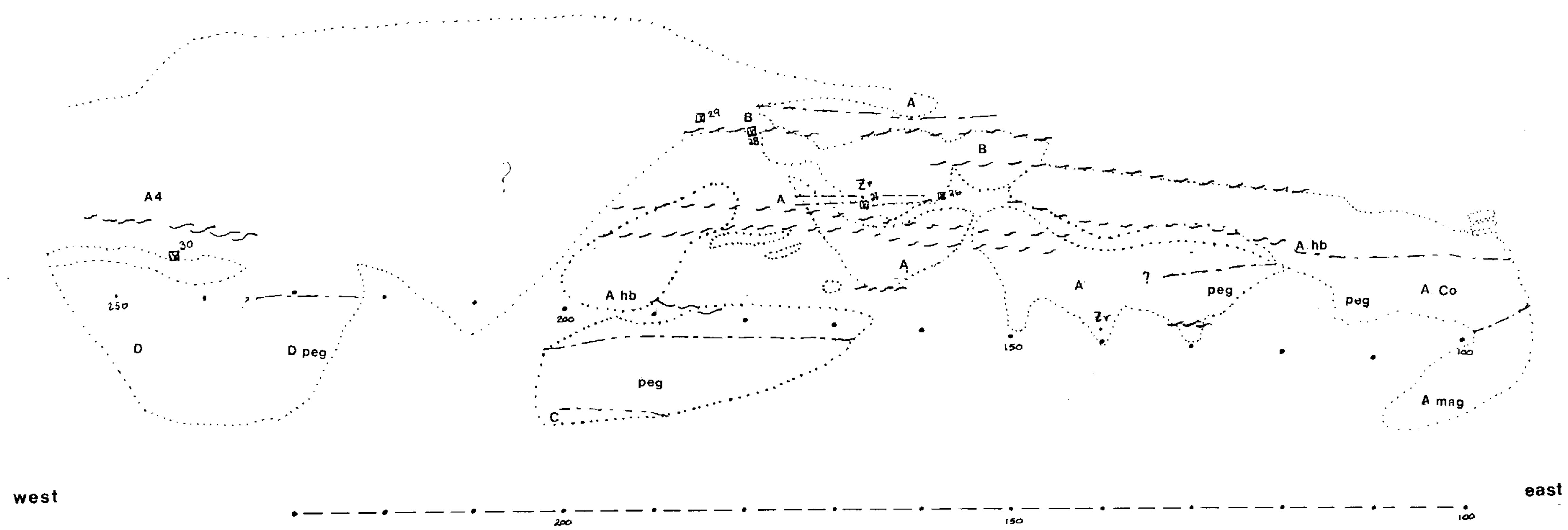
Scale in Metres

ANGLO-SWISS INDUSTRIES INC.		
Blu Moon Property, B.C.		
GEOLOGY MAP		
Scale: 1: 500	GAUTHIER, DIXON	November 1996
		MAP 5

LEGEND

A Syenitic gneiss
B Augen gneiss
C Pegmatitic syenite (potassium feldspar - hornblende)
D Interlaminated paragneiss
hb: hornblende - rich
Mag: magnetite-rich
Co: corundum - bearing
Zr: zircon - bearing
peg: zones rich in syenitic pegmatites

× Sample location
Shear zone
Geological contact



25,032

0 10 20 30 40 50
Scale in Metres

ANGLO-SWISS INDUSTRIES INC.		
Blu Moon Property, B.C.		
LONGITUDINAL SECTION (Looking towards 350°)		
scale 1:500	GAUTHIER, DIXON	November 1996
		MAP 6

LEGEND

AF : Alluvium fan deposits; undifferentiated.
$T_{0\text{-}5}$: Terrace deposits gravel, sandy gravel, and sand
T0 : River level T5 5th level of terraces

U Undivided deposits: (forested areas mapped largely by airphoto interpretation), mainly undifferentiated moraine deposits.

R Rock outcrop

1000 Topographic contours (in meters)

Glacial striae

Property boundary

Geological contact

Site 1, 2 Potential sites for paleoplacers

Power line

N

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,032

0 500 1000 1500 2000
Scale in metres

ANGLO-SWISS INDUSTRIES INC.

SURFICIAL GEOLOGY

Scale: 1:20 000	G. GAUTHIER	November 1996
		MAP 7