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SKARNS IN BRITISH COLUMBIA

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ABSTRACT

There are at least 735 skarns in British Columbia. They range from small occurrences to extensive skarns that are associated with metal deposits exceeding 30 million-t of ore. The overwhelming majority have calcic mineral assemblages (garnet-clinopyroxene-epidote-wollastonite); the rarity of magnesian skarns with olivine-serpentinite-phlogopite gangue assemblages reflects the absence of major plutonism in areas with extensive platformal dolomites in British Columbia.

The 735 skarns can be divided into three groups. The smallest group of 15 occurrences is related to Cu or Cu-Mo porphyry deposits. Another small but unique group of 25 skarns occur as barren wallrock alteration to large, Cu-Au bearing quartz or sulphide vein systems. The third and largest group comprises 695 skarns which, on the basis of their chemistry or dominant sulphide, oxide or silicate assemblages, can be classed as follows: 340 Cu, 146 Fe, 80 Pb-Zn, 48 W, 28 Au, 22 Mo, 17 industrial mineral, 3 Sn skarns and 11 occurrences of unknown class.

Skarns are poorly developed in tectono-stratigraphic terranes having abundant ocean-floor material whereas terranes dominated by oceanic island arc rocks contain over 80 % of the skarns and have accounted for virtually all the Fe, Cu, Au, Ag and Zn metal production from skarn. Only 5 % of the skarns are hosted by terranes in the North American basement and craton yet these have been responsible for all of the W metal production. All the Mo production from skarn has come from the Kootenay Terrane which also hosts the largest number of Mo skarns (8 occurrences). Although the Coast Belt has the greatest concentration of plutonic rocks in the province, its terranes host only 4 % of the skarns and these have had negligible metal production.

At least 112 skarns have had some recorded metal production and an additional three deposits have produced a variety of industrial mineral commodities such as marble. The 112 metal-producing skarns are distributed across 10 terranes but the largest deposits are confined to only four terranes: Wrangellia, Quesnellia, Kootenay and ancestral North America. Production data indicates that between 120 million and 142 million-t of ore has been mined from skarn with a yield of nearly 35 million-t of Fe concentrate (magnetite), 850 000-t of Cu metal, 7520-t of W concentrate (scheelite) and 1760-t of Mo concentrate (molybdenite). This represents approximately 90 % of the Fe, 80 % of the W and 12 % of the Cu produced from hardrock mining in British Columbia.

Skarns have produced over 119-t of Au and 364-t of Ag, representing nearly 16 % and 2 %, respectively, of the provinces production of these metals from hardrock mining. Although 70 skarns have produced some Au, over 80 % has been won from just two major deposits, Nickel Plate and Phoenix. All the Ag from skarn was derived as a byproduct, largely from Cu and Fe skarns, with the Phoenix deposit being the largest single skarn producer of Ag.

Skarns in British Columbia were developed during three distinct time periods which coincided with three major episodes of subduction-related plutonism. The most important episode took place during the Early to Middle Jurassic when over half of the skarns (372 occurrences) were formed, including most of the Fe, Cu, Au and Mo skarns and over 40 % of the Pb-Zn skarns. Later episodes, during the Cretaceous and Eocene-Oligocene, resulted in the development of 120 and 61 occurrences respectively; the Cretaceous was responsible for virtually all the W and Sn skarns, as well as a substantial number of Pb-Zn skarns.

Major and trace element analytical data of unaltered igneous rocks associated with skarns, indicate that the plutonic rocks are mostly sub-alkaline and calc-alkaline. The plutons responsible for Fe, Au and many Cu skarns are metaluminous, relatively undifferentiated, Fe-rich and largely of gabbro-quartz diorite-quartz monzodiorite composition. Their Nb, Y and Rb contents are characteristic of "volcanic arc granites" (as defined by Pearce *et al.*, 1984). Their chemistry and preferential development in oceanic island arc terranes suggests they were derived as melts from primitive oceanic crust and that they represent "pre-plate collision" intrusions.

The plutons associated with W and Sn skarns are peraluminous, highly differentiated, Fe-poor rocks that are rich in large ion lithophile elements and largely of granite-adamellite composition. Their chemistry and terrane setting suggests they are mostly "syn-collision" and "within plate" intrusions that were derived from the partial melting of continental crust and continentally-derived sediments.

Detailed petrology and microprobe analyses of ore and gangue assemblages define differences in mineral abundances and mineral chemistry between various classes of skarn. In some cases, these differences may be used to determine the potential for a particular type of mineralization in a skarn. Although most skarn garnets are low Mn andradite-grossularite solid solutions, some garnets in the Emerald Tungsten W skarn contain up to 16 % MnO. Sporadic F, Cl and Sn enrichment is noted in the garnets and vesuvianites of some Sn and W skarns. Most skarn clinopyroxenes are low Mn diopside-hedenbergite solid solutions although those in some Fe, Au and Sn skarns are johannsenite-hedenbergite solid solutions. Many pyroxenes in Sn, W and Pb-Zn skarns can be discriminated on the basis of their Al_2O_3/MgO and MnO/FeO ratios.

The use of either production data or assay results from mineralized grab samples indicates that some skarn

classes are marked by diagnostic differences in their base metal:Au and Ag:Au ratios. Gold skarns have the lowest Cu/Au (<2000), Zn/Au (<100) and Ag/Au (< 2) ratios of any skarn class. By contrast, Pb-Zn skarns have the highest Zn/Au ratios (>1000) and the ore of Cu, Fe, W, and Sn skarns tends to plot intermediate between Au and Pb-Zn skarns

On the basis of gangue mineralogy, calcic Au skarns can be separated into either pyroxene-rich, garnet-rich or epidote-rich types which have significantly different styles of mineralization and mineral and metal zoning. The contrasting features in these three types reflect differences in the hostrock lithologies as well as the oxidation and sulphidation conditions in which the skarns developed. Pyroxene-rich and epidote-rich Au skarns are represented by the Nickel Plate and QR (Quesnel River) deposits respectively. However, no garnet-rich Au skarns, such as the McCoy deposit in Nevada and the Wabu deposit in Indonesia, have yet been discovered in British Columbia, although there is a good potential for such mineralization.

A good positive correlation exists between Au and Cu in the epidote-rich QR deposit but no similar correlation between these metals is seen in most pyroxene-rich and garnet-rich Au skarns. Thus, the gold potential of a skarn can be overlooked if only outcrops rich in Cu sulphides are sampled and assayed.

In British Columbia, Au skarns and Au-bearing Cu skarns are currently the most economically attractive targets for skarn exploration. This study indicates that island arc assemblages in Quesnellia, or in correlative rocks elsewhere, have the best exploration potential for these deposits.

1. INTRODUCTION

There are at least 735 recorded occurrences of skarn (as defined by Burt, 1977) in British Columbia and most of these are associated with varying amounts of Fe, Cu, Au, W, Pb, Zn, Mo or, in very rare instances, Sn mineralization. This bulletin is the result of a project to study these skarns. It includes a database of known skarn occurrences, and outlines their distribution and metallogeny in relation to the provinces tectonic belts, litho-structural terranes, and episodes of plutonism.

In addition, this bulletin provides data on the mineralogy and mineral chemistry of skarns as well as the major and trace element geochemistry of their associated plutonic rocks. It also presents information on metal production from skarn and geochemical assay data of mineralized grab samples collected from individual skarn properties. The information will hopefully assist prospectors and exploration geologists to identify areas of low and high mineral potential. Also, because some mineralized skarns represent point sources of potential natural heavy metal or toxic element (Pb, As, Sb, Cd, Bi, Te and Se) contamination, a knowledge of the location and geochemistry of such mineralization may aid in planning future land and water uses throughout the province.

PREVIOUS WORK

Much of this project has been broad based in its examination of skarns throughout British Columbia (Webster *et al.*, 1992; Ray and Webster, 1995), although some detailed mapping or evaluation studies were also completed on individual skarn deposits or skarn mining camps. The latter work includes mapping around the Texada Island and Merry Widow Fe skarns (Webster and Ray, 1990a, 1990b; Ray and Webster, 1991a), the examination of skarns in the Iskut River area (Ray *et al*, 1991; Webster and Ray, 1991) and mapping the Mineral Hill wollastonite skarns at Sechelt (Ray and Kilby, 1996a, 1996b).

The database compiled during this project has drawn upon earlier, often classical work, including that by Camsell (1910), Billingsley and Hume (1941), and Dolmage and Brown (1945) on Au skarns; by Sangster (1965) and Meinert (1984) on Fe skarns; by Morrison (1980) on Cu skarns; by Ball *et al.* (1953), Ball (1954), Fyles and Hewlett (1959), Mulligan (1984) and Gower *et al.* (1985a) on W skarns; and by Fyles (1984) on Mo skarns. In addition, we have used more recent work on Au or precious metal enriched skarns, including those at Tillicum Mountain and elsewhere (Ettlinger and Ray, 1989a; Ray *et al.*, 1985; 1986a) and at Hedley (Ettlinger, 1990a; Ray et a., 1990; Ettlinger *et al.*, 1992; Ray and Dawson, 1994; Dawson, 1994).

SKARN TERMINOLOGY AND CLASSIFICATION

Some skarn terminology is contentious but excellent reviews have been given by Burt (1977, 1982), Einaudi and Burt (1982), and Einaudi *et al.* (1981). The term **skarn** is used in this bulletin to describe generally Ca or Mg silicate alteration, commonly also rich in Fe, Al, and possibly Mn, often formed by the replacement of calcareous rocks. Skarns do not always form exclusively in carbonate-bearing rocks; examples in British Columbia include the QR (Quesnel River) Au skarn which is hosted by calcareous tuffs (Fox and Cameron, 1995) and some Fe skarns in which parts of the magnetite orebodies are hosted by basaltic volcanics and tuffs (Meinert, 1984; Webster and Ray, 1990). However, it should be noted that in the latter example carbonates invariably form an intimate part of the host volcanic package. As a skarn is defined by its gangue mineralogy, it is not necessarily mineralized and many skarns are barren.

Skarn is mostly coarse grained, although fine to medium-grained textures may occur. It commonly forms at relatively high temperatures but, as noted by Burt (1977), under certain physiochemical conditions skarn develops at relatively low temperatures, with zeolites being an extreme example. Skarn commonly forms by either of the following two processes:

1. Localized metasomatic reaction, during regional or contact metamorphism, between different lithologies, such as between argillite and limestone. This alteration is often called **"reaction skarn"** (Magnusson, 1960).

2. Infiltration metasomatism involving the entry, generally into calcareous rocks, of hydrothermal fluids of either magmatic or metamorphic origin. Such alteration is commonly called **"replacement"** or **"infiltration skarn"**.

It should be noted that pyroxene-garnet-epidote assemblages may also be produced by the isochemical recrystallization of calcareous rocks as a result of regional metamorphism or local thermal metamorphism. This type of alteration, some of which has been termed **"calc-silicate hornfels"** (Goldschmidt, 1911) or **"skarnoid"** (Zharikov, 1970), is not considered to be skarn by many geologists. However, in the field it may be indistinguishable from reaction or infiltration skarn.

Mineralization may occur with either reaction or infiltration skarns. However, practically all of the world's major metallic skarn deposits, and most of the occurrences listed in this bulletin, are believed to be infiltration skarns related the introduction of magmatic hydrothermal fluids. The alteration commonly overprints the genetically related intrusion to produce **endoskarn**, as well as the adjacent country rocks to form **exoskarn**. Most of the world's economic skarn deposits occur in exoskarn (Einaudi and Burt, 1982), although in many deposits the alteration may be so intense that the original protolith is unrecognizable.

Based on alteration assemblages, skarns are separable into two broad groups: **magnesian skarns**, where the replacement of dolomite results in assemblages containing olivine, phlogopite, serpentine, spinel, Mg-rich clinopyroxene and chlorite, orthopyroxene, garnet, pargasite and humite group minerals; and **calcic skarns**, where the replacement of limestone or other calcareous rocks produces assemblages dominated by garnet, clinopyroxene, epidote, calcic amphibole and wollastonite.

Metal deposits associated with a skarn gangue are termed **skarn deposits** (Burt, 1972, 1977). On the basis of the dominant economic metal, at least seven major classes of metallic skarn deposit are recognized: Fe, Cu, Mo, W, Pb-Zn, Sn and Au skarns (Knopf, 1942; Burt, 1972, 1977; Einaudi *et al.* 1981; Orris *et al.*, 1987; Ray *et al.*, 1987, 1990; Meinert, 1988, 1989, 1992; Ettlinger and Ray, 1989a; Theodore *et al.*, 1991).

Knopf (1942) suggested the existence of four other classes dominated by graphite, Ba, Pt and Ce, although no major economic skarn deposits of these types are recorded. In addition, some skarns are radioactive and are enriched in U, Th and rare earth elements (REE); examples occur in the Grenville Province of Ontario and Quebec (Shaw *et al.*, 1963; Lentz, 1991).

The ore in many Fe, Cu, Mo and W skarn deposits tends to form proximal to their related plutons, whereas the ore in many Au, Sn and Pb-Zn skarns develops more distally in the outer parts of the exoskarn envelope. In certain circumstances, the late, metal-carrying hydrothermal fluids may migrate considerable distances along structures, lithological contacts or bedding planes to produce deposits *beyond* the main exoskarn halo (Figure 1D). In many of these distal deposits, the source of the fluids and the location of the related plutonic rocks are unknown. Depending on the physio-chemical conditions present (e.g. hostrock lithology and permeability and fluid chemistry), the distal magmatic fluids may result in a variety of deposits including sediment-hosted Carlin-type Au orebodies (Sillitoe and Bonham, 1990), and sulphide-rich veins, replacement bodies and mantos (Figure 1D). Many distal replacements are commonly Pb-Zn-Ag-rich, but some contain economic quantities of Au or Cu; examples of sulphide-rich Au mantos in British Columbia probably include the Sylvestor K (Minfile No. 082ESE046) and San Jacinto zone in the Marshall skarn (082ESE031; Church, 1986).

Many Cu skarns, and to a lesser degree some Fe, Pb-Zn, W and Mo skarns, may be enriched in Au, and this precious metal may be an important economic byproduct (Orris *et al.*, 1987). Although all the skarn deposit classes occur in magnesian and calcic skarns, Cu, W and Pb-Zn deposits are less commonly developed in magnesian skarns (Einaudi *et al.*, 1981). The overwhelming majority of Au skarn deposits throughout the world are developed in calcic skarns.

Skarns and their associated altered hostrocks are also a potential economic source of industrial minerals. These deposits, which can be classed as **industrial mineral skarns**, produce such substances as fluorite, wollastonite, garnet, borates, rhodonite, tremolite or marble. In parts of the former USSR., some magnesian skarn deposits have been mined for coarse phlogopite and various borate minerals such as kotoite and ludwigite (Pertsev, 1971; 1991). Skarn-related garnet and wollastonite are mined from several localities in the U.S.A. (Hight, 1983; Harben and Bates, 1990; Austin, 1991) and, in British Columbia, the bleached carbonate haloes associated with some Fe skarns on Texada Island are quarried for white ornamental marble. The Mount Riordan (Crystal Peak) skarn at Hedley has been evaluated as a source of industrial abrasive garnet (Grond *et al.*, 1991; Mathieu *et al.*, 1991; Ray *et al.*, 1992), and ongoing exploration is taking place at the Mineral Hill and Zippa Mountain-Isk skarns for their wollastonite potential (Ray and Kilby, 1996a, 1996b; Jaworski, 1996; Jaworski and Dipple, 1996).

PROBLEMS IDENTIFYING INFILTRATION SKARN DEPOSITS

The problems in distinguishing between calc-silicate hornfels, skarnoid, reaction skarn and infiltration skarn are discussed by Burt (1977) and Einaudi and Burt (1982). Garnets, pyroxenes, biotites and epidotes developed in infiltration skarn tend to be coarser grained and some of these minerals may be more enriched in Fe and Mn than those in hornfels and skarnoid. Many alteration envelopes associated with infiltration skarns exhibit distinctive textural and mineral zoning patterns that commonly developed peripheral to the hydrothermal conduits. A typical pattern comprises coarse grained garnet-rich exoskarn proximal to the intrusion and finer grained alteration dominated by pyroxene, amphibole or epidote more distally. Thus, mineral and textural zoning patterns can be used to distinguish the higher temperature skarn, developed close to the source of the magmatic fluids, from lower temperature distal skarn formed on the outer parts of the alteration zone. Recognizing and mapping the mineral zoning in a skarn is important as it helps both to identify the original hydrothermal channels and to outline those parts of the envelope most likely to contain orebodies. By contrast, in hornfels, skarnoid and reaction skarn, such mineral and textural zoning is less pronounced and the distribution of calc-silicates is primarily controlled by original features such as sedimentary lithologies and bedding.

In some cases, diagnostic features such as mineral chemistry, grain size and mineralogical zoning are equivocal, particularly where deformation and metamorphism have overprinted the original lithological contacts or mineral assemblages. The presence of a Ca or Mg silicate alteration spatially associated with mineralization does *not* necessarily prove the existence of a skarn deposit. *To qualify as a skarn deposit, the alteration must have been related to, and thus be essentially coeval with, the mineralizing hydrothermal system.* However, proving this coeval relationship in the field is often difficult.

Where other types of deposits, such as volcanogenic massive sulphides (VMS) or syngenetic and epigenetic sediment-hosted orebodies have been overprinted by high grade regional or thermal metamorphism they can easily be misidentified as skarn deposits. So too can mineralized veins that have cut a pre-existing and hydrothermally unrelated skarn hostrock. Examples that superficially resemble skarn deposits include the Goldstream and Cottonbelt properties in southeastern British Columbia. The coarse-grained garnets in these deposits are enriched in Fe and Mn, and are texturally and chemically indistinguishable from garnets formed in infiltration skarns. But these deposits are believed to be exhalites laid down in Mn and Fe-rich sediments that were subsequently overprinted by amphibolite-facies regional metamorphism (Höy 1979, 1987; Höy *et al.*, 1984).

Some elongate and stratiform zones of mineralization and skarn-like alteration are difficult to classify, particularly where no parent intrusions are identifiable. Many are reaction skarns formed along the contact between two reactive lithological units. Others probably represent infiltration skarns formed by far-traveled magmatic fluids that moved along highly permeable horizons or structures. However, the origin of some other stratiform skarns is controversial, and a few may represent syngenetic metalliferous sediments that were thermally metamorphosed by later intrusions. Syngenetic or exhalitive *versus* epigenetic origins for the magnetite-rich San Leone deposits in Sardinia, the Aguilar Zn-Pb-Ag deposit in Argentina and some W skarns are discussed by Verkaeren and Bartholome (1979), Gemmell *et al.*, (1992) and James and Ineson (1993).

There are several controversial stratiform alteration zones in British Columbia, and some contain ambiguous features suggesting they may be either infiltration skarns, massive replacement bodies related to skarn systems, exhalites or metamorphically overprinted volcanogenic massive sulphide deposits. They include the Steep property (082M 118) in the Kamloops district, and the Sylvestor K (082ESE031) in the Greenwood skarn camp. The Steep prospect contains a zone of garnet-epidote-amphibole skarn, up to several hundred metres thick, that is traceable for over 10 kilometres along strike. It contains Fe and Cu sulphides with some native Bi, Bi-tellurides and Au (Miller *et al.*, 1988; Ettlinger and Ray, 1989a). The Sylvestor K deposit is a steeply dipping zone of massive, Au-bearing Fe sulphides up to 6 metres thick and 240 metres long (Church, 1986). Only minor garnet-epidote-amphibole alteration is found in the adjacent wallrock, but the deposits probably represents a massive replacement body that formed distal to the nearby Phoenix Cu-Au skarn system.

Although the idea is controversial, it has been suggested that some skarns were related to fluids of exhalitive origin and thus formed syngenetically in sediments just below the sea floor; the Australian stratiform Zn skarns may be deposits of this type (Stanton, 1987). It is noteworthy that some recent metal-bearing sediments in the Red Sea are locally recrystallized to an assemblage containing hematite, magnetite, hedenbergitic pyroxene, actinolite and trace andradite garnet (Zierenberg and Shanks, 1983); recrystallization is probably due to the intrusion of basalts into the wet metalliferous sediments. However, given the problem of maintaining sufficient temperature for the crystallization of prograde skarn assemblages, it is difficult to believe that large skarn envelopes could develop in typical wet sediment environments.

2. GENETIC MODEL OF SKARN FORMATION

Skarn deposits are generally hosted by envelopes or haloes of exoskarn alteration with morphologies that vary from stratiform to subcircular and sharply discordant. The amount of exoskarn that can develop ranges from narrow zones (< 1 m thick) up to large envelopes that involve the generation of several cubic kilometres of skarn alteration. Associated ore zones are often volumetrically small compared to the total size of the prograde skarn envelope, and may thus be difficult to locate during exploration drilling. Formation of a skarn envelope is usually an evolving, complex process (Meinert, 1992; Figure 1), but the following paragenetic stages are common to many infiltration calcic skarns:

1. Magmatic intrusion into relatively cool hostrocks (Figure 1A) leading to the production of an isochemical, contact metamorphic calcsilicate or biotite-rich hornfels.

2. Infiltration of high temperature, magmatic hydrothermal fluids into the permeable country rocks, resulting in multiple stages of metasomatic garnet-pyroxene ± amphibole ± wollastonite prograde skarn assemblages (Figures 1B and 1C). A prograde skarn halo is produced which continues to expand until the hydrothermal system wanes. The margins of this metasomatic envelope may pass outward into a fine-grained pyroxene ± garnet ± biotite-rich hornfels or skarnoid

3. Multistage retrograde alteration of the prograde skarn assemblages as the envelope and hydrothermal fluids cool (Figure 1D. This results in the formation of lower temperature hydrous phases such as chlorite, epidote, amphibole, ilvaite, prehnite or, more rarely scapolite (as possibly at the Nickel Plate skarn). Sometimes, as in some W and Sn skarn deposits, this stage is associated with the introduction or redistribution of metals. In some larger skarn systems, the alteration stages 2 and 3 may occur diachronously, with prograde alteration taking place in certain parts of the system while at the same time hydrous overprinting is occurring elsewhere. In many instances, the fluids responsible for both the stage 2 prograde and stage 3 retrograde alteration are controlled by conduits that followed original sedimentary lithogical contacts, intrusive margins or fractures.

Formation of an isochemical calcsilicate hornfels either during stage 1 or stage 2 may render the wallrocks receptive to brittle fracturing which increases permeability for later skarn-forming fluids. *The presence of hostrocks that are both chemically reactive and have a physical ability to maintain long-lived permeability is vital for major skarn formation.* As the fluids continue to infiltrate the hostrocks under pressure, the skarn envelope steadily grows in size. Fluid-flow is controlled by bulk rock permeability and other features such as fractures, fold structures and lithological contacts, all of which may influence the ultimate morphology of the skarn (Figure 1).

In most calcic skarns, pyroxene is the first dominant prograde mineral to develop in stage 2 (Figure 1B) and it generally continues to crystallize throughout the entire process of prograde skarn formation. Garnet generally has a shorter period of crystallization and it usually postdates the appearance of pyroxene. Thus, the generalized sequence of prograde crystallization in many calcic skarns is : 1) pyroxene, 2) pyroxene and garnet, 3) pyroxene. In many Cu and some Au skarns the prograde alteration may initially involve potassic metasomatism marked by crystallization of biotite and orthoclase; this potassic alteration postdates the stage 1 contact metamorphic hornfels and predates the pyroxene-garnet assemblages (Brookes *et al.*, 1990; Ettlinger *et al.*, 1992).

Mineralization occurs either late in stage 2 or during the stage 3 retrograde alteration as temperatures fall (Figure 1D). In some calcic Fe skarns, magnetite is introduced relatively early and can be overgrown by garnet. However, retrogression is important in many skarn deposits because any low-grade mineralization introduced during the prograde phase may be scavenged and redeposited as higher grade ore zones. This late upgrading takes place in many W skarns (Dick, 1979; Dick and Hodgson, 1982) and in some Sn skarns. The importance of retrograde activity in developing an ore grade skarn deposit has been emphasized by Dick (1979) and Meinert (1986).

The stage 3 generation of retrograde hydrous minerals occurs during the final cooling process, sometimes due to interaction with meteoric waters (Figure 1D). The degree of retrograde alteration varies enormously in skarns. Intense alteration is common in many Fe and W skarns and in Cu skarns related to porphyry Cu systems. Propyllitic alteration is rare in the Hedley Au skarns, although the final phase of scapolitization in these deposits may, in part, represent a retrograde event.

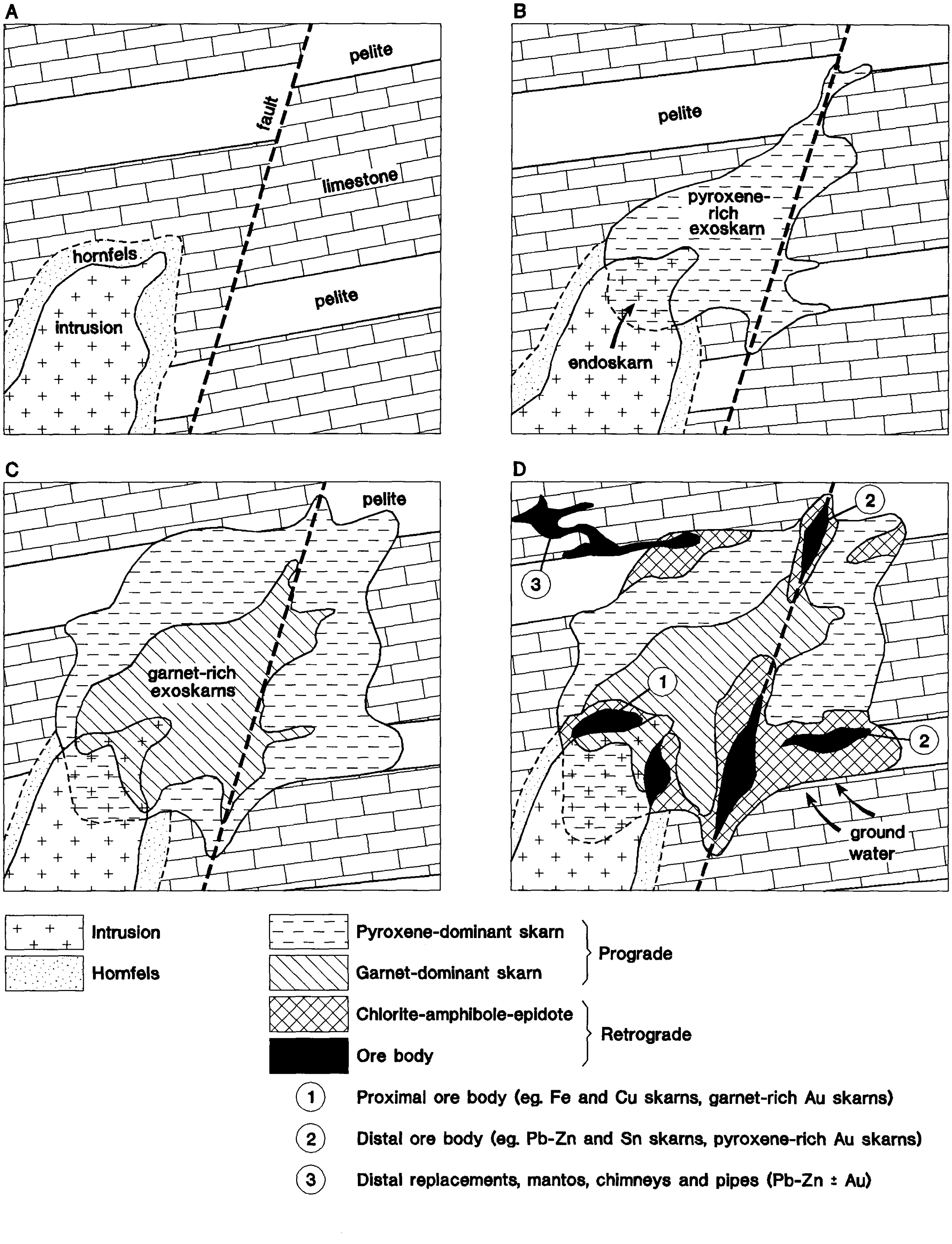

A
pelite
fault
limestone
hornfels
intrusion
pelite
B
pelite
pyroxene-rich exoskarn
endoskarn
C
pelite
garnet-rich exoskarns
D
2
3
1
2
ground water
Intrusion
Hornfels
Pyroxene-dominant skarn
Garnet-dominant skarn
Prograde
Chlorite-amphibole-epidote
Ore body
Retrograde
1 Proximal ore body (eg. Fe and Cu skarns, garnet-rich Au skarns)
2 Distal ore body (eg. Pb-Zn and Sn skarns, pyroxene-rich Au skarns)
3 Distal replacements, mantos, chimneys and pipes (Pb-Zn ± Au)

Fig 1. Schematic evolution of a calcic skarn deposit.

A. Intrusion of magma into faulted, carbonate-pelite sequence and formation of a contact hornfels or skarnoid.

B. Infiltration of hydrothermal fluids to produce endoskarn and pyroxene-dominant exoskarn.

C. Continued infiltration of fluids, with progressive expansion of exoskarn envelope. At its full prograde development, the exoskarn envelope may comprise a zone of coarse grained garnet-rich skarn proximal to the pluton and an outer halo of finer grained pyroxene-dominant skarn. Skarn development is controlled partly by factors such as rock porosity and permeability, bedding planes, fractures and rock lithologies. Some disseminated mineralization may form late in this stage.

D. The hydrothermal system wanes and cools, leading to retrograde overprinting. During this stage orebodies may form either by the scavenging and redeposition of disseminated metals laid down in the prograde stage or more commonly by the introduction of new metals. The structural/lithological controls and influence of meteoric water may result in irregularly distributed orebodies that are notoriously difficult to delineate in skarn. In the exoskarn envelope, ore bodies may form proximally (as with some Cu, Fe and garnet-rich Au skarns) or more distally (as with pyroxene-rich Au skarns, Sn skarns and Pb-Zn skarns). Some mineralizing fluids may also travel beyond the skarn envelope to form sulphide-rich replacement mantos, chimneys and pipes or sulphide-lean Carlin-type Au deposits.

Magnesian skarns have a similar evolutionary process except that the skarn silicates can start crystallizing during the stage 1, high-temperature magmatic phase (Pertsev, 1991). Stages 1 and 2 in magnesian skarns typically result in the growth of olivine, spinel, phlogopite, pyroxene, pargasite and calcic plagioclase. Some magnesian skarns such as the GBT/IOZ Cu-Au deposit of Irian Jaya (Hefton *et al.*, 1995) contain monticellite, an unusual Ca-Mg silicate with an olivine-type structure. Stage 3 leads to the overprinting of these prograde minerals by serpentine, talc, amphibole and Mg chlorite. Gangue minerals in many magnesian skarns tend to be rich in alkalis, and contain hydroxyl ions and fluorine (Pertsev, 1991).

Based largely on spatial relationships, geologists have long suggested that the intrusions were the primary source of both the skarn-forming fluids and the metals in many skarn deposits (e.g. Von Rath, 1868; Packard, 1895; Burt, 1982). In the Hedley skarns, Au is believed to have been derived from magmatic fluids (Dolmage and Brown, 1945) which were saline and relatively high temperature (Ettlinger *et al.*, 1992). Ore bodies can form either close to the intrusions, as in many Fe, Cu, Mo and W skarns, or more distally in the outer parts of the exoskarn envelope as in many Au, Sn and Pb-Zn skarns (Figure 1D). In some instances, the late hydrothermal fluids may travel considerable distances and result in ore bodies being formed beyond the exoskarn envelope. These distal ore bodies include sulphide-lean Carlin-type Au deposits (Sillitoe and Bonham, 1990) and sulphide-rich replacements that may occur as stratabound, vein-like or pipe-like deposits (Figure 1D). Many of these replacements contain little or no typical skarn gangue minerals. Thus, their origin is often controversial because direct evidence genetically linking them to a skarn or a magmatic source is lacking. Depending on their morphology and world location, they are called a variety of names, including mantos, chimneys or replacement deposits. Such distal deposits are typically rich in Pb, Zn and Ag, but examples exist that contain economic quantities of Cu and Au.

The chemistry and mineralogy of both the skarn gangue assemblage and the ore are influenced by a number of factors including: lithology of the original hostrocks, depth of formation and the composition of the intrusion and hydrothermal fluids. Dolomitic rocks are favorable hosts for some Fe and Sn skarns but tend to inhibit the development of W skarns (Zharikov, 1970). Calcareous siltstones are commonly altered to pyroxene-rich assemblages whereas the presence of impure, permeable limestone may lead to the formation of massive grossular garnet skarn.

The oxidation state of the hydrothermal fluids and the oxidizing or reducing capacity of the hostrocks (related, for example to the presence of carbon, hematite or gypsum) influences the skarn mineralogy and metal chemistry. A reduced hostrock tends to result in high pyrrhotite/pyrite ratios, magnetite rather than hematite, and low Fe_2O_3/FeO ratios in the silicates. It may also influence garnet/pyroxene ratios in the exoskarn.

Skarns can form throughout a wide range of depths, including shallow subvolcanic regimes as indicated by the presence of skarns within some high-level porphyry systems where explosive brecciation is recorded (e.g. the Copper Mountain and Ingerbelle deposits in southern British Columbia; Preto 1972). Depth of formation can influence the development of a skarn as well as its morphology, metal content, chemistry, oxidation state and intensity of alteration (Casquet and Tornos, 1991). Increased metamorphism, ductile deformation, higher temperature mineral assemblages and relatively reduced states are more pronounced in deeper level skarns. At shallower depths, the exoskarn envelopes tend to be more extensive, are increasingly controlled by brittle structures and may include hydrothermal breccias. They also have more oxidized mineral assemblages than skarns formed at greater depths and are liable to be more retrograde-altered by ground water.

The paragenetic sequences in stages 1 to 3 result in many calcic and magnesian skarns having spatial and temporal mineralogical zoning patterns that can assist mineral exploration (Burt, 1974). Depending on the skarn deposit class and its environment of formation, these zones can be highly variable. However, in calcic skarns, an idealized zoning from the intrusion to unaltered country rocks is often as follows: (1) endoskarn, (2) garnet-dominant exoskarn, (3) pyroxene-dominant exoskarn, (4) vesuvianite, wollastonite, bustamite or rhodonite-bearing skarn with abundant carbonate, (5) marble, with or without silicification, (6) unaltered wallrock. If the fluids are undersaturated in Si, too high in CO_2, or too low in temperature, the wollastonite-rich zone is not developed. In magnesian skarns, the most common mineral zoning developed between granite and dolomite is: (1) endoskarn, (2) pyroxene and plagioclase-rich exoskarn, (3) olivine and spinel-rich exoskarn, (4) dolomite (Pertsev, 1991).

The widths of individual mineralogical zones are highly variable and some zones may be absent locally. As the exoskarn silicates developed closer to the intrusion have generally undergone a longer period of growth than those formed on the outer margin of the skarn envelope, there tends to be a decrease in crystal size away from the pluton. The composition of the pyroxenes, garnets and other minerals may change progressively from proximal to distal across an exoskarn envelope. Chemical and optical zoning may be present within individual garnet and pyroxene crystals; this commonly reflects a progressive change in fluid composition, pH, sulphur fugacity or oxidation state as the system evolved and the mineral crystallized. Thus, knowledge of chemical zoning in the crystal may reveal details of the evolution and changing conditions of skarn hydrothermal system (Jamtveit, *et al.*, 1993). Studies of metasomatic or mineralogical zoning in skarn deposits include those by Burt (1974), Atkinson and Einaudi (1978), Catlin (1984) and Newberry (1987, 1991).

Fluid inclusion and stable isotope studies (quoted by Einaudi *et al.*, 1981; Kwak, 1986) indicate that the hydrothermal solutions responsible for ore in infiltration skarn tend to be more saline, have higher $CaCl_2$ contents and are higher temperature than the fluids responsible for mineralized veins or skarns produced by metamorphism. In magnesian skarns, silicate minerals crystallized during the early, magmatic stage of skarn formation may develop at temperatures of between 700^o and 1100^o C (Pertsev, 1991). By contrast, prograde calcic skarn formation generally occurs at temperatures between 400^0 and 650^0 C, although both temperatures and salinities tend to decrease away from the fluid source, both in time and space (Kwak, 1986). Compared to the other calcic skarn classes, W and Sn skarns characteristically form at higher temperatures, at deeper levels and at correspondingly higher pressures (1-3 kb). Their metasomatic fluids commonly have a low CO_2 content (X_{CO_2} less than 0.1) and moderate to high salinities (10-50 per cent NaCl equivalent). Boiling appears to be more characteristic of skarns formed in shallower environments. Kwak (1986) notes that the fluid inclusions in skarns adjacent to K-rich granitoids have high KCl contents whereas those formed close to calcic intrusions are relatively enriched in NaCl.

Fluid inclusion and stable isotope data in Au skarns has been summarized by Theodore *et al.* (1991) and Theodore and Hammarstrom (1991). Boiling Na-Ca-Fe brines, containing up to 70 weight % NaCl equivalent, circulated in the Battle Mountain Au-bearing skarns of Nevada, and the prograde skarn developed at a temperature of about 475^0 C. (Theodore and Hammarstrom, 1991). At the Nickel Plate deposit, garnet and pyroxene crystallized at temperatures (pressure corrected) averaging 460^0 to 480^0 C although they locally exceeded 700^0 C (Ettlinger *et al.*, 1992). The salinity of fluid inclusions in garnet at Nickel Plate averaged 18 per cent NaCl equivalent and similar salinities were recorded in the scapolites (Pan *et al.*, 1994) which are also chlorine-rich (up to 2.1% Cl). Fluid inclusion studies at the Buckhorn Mountain-Crown Jewel Au skarn in Washington State, just south of the British Columbia-U.S border (Hickey, 1992) indicate that the average temperatures (pressure corrected) for the prograde garnet-pyroxene skarn were 465^o C and for retrograde epidote skarn 360^o C. Salinities in the skarn minerals ranged from 18 to 22 weight per cent NaCl equivalent.

To summarize, the complex morphology and mineralogy of a skarn and its deposits is partly caused by varied hostrock lithologies and depth of emplacement, as well as the changing fluid chemistry of the evolving hydrothermal system. This often results in chemical zoning, including core-to-rim changes within individual crystals, and proximal to distal chemical variations in the same mineral species across the skarn envelope. As the exoskarn envelope grows, early prograde minerals that were developed close to the intrusion may be overgrown by the same minerals of progressively different composition, or replaced by new minerals. A steady overgrowing of minerals under changing conditions of oxidation, sulphidation, temperature and fluid chemistry may result in compositional zoning in the crystals of garnet, pyroxene, amphibole and other minerals. Additional complexity occurs in the skarn envelope with subsequent overprinting by hydrous phase retrograde alteration and mineralization, both of which may be partly structurally or stratigraphically controlled. This often results in irregular and complex orebodies that are difficult to explore and delineate. The importance of controlling structures and their influence on the development of prograde and retrograde skarn and mineralization has probably been underrated by many geologists. Thus, mapping remnant structural features in a skarn envelope that controlled the development of alteration may provide vital clues for the successful discovery and exploration of skarn deposits.

3. DESCRIPTIVE PROFILES OF SKARN DEPOSITS

The following profiles are based on skarn deposits occurring both in British Columbia and elsewhere. Those for Fe, Cu, W, Pb-Zn and Sn skarn deposits are updated from Eckstrand (1984) and Cox and Singer (1986), whereas those for Au, Mo and garnet skarns have been compiled from our own data, and that of Einaudi *et al.* (1981), Orris *et al.* (1987), Ettlinger and Ray (1989a), Hammarstrom *et al.* (1989), Meinert (1989; 1992), Theodore *et al.* (1991), Ray *et al.* (1992) and Ray and Dawson (1994).

Fe SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic Fe deposits.

COMMODITIES (*BYPRODUCTS*): Magnetite (*Cu, Ag, Au, Co, phlogopite, borate minerals*).

EXAMPLES (British Columbia - *Canada/International*): Tasu (103C003), Jessie (103B026), Merry Widow (092L044), Iron Crown (092L034), Iron Hill (092F075), Yellow Kid (092F258), Prescott (092F106), Paxton (092F107), Lake (092F259); *Shinyama (Japan), Cornwall (Pennsylvania), Iron Springs (Utah, USA) Eagle Mountain (California, USA), Perschansk, Dashkesan, Sheregesh and Teya (Russia), Daiquiri (Cuba), San Leone (Italy).*

CAPSULE DESCRIPTION: Magnetite-dominant mineralization genetically associated with a skarn gangue (includes calcic and magnesian Fe skarns).

TECTONIC SETTING: Calcic Fe skarns: Intra and non-intraoceanic island arcs; rifted continental margins. Magnesian Fe skarns: Cordilleran-type, synorogenic continental margins.

AGE OF MINERALIZATION: Can be of any age, mainly Mesozoic to Cenozoic. Typically Early to mid-Jurassic in British Columbia.

HOST/ASSOCIATED ROCK TYPES: Calcic Fe skarns: Fe-rich, Si-poor intrusions derived from primitive oceanic crust. Large to small stocks and dikes of gabbro to syenite (mostly gabbro-diorite) intruding limestone, calcareous clastic sedimentary rocks, tuffs or mafic volcanics at a high to intermediate structural level. Magnesian Fe skarns: Small stocks, dikes and sills of granodiorite to granite intruding dolomite and dolomitic sedimentary rocks.

DEPOSIT FORM: Variable and includes stratiform orebodies, vertical pipes, fault-controlled sheets, massive lenses or veins, and irregular ore zones along intrusive margins.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Some hornfelsic textures. Magnetite varies from massive to disseminated to veins.

ORE MINERALOGY(Principal and *Subordinate*): Calcic Fe skarns: Magnetite ± *chalcopyrite* ± *pyrite* ± *cobaltite* ± *pyrrhotite* ± *arsenopyrite* ± *sphalerite* ± *galena* ± *molybdenite* ± *bornite* ± *hematite* ± *martite* ± *gold.* Rarely, can contain *tellurobismuthite* ± *fluorite* ± *scheelite*. Magnesian Fe skarns: Magnetite ± *chalcopyrite* ± *bornite* ± *pyrite* ± *pyrrhotite* ± *sphalerite* ± *molybdenite.*

EXOSKARN ALTERATION (both calcic and magnesian): High Fe, low Mn, diopside-hedenbergite clinopyroxene (Hd20-80); however, some deposits include johannsenite-hedenbergite solid solutions (up to Jo50). Garnets are low Mn grossular-andradite solid solutions (Ad20-95), ± epidote ± apatite. Late stage amphibole ± chlorite ± ilvaite ± epidote ± scapolite ± albite ± K-feldspar. Magnesian Fe skarns can contain olivine, spinel, phlogopite, xanthophyllite, brucite, serpentine, and rare borate minerals such as ludwigite, szaibelyite, fluorborite and kotoite.

ENDOSKARN ALTERATION: Calcic Fe skarns: Extensive endoskarn with Na-silicates ± garnet ± pyroxene ± epidote ± scapolite. Magnesian skarns: Minor pyroxene ± garnet endoskarn, and propyllitic alteration.

ORE CONTROLS: Stratigraphic and structural controls. Close proximity to contacts between intrusions and carbonate sequences, volcanics or calcareous tuffs and sediments. Fracture zones near igneous contacts can also be important.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu deposits; Cu and Pb-Zn skarns; small Pb-Zn veins. However, regionally in British Columbia there is a negative spatial relationship between Fe and Au skarns.

COMMENTS: In both calcic and magnesian Fe skarns, early magnetite is locally intergrown with, or cut by, garnet and magnesian silicates (Korzhinski, 1964, 1965; Sangster, 1969; Burt, 1977). Some calcic Fe skarns contain relatively small veins and pockets of pyrrhotite-pyrite mineralization that postdate the magnetite; this mineralization can be Au-rich. Byproduct magnetite is also derived from some Sn, Cu and calcic Pb-Zn skarns. Over 90% of the 146 Fe skarn occurrences in British Columbia lie within the Wrangellia Terrane of the Insular Belt. The majority of these form where Early to mid-Jurassic dioritic plutons intrude Late Triassic limestones.

GEOCHEMICAL SIGNATURE: Calcic Fe skarn: enriched in Fe, Cu, Co, Au, Ni, As and Cr. Overall Cu and Au grades are low (<0.2% Cu and 0.5 g/t Au). Magnesian Fe skarn: enriched in Fe, Cu, Zn and Bo.

GEOPHYSICAL SIGNATURE: Strong positive magnetic, electromagnetic and induced polarization anomalies. Possible gravity anomalies.

OTHER EXPLORATION GUIDES: Magnetite-rich float. In the Wrangellia Terrane of British Columbia, the upper and lower contacts of the Late Triassic Quatsino limestone (or equivalent units) are favorable horizons for Fe skarn development.

GRADE AND TONNAGE: Grades are typically 40 to 60 % Fe. Worldwide, calcic Fe skarns range from 3 to 150 Mt whereas magnesian Fe skarns can be larger (exceeding 250 Mt). In British Columbia, they reach 20 Mt and average approximately 4 Mt of mined ore.

IMPORTANCE: Worldwide, these deposits were once an important source of Fe, but in the last 40 years the market has been increasingly dominated by sedimentary Fe formation deposits. Nearly 90 % of British Columbia's historic Fe production was from skarns, most of which was derived from deposits in the Wrangellia Terrane.

REFERENCES FOR Fe SKARNS: Korzhinski (1964, 1965); Sangster (1969); Einaudi *et al.* (1981); Meinert (1984, 1992); Podlessky *et al.* (1991); Ray and Webster (1991a, 1991b).

Cu SKARN DEPOSITS

SYNONYMS: Pyrometasomatic and contact metasomatic Cu deposits.

COMMODITIES (*BYPRODUCTS*): Cu (*Au, Ag, Mo, W, magnetite*)

EXAMPLES (British Columbia - *Canada/International*): Craigmont (092ISE 035), Phoenix (082ESE 020), Old Sport (092L 035), Queen Victoria (082FSW 082); *Mines Gaspé deposits (Québec, Canada), Ruth, Mason Valley and Copper Canyon (Nevada, USA), Carr Fork (Utah, USA), Ok Tedi (Papua New Guinea), Big Gossan, Ertsberg, Gunung Bijih Timor-IOZ-DOZ (Irian Jaya, Indonesia), Rosita (Nicaragua), Candelaria (Chile).*

CAPSULE DESCRIPTION: Cu-dominant mineralization (generally chalcopyrite) genetically associated with a skarn gangue (includes calcic and magnesian Cu skarns).

TECTONIC SETTING: Cu skarns are most common where Andean-type plutons intrude older continental-margin carbonate sequences. To a lesser extent (but important in British Columbia), they are associated with oceanic island arc plutonism.

AGE OF MINERALIZATION: Mainly Mesozoic, but may be any age. In Irian Jaya, Indonesia, they are Miocene in age whereas in British Columbia they are mostly Early to mid-Jurassic.

HOST/ASSOCIATED ROCK TYPES: Alkalic and subalkalic porphyritic stocks, dikes and breccia pipes of quartz diorite, granodiorite, monzogranite and tonalite composition, intruding carbonate rocks, calcareous volcanics or tuffs. Copper skarns in oceanic island arcs tend to be associated with more mafic intrusions (quartz diorite to granodiorite), while those formed in continental margin environments are associated with more felsic rocks.

DEPOSIT FORM: Highly varied; includes stratiform and tabular orebodies, vertical pipes, narrow lenses, and irregular ore zones that are controlled by intrusive contacts, sedimentary host lithologies or structures.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Some hornfelsic textures.

ORE MINERALOGY (Principal and *subordinate*): Moderate to high sulphide content. Chalcopyrite ± pyrite ± magnetite in inner garnet-pyroxene zone. Bornite ± chalcopyrite ± *sphalerite* ± *tennantite* in outer wollastonite zone. Hematite, pyrite, pyrrhotite or magnetite may predominate (depending on the oxidation and sulphidation states). *Scheelite* and traces of *chalcocite, molybdenite, bismuthinite, galena, cosalite, arsenopyrite, enargite, tennantite, loellingite, cobaltite, goethite, tetrahedrite, covellite, digenite, electrum, native gold, native copper* and *rutile* may be present. Distal to the skarn envelope, veins of pyrite, chalcopyrite, galena and sphalerite may occur.

ALTERATION MINERALOGY: Exoskarn alteration: usually high garnet:pyroxene ratios. High Fe, low Al, Mn andradite garnet (Ad35-100), and diopsidic clinopyroxene (Hd2-50). However, some deposits, such as the *Candelaria* skarn in Chile (Ryan *et al*., 1996) include hedenbergitic pyroxenes.

Other minerals include K-feldspar, biotite, amphibole, clinozoisite, epidote, wollastonite, scapolite and sericite. The mineral zoning from stock out to marble is commonly: diopside + andradite (proximal); wollastonite ± tremolite/actinolite ± garnet ± diopside ± vesuvianite (distal). Retrograde alteration to actinolite, chlorite and montmorillonite is common. Other late alteration may include K-feldspar, epidote and minor sericite. The Candelaria Cu skarn in Chile includes scapolite (Ryan *et al*., 1995), and skarn alteration associated with some of the alkalic porphyry Cu-Au deposits in British Columbia contains late scapolite veining. Magnesian Cu skarns also contain olivine, serpentine, monticellite and brucite.

Endoskarn alteration: Potassic alteration with K-feldspar, epidote, sericite ± pyroxene ± garnet. Retrograde phyllic alteration generates actinolite, talc, chlorite and clay minerals. The exoskarn may pass out to a highly altered or silicified marble zone.

ORE CONTROLS: Irregular or tabular orebodies tend to form in carbonate rocks and/or calcareous volcanics or tuffs near igneous contacts. Pre-skarn structures and hostrock permeability can be important. Some ore bodies (e.g. Ertsberg) form in pendants within the igneous stocks. Copper mineralization is present as stockwork veining and disseminations in both endoskarn and exoskarn; it commonly accompanies retrograde alteration.

COMMENTS: Generally, calcic Cu skarns are more economically important than magnesian Cu skarns. Copper skarns are broadly separable into those associated with strongly altered porphyry Cu systems, and those associated with barren, generally unaltered stocks; there is probably a continuum between these two types (Einaudi *et al*., 1981). Copper skarn deposits related to porphyry Cu intrusions tend to be larger, lower grade, and emplaced at higher structural levels than those associated with barren stocks. Most Cu skarns contain oxidized mineral assemblages, and a mineral zoning is common in the skarn envelope. Those with reduced assemblages can be enriched in W, Mo, Bi, Zn, As and Au. Over half of the 340 Cu skarn occurrences in British Columbia lie in the Wrangellia Terrane of the Insular Belt, while another third are associated with intraoceanic island-arc plutonism in the Quesnellia and Stikinia terranes. Variable amounts of Cu-bearing skarn alteration are associated with some alkalic and subalkalic porphyry Cu plutons (e.g. Copper Mountain, Mount Polley).

GEOCHEMICAL SIGNATURE: Rock analyses may show Cu-Au-Ag-rich inner zones grading outward through Au-Ag zones with high Au:Ag ratios to an outer Pb-Zn-Ag zone. Cobalt-As-Sb-Bi-Mo-W geochemical anomalies are present in the more reduced Cu skarn deposits.

GEOPHYSICAL SIGNATURE: Magnetic, electromagnetic and induced polarization anomalies.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu deposits, Au, Fe and Pb-Zn skarns, and replacement Pb-Zn-Ag deposits.

GRADE AND TONNAGE: Average 1 to 2 % Cu. Worldwide, they generally range from 1 to 100 Mt, although some exceptional deposits exceed 300 Mt (the Candelaria deposit in Chile, for example, contains 366 Mt grading 1.08% Cu; Ryan *et al*., 1995). Craigmont, British Columbia's largest Cu skarn, contained approximately 34 Mt grading 1.3 % Cu.

IMPORTANCE: Historically, these deposits were a major source of Cu, although porphyry deposits have become much more important during the last 30 years. However, major Cu skarns are still worked throughout the world, including those in China, Indonesia and the U.S.

REFERENCES FOR Cu SKARNS: Einaudi *et al.* (1981); Einaudi (1982); Cox and Singer (1986); Dawson *et al.* (1991); Hefton *et al.* (1995); Meinert (1983, 1992); Ryan *et al.* (1995).

Au SKARN DEPOSITS

SYNONYMS: Pyrometasomatic, tactite, or contact metasomatic Au deposits.

COMMODITIES (*BYPRODUCTS*): Au (*Cu, Ag*).

EXAMPLES (British Columbia - Canada/*International*): Nickel Plate (092HSE 038), French (092HSE 059), Canty (092HSE 064), Good Hope (092HSE 060), QR - Quesnel River (093A 121); *Fortitude, McCoy and Tomboy-Minnie (Nevada, USA), Buckhorn Mountain (Washington, USA), New World district & Butte Highlands (Montana, USA), Thanksgiving (Philippines), Browns Creek & Junction Reefs-Sheahan-Grants (New South Wales, Australia), Mount Biggenden (Queensland, Australia), Nambija (Ecuador), Wabu (Irian Jaya, Indonesia), Savage Lode (Western Australia, Australia).*

CAPSULE DESCRIPTION: Gold-dominant mineralization genetically associated with a skarn gangue consisting of Ca - Fe - Mg silicates. Gold skarns can be broadly separated into magnesian and calcic varieties. **Magnesian Au skarns** are extremely uncommon They are hosted by dolomites and Mg-rich volcanics and their alteration minerals include olivine, serpentine and Mg-chlorite. Examples include the *Savage Lode* and *Butte Highlands* deposits in Western Australia and Montana respectively.

Calcic Au skarns are hosted by calcareous rocks and, on the basis of gangue mineralogy, they can be separated into either pyroxene-rich, garnet-rich or epidote-rich types. The contrasting mineral assemblages in these three types reflect differences in the hostrock lithologies as well as the oxidation and sulphidation conditions in which the skarns developed.

Pyroxene-rich Au skarns (e.g. *Nickel Plate* and *Fortitude*) tend to be hosted by siltstone-dominant packages and form in more reduced hydrothermal systems that have relatively higher sulphidation states. They are characterized by low garnet/pyroxene and pyrite/pyrrhotite ratios. In addition to diopside, these deposits, contain hedenbergitic pyroxenes and Fe-rich biotite.

Garnet-rich Au skarns (e.g. *McCoy, Wabu* and *Nambija*) tend to be hosted by carbonate-dominant packages and develop in more oxidising and/or more sulphur-poor hydrothermal systems. They have high garnet/pyroxene and pyrite/pyrrhotite ratios, and the pyroxenes are diopsidic. The ore is dominated by pyrite, magnetite and hematite rather than pyrrhotite.

Epidote-rich Au skarns are apparently less common than the other two types and the only economic deposit known in British Columbia is the recently recognized *QR* skarn (Fox and Cameron, 1995). This skarn is related to a high-level, oxidized alkalic porphyry system. It is hosted mainly by epidotized and chloritized calcareous mafic volcanics and tuffs with some thin units of graphitic shale. The ore has high pyrite/pyrrhotite ratios and is locally rich in chalcopyrite. Unlike the pyroxene-rich and garnet-rich Au skarns, there is a good Au:Cu correlation in the ore.

TECTONIC SETTINGS: Most Au skarns form in orogenic belts at convergent plate margins. They tend to be associated with syn to late intraoceanic island arc intrusions emplaced into calcareous sequences in arc or back-arc environments. Both the *Wabu* (Irian Jaya) and *Butte Highlands* (Montana, U.S.) Au skarns are hosted by platformal carbonates (Allen, 1995; Ettlinger *et al.*, 1995). The latter deposit is associated with melts that possibly include arc and continent components. The *Savage Lode* magnesian Au skarns of Western Australia are hosted by Archean greenstones.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Most deposits are related to plutonism associated with the development of oceanic island arcs or back arcs, such as the Late Triassic to Early Jurassic Nicola Group in British Columbia.

AGE OF MINERALIZATION: Phanerozoic (mostly Cenozoic and Mesozoic); in British Columbia they are mainly of Early to Middle-Jurassic age. The unusual magnesian Au skarns of Western Australia are Archean (Mueller, 1988, 1991; Mueller *et al.*, 1991).

HOST/ASSOCIATED ROCK TYPES: High to intermediate level stocks, sills and dikes of gabbro, quartz diorite or granodiorite intruding carbonate, calcareous clastic or volcaniclastic rocks. The island arc related, I-type intrusions are commonly porphyritic, undifferentiated, Fe-rich and calc-alkaline. However, the *Nambija* (Ecuador), *Wabu* (Irian Jaya) and *QR* (British Columbia) Au skarns are associated with alkalic intrusions (Allen *et al.*, 1995; O'Connor *et al.*, 1994; Fox and Cameron, 1995). The igneous rocks related to pyroxene-rich Au skarns may have low Fe_2O_3/FeO ratios.

DEPOSIT FORM: Variable from irregular lenses and veins to tabular or stratiform orebodies with lengths and widths ranging up to many hundreds of metres.

TEXTURE/STRUCTURE: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to layered textures in exoskarn. Some hornfelsic textures. Fractures and sill-dike margins can be an important loci for mineralization.

ORE MINERALOGY(Principal and *subordinate*):

Calcic Au skarn **(pyroxene-rich type)**: Native gold ± pyrrhotite ± arsenopyrite ± *chalcopyrite* ± *tellurides* (e.g. *hedleyite, tetradymite, altaite* and *hessite*) ± *bismuthinite* ± *cobaltite* ± *native bismuth* ± *pyrite* ± *sphalerite* ± *maldonite*. Generally high sulphide content and high pyrrhotite:pyrite ratios.

Calcic Au skarn **(garnet-rich type)**: Native gold ± chalcopyrite ± pyrite ± arsenopyrite ± sphalerite ± magnetite ± hematite ± *pyrrhotite* ± *galena* ± *tellurides* ± *bismuthinite*. Generally low to moderate sulphide content and low pyrrhotite:pyrite ratios.

Calcic Au skarn **(epidote-rich type)**: Native gold ± chalcopyrite ± pyrite ± arsenopyrite ± *pyrrhotite* ± *galena*. Generally moderate to high sulphide content with low pyrrhotite:pyrite ratios.

Magnesian Au skarn: Native gold ± pyrrhotite ± chalcopyrite ± pyrite ± *magnetite* ± *galena* ± *tetrahedrite*.

In all types of Au skarns, the gold is commonly present as micron-sized inclusions in sulphides, or at sulphide grain boundaries. To the naked eye, Au skarn ore is generally indistinguishable from waste rock. The ore in both the pyroxene-rich and garnet-rich types tends to have low Cu:Au (<2000), Cu:Ag (<1000), Zn:Au (<100) and Ag/Au (<1) ratios, and the gold is commonly associated with tellurides.

EXOSKARN MINERALOGY (GANGUE):

Calcic Au skarn **(pyroxene-rich type)**: extensive exoskarn, generally with high pyroxene:garnet ratios, although at the *Fortitude* deposit in Nevada, some higher Au values are concentrated in thin, structurally controlled garnet-rich zones. Prograde minerals include K-feldspar, Fe-rich biotite, low Mn grandite garnet (Ad 10-100), wollastonite, diopsidic to hedenbergitic clinopyroxene (Hd 20-100) and vesuvianite. Other less common minerals include rutile, axinite and sphene. Mineral and metal zoning is common in skarn envelope (*e.g.* Nickel Plate and Fortitude; *see* Ettlinger *et al.*, 1992; Myers and Meinert, 1989) with proximal coarse-grained, garnet-rich skarn containing high Cu:Au ratios, and distal, finer grained pyroxene-rich skarn containing low Cu:Au ratios and Au-sulphide orebodies. Late or retrograde minerals include epidote, chlorite, clinozoisite, vesuvianite, scapolite, tremolite-actinolite, sericite and prehnite.

Calcic Au skarn **(garnet-rich type)**: extensive exoskarn, generally with low pyroxene:garnet ratios. Prograde minerals include K-feldspar, low Mn grandite garnet (Ad 10-100), wollastonite, diopsidic clinopyroxene (Hd 0-60), epidote, vesuvianite, sphene and apatite. Late or retrograde minerals include epidote, chlorite, clinozoisite, vesuvianite tremolite-actinolite, sericite, dolomite, siderite and prehnite.

Calcic skarn **(epidote-rich type)**: extensive exoskarn with abundant epidote and lesser chlorite, quartz and late carbonate. Epidote-pyrite and carbonate-pyrite veinlets and coarse aggregates are common. At the *QR* (British Columbia) deposit, the best ore occurs within 50 m of the epidote skarn front (Fox and Cameron, 1995).

Magnesian Au skarns: olivine, clinopyroxene (Hd2-50), garnet (Ad7-30), chondrodite and monticellite. Retrograde minerals include serpentine, epidote, vesuvianite, tremolite-actinolite, phlogopite, talc, K-feldspar and chlorite.

ENDOSKARN MINERALOGY (GANGUE):

Calcic Au skarns: moderate endoskarn with K-feldspar, biotite, Mg-pyroxene (Hd 5-30) and garnet. Endoskarn at the epidote-rich *QR* deposit is characterized by calcite, epidote, clinozoisite and tremolite (Melling *et al.*, 1990).

Magnesian Au skarns: details on endoskarn are poorly documented. Argillic and propyllitic alteration with some garnet, clinopyroxene and epidote occurs in the endoskarn at the *Butte Highlands* Au skarn.

WEATHERING: In temperate and wet tropical climates, skarns often form topographic features with positive relief.

ORE CONTROLS: The ore in pyroxene-rich, garnet-rich and epidote-rich types of Au skarns exhibits stratigraphic and structural controls; some orebodies form along sill-dike intersections, sill-fault contacts or bedding-fault intersections as well as along fold axes. In the pyroxene-rich and epidote-rich types, sulphide-rich ore commonly develops in the more distal portions of the alteration envelopes. In some districts, specific suites of reduced, Fe-rich intrusions are spatially related to Au skarn mineralization.

Ore bodies in the garnet-rich Au skarns tend to lie more proximal to the intrusions.

GENETIC MODEL: Many Au skarns are related to plutons formed during oceanic plate subduction. There is a worldwide spatial, temporal and genetic association between porphyry Cu provinces and calcic Au skarns.

ASSOCIATED DEPOSIT TYPES:

Calcic Au skarns: Au placers, porphyry Cu deposits, calcic Cu skarns and Au-bearing quartz and/or sulphide veins.

Magnesian Au skarns: Au placers, Cu skarns, porphyry Cu and Mo deposits, Au-bearing quartz and/or sulphide veins; possibly W skarns.

COMMENTS: Most Au skarns throughout the world are calcic and are associated with island arc plutonism. However, the *Savage Lode* magnesian Au skarn occurs in the Archean greenstones of Western Australia (Mueller, 1991) and the *Butte Highlands* magnesian Au skarn in Montana, U.S.A., is hosted by Cambrian platformal dolomites (Ettlinger *et al.*, 1996). Regionally, in British Columbia, there is a negative spatial association between Au and Fe skarns even though both classes are related to arc plutonism; Fe skarns are concentrated in the Wrangellia Terrane whereas most Au skarn occurrences and all the economic deposits lie in Quesnellia.

GEOCHEMICAL SIGNATURE: Au, As, Bi, Te, Co, Cu, Zn or Ni anomalies, as well as some geochemical zoning patterns throughout the skarn envelope (notably in Cu/Au and Ag/Au ratios). Calcic Au skarns (whether garnet-rich or pyroxene-rich) tend to have lower Zn/Au, Cu/Au and Ag/Au ratios than any other skarn class.

A positive Cu:Au correlation exists in the ore of the epidote-rich *QR* skarn. However, there is little or no correlation between Au and Cu in many pyroxene-rich and garnet-rich Au skarns (unlike in Fe and in some Cu skarns where a good correlation exists between these metals). Thus, the economic potential of a Au skarn can be easily overlooked if Cu-sulphide-rich outcrops are preferentially sampled and other sulphide-bearing or sulphide-lean assemblages are ignored.

The intrusions related to Au skarns may be relatively enriched in the compatible elements Cr, Sc and V, and depleted in lithophile incompatible elements (Rb, Zr, Ce, Nb and La), compared to intrusions associated with most other skarn classes.

GEOPHYSICAL SIGNATURE: Airborne magnetic or gravity surveys to locate plutons. Induced polarization and ground magnetic follow-up surveys can outline some deposits. Magnesian Au skarns and garnet-rich calcic Au skarns can be magnetite-bearing. The stock associated with the epidote-rich *QR* deposit contains magnetite (Fox and Cameron, 1995).

OTHER EXPLORATION GUIDES: Placer Au. Any carbonates, calcareous tuffs or calcareous volcanics intruded by arc-related plutons have a potential for hosting calcic Au skarns. Carbonates are relatively rare in typical island arc environments, but primary exploration target areas include:

(a) reef aprons that flanked the original volcanic islands.

(b) shallow-water carbonate facies that were deposited on intrabasinal platforms or along the margins of back arc-basins.

In addition, Au skarn potential exists where plate movements have thrust packages of continental platformal carbonates into regions where the rocks were subsequently intruded by arc magmatism; the Au skarns of New Guinea may represent examples of this type. During exploration, any pyroxene, epidote or garnet-rich skarn should be checked for Au. Any large, *pyroxene-rich skarn* has a potential for hosting Au orebodies, particularly if it:

(a) has proximal Cu-rich mineralization and distal, apparently barren skarn.

(b) is associated with an undifferentiated, Fe-rich intrusion with low Fe_2O_3/FeO ratios.

(c) contains some hedenbergitic pyroxene (although diopside may be dominant overall).
(d) has high pyrrhotite/pyrite ratios in the distal skarn.
(e) there are sporadic As-Bi-Te geochemical anomalies.

Any large, *garnet-rich skarn* has a potential for micron Au, even if it lacks Cu mineralization and is lean in sulphides. Bismuth-Te-Zn geochemical anomalies may indicate an increased potential for Au in these systems.

Any calcareous tuffs or volcanics intruded by high-level porphyry systems (particularly alkalic plutons) have a potential for hosting *epidote-rich skarns* with micron Au.

TYPICAL GRADE AND TONNAGE: These deposits range from 0.4 to 13 Mt and from 2 to 15 g/t Au. Theodore *et al.* (1991) report median Au and Ag grades and tonnage of 8.6 g/t Au, 5.0 g/t Ag and 213,000 t. Between 1904 and 1995, *Nickel Plate* produced over 71 tonnes of Au from 13.4 Mt of ore (grading 5.3 g/t Au). The *QR* epidote-rich Au skarn has mineable reserves exceeding 1.3 Mt grading 4.7 g/t Au (Fox and Cameron, 1995). The average grade for Au skarns worldwide is estimated to be between 10.6 and 4.5 g/t Au (Meinert, 1988, 1989).

IMPORTANCE: Recently, there have been some significant Au skarn deposits discovered around the world. Nevertheless, total historic production of Au from skarn (more than 1000 t of metal; Meinert, 1989) is minute compared to production from other deposit types. The *Nickel Plate* deposit (Hedley, British Columbia) was probably one of the earliest major Au skarns in the world to be mined. Skarns have accounted for about 16 % of British Columbia's Au production, although nearly half of this was derived as a byproduct from Cu and Fe skarns

GOLD SKARNS WITH UNUSUAL FEATURES: Although most Au skarns have some or many of the above characteristics, individual deposits can have unique or unusual features, and it is likely that new types or varieties of Au skarns will be discovered. Examples with unusual features include:

Butte Highlands (Montana): is hosted in platformal carbonates and has no As or Te enrichment.

Nambija (Ecuador): is associated with an alkalic intrusion; it has no Bi, As or Te enrichment in ore; has abundant quartz veining in skarn.

McCoy (Nevada): the main Au phase is associated with minor Zn enrichment.

Wabu (Irian Jaya): is associated with an alkalic intrusion. Mineralization generally has very low Cu values but is locally enriched in Zn.

At *Wabu (Irian Jaya)* and *Buckhorn Mountain (Washington, USA*): some magnetite-rich mineralization is associated with hydrothermal brecciation that pre and post-dates some garnet crystallization.

REFERENCES FOR Au SKARNS:

Billingsley and Hume (1941); Orris *et al.* (1987); Meinert (1988, 1989, 1992); Ettlinger and Ray (1989a); Hammarstrom *et al.* (1989); Ray *et al.* (1990); Brooks *et al.* (1990); Wilson *et al.* (1990a); McKelvey and Hammarstrom (1991); Theodore *et al.* (1991); Mueller (1991); Hickey (1992); Ettlinger *et al.* (1992); Ray and Dawson (1994); Ettlinger *et al.* (1995); Fox and Cameron (1995); Dawson (1996).

Mo SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic Mo deposits.

COMMODITIES (*BYPRODUCTS*): Mo (*W, Cu, Pb, Zn, Sn, Bi, U, Au*).

EXAMPLES (British Columbia - *Canada/International*): Coxey (082FSW110), Novelty (082FSW107); *Mount Tennyson (New South Wales, Australia), Little Boulder Creek (Idaho, USA), Cannivan Gulch (Montana, USA), Azegour (Morocco), Yangchiachangtze (China).*

CAPSULE DESCRIPTION: Molybdenite-dominant mineralization genetically associated with a skarn gangue (includes calcic and magnesian Mo skarns). Molybdenum skarns are broadly separable into two types: polymetallic (containing molybdenite with other W, Zn, Pb, Bi, Sn, Co or U-rich minerals), and "molybedenite-only" (containing mainly molybdenite with no or few other sulphides).

TECTONIC SETTING: Late orogenic plutonism (derived from transitional crust) intruding continental margin carbonate sequences. Also, some are associated with Mo-bearing porphyry systems developed within intra-oceanic island arcs.

AGE OF MINERALIZATION: Mainly Mesozoic and Paleozoic, but may be any age. In British Columbia, they are mainly Early to mid-Jurassic in age.

HOST/ASSOCIATED ROCK TYPES: Stocks and dikes of evolved, commonly leucocratic quartz monzonite to granite (some containing primary biotite and muscovite) intruding calcareous clastic rocks. Deposits tend to develop close to intrusive contacts. Some of the Mo skarns in British Columbia are associated with high-level intrusions that have explosive breccia textures.

DEPOSIT FORM: Irregular orebodies along, and controlled by, the intrusive contacts.

TEXTURES: Igneous textures in endoskarn; local explosive breccia textures. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Some hornfelsic textures.

ORE MINERALOGY (Principal and *subordinate*): Molybdenite ± *scheelite* ± *powellite* ± *chalcopyrite* ± *arsenopyrite* ± pyrite ± pyrrhotite ± *bismuthinite* ± *sphalerite* ± *fluorite*. In rare instances Mo skarns carry *galena* ± *magnetite* ± *uraninite* ± *pitchblende* ± *cassiterite* ± *cobaltite* ± *stannite* ± *Au.*

EXOSKARN ALTERATION: Calcic Mo skarns: Hedenbergite pyroxene (Hd50-80, Jo-3) ± low Mn grossular-andradite garnet (Ad40-95) ± wollastonite ± biotite ± vesuvianite. Magnesian Mo skarns: olivine (Fo96). Retrograde minerals: Calcic skarns: amphibole ± epidote ± chlorite and muscovite. Magnesian skarns: serpentine ± tremolite ± chlorite.

ENDOSKARN ALTERATION: Clinopyroxene, K-feldspar, hornblende, epidote, quartz veining, sericite, molybdenite.

ORE CONTROLS: Carbonate or calcareous rocks in thermal aureoles adjacent to intrusive margins.

ASSOCIATED DEPOSIT TYPES: Porphyry Mo deposits of quartz monzonite type, Mo-sulphide veins, and Zn-sulphide veins. Some Mo skarns in China are associated with distally-developed sphalerite-rich mineralization.

COMMENTS: Over 80% of the 22 Mo skarns recorded in British Columbia occur in the Omineca Belt. Nearly 60% are hosted by cratonic, pericratonic and displaced continental margin rocks of the Kootenay, Cassiar and Ancestral North America terranes, and a further 18% are found in the Quesnellia Terrane.

GEOCHEMICAL SIGNATURE: Enriched in Mo, Zn, Cu, Sn, Bi, As, F, Pb, U, Sb, Co (Au).

GEOPHYSICAL SIGNATURE: Positive magnetic and induced polarization anomalies.

GRADE AND TONNAGE: Worldwide, grades range from 0.1 to 2 % MoS_2, and tonnages between 0.1 and 2 Mt. In British Columbia, the Coxey deposit produced 1 Mt of ore grading approximately 0.17 % MoS_2. The Novelty and Giant (082FSW107 and 109) Mo skarns near Rossland, British Columbia are unique; grab samples assay up to 47 g/t Au, 1.4 % Ni, 30.5 % As and 4.84 % Co.

IMPORTANCE: Molybdenum skarns are usually of smaller tonnage and less economically important than porphyry Mo deposits.

REFERENCES FOR Mo SKARNS: Einaudi *et al.* (1981); Theodore and Menzie (1984).

W SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic W deposits.

COMMODITIES (*BYPRODUCTS*): W (*Mo, Cu, Sn, Zn*).

EXAMPLES (British Columbia - *Canada/International*): Emerald Tungsten (082FSW010), Dodger (082FSW011), Feeney (082FSW247), Invincible (082FSW218), Dimac (082M123); *Fostung (Ontario, Canada), MacTung (Yukon, Canada), Cantung (Northwest Territories, Canada), Pine Creek and Strawberry(California, USA), Osgood Range (Nevada, USA), King Island (Tasmania, Australia), Sang Dong (South Korea).*

CAPSULE DESCRIPTION: Scheelite-dominant mineralization genetically associated with a skarn gangue.

TECTONIC SETTING: Continental margin, synorogenic to late orogenic plutonism intruding deeply buried sequences of eugeoclinal carbonate-shale sedimentary rocks. Can develop in tectonically thickened packages in back-arc thrust settings.

AGE OF MINERALIZATION: Mainly Mesozoic, but may be any age. Over 70% of the W skarns in British Columbia are related to Cretaceous intrusions; the *Fostung* deposit in Ontario is Precambrian.

HOST/ASSOCIATED ROCK TYPES: Pure and impure limestones, calcareous to carbonaceous pelites. Associated with tonalite, granodiorite, quartz monzonite and granite of both I and S-types. Tungsten skarn-related granitoids, compared to Cu skarn-related plutonic rocks, tend to be more differentiated, more contaminated with sedimentary material, and have crystallized at a deeper structural level.

DEPOSIT FORM: Stratiform, tabular and lens-like orebodies. Deposits can be continuos for hundreds of metres and follow intrusive contacts.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Biotite hornfelsic textures common.

ORE MINERALOGY (Principal and *subordinate*): Scheelite ± molybdenite ± chalcopyrite ± pyrrhotite ± sphalerite ± arsenopyrite ± pyrite ± powellite. May contain *trace wolframite, fluorite, cassiterite, galena, marcasite and bornite*. Reduced types are characterized by pyrrhotite, magnetite, *bismuthinite, native bismuth* and high pyrrhotite:pyrite ratios. Variable amounts of quartz-vein stockwork (with local molybdenite) can cut both the exoskarn and endoskarn. The Emerald Tungsten skarns in British Columbia include pyrrhotite-arsenopyrite veins and pods that carry up to 9 g/t Au.

ALTERATION MINERALOGY: Exoskarn alteration: Inner zone of diopside-hedenbergite (Hd60-90, Jo5-20) ± grossular-andradite (Ad 10-50, Spess5-50) ± biotite ± vesuvianite, with outer barren wollastonite-bearing zone. An innermost zone of massive quartz may be present. Late-stage spessartine ± almandine ± biotite ± amphibole ± plagioclase ± phlogopite ± epidote ± fluorite ± sphene. Reduced types are characterized by hedenbergitic pyroxene, Fe-rich biotite, fluorite, vesuvianite, scapolite and low garnet:pyroxene ratios, whereas oxidized types are characterized by salitic pyroxene, epidote and andraditic garnet and high garnet:pyroxene ratios. Exoskarn envelope can be associated with extensive areas of biotite hornfels. Endoskarn alteration: Pyroxene ± garnet ± biotite ± epidote ± amphibole ± muscovite ± plagioclase ± pyrite ± pyrrhotite ± trace tourmaline and scapolite; local greisen developed.

ORE CONTROLS: Carbonate rocks in extensive thermal aureoles of intrusions; gently inclined bedding and intrusive contacts; structural and/or stratigraphic traps in sedimentary rocks, and irregular parts of the pluton/country rock contacts.

ASSOCIATED DEPOSIT TYPES: Tin, Mo and Pb-Zn skarns. Wollastonite-rich industrial mineral skarns.

COMMENTS: Tungsten skarns are separable into two types (Newberry, 1982): reduced skarns (e.g. Cantung, Mactung), formed in carbonaceous rocks and/or at greater depths, and oxidized skarns (e.g. *King Island*), formed in hematitic or non-carbonaceous rocks, and/or at shallower depths. Late retrograde alteration is an important factor in many W skarns because, during retrogression, the early low-grade mineralization is often scavenged and redeposited into high-grade ore zones (e.g. Bateman, 1945; Dick, 1976, 1980). Dolomitic rocks tend to inhibit the development of W skarns; consequently magnesian W skarns are less common than calcic W skarns. In British Columbia, W skarns are preferentially associated with Cretaceous intrusions and hosted by calcareous, Cambrian cratonic, pericratonic and displaced continental margin rocks in the Cassiar, Kootenay-Barkerville, Dorsey and Ancestral North American terranes.

GEOCHEMICAL SIGNATURE: W, Cu, Mo, As, Bi and B. Less commonly Zn, Pb, Sn, Be and F geochemical anomalies.

GRADE AND TONNAGE: Grades range between 0.4 and 2 % WO_3 (typically 0.7 %). Deposits vary from 0.1 to >30 Mt.

IMPORTANCE: Skarn deposits have accounted for nearly 60 % of the western world's production, and over 80 % of British Columbia's production.

REFERENCES FOR W SKARNS: Bateman (1945); Dick (1976, 1980); Dick and Hodgson (1982, 1983); Newberry (1979, 1982); Einaudi *et al.* (1981). Kwak and White (1982); Eckstrand (1984); Newberry and Swanson (1986); Kwak (1987); Lowell (1991); Dawson *et al.* (1991); Dawson (1996).

Pb-Zn SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic Pb-Zn deposits.

COMMODITIES (*BYPRODUCTS*): Pb, Zn, Ag, (*Cu, Cd, W, Au*).

EXAMPLES (British Columbia - *Canada/International*): Piedmont (082FNW 129), Contact (104P 004), *Quartz Lake (Yukon, Canada), Groundhog (New Mexico, USA), Darwin (California, USA) San Antonio, Santa Eulalia and Naica (Mexico), Yeonhwa-Ulchin deposits (South Korea), Nakatatsu deposits (Japan), Shuikoushan and Tienpaoshan (China).*

CAPSULE DESCRIPTION: Galena and/or sphalerite-dominant mineralization genetically associated with a skarn gangue.

TECTONIC SETTING: Along continental margins where they are associated with late orogenic plutonism. Pb-Zn skarns occur at a wide range of depths, being associated with subvolcanic aphanitic dikes and high-level breccia pipes, as well as deep-level batholiths. In British Columbia, some Pb-Zn skarns are found in oceanic island arcs where they form distally to larger calcic Fe or Cu skarn systems.

AGE OF MINERALIZATION: Mainly Mesozoic, but may be any age. In British Columbia, the 80 Pb-Zn skarn occurrences identified have a wide age range; over 40 % are Early to mid-Jurassic, 22 % are Cretaceous, and a further 17 % are Eocene-Oligocene in age.

HOST/ASSOCIATED ROCK TYPES: Variable; from high-level skarns in thick limestones, calcareous tuffs and sediment to deeper level skarns in marbles and calcsilicate-bearing migmatites. Associated intrusive rocks are granodiorite to leucogranite, diorite to syenite (mostly quartz monzonite). Pb-Zn skarns tend to be associated with small stocks, sills and dikes and less commonly with larger plutons. The composition of the intrusions responsible for many distal Pb-Zn skarns is uncertain.

DEPOSIT FORM: Variable; commonly occurs along igneous or stratigraphic contacts. Can develop as subvertical chimneys or veins along faults and fissures and as subhorizontal blankets. Pb-Zn skarn deposits formed either at higher structural levels or distal to the intrusions tend to be larger and more Mn-rich compared to those formed at greater depths or more proximal.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn.

ORE MINERALOGY (Principal and *subordinate*): Sphalerite ± galena ± pyrrhotite ± pyrite ± *magnetite* ± *arsenopyrite* ± *chalcopyrite* ± *bornite*. Other trace minerals reported include *scheelite, bismuthinite, stannite, cassiterite, tetrahedrite, molybdenite, fluorite, and native gold.* Proximal skarns tend to be richer in Cu and W, whereas distal skarns contain higher amounts of Pb, Ag and Mn.

ALTERATION MINERALOGY: Exoskarn alteration: Mn-rich hedenbergite (Hd30-90, Jo10-50), andraditic garnet (Ad20-100, Spess2-10) ± wollastonite ± bustamite ± rhodonite. Late-stage Mn-rich actinolite ± epidote ± ilvaite ± chlorite ± dannermorite ± rhodochrosite ± axinite. Endoskarn alteration: Highly variable in development, and in many of the distal Pb-Zn skarns the nature of the endoskarn is unknown. However, Zn-rich skarns formed near stocks are often associated with abundant endoskarn that may equal or exceed the exoskarn (Einaudi *et al.*, 1981). Endoskarn mineralogy is dominated by epidote ± amphibole ± chlorite ± sericite with lesser rhodonite ± garnet ± vesuvianite ± pyroxene ± K-feldspar ± biotite and rare topaz. Marginal phases may contain greisen and/or tourmaline.

ORE CONTROLS: Carbonate rocks, particularly along structural and/or lithogical contacts (e.g. shale-limestone contacts or pre-ore dikes). Deposits may occur considerable distances (100-1000+ m) from the source intrusions.

ASSOCIATED DEPOSIT TYPES: Pb-Zn-Ag veins, Cu skarns and Cu porphyries. In B.C., small Pb-Zn skarns occur distally to some Fe and W skarns.

COMMENTS: In British Columbia. Pb-Zn skarn occurrences are preferentially developed in: (1) continental margin sedimentary rocks of the Cassiar and Ancestral North America terranes, (2) oceanic island arc rocks of the Quesnellia and Stikinia terranes, and (3) arc rocks of the Wrangellia Terrane. Their widespread terrane distribution partly reflects their formation as small distal mineralized occurrences related to other skarns (notably Cu, Fe and W skarns), as well as some porphyry systems. British Columbia is endowed with some large and significant Pb-Zn reserves classified as manto deposits (Nelson, 1991; Dawson *et al.*, 1991). These deposits lack skarn gangue, but are sometimes grouped with the Pb-Zn skarns.

GEOCHEMICAL SIGNATURE: Pb, Zn, Ag, Cu, Mn, As, Bi, W, F, Sn, Mo, Co, Sb, Cd and Au geochemical anomalies.

GEOPHYSICAL SIGNATURE: Generally good induced polarization response. Galena-rich orebodies may be marked by gravity anomalies whereas pyrrhotite-rich mineralization may be detected by magnetic surveys. CS-AMT may also be a useful exploration system.

OTHER EXPLORATION GUIDES: Thick limestones distal to small granitoid stocks; structural traps and lithological contacts; exoskarns with low garnet/pyroxene ratios.

GRADE AND TONNAGE: Lead-zinc skarns tend to be small (< 3 Mt) but can reach 45 Mt, grading up to 15 % Zn, 10 % Pb and > 150 g/t Ag with substantial Cd. Copper grades are generally < 0.2 %. Some deposits (e.g. *Naica* (Mexico) and *Falun* (Sweden)) contain Au. The 80 British Columbia Pb-Zn skarn occurrences are generally small and have had no major metal production.

IMPORTANCE: There are important past and current producers in Mexico, China, U.S.A (New Mexico and California), and Argentina. No large productive Pb-Zn skarns have been discovered in British Columbia.

REFERENCES FOR Pb-Zn SKARNS: Dawson and Dick (1978); Einaudi *et al.* (1981); Einaudi and Burt (1982); Dawson *et al.* (1991); Dawson (1996).

Sn SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic Sn deposits.

COMMODITIES (*BYPRODUCTS*): Sn (*W, Zn, magnetite*).

EXAMPLES (British Columbia - *Canada/International*): Silver Diamond, Atlin Magnetite and Daybreak (104N069, 126 and 134 respectively); *JC (Yukon, Canada), Moina, Mount Lindsay, Hole 16 and Mt. Garnet (Tasmania, Australia), Lost River (Alaska, USA).*

CAPSULE DESCRIPTION: Cassiterite-dominant mineralization genetically associated with a skarn gangue (includes calcic and magnesian Sn skarns).

TECTONIC SETTINGS: Late to post orogenic granites emplaced into thick and deeply buried continental margin sedimentary sequences, or sequences in rifted or stable cratonic environments.

AGE OF MINERALIZATION: Most economic deposits are Mesozoic or Paleozoic, but occurrences may be any age (the occurrences in British Columbia are Late Cretaceous).

HOST/ASSOCIATED ROCK TYPES: Carbonates and calcareous sedimentary sequences. Associated with differentiated (low Ca, high Si and K) ilmenite-series granite, adamellite and quartz monzonitic stocks and batholiths (of both I and S-type) intruding carbonate and calcareous clastic rocks. Tin skarns tend to develop in reduced and deep-level environments and may be associated with greisen alteration.

DEPOSIT FORM: Variable; can occur as either stratiform, stockwork, pipe-like or irregular vein-like orebodies.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn; wrigglite skarns contain thin rhythmic and alternating layers rich in either magnetite, fluorite, vesuvianite or tourmaline. Some hornfelsic textures.

ORE MINERALOGY (Principal and *subordinate*): Cassiterite ± scheelite ± arsenopyrite ± pyrrhotite ± chalcopyrite ± stannite ± magnetite ± *bismuthinite* ± *sphalerite* ± *pyrite* ± *ilmenite*.

ALTERATION MINERALOGY: Exoskarn alteration: Grandite garnet (Ad15-75, pyralspite 5-30) (sometimes Sn, F, and Be enriched), hedenbergitic pyroxene (Hd40-95) ± vesuvianite (sometimes Sn and F-enriched) ± malayaite ± Fe and/or F-rich biotite ± stanniferous sphene ± gahnite ± rutile ± Sn-rich ilvaite ± wollastonite ± adularia. Late minerals include muscovite, Fe-rich biotite, chlorite, tourmaline, fluorite, sellaite, stilpnomelane, epidote and amphibole (latter two minerals can be Sn rich). Associated greisens carry quartz and muscovite ± tourmaline ± topaz ± fluorite ± cassiterite ± sulphides. Magnesian Sn skarns may also contain olivine, serpentine, spinel, ludwigite, talc and brucite.

ORE CONTROLS: Differentiated, peraluminous plutons intruding carbonate rocks; fractures, lithological or structural contacts. Deposits may develop some distance (up to 500 m) from the related intrusions.

ASSOCIATED DEPOSIT TYPES: Tungsten skarns, Sn ± Be greisens), Sn-bearing quartz-sulphide veins and mantos. In British Columbia, some of the Sn and W skarn-related intrusions (e.g. Cassiar batholith, Mount Haskin stock) are also associated with small Pb-Zn skarn occurrences.

COMMENTS: Tin skarns generally form at deep structural levels and in reduced oxidation states. However, wrigglite Sn skarns tend to develop in relatively near-surface conditions, such as over the cupolas of high-level granites. The three Sn skarn occurrences in British Columbia are all associated with an S-type, fluorine-rich accretionary granite, the Surprise Lake batholith. However, they are unusual in being hosted in allochthonous oceanic rocks of the Cache Creek Terrane.

GEOCHEMICAL SIGNATURE: Sn, W, F, Be, Bi, Mo, As, Zn, Cu, Rb, Li, Cs and Re geochemical anomalies. Borate-bearing magnesian Sn skarns may exhibit boron enrichment.

GEOPHYSICAL SIGNATURE: Magnetic, induced polarization and possible radiometric anomalies.

GRADE AND TONNAGE: Deposits grade up to 1 % Sn, but much of the metal occurring in malayaite, garnet, amphibole and epidote is not economically recoverable. Worldwide, deposits reach 30 Mt, but most range between 0.1 and 3 Mt.

IMPORTANCE: Worldwide, Sn skarns represent a major reserve of tin. However, current production from skarn is relatively minor compared to that from placer Sn deposits and Sn-rich greisens and mantos. British Columbia has had no Sn production from skarns.

REFERENCES FOR Sn SKARNS: Burt (1978); Einaudi *et al.* (1981); Kwak and Askins (1981); Mitrofanov and Stolyarov (1982); Cox and Singer (1986); Kwak (1987); Ray *et al.* (1997).

GARNET SKARN DEPOSITS

SYNONYMS: Pyrometasomatic or contact metasomatic garnet deposits.

COMMODITIES (*BYPRODUCTS*): Garnet (*wollastonite, magnetite*).

EXAMPLES (British Columbia - *International*): Mount Riordan (Crystal Peak) (082ESW 102), *NYCO (New York, USA).*

CAPSULE DESCRIPTION: Garnet-dominant skarn.

TECTONIC SETTING: Thick carbonate or altered calcareous mafic volcanic sequences intruded by granitic rocks in any setting.

AGE: May be any age.

HOST/ASSOCIATED ROCK TYPES: Relatively oxidized, calc-alkaline plutons intruding oxidized carbonate successions.

DEPOSIT FORM: Irregular zones of massive garnet developed in exoskarn close to intrusive contacts. The shape of the deposit may be controlled partly by the morphology of the original carbonate units.

TEXTURES: Igneous textures in endoskarn. Coarse-grained, massive granoblastic textures in exoskarn.

ORE MINERALOGY: Economically viable garnet deposits should have a very low to zero content of non silicate minerals, particularly sulphides. Mount Riordan contains traces of scheelite, pyrrhotite, chalcopyrite, magnetite, pyrite and bornite.

ALTERATION MINERALOGY: Exoskarn alteration: Abundant and massive, coarse-grained garnet ± lesser clinopyroxene and wollastonite. The Mount Riordan deposit contains >75 per cent grandite garnet (Ad45-90 with lesser clinopyroxene (Hd41-51), calcite, quartz, sericite, chlorite, epidote, actinolite, feldspar, sphene, apatite, axinite, and vesuvianite.

ORE CONTROLS: Intrusive contacts and oxidized carbonate hostrocks. The Mount Riordan garnet skarn lies close to the intrusion.

ASSOCIATED DEPOSIT TYPES: Cu, Au, Fe and wollastonite skarns.

COMMENTS: The most desirable (due to higher specific gravity and hardness) industrial garnets are those derived from high grade metamorphic rocks, commonly via beach or stream placers; examples include the Emerald Creek deposit in Idaho, U.S.A., as well as a 6 Mt beach-sand deposit near Geraldton, Western Australia that grades 35 per cent garnet (Mining Annual Review, 1992). Economic concentrations of clean and industrially suitable garnet in skarn are rare. The San Pedro (New Mexico, U.S.A) reportedly comprises a 22 to 30 Mt deposit grading 85 % andradite garnet (Northern Miner, November 1993).

The Mount Riordan (Crystal Peak) deposit in British Columbia is probably one of the largest and highest grade garnet skarns yet identified; its garnet is suitable for the production of sandblasting and other abrasive products that require high angularity and a wide range of grain sizes (Mathieu *et al.*, 1991; Grond *et al.*, 1991; Ray *et al.*, 1992). The NYCO deposit in New York, has produced byproduct garnet from mining wollastonite skarn (Harben and Bates, 1990).

GEOCHEMICAL SIGNATURE: Generally none. Mount Riordan is marked by weak W, Mo, Zn, and Cu geochemical anomalies.

GEOPHYSICAL SIGNATURE: Gravity and possible magnetic anomalies

GRADE AND TONNAGE: To be economic, industrial garnet skarn deposits should be large tonnage (>20 Mt) and high grade (> 70 % garnet). The Mount Riordan (Crystal Peak) deposit contains reserves of 40 Mt grading 78 % garnet. The garnet should be free of inclusions, have a high angularity, and be present as discrete grains that can be processed easily by conventional benefication techniques. For blasting techniques, garnets with a higher specific gravity, such as those of almandine-spessartine-andradite composition are superior to pyrope and grossular garnets. Easy access, low-cost transportation and a ready and reliable market for the product are essential features controlling the economic viability of a deposit.

IMPORTANCE: World production of industrial garnet in 1995 was approximately 110,000 tonnes, of which just under half (valued at over US $10 million) was produced in the U.S.A. Worldwide, most garnet is obtained from placer deposits or as a byproduct of other hard-rock mining. The demand for industrial garnet in North America is growing; skarns are expected to be an important future source for the mineral.

REFERENCES FOR GARNET SKARNS: Hight (1983); Smoak (1985); Harben and Bates (1990); Austin (1991); Grond *et al.* (1991); Ray *et al.* (1992).

4. THE BRITISH COLUMBIA SKARN DATABASE

The British Columbia geoscience information system, MINFILE, is a comprehensive database that contains details on over 11 500 metallic and industrial mineral occurrences in the province. A MINFILE/PC system search of these occurrences identified nearly one thousand occurrences that have been described in the literature, or by prospectors and geologists in assessment reports, as "skarn". However, in may instances reliable data on their classification was lacking and, in some cases it was later demonstrated that the mineralization and skarn gangue were not coeval with, or related to the same hydrothermal system.

An extensive literature search, accompanied by three seasons of follow-up field investigations and sampling, resulted in the positive identification of at least 735 occurrences of skarn in British Columbia (Appendices 1, 2 and 3). Metallic minerals are associated with more than 97 % of these occurrences which are classified as skarn as defined by Burt (1977) and Einaudi and Burt (1982).

The 735 skarn occurrences can be divided into three groups. The smallest comprises 15 occurrences that are spatially and genetically related to alkalic and calc-alkalic porphyry Cu or Cu-Mo deposits (Appendix 1; Figure 20). These deposits include Ingerbelle and Copper Mountain (Preto, 1972; Fahrni *et al.*, 1976), Galore Creek (Allen *et al.*, 1976) and Mount Polley (Hodgson *et al.*, 1976; Dawson *et al.*, 1991). However, these skarns generally make up only a minor component of the overall porphyry-related alteration halo.

The second distinctive group consists of 25 skarn occurrences that are spatially associated with large vein systems (Appendix 2; Figure 20). These generally consist of extensive, barren to mineralized skarn-altered envelopes that surround quartz and/or sulphide veins. Some veins exceed 4 m in width and over 300 m in strike length. There are no examples where the wallrock skarn makes ore, but some veins, such as those in the Rossland district (Wilson *et al.*, 1990a, 1900b; Höy *et al.*, 1992), have been major producers of Cu and Au. It is not always certain whether the garnet-pyroxene wallrock alteration was coeval with the mineralized veins, although at some, including the Rossland sulphide veins, it appears to be so. Other occurrences, however, probably represent early skarn hostrocks cut by later veins that were related to a younger hydrothermal system.

The third and largest group comprises 695 skarn occurrences whose location and distribution are shown in Figures 21 to 23. These skarns are listed in Appendix 3, together with details concerning their host tectonic terrane (as defined by Wheeler *et al.*, 1991; Wheeler and McFeeley, 1991; Monger, 1992), alteration mineralogy, geochemistry, age and composition of their hostrocks and associated plutons. Assay data from mineralized skarn samples obtained from unpublished assessment reports and our own field sampling are also presented in Appendices 4A to 4H.

We collected and analyzed over 150 samples of unaltered igneous rocks associated with various Fe, Cu, Au, Mo, W and Sn skarns to determine the major and trace element geochemistry of skarn-related plutons in British Columbia. This geochemistry, together with data on another 36 samples previously published by Sangster (1969), White *et al.* (1976), Christopher and Pinsent (1979), Meinert (1984) and Ettlinger and Ray (1989a) is presented in Appendices 5A to 5F and summarized in Table 1. Because of the lack of major Pb-Zn skarns in British Columbia, no plutons associated with this class of skarn were sampled.

Manto deposits, such as the Midway (Bradford, 1988; Nelson *et al.*, 1988) are also not included in this study. These Pb-Zn deposits commonly lack a skarn gangue and, in many examples, evidence for their relationship to magmatic skarn-forming fluids is circumstantial (Nelson, 1991).

Table 1: Comparative geochemistry of the igneous rocks associated with Au, Fe, Cu, Mo, W and Sn skarns in British Columbia.

	Au Skarns (Hedley Intrusions)			Fe Skarns			Cu Skarns			Mo Skarns			W Skarns			Sn Skarns		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
SiO_2	54.82	2.20	27	58.61	6.86	49	60.23	9.09	59	62.70	2.80	14	74.41	2.00	21	75.80	1.00	19
TiO_2	0.66	0.10	27	0.99	0.90	49	0.65	0.43	59	0.66	0.14	14	0.17	0.08	21	0.14	0.04	19
Al_2O_3	18.59	0.80	27	16.46	1.73	49	15.98	1.50	59	15.85	0.40	14	13.68	0.70	21	12.74	0.60	19
Fe_2O_{3T}	7.74	1.00	27	7.25	4.17	49	6.04	3.18	59	5.62	1.10	14	1.19	0.60	21	1.29	0.30	19
MnO	0.14	0.03	27	0.15	0.07	49	0.12	0.07	59	0.10	0.04	14	0.06	0.05	21	0.04	0.07	19
MgO	3.82	0.60	27	2.59	1.67	49	2.76	1.91	59	2.07	0.74	14	0.27	0.20	21	0.12	0.10	19
CaO	8.40	1.00	27	6.57	2.59	49	5.88	3.47	59	4.49	1.13	14	1.13	0.80	21	0.59	0.30	19
Na_2O	3.21	0.50	27	4.01	0.97	49	3.76	0.70	59	3.01	0.40	14	3.58	0.50	21	3.46	0.30	19
K_2O	1.43	0.50	27	1.86	1.20	49	2.25	1.47	59	3.71	1.40	14	4.19	0.70	21	4.71	0.40	19
P_2O_5	0.18	0.03	27	0.39	0.47	49	0.21	0.19	59	0.23	0.04	14	0.07	0.05	21	0.06	0.07	11
S	0.20	0.40	27	0.02	0.01	6	0.09	0.10	19	-	-	-	-	-	-	0.01	-	1
CO_2	0.29	0.15	27	0.07	0.04	8	1.03	1.54	18	-	-	-	-	-	-	0.07	-	1
H_2O	-	-	-	0.97	0.64	7	-	-	-	-	-	-	-	-	-	-	-	-
LOI	1.31	0.50	27	1.08	0.82	32	1.61	1.53	56	0.92	0.20	14	0.65	0.40	21	0.69	0.20	11
Sum	100.30	1.10	27	99.75	0.46	49	99.40	0.29	56	99.37	0.30	14	99.40	0.20	21	99.27	0.60	19
FeO	5.81	0.90	27	5.16	3.22	36	3.45	1.70	47	3.46	0.90	14	0.79	0.30	21	0.87	0.30	19
Fe_2O_3	1.28	0.45	27	2.23	1.36	36	3.02	2.18	49	1.78	0.60	14	0.34	0.30	21	0.32	0.10	19
Fe_2O_3/FeO	0.23	0.09	27	0.57	0.43	36	0.80	0.39	57	0.55	0.20	14	0.40	0.40	21	0.40	0.20	19
K_2O/Na_2O	0.44	0.12	27	0.48	0.31	49	0.64	0.60	59	1.31	0.80	14	1.21	0.30	21	1.38	0.20	19
Au (ppb)	15	11	27	2	1	10	2	2	13	<2	-	2	2.25	2	4	-	-	-
Ba	979	290	27	446	310	29	751	383	57	1141	350	14	490	420	21	219	127	6
Ce	23	9	27	43	16	29	32	15	46	51	12	14	41	29	21	84	20	6
Co	32	4	27	29	4	10	28	10	31	27	3	2	33	5	4	-	-	-
Cr	21	17	27	12	8	29	25	51	56	20	17	14	7	4	21	7	4	6
Cs	1	1	27	2	0.4	10	3	2	56	<5	-	14	5	5	21	4	2	6
F	372	40	27	487	235	29	353	134	56	483	60	14	363	205	21	2767	900	6
La	9	2	27	18	10	29	16	8	56	27	7	14	21	16	21	34	13	6
Nb	<3	-	27	5	3	29	5	4	56	11	3	14	44	30	21	33	19	6
Ni	8	6	27	17	23	10	11	11	23	11	1	2	12	1	4	-	-	-
Rb	28	11	27	51	45	29	45	25	56	114	46	14	230	82	21	286	90	10
Sc	34	13	27	20	18	29	15	12	56	13	4	14	3	1	21	<5	-	6
Sn	-	-	-	<5	-	29	6	3	47	8	3	14	6	2	21	37	31	10
Sr	612	150	27	617	185	29	553	290	57	642	135	14	152	120	21	42	28	10
Th	24	6	27	10.0	3.0	27	6	2	47	<15	-	14	15	11	21	30	6	10
U	1	1	27	4	1	10	6	3	46	<15	-	14	8	3	18	15	11	10
V	201	61	27	138	167	29	144	104	56	109	50	14	13	11	21	<5	-	6
Y	14	3	27	34	15	29	21	8	56	20	3	14	22	8	21	99	34	6
Zr	60	11	27	166	110	29	109	37	56	145	12	14	91	37	21	143	30	10
Ba/La	119	55	27	26	17	29	57	40	56	44	16	14	34	44	21	6	3	6
Sc/Nb	23	8	27	6	7	29	4	3	56	1.44	1	14	0.26	0.6	21	0.09	0.04	6

Table 1: (Continued).

Data from Ettlinger and Ray (1989a), Ray and Dawson (1994) and Appendix 5. The number of plutonic samples collected from each deposit or prospect is as follows:

Au skarns: Hedley intrusions = 27 .

Fe skarns: Merry Widow = 17; Texada Fe = 2; Yellow Kid = 10 Data for an additional 20 samples from Brynnor, Iron Hill, Iron Crown, Jedway, Zeballos & Texada Fe deposits after Sangster (1969), Meinert (1984) and Ettlinger and Ray (1989a).

Cu skarns: Craigmont = 9; Maid of Erin = 5; Queen Victoria = 1; Greenwood (Phoenix, Emma, Oro Denoro) = 3; Moly B = 1; Texada Island (Loyal, Paris, Marble Bay, Cornell, Florence-Security, Little Billie) = 25; Iskut River prospects (Dundee, Dirk, Shan, Ken, Tic) = 8; Chalco 5 prospect = 5; Lucky Mike prospect = 1; data for an additional 1 sample from Oro Denoro deposit after Church (1986).

Mo skarns: Coxey deposits (Coxey, Novelty, Giant) = 12.

W skarns: Emerald Tungsten = 11; Dimac = 6 ; Lamb Mtn. = 3; Lizard = 1.

Sn skarns: Surprise Lake prospects (Atlin Magnetite, Silver Diamond, Daybreak) = 6; data for an additional 13 samples from the Surprise Lake batholith after Christopher and Pinsent (1979) and White et al. (1976).

Where trace element values were below detection limits, half the value of the detection limit (e.g., 1.5 for <3) was used to calculate the mean.

SD = standard deviation.

Fe_2O_3T = total iron as Fe_2O_3. n = number of rock samples analysed.

All major element values in weight percent; trace element values in ppm, except Au, in ppb.

Analytical methods: major elements by x-ray fluorescence (with a precision averaging 5 percent relative error); Au by fire assay and AAS finish; loss on ignition (LOI) calculated after heating predried samples to 1 050 degrees Celsius for 4 hours.

FeO by digestion/titration; Ag, Cu, Pb, Zn, As, Sb, Co and Ni by flame atomic adsorption spectrometry; CO_2 and S using a Leco analyzer; completed at the Geochemical Laboratory, Ministry of E.M.P.R., Victoria, B.C.

F by specific ion electrode at Echo-Tech Labs. Ltd., Kamloops, B.C.; Ba, Cr, Cs, Nb, Rb, Sc, Sn, Sr, V, Y and Zr by XRF (pressed pellet); Ce, La, Th, and U by thermal neutron activation at Activation Labs. Ltd., Ancaster, Ontario, and Acme Analytical Labs. Ltd., Vancouver, B.C.

Major elements in percent; Au in ppb, other trace elements in ppm.

5. NUMBER AND DISTRIBUTION OF SKARNS IN BRITISH COLUMBIA

SKARNS ASSOCIATED WITH PORPHYRY SYSTEMS

At least 15 Cu or Mo-bearing porphyry systems in British Columbia are associated with variable amounts of exo and endoskarn alteration and these are listed in Appendix 1; their distribution is shown on Figure 20. The porphyries include both alkalic and calc-alkalic classes and, in most cases, the skarn represents only a minor component of the overall porphyry alteration system. In some porphyries, however, such as the Copper Mountain-Ingerbelle and Mount Polley (formerly Cariboo-Bell) deposits, skarn is more common (Preto, 1972; Fahrni *et al.*, 1976; Simpson and Saleken, 1983; Stanley *et al.*, 1995; Fraser *et al.*, 1995). In many instances the garnet-pyroxene assemblages are developed adjacent to the intrusive stock, but at Mount Polley the skarn alteration lies between an inner potassic zone and an outer propyllitic zone.

Skarn development in these porphyry systems generally predates the Cu or Mo mineralization, and scapolite veining, where present, is commonly a late feature. Detailed studies of mineral paragenesis at the Willa property (Heather, 1985) indicate a complex and related history of skarn development and Au deposition.

Ten of the 15 occurrences are associated with porphyry Cu systems, and the remaining 5 are related to porphyry Mo deposits. Based on their ore mineralogies, these skarn-related porphyry deposits can be divided into five subclasses, namely Cu, Cu(Au), Mo(W), Mo, and Cu(Mo); the relationships between these subclasses and the belts, terranes and ages of intrusive and hostrocks are shown in Table 2.

All but one of the 15 occurrences are hosted by Triassic-Jurassic oceanic island arc rocks of the Quesnellia and Stikinia terranes. The 1 remaining occurrence (the Trout Lake Mo(W) porphyry) is in Lardeau Group rocks of the Kootenay Terrane. Based on the ages and composition of the porphyry intrusions, the 14 occurrences in Quesnellia and Stikinia are separable into two suites. The oldest are Late Triassic to Early Jurassic in age, were essentially comagmatic with the hosting Nicola, Stuhini, Hazleton and Rossland island arc supracrustal rocks, and are associated with porphyry Cu or Cu-Au mineralization. These intrusions tend to be alkalic and range in composition from diorite to monzonite to syenite; examples of this older, Cu-Au suite include the Copper Mountain, Ingerbelle and Ajax East and West deposits.

The younger suite ranges from Upper Cretaceous to Eocene in age and is associated with Mo ± Cu ± W mineralization that is generally Au-poor. Most of these intrusions are calc-alkalic and range from quartz monzonite to granodiorite in composition. Examples include the host intrusions of the Mount Ogden and Glacier Gulch deposits.

Skarn assemblages in all 15 occurrences are dominated by epidote with, in decreasing abundance, garnet and clinopyroxene. Four occurrences include late scapolite, and two others contain fluorite.

There are few data available concerning the mineral chemistry of the skarn gangue silicates at these occurrences. Watson (1969) has noted that the garnets at Galore Creek are Ti-rich, and recent microprobe analyses of scapolite from the Ajax East porphyry indicate the mineral contains up to 3.6 % Cl_2O (K. Ross and Y. Pan, personal communication, 1993).

SKARNS ASSOCIATED WITH VEIN SYSTEMS

At least 25 occurrences are recognized in close spatial association with vein systems. These are listed in Appendix 2 and their distribution throughout British Columbia is shown on Figure 20. They are characterized by quartz and/or sulphide veins that are enveloped by extensive and pervasive wallrock skarn alteration. The veins, which in some cases reach several metres in thickness and hundreds of metres in length, are commonly Au and/or Cu rich. Less commonly, they are dominated by Pb-Zn or W ± Mo mineralization.

The skarn envelope adjacent to the veins is generally barren. However, some mineralized sulphide veins in the Rossland area, such as the Evening Star and Gertrude veins, have skarn-altered wallrock containing Cu and Au (D. Wehrle, personal communication 1991; Höy *et al.*, 1992).

Both the veins and the adjacent skarn commonly exhibit a strong fracture control. The genetic relationship between the veins and the skarn is still uncertain; in the Rossland occurrences for example, the skarn appears to be coeval with, and related to, vein development. In others however, it is possible that the skarn and veins are unrelated, the veins having formed preferentially in a brittle, pre-existing skarn hostrock.

Table 2: Belt and terrane distribution and ages of 15 skarns related to porphyry deposits in B.C.

	No. of skarns	% of skarns	Number and (percentage) of skarn subclasses Cu 4 (26.7%)	Cu(Au) 4 (26.7%)	Mo(W) 3 (20.0%)	Mo 2 (13.3%)	Cu(Mo) 2 (13.3%)
Belt							
Insular							
Coast	1	6.7				1	
Intermontane	11	73.3	4	3	1	1	2
Omineca	3	20		1	2		
Foreland							
SUM	**15**	**100**	**4**	**4**	**3**	**2**	**2**
Terrane							
Quesnellia	7	46.7	3	3	1		
Stikinia	7	46.7	1	1	1	2	2
Kootenay	1	6.6			1		
SUM	**15**	**100**	**4**	**4**	**3**	**2**	**2**
Intrusive Age							
Eocene	1	7				1	
Late Cretaceous	4	27			2		2
Cretaceous-Tertiary	1	7				1	
Middle Jurassic	2	13		1	1		
Early Jurassic	4	27	3	1			
L Trias.- E Jurassic	2	13	1	1			
Late Triassic	1	7		1			
SUM	**15**	**100**	**4**	**4**	**3**	**2**	**2**
Host Age							
Early Jurassic	4	27		1	1		2
Jurassic	1	7			1		
Late Triassic	8	53	4	3		1	
Permian-Triassic	1	7				1	
Early Cambrian	1	7			1		
SUM	**15**	**100**	**4**	**4**	**3**	**2**	**2**

Table 3: Belt and terrane distribution and ages of 25 skarns related to vein systems in B.C..

	No. of skarns	% of skarns	Number and (percentage) of skarn subclasses Au (Cu) 9 (36%)	Au 5 (20%)	Cu 5 (20%)	Pb-Zn = 4 (16%)	W 1 (4%)	W (Mo) 1 (4%)
Belt								
Insular	5	20		3	2			
Coast	1	4				1		
Intermontane	4	16		1	1	2		
Omineca	15	60	9	1	2	1	1	1
Foreland	0	0						
SUM	**25**	**100**	**9**	**5**	**5**	**4**	**1**	**1**
Terrane								
Wrangellia	5	20		3	2			
Alexander	1	4				1		
Quesnellia	15	60	9	2	2	1	1	
Stikinia	3	12			1	2		
Dorsey	1	4						1
SUM	**25**	**100**	**9**	**5**	**5**	**4**	**1**	**1**
Intrusive Age								
Eocene	2	8		1	1			
Cretaceous	1	4						1
Late Jurassic	1	4		1				
middle Jurassic	4	16	2	1			1	
Early Jurassic	9	36	7		2			
Jurassic	2	8			1	1		
Triassic	1	4		1				
Uncertain Age	5	20		1	1	3		
SUM	**25**	**100**	**9**	**5**	**5**	**4**	**1**	**1**
Host Age								
Early Jurassic	17	68	9	4	2	1	1	
Late Triassic	5	20			3	2		
Permian	1	4				1		
Paleozoic-Mesozoic	2	8		1				1
SUM	**25**	**100**	**9**	**5**	**5**	**4**	**1**	**1**

On the basis of their dominant ore minerals, the 25 vein-related skarns are divisible into six subclasses, namely Cu, Au, Au(Cu), Pb-Zn, W, and W(Mo) (Table 3). Fifteen occurrences lie within the Quesnellia Terrane, and most of these are hosted by Lower Jurassic rocks of the Rossland Group and are related to Early to Middle Jurassic intrusions. Rocks of the Wrangellia and Stikinia terranes host 5 and 3 occurrences respectively, whereas the Alexander and Dorsey terrane each have just 1 vein-associated skarn occurrence.

Apart from studies on the sulphide chemistry of the Crown Point property (Wilson *et al.*, 1990), and microprobe work on garnets at the Second Relief mine (Ettlinger and Ray, 1989a), which both lie in the Rossland camp, little is known about the mineral chemistry of the skarn assemblages. It is not clear why 14 of the 25 occurrences are in Rossland Group rocks, particularly as there are numerous vein systems cutting calcareous rocks elsewhere in British Columbia that show no skarn wallrock alteration.

OTHER SKARNS (695 OCCURRENCES)

NUMBER OF OCCURRENCES IN EACH SKARN CLASS

Magnesian skarns are rare in British Columbia, probably because terranes containing platformal dolomitic rocks have had less plutonism than the limestone-bearing island-arc terranes. Virtually all of the 695 skarn occurrences listed in Appendix 3 are calcic skarns. These occurrences have been classified, on the basis of either their chemistry or the dominant sulphides or oxides present, into a particular metallic class (Fe, Cu, Au, Mo, W, Pb-Zn, or Sn). The distribution of these seven skarn classes throughout British Columbia is shown on Figures 21, 22 and 23. Where some occurrences reportedly contain, for example, scheelite and lesser molybdenite, or magnetite and lesser chalcopyrite, or chalcopyrite and lesser gold, they are classified as W (Mo), Fe (Cu) and Cu (Au) in Appendix 3.

A small group of 17 occurrences represents industrial mineral skarns; these commonly lack significant metallic minerals, but are either past producers or a potential source of industrial minerals or substances such as garnet, wollastonite, tremolite, rhodonite or marble. Their distribution in British Columbia is shown on Figure 23.

In addition, 11 occurrences lack sufficient mineralogical data and are designated as being of an unknown class; their distribution is shown on Figure 23.

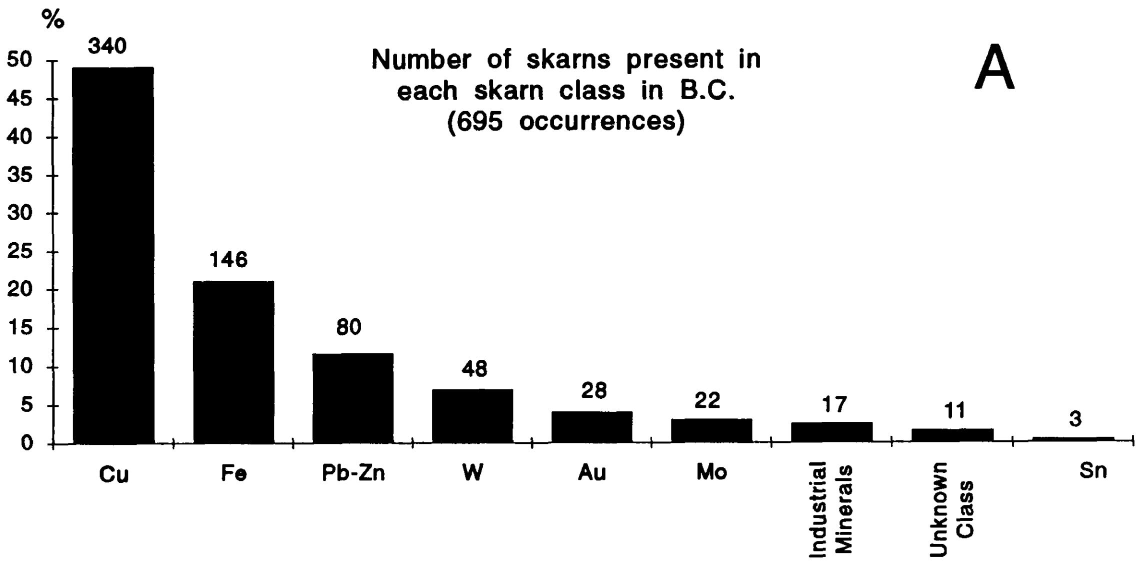
The number of occurrences in each skarn class is presented in Figure 2A. Copper skarns predominate with 340 occurrences which represent nearly half of all the skarns identified in the province. Iron and Pb-Zn skarns are the next two most abundant, containing 146 and 80 occurrences, respectively. The other skarn classes are W (48 occurrences) Au (28), Mo (22), industrial mineral (17) and Sn skarns (3). Eleven occurrences of unknown class comprise 1.6 % of the total.

DISTRIBUTION OF SKARN CLASSES BY BELT AND TECTONIC TERRANE

The Canadian Cordillera is subdivided into five physiographic belts: from west to east these are the Insular, Coast, Intermontane, Omineca and Foreland belts. A number of generally fault-bounded terranes and subterranes are recognized throughout these belts (Figure 3); each terrane has a distinct geological character and internal stratigraphy. Important studies or reviews of the tectonic history of the Cordillera, with particular reference to the belts and terranes in British Columbia, include those by White (1959), Wheeler (1970), Wheeler and Gabrielse (1972), Monger *et al.* (1972; 1982), Monger (1992), Jones *et al.* (1977), Wheeler *et al.* (1991), Wheeler and McFeely (1991) and Gabrielse *et al.* (1991). An overview of the metallogeny of the Cordilleran belts and terranes has been presented by Dawson *et al.* (1991).

Our database indicates that the 695 skarns in the province are distributed across at least 19 different terranes and subterranes (Figure 2B) that vary considerably in character; they include terranes dominated by island arc rocks (e.g. Wrangellia, Quesnellia and Stikinia), those having abundant ocean-floor material (e.g. Cache Creek and Slide Mountain), those containing sediments deposited at or relatively close to the ancestral continental margin (e.g. Kootenay, Cassiar and Barkerville), and others that largely comprise cratonic basement (Monashee and ancestral North America).

Tables 4 to 11 summarize the number of skarns of each class in relation to the five physiographic belts, the 19 skarn-hosting terranes, and the respective ages of the host rocks and related plutons. It should be noted that some terranes overlap belt boundaries and this may cause some apparent discrepancies when comparing the distribution of skarns in the terranes and the belts. For example, the Wrangellia and Alexander terranes make up most of the Insular Belt, but the eastern parts of both terranes are included in the Coast Belt (Wheeler and McFeely, 1991). Similarly, Quesnellia lies mainly within the Intermontane Belt,



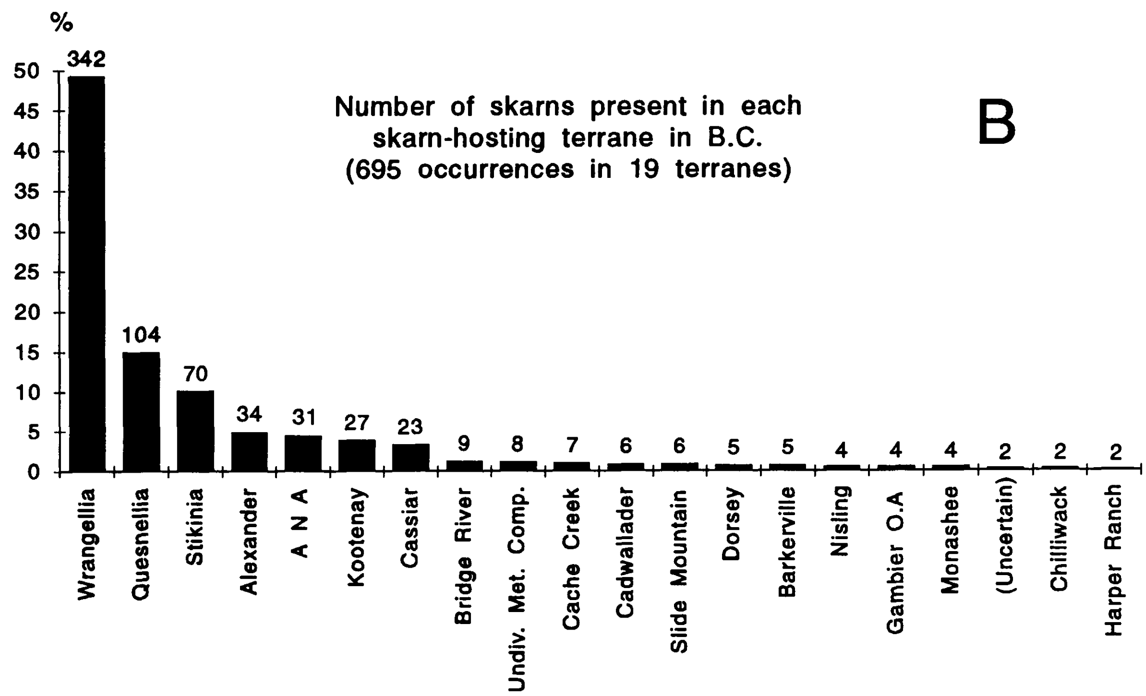


Fig 2: Bar charts showing (A) percentage of occurrences in each skarn class, and (B) percentage of occurrences in each skarn-hosting tectonic terrane in British Columbia. Number above each bar = number of skarn occurrences; ANA = Ancestral North America; Gambier O.A = Gambier overlap Assemblage; Undiv. Met. Comp. = undivided metamorphic complexes.

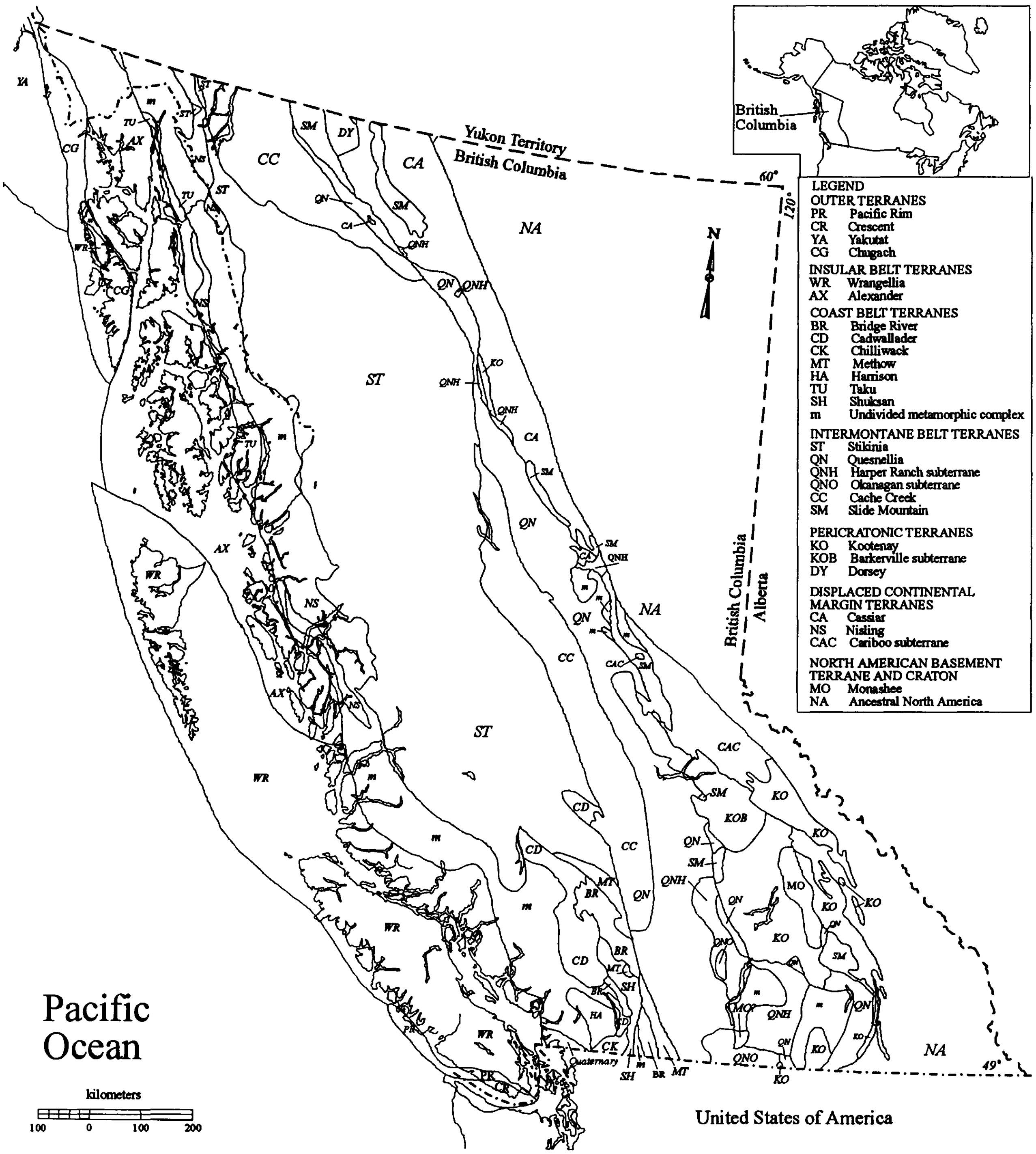


Fig 3: Simplified terrane map of British Columbia, modified after Wheeler *et al.* (1991) and Wheeler and McFeeley (1991).

but a small part of it also extends eastward into the Omineca Belt.

From west to east across British Columbia and, on the basis of their differing ages, character and origin, the 19 skarn-hosting terranes and subterranes can be grouped as follows (Figures 3 and 4):

1. Terranes comprising most of the Insular Belt (Wrangellia and Alexander).
2. Terranes comprising most of the Coast Belt (Chilliwack, Cadwallader, Bridge River, undivided metamorphic complexes and Gambier overlap assemblage).
3. Terranes comprising most of the Intermontane Belt (Quesnellia, Stikinia, Cache Creek, Slide Mountain terranes and the Harper Ranch subterrane).
4. Pericratonic terranes (Kootenay and Dorsey terranes and the Barkerville subterrane).
5. Displaced continental margin terranes (Cassiar and Nisling). These, and the pericratonic terranes form part of the Omineca Belt.
6. North American basement terranes and craton (Monashee and ancestral North America).

The total number of skarns present in each of the above six terrane groupings is presented on Figure 4A. The terranes comprising most of the Insular and Intermontane belts, which are dominated by oceanic island-arc rocks, contain over 80 % of the occurrences. By contrast, the terranes that make up most of the Coast Belt only host 4 % of the province's skarns, despite an abundance of plutonic rocks. In the Insular Belt, most skarns are developed in island-arc rocks of the Wrangellia Terrane, whereas the Alexander Terrane contains far fewer skarns. Likewise, almost all the skarns in the Intermontane Belt are concentrated in the island arc dominated Quesnellia and Stikinia terranes, whereas skarns are rare in the Harper Ranch, Cache Creek and Slide Mountain terranes (Figure 2B) which contain a large component of ocean-floor material.

The variable distributions of the different skarn classes, including industrial mineral skarns, in relation to the six terrane groupings, are illustrated by Figures 4B to 4H. Although Fe, Cu and Au skarns are mostly related to plutonism developed in island arc terranes, these three classes show marked differences in their overall distribution. There are 146 occurrences of Fe skarn in the province which represents 21 % of the total number of skarns recorded (Figure 2A). They are virtually all confined to the western edge of British Columbia (Figure 4B), and over 90 % (136 occurrences) are concentrated in the Wrangellia Terrane of the Insular Belt (Table 4). By contrast the Alexander Terrane, which also lies mostly within the Insular Belt, has only one Fe skarn occurrence. Most Fe skarns in Wrangellia are hosted by Upper Triassic Quatsino Formation limestones, being generally developed close to the formation's upper and lower contacts with volcanic or tuffaceous units. They are mainly related to Fe-rich, Lower to Middle Jurassic age gabbros and diorites belonging to the Bonanza island arc suite.

Copper skarns make up nearly half of known skarn occurrence in British Columbia (Figure 2A). Over half of these are concentrated in the Wrangellia Terrane of the Insular Belt, but another 30% are hosted by rocks of Stikinia and Quesnellia (Table 5). In spite of the large number of Cu skarns in Wrangellia, their total Cu metal production is relatively small. By contrast, Quesnellia with less than 20 % of the Cu skarns has had the biggest mines (Craigmont and Phoenix) and the largest amount of Cu production from skarn. Like Fe skarns, most Cu skarns in Wrangellia are related to the Lower to Middle Jurassic Bonanza island arc plutonism, and they occur mainly where these intrusions cut Upper Triassic limestone-basalt sequences of the Quatsino and Karmutsen formations. However, most Cu skarns in Quesnellia and Stikinia, like many of the porphyry Cu deposits in those terranes, are associated with syn to late volcanic intrusions related to the Late Triassic - Early Jurassic oceanic island arcs. Unlike the Cu skarns in Wrangellia, they are mainly hosted by supracrustal sequences that were essentially coeval with the plutons.

Twenty-eight occurrences of Au skarn are recorded in British Columbia which represents just over 4 per cent of the total number of skarns (Figure 2A). Quesnellia contains 18 occurrences (Table 6) and has the highest Au production because of the large mines at Hedley. Most of the Au skarns in this terrane are related to gabbros and quartz diorites belonging to the Late Triassic - Early Jurassic Nicola island arc (Ettlinger and Ray, 1989a; Ray and Dawson, 1994).

British Columbia has 22 Mo skarns, representing 3 % of its total skarns (Figure 2A). Over 80 % are confined to the Omineca Belt (Table 7), and most of these are hosted by Paleozoic sedimentary sequences. They are related to Jurassic (particularly Middle Jurassic) plutonism and are concentrated in terranes in the central and eastern parts of the province (Figure 4F). The pericratonic Kootenay Terrane has the largest number of occurrences (8), as well as the most productive deposit (Coxey, in the Rossland district). The nature of their hostrocks suggests that Mo skarns developed in either sequences deposited along the continental margin or in oceanic island arcs. The largest group, representing 63 % of Mo skarns, is hosted by cratonic, pericratonic and displaced continental margin sedimentary rocks of the Monashee, Ancestral North America, Kootenay and Cassiar

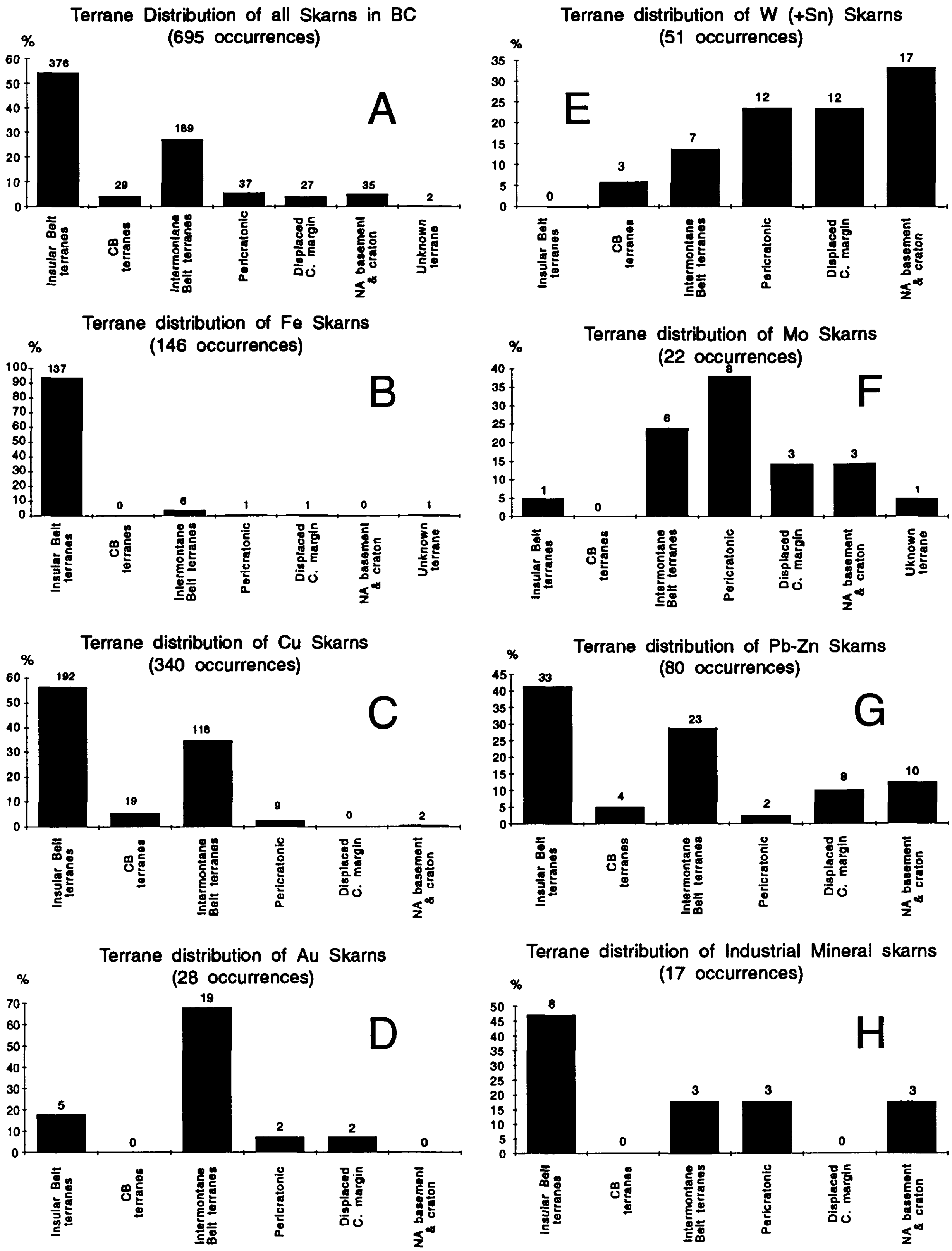


Fig. 4: Bar charts showing percentage and number of skarn occurrences present in the six tectonic terrane groupings, (CB = Coast Belt; C = Continental; NA = North America).
A. All 695 skarn occurrences. B. Fe skarns. C. Cu skarns. D. Au skarns. E. Sn and W skarns. F. Mo skarns. G. Pb-Zn skarns. H. Industrial mineral skarns.

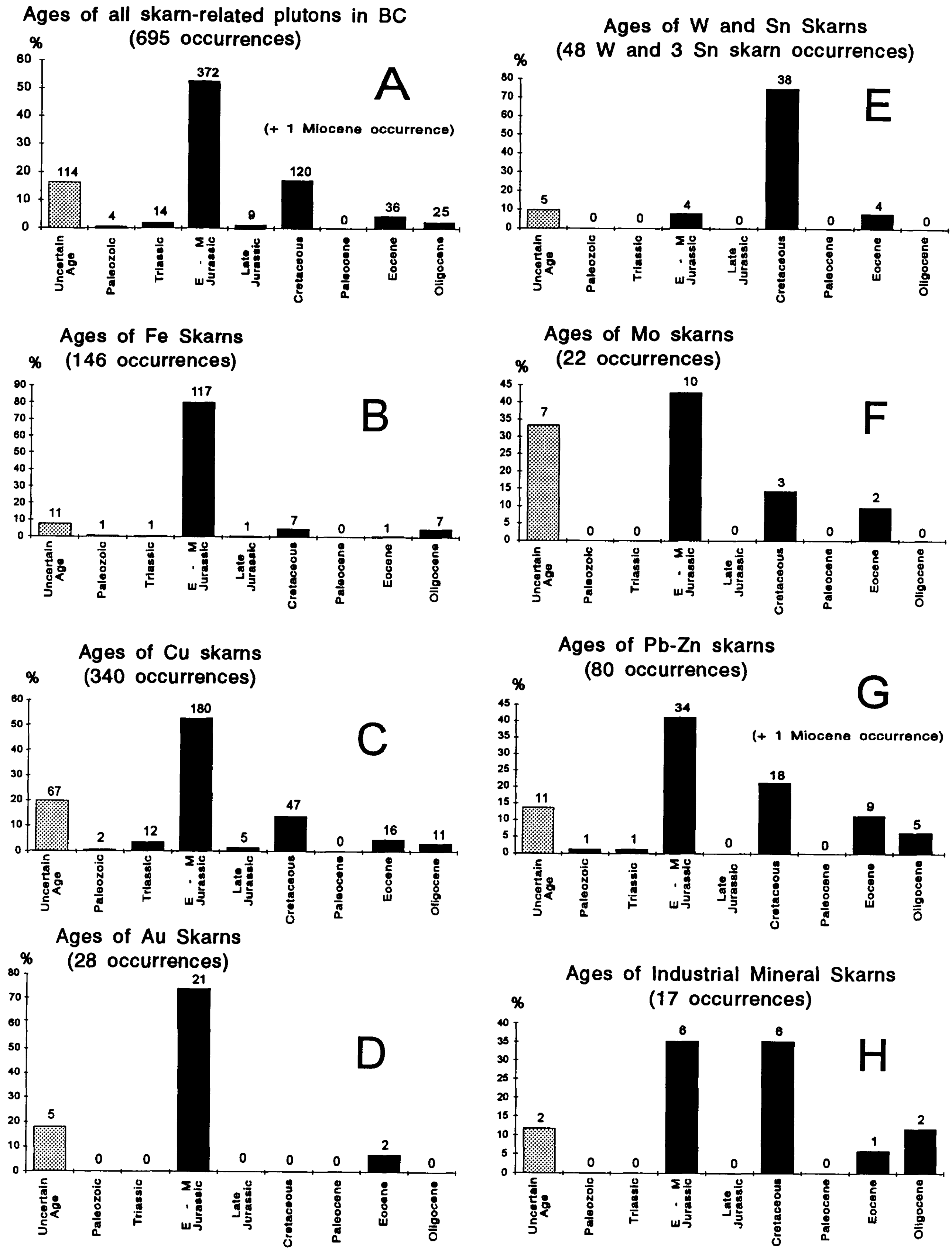


Fig. 5: Bar charts showing relative ages of the plutonic rocks associated with skarns.
A: Plutons related to all 695 skarn occurrences. B: Plutons related to Fe skarns. C: Plutons related to Cu skarns. D: Plutons related to Au skarns. E: Plutons related to W and Sn skarns. F: Plutons related to Mo skarns. G: Plutons related to Pb-Zn skarns. H: Plutons related to industrial mineral skarns. Note: Figure 5A includes 11 skarn occurrences of unknown class.

terranes (Figure 4F). A smaller group (22 % of Mo skarns) is hosted by Triassic island arc rocks of the Quesnellia and Stikinia terranes (Table 7).

In contrast to the spatial distribution pattern exhibited by other skarn types, there is a progressive easterly increase in the number of W and Sn skarn occurrences across British Columbia (Figure 4E). No W skarns are recorded in the terranes of the Insular Belt (Table 8) whereas cratonic North America and those terranes believed to contain sedimentary rocks derived from the ancestral continent host over 80 % of these skarns. In all, there are 48 recorded W skarns in the province and they make up nearly 7 % of the total (Figure 2A). Over 80 % of W skarns are concentrated in the Omineca Belt, and the majority of these are related to Si-rich and Fe-poor intrusions of mid to Upper Cretaceous age (Table 8). A majority of these lie within rocks of the Cassiar, Kootenay and Ancestral North American terranes, where they are preferentially hosted by Lower Paleozoic, cratonic, pericratonic and displaced continental margin carbonate sequences.

British Columbia has 80 Pb-Zn skarn occurrences which comprise nearly 12 per cent of all the skarns known in the province (Figure 2A; Table 9). Compared to the major Pb-Zn skarns in the Yukon and elsewhere in the world, British Columbia's examples are small and their metal production has been inconsequential (Ray and Webster, 1991b). Lead-zinc skarns are widely distributed in all six terrane groupings (Figure 4G), which demonstrates they can develop in many different tectonic and plutonic environments. Seventy per cent of Pb-Zn skarns are confined to arc-dominant terranes in the Insular and Intermontane belts but a further 25 % of the occurrences are hosted by sedimentary assemblages on or close to the ancestral North American continent.

The 80 Pb-Zn skarns are associated with three different geological units (Table 9). One third of the occurrences are hosted by rocks in Wrangellia and are mainly associated with mafic, Early to Middle Jurassic intrusions of the Bonanza island arc; most of these are small, distal occurrences related to larger Fe and Cu skarns and porphyry Cu deposits. The second group of Pb-Zn skarns is concentrated in Upper Triassic oceanic island arc sequences in Quesnellia and Stikinia. These skarns are related to late arc plutons and many, like those in Wrangellia, represent small occurrences that formed distal to large Cu skarn or porphyry Cu systems. The third group of Pb-Zn skarns is concentrated in the Cassiar and Ancestral North American terranes, and is largely hosted by Lower Paleozoic platformal sequences that were deposited along the passive continental margin of North America. It is associated with strongly differentiated Cretaceous or post-Cretaceous intrusions that were probably derived from continental crust. Many of the Pb-Zn skarns in this group represent small, distal occurrences related to W, Cu, Mo or Sn-bearing skarn systems.

To summarize, Pb-Zn skarn occurrences in British Columbia are generally small, are widely distributed and are found in two different geological environments, namely oceanic island arcs and platformal sediments. In the island arc sequences, the Pb-Zn skarns are related to primitive, mafic magmas, but in the platformal rocks they are associated with differentiated melts derived from continental crust. In both of these environments, many Pb-Zn skarns are associated with, and lie distal to, larger Fe, Cu, W and Mo skarn or porphyry Cu systems.

Only three Sn skarns are known in British Columbia (Table 10), although there are a small number of W and Pb-Zn skarns that contain minor Sn enrichment (Tables 8 and 9; Appendix 3). These three Sn skarns are all in the Atlin district of northern British Columbia, and two of them (Silver Diamond and Daybreak) are enriched in W and F (Ray *et al.*, 1997). All three occurrences are genetically related to highly differentiated and F-rich granites of Upper Cretaceous age. They are atypical of most other Sn skarns in the North American cordillera in being hosted by allochtonous, ophiolitic rocks of the Cache Creek Terrane. One of these occurrences, the Daybreak skarn, is distinct in having wrigglite textures (Webster *et al.*, 1992) and garnets that are enriched in Cr (Ray *et al.*, 1997). The latter phenomenon is believed to be related to the presence of ultramafic rocks in the hosting package.

Compared to metalliferous skarn deposits, transportation cost tends to be a crucial factor in determining the economic viability of an industrial mineral skarn. Thus, most of the exploration to date for industrial mineral skarns has been confined to the southern half of British Columbia. In all, there are 17 industrial mineral skarn comprising just over 2 % of all skarns in the province (Table 11). They are associated with a variety of substances including garnet, wollastonite, tremolite, rhodonite and calcic and dolomitic marble, and are hosted by seven terranes. However, the terranes of the Insular Belt, with their proximity to sea transportation, contain nearly half the occurrences (Figure 4H). In general, industrial mineral skarns are associated with host and intrusive rocks that have a wide range of ages, although Upper Triassic hostrocks and Cretaceous plutons predominate (Figure 5H; Table 11).

SKARN DEPOSIT SUBCLASSES

An examination of ore mineralogy and assay results indicates that Fe, Cu, Mo, W and Pb-Zn skarns can be separated into subclasses. Details regarding the number of occurrences in these subclasses, their distribution and the ages of their hostrocks and related plutons are presented in Tables 4, 5, 7, 8 and 9.

Iron skarns include three subclasses (Table 4): 'Fe only', Fe (Cu) and Fe (Cu, Zn). The majority (114 occurrences representing 78 % of the total), are 'Fe only' and little or no Cu sulphides are reported in them. Iron (Cu) skarns containing abundant chalcopyrite with the magnetite ore comprise 31 occurrences (21 %) whereas the Fe (Cu, Zn) subclass is represented by only one occurrence (Garnet, 103C 004). There are no significant differences in either age or distribution between the 'Fe only' and Fe (Cu) subclasses (Table 4)

Copper skarns are separable into six subclasses, namely 'Cu only', Cu (Au), Cu (Zn), Cu (Fe), Cu (W) and Cu (Mo) (Table 5). Wrangellia contains most of the 'Cu only', Cu (Zn), Cu (Fe) and Cu (Au) subclasses. The Cu(Au) subclass is mostly hosted by Triassic rocks and is related to Early to Middle Jurassic intrusions.

Molybdenum skarns are divisible into four subclasses (Table 7): 'Mo only', Mo (W), Mo (Au) and Mo (Cu), the first two of which make up 78 % of the Mo skarn occurrences. The two reported Mo (Au) occurrences (Novelty, 082FSW 107 and Giant, 082FSW 109) are related to Middle Jurassic intrusions and are hosted by Kootenay Terrane rocks.

Tungsten skarns can be separated into five subclasses (Table 8): 'W only', W (Mo), W (Sn), W (Cu) and W (Pb-Zn). Most (29 occurrences) belong to the 'W only' subclass and many of these are hosted by Cambrian age rocks in Ancestral North America. By contrast, a majority of the Mo bearing W skarns occur in the Cassiar Terrane whereas all three reported Sn-bearing W skarns are hosted by Dorsey Terrane rocks.

Lead-zinc skarns include seven subclasses (Table 9). The two most important of these are the Pb-Zn subclass (those reported to contain both galena and sphalerite) comprising 49 occurrences, and the Zn subclass (containing sphalerite with little or no galena), which makes up a further 20 occurrences. Some differences in distribution are noted between these two subclasses; Quesnellia, for example, hosts 10 occurrences belonging to the Pb-Zn subclass but contains none of the Zn subclass.

Table 4: Belt and terrane distribution and ages of 146 Fe skarns in B.C. (Fe skarns = 21% of all skarns).

	No. of Fe Skarns	% of Fe Skarns	Number and (percentage) of Fe skarn subclasses "Fe only" 114 (78%)	Fe (Cu) 31 (21%)	Fe (Cu, Zn) 1 (0.7%)
Belt					
Insular	132	90.4	103	28	1
Coast	10	6.8	8	2	
Intermontane	3	2.1	2	1	
Omineca	1	0.7	1		
Foreland					
SUM	**146**	**100**	**114**	**31**	**1**
Terrane					
Wrangellia	136	93.1	107	28	1
Alexander	1	0.7	1		
Nisling	1	0.7		1	
Stikinia	6	4.1	5	1	
Kootenay	1	0.7	1		
unknown	1	0.7		1	
SUM	**146**	**100.0**	**114**	**31**	**1**
Intrusive age					
Oligocene	7	4.8	1	6	
Eocene	1	0.7	1		
Cretaceous-Tertiary	1	0.7	1		
Late Cretaceous	1	0.7	1		
Middle Cretaceous	5	3.4	4	1	
Late Jurassic- E. Cretaceous	1	0.7	1		
Middle Jurassic	72	49.3	59	12	1
Early-Middle Jurassic	18	12.3	17	1	
Early Jurassic	27	18.5	22	5	
Late Triassic	1	0.7		1	
Protero.-Paleozoic	1	0.7		1	
Uncertain age	11	7.5	7	4	
SUM	**146**	**100**	**114**	**31**	**1**
Host Age					
Early-Middle Jurassic	10	6.8	10		
Late Triassic-Middle Jurassic	13	8.9	12	1	
Late Triassic	89	61.0	64	24	1
Pennsylvanian-Permian	7	4.8	6	1	
Mississippian-Permian	1	0.7	1		
Ordovician-Triassic	1	0.7	1		
Paleozoic-Mesozoic	18	12.3	15	3	
Uncertain Age	7	4.8	5	2	
SUM	**146**	**100**	**114**	**31**	**1**

Table 5: Belt and terrane distribution and ages of 340 Cu skarns in B.C. (Cu skarns = 48.9 % of all skarns).

	No. of Cu skarns	% of Cu skarns	Number and (percentage) of Cu skarn subclasses "Cu only" 301 (89%)	Cu (Au) 20 (6%)	Cu (Zn) 9 (3%)	Cu (Fe) 6 (2%)	Cu (W) 3 (1%)	Cu (Mo) 1 (0.3%)
Belt								
Insular	176	51.7	153	12	6	4	1	
Coast	39	12.0	36		2		1	
Intermontane	74	21.0	66	4	1	2	1	
Omineca	50	15.0	45	4				1
Foreland	1	0.3	1					
SUM	**340**	**100**	**301**	**20**	**9**	**6**	**3**	**1**
Terrane	**No**	**%**						
Wrangellia	173	51	150	12	7	4		
Alexander	19	6	17		1		1	
Undivided Meta.	8	2	7				1	
Gambier	2	1	2					
Chilliwack	2	1	2					
Bridge River	4	1	4					
Cadwallader	3	1	3					
Quesnellia	64	19	59	2		2	1	
Stikinia	47	13	42	4	1			
Cache Creek	3	1	3					
Slide Mountain	4	1	4					
Dorsey	1	0	1					
Barkerville	1	0						1
Kootenay	7	2	5	2				
Ancestral N.A.	2	1	2					
SUM	**340**	**100**	**301**	**20**	**9**	**6**	**3**	**1**
Intrusive age								
Oligocene	11	3	10		1			
Eocene	14	4	13	1				
Early Tertiary	2	1	2					
Cretaceous-Tertiary	2	1	2					
Late Cretaceous	9	3	9					
Middle Cretaceous	26	8	21	2	2			1
Early Cretaceous	6	2	6					
Cretaceous	4	1	4					
Jurassic-Cretaceous	3	1	2				1	
Late Jurassic-Early Cretac	2	1	2					
Middle Jurassic	118	34	108	4	3	3		
Early-Middle Jurassic	15	4	7	6	1		1	
Early Jurassic	44	13	40	1	2	1		
Jurassic	3	1	2	1				
Late Triassic-Early Jurassi	1	0	1					
Late Triassic	7	2	7					
Triassic	4	1	4					
Late Devonian	2	1	1	1				
Uncertain Age	67	19	60	4		2	1	
SUM	**340**	**100**	**301**	**20**	**9**	**6**	**3**	**1**

Table 5 (Continued): Belt and terrane distribution and ages of 340 Cu skarns in B.C.

Host Age	No. of Cu skarns	% of Cu skarns	"Cu only"	Number of Cu skarn subclasses Cu (Au)	Cu (Zn)	Cu (Fe)	Cu (W)	Cu (Mo)
Eocene	1	0.3	1					
Upper Juras.- Low Cret.	1	0.3	1					
Low-Mid Jurassic	28	8.2	25	3				
Lower Jurassic	4	1.2	3	1				
Upper Trias.-Mid Juras.	14	4.1	12	2				
Upper Trias.-Low Juras.	21	6.2	19			1	1	
Upper Triassic	153	45.0	137	8	4	4		
Middle Triassic	1	0.3	1					
Upper Paleozoic- Low Juras.	3	0.9	3					
Upper Permian	1	0.3		1				
Permian-Jurassic	4	1.2	4					
Permian	5	1.5	5					
Pennsylvanian-Permian	4	1.2	3	1				
Mississippian-Upper Trias.	3	0.9	3					
Mississippian-Permian	14	4.1	14					
Mississippian	3	0.9	2	1				
Carboniferous	1	0.3		1				
Devonian-Triassic	1	0.3				1		
Devonian-Permian	6	1.8	4	1	1			
Upper Devonian	1	0.3	1					
Lower Devonian	1	0.3	1					
Devonian	4	1.2	4					
Silurian-Devonian	1	0.3					1	
Ordovician-Triassic	1	0.3	1					
Ordovician-Silurian	1	0.3	1					
Lower Cambrian	2	0.6	2					
Cambrian	2	0.6	2					
Paleozoic-Mesozoic	24	7.1	21		3			
Paleozoic	8	2.4	7					1
middle Proterozoic	1	0.3	1					
Uncertain Age	26	7.6	23	1	1		1	
SUM	**340**	**100.0**	**301**	**20**	**9**	**6**	**3**	**1**

Table 6: Belt and terrane distribution and ages of 28 Au skarns in B.C. (Au skarns = 4% of all skarns).

	No. of Au skarns	% of Au skarns
Belt		
Insular	1	3.6
Coast	7	25.0
Intermontane	17	60.7
Omineca	3	10.7
Foreland	0	0.0
SUM	**28**	100.0
Terrane		
Wrangellia	1	3.6
Alexander	4	14.3
Quesnellia	18	64.3
Stikinia	1	3.6
Nisling	2	7.1
Kootenay	2	7.1
SUM	**28**	100
Intrusive age		
Tertiary	1	3.6
Jurassic-Eocene	1	3.6
Middle Jurassic	5	17.9
Early Jurassic	1	3.6
Late Triassic-Early Jurassic	15	53.6
Uncertain Age	5	17.9
SUM	**28**	100
Host Age		
Early-Middle Jurassic	1	3.6
Early Jurassic	1	3.6
Late Triassic-Middle Jurassic	1	3.6
Late Triassic-Early Jurassic	16	57.1
Triassic	1	3.6
Permian	4	14.3
Pennsylvanian-Permian	1	3.6
Paleozoic	3	10.7
SUM	**28**	100

Table 7: Belt and terrane distribution and ages of 22 Mo skarns in B.C. (Mo skarns = 3% of all skarns).

	No. of Mo skarns	% of Mo skarns	Number and (percentage) of Mo skarn subclasses "Mo only" 12 (55%)	Mo (W) 5 (23%)	Mo (Au) 2 (9%)	Mo (Cu) 3 (13%)
Belt						
Insular	0	0.0				
Coast	2	9.1	2			
Intermontane	2	9.1	1			1
Omineca	18	81.8	9	5	2	2
Foreland	0	0.0				
SUM	**22**	**100**	**12**	**5**	**2**	**3**
Terrane						
Alexander	1	4.5	1			
Quesnellia	4	18.2	2			2
Stikinia	1	4.5	1			
Cassiar	3	13.6	1	2		
Kootenay	8	36.4	4	2	2	
Monashee	1	4.5	1			
Ancestral N.A.	2	9.1	1	1		
Harper Ranch	1	4.5				1
Unknown	1	4.5	1			
SUM	**22**	**100**	**12**	**5**	**2**	**3**
Intrusive Ages						
Eocene	1	4.5	1			
Tertiary	1	4.5	1			
Early Cretaceous	1	4.5		1		
Cretaceous	2	9.1		2		
Middle Jurassic	7	31.8	4	1	2	
Early Jurassic	2	9.1	1			1
Jurassic	1	4.5		1		
Uncertain Age	7	31.8	5			2
SUM	**22**	100	**12**	**5**	**2**	**3**
Host Age						
Pennsylvanian-Perm.	8	36.4	4	2	2	
Devonian-Permian	2	9.1	1			1
Early Ordovician	1	4.5		1		
Early Cambrian	1	4.5	1			
Paleozoic	1	4.5	1			
Late Proterozoic	3	13.6	1	2		
Helikian	1	4.5	1			
Uncertain Age	5	22.7	3			2
SUM	**22**	**100**	**12**	**5**	**2**	**3**

Table 8: Belt and terrane distribution and ages of 48 W skarns in B.C. (W skarns = 6.9% of all skarns).

	No. of W skarns	% of W skarns	Number and (percentage) of W skarn subclasses				
			"W only" 29 (60%)	W (Mo) 14 (29%)	W (Sn) 3 (6%)	W (Cu) 1 (2%)	W (Pb-Zn) 1 (2%)
Belt							
Insular	0	0	0				
Coast	2	4	2				
Intermontane	4	8	1	1		1	1
Omineca	39	81	26	10	3		
Foreland	3	6	0	3			
SUM	**48**	**100**	**29**	**14**	**3**	**1**	**1**
Terrane							
Cadwallader	1	2.1	1				
Bridge River	2	4.2	1	1			
Quesnellia	1	2.1	1				
Stikinia	2	4.2	1			1	
Cache Creek	1	2.1					1
Cassiar	12	25.0	4	8			
Dorsey	3	6.3			3		
Kootenay	5	10.4	4	1			
Barkerville	4	8.3	4				
Monashee	2	4.2	2				
Ancestral N.A.	15	31.1	11	4			
SUM	**48**	**100**	**29**	**14**	**3**	**1**	**1**
Intrusive Age							
Eocene	4	8	2	1	1		
Late Cretaceous	9	19	3	3	2		1
Middle Cretaceous	12	25	7	5			
Early Cretaceous	4	8	3	1			
Cretaceous	10	21	10				
Middle Jurassic	3	6	2	1			
Early Jurassic	1	2				1	
Uncertain age	5	10	2	3			
SUM	**48**	**100**	**29**	**14**	**3**	**1**	**1**
Host Age							
Early-Middle Jurassic	2	4.2	1			1	
Early Jurassic	1	2.1	1				
Late Triassic	1	2.1	1				
Permian-Jurassic	2	4.2	1	1			
Carboniferous	4	8.3			3		1
Early Ordovician	3	6.3	2	1			
Cambrian-Ordovician	3	6.3		3			
Early Cambrian	13	27.1	10	3			
Cambrian	3	6.3	2	1			
Paleozoic	7	14.2	5	2			
Proterozoic-Cambrian	1	2.1		1			
Proterozoic-Paleozoic	2	4.2	1				
Late Proterozoic	2	4.2	2				
Middle Proterozoic	2	4.2		2			
Hadrynian	1	2.1	1				
Uncertian Age	1	2.1	1				
SUM	**48**	**100**	**28**	**14**	**3**	**1**	**1**

Table 9: Belt and terrane distribution and ages of 80 Pb-Zn skarns in B.C. (Pb-Zn skarns = 11.5% of all skarns).

	No. of Pb-Zn skarns	% of Pb-Zn skarns	Number and (percentage) of Pb-Zn subclasses							
			Pb-Zn 49 (61%)	"Zn only" 20 (25%)	Pb-Zn (W) 4 (5%)	Zn (Cu) 3 (4%)	Pb-Zn (Mo) 1 (1%)	Pb-Zn (Sn) 1 (1%)	Pb-Zn (Cu) 1 (1%)	Zn (W) 1 (1%)
Belt										
Insular	27	34	18	8					1	
Coast	10	13	3	4		2				1
Intermontane	17	21	11	3	2	1				
Omineca	26	33	17	5	2		1	1		
Foreland	0	0	0		0					
SUM	**80**	**100**	**49**	**20**	**4**	**3**	**1**	**1**	**1**	**1**
Terrane										
Wrangellia	25	31.0	14	8		2			1	
Alexander	8	10.0	5	2						1
Gambier	2	3.0		2						
Cadwallader	1	1.0	1							
Bridge River	1	1.0	1							
Quesnellia	10	12.5	10							
Stikinia	11	14.0	5	3	2	1				
Slide Mountain	2	3.0	2							
Dorsey	1	1.0	1							
Cassiar	8	10.0	5	2				1		
Kootenay	1	1.0		1						
Ancestral N.A.	10	12.5	5	2	2		1			
SUM	**80**	**100**	**49**	**20**	**4**	**3**	**1**	**1**	**1**	**1**
Intrusive ages										
Miocene	1	1	1							
Oligocene	5	6	5							
Eocene	5	6	2	2				1		
Early Tertiary	2	3	2							
Tertiary	2	3	1		1					
Late Cretaceous	2	3	2							
Middle Cretaceous	8	10	4	2		2				
Early Cretaceous	6	8	3	1	2					
Cretaceous	1	1					1			
Late Jurassic-Early Cretaceous	2	3		2						
Middle Jurassic	26	32	16	8					1	1
Early-Middle Jurassic	1	1	1							
Early Jurassic	6	8	2	3		1				
Triassic	1	1		1						
Paleozoic-Mesozoic	1	1	1							
Uncertain age	11	13	9	1	1					
SUM	**80**	**100**	**49**	**20**	**4**	**3**	**1**	**1**	**1**	**1**

Table 9 (Continued): Belt and terrane distribution and ages of 80 Pb-Zn skarns in B.C.

	No. of Pb-Zn skarns	% of Pb-Zn skarns	Number and (percentage) of Pb-Zn subclasses							
			Pb-Zn 49 (61%)	**"Zn only" 20 (25%)**	**Pb-Zn (W) 4 (5%)**	**Zn (Cu) 3 (4%)**	**Pb-Zn (Mo) 1 (1%)**	**Pb-Zn (Sn) 1 (1%)**	**Pb-Zn (Cu) 1 (1%)**	**Zn (W) 1 (1%)**
Host Age										
U Juras.- Low Cret.	2	3		2						
Low-Mid Jurassic	4	5	3	1						
Upper Trias.-Mid Juras.	1	1	1							
Lower Jurassic	3	4	3							
Upper Trias.- Low Juras.	4	5	4							
Upper Triassic	24	30	17	6					1	
Triassic	1	1		1						
Paleozoic-Mesozoic	5	6	5							
Penn.-Permian	1	1		1						
Miss.-Permian	1	1		1						
Carboniferous	1	1	1							
Permian-Jurassic	1	1	1							
Devonian-Triassic	1	1	1							
Devonian-Permian	4	5		1	2	1				
Lower Ordovician	2	3		2						
Ordovician-Triassic	1	1		1						
Lower Cambrian	13	16	8	1	2		1	1		
Cambrian	1	1		1						
Paleozoic	2	3	1							1
Hadrynian	1	1	1							
Uncertain Age	7	9	3	2		2				
SUM	**80**	**99**	**49**	**20**	**4**	**3**	**1**	**1**	**1**	**1**

Table 10: Belt and terrane distribution of 3 Sn skarns in B.C. (Sn skarns = 0.4% of all skarns).

	No. of Sn skarns	**% of Sn skarns**
Intermontane Belt	3	100
Cache Creek Terrane	3	100
Upper Cretaceous Intrusion	3	100
Carboniferous Host	3	100

Table 11: Belt and terrane distribution and ages of 17 industrial mineral skarns in B.C. (industrial mineral skarns = 2.4% of all skarns).

Belt	**No. of industrial mineral skarns**	**% of industrial mineral skarns**
Insular	4	24
Coast	4	24
Intermontane	2	12
Omineca	6	35
Foreland	1	6
SUM	**17**	**100**
Terrane	No	%
Wrangellia	7	41.1
Alexander	1	5.9
Quesnellia	2	11.8
Kootenay	3	17.6
Harper Ranch	1	5.9
Monashee	1	5.9
Ancestral N.A.	2	11.8
SUM	**17**	**100**
Intrusive Age		
Oligocene	1	6
Eocene	1	6
Early Tertiary	1	6
Middle Cretaceous	5	29
Cretaceous	1	6
Middle Jurassic	4	24
Early Jurassic	2	12
Uncertain Age	2	12
SUM	**17**	**100**
Host Age		
Late Triassic-Early Jurassic	1	6
Late Triassic	6	35
Pennsylvanian-Permian	2	12
Paleozoic-Mesozoic	1	6
Paleozoic	3	18
Late Proterozoic	1	6
Middle Proterozoic	1	6
Uncertain Age	2	12
SUM	**17**	**100**

6. AGES OF SKARN-RELATED PLUTONISM IN BRITISH COLUMBIA

The ages of the plutons related to the 695 skarn occurrences, as compiled in our database, are summarized in Figure 5A. At least 114 of these skarns are of unknown age, due either to lack of radiometric dating or an apparent absence of any identifiable plutonic rocks. Of the remaining 581 skarns, 489 (84%) were assigned ages based on K-Ar dating methods, a further 86 occurrences (approximately 15 %) were determined by U-Pb zircon analyses, and the ages of five occurrences were obtained by Rb-Sr methods. In many cases the plutonic rocks directly related to some skarns have not been radiometrically dated, and the ages have been assigned by us from radiometric analyses of correlative plutonic suites in the district.

Pre-Middle Triassic skarns are rare in the province and only four Paleozoic occurrences have been positively identified (Figure 5A). Most of the skarns were formed during three distinct time periods, the oldest and most important of which was the Early to Middle Jurassic when over half (372 occurrences) of the skarns in British Columbia were developed. The other two periods were the Cretaceous and the Eocene-Oligocene when 17 % and 9 % of the province's skarns were formed. The intervals between these three periods, in the Late Jurassic and Paleocene, were times of virtually no skarn formation (Figure 5A).

These periods of skarn development coincide with three major plutonic episodes in British Columbia, all of which were associated with magmatism that may have been related to eastward subducting oceanic crust (Armstrong, 1988). The Early to Middle Jurassic episode resulted in alkalic and calc-alkalic, mafic to intermediate I-type plutonism in various types of island arc settings. It was the most economically important metallogenic epoch in British Columbia; in addition to skarns, this plutonism was responsible for many of the provinces porphyry Cu, Cu-Au and Cu-Mo deposits (Preto, 1972, 1979; Preto *et al.*, 1979; Barr *et al.*, 1976; McMillan, 1991; Dawson *et al.*, 1991). The plutonism was concentrated in the western accretionary terranes of Wrangellia, Stikinia and Quesnellia at a time when they lay outboard of North America.

The Cretaceous plutonism was more widespread and there are doubts concerning a tectonic model for its origin. In part, the Cretaceous episode was probably related to an Andean-type continental margin magmatic arc (Armstrong, 1988; van der Heyden, 1992), although compressional thickening as a result of collision between allochtonous superterranes and the continent (Monger *et al.*, 1982) may have generated many of these intrusions. This plutonism was more variable in composition than that in the Jurassic, and included magmas emplaced at depths varying from shallow to deep. The Cretaceous plutons were concentrated in two broad zones that coincide with two large major metamorphic belts recognized in the Canadian Cordillera (Monger *et al.*, 1982; Woodsworth *et al.*, 1991). The eastern zone corresponds with the Omineca Belt, and its Cretaceous plutons are predominantly felsic and S-type, tend to have initial 87Sr/86Sr ratios greater than 0.706 (Armstrong, 1988), and are enriched in 18O (Dagenais, 1984). By contrast, the Cretaceous intrusions in the western zone, which largely coincides with the Coast Belt, are characteristically I-type, range from felsic to mafic, and tend to have initial 87Sr/86S ratios of less than 0.706.

Much of the Eocene magmatism may have been related to a wide volcanic arc (Godwin, 1975; Armstrong, 1988); a chemical polarity is recognized with subalkaline and calc-alkaline plutons in the western part of the arc and alkaline rocks farther east (Ewing, 1981).

Figures 5B to 5H summarize the ages of plutons associated with each skarn class in British Columbia and demonstrate that certain metallogenic epochs were strongly time specific. Iron, Cu, Au and, to a lesser extent, Mo skarns are predominantly Early to Middle Jurassic in age, whereas W and Sn skarns are overwhelming related to the Cretaceous plutonic event. Lead-zinc and industrial mineral skarns tend to have a wider age range than the other classes (Figures 5G and 5H), and a substantial proportion of these were developed during each of the three major skarn-forming plutonic episodes.

7. METAL PRODUCTION FROM SKARN IN BRITISH COLUMBIA

Historically, skarns in British Columbia have been an important source of Fe, W, Cu and Au, and relatively unimportant sources of Mo, Ag, Pb and Zn. There has been no production of Sn from skarn in British Columbia. Nearly all of the major producing skarn deposits are located close to either the U.S. border or the coast where access is easier and past exploration has been greater.

A detailed listing of the known metal production from each skarn deposit as compiled by us from National Mineral Inventory, British Columbia Ministry of Employment and Investment (formerly Ministry of Energy, Mines and Petroleum Resources) mineral statistics, MINFILE and some publications is shown in Appendix 6. This data is summarized by production from each tectonic terrane and terrane grouping in Table 12). The data, particularly for Au and Ag production from Quesnellia, is updated from that presented by Ray *et al.* (1995) to account for the recent production from Nickel Plate between 1992 and 1995.

Problems exist with the skarn production data, and significant discrepancies are noted between the reported amount of material mined and milled in some deposits (Appendix 6). These discrepancies make it difficult to determine the total tonnage of skarn material mined in the province. They also present uncertainties in calculating the size and tonnage of some orebodies and cause problems in determining ore metal grades and metal ratios of these deposits. In most cases, the companies have only reported the tonnage mined and we have assumed this mined material represents ore (although it probably includes an unknown quantity of waste rock). In many other examples, the reported tonnage mined exceeds the tonnage milled and for most of these we have accepted the milled statistics to represent the true amount of ore in the deposit. However, with some deposits, such as the Iron Hill, Jessie, Merry Widow, Prescott , and the Craigmont skarns, the quantities of milled data apparently *exceeds* the mined data. In most of these cases we have used the latter figure to conservatively estimate the tonnage of each deposit. Appendix 6 lists the reported mined and milled material as well as the alternative metal grades calculated from these two sets of data. In a few instances the differences in metal grades calculated by using either the mined or milled data are striking. At the Mother Lode Cu skarn (082ESE034) for example, mined tonnage indicates the ore graded 0.7 % Cu and 1.07 g/t Au whereas the milled data suggests a grade of 4.62 % Cu and 7.04 g/t Au.

Although records on mining and production from some skarn deposits in the early 1900's are incomplete our data indicate that at least 112 skarns in the province have been worked for metals (this number depends on whether, for example, the Prescott, Paxton, Yellow Kid and Lake Fe skarns and the Nickel Plate and Hedley Mascot Au skarns are regarded as single or multiple producers). In addition, three skarn deposits have produced a variety of industrial commodities

The 112 skarns with reported metal production range in size from major deposits (Table 13) to small mineralized bodies that produced less than 10 tonnes of ore. The QR deposit is the only skarn currently being mined in British Columbia, although production at the Nickel Plate Au mine only recently ceased in 1996. In addition, the tailings of some abandoned mines, such as the Craigmont and Nickel Plate skarns are currently being reworked for either magnetite or Au.

A total of between 120 million and 142 million-t of ore has been mined or milled from the 112 deposits (Table 12; Appendix 6), with a yield of nearly 35 million-t of Fe (magnetite) concentrate, 850 000-t of Cu, 7520-t of W (scheelite) concentrate and 1760-t of Mo (molybdenite) concentrate. This historical production from skarn represents nearly 90 % of the Fe, 80 % of the W and approximately 12 % of the Cu produced in the province.

Skarns have also produced over 119-t of Au and 364-t of Ag, representing approximately 16 % and 2 %, respectively, of the provinces total Au and Ag production from hardrock mining. Just over 60% of the Au was derived as a primary product from Au skarns, and 36 % and 2 % respectively was recovered as a byproduct from mining Cu and Fe skarns.

At least 70 skarns in the province have produced some Au (Appendix 6). However, more than 90 per cent of the total Au production from skarn came from just eight deposits, of which the Nickel Plate and Phoenix skarns account for 83 % of the production. Other significant producers include the Motherlode, Tasu, Old Sport, Marble Bay and French deposits.

Over 364 tonnes of Ag have been produced from skarn (Table 12) although this represents less than 2 per cent of the provinces total Ag production (Ray and Webster, 1991b). All the Ag was derived as a byproduct; Cu and Fe skarns account for most of this production (73 % and 20 % respectively); Au skarns have produced only 5 % while Pb-Zn skarns have accounted for just 1 % of the Ag production. The single largest source was the Phoenix deposit which produced over 50 per cent of the skarn-derived Ag (183 tonnes). Other deposits with over 15-tonnes of Ag metal production include the Tasu and Yellow Kid Fe skarns and the Motherlode Cu skarns.

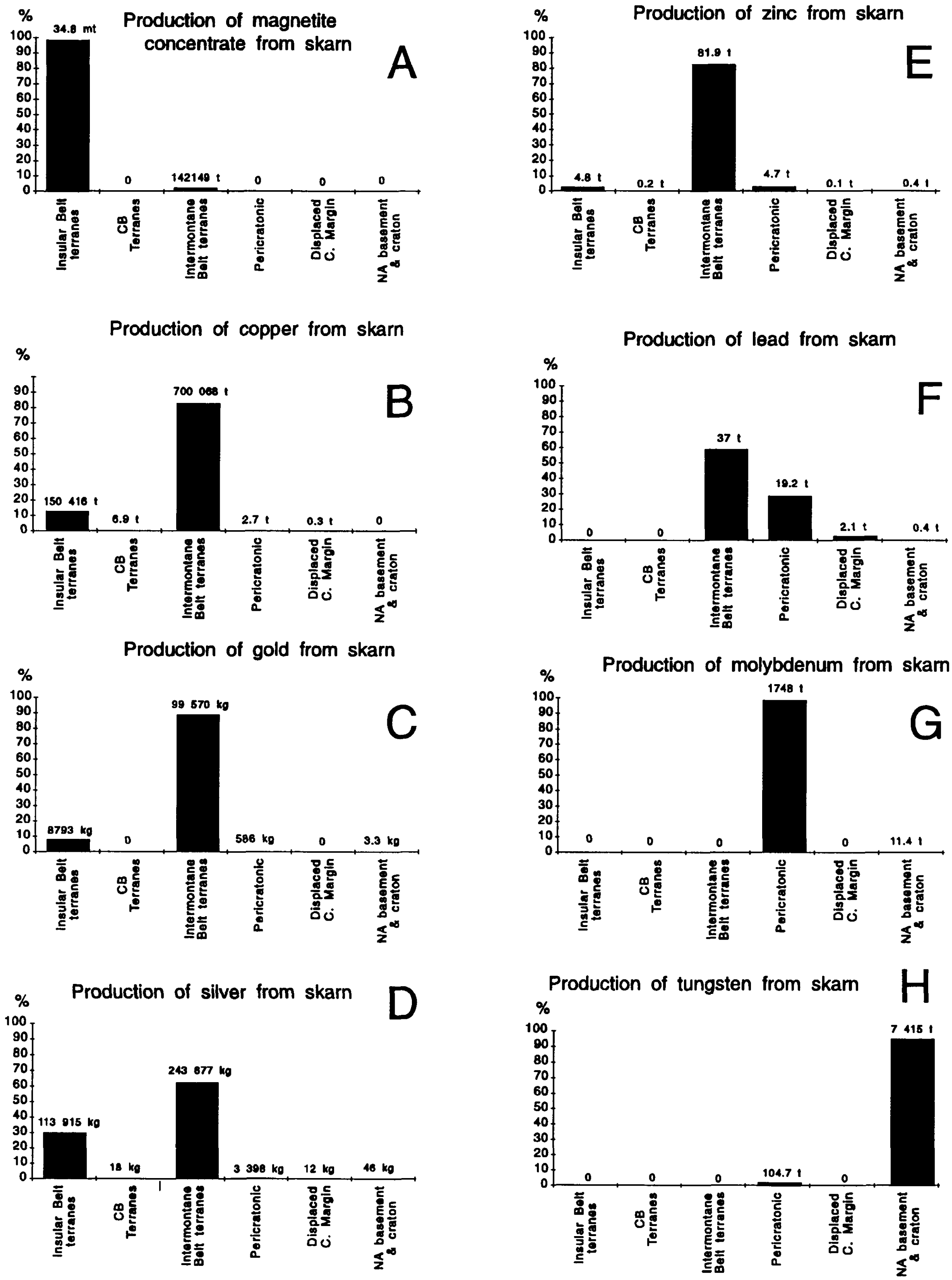


Fig. 6: Bar charts illustrating the total production of various metals from skarn in relation to the six tectonic terrane groupings, (CB = Coast Belt; C = Continental; NA = North America). Production data in tonnes (t) or kilograms (kg). Data from British Columbia MINFILE or National Mineral Inventory.

The 112 metal-producing skarns are distributed across ten tectonic terranes (Table 12) although the largest deposits are confined to just four terranes: Wrangellia, Quesnellia, Kootenay and ancestral North America (Table 13). Data presented in Table 12, Appendix 6 and Figure 6 illustrate that many of the host terranes are specific in their metal production. As would be expected with its large number of Fe skarn occurrences, over 99 % of the magnetite from skarn has come from Wrangellia in the Insular Belt (Figure 6A). However, there is no consistent relationship between the number of skarn occurrences in a terrane and the amount of its metal production from skarn. Although the terranes of the Insular Belt contain many more Cu skarn occurrences than those of the Intermontane Belt (Figure 4C), the latter, largely represented by Quesnellia, has had over 80 % of the Cu production (Figure 6B). This reflects the contrasting sizes of their Cu skarn deposits; in the Insular Belt, Cu skarns have produced an average of less than 1800-t of metal whereas those in the Intermontane Belt have averaged approximately 38 000-t of Cu.

Although Wrangellia hosts 18 % of the Au skarns, they are small and uneconomic, and nearly all of the 8.7 tonnes of Au won from skarn in this terrane was a byproduct from mining Cu and Fe skarns. Quesnellia, in the Intermontane Belt, not only has the most Au skarn occurrences (Figure 4D) but has produced over 90 % of the skarn-derived Au (Figure 6C).

Nearly 70 % of Ag production from skarn has come from the Intermontane Belt (Figure 6D), and most of this represents a byproduct from mining Cu skarns in the Quesnellia Terrane. The remaining 30 % was derived largely as a byproduct from the Fe skarn deposits in Wrangellia.

Although there are some important Pb-Zn skarns in the Yukon, including the Sa Dena Hes deposit (formerly known as Mount Hundere; Dawson, 1964; Dawson and Dick, 1978; Dawson *et al.*, 1991), no large productive Pb-Zn skarns have yet been discovered in British Columbia. However, the province does contain some significant manto-replacement deposits (Nelson, 1991; Dawson *et al.*, 1991). The small amounts of Zn and Pb produced from skarn have come from deposits in the Intermontane Belt and the pericratonic terranes (Figures 6E and 6F).

Kootenay Terrane pericratonic rocks contain the largest number of Mo skarn occurrences in British Columbia (Figure 4F), and all of the Mo production from skarn has come from one deposit, the Coxey, which is hosted by these rocks (Figure 6G). The Coxey deposit was mined from several open pits (Coxey, Novelty and Giant) and is unusual for a Mo skarn in being locally enriched in Au, As, Co, Ni and U (Appendix 4D; Fyles, 1984; Webster *et al.*, 1992).

Virtually all (98%) of the province's W production from skarn has come from four related deposits: Emerald Tungsten, Dodger, Feeney and Invincible. These are located in the Salmo district and are hosted by rocks of ancestral North America (Table 13; Figure 6H). Tin skarns are very rare in British Columbia, and there has been no metal production from them

Table 12: Metal production from 112 skarn deposits in British Columbia listed by tectonic terrane.

	Milled or milled (t)	Au (kg)	Ag (kg)	Fe (t)	Cu (t)	Pb (t)	Zn (t)	W (t)	Mo (t)
INSULAR BELT TERRANES									
1. Wrangellia (56 producers)	64465373	8792.9	112415	34842642	150170.8	0	4.8	0	0
2. Alexander (2 producers)	3294	0.3	1500	0	246.0	0	0.0	0	0
Total Insular Superterrane Prodn	**64468667**	**8793.2**	**113915**	**34842642**	**150417**	**0**	**4.8**	**0**	**0**
COAST BELT TERRANES									
3. Chilliwack (1 producer)	91	0.0	0	0	6.4	0	0.0	0	0
4. Undiv Metamorphic (1 producer)	35	0.0	1	0	0.4	0	0.0	0	0
5. Bridge River (1 producer)	15	0.0	17	0	0.1	0	0.2	0	0
Total Coast Belt Prodn	**141**	**0.0**	**18**	**0**	**6.9**	**0**	**0.2**	**0**	**0**
INTERMONTANE BELT TERRANES									
6. Quesnellia (32 producers)	76464197	110222.0	247159	141638	700066.1	36.3	81.9	0	0
7. Stikinia (2 producers)	1378	0.7	4	511	2.1	0	0.0	0	0
Total Intermontane Prodn	**76465575**	**110222.7**	**247163**	**142149**	**700068**	**36**	**82**	**0**	**0**
PERICRATONIC TERRANES									
8. Kootenay (8 producers)	1090164	586.1	3398	0	2.7	19.2	4.7	104.7	1748.9
DISPLACED CONTINENTAL MARGIN TERRANES									
9. Cassiar (2 producers)	26	0.0	12	0	0.3	2.1	0.1	0	0
NORTH AMERICAN BASEMENT & CRATON									
10. Ancestral N.America (7 producers)	368	3.3	46	0	0	0.4	0.4	7415.7	11.4
GRAND TOTAL (112 producers)	**142024941**	**119605**	**364552**	**34984791**	**850495**	**58**	**92**	**7520**	**1760**
SUMMARY									
Total Insular Superterrane	64468667	8793.2	113915	34842642	150417	0	4.8	0	0
Total Coast Belt	141	0.0	18	0	6.9	0	0.2	0	0
Total Intermontane	76465575	110222.7	247163	142149	700068	36.3	82	0	0
Total Kootenay Terrane	1090164	586.1	3398	0	2.7	19.2	4.7	104.7	1748.9
Total Cassiar Terrane	26	0.0	12	0	0.3	2.1	0.1	0	0
Total Ancestral N. America	368	3.3	46	0	0	0.4	0.4	7415.7	11.4
GRAND TOTAL (112 producers)	**142024941***	**119605**	**364552**	**34984791**	**850495**	**58**	**92**	**7520**	**1760**

Data from B.C. Employment and Investment (formerly Energy, Mines and Petroleum) mineral statistics or National Mineral Inventory.
Iron, tungsten and molybdenum production as concentrate.
* Total ore production ranges between 120 and 142 mt depending on whether milled or mined data is used.

Table 13: Production data of major skarn deposits in B.C. (with Minfile Numbers).

	Ore mined and/or milled (t)	Au (kg)	Ag (kg)	Fe (t)	Cu (t)	References
WRANGELLIA						
Cu Skarns						
Benson Lake 092L 091	64 387	62.9	488.5	0	1 237	Eastwood and Merrett (1962); Ettlinger and Ray (1989a); Ray and Webster (1991a)
Blue Grouse 092C 017	249 298	0.2	2 508.6	0	6 815	Fyles (1955); MINFILE
Cornell 092F 112	40 687	471.1	2 194.5	0	1 369	Ettlinger (1990); Webster and Ray (1990a, 1990b)
Indian Chief 092E 011	73 608	22.5	1 707.4	0	1 102	MINFILE
Marble Bay 092F 270	284 728	1 555.2	12 621.8	0	6 790	Ettlinger (1990); Webster and Ray (1990a, 1990b)
Old Sport 092L 035	2 657 594	3 868.8	11 731.2	488 726	41 193	Eastwood and Merrett (1962); Western Miner (1962); Ettlinger and Ray (1989a)
Yreka 092L 052	145 334	49.9	4 537.1	0	3 936	MINFILE
WRANGELLIA	**Ore mined**					
Fe Skarns	**and/or milled (t)**	**Au (kg)**	**Ag (kg)**	**Fe (t)**	**Cu (t)**	
Brynnor 092F 001	4 480 917	NA	NA	3 061 117	0	Sangster (1969)
Ford 092L 028	1 739 892	NA	NA	1 183 727	0	Sangster (1969)
Glengary 092E 001	114 047	NA	NA	22 680	0	Sangster (1969); MINFILE
Iron Crown 092L 034	2 175 683	NA	NA	1 275 186	0	Sangster (1969); Meinert (1984)
Iron Hill 092F 075	3 655 773	NA	NA	2 031 328	0	Sangster (1969); Meinert (1984)
Iron Mike 092K 043	168 735	NA	NA	82 863	0	MINFILE
Jessie 103B 026	3 747 350	NA	NA	2 025 950	0	Sutherland Brown (1962); Sangster (1969)
Kingfisher 092L 045	380 525	NA	NA	19 026	0	Stevenson and Jeffery (1964); Sangster (1969); Ray and Webster (1991)
Merry Widow 092L 044	3 371 813	NA	NA	1 683 507	0	Stevenson and Jeffery (1964); Eastwood (1965); Sangster (1969); Meinert (1984)
Prescott 092F 106	17 607 432	NA	NA	10 714 652	0	Sangster (1969); Meinert (1984); Ettlinger (1990)
Tasu 103C 003	20 833 962	1 339.5	50 394	12 253 880	59 866	Sutherland Brown (1968); Sangster (1969)
Yellow Kid 092F 258	2 571 331	887.4	23 645.2	NA	25 432	Sangster (1969); Meinert (1984); Webster and Ray (1990a, 1990b)
QUESNELLIA	**Ore mined**					
Au Skarns	**and/or milled (t)**	**Au (kg)**	**Ag (kg)**	**Fe (t)**	**Cu (t)**	
Dividend-Lakeview 082ESW001	111 252	504.4	87.2	0	73	Ettlinger and Ray (1989)
French Mine 092HSE059	82 046	1 629	201.0	0	21	Billingsley (1936); Dawson et al. (1990a, 1990b); Ray and Dawson (1994)
Hedley Mascot 092HSE036 (1936-1949)	619 022	7 248	1707.0	0	871	Dolmage and Brown (1945); Ettlinger et al. (1992)
Nickel Plate 092HSE038						Billingsley and Hume (1941); Ettlinger (1990); Ray et al. (1988); Ray and Dawson (1994)
Nickel Plate (Open pit 1987-1995)	9 835 436	22 569	12042	0	0	Ettlinger et al. (1992); Ray and Dawson (1994); Ray et al. (1996)
Nickel Plate (Underground 1904-1963)	2 983 900	41 705	4160	0	981	Camsell (1910); Billingsley and Hume (1941); Dolmage and Brown (1945)
Total Nickel Plate & Hedley Mascot	13 438 358	71 522	17 909	0	1 852	Ray et al. (1996)
QUESNELLIA	**Ore mined**					
Cu Skarns	**and/or milled (t)**	**Au (kg)**	**Ag (kg)**	**Fe (t)**	**Cu (t)**	
Craigmont 092ISE035	29 325 342	77.9	242.5	141 638	402 704	Morrison (1980); Webster et al. (1992)
Emma 082ESE062	240 948	211.8	2 434	0	2 350	Church (1986); Fyles (1990)
Mother Lode 082ESE034	5 049 201	5 406.4	21 754.5	0	35 512	LeRoy (1913); Church (1986)
Oro Denoro 082ESE063	124 001	116.8	953.8	0	1 691	Church (1986)
Phoenix 082ESE020	21 552 283	28 083.3	183 035.7	0	235 693	LeRoy (1912); Church (1986); Fyles (1990); Webster et al. (1992)
Queen Victoria 082FSW082	45 352	7.7	950.0	0	673	Little (1960); Webster et al (1992)
Rawhide 082ESE026	852 849	1 055.7	6 909.5	0	8 441	Church (1986)
Snowshoe 082ESE025	545 129	1 284	4 950	0	6 322	Church (1986); Fyles (1990)

Table 13 (Continued): Production data of major skarn deposits in B.C. (with Minfile Numbers).

KOOTENAY	**Ore mined**		
Mo Skarn	**and/or milled (t)**	**Mo (t)**	**References**
Coxey 082FSW110	1 035 509	1 748.9	Little (1963, 1982); Fyles (1984); Webster et al. (1992)
KOOTENAY	**Ore mined**		
W Skarn	**and/or milled (t)**	**W (t)**	
Dimac (Silence Lake) 082M 123	18 350	104.7	Dawson et al. (1983); Webster et al. (1992)
ANCESTRAL N A	**Ore mined**		
W Skarns	**and/or milled (t)**	**W (t)**	
Emerald Tungsten Camp (includes Dodger 082FSW011, Emerald Tungsten 082FSW010, Feeney 082FSW247 and Invincible 082FSW218)	NA	7 415.7	Ball (1954); Mulligan (1984); Webster et al. (1992)

Data for Table 13 from MINFILE, B.C. Ministry of Energy, Mines and Petroleum Resources, and National Mineral Inventory.
Iron, tungsten and molybdenum production reported as concentrate.

8. ASSAY DATA FOR MINERALIZED SKARNS

During this study, mineralized grab samples were collected from a number of skarns distributed throughout British Columbia. The assay results for each of the skarn classes are presented in Appendices 4A to 4H. Most of the samples listed in the appendices were collected during this study although some assay data previously published by Ettlinger and Ray (1989a) and Ray and Dawson (1994) is included. Three hundred and ten samples were taken from 81 skarns. They are as follows: 112 samples from 35 Cu skarns, 69 samples from 9 Fe skarns, 30 samples from 11 Au skarns, 28 samples from 7 W skarns, 18 samples from 5 Mo skarns, 15 samples from 3 Sn skarns, 11 samples from 7 Pb-Zn skarns and 27 samples from 4 industrial mineral skarns. All the samples were assayed for Au, Ag, and the base metals; some were also analysed for trace and rare earth elements. Because the samples were collected over a period of several years, they were assayed at various laboratories using a variety of analytical methods and detection levels. Consequently, some of the data in Appendices 4A to 4H is presented in batches according to the various analytical techniques.

ASSAYS OF FE SKARN SAMPLES

Assay results for Fe skarns are listed in Appendix 4A. Prior to analysis, the samples were separated into the following three groups on the basis of their mineralogy: (1) magnetite-rich with very little sulphides, (2) magnetite-rich with appreciable (> 3%) sulphides, generally as veinlets, and (3) sulphide-rich samples that lack magnetite; some of the latter represent sulphide replacements or veins developed outside the magnetite orebodies or beyond the exoskarn halos.

In general, the highest Au, Ag, Cu, Zn, Co, Mo and As values are confined to the sulphide-bearing magnetite samples, particularly those collected from the Merry Widow and Prescott-Texada deposits. This suggests that the Au and base metals do not occur in the early magnetite but are carried in the late sulphides. Although a good Cu:Au correlation exists in Fe skarns (Ray and Webster, 1995), it is not yet known whether Au occurs in the pyrite, pyrrhotite or chalcopyrite; however, the latter sulphide is suspected to be the main carrier of Au in these deposits.

Most Fe skarns have very low Hg values (< 100 ppb) but a sample from one of the Kingfisher deposits, which lie close to the Merry Widow mine, contains 745 ppb Hg (Appendix 4A). The Kingfisher deposits have morphological, textural and mineralogical features that distinguishes them from other Fe skarns in Wrangellia. The deposits form sub-circular, vertical and pipe-like bodies that sharply crosscut the carbonates, and the wall-rocks show little evidence of skarn alteration (Haug and Farquharson, 1976; Ray and Webster, 1991a). Magnetite at the Kingfisher has unusual colloform textures (Stevenson and Jeffrey, 1964) and is cut by veinlets of green phlogopite. This mica probably accounts for the enhanced abundances of F at the Kingfisher and suggests, together with the moderately high Mg values (up to 2.06% Mg), that some magnesian skarn is present. However, the highest Mg values in the ore of any Fe skarn (> 4 % Mg) occur the Yellow Kid deposit on Texada Island (Appendix 4A).

ASSAYS OF CU SKARN SAMPLES

Assay results for 112 mineralized Cu skarn samples are listed in Appendix 4B. A number of occurrences have sporadic Au enrichment (> 1000 ppb Au): these include some of the Cu skarns in the Greenwood district (Phoenix, Sunset, Mother Lode, Snowshoe, Idaho and Oro Denoro). In addition, the Sylvestor K and San Jacinto occurrences, which are believed by us to be the sulphide-rich replacements related to the Phoenix skarn systems, also contains some high Au values (Church, 1986; Appendix 4B). Other Au-rich Cu skarns include the Old Sport, McLymont, Lady Luck, Dirk, Ken, Dundee and Tic; the latter four occurrences lie in the Iskut River area of northwest British Columbia (Webster and Ray, 1991).

The Maid of Erin and State of Montana deposits in northwestern British Columbia, with samples assaying of over 1000 ppm Ag, are the most Ag-rich Cu skarns known in the province. Although these two skarns are not rich in Au, their ore is distinct in having sporadically high abundances of Zn, Co, Bi, Te, Se, Ce, and F (Appendix 4B). This Bi, Te, Co and Se chemical signature perhaps indicates that the large alteration envelope in which these two proximal Cu skarns are developed could contain distal Au skarn mineralization (Webster *at al.*, 1992). Other Cu skarns with enhanced Ag values (> 100 ppm Ag) include the Loyal, Dundee, Phoenix, and Cambrian Chieftain deposits. The latter, which was the largest metal producing skarn in the Coast Belt, also contains sporadically high values of Zn, Cd, Co, Ni and Se. High W and Mo values (> 1000 ppm W and Mo) in Cu skarns are only seen in the Chalco 5 and Molly B occurrences. Moderately high

Hg values (>500ppb Hg) are seen in the Loyal and McClymont skarns.

The magnetite-rich Iron Range deposit (092INE 096) could be an Fe skarn but, due to its sporadic Cu content, has been classed by us as a Cu (Fe) skarn. The Iron Range deposit is hosted by Quesnellia Terrane rocks and its ore chemistry is markedly different from the other magnetite-rich Fe skarns in Wrangellia; it has higher abundances of a number of trace and rare earth elements including, Cr, Ce, Sc, La, Nd, Sm, Eu, V, Zr and Y (Appendices 4A and B).

ASSAYS OF AU SKARN SAMPLES

Assay results of 30 Au skarn samples are listed in Appendix 4C. In addition to Au, many of samples contain anomalous amounts of As, Bi, Sb, Co, Te and Se. Most of these deposits have low abundances of Ag and Zn, although the TP skarn in northern British Columbia and the French mine at Hedley are notable exceptions. Ray and Webster (1995) note that there are poor correlations between Cu:Au and Ag:Au in the ore of these deposits.

ASSAYS OF MO SKARN SAMPLES

Assay results for samples from 5 Mo skarns are listed in Appendix 4D. The ore in the Novelty and Giant skarns at Rossland are mineralogically and chemically distinct from that present in the nearby Coxey pits (Fyles, 1984; Webster *et al.*, 1992). The Novelty and Giant are an unusual type of Mo skarn in being Au-bearing (up to 22900 ppb Au) and they are also enriched in Co, Bi, As, Ni, Sb, Te and Se. By contrast, these elements are not abundant in the nearby Coxey skarns; instead, these ore bodies can contain anomalous amounts of Ag, Cu and W. It is possible that these three Rossland deposits are related and coeval, and were formed during the development of a large skarn envelope. If this hypothesis is correct, mineralogical and metal zoning exists in this Rossland Mo skarn system.

The Kenallen Mo skarn contains sporadic Cu and W enrichment (Appendix 4D); the high Mg abundances (up to 8.9 %) suggests the presence of dolomitic hostrocks and magnesian skarn at this property.

Ray and Webster (1995) have presented plots using most of the data in Appendix 4D (the assays from the Kenallen property were not then available). Overall, these show a positive correlation between Au:Bi, Au:Co and Au:Se, and a marked negative correlation between Au:Zn, Au:Cu and Mo:Zn.

ASSAYS OF PB-ZN SKARN SAMPLES

Assay results listed in Appendix 4E show that most samples from the 7 sampled Pb-Zn skarns are highly anomalous in Ag and Cd, but they all contain low quantities of Au. Samples from the small Piedmont deposit, which represents British Columbia's largest Pb-Zn skarn producer (Webster *et al.*, 1992), are weakly anomalous in Ni and Se. Weak Co enrichment is seen at the Cyclops occurrence in the Greenwood district and at the Devils Elbow skarn; the latter also contains higher abundances of Cu and Se. The Contact Pb-Zn skarn, in the Cassiar district (McDougall, 1954; Webster *et al.*, 1992) is distinct from the other sampled properties in being variably anomalous in Sb and F.

Although only sporadically low to moderate values of As and Bi are recorded in these Pb-Zn skarns, plots constructed by Ray and Webster (1995) show that negative correlations exist between Cu:Zn and As:Bi.

ASSAYS OF W SKARN SAMPLES

Appendix 4F lists the assay results for samples collected from 7 W skarns. High quantities of F (>1000 ppm) occur erratically in all the W skarns, and sporadic Zn enrichment (< 1000 ppm Zn) is present at the Dead Goat and Kuhn skarns in the Cassiar district (Webster *et al.*, 1992). In addition, high Mo values (> 100 ppm) are recorded at the Kuhn, Lamb Mountain and Emerald Tungsten skarns.

Prior to assaying, samples from the Emerald Tungsten-Dodger deposits (Ball *et al.*, 1953; Ball, 1954; Fyles and Hewlett, 1959; Webster *et al.*, 1992) were separated, on the basis of mineralogy, into two groups: sulphide-rich and sulphide-poor (Appendix 4F). These two groups are chemically distinct. The sulphide-poor group comprises scheelite-bearing garnet-pyroxene skarn and it probably represents typical scheelite ore. The sulphide-bearing group contains abundant pyrrhotite and arsenopyrite and is generally quartz-rich. Because it commonly lacks significant skarn alteration it is uncertain whether this mineralization is related to the skarn or is the result of a later hydrothermal event. Most of the sulphide-poor samples contain higher values of W, F, Mo, Cs, U, La, and Yb than the sulphide-rich material whereas the latter contains anomalous quantities of Au (up to 9820 ppb Au), Ag, Cu, As, Sb, Bi, Te, Se and Be.

Microprobe analyses of sulphide-rich samples from the Emerald Tungsten-Dodger deposits indicate the presence of native bismuth, Ni and Co-bearing arsenopyrite, an Mg-rich sideritic carbonate, as well as a number of Bi-tellurides, Bi-selenides, and several minerals containing various quantities of Pb, Ag, Sb, Bi, Te, Se and S (S.B. Cornelius, written communication, 1995). A preliminary examination of the microprobe data (Dr. L.A. Groat, written communication, 1996) suggests the alteration contains several unusual minerals including tetradymite (Bi_2Te_2S), pilsenite (Bi_4Te_3), bismuthinite (Bi_2S_3) and joseite-B (Bi_4Te_2S). In addition, a number of exotic minerals may be present, including csiklovaite [$Bi_2Te(S,Se)_2$], eskimoite ($Ag_7Pb_{10}Bi_{15}S_{36}$), laitakarite [$Bi_4(Se,S)_3$], paraguanajuatite [Bi_2 (Se,S)3], schirmerite (Ag3Pb3Bi9S18), vikingite (Ag5Pb8Bi13S30) and heteromorphite ($Pb_7Sb_8S_{19}$). No Au-bearing minerals have yet been identified in either polished thin sections or by microprobe analyses.

ASSAYS OF SN SKARN SAMPLES

Assay results of 15 samples collected from three Sn skarns in the Atlin area of northern British Columbia are presented in Appendix 4G. Many of these samples contain elevated values of Cu, Pb, Zn, Cd, Co, Bi, W, Be and F (Appendix 4G; Ray *et al.*, 1997). Surprisingly, some samples are weakly anomalous in Au (up to 660 ppb Au) and Te, and are highly anomalous in Ag. There is a moderate positive correlation between Au:Bi, Au:Ni and Au:Co in these skarns (Ray and Webster, 1995).

ASSAYS OF INDUSTRIAL MINERAL SKARN SAMPLES

Sulphide-rich samples were collected from four industrial mineral skarn properties (Rossland Wollastonite, Fintry Point, Zippa Mountain-Isk and Mineral Hill) and the assay results are presented in Appendix 4H. All the samples have low Au values; the highest values (423 ppb Au) occur in a pyrite-quartz vein at the Mineral Hill wollastonite property. Some of the sulphides at Mineral Hill are sporadically anomalous in Zn, Cu, Ag, Co, Sb, Te and Se and contain up to 8135 ppb Hg (Ray and Kilby, 1996a; 1996b; Appendix 4H). The high Mg content of one sample from Mineral Hill suggests the presence of some magnesian skarn. Some of the sulphide-bearing samples at the Zippa Mountain-Isk wollastonite skarn contain enhanced quantities of Cu, Sb, F and Ti.

9. METAL RATIOS OF MINERALIZED SKARNS

Some previous studies have attempted to use metal ratios to distinguish various skarn classes. Myers and Meinert (1988) noted that Cu skarns tend to have Au/Cu ratios of less than 3, and Ettlinger and Ray (1989a), Ray *et al.* (1990) and Ray and Webster (1995) have used Cu/Au, Cu/Ag and Zn/Au ratios to discriminate between Au and other skarn classes. In addition, Einaudi (personal comm. 1993) has recognized that some porphyry Cu deposits and their related satellite skarns have different Ag/Au ratios.

Either production or assay sampling data have been used to calculate metal ratios of skarns (Ettlinger and Ray, 1989a; Ray *et al.*, 1990; Orris *et al.*, 1987; Theodore *et al.*, 1991) and in this study we present plots based on both types of data. The use of production statistics limits the database to the larger, economic deposits, and the historic recovery of certain metals from some deposits has been erratic due to changing economic factors. Because only the economic metals are extracted from a deposit during mining, the resulting plots are limited to a small number of metals. Plots based on assays of mineralized skarn samples also have problems due to sampling inhomogenuity, although this difficulty may be partly offset by using metal ratios rather than absolute numbers. Assay data has several important advantages: a larger number of metallic elements can be tested, and the plots can include samples from both large economic deposits and small skarn occurrences.

METAL RATIO PLOTS USING ASSAY DATA

A variety of metallic element plots were constructed using the Au, Ag, Cu, Zn, Co, As and Bi assay data from mineralized samples presented in Appendices 4A to 4G. This was undertaken to see whether it is possible to discriminate between the different skarn classes using metal ratios based on assay data.

Plots in which some of the skarn classes can be discriminated are presented on Figures 7A to 7D. Gold skarns cluster as a group and are characterized by having the lowest Cu/Au (<2000) and Zn/Au (<100) ratios of any skarn class (Figure 7A). Lead-zinc skarns have the highest Zn/Au ratios (>1 000 000) whereas Cu, Fe, W and Sn skarns tend to plot intermediate between the fields for Au and Pb-Zn skarns. Other metal ratio plots in which Au skarns are readily discriminated from other skarn classes use Cu/Au *versus* Ag/Au, Cu/Ag *versus* Cu/Au and absolute values of Au (in ppm) *versus* Cu/Au (Figures 7B to 7D).

METAL RATIO PLOTS USING PRODUCTION DATA

Known production data for British Columbia skarns is listed in Appendix 6, and the calculated metal ratios, using either milled or mined statistics, is presented in Appendix 7. Due to the small number of Zn and Pb producers, it is not possible to construct plots using Zn/Au, Pb/Ag or Pb/Zn ratios. However, plots using Cu/Au, Cu/Ag and Ag/Au calculated from the production data available for some 45 Cu, 5 Au and 4 Fe skarns are presented in Figures 8A to 8C. Of these three skarn classes, Au skarns have markedly lower Cu/Au, Ag/Au and Cu/Ag ratios than the Cu and Fe skarns. For example, Cu/Au ratios average approximately 97 000 and 25 000 for Cu and Fe skarns respectively (Appendix 7) whereas in Au skarns they average approximately 50.

A few Cu and Fe skarns have atypically high or low Cu/Au ratios for their skarn class and these specific properties are highlighted in Figure 8. The Craigmont, Maid of Erin, Monitor and Blue Grouse skarns are among those having the highest Cu/Au ratios, whereas the Silverado, Apex, Marshall, Geiler and Thelma skarns have very low Cu/Au, similar to the Au skarns. The latter five properties are small deposits with less than 200 tonnes of ore production.

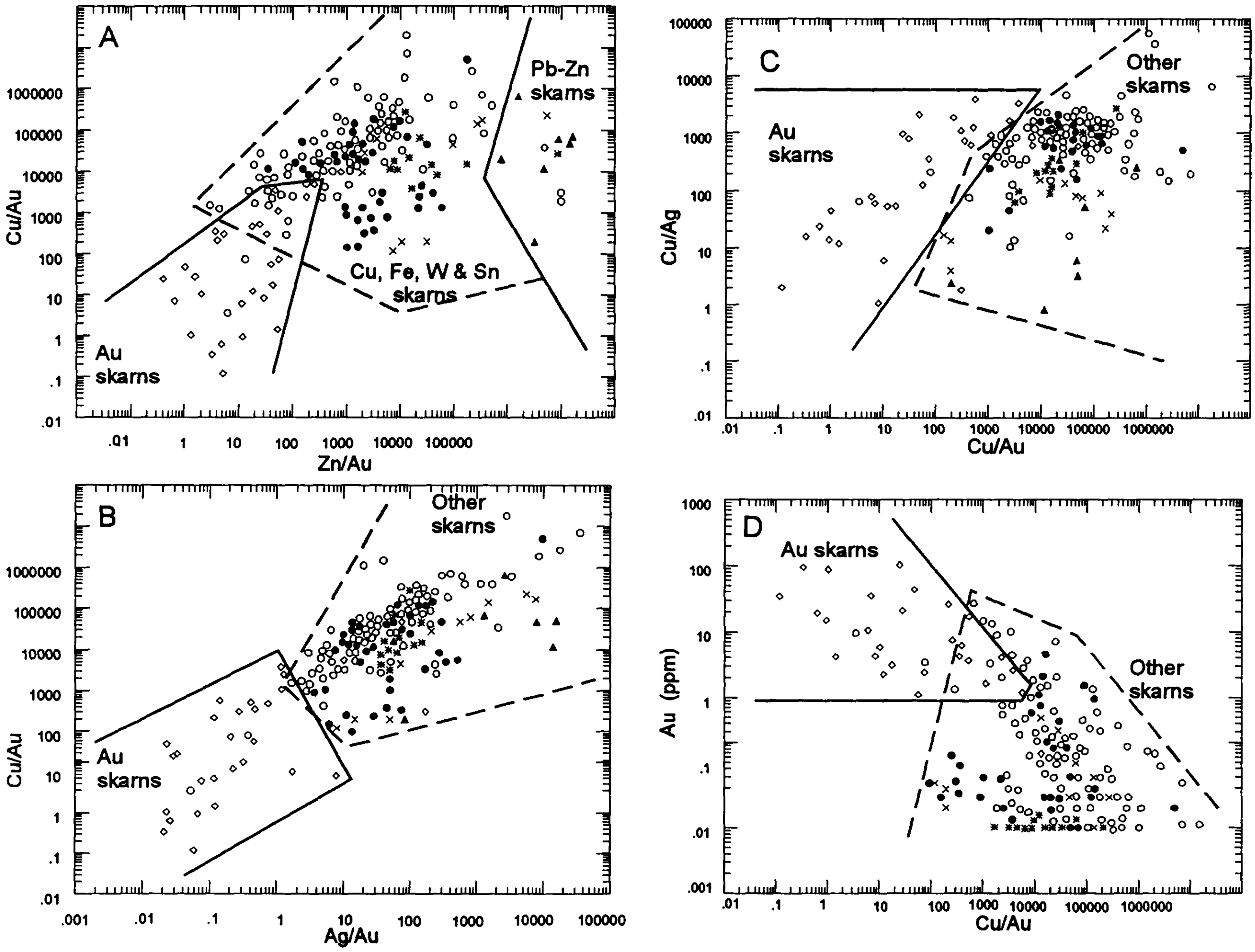


Fig. 7: Plots (using geochemical assay data) comparing the metal ratios of Au, Fe, Cu, W, Sn and Pb-Zn skarns in British Columbia; (Au skarns = open diamonds; Fe skarns = solid dots; Cu skarns = open circles; W skarns = asterisks; Sn skarns = crosses; Pb-Zn skarns = triangles. Skarn field classes are empirically drawn around main clustering of points. A: Log Cu/Au *versus* log Zn/Au. B: log Cu/Au *versus* log Ag/Au. C: log Cu/Ag *versus* log Cu/Au. D: log Au (in ppm) *versus* log Cu/Au.

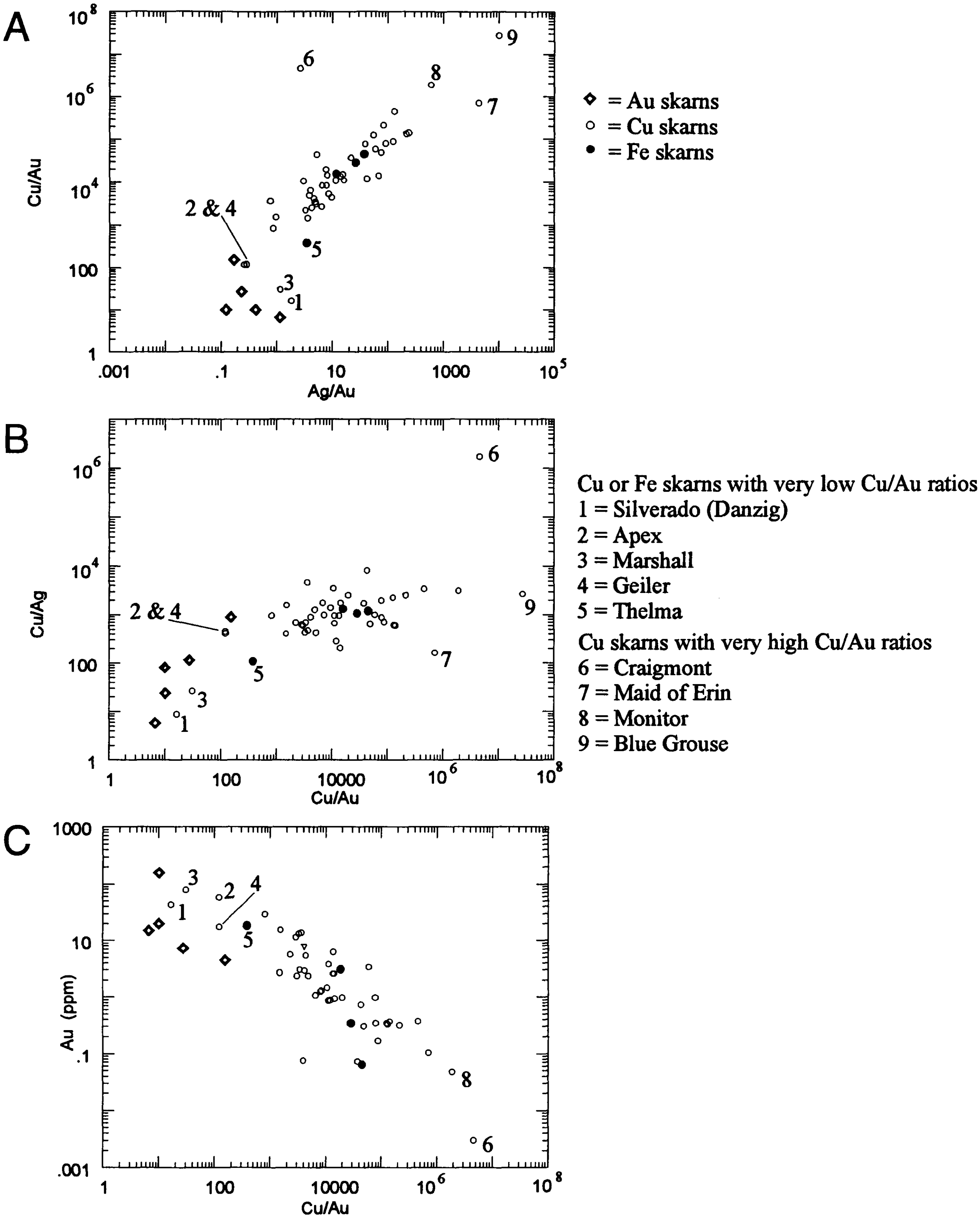


Fig. 8: Plots (using production data) comparing the metal ratios of Au, Cu and Fe skarn deposits in British Columbia; (Au skarns = open diamonds; Fe skarns = solid dots; Cu skarns = open circles. A: Log Cu/Au *versus* log Ag/Au. B: log Cu/Ag *versus* log Cu/Au. C: log Au (in ppm) *versus* log Cu/Au.

10. SKARN MINERALOGY

Skarns are defined largely on the basis of their gangue alteration minerals whereas skarn deposits are classified on their predominant economic metal or minerals (Burt, 1972, 1977; Einaudi and Burt, 1982). The characteristic gangue minerals in calcic skarns are pyroxene and garnet with subordinate and variable amounts of amphibole, carbonate, epidote, chlorite and wollastonite. Garnet, pyroxene and amphibole are useful minerals in aiding classification as they are widely distributed and may exhibit systematic compositional variations that reflect the various skarn deposit subclasses (Zharikov, 1970; Burt, 1972; Einaudi *et al.*, 1981). Most skarn pyroxenes, particularly those in Cu and Au deposits, are diopside-hedenbergite solid solutions. However, an increased Mn content and johannsenite component is common in the pyroxenes of many Pb-Zn and W skarns and occurs sporadically in some Fe, Mo, Sn and Au skarns. A high Mn content in Pb-Zn skarns, together with relatively lower temperatures and/or a higher XCO_2 content are responsible for the common occurrence of bustamite or rhodonite rather than wollastonite.

Garnets in skarn have a wide range of colour, and include both optically birefringent and isotropic varieties. With the exception of W, Sn and some Pb-Zn skarns, the garnets are grossular-andradite solid solutions containing less than 20 mole per cent spessartine + almandine. Iron and Au skarns are characterized by very low Mn (< 1 weight per cent MnO_2) grandite garnets and low Mn (<4 weight per cent MnO_2) Fe-rich diopside-hedenbergitic pyroxenes. Many Sn and W skarns are relatively enriched in Al_2O_3 resulting in the occurrence of vesuvianite with, or in place of, pyroxene or wollastonite (Einaudi and Burt, 1982). The amphiboles in Sn and W skarns also tend to be aluminous (hastingsite-hornblende), while those from Cu, Mo, Fe and Au skarns are more Fe-rich in the tremolite-ferroactinolite series. Amphiboles from Pb-Zn skarns are more Mn-rich and Ca-deficient (Meinert, 1983), while the Cl-rich amphibole dashkesanite is described at the Dashkesan Fe skarn in the Azerbaijan region, former U.S.S.R. (Sokolov and Grigorev, 1977). Likewise, some Au skarns in British Columbia contain Cl-rich amphiboles (Ettlinger and Ray, 1989a), as well as Cl-rich scapolites (Pan *et al.*, 1994).

Some skarns replacing basaltic or pelitic rocks can have a distinctive silicate mineralogy, often due to the high Al/Si ratio in the altered hostrock. For example, some Sn skarns hosted in basalts in Cornwall, England are associated with garnet-pyroxene assemblages rich in spinel and amphibole of sadanagaitic composition (van Marcke de Lummen and Verkaeren, 1985). Also present in these assemblages are tourmaline, axinite and vesuvianite.

GANGUE MINERALOGY OF SKARNS IN BRITISH COLUMBIA

The number and percentage of skarns in each skarn class reported in MINFILE to contain various gangue and metallic or opaque alteration minerals is summarized in Tables 14 and 15. It should be noted that these data merely indicate whether or not the minerals are reported in the skarn and does *not* provide information on the quantities or relative proportions of the minerals present. Thus, mineral ratios for each skarn class cannot be calculated.

Tables 14A and 14B lists, in decreasing order, the number and percentage of skarns reported to contain various gangue minerals. After quartz and carbonate, **garnet** *(75%)*, **epidote** *(56%)* and **pyroxene** (34%) are the three gangue minerals most recorded in the 695 skarn database. Garnet without pyroxene is reported in 44 % of the skarns but pyroxene without garnet is much rarer, being recorded in just 4 % of the occurrences; this probably reflects that, in the field, garnet is more readily identifiable than clinopyroxene. Secondary epidote tends to be more common in garnet-rich skarns than in pyroxene-dominant systems. Nearly 73% of the skarns of unknown class report the presence of epidote (Tables 14A and 14B). The mineral is reported in nearly 70 % of the Cu skarns, 56% of the Fe skarns and nearly half of the Au, Mo and industrial mineral skarns (Tables 14A and 14B). However, it is reported in only 19 % of the W skarns which indicates that this ferric-Fe-dominant mineral favours higher-level and oxidized skarn systems.

The low number (< 1 %) of skarns with either **serpentinite, olivine, phlogopite** or **monticellite** (Tables 14A and 14B) reflects the rarity of magnesian skarns in British Columbia. **Biotite** is present in nearly one third of the Au skarns but is not reported in any of the Fe or industrial mineral skarns. Similarly, **vesuvianite** is rare in Fe, Cu and Pb-Zn skarns; together with **fluorite,** it is most widely reported in W and Sn skarns where the associated hydrothermal systems are richer in Al_2O_3, F and B. The highest reporting of **scapolite, prehnite, axinite, K-Feldspar** and **albite** (Tables 14A and 14B) is from Au skarns, but this is probably due to the more recent and intense study of these deposits compared to other skarn classes with less current economic interest.

Wollastonite has been identified in nearly 10 % (68 occurrences) of the province's 695 skarns (Table 14B), although only six occurrences (Mineral Hill, Wormy Lake, Fintry Point, Little Billie, Rossland Wollastonite and Zippa Mountain-Isk) have a demonstrated commercial potential for this mineral. Traces of wollastonite also occur in skarn alteration at the Mount Polley porphyry Cu deposit and at the Privateer and War Eagle vein-related skarn systems (Appendices 1 and 2).

The 68 wollastonite-bearing skarns exhibit some spatial and temporal controls; the majority occur within terranes of the Intermontane and Insular belts, primarily in Quesnellia, Stikinia and Wrangellia, and the largest number of wollastonite-bearing skarns (28 occurrences representing 41 %) are Jurassic in age. However, when the six skarns with higher wollastonite potential are examined, different temporal and spatial relationships emerge. Three of these wollastonite-rich skarns (Mineral Hill, Wormy Lake and Little Billie) occur in Wrangellia, two others (Rossland Wollastonite, and Fintry Point) are in the Kootenay and Harper Ranch terranes respectively, whereas the Zippa Mountain-Isk occurrence is in Stikinia. Regarding future wollastonite exploration, it is significant that although over 40 % of the wollastonite-bearing skarns are Jurassic, most of the six occurrences with commercial industrial mineral potential are not of this age. Instead, two occurrences (Little Billie and Fintry Point) are related to Cretaceous plutonism, two others (Rossland Wollastonite and Zippa Mountain-Isk) are Eocene and Triassic in age, respectively, and the remaining two (Mineral Hill and Wormy Lake) may be either Jurassic or Cretaceous.

Wollastonite occurs in all the skarn classes and is found in skarns related to a wide variety of igneous rocks, ranging from diorite to granite to syenite to tonalite. This indicates that wollastonite can form in widely different physical and chemical environments, including oxidized, high-level and reduced, deeper level skarn systems. However, it tends to be poorly developed in some skarn classes, which may provide clues concerning the chemistry and the CO_2 and Si contents of those hydrothermal systems and protoliths. Although Fe skarns are the second most numerous class of skarn deposit in British Columbia (Figure 2A), only two Fe skarn occurrences are reported to contain wollastonite and then only in trace amounts. This scarcity of wollastonite in Fe skarns may have several causes: the pure Quatsino limestone in which most Fe skarns were developed are Si-poor and this, together with the high CO_2 content that probably existed in the hydrothermal fluids, would inhibit the crystallization of wollastonite. In addition, the Fe-rich nature of the fluids in Fe skarns probably results in most of the Si present crystallizing as garnet or pyroxene rather than as wollastonite. The Fe and Cu skarns on Texada Island suggests that, in certain circumstances, the protolith composition may be a less important control on wollastonite development than the Si, Fe and CO_2 content of the hydrothermal fluids. On Texada Island, Jurassic Fe skarns hosted by the relatively pure Quatsino limestone contain no wollastonite whereas the Cu skarns developed in the Quatsino limestone (Little Billie, Florence Security, Canada and Marble Bay) do contain this mineral. The Little Billie Cu skarn, in particular, has substantial thicknesses of wollastonite-rich skarn that has commercial industrial mineral potential.

To summarize, in infiltration skarn systems wollastonite preferentially develops in either:

(a) skarns that replace chemically favorable carbonate hostrocks that are Si-rich and Fe and Mg-poor. In these situations, the composition of the intrusive rocks appears to be unimportant, or

(b) skarns that are related to more granitic intrusions and Si-rich hydrothermal fluids. In these deposits the composition of the protolith is less important and abundant wollastonite may form even in pure, Si-poor carbonates.

Large, commercial wollastonite deposits are probably more likely to form in drier reaction skarns or contact metamorphic aureoles than in infiltration skarns where the CO_2-rich fluids would inhibit wollastonite formation (Greenwood, 1967). In such dry systems, the higher temperatures associated with gabbroic and syenitic intrusions may be an important controlling factor for wollastonite. The Rossland Wollastonite (Stinson, 1995), Mineral Hill (Ray and Kilby, 1996a, 1996b) and Zippa Mountain-Isk (Jaworski and Dipple, 1996) occurrences may represent examples where high temperature contact metamorphism was more important for wollastonite development than magmatic hydrothermal fluids.

OPAQUE AND METALLIC MINERALOGY OF SKARNS IN BRITISH COLUMBIA

The number and percentage of skarns reported to contain various opaque metallic minerals are listed in Tables 15A and 15B. **Chalcopyrite, pyrite, magnetite, pyrrhotite, sphalerite, galena, molybdenite** and **scheelite** are, in decreasing order, the most widespread opaque or metallic minerals reported in the 695 skarn occurrences; by contrast such minerals as **beryl, canfieldite, autunite** and **stannite** are extremely rare in British Columbia skarns (Table 15A). Eighty-five percent of the Au skarns contain **arsenopyrite** and nearly 30 % reportedly contain **native bismuth** (Table 15B). Compared to the other skarn classes, Au skarns also have more reported occurrences of **native gold, cobaltite, bismuthinite** and **tellurides** such as **hedleyite and tetradymite**. **Hematite** is most commonly reported in Cu skarns (18 %) indicating the more oxidized nature of these systems in contrast to the more reduced Au, W, Sn and Mo skarns where hematite is rare or absent.

Fluorite is most commonly recorded in W and Sn skarns but is also reported in some Zn-rich skarns (Tables 14A and 14B). When the Pb-Zn skarn class is divided into Zn ("sphalerite-dominant") and Pb-Zn ("galena-dominant") subclasses, some mineralogical similarities and differences in these subclasses emerge (Tables 14 and 15). Besides the higher reported incidence of **galena** in the Pb-Zn subclass, **native silver, bismuthinite, scheelite, rhodonite** and **hematite** are most commonly recorded in this subclass. By contrast, **marcasite, covellite, electrum, native copper, cubanite** and **fluorite** are only reported in the Zn subclass (Tables 14 and 15).

Table 14A: Number of skarns in each skarn class reported to contain the following gangue minerals

Skarn class	Au	Cu	Fe	W	Mo	.... Pb-Zn	....	Sn	I.M.	Unkn*	Total
No. of occurrences	28	340	146	48	22	80		3	17	11	
						Pb-Zn subclass (56)	Zn subclass (24)				
Mineral											
Garnet	27	254	109	35	13	39	16	3	15	8	**519**
Epidote	13	228	82	9	10	24	9	1	8	8	**392**
Pyroxene	21	98	43	31	5	19	7	3	8	4	**239**
Chlorite	7	87	24	3	2	5	3	0	2	2	**135**
Actinolite	8	65	26	9	2	7	4	2	3	8	**134**
Wollastonite	7	27	2	10	1	9	1	1	9	1	**68**
Amphibole	4	26	8	3	0	1	0	1	0	3	**46**
Tremolite	2	15	5	9	0	8	2	0	4	1	**46**
Biotite	8	14	0	6	2	2	1	2	0	1	**36**
Vesuvianite	3	5	1	14	1	1	0	1	1	1	**28**
Hornblende	0	19	1	0	0	2	0	0	0	1	**23**
Sericite	1	7	5	3	2	1	0	1	0	1	**21**
K-Feldspar	4	7	2	3	2	2	0	0	0	0	**20**
Scapolite	10	2	3	1	0	2	0	0	0	0	**18**
Fluorite	0	1	0	6	2	0	2	2	1	0	**14**
Albite	2	4	3	0	0	0	0	0	0	0	**9**
Prehnite	7	0	0	0	0	0	0	0	0	0	**7**
Talc	0	2	1	1	0	1	0	1	1	0	**7**
Serpentine	0	2	3	0	0	2	0	0	0	0	**7**
Barite	0	3	2	0	1	0	1	0	0	0	**7**
Rhodonite	0	0	0	1	0	3	0	1	1	0	**6**
Ilvaite	0	4	0	0	0	0	1	0	0	0	**5**
Zoisite	2	3	0	0	0	0	0	0	0	0	**5**
Tourmaline	0	2	0	1	0	1	0	0	0	0	**4**
Axinite	2	0	0	0	0	0	0	0	1	0	**3**
Olivine	0	0	0	0	1	1	0	0	1	0	**3**
Phlogopite	0	1	0	1	0	0	0	0	0	0	**2**
Monticellite	0	1	0	0	0	0	0	0	0	0	**1**
Chondrodite	0	0	0	1	0	0	0	0	0	0	**1**
Garnet without pyroxene	7	166	72	5	9	26	11	0	7	6	**309**
Pyroxene without garnet	1	9	6	1	1	6	2	0	1	2	**29**

I.M. = industrial mineral skarns.

Unkn* = skarns of unknown class

Table 14B: Percentage of skarns in each skarn class reported to contain the following gangue minerals.

Skarn class	**Au**	**Cu**	**Fe**	**W**	**Mo**	**.............. Pb-Zn**	**............**	**Sn**	**I.M.**	**Unkn***	**% of all**
No. of occurrences	**28**	**340**	**146**	**48**	**22**	**80**		**3**	**17**	**11**	**skarns**
						Pb-Zn subclass (56)	**Zn subclass (24)**				
Mineral											
Garnet	96.4	74.7	74.7	72.9	59.1	69.6	66.7	100.0	88.2	72.7	**74.7**
Epidote	46.4	67.1	56.2	18.8	45.5	42.9	37.5	33.3	47.1	72.7	**56.4**
Pyroxene	75.0	28.8	29.5	64.6	22.7	33.9	29.2	100.0	47.1	36.4	**34.4**
Chlorite	25.0	25.6	16.4	6.3	9.1	8.9	12.5	0.0	11.8	18.2	**19.4**
Actinolite	28.6	19.1	17.8	18.8	9.1	12.5	16.7	66.7	17.6	72.7	**19.3**
Wollastonite	25.0	7.9	1.4	20.8	4.5	16.1	4.2	33.3	52.9	9.1	**9.8**
Amphibole	14.3	7.6	5.5	6.3	0.0	1.8	0.0	33.3	0.0	27.3	**6.6**
Tremolite	7.1	4.4	3.4	18.8	0.0	14.3	8.3	0.0	23.5	9.1	**6.6**
Biotite	28.6	4.1	0.0	12.5	9.1	3.6	4.2	66.7	0.0	9.1	**5.2**
Vesuvianite	10.7	1.5	0.7	29.2	4.5	1.8	0.0	33.3	5.9	9.1	**4.0**
Hornblende	0.0	5.6	0.7	0.0	0.0	3.6	0.0	0.0	0.0	9.1	**3.3**
Sericite	3.6	2.1	3.4	6.3	9.1	1.8	0.0	33.3	0.0	9.1	**3.0**
K-Feldspar	14.3	2.1	1.4	6.3	9.1	3.6	0.0	0.0	0.0	0.0	**2.9**
Scapolite	35.7	0.6	2.1	2.1	0.0	3.6	0.0	0.0	0.0	0.0	**2.6**
Fluorite	0.0	0.3	0.0	12.5	9.1	0.0	8.3	66.7	5.9	0.0	**2.0**
Albite	7.1	1.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**
Prehnite	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**
Talc	0.0	0.6	0.7	2.1	0.0	1.8	0.0	33.3	5.9	0.0	**1.0**
Serpentine	0.0	0.6	2.1	0.0	0.0	3.6	0.0	0.0	0.0	0.0	**1.0**
Barite	0.0	0.9	1.4	0.0	4.5	0.0	4.2	0.0	0.0	0.0	**1.0**
Rhodonite	0.0	0.0	0.0	2.1	0.0	5.4	0.0	33.3	5.9	0.0	**0.9**
Ilvaite	0.0	1.2	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	**0.7**
Zoisite	7.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.7**
Tourmaline	0.0	0.6	0.0	2.1	0.0	1.8	0.0	0.0	0.0	0.0	**0.6**
Axinite	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	**0.4**
Olivine	0.0	0.0	0.0	0.0	4.5	1.8	0.0	0.0	5.9	0.0	**0.4**
Phlogopite	0.0	0.3	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
Monticellite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Chondrodite	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
Garnet without pyroxene	25.0	48.8	49.3	10.4	40.9	46.4	45.8	0.0	41.2	54.5	**44.5**
Pyroxene without garnet	3.6	2.6	4.1	2.1	4.5	10.7	8.3	0.0	5.9	18.2	**4.2**

I.M. = industrial mineral skarns

Unkn* = skarns of unknown class

Table 15A: Number of skarns in each skarn class reported to contain the following metallic minerals.

Skarn class	Au	Cu	Fe	W	Mo	.... Pb-Zn	....	Sn	I.M.	Unkn*	Total
No. of occurrences	28	340	146	48	22	80		3	17	11	number
						Pb-Zn subclass (56)	Zn subclass (24)				
Mineral											
Chalcopyrite	25	331	85	18	15	37	12	2	4	9	538
Pyrite	20	233	86	24	17	37	18	3	6	10	454
Magnetite	6	218	146	6	7	17	6	2	2	7	417
Pyrrhotite	25	169	46	20	15	32	11	3	3	8	332
Sphalerite	13	85	18	14	7	56	24	1	1	7	226
Galena	12	40	5	11	6	56	6	1	0	5	142
Molybdenite	5	47	5	30	22	4	2	1	0	2	118
Scheelite	2	14	1	48	9	8	2	2	2	2	90
Bornite	1	70	6	0	2	5	1	0	1	0	86
Arsenopyrite	24	27	6	4	2	6	2	0	0	4	75
Hematite	1	61	6	0	0	4	1	0	0	2	75
Native gold	14	19	2	0	2	0	0	0	0	1	38
Tetrahedrite	3	13	1	0	0	6	2	1	0	1	27
Marcasite	4	8	2	1	0	0	2	0	0	0	17
Powellite	0	3	0	12	1	0	0	0	1	0	17
Cobaltite	5	5	3	0	2	0	0	0	0	0	15
Fluorite	0	1	0	6	2	0	2	2	1	0	14
Native bismuth	8	0	0	0	1	1	1	0	0	0	11
Erythrite	1	1	7	0	1	0	0	0	0	0	10
Covellite	1	7	0	0	0	0	1	0	0	0	9
Bismuthinite	3	0	0	0	2	2	0	0	0	1	8
Hedleyite	6	1	0	0	0	0	0	0	0	0	7
Rhodonite	0	0	0	1	0	3	0	1	1	0	6
Native silver	0	4	0	0	0	2	0	0	0	0	6
Electrum	3	0	0	0	0	0	1	0	0	1	5
Greenockite	0	3	0	0	0	1	1	0	0	0	5
Cuprite	0	3	2	0	0	0	0	0	0	0	5
Cassiterite	0	0	0	0	2	0	0	2	0	0	4
Stibnite	0	1	0	1	0	1	0	0	0	1	4
Wolframite	0	0	0	4	0	0	0	0	0	0	4
Tennantite	0	4	0	0	0	0	0	0	0	0	4
Native copper	0	2	1	0	0	0	1	0	0	0	4
Pyrolusite	0	1	0	0	0	1	0	0	0	1	3
Wittichenite	0	3	0	0	0	0	0	0	0	0	3
Tetradymite	2	0	0	0	0	0	0	0	0	0	2
Allemontite	1	1	0	0	0	0	0	0	0	0	2

Table 15A (Continued): Number of skarns in each skarn class reported to contain the following metallic minerals.

Skarn class	Au	Cu	Fe	W	Mo	.... Pb-Zn		Sn	I.M.	Unkn*	Total
No. of occurrences	28	340	146	48	22	80		3	17	11	number
						Pb-Zn subclass (56)	Zn subclass (24)				
Uraninite	0	0	0	1	1	0	0	0	0	0	2
Gahnite	0	1	0	0	0	0	0	1	0	0	2
Dyscrasite	0	0	0	0	0	2	0	0	0	0	2
Argentite	0	0	0	0	0	2	0	0	0	0	2
Pyrargyrite	0	0	0	0	0	2	0	0	0	0	2
Ilmenite	0	0	1	0	0	0	0	0	0	0	1
Boulangerite	0	0	0	0	0	1	0	0	0	0	1
Azurite	0	1	0	0	0	0	0	0	0	0	1
Autunite	0	0	0	0	1	0	0	0	0	0	1
Acanthite	0	0	0	0	0	0	0	1	0	0	1
Stannite	0	0	0	0	0	0	0	1	0	0	1
Beryl	0	0	0	1	0	0	0	0	0	0	1
Cubanite	0	0	0	0	0	0	1	0	0	0	1
Sylvanite	0	1	0	0	0	0	0	0	0	0	1
Hessite	0	1	0	0	0	0	0	0	0	0	1
Petzite	0	1	0	0	0	0	0	0	0	0	1
Canfieldite	0	0	0	0	0	0	0	1	0	0	1

I.M. = industrial mineral skarns

Unkn* = skarns of unknown class

Table 15B: Percentage of skarns in each skarn class reported to contain the following metallic minerals.

Skarn class	Au	Cu	Fe	W	Mo	Pb-Zn		Sn	I.M.	Unkn*	% of all
No. of occurrences	28	340	146	48	22	80		3	17	11	skarns
						Pb-Zn subclass (56)	Zn subclass (24)				
Mineral											
Chalcopyrite	89.3	97.4	58.2	37.5	68.2	66.1	50.0	66.7	23.5	81.8	77.4
Pyrite	71.4	68.5	58.9	50.0	77.3	66.1	75.0	100.0	35.3	90.9	65.3
Magnetite	21.4	64.1	100.0	12.5	31.8	30.4	25.0	66.7	11.8	63.6	60.0
Pyrrhotite	89.3	49.7	31.5	41.7	68.2	57.1	45.8	100.0	17.6	72.7	47.8
Sphalerite	46.4	25.0	12.3	29.2	31.8	100.0	100.0	33.3	5.9	63.6	32.5
Galena	42.9	11.8	3.4	22.9	27.3	100.0	25.0	33.3	0.0	45.5	20.4
Molybdenite	17.9	13.8	3.4	62.5	100.0	7.1	8.3	33.3	0.0	18.2	17.0
Scheelite	7.1	4.1	0.7	100.0	40.9	14.3	8.3	66.7	11.8	18.2	12.9
Bornite	3.6	20.6	4.1	0.0	9.1	8.9	4.2	0.0	5.9	0.0	12.4
Arsenopyrite	85.7	7.9	4.1	8.3	9.1	10.7	8.3	0.0	0.0	36.4	10.8
Hematite	3.6	17.9	4.1	0.0	0.0	7.1	4.2	0.0	0.0	18.2	10.8
Native gold	50.0	5.6	1.4	0.0	9.1	0.0	0.0	0.0	0.0	9.1	5.5
Tetrahedrite	10.7	3.8	0.7	0.0	0.0	10.7	8.3	33.3	0.0	9.1	3.9
Marcasite	14.3	2.4	1.4	2.1	0.0	0.0	8.3	0.0	0.0	0.0	2.4
Powellite	0.0	0.9	0.0	25.0	4.5	0.0	0.0	0.0	5.9	0.0	2.4
Cobaltite	17.9	1.5	2.1	0.0	9.1	0.0	0.0	0.0	0.0	0.0	2.2
Fluorite	0.0	0.3	0.0	12.5	9.1	0.0	8.3	66.7	5.9	0.0	2.0
Native bismuth	28.6	0.0	0.0	0.0	4.5	1.8	4.2	0.0	0.0	0.0	1.6
Erythrite	3.6	0.3	4.8	0.0	4.5	0.0	0.0	0.0	0.0	0.0	1.4
Covellite	3.6	2.1	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	1.3
Bismuthinite	10.7	0.0	0.0	0.0	9.1	3.6	0.0	0.0	0.0	9.1	1.2
Hedleyite	21.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Rhodonite	0.0	0.0	0.0	2.1	0.0	5.4	0.0	33.3	5.9	0.0	0.9
Native silver	0.0	1.2	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.9
Electrum	10.7	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	9.1	0.7
Greenockite	0.0	0.9	0.0	0.0	0.0	1.8	4.2	0.0	0.0	0.0	0.7
Cuprite	0.0	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Cassiterite	0.0	0.0	0.0	0.0	9.1	0.0	0.0	66.7	0.0	0.0	0.6
Stibnite	0.0	0.3	0.0	2.1	0.0	1.8	0.0	0.0	0.0	9.1	0.6
Wolframite	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Tennantite	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Native copper	0.0	0.6	0.7	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.6
Pyrolusite	0.0	0.3	0.0	0.0	0.0	1.8	0.0	0.0	0.0	9.1	0.4
Wittichenite	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Tetradymite	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3

Table 15B (Continued): Percentage of skarns in each skarn class reported to contain the following metallic minerals.

Skarn class	**Au**	**Cu**	**Fe**	**W**	**Mo**	**................ Pb-Zn**	**.............**	**Sn**	**I.M.**	**Unkn***	**% of all**
No. of occurrences	**28**	**340**	**146**	**48**	**22**	**80**		**3**	**17**	**11**	**skarns**
						Pb-Zn subclass (56)	**Zn subclass (24)**				
Allemontite	3.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Uraninite	0.0	0.0	0.0	2.1	4.5	0.0	0.0	0.0	0.0	0.0	0.3
Gahnite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.3
Dyscrasite	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.3
Argentite	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.3
Pyrargyrite	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.3
Ilmenite	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Boulangerite	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.1
Azurite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Autunite	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.1
Acanthite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.1
Stannite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.1
Beryl	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Cubanite	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.1
Sylvanite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Hessite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Petzite	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Canfieldite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.1

I.M. = industrial mineral skarns

Unkn* = skarns of unknown class

11. SKARN MINERAL CHEMISTRY

Until the development of microprobe analytical equipment, very little was known concerning the chemistry of skarn minerals in British Columbia, although Mulligan and Jambor (1966, 1968) described some Sn-rich skarn garnets from the Cassiar district. Recently, however, considerable microprobe analytical data has been published on silicate chemistry of specific skarn deposits or mining districts. This includes work by Meinert (1984) on Fe skarns and by Ettlinger and Ray (1988, 1989a), Ettlinger (1990a, 1990b), Ray *et al.* (1991), Ettlinger *et al.* (1992), Ray and Dawson (1994) and Dawson (1994) on Au skarns or Au-enriched base metal skarns. Newberry (1983), Dawson *et al.* (1985) and Gower *et al.* (1985a) present mineral chemistry data on some W-rich skarns. Ray *et al.* (1992) examine analytical data on garnet and pyroxenes from the Mount Riordan (Crystal Peak) industrial garnet skarn. In addition, chemical data on the garnets, pyroxenes and vesuvianites in the Atlin Sn skarns are presented by Ray *et al.* (1997).

For this skarn study, over 1000 microprobe analyses were completed on exoskarn alteration minerals such as garnet, pyroxene, amphibole, biotite and vesuvianite from 27 skarns, as well as from the Mount Copeland Mo deposit which has doubtful status as a skarn. Some analyses were also done in an attempt to identify Sn-bearing minerals in the Atlin skarns and Bi-Te-Se-bearing minerals in the Emerald-Dodger W skarn. No endoskarn assemblages were analyzed.

The properties sampled for microprobe studies are listed in Table 16; they comprise thirteen Cu skarns (including the Craigmont, Phoenix and Old Sport mines), five W skarns (including the Emerald-Dodger deposits), four Pb-Zn skarns, three Sn skarns, one Au skarn (the Steep occurrence), one Mo skarn (the Coxey mine) as well as the Mount Copeland Mo deposit.

Over 460 and 230 analyses were completed on garnets and pyroxenes respectively. The complete results are presented in Appendices 8 and 9 and are summarized in Tables 16 and 17. In addition, some biotite and vesuvianite crystals were also analyzed by microprobe (Appendix 10).

GARNET CHEMISTRY

Over 460 microprobe analyses were completed on garnets from 27 skarns (Appendix 8) and these results are summarized in Table 16. Andradite-grossularite-pyralspite mole % plots using this data and other analyses by Meinert (1984), Ettlinger and Ray (1989a), Ettlinger (1990a) and Ray and Dawson (1994) are presented in Figures 9 and 10. These indicate that the majority of garnets from all the skarn deposit classes in British Columbia represent andradite-grossularite solid solutions (Figure 9). However a few Sn, W and Pb-Zn skarns have some garnets that contain more than 5 mole % pyralspite; these include the Piedmont Pb-Zn skarn (Figure 10D), the Kuhn and Emerald-Dodger W skarns (Figure 10E) and the Daybreak and Silver Diamond Sn skarns (Figure 10G).

Most skarn garnets are characterized by less than 1 weight % MnO. However, the garnets in some Pb-Zn skarns (Piedmont), Sn skarns (Daybreak and Silver Diamond) and W skarns (Kuhn, Deadgoat and Lamb Mountain) are marked by a slight manganese enrichment of up to 3 weight % MnO. The garnets in the Emerald Tungsten-Dodger deposits are distinct in being the most manganiferous skarn garnets in British Columbia; they contain up to 16 weight % MnO (Appendix 8) and 48 mole % pyralspite.

Most skarn garnets in British Columbia are calcic and typically contain three Ca atoms per formula unit (on the basis of 12 oxygens and 0 OH). However, some Pb-Zn, Sn and W skarns contain subcalcic garnets, a feature that probably indicates a reduced oxidation state for these occurrences (Ray *et al.*, 1997). Moderately subcalcic garnets (i.e. those with between 2.6 and 2.9 Ca atoms per formula unit) are present at the Silver Diamond Sn and Kuhn W occurrences. The Chalco 5 Cu occurrence is unusual for a Cu skarn in containing mildly subcalcic garnets (2.8 Ca atoms per formula unit) although it is noteworthy that this skarn is enriched in W as well as Cu.

Highly subcalcic garnets with less than 2.6 Ca atoms per formula unit are seen in the Daybreak Sn occurrence, the Piedmont Pb-Zn skarn, the Emerald Tungsten-Dodger W deposits (Ray *et al.*, 1997) and sporadically in the Deadgoat W skarn. Newberry (1983) has previously noted the sub-calcic nature of the garnets at the Emerald-Dodger and this study indicates that they are the most subcalcic skarn garnets yet found in British Columbia, with between 1.1 and 1.6 Ca atoms per formula unit. The strongly subcalcic nature of garnets at the Emerald Tungsten-Dodger, skarn together with these deposits being the largest W producers in the province, supports the conclusions of Newberry (1983) that a relationship exists between subcalcic garnets, reduced oxidation states and the size and grade of W skarn deposits.

Most of the skarn garnets have less than 0.4 weight % MgO. However, some garnets in the Emerald Tungsten-Dodger skarns and in the skarnoid alteration adjacent to the Daybreak Sn occurrence contain more than 1 weight % MgO. Garnets with anomalous quantities of Sn, F, Cl and Cr were also detected in these occurrences.

Tin, F, Cl and Cr enrichment in skarn garnets

No systematic attempt was made during this study to analyze all the skarn silicates for Sn, F, Cl or Cr. However, significant quantities of these elements were noted in some garnets and vesuvianite of some Sn and W skarns, but no similar enrichment was detected in any pyroxenes. Values of up to 2106 and 317 ppm Sn were recorded in large, hand-picked crystals of vesuvianite and garnet, respectively, from the Dimac W skarn, using x-ray defraction techniques (Webster *et al.*, 1992). However, microprobe analyses of other garnets from this deposit failed to detect Sn, although minor amounts of F (up to 0.34 wt % F) are present.

At the Daybreak Sn skarn (Ray *et al.*, 1997), both the garnets in the proximal wrigglite and more distal biotite hornfels contain anomalous amounts of F and Sn (up to 0.74 and 2.07 wt % F and up to 0.15 and 0.7 wt % SnO_2, respectively), but no Cl was detected. The garnets in veins that cut the distal hornfels are distinct in containing up to 1.21 weight % Cr2O3; this Cr enrichment is probably related to the presence of ultramafics in the surrounding country rocks (Bloodgood *et al.*, 1989; Ash, 1994). None of the garnets from the other two Sn skarns in the Atlin area (Atlin Magnetite and Silver Diamond) are enriched in F, Cr or Cl, although those at Silver Diamond are weakly anomalous in Sn (up to 0.25 wt % SnO2).

The few skarn garnets from the Emerald W skarn that have been analyzed for F or Sn are not anomalous in these elements. However, samples of primary igneous garnets from the Emerald stock which are cut by cassiterite veins, are weakly enriched in F (up to 0.23 wt % F) but contain low values of Cl and Sn.

PYROXENE CHEMISTRY

Over 230 microprobe analyses of skarn pyroxenes were performed for this study; the complete data are contained in Appendix 9 and the results are summarized in Tables 17A and 17B. Diopside-hedenbergite-johannsenite mole % plots using these data, together with other analyses from Meinert (1984), Ettlinger and Ray (1989a), Ettlinger (1990a), Ray and Dawson (1994) and Dawson (1994) are illustrated by Figures 11 and 12.

Most pyroxenes in all the skarn deposit classes represent diopside-hedenbergite solid solutions (Figure 11) although varying amounts of the johannsenite component are present in the pyroxene of some Fe, Au, Pb-Zn and W skarns. Overall, the pyroxenes in Au and Fe skarns are chemically similar. They generally have a low manganese content (< 2 wt % MnO), and range from end-member diopside to end-member hedenbergite, although the Fe skarns analyzed to date lack pyroxenes of Hd 70 to Hd 90 composition (Figure 11). However, some Fe and Au skarn pyroxenes, which are relatively enriched in manganese, represent johannsenite-hedenbergite solid solutions. Examples of the latter include the Good Hope Au skarn (Figure 12A) which contains pyroxenes with up to Jo23 mole % (Ray and Dawson, 1994) and the Paxton and Iron Hill Fe skarns (Figure 12B) with pyroxenes up to Jo12 and Jo52 mole % respectively (Meinert, 1984). Pyroxenes in Cu skarns, in contrast to those in Au and Fe skarns, generally do not contain more than a Hd70 mole % (Figure 11).

As a whole, the pyroxenes in W skarns in British Columbia display a positive correlation between their hedenbergitic and johannsenitic components (Figure 11) which is typical of most skarns (Sato, 1980; Abrecht, 1985; Brown *et al.*, 1985). No negative hedenbergitic-johannsenitic correlation, as noted in some Japanese W skarns (Nakano, 1991) has been identified in British Columbia skarns. Two W skarns, the Deadgoat and the Emerald-Dodger deposits, contain pyroxenes that are more manganiferous (Figure 12E), averaging Jo10 and Jo15, respectively.

Meinert (1984) suggested that higher concentrations of mobile elements such as manganese in skarn pyroxenes can reflect longer travel distances for their related hydrothermal fluids, thus indicating a more distal environment with respect to the magmatic source. The hedenbergitic pyroxenes in the Good Hope deposit at Hedley are unusually manganiferous for a typical Au skarn (Figure 12A) which may indicate that this small ore body is related to long traveled hydrothermal fluids.

Nakano *et al.* (1994), in a study of 46 skarn deposits in Japan, has noted that most pyroxenes in Cu-Fe skarns have low Mn/Fe ratios (<0.1), those in Pb-Zn skarns have high Mn/Fe ratios (>0.2) and those in W skarns have intermediate ratios (c. 0.15). Average chemical values of pyroxenes in Mo, W, Sn, Cu and Pb-Zn skarns in British Columbia are presented in Table 17B, together with average values for the MnO/FeO ratios. The pyroxenes in the Pb-Zn skarns have the highest MnO/FeO ratios (avg. 0.22), similar to the Nakano *et al.* (1994) data for Japan. Pyroxenes in the Coxey Mo skarn have the lowest MnO/FeO ratios (avg. 0.02) whereas those in W, Cu and Sn skarns have intermediate ratios (Table 17B). However, some individual skarns have atypical MnO/FeO average values for their respective skarn class. For example, pyroxenes at the Dimac (avg. 0.04), Adams and Piedmont (avg. 0.05 and 0.09 respectively) skarns have unusually low MnO/FeO ratios for typical W and Pb-Zn skarns whereas those at the Little Billie Cu skarn (avg. 0.23) are unusually high (Table 17B).

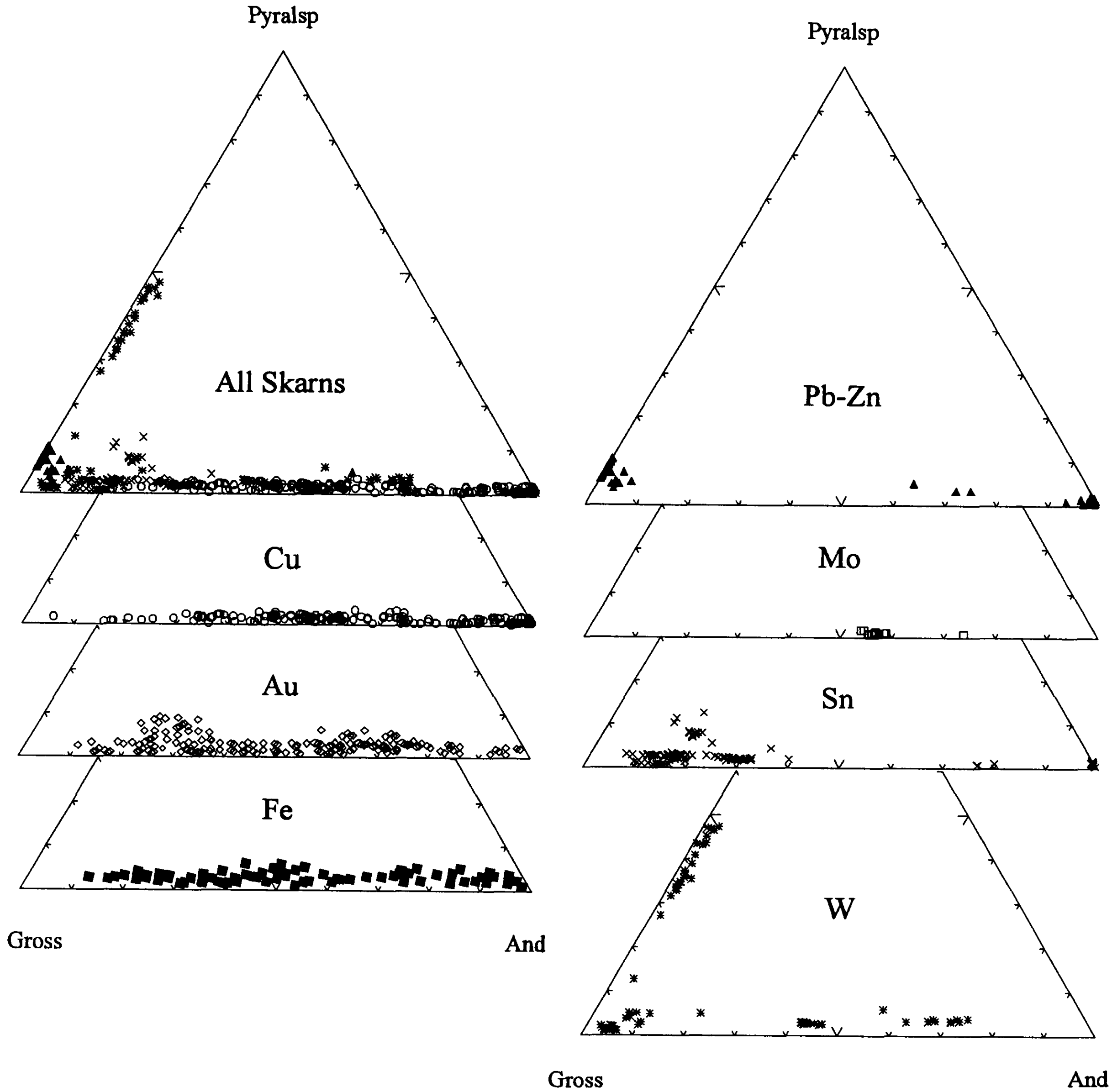


Fig. 9: Mole percent garnet compositions of skarn deposit classes in British Columbia. Data from Appendix 8, Meinert (1984), Ettlinger and Ray (1989a), Ettlinger (1990a) and Ray and Dawson (1994).

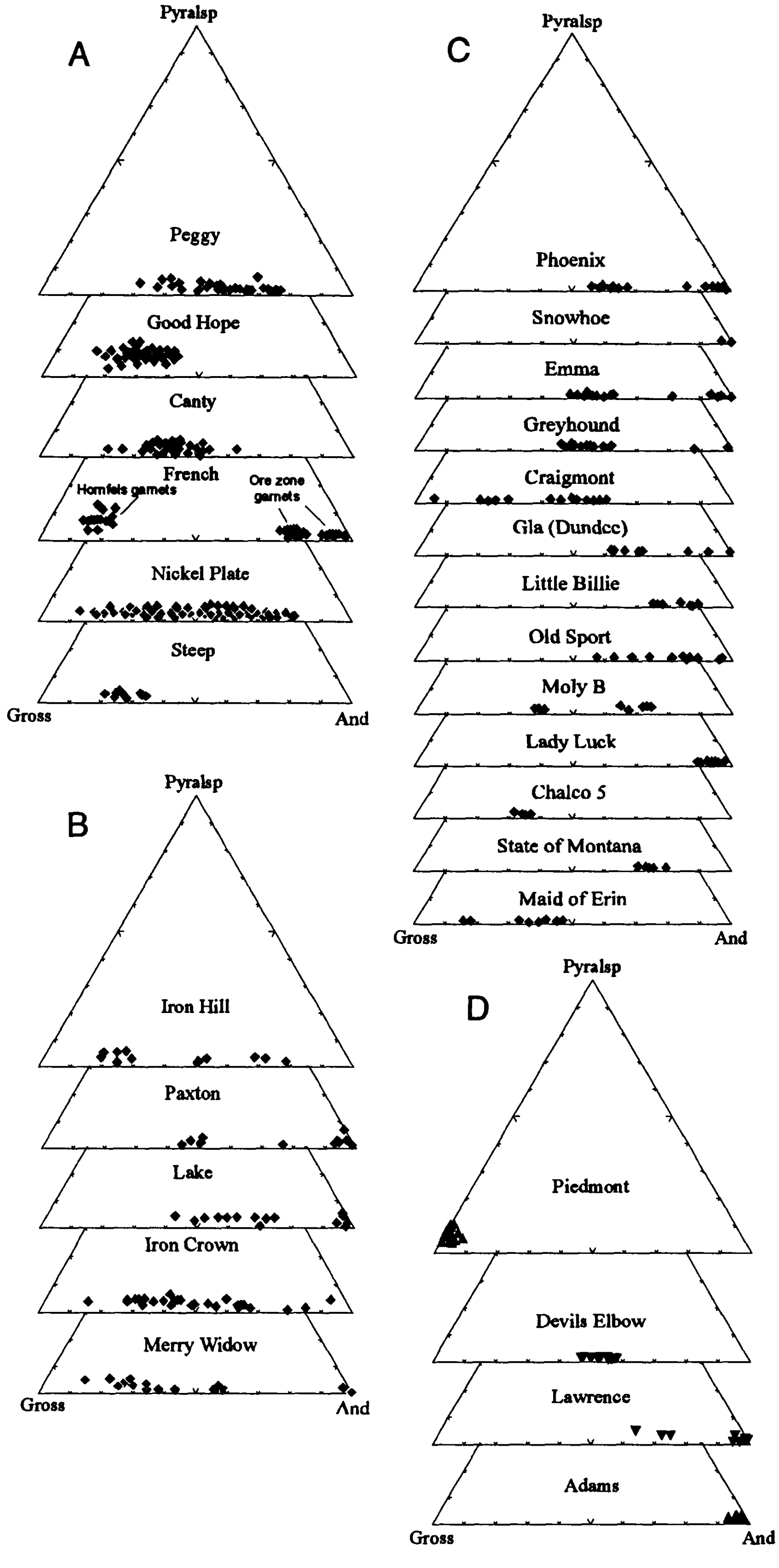


Fig. 10: Mole percent garnet compositions of individual skarn deposits and occurrences.
A: Garnet compositions of Au skarns. B: Garnet compositions of Fe skarns. C: Garnet compositions of Cu skarns. D: Garnet compositions of Pb-Zn skarns.

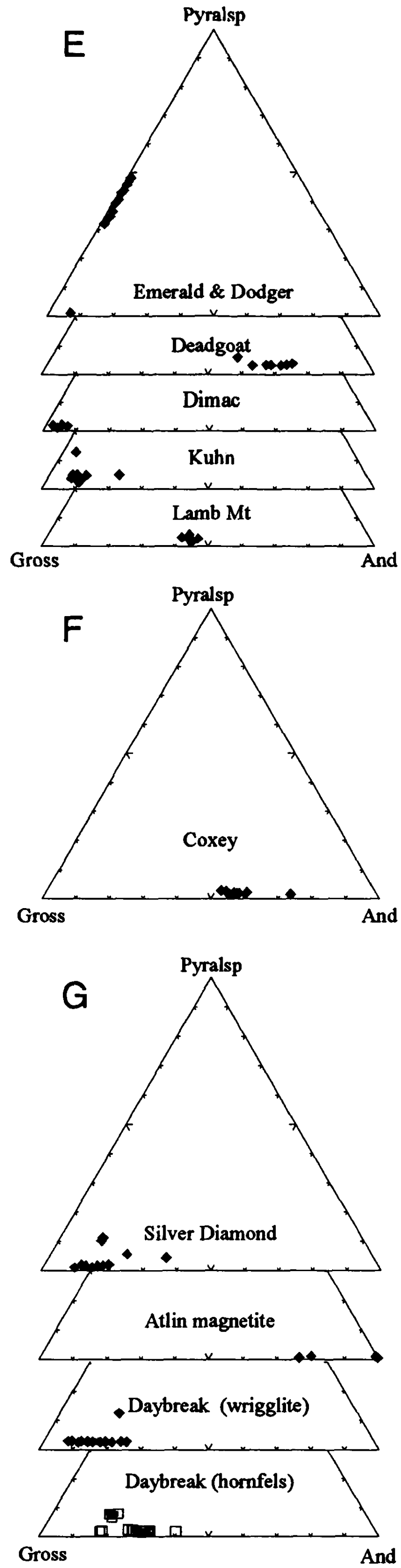


Fig. 10 (Continued): Mole percent garnet compositions of individual skarn deposits and occurrences. E: Garnet compositions of W skarns. F: Garnet compositions of Mo skarns. G: Garnet compositions of Sn skarns.

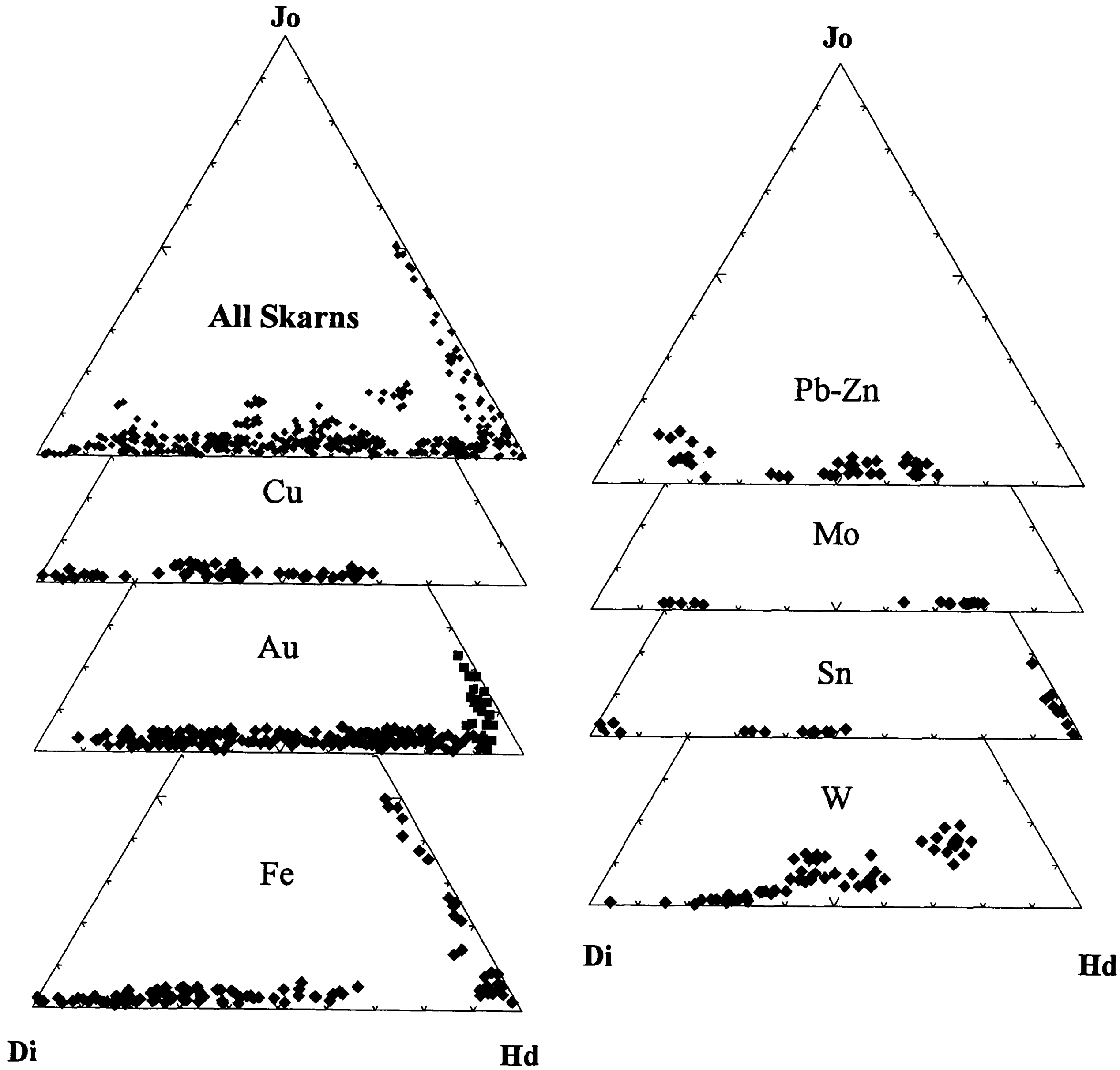


Figure 11: Mole percent pyroxene compositions of skarn deposit classes in British Columbia. Data from Appendix 9, Meinert (1984), Ettlinger and Ray (1989a), Ettlinger (1990a), Dawson (1994) and Ray and Dawson (1994).

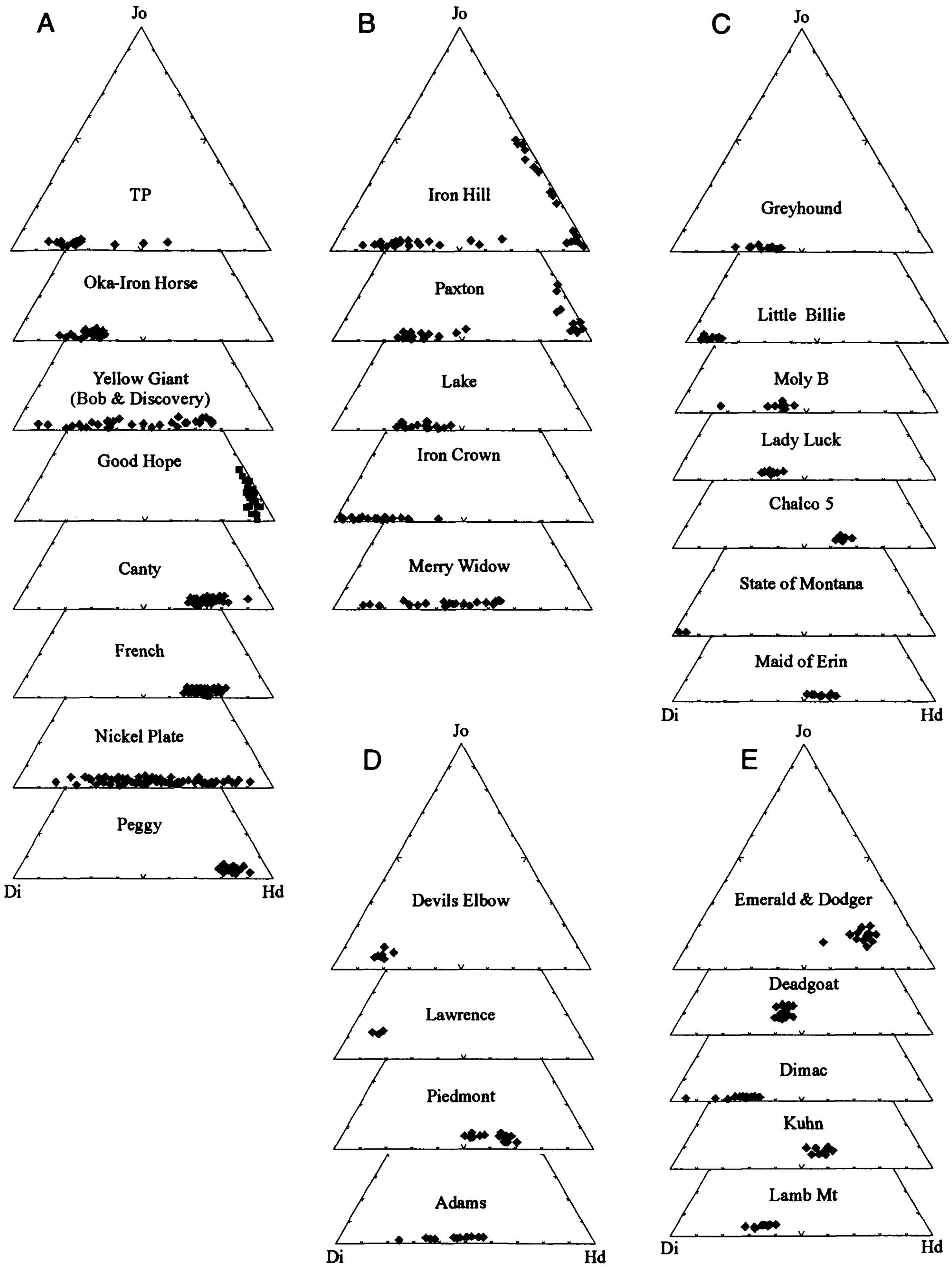


Fig. 12: Mole percent pyroxene compositions of individual skarn deposits and occurrences.
A: Pyroxene compositions of Au skarns. B: Pyroxene compositions of Fe skarns. C: Pyroxene compositions of Cu skarns. D: Pyroxene compositions of Pb-Zn skarns. E: Pyroxene compositions of W skarns.

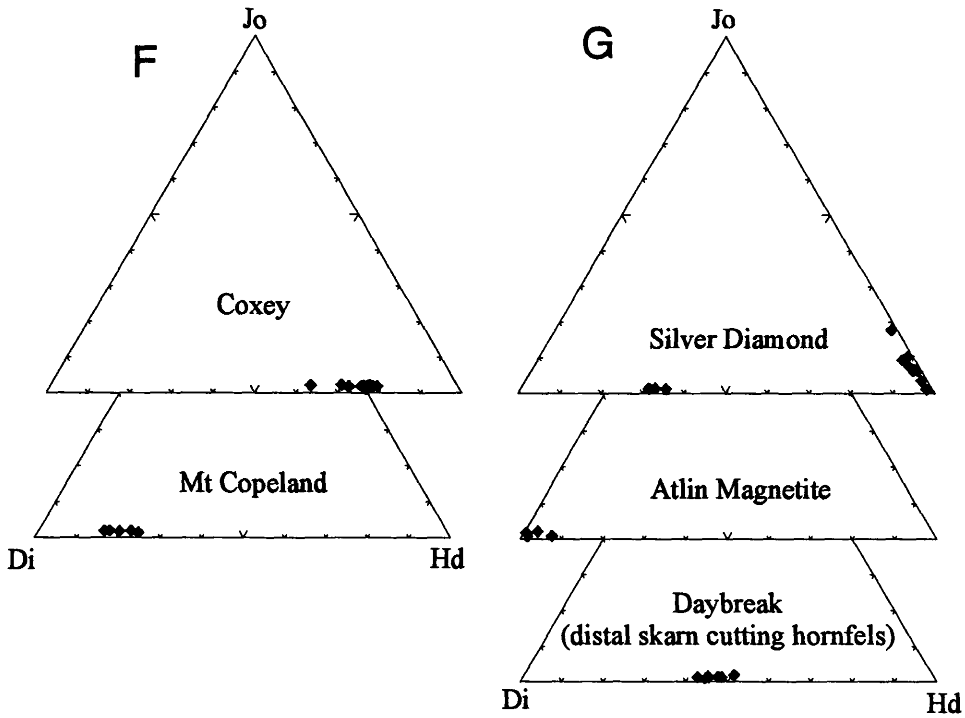


Fig. 12 (Continued): Mole percent pyroxene compositions of individual skarn deposits and occurrences. F: Pyroxene compositions of Mo skarns. G: Pyroxene compositions of Sn skarns.

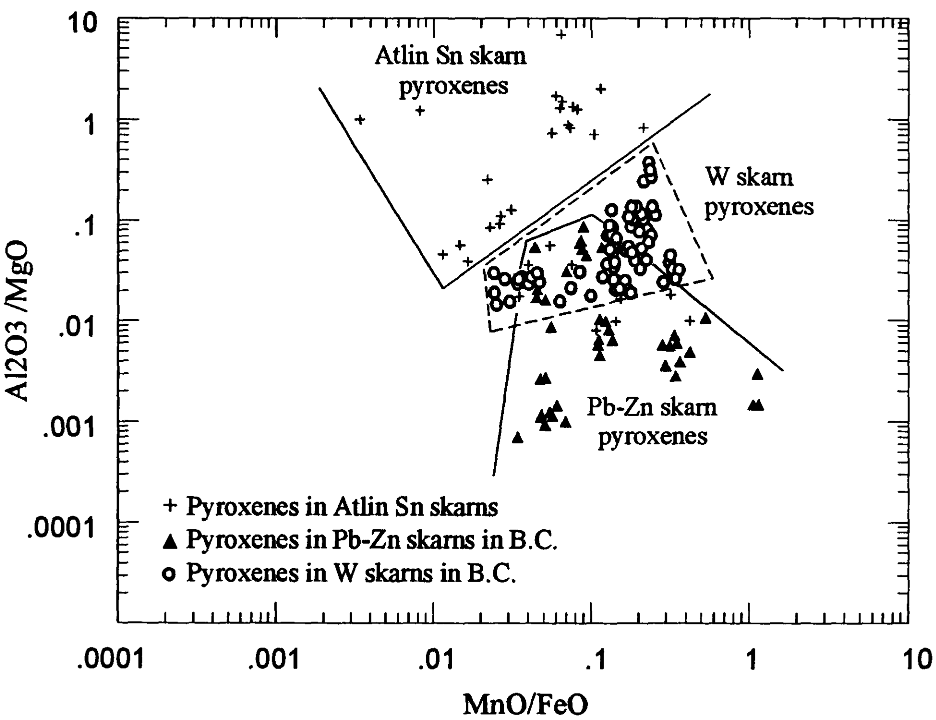
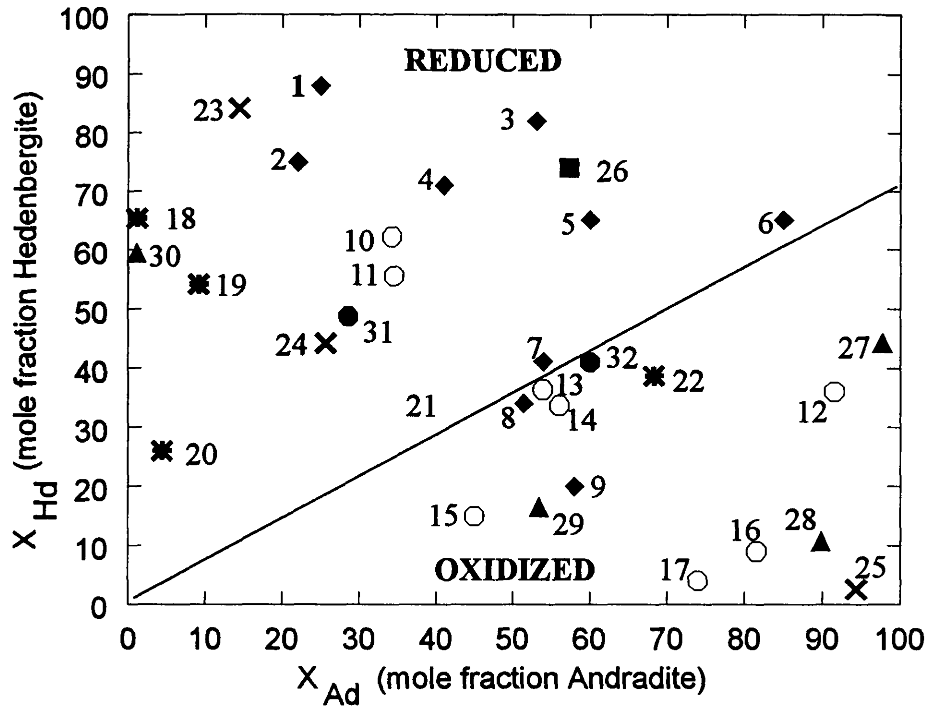


Fig. 13: Plot of weight percent Al_2O_3/MgO *versus* MnO/FeO illustrating different compositional fields for pyroxenes in Sn, W and Pb-Zn skarns.



◆ Au skarns

1 Good Hope (Hedley)
2 Discovery (Banks Island)
3 Peggy (Hedley)
4 Canty (Hedley)
5 Nickel Plate (Hedley)
6 French (Hedley)
7 Iron Horse
8 Bob (Banks Island)
9 TP

✱ W skarns

18 Emerald Tungsten & Dodger
19 Kuhn
20 Dimac
21 Lamb Mt
22 Dead Goat

● Fe skarns

31 Merry Widow
32 Lake (Texada)

■ Mo skarn

26 Coxey (Rossland)

○ Cu skarns

10 Chalco 5
11 Maid of Erin (Rainy Hollow)
12 Lady Luck
13 Moly B
14 Greyhound (Greenwood)
15 Florence (Texada)
16 Little Billie (Texada)
17 State of Montana (Rainy Hollow)

▲ Pb-Zn skarns

27 Adams
28 Lawrence
29 Devils Elbow
30 Piedmont

✕ Sn skarns

23 Silver Diamond
24 Daybreak (hornfels)
25 Atlin Magnetite

Figure 14: Plot of average mole fraction hedenbergite *versus* average mole fraction andradite for various Au, Fe, Cu, Pb-Zn, W, Mo and Sn skarns in British Columbia (plot after Einaudi, 1982).

Our study shows that many of the pyroxenes in Sn, W and Pb-Zn skarns have different Al_2O_3/MgO ratios (Table 17B; Ray *et al.*, 1997). Essentially, pyroxenes in Sn skarns are characterized by high Al_2O_3/MgO and low MnO/FeO ratios, those in Pb-Zn skarns have low Al_2O_3/MgO and higher MnO/FeO ratios whereas the W skarn pyroxenes cluster in an intermediate field (Figure 13). Variations in Al_2O_3/MgO *versus* MnO/FeO of the pyroxenes appears to correlate with the oxidation state of the skarn system. Some pyroxenes in the Piedmont Pb-Zn skarn plot within the W skarn field (Figure 13) and mineralogical and chemical data (Figure 14) indicates that this deposit is atypical of Pb-Zn skarns and was probably a relatively reduced system. Similarly, Al_2O_3/MgO *versus* MnO/FeO plots of some pyroxenes from the Atlin Magnetite Sn skarn fall within the W skarn and Pb-Zn fields (Figure 13) and this occurrence probably developed in a more oxidizing environment than either the Silver Diamond or Daybreak Sn skarns (Figure 14).

HEDENBERGITE VERSUS ANDRADITE RATIOS OF SKARNS

Using a plot of hedenbergite and andradite mole % values of pyroxenes and garnets respectively, Einaudi (1982) recognized two distinct fields representing Cu skarns related to porphyry Cu deposits and W skarns. The former skarn type, which tends to have developed in high-level, oxidized environments, is characterized by andraditic garnets and diopsidic pyroxenes, whereas the more reduced W skarns are generally marked by more grossularitic garnets and Fe-rich, hedenbergitic pyroxenes (Einaudi notes that skarn pyroxenes with significant Mn enrichment or individual deposits that have a wide range in the proportions of hedenbergite and andradite may be unsuitable for this plot).

Average mole % values of hedenbergite and andradite for 31 skarn deposits or occurrences in British Columbia are plotted on Figure 14. As noted by Ray and Webster (1991), Ettlinger *et al.* (1992) and Ray and Dawson (1994), all of the Hedley Au skarns fall within the reduced W skarn field, although the TP Au skarn does not (Figure 14). All of the W skarns except the Deadgoat occurrence (with pyroxenes showing weak Mn enrichment) fall within the reduced field. Likewise, most of the Cu skarns fall in the oxidized field; exceptions are the Chalco 5 and Maid of Erin occurrences. The Coxey Mo skarn plots in the reduced field as do two of the three Sn skarns in British Columbia. The Atlin Magnetite Sn skarn, however, plots within the oxidized field (Figure 14); this conclusion is further supported by the garnet and magnetite-rich character of the skarn and, as noted above, the similarity of its pyroxene Al_2O_3/MgO *versus* MnO/FeO ratios to those in Pb-Zn skarns (Figure 13). Except for the Piedmont occurrence, all the Pb-Zn skarns plot within the oxidized field. The high pyrrhotite/pyrite ratios in the Piedmont skarn (Webster *et al.*, 1992) also suggest it was a more reduced system than other Pb-Zn skarns.

CHEMISTRY OF VESUVIANITE IN SKARNS

Vesuvianites from the Daybreak Sn skarn, the Maid of Erin Cu skarn and the Emerald-Dodger W skarn, were analyzed by electron microprobe techniques and the results are presented in Appendix 10. Core to rim analyses were completed across individual crystals from the Daybreak and Emerald-Dodger skarns but no chemical zoning was detected.

Vesuvianites from two different locations at the Daybreak Sn skarn were analyzed: proximal vesuvianite in garnet-magnetite-fluorite skarn that has layered wrigglite textures (sample GR91-157) and distal vesuvianite from veins of vesuvianite, garnet or pyroxene that cut the distal biotite hornfels (sample GR91-158). Some chemical differences and similarities are noted between the vesuvianites at these two locations (Ray *et al.*, 1997). All the vesuvianites at the Daybreak occurrence are F-rich (up to 1.77 wt % F; Appendix 10). However, the wrigglite vesuvianites contain appreciably more Fe, Cl, Sn and Mn than the distal vesuvianites. By contrast, the latter are characterized by higher values of Mg, Na and Ti. Titanium appears to be substituting for Fe and Mg in these samples.

Vesuvianites at the Emerald-Dodger W skarn are also F-rich (up to 1.94 wt % F). However, they have no detectable Sn and contain only minor amounts of Cl. Their Fe content is similar to the vesuvianite in the proximal wrigglite skarn at the Daybreak occurrence (Appendix 10) but they contain less Ti and more Mg.

Apart from their Cl content, vesuvianites in the Maid of Erin Cu skarn are generally chemically distinct from those in the Sn and W skarn systems at the Daybreak and Emerald-Tungsten properties. They are not enriched in F or Sn, they have much lower Fe and higher Al contents, and their Ti content is erratic.

CHEMISTRY OF BIOTITE IN SKARNS

Very few data are available on the chemistry of skarn-related biotite in British Columbia, although Ettlinger (1990a) and Ettlinger *et al* (1992) present some data on hydrothermal biotite that overprints endoskarn at the Nickel Plate mine. Further study on biotite in skarn will probably show that the chemistry of this mineral is as diagnostic of the various metallic skarn classes as garnet and pyroxene.

For this skarn study, biotite crystals from an exoskarn sample taken from the Maid of Erin Cu skarn (GR91-167) were subjected to microprobe analysis. The sample contains remnant patches of biotite-rich hornfels that are enclosed by zones of pyroxene and garnet-rich skarn. The analytical results are presented in Appendix 10; core and rim analyses of individual crystals reveal no indication of chemical zoning. Only two F and Cl analyses were completed; Cl values are low but up to 0.36 wt % F is present.

Table 16: Characteristics of garnets in some British Columbia skarns.

Property		No. of microprobe analyses	Skarn class	Py + Sp + Cd	Gross	And + Sc	Comments
Adams	Avg	10	Pb-Zn	0.57	1.70	97.73	Massive to crystalline brown & green garnets. Isotropic to weakly birefringent
	Max	-		0.95	6.00	99.41	crystals with abundant pyroxene inclusions. No chemical zoning except
	Min	-		0.00	0.00	93.19	the thin, outermost rims are more grossularitic (Gr 6).
Atlin Magnetite	Avg	15	Sn	1.13	4.46	94.41	Highly variable coloured ganets (red, orange, yellow-green, dark green, brown,
	Max	-		1.75	23.01	99.52	amber & black). Euhedral, predominantly isotropic, andraditic crystals with
	Min	-		0.48	0.00	76.29	thin birefringent & more grossularitc rims. No Sn or F enrichment in garnets.
Chalco 5	Avg	9	Cu	1.84	63.90	34.26	Red, brown & black crystalline garnet. Weakly to moderately isotropic.
	Max			2.44	66.93	36.22	Growth zoning seen in hand samples but no chemical zoning is present.
	Min			1.62	62.03	30.63	
Coxey	Avg	12	Mo	1.07	41.66	57.27	Red-brown garnets. Isotropic massive to euhedral crystals. No consistent
	Max			1.74	45.19	73.40	core to rim chemical zoning.
	Min			0.69	25.83	53.09	
Craigmont	Avg	21	Cu	1.47	53.33	45.20	Red-brown anhedral garnets. Isotropic and intensely chloritized.
	Max			2.29	93.02	59.59	Chemical zoning with thin, grossularitic (Ad 5) rims and more.
	Min			0.88	38.93	5.22	andraditic cores (Ad 24 to 43).
Daybreak (hornfels)	Avg	38	Sn	3.80	70.93	25.27	Veins of orange-red garnet. Isotropic to moderately birefringent, anhedral
	Max			8.28	81.10	39.32	crystals with abundant inclusions. Variable chemical zoning. Contains up to
	Min			1.59	58.81	16.56	2 w t% F, 1.2 wt % Cr_2O_3, 0.19 wt % Cl & 0.09 wt % SnO_2.
Daybreak (wrigglite)	Avg	41	Sn	3.04	81.89	15.08	Red & red-brown garnet. Contains up to 0.74 wt % F, 0.15 wt % SnO_2.
	Max			12.67	89.94	24.47	& 0.03 wt % Cr_2O_3.
	Min			2.26	70.12	7.03	
Dead Goat	Avg	11	W	5.45	26.20	68.35	Brown, euhedral garnets. Mostly birefringent with sector twinning but some
	Max			22.26	38.20	77.74	isotropic crystals present. No consistent optical or chemical zoning.
	Min			3.26	0.00	55.79	Some isotropic garnets are weakly enriched in MnO (up to 3.7 wt %).
Devils Elbow	Avg	16	Pb-Zn	1.33	45.27	53.40	Brown euhedral garnets. Isotropic & weakly isotropic. Minor chemical
	Max			1.80	52.36	56.97	zoning with slight decrease in andradite from core (Ad 42) to rim (Ad 52).
	Min			0.99	41.71	46.10	
Dimac	Avg	13	W	1.58	93.97	4.46	Very large, euhedral, red-brown, isotropic garnets up to 7 cm across. XRD
	Max			2.25	94.98	6.05	analysis of a large garnet indicated 317 ppm Sn. Microprobe analyses show
	Min			1.03	92.66	2.89	up to 0.34 wt % F but no Sn enrichment. No core to rim chemical zoning.
Emerald Tungsten & Dodger	Avg	22	W	38.32	61.38	0.30	Red-brown, euhedral & isotropic garnets. Garnets are highly subcalcic & contain
	Max			48.18	92.43	6.50	up to 16 wt% MnO (the most manganiferous skarn garnets identified in B.C.).
	Min			1.08	51.82	0.00	Weak but inconsistent chemical zoning.

Table 16 (Continued): Characteristics of garnets in some British Columbia skarns.

Property		No. of microprobe analyses	Skarn class	Py + Sp + Cd	Gross	And + Sc	Comments
Emma	Avg	22	Cu	1.04	25.61	73.35	Euhedral to massive pale brown to green garnet.
	Max			2.58	50.35	99.23	Chemical & optical zoning with isotropic, andraditic cores (Ad 93-99)
	Min			0.29	0.16	48.02	& more grossularitic (Ad 54-62) margins.
Gla (Dundee)	Avg	13	Cu	1.84	13.98	84.17	Brown, euhedral garnet. Core to rim optical & chemical zoning with isotropic,
	Max			2.37	36.97	98.63	andraditic (Ad 98) cores & more grossularitic (Ad 60-70) margins.
	Min			1.37	0.00	60.66	
Greyhound	Avg	22	Cu	2.08	42.79	55.12	Euhedral to anhedral brown garnet. Birefringent & isotropic varieties.
	Max			3.01	52.34	98.84	Chemical zoning seen in some crystals with birefringent, grossularitic (Ad 47)
	Min			0.84	0.31	44.75	cores and isotropic, andraditic (Ad 98) margins.
Kuhn	Avg	10	W	7.42	84.02	8.56	Red, brown, amber and black euhedral garnets. Moderately isotropic with
	Max			27.45	89.21	20.81	sector twinning and optical zoning but no chemical zoning. Contains
	Min			2.40	72.55	0.00	up to 10.5 wt % MnO.
Ladyluck	Avg	11	Cu	1.68	6.78	91.54	Brown, massive to crystalline garnet. Isotropic with no chemical or
	Max			2.08	10.09	96.01	optical zoning.
	Min			1.05	2.08	88.19	
Lamb Mt	Avg	12	W	2.85	54.23	42.91	Euhedral red, brown & amber garnets. Isotropic crystals with no
	Max			3.20	55.50	45.66	chemical or optical zoning.
	Min			2.48	51.66	41.45	
Lawrence	Avg	11	Pb-Zn	2.15	7.99	89.86	Brown, euhedral garnet. Optical & chemical zoning with isotropic, andraditic
	Max			4.98	33.50	98.85	(Ad 98) cores and thin rims of more grossular garnet (Ad 60-70).
	Min			1.15	0.00	61.52	
Little Billie	Avg	9	Cu	0.67	17.72	81.60	Brown to green garnets. Euhedral to subhedral, isotropic to moderately
	Max			0.93	24.92	88.84	birefringent crystals. No consistent chemical zoning although the outer-most
	Min			0.50	10.50	74.18	rims tend to be slightly more grossularitic.
Maid of Erin	Avg	11	Cu	0.77	64.74	34.49	Brown, green & yellow-green garnets. Optical zoning with sector twinning.
	Max			0.89	83.81	46.79	No chemical zoning.
	Min			0.41	52.37	15.46	
Molly B	Avg	10	Cu	2.61	43.99	53.41	Red, brown, amber & black crystals. Euhedral to subhedral garnets that are
	Max			3.48	60.84	73.15	colourless to pale brown in PPL. Isotropic and birefringent crystals occur; the
	Min			1.76	23.89	36.82	latter are grossularitic (Ad 36) whereas isotropic garnets are andraditic (Ad 70).
Old Sport	Avg	12	Cu	0.67	19.09	80.25	Brown garnet. Isotropic to weakly birefringent crystals with some
	Max			1.07	42.47	96.47	optical zoning. Isotropic sectors in crystals tend to be more andraditic than
	Min			0.36	2.74	56.79	birefrin
Phoenix	Avg	30	Cu	1.43	19.53	79.04	Mostly brown garnet but some yellow-green crystals present. Isotropic crystals
	Max			2.41	42.87	97.95	are partially chloritized. No consistent optical or chemical zoning present.
	Min			0.58	0.00	55.27	

Table 16 (Continued): Characteristics of garnets in some British Columbia skarns.

Property		No. of microprobe analyses	Skarn class	Py + Sp + Cd	Gross	And + Sc	Comments
Piedmont	Avg	27	Pb-Zn	7.73	91.16	1.11	Red, brown & yellow-green garnets. Anhedral, isotropic crystals with no chemical zoning.
	Max			10.61	94.03	6.38	
	Min			3.84	88.29	0.00	
Silver Diamond	Avg	24	Sn	2.25	82.05	15.70	Red and brown garnet. Includes both isotropic and moderately birefringent cystals with no chemical or optical zoning. Garnets are weakly enriched in F & Sn. Up to 0.2 wt % F & 0.25 wt % SnO_2 present.
	Max			11.32	89.38	34.55	
	Min			0.00	60.98	9.27	
Snowshoe	Avg	10	Cu	0.80	0.00	99.20	Massive to crystalline brown garnet. Isotropic & andraditic with no optical or chemical zoning.
	Max			0.92	0.00	99.32	
	Min			0.68	0.00	99.08	
State of Montana	Avg	10	Cu	1.68	24.31	74.01	Brown & green garnet. Isotropic, subhedral crystals. No chemical or optical zoning.
	Max			2.23	28.24	78.93	
	Min			0.92	19.73	69.52	
Steep	Avg	8	Au	2.93	70.07	27.00	Red-brown garnet. Isotropic, massive and intensely altered. No optical or chemical zoning.
	Max			3.38	76.28	31.98	
	Min			2.40	65.10	20.49	

Py+Sp+Cd = Pyrope+Spessartine+Calderite.
Gross = Grossularite.
And+Sc = Andradite+Schorlomite.

Table 17A: Average, maximum and minimum composition of pyroxenes in some skarns in British Columbia

Property		No. of analyses	Skarn class	Mol % Hd	Mol % Di	Mol % Jo	Mol % Fa
Adams	Avg	12	Pb-Zn	44.27	53.35	2.38	0.06
Adams	Max		Pb-Zn	54.59	75.11	3.28	0.32
Adams	Min		Pb-Zn	24.06	42.78	0.83	0.01
Atlin Magnetite	Avg	8	Sn	2.58	97.02	0.40	1.33
Atlin Magnetite	Max		Sn	7.34	98.50	0.90	2.56
Atlin Magnetite	Min		Sn	1.49	91.76	0.00	0.56
Chalco 5	Avg	10	Cu	62.21	33.45	4.34	1.48
Chalco 5	Max		Cu	64.48	36.18	4.67	2.18
Chalco 5	Min		Cu	60.18	31.18	3.64	0.86
Coxey	Avg	12	Mo(W)	74.00	24.69	1.31	5.45
Coxey	Max		Mo(W)	78.53	35.73	1.57	8.87
Coxey	Min		Mo(W)	63.06	20.20	1.20	1.39
Daybreak	Avg	7	Sn	46.00	52.64	1.36	4.13
Daybreak	Max		Sn	49.13	55.58	1.92	9.69
Daybreak	Min		Sn	43.06	48.95	1.02	0.75
Deadgoat	Avg	16	W	38.67	51.13	10.20	4.92
Deadgoat	Max		W	41.22	55.49	13.76	13.06
Deadgoat	Min		W	36.51	47.39	7.16	0.84
Devils Elbow	Avg	10	Pb-Zn(W)	16.65	77.29	6.07	0.33
Devils Elbow	Max		Pb-Zn(W)	20.26	79.77	8.71	0.60
Devils Elbow	Min		Pb-Zn(W)	15.01	72.21	5.19	0.19
Dimac	Avg	16	W	26.05	72.98	0.97	1.27
Dimac	Max		W	32.19	93.70	1.92	1.96
Dimac	Min		W	5.83	67.01	0.01	0.79
Emerald-Dodger	Avg	19	W	65.37	19.71	14.92	2.20
Emerald-Dodger	Max		W	68.42	36.53	17.51	5.51
Emerald-Dodger	Min		W	51.33	15.82	11.95	0.55
Greyhound	Avg	11	Cu	34.67	63.48	1.85	1.22
Greyhound	Max		Cu	40.42	73.98	2.47	4.75
Greyhound	Min		Cu	23.66	57.98	1.39	0.27
Kuhn	Avg	10	W(Mo)	53.58	38.46	7.97	1.23
Kuhn	Max		W(Mo)	57.10	43.16	8.94	4.58
Kuhn	Min		W(Mo)	48.40	34.71	7.33	0.56
Ladyluck	Avg	10	Cu	36.05	60.46	3.49	3.34
Ladyluck	Max		Cu	39.12	62.46	3.83	3.82
Ladyluck	Min		Cu	34.27	57.05	3.27	2.91
Lamb Mt	Avg	11	W(Mo)	33.02	62.45	4.54	2.97
Lamb Mt	Max		W(Mo)	36.29	67.74	5.05	5.50
Lamb Mt	Min		W(Mo)	28.19	58.72	3.24	0.88
Lawrence	Avg	3	Pb-Zn	10.76	76.94	12.29	0.12
Lawrence	Max		Pb-Zn	11.29	77.61	12.64	0.16
Lawrence	Min		Pb-Zn	10.44	76.07	11.95	0.09
Little Billie	Avg	10	Cu	9.01	88.98	2.01	0.63
Little Billie	Max		Cu	11.90	92.42	2.71	1.33
Little Billie	Min		Cu	6.11	86.00	1.45	0.16

Table 17A (Continued): Average, maximum and minimum composition of pyroxenes in some skarns in British Columbia

Property		No. of analyses	Skarn class	Mol % Hd	Mol % Di	Mol % Jo	Mol % Fa
Maid of Erin	Avg	11	Cu	55.56	41.62	2.82	0.60
Maid of Erin	Max		Cu	59.96	45.59	3.35	0.93
Maid of Erin	Min		Cu	51.06	37.60	2.41	0.36
Moly B	Avg	10	Cu	36.65	59.95	3.41	3.00
Moly B	Max		Cu	51.06	81.04	4.61	3.92
Moly B	Min		Cu	15.89	54.01	2.75	1.17
Mt Copeland*	Avg	5	Mo	20.20	78.98	0.83	2.45
Mt Copeland*	Max		Mo	23.78	82.28	0.98	4.12
Mt Copeland*	Min		Mo	16.89	75.24	0.68	1.53
Piedmont	Avg	17	Pb-Zn	59.51	35.21	5.28	0.76
Piedmont	Max		Pb-Zn	69.04	46.60	7.22	1.52
Piedmont	Min		Pb-Zn	47.57	27.89	3.00	0.16
Silver Diamond	Avg	20	Sn(W)	84.35	10.77	4.88	1.10
Silver Diamond	Max		Sn(W)	99.52	67.31	17.74	2.91
Silver Diamond	Min		Sn(W)	32.22	0.28	0.00	0.40
State of Montana	Avg	2	Cu	4.12	95.55	0.34	1.62

Hd = hedenbegite; Di = diopside; Jo = johannsenite; Fa = fassite

* There are doubts whether the Mount Copeland deposit represents a skarn.

Table 17B: Average microprobe chemical analyses of pyroxenes from some skarns in British Columbia

Property	No. of analyses	Na_2O	FeO	K_2O	SiO_2	CaO	Al_2O3	TiO_2	MgO	MnO	Total	MnO/FeO	Al_2O_3/MgO
Avg Coxey	12	0.30	21.98	0.01	48.78	22.73	1.12	0.07	4.12	0.38	99.49	0.02	0.288
Avg. Mo skarns	**12**	**0.30**	**21.98**	**0.01**	**48.78**	**22.73**	**1.12**	**0.07**	**4.12**	**0.38**	**99.49**	**0.02**	**0.288**
Avg Deadgoat	16	0.18	14.03	0.05	52.24	17.90	0.61	0.01	10.45	3.55	99.01	0.26	0.05
Avg Dimac	16	0.10	8.15	0.01	53.52	24.71	0.29	0.04	12.84	0.30	99.96	0.04	0.02
Avg Emerald-Dodger	19	0.20	19.99	0.00	49.83	21.96	0.44	0.04	3.38	4.51	100.35	0.23	0.13
Avg Kuhn	10	0.08	16.33	0.02	50.82	22.99	0.24	0.01	6.59	2.40	99.47	0.15	0.04
Avg Lamb Mt	11	0.16	10.25	0.00	52.46	24.41	0.66	0.04	10.89	1.39	100.26	0.14	0.06
Avg. W skarns	**72**	**0.15**	**14.04**	**0.02**	**51.73**	**22.18**	**0.45**	**0.03**	**8.65**	**2.59**	**99.83**	**0.17**	**0.066**
Avg Silver Diamond	20	0.12	24.05	0.02	49.51	23.29	0.24	0.27	1.88	1.42	100.80	0.06	1.27
Avg Atlin Mag	8	0.02	0.86	0.01	54.77	25.71	0.31	0.03	17.91	0.13	99.74	0.16	0.02
Avg Daybreak	7	0.19	13.95	0.00	51.35	24.06	0.90	0.10	8.96	0.41	99.90	0.03	0.10
Avg. Sn skarns	**35**	**0.11**	**16.73**	**0.01**	**51.08**	**24.00**	**0.39**	**0.18**	**6.96**	**0.92**	**100.38**	**0.07**	**0.753**
Avg Chalco 5	10	0.23	18.69	0.01	50.62	23.42	0.31	0.01	5.64	1.29	100.21	0.07	0.06
Avg Greyhound	11	0.20	10.96	0.01	52.86	24.04	0.25	0.05	11.27	0.58	100.23	0.06	0.02
Avg Ladyluck	10	0.05	11.36	0.00	51.66	24.36	0.74	0.03	10.69	1.09	99.96	0.10	0.07
Avg Little Billie	10	0.04	2.90	0.00	54.21	25.49	0.15	0.02	16.11	0.64	99.55	0.23	0.01
Avg Maid of Erin	11	0.17	16.86	0.02	51.55	23.92	0.13	0.00	7.08	0.84	100.59	0.05	0.02
Avg MolyB	10	0.24	11.49	0.01	52.11	24.31	0.66	0.02	10.58	1.06	100.48	0.10	0.06
Avg State of Montana	2	0.06	1.36	0.01	54.78	25.98	0.38	0.02	17.67	0.11	100.34	0.08	0.02
Avg. Cu skarns	**64**	**0.15**	**11.77**	**0.01**	**52.25**	**24.30**	**0.37**	**0.02**	**10.43**	**0.88**	**100.18**	**0.10**	**0.039**
Avg Adams	12	0.04	13.58	0.00	52.17	24.49	0.02	0.01	9.25	0.72	100.27	0.05	0.00
Avg Devils Elbow	10	0.06	5.27	0.00	53.50	25.23	0.08	0.01	13.74	1.89	99.77	0.36	0.01
Avg Lawrence	3	0.03	3.41	0.00	52.50	24.98	0.03	0.01	13.66	3.84	98.47	1.13	0.00
Avg Piedmont	17	0.05	17.81	0.00	51.09	23.67	0.16	0.02	5.93	1.56	100.31	0.09	0.03
Avg. Pb-Zn skarns	**42**	**0.05**	**12.59**	**0.00**	**52.07**	**24.37**	**0.09**	**0.01**	**9.29**	**1.56**	**100.04**	**0.22**	**0.015**

12. CHEMISTRY OF THE SKARN-RELATED INTRUSIONS

Chemical data of skarn-related plutons worldwide have been presented by Meinert (1983, 1995) and Meinert *et al.* (1990). In this bulletin we examine the major and trace element chemistry of 189 samples of skarn-related plutons in British Columbia, and the analytical results are presented in Appendices 5A to 5F. The number of unaltered plutonic samples collected for analysis in relation to their associated skarn class is as follows: 29 (Fe), 27 (Au), 56 (Cu), 14 (Mo), 21 (W) and 6 (Sn). In addition, some previously published analytical data were incorporated into our dataset; the number of these samples and their related skarn class is as follows: 20 Fe (Sangster, 1969; Meinert, 1984, Ettlinger and Ray, 1989a), 3 Cu (Church, 1986; Ettlinger and Ray, 1989a), and 13 Sn (Christopher and Pinsent, 1979; White *et al.*, 1976).

MAJOR ELEMENT GEOCHEMISTRY OF THE INTRUSIONS

Major and trace element analytical data for plutonic rocks related to various calcic Fe, Cu, Au, Mo, W and Sn skarn occurrences and deposits throughout British Columbia are listed in Appendices 5A to 5F, and these results are summarized in Table 1. Major element plots illustrate that the plutonic rocks associated with skarns range in composition from gabbro and quartz diorite (Au skarns) to granite (Sn skarns; Figure 15A), and from peraluminous to metaluminous (Figure 15B).

Virtually all the skarns are related to subalkalic, calcalkaline igneous rocks (Figures 15C and 15D). Noted exceptions in British Columbia are a few skarns that are associated with alkalic porphyry Cu-Au systems (Hodgson *et al.*, 1976; Fahrni *et al.*, 1976). Also, some Fe-rich gabbroic rocks related to the Fe and Cu (Au) skarn deposits in the Merry Widow camp of northern Vancouver Island are unusual in having tholeiitic affinities (Ray and Webster, 1991a; Figure 15D).

Major element plots demonstrate there are systematic geochemical variations and that the intrusive rocks associated with Fe, Au and Cu skarns and with Sn and W skarns represent two chemically contrasting groups (Ray *et al.*, 1995). Molybdenum-skarn related plutons tend to be chemically intermediate to these two groups. Compared to the other skarn classes, igneous rocks related to Fe, Au and Cu skarns are metaluminous (Figure 15B) and range in composition from gabbro to granodiorite to tonalite (Figure 15A); they contain on average the least Si and total alkalis and the most Ca, Mg, Al, ferrous Fe and total Fe (Ray *et al.*, 1995; Table 1). By contrast, plutons related to Sn and W skarns are peraluminous leucogranitoids of mainly granite-adamellite composition (Figures 15B and 15A); they have the highest average Si contents (Figure 15C), and the lowest overall amounts of total Fe, Mg, Al and Ca (Table 1; Appendices 5A to 5F).

Meinert (1983) did not recognize any significant difference in the total alkali content of intrusions related to W, Mo, Pb-Zn and Sn skarns. However, our British Columbia dataset indicates some systematic increases of these combined elements, with Au skarn related plutons having the lowest (<5 per cent) average total alkali content, and those associated with Sn skarns, the highest (> 8 per cent; Table 1). Plutons related to calcic Fe and Au skarns tend to have very low K2O/Na2O ratios (<0.5), those with Cu skarns have ratios averaging 0.7 and those related to Mo, W and Sn skarns are characterized by higher ratios, averaging between 1.1 and 1.4 (Table 1).

There are also systematic changes in the Fe_2O_3/FeO (Table 1; Ray *et al.*, 1995)) and TiO_2/Fe_2O_3 ratios of the intrusions (Webster and Ray, 1991). Keith and Swan (1987) and Theodore *et al.* (1991) have used whole-rock Fe_2O_3/FeO ratios to determine the oxidation state of plutonic rocks associated with various metal deposits. Plots of average Fe_2O_3/FeO ratios (Ray *et al.*, 1995) indicates that plutons associated with W and Au skarns in British Columbia have the lowest ratios whereas those related to Cu skarns are the most oxidized.

Other plots using major elements indicate a relationship between the skarn deposit class, the peraluminous or metaluminous character of the intrusions, and the orogenic environment in which the melts were generated. In British Columbia, Au, Fe, and Cu skarns are most commonly associated with metaluminous igneous rocks (Figures 15B and 16A) that were "pre-plate collisional" (Figure 16B) as defined by Batchelor and Bowden (1985). By contrast, W and Sn skarns are associated with fractionated, peraluminous leuco-granitoids (Figures 15B and 16A) that fall in either in the "syncollisional" or "post-orogenic" fields (Figure 16B) outlined by Batchelor and Bowden (1985). Molybdenum skarns in British Columbia formed in both oceanic arcs and continental margin sequences, and their related intrusions include both metaluminous and peraluminous types (Figure 15B).

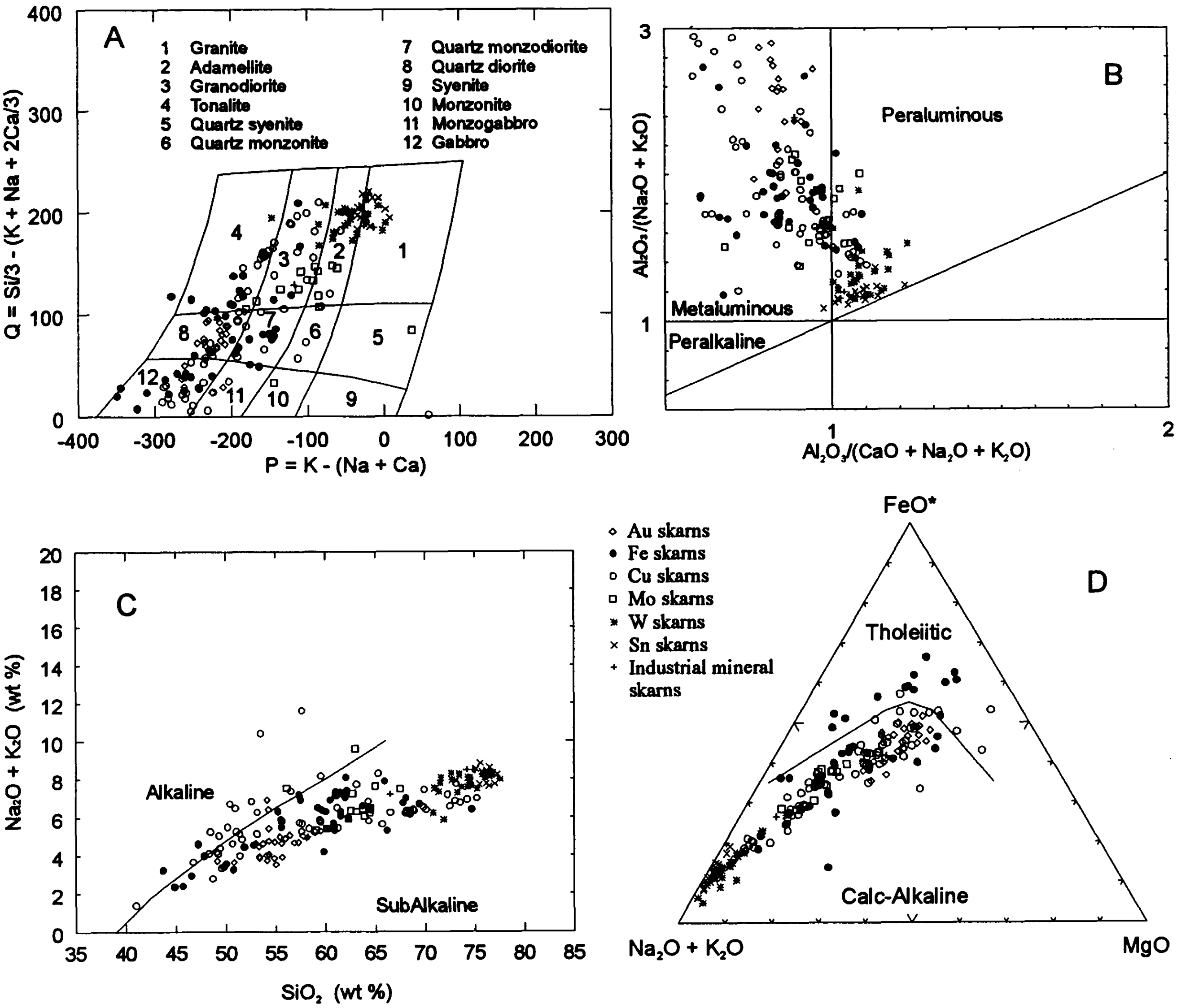


Fig 15: Plots comparing the major element contents of plutonic rocks related to calcic Fe, Cu, Au, Mo, W and Sn skarns in British Columbia (Data from Appendix 5).
A: Plot (after Debon and Le Fort, 1983) illustrating the composition of the various skarn-related igneous rocks. B: Al_2O_3 ($Na_2O + K_2O$) *versus* Al_2O_3 ($CaO + Na_2O + K_2O$) plot after Maniar and Piccoli (1989) illustrating the peraluminous character of W and Sn skarn-related plutons and the metaluminous character of Au, Fe, Cu and Mo skarn-related plutons. C: Alkali *versus* silica plot demonstrating the subalkaline affinity of the igneous rocks associated with all the metallic skarn classes. D: AFM plot showing the calcalkaline affinity of the igneous rocks associated with all the metallic skarn classes.

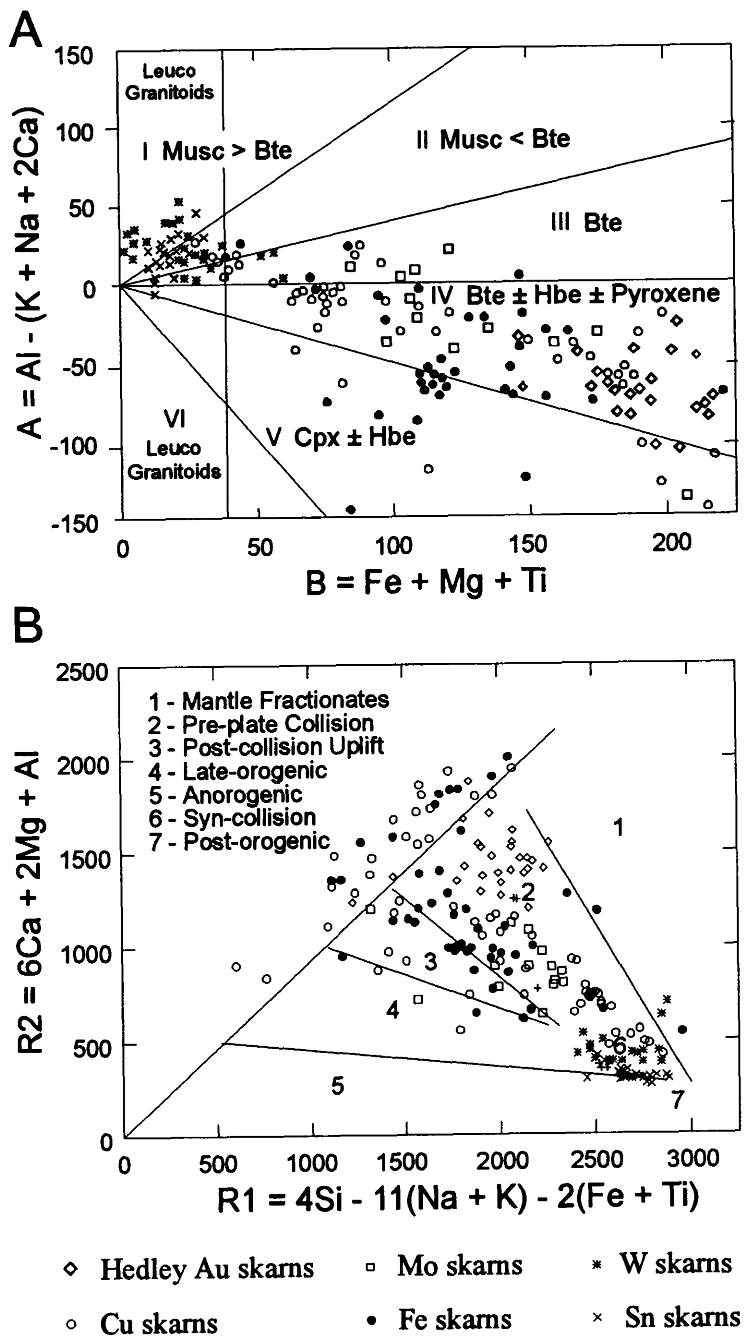


Fig 16: A: "Characteristic mineral" plot, after Debon and Le Fort (1983); zones I, II and III represent peraluminous domain, zones IV, V and VI represent metaluminous domain. The igneous rocks related to Au, Fe, Cu and Mo skarns in British Columbia represent metaluminous rocks that fall in zone IV which is characterized by biotite ± hornblende ± orthopyroxene ± clinopyroxene ± primary epidote ± sphene. (Musc = muscovite; Bte = biotite; Hbe = hornblende; Cpx = clinopyroxene). The plutonic rocks related to W and Sn skarns represent mainly peraluminous leuco-granites.
B: Major element plot (after Batchelor and Bowden, 1985) illustrating tectonic environments of some skarn-related plutons in British Columbia. Igneous rocks related to Sn and W skarn plot as "syn-collision plutons", those of most Fe, Cu, Au and Mo skarns plot as "pre-plate collision-plutons".

TRACE ELEMENT GEOCHEMISTRY OF THE INTRUSIONS

Table 1 summarizes the trace element geochemistry for plutonic rocks associated with the seven classes of skarn deposit as listed in Appendices 5A to 5F. Systematic variations in the trace element content of the various skarn-related plutons are noted (Figures 17A and 17B; Ray *et al.*, 1995), particular in their contents of Cr, F, Nb, Ba, Rb, Sc, Ta, U, V, Y and the light rare earth elements, La and Ce

Essentially, the igneous rocks related to Au, Fe and Cu skarns contain higher amounts of Cr, Sc, Sr and V than those related to Sn and W skarns. By contrast, the latter group is enriched in large ion lithophile elements such as Rb, Ce, Nb, Ta and La (Table 1; Figures 17A and 17B). The trace element content of igneous rocks related to Mo skarns tends to be intermediate between these two groups (Ray *et al.*, 1995).

The trace element data support the conclusion that the plutons related to Au, Fe and Cu skarn deposits in British Columbia were derived from more primitive oceanic crust. Moreover, the terrane setting of these skarn classes indicates that their related melts formed in a variety of oceanic arc and back-arc environments, and this conclusion is supported by trace element discrimination plots (Figures 18A and 18B) indicating these intrusions have a "volcanic arc" affinity, as defined by Pearce *et al.* (1984). By contrast, intrusions associated with Sn and most of the W skarns represent "within plate" intrusions, and their chemistry, predominant S-type affinity and high initial 87Sr/86Sr ratios (Armstrong, 1988) suggests derivation largely by partial melting of sialic continental crust.

The intermediate trace element content of plutons related to Mo skarns suggests these formed in transitional crust and, in British Columbia, these skarns occur in both oceanic island-arc and continental margin terranes.

To summarize, there are systematic correlations between the metal chemistry of skarn deposits in British Columbia and the major and trace element geochemistry of their associated intrusions. These changes indicate a link between the dominant metal in a skarn and magmatic differentiation processes, which are in turn influenced by the magma source and overall tectonic setting, as suggested by Meinert (1983; 1995). In British Columbia, many of these chemical differences reflect the increasing influences of differentiation, fractionation and continental crust as a source for plutonic rocks that generated Sn and W skarns. By contrast, those related to Au, Fe, Cu and certain Mo skarns are derived from more primitive oceanic crust in oceanic island-arc settings and they are less differentiation.

However, in spite of the overall major element chemical similarity of Au, Fe and Cu skarn related plutons, there are subtle trace element differences which may be used to identify other igneous rocks in British Columbia with Au skarn potential. Plots using such elements as Ba, La, Nb, Sc and Rb (Ray *et al.*, 1996; Figure 19) discriminate, to varying degrees, the Hedley Au-skarn intrusions from other plutonic rocks. Relative to other skarn-related plutons, the Hedley intrusions have the highest Ba/La and Sc/Nb ratios and the lowest Rb abundances. However, these plots cannot be used universally to discriminate between Au, Fe and Cu skarn-related igneous rocks; this is apparent when the plots are applied to a worldwide dataset compiled by Meinert (1995). Furthermore, although Brookes (1994) noted in his study of the McCoy Au skarn in Nevada that the Ni and Cr contents of its igneous rocks are different from those in plutons related to Cu skarns, such is not the case in British Columbia. Although the discrimination plots in Figure 19 and those presented by Brookes (1994) are applicable to relatively small parts of the world such as British Columbia and Nevada, the search for universal plots capable of fingerprinting plutons with Au skarn potential worldwide remains unfulfilled.

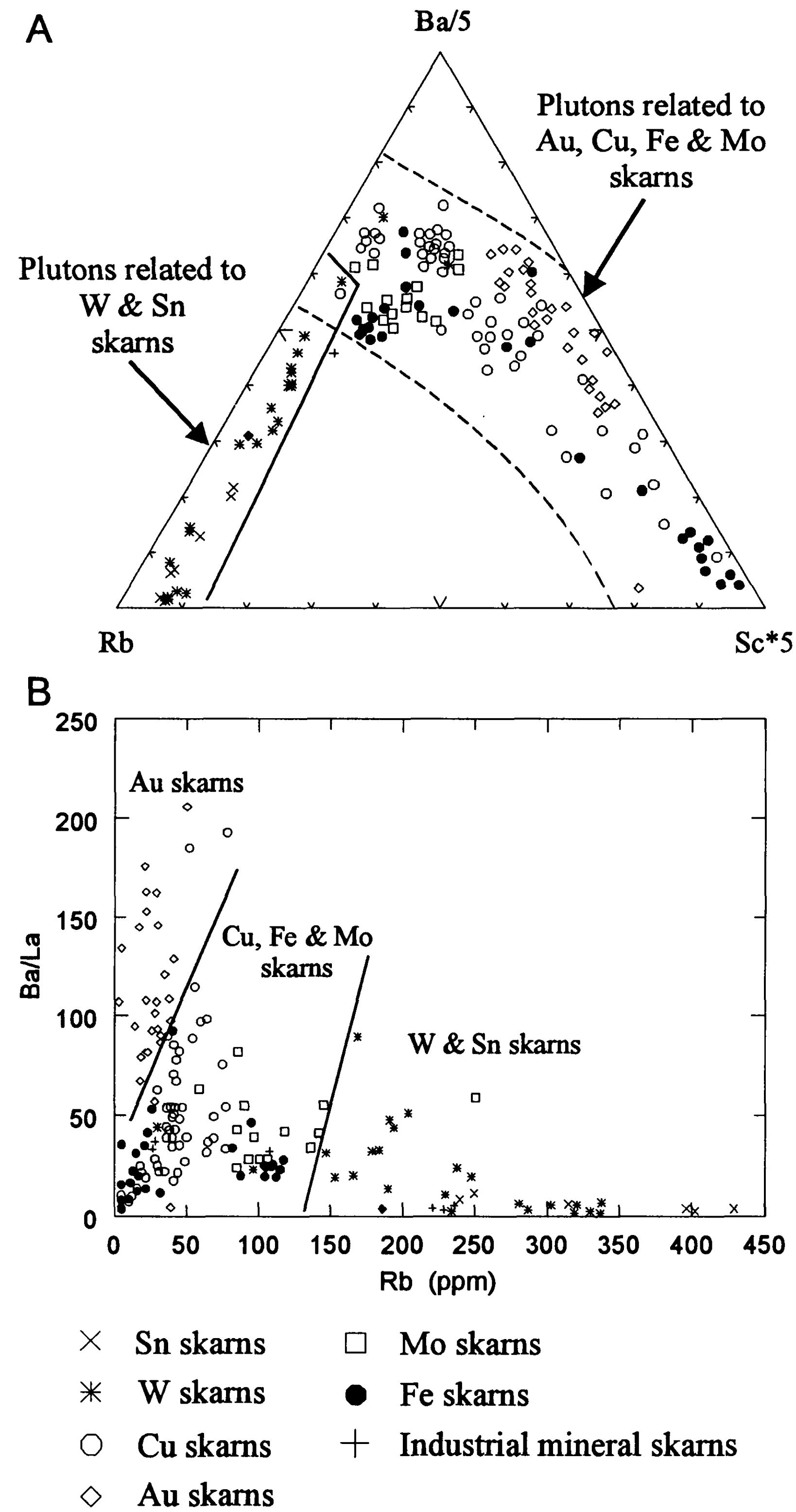
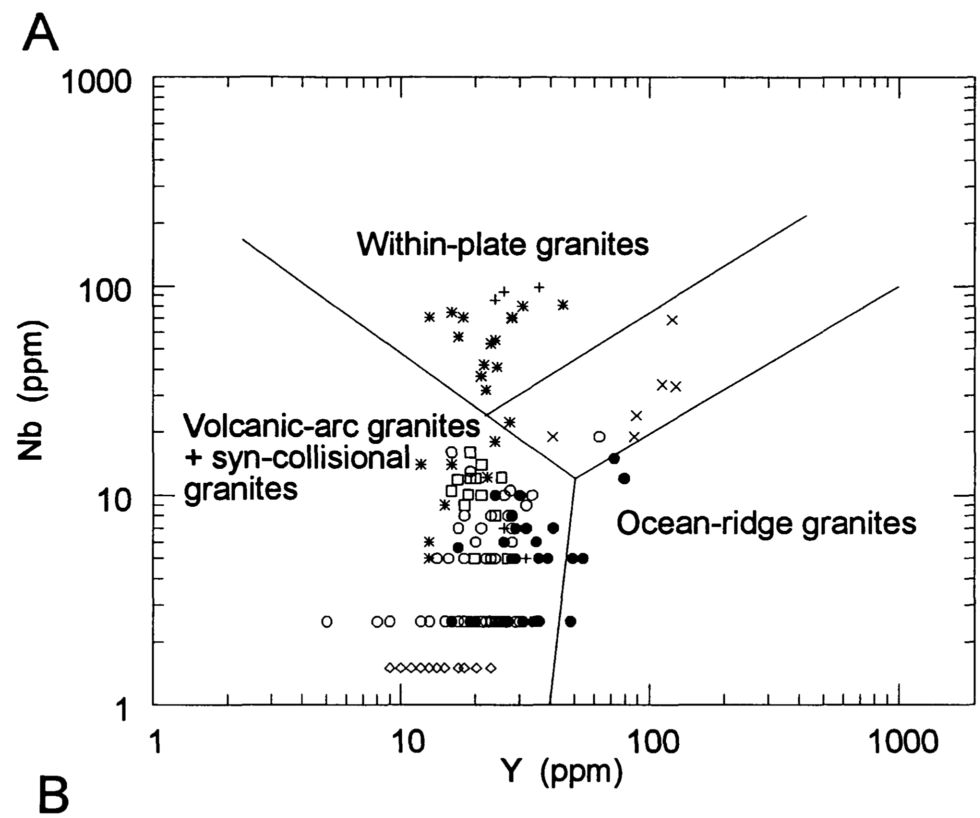


Fig 17: Trace element plots of plutonic rocks related to calcic Fe, Cu, Au, Mo, W and Sn skarn deposits in British Columbia.
A: Triangular Rb-Ba/5-Sc*5 discrimination plot.
B: Ba/La *versus* Rb discrimination plot.



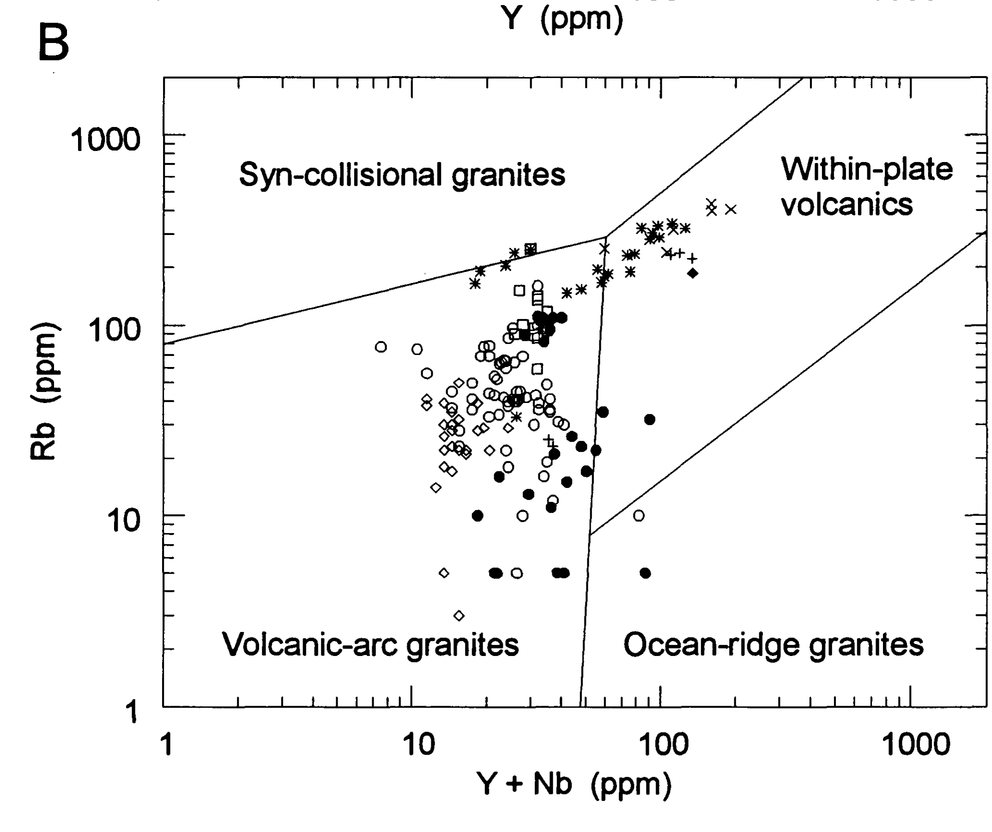


Figure 18A and B: Trace element discrimination plots (after Pearce *et al.* (1984), illustrating the "volcanic arc" character of intrusions related to Fe, Cu, Au and Mo skarns, and the "within-plate" character of most plutons related to W and Sn skarns. Symbols as in Figure 17.

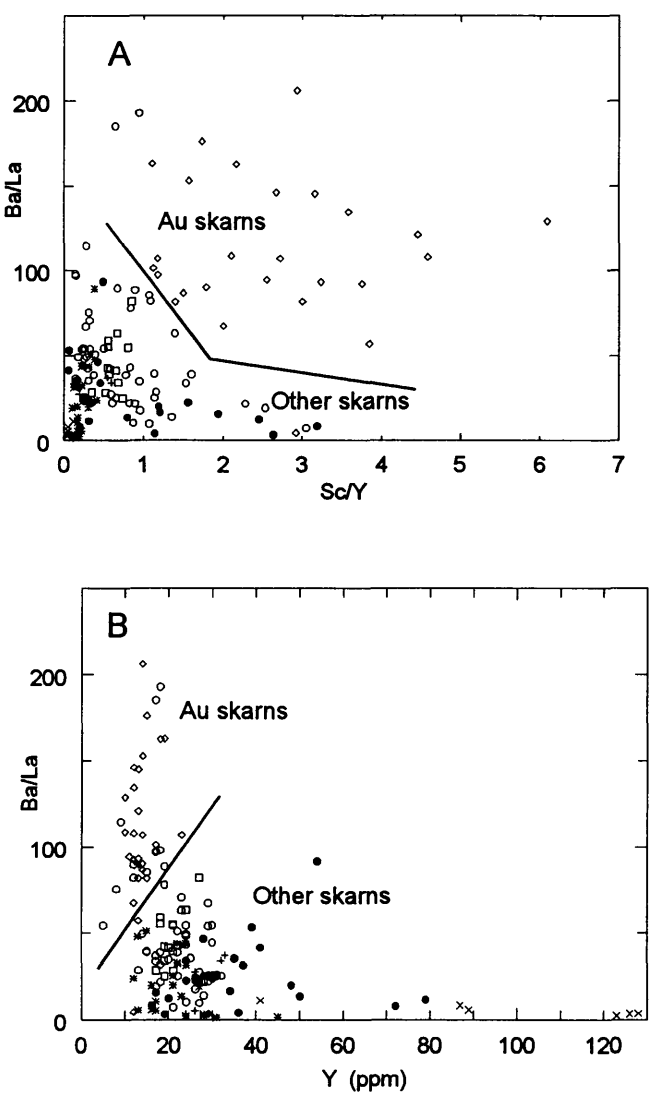


Fig 19: Major and trace element plots that partially differentiate igneous rocks related to Au skarns from plutons related to other skarn class. Symbols as in Figure 17.
A: Ba/La *versus* Sc/Y. B: Ba/La *versus* Y. C: Ba/La *versus* Sc/Nb. D: Ba/La *versus* Al_2O_3

13. MAPPING AND EVALUATING SKARNS

Skarns can be difficult to evaluate for their economic potential The associated orebodies are commonly hard to locate, partly because they tend to be relatively small compared to the size of the overall exoskarn envelope. The following points should be noted:

1. The character of the skarn should be determined as soon as possible. Alteration related to regional or isochemical contact metamorphism or to reaction skarn has a low potential for metallic deposits although it may host garnet or wollastonite-rich deposits. However, most metallic skarn deposits worldwide are related to hydrothermal fluids of magmatic origin.

2. Establish, if possible, whether the skarn is genetically or spatially associated with igneous rocks. If it is, mapping should outline the dimensions, attitude and shape of the related igneous body and whether an endoskarn is developed. These data are useful because some skarn deposits are controlled by irregularities or changes in attitude of the intrusive margins. Determining the composition and mineralogy of the unaltered igneous rocks and endoskarn may help identify other intrusive bodies in the district with a similar skarn potential.

3. Use the skarn mineral assemblages and the composition of any protolith carbonates (limestone *versus* dolomites) to establish whether the skarn is calcic or magnesian in character. Some magnesian skarns containing abundant olivine and/or serpentinite can be misidentified as ultramafic igneous rocks.

4. The lithologies and mineralogy of the unaltered rock package surrounding the skarn can provide hints on whether these rocks were originally oxidized or reduced (e.g. hematite-bearing versus graphite-bearing). The oxidation state of the hostrocks can influence skarn metallogeny.

5. If possible, both the skarn envelope *and outlying parts of the surrounding country rocks* should be geologically mapped to identify any possible stratigraphic or structural controls to the alteration and mineralization. Ideally, mapping should begin in the unaltered country rocks and progress *into* the skarn halo. This may reveal the variable effects of progressive skarn overprinting on different protoliths which should also help identify endo and exoskarn protolith when mapping or core logging the more intensely altered rocks.

6. Visual identification of the protolith is difficult or impossible in many coarse-grained, strongly recrystallized skarns. However, in some instances, thin section examination can reveal remnant igneous features such as porphyritic textures in endoskarn which often survive intense overprinting.

7. Whole-rock analyses of skarn samples are useful in some cases to distinguish endoskarn from exoskarn. Also, microprobe geochemical analyses on certain prograde minerals can help to identify the protolith. The Ti content of skarn garnets at the Hedley and Greenwood camps in southern British Columbia reflect the composition of the original igneous or sedimentary protoliths. Garnets with low Ti contents (< 0.1 wt % TiO_2) generally indicate limestone protoliths, those containing 0.1 to 0.4 % TiO_2 replaced siltstones, whereas those overprinting argillites, mafic tuffs or the intrusions as endoskarn commonly contain between 0.4 and 1.8 % TiO_2.

8. When field mapping or core logging skarns, it is often easier to maintain two copies of the geological map or core log. One copy is used to record conventional geological data of the *original* lithologies (protolith). The other copy includes details of skarn alteration, mineralization and ore grade (if known) at each mapping station or core interval. Details may include:

(a). The relative intensity of skarn overprinting.

(b). The grain-size, texture and color of the prograde and retrograde mineral assemblages. As mapping or core logging progresses, this data can be used to determine proximal and distal skarn in relation to the pluton or hydrothermal source (prograde and retrograde minerals tend to be coarser grained in areas closer to their hydrothermal source). This knowledge can be used to locate the conduits along which the hydrothermal fluids or late meteoric waters flowed, which in turn may be used to target orebodies. Because some infiltration skarns contain internal remnants or distal zones of calcsilicate hornfels, grain-size data can be useful to outline areas of skarnoid with lower economic potential. The colour of some silicates may also assist in determining proximity to fluid flow. Although not universal to all skarns, proximal garnets tend to be darker coloured relative to the distally developed garnets which may be light brown or more greenish in colour.

(c). Systematically recording the estimated percentages of alteration minerals present is important for identifying mineralogical zoning in the prograde and retrograde assemblages. Where appropriate, care should be taken to document changes in garnet/pyroxene, garnet/wollastonite, pyroxene/biotite, pyrite/pyrrhotite or magnetite/sulphide ratios, as well as the proportion of prograde and retrograde minerals present. Mineral ratios commonly change throughout a skarn (e.g. proximal garnet-dominant skarn and distal pyroxene-rich skarn), and they also tend to characterize certain classes of skarn deposits. They may be used to locate the channelways that controlled retrograde overprinting and mineralization and also provide clues on the oxidation and sulphidation conditions in the skarn.

9. Determining the paragenesis of the prograde and retrograde skarn minerals is important because the predominant mineralization event or events may be linked to a particular mineral phase. Individual skarns may contain several generations of garnet, pyroxene, epidote, amphibole, chlorite, biotite, K-feldspar, sulphides or magnetite. These generations may be distinguishable by colour (suggesting differing chemistry), texture, grain size, style or on their crosscutting or overprinting relationships. Because retrograde overprinting may be associated with ore-upgrading or late-stage mineralization, identifying the controls of retrograde alteration and the phases of hydrous mineral growth is important for the economic evaluation of a skarn.

10. Some skarn minerals such as scapolite, axinite, prehnite, vesuvianite, scheelite or tellurides are difficult to visually identify in the field, and some yellow-green garnets may superficially resemble epidote or pyroxene. Core and outcrop samples should be routinely tested with an ultra-violet lamp for the presence of fluorite, scheelite or powellite.

11. Because some high grade ore in Au skarns may contain little or no sulphides and the Au is generally invisible to the naked eye, routine assaying is essential to determine ore and waste-rock. However, the poor Cu:Au correlation that exists in most Au skarns and some Cu skarns indicates that the precious metal potential of a skarn may be overlooked if sampling is restricted to sections rich in Cu sulphides. Ideally, *all* the different mineral assemblages, including sulphide-poor sections or outcrops should be assayed. This assay data can be used to determine metal correlations and metal ratios, which in turn can be diagnostic of particular skarn classes (e.g. Au skarns have lower Cu/Au and Zn/Au ratios than the other skarn classes). Variations in some metal element ratios throughout a skarn may be used as a guide to ore.

12. Whole-rock analyses on the intrusion associated with the skarn provides compositional data which may assist identifying similar intrusions regionally. The Fe_2O_3/FeO ratios give information on the relative oxidation state of the intrusion (e.g. Keith and Swan, 1987; Theodore *et al.*, 1991) and some trace element data, using discrimination plots or spidergrams can be used to interpret the tectonic and igneous environment in which the intrusion and the skarn were generated (e.g. Meinert, 1995).

13. Because the chemistry of skarn minerals (particularly garnet, clinopyroxene, amphibole and biotite) can be diagnostic of some skarn classes, microprobe analyses of crystals provides useful data about the chemical history and environment of the skarn system. The chemistry of many minerals varies both throughout single crystals (core-to-rim chemical zoning) and throughout the skarn envelope as a whole. Single spot microprobe analyses on randomly selected minerals is less useful than tracked core-to-rim analyses across single crystals, particularly where chemical zoning is present. Ideally, tracked analyses should be completed across both small and large crystals of any particular mineral; the latter tend to have undergone a relatively longer period of growth and thus may provide a more complete history of the skarns chemical evolution at that location. Some data, such as the mole fractions of hedenbergite and andradite present in pyroxenes and garnets respectively (Einaudi, 1982), or the subcalcic nature of the garnets (Newberry, 1983) may provide clues regarding the oxidation state of the skarn. Newberry has observed that subcalcic garnets are diagnostic of larger and higher grade W skarn deposits which indicates this geochemical data of garnets are important in W exploration.

14. It is emphasized that much of the prograde and retrograde alteration in a skarn is strongly controlled by stratigraphy and/or pre-skarn structures, although recognizing such features may be difficult due to skarn overprinting. Identifying the structurally related hydrothermal conduits by mapping may provide vital clues for the successful discovery and exploration of skarn deposits.

14. RECOMMENDATIONS FOR FURTHER RESEARCH

This study has raised a number of intriguing aspects and/or problems regarding some skarns in British Columbia. These include:

1. Although some polymetallic Mo skarns worldwide are enriched in U and Bi (Einaudi *et al.*, 1981), Au-rich Mo skarns are rare (Einaudi, personal communication, 1994). Thus, the Au-Co-As-bearing Novelty and Giant deposits (082FSW 107 and 109) at Rossland appear to be a unique type of Mo skarn that warrant further mapping and research. These deposits, together with those at the adjoining Coxey Mo (W) skarn (082FSW 110), may belong to a single, large exoskarn envelope that has mineralogical and metallic zoning.

2. The Emerald Tungsten-Dodger deposits (082FSW 010, 011) contain some mineralization that is rich in Au, As, Bi, Te and Se, and a number of unusual tellurides and selenides have been tentatively identified by electron microprobe techniques. The Au mineralization is quartz and sulphide-rich and is mineralogically and chemically distinct from the sulphide-poor scheelite-bearing ore. However, no mineral containing the gold has yet been identified and it is not known whether the Au-Bi-As-Te-Se mineralization is related to the W skarn system or represents a later overprint. If the former is true, it suggests that other W skarns in British Columbia also have a potential for gold.

3. The significance of the skarn wallrock associated with some vein systems (Figure 20), including the Au-bearing quartz veins at Second Relief and the Cu-Au bearing sulphide veins at Rossland is unknown. We know of no vein deposits elsewhere with this style of alteration and the examples in British Columbia need further study.

4. The variable Cu:Au, Cu:Ag and Ag:Au ratios in Fe, Cu and Au skarns suggests that the Au is associated with different mineral assemblages in each of these skarn classes. We know from the work of Camsell (1910), Billingsley and Hume (1941), Theodore *et al.*, (1991) and Ettlinger *et al* (1992) that the gold in most Au skarns is associated with arsenopyrite and Bi-tellurides, whereas the chalcopyrite tends to be barren of Au. Assay data suggests that much of the Au in Fe skarns is related to chalcopyrite, but this is not proven and it could, alternatively, be carried in either the pyrite or pyrrhotite. Likewise, although there is poor Cu:Au correlation in Cu skarns *as a whole*, a good correlation between these metals is seen in some individual deposits.

5. The Maid of Erin, State of Montana, Majestic, Adams and Lawrence skarns in the Rainy Hollow area of northwestern British Columbia(Webster *et al.*, 1992) may all lie within a major skarn envelope that should be mapped and explored. The Au-poor and Ag-rich Maid of Erin and State of Montana Cu skarns are hosted by proximal garnet skarn. It is possible that the distal, pyroxene-rich parts of the envelope contain Au skarn deposits.

15. SUMMARY AND CONCLUSIONS

There are at least 735 skarns (as defined by Burt, 1977) in British Columbia. The overwhelming majority are calcic skarns; the rarity of magnesian skarns in British Columbia reflects the absence of major plutonism in the areas with platformal dolomites. They range from small, barren occurrences to extensive alteration envelopes that involved the production of more than one cubic kilometre of skarn alteration. Some of the larger skarns are associated with metal deposits exceeding 30 million tonnes of ore.

Skarns can be separated into three groups. One group of 15 skarn occurrences is associated with Cu or Mo porphyry deposits. However, the skarn alteration generally represents only a minor component of the overall porphyry system and, as with most skarns, it predates the introduction of the metals. The majority of these skarn-bearing porphyry systems are hosted by Triassic-Jurassic island arc rocks in the Quesnellia and Stikinia terranes.

Another small and unique group of skarns, comprising 25 occurrences, is found as generally barren wallrock alteration to large quartz and/or sulphide vein systems. Over half of these are hosted by Lower Jurassic rocks of the Rossland Group in the Quesnellia Terrane of southeastern British Columbia. In many cases, the genetic and temporal relationship between the veins and the skarn envelopes is uncertain although some of those at Rossland appear to be related and coeval.

The third and largest group of skarns comprises 695 occurrences. On the basis of their chemistry or dominant minerals, these are classed as follows: 340 Cu, 146 Fe, 80 Pb-Zn, 48 W, 28 Au, 22 Mo, 17 industrial mineral and 3 Sn skarns, as well as a further 11 occurrences of unknown class. These are distributed across 19 different tectono-stratigraphic terranes and subterranes (as defined by Wheeler *et al.*, 1991; Gabrielse *et al.*, 1991); these terranes vary considerably in character from those dominated by island arc rocks (e.g. Wrangellia, Stikinia and Quesnellia), those with abundant ocean-floor material (e.g. Cache Creek and Slide Mountain), those which were formed at or relatively close to the ancestral continental margin (e.g. Kootenay, Cassiar and Barkerville), and others that comprise cratonic basement (Monashee and ancestral North America). However, there is a marked spatial and temporal relationship between certain skarn classes, their metal production, and the character and origin of the host terranes. Skarns are poorly developed in terranes having abundant ocean-floor material whereas those dominated by oceanic island arc rocks contain over 80 % of the skarns and have accounted for virtually all the Fe, Cu, Au, Ag and Zn metal produced. Only 5 % of the skarns is hosted by terranes in the North American basement and craton yet these have been responsible for all of the W production. All the Mo production from skarn has come from the Kootenay terrane which also hosts the largest number of Mo skarns (8 occurrences). Although the Coast Belt has the greatest concentration of plutonic rocks in the province, its terranes host only 4 % of the skarns and these have had negligible metal production. The reason for the scarcity of skarn (and other magmatic-related deposits such as Cu porphyries) in the Coast Belt terranes is unknown.

At least 112 skarns have had some recorded metal production and an additional three deposits have produced a variety of industrial mineral commodities such as marble. These 112 metal-producing skarns are distributed across 10 tectono-stratigraphic terranes but the largest deposits are confined to only four terranes: Wrangellia, Quesnellia, Kootenay and ancestral North America. Production data suggests that between 120 million and 142 million-t of ore has been mined from skarn with a yield of nearly 35 million-t of Fe concentrate (magnetite), 850 000-t of Cu metal, 7520-t of W concentrate (scheelite) and 1760-t of Mo concentrate (molybdenite). This represents approximately 90 % of the Fe, 80 % of the W and 12 % of the Cu produced in British Columbia. Skarns have also produced over 119-t of Au and 364-t of Ag, representing nearly 16 % and 2 %, respectively, of the provinces production of these metals from hardrock mining. Although 70 skarns have produced some Au, over 80 % has been won from just two major deposits, Nickel Plate and Phoenix. All the Ag from skarn was derived as a byproduct, largely from Cu and Fe skarns, with the Phoenix deposit being the largest single producer of Ag.

In many terranes, there is no consistent relationship between the number of skarns and the total metal production. For example, Wrangellia hosts nearly all the Fe skarns and has accounted for virtually all the magnetite produced in British Columbia. Yet it also has the largest number of Cu skarns (173 occurrences) of any terrane yet its Cu production is only one fifth that of Quesnellia which has only 64 Cu skarns.

Skarns in British Columbia were developed during three distinct time periods (Jurassic, Cretaceous and Eocene-Oligocene) which coincided with three episodes of subduction-related plutonism. The most important episode took place in the Jurassic when over half of the skarns (at least 372 occurrences) were formed. Later episodes, during the Cretaceous and Eocene-Oligocene, resulted in the development of 120 and 61 skarns respectively.

The majority of British Columbia's Au, Fe and Cu skarns were developed during Early to Middle Jurassic oceanic island-arc activity in Wrangellia, Quesnellia and Stikinia. By contrast, nearly all the W are related to a belt of Cretaceous plutons that intrude sedimentary rocks deposited either close to or on the ancestral north American continent.

Major and trace element analytical data on 189 samples of unaltered igneous rocks associated with skarns, indicate that nearly all skarns are related to calc-alkaline rocks. The plutons responsible for Fe, Au and many Cu skarns are metaluminous, relatively undifferentiated, Fe-rich and largely of gabbro-quartz diorite-quartz monzodiorite composition; their Nb, Y and Rb contents are characteristic of "volcanic arc granites" (as defined by Pearce *et al.*, 1984), and their chemistry and preferential development in oceanic island arc terranes suggests they were derived as melts from primitive oceanic crust. Chemical plots, after Batchelor and Bowden (1985), indicate that they mostly represent "pre-plate collision" intrusions that were presumably formed in the island arcs when the latter lay outboard from the ancestral north American continent. Relative to other igneous rocks, plutons responsible for the Hedley Au skarns are distinct in having very low Rb abundances (avg. 28 ppm Rb) as well as the highest Ba/La and Sc/Nb ratios (avg. 119 and 23 respectively).

The plutons associated with W and Sn skarns are peraluminous, highly differentiated, Fe-poor rocks that are rich in large ion lithophile elements and largely of granite-adamellite-composition. Their chemistry and terrane setting suggests they represent partial melts of continentally-derived sediments, and chemical plots after Batchelor and Bowden (1985) indicate they are "syn-collision" intrusions. Most of the plutons, including those responsible for the Emerald Tungsten-Dodger deposits are "within plate" intrusions; however, the igneous rocks related to the Dimac (Silence Lake) W skarn are unusual in being "volcanic arc granites".

Garnet, epidote and clinopyroxene are the three most common gangue minerals, being reported in 75 %, 56 % and 34 % of British Columbia's skarns respectively. The ferric-Fe dominant mineral epidote is present in 70 % of the Cu skarns but is less commonly reported in the more reduced W skarns. Vesuvianite and fluorite are most common in W and Sn skarns where the hydrothermal systems are richer in Al, F and B. Although wollastonite is recorded in 68 skarns, only six deposits discovered to date have a commercial potential for this industrial mineral. Even as a trace mineral, wollastonite is extremely rare in Fe skarns.

Chalcopyrite, pyrite, magnetite, pyrrhotite, sphalerite, galena, molybdenite and scheelite are, in decreasing order, the most commonly reported opaque minerals in skarn. More than 85 % of Au skarns contain arsenopyrite and nearly 30 % carry native bismuth. Hematite is most commonly reported in Cu skarns, reflecting their more oxidized state.

Over 460 microprobe analyses completed on garnets from 27 skarns indicate the mineral is mostly low Mn andradite-grossularite solid solutions. A few Sn, W and Pb-Zn skarns have garnets containing > 5 mol % pyralspite. Some garnets in the Emerald Tungsten skarn are highly subcalcic and manganiferous, containing up to 16 % Mn O and 48 mol % pyralspite. They are also unusual in containing more than 1 % MgO. Sporadic F, Cl and Sn enrichment is noted in the garnets and vesuvianites of some Sn and W skarns. Some garnets at the Daybreak Sn skarn are also distinct in containing up to 1.2 % Cr_2O_3 (Ray *et al.*, 1997).

Over 230 microprobe analyses of skarn clinopyroxenes demonstrate that most are low Mn diopside-hedenbergite solid solutions. However, varying amounts of the johannsenite component are present in the pyroxenes of individual Fe, Au Pb-Zn and W skarns. No F, Cl or Sn enrichment was noted in any pyroxenes. The pyroxenes of Au and Fe skarns are chemically similar, except those in the latter commonly lack pyroxenes of Hd 70 to Hd 90 composition. This study suggests that many pyroxenes in Sn, W and Pb-Zn skarns have different Al_2O_3/MgO and MnO/FeO ratios and that variations in these ratios appears to correlate with the oxidation state of the skarn system.

Assay data shows that in the ore of Fe skarns, an excellent positive correlation exists between Au:Cu, Au:Ag and Cu:Ag. In Cu skarns as a whole, a good Cu:Ag correlation is seen, but there is generally a poor correlation between Au:Cu and Au:Ag. In most Au skarns, there is no apparent correlation between either Au, Cu or Ag. These differences suggest that the Au metal is associated with different mineral assemblages in these three skarn classes. It also shows that the Au potential of a skarn can be overlooked if only outcrops rich in Cu sulphides are sampled and assayed.

The use of either production data or assay results from mineralized grab samples indicates that some skarn classes are marked by diagnostically different metal ratios. Essentially, Au skarns have the lowest Cu/Au (<2000), Zn/Au (<100) and Ag/Au (< 2) ratios of any skarn class. By contrast, Pb-Zn skarns have the highest Zn/Au ratios (>1000) and the ore of Cu, Fe, W, and Sn skarns tends to plot intermediate between Au and Pb-Zn skarns.

On the basis of gangue mineralogy, calcic Au skarns can be separated into either pyroxene-rich, garnet-rich or epidote-rich types which have significantly different hostrocks, styles of mineralization and mineral and metal zoning. Pyroxene-rich and epidote-rich Au skarns are well represented by the Nickel Plate and QR deposits respectively. However, no major garnet-rich Au skarn has yet been discovered in British Columbia, although there is a good potential for such deposits.

In British Columbia, Au skarns and Au-bearing Cu skarns are currently the most economically attractive targets for skarn exploration. This study indicates that island arc assemblages in Quesnellia, or in correlative rocks elsewhere, have the best exploration potential for these deposits.

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APPENDICES 1-3

Appendix 1: Listing of 15 skarns associated with porphyry deposits.

Appendix 2: Listing of 25 skarns associated with vein systems.

Appendix 3: Listing of remaining 695 skarn occurrences in B.C.

The numbers in first column 1 of Appendices 1-3 refer to the skarn occurrence numbers shown in Figures 20-23.

For terrane legend *see* Figure 3.

Note: after Appendices 1-3 had been compiled, a few additional occurrences were recognized to be skarn but it was too late to include these properties in the database or statistics. The largest and most important of these is the QR-Quesnel River Au skarn (093A 121) (Fox and Cameron, 1995) which is mentioned in the text but not listed in Appendix 3. Other minor occurrences not listed in Appendix 3 include the Cyclops Pb-Zn skarn (082ESE 122) in the Greenwood district; an assay of this skarn is presented in Appendix 4E.

APPENDICES 4-10

(On diskette as Excel 5 files and Comma delimited (csv) files)

Appendix 4: Assay data of mineralized skarns...................... (appen04a.xls/csv - appen04h.xls/csv)
4A: Fe skarns, 4B: Cu skarns, 4C: Au skarns,
4D: Mo skarns, 4E: Pb-Zn skarns, 4F W skarns,
4G Sn skarns, 4H industrial mineral skarns.

Appendix 5: Chemistry of intrusions related to skarns........... (appen05a.xls/csv - appen15f.xls/csv)
5A: Fe skarns. 5B: Cu skarns, 5C: Au skarns,
5D: Mo skarns, 5E: W skarns, 5F: Sn skarns.

Appendix 6: Metal production from skarns listed
by tectonic terrane.. (appen06.xls/csv)

Appendix 7: Calculated metal ratios of skarns
using production data in Appendix 6... (appen07.xls/csv)

Appendix 8: Microprobe analytical data of skarn garnets...................................... (appen08.xls/csv

Appendix 9: Microprobe analytical data of skarn pyroxenes................................ (appen09.xls/csv)

Appendix 10: Microprobe analytical results of
skarn vesuvianites and biotites... (appen010.xls/csv)

Sample descriptions for assays listed in Appendix 4 are presented in the following files: Fe skarns (feaspubc.xls); Cu skarns (cuaspubc.xls); Au skarns (auaspubc.xls); Mo skarns (moaspubc.xls); Pb-Zn skarns (pbaspubc.xls); W skarns (waspubc.xls); Sn skarns (snaspubc.xls); industrial mineral skarns (imaspubc.xls).

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
696	**082FNW071** WILLA AYLWIN	49 52 57 117 21 57	QN	DEPR	Au Cu Ag Zn Pb Mo Sb Bi	Pyroxene Actinolite Garnet Epidote Anhydrite Scapolite K-Feldspar	Pyrite Pyrrhotite Chalcopyrite Native Gold Magnetite Sphalerite Native Silver Molybdenite Hematite	Cu (Au)	Breccia Tuff Siltstone	Rossland Undefined Formation Lower Jurassic	Quartz Monzonite Middle Jurassic 165 Ma

COMMENTS:
Locally, the mineralization includes traces of Pb-Bi-Sb sulphosalts, and it is associated with garnet-pyroxene-scapolite alteration assemblages. There is a strong spatial relationship between high gold
grades and the calcsilicate assemblages, with andraditic garnet developed in the upper portion of the ore zones and anhydrite in the lower portions. The garnet-magnetite assemblage over
-printed the pyroxene-pyrite-pyrrhotite assemblage, and gold was deposited during the transition (Heather, 1985). Minfile reports reserves of 414 544 t grading 5.93 g/t Au and 0.91% Cu.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
697	**082FSW229** STEWART 2 MAIN	49 16 55 117 15 52	QN	DEPR	Mo W Au Ag Pb Zn	Epidote Sericite Chlorite K-Feldspar	Molybdenite Scheelite Pyrite Pyrrhotite Powellite Native Gold	Mo (W)	Breccia Agglomerate	Rossland Hall Lower Jurassic	Nelson Intrusions Middle Jurassic Quartz Monzonite Middle Jurassic

COMMENTS:
MINFILE reports some W bearing skarns are developed around the margins of this porphyry-Mo related intrusion.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
698	**082KNW087** TROUT LAKE	50 38 20 117 36 09	KO	DEPR	Mo W Pb Zn Cu	Quartz K-Feldspar Albite Biotite Sericite Pyrite Ankerite Chlorite	Molybdenite Pyrite Pyrrhotite Scheelite Galena Sphalerite Chalcopyrite Tetrahedrite	Mo (W)	Limestone Argillite	Lardeau Undefined Formation Lower Cambrian	Granodiorite Upper Cretaceous

COMMENTS:
Skarn alteration is reported by Linnen (1985).

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
699	**092HSE001** SIMILCO COPPER MOUNTAIN (SIMILCO) **COMMENTS:** A 60 m wide zone of garnet-pyroxene-epidote-hornblende skarn overprints early alteration close to the Copper Mountain stock. Elsewhere, between the Ingerbelle mine and Copper Mt., late K-feldspar and scapolite veining is present. The alkalic Copper Mountain stock ranges from monzonite (core) to diorite (margin) (Preto, 1972).	49 19 52 120 31 59	QN	PROD	Cu Au Ag	Biotite Albite Epidote K-Feldspar Garnet Scapolite Pyroxene Hornblende	Chalcopyrite Pyrite Bornite Chalcocite Native Gold	Cu (Au)	Andesite Tuff Siltstone	Nicola Undefined Formation Upper Triassic	Copper Mountain Intrusions Upper Triassic Monzonite Upper Triassic
700	**092HSE004** INGERBELLE INGERSOLL BELLE **COMMENTS:** The garnet, pyroxene and scapolite alteration is similar to that seen on the Similco property. The alkalic Lost Horse intrusion ranges from diorite to monzonite to syenite (Preto, 1972). Sphene is also present.	49 20 22 120 33 18	QN	PAPR	Cu Au Ag Mo Zn	Biotite Albite Epidote Chlorite K-Feldspar Scapolite Pyroxene Garnet	Chalcopyrite Pyrite Molybdenite Sphalerite	Cu	Tuff Andesite Diorite	Nicola Undefined Formation Upper Triassic	Lost Horse Intrusions Lower Jurassic 195 Ma +/- 8 Ma Monzonite Lower Jurassic 195 +/- 8 Ma
701	**092INE012** AJAX (WEST) AJAX (AFTON) **COMMENTS:** Some of the albitized alteration zones are cut by veins of pale green pyroxene; the latter was identified by XRD as diopside (Ray and Webster, unpublished data).	50 36 29 120 24 12	QN	PAPR	Cu Au Ag Mo	Albite Chlorite Epidote Biotite K-Feldspar Pyroxene	Chalcopyrite Pyrite Bornite Chalcocite Molybdenite Magnetite	Cu	Andesite Basalt Tuff	Nicola Undefined Formation Upper Triassic	Iron Mask Batholith Lower Jurassic Diorite Lower Jurassic
702	**092INE013** AJAX (EAST) AJAX (AFTON) **COMMENTS:** The mineralization is cut locally by late veins of scapolite; the latter was identified by XRD as marialite (calcian scapolite) (Ray and Webster, unpublished data). Microprobe analyses indicate the scapolite contains up to 3.6% Cl2O (K.Ross, personal communication, 1993).	50 36 43 120 23 21	QN	PAPR	Cu Mo Au Ag	Biotite Epidote Albite Scapolite	Chalcopyrite Pyrite Bornite Chalcocite Molybdenite Magnetite	Cu	Andesite Tuff Basalt	Nicola Undefined Formation Upper Triassic	Iron Mask Batholith Lower Jurassic Diorite Lower Jurassic
703	**093A 008** MOUNT POLLEY CARIBOO-BELL **COMMENTS:** A garnet-epidote zone occurs between an inner potassic zone and an outer propylitic zone. The alkalic Polley stock ranges from diorite to syenite in composition.	52 33 48 121 38 12	QN	DEPR	Cu Au	Biotite K-Feldspar Pyroxene Epidote Chlorite Garnet	Chalcopyrite Magnetite Pyrite Native Copper Cuprite Chalcocite Digenite Covellite Bornite	Cu (Au)	Diorite Breccia	Nicola Undefined Formation Upper Triassic	Polley Stock Lower Jurassic 184 +/- 7 Ma Diorite Lower Jurassic 184 +/- 7 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHYRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
704	**093L 045** FOG/FLY S.L. 15 **COMMENTS:** Garnet skarn locally overprints volcanic rocks.	54 29 04 127 10 22	ST	PROS	Mo Cu	Sericite Garnet Epidote	Molybdenite Chalcopyrite Pyrite Magnetite	Cu (Mo)	Tuff Breccia Porphyry	Hazelton Telkwa Lower Jurassic	Bulkley Intrusions Upper Cretaceous Granodiorite Upper Cretaceous
705	**093L 046** FOG S.L. 6 **COMMENTS:** Garnet skarn locally overprints volcanic rocks.	54 29 01 127 09 09	ST	PROS	Mo Cu	Sericite Garnet	Molybdenite Chalcopyrite Pyrite Magnetite	Cu (Mo)	Tuff Breccia Porphyry	Hazelton Telkwa Lower Jurassic	Bulkley Intrusions Upper Cretaceous Granodiorite Upper Cretaceous
706	**093L 110** GLACIER GULCH **COMMENTS:** Some garnet-epidote-scheelite skarn assemblages developed prior to the main molybdenum stockwork.	54 49 12 127 17 54	ST	DEPR	Mo W Cu Zn As Bi	K-Feldspar Sericite Garnet Biotite Amphibole Epidote Chlorite	Molybdenite Scheelite Wolframite Chalcopyrite Sphalerite Pyrite Pyrrhotite Bismuthinite Tennantite	Mo (W)	Granodiorite Porphyry Dyke	Hazelton Undefined Formation Jurassic	Hudson Bay Mtn. stock Upper Cretaceous Granodiorite Upper Cretaceous
707	**103P 223** AJAX LE ROY **COMMENTS:** The deposit is associated with four closely spaced elongate stocks. A 2000 by 1500 m alteration envelope comprises an outer biotite hornfels zone and an inner quartz-albite-epidote-garnet zone. Mineralization occurs in the stocks and the adjacent contact metamorphosed rocks. Drilling has defined indicated reserves of 196 800 000 t grading 0.072% Mo (0.12% MoS2)(Preliminary Map 65-1987).	55 35 25 129 23 59	ST	DEPR	Mo Zn Pb Cu Ag	Sericite Albite Epidote Garnet	Molybdenite Pyrrhotite Sphalerite Pyrite Galena Chalcopyrite	Mo	Argillite Siltstone Greywacke	Stuhini Undefined Formation Upper Triassic	Alice Arm Intrusion Eocene 54.5 Ma Quartz Monzonite Eocene 54.5 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
708	**104G 090** GALORE CREEK STIKINE COPPER	57 08 10 131 27 13	ST	DEPR	Cu Au Ag Zn Mo Pb Sb As F	Garnet Vesuvianite Biotite Fluorite Sericite Chlorite Albite K-Feldspar	Chalcopyrite Bornite Chalcocite Sphalerite Molybdenite Galena Scheelite Native Gold Native Silver Tetrahedrite Tennantite Pyrite Magnetite Hematite	Cu (Au)	Trachyte Phonolite Tuff	Stuhini Undefined Formation Upper Triassic	Galore Creek Intrusions U Trias.-L Juras. Syenite U Trias.-L Juras.

COMMENTS:
The garnets occur both in the syenite intrusions and in veins and disseminations in the volcanic country rock. Some of the garnet crystals are colour zoned.
This zoning is associated with an enrichment in TiO2 (Watson, 1969).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
709	**104G 098** GALORE CREEK - SOUTH BUTTE STIKINE COPPER	57 05 52 131 27 19	ST	PROS	Cu	Unknown	Chalcopyrite Pyrite	Cu	Volcanic Porphyry Breccia	Stuhini Undefined Formation Upper Triassic	Galore Creek Intrusions U Trias.-L Juras. Syenite U Trias.-L Juras.

COMMENTS:

TECTONIC BELT: Coast Crystalline

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	PORPHRY CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
710	**104K 013** MT. OGDEN (MOLY-TAKU) NAN	58 26 19 133 21 33	ST	DEPR	Mo Zn Cu Ag W F	Epidote Chlorite Garnet Fluorite Tremolite Wollastonite Pyroxene Rhodochrosite	Molybdenite Sphalerite Pyrite Chalcopyrite Pyrrhotite Scheelite Magnetite	Mo	Limestone Chert Alaskite	Unknown Group Unknown Formation Permian-Triassic	Alaskite Cretaceous-Tertiary

COMMENTS:
Mineralization consists mainly of veins and fracture fillings of molybdenite with quartz, sericite, fluorite, pyrite and trace sphalerite.
Locally, the country rock adjacent to the alaskite stock contains pyroxene-garnet-epidote skarn assemblages, together with disseminated magnetite, chalcopyrite and sphalerite.

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
711	**082ESW180** YUNIMAN BLACK PINE (L.1912)	49 18 30 119 56 15	QNO	SHOW	Au Ag Pb Zn Cu As	Scapolite Garnet	Arsenopyrite Native Gold Galena Sphalerite Chalcopyrite Pyrite Marcasite Pyrrhotite Magnetite	Au	Chert Tuff Greenstone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	 Triassic Diorite Jurassic

COMMENTS:
This skarn is associated with mineralized quartz veins. A 0.3 m thick vein assayed 95 g/t Au and 1.95% As (Ass. Rpt. 14580 & 15843).

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
712	**082FSW093** LE ROI BLACK BEAR	49 04 43 117 48 28	QN	PAPR	Au Ag Cu	Actinolite Chlorite Epidote Garnet	Pyrrhotite Chalcopyrite Pyrite Native Silver Stromeyerite Magnetite Native Gold	Au (Cu)	Monzonite	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma

COMMENTS:
Steeply dipping auiferous pyrrhotite-chalcopyrite veins are associated with garnet-pyroxene skarn wallrock alteration.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
713	**082FSW097** WAR EAGLE	49 04 58 117 48 21	QN	PAPR	Au Ag Cu	Wollastonite Gmelinite	Pyrrhotite Chalcopyrite Native Gold Native Silver Stromeyerite Pyrite Molybdenite Sphalerite Magnetite	Au (Cu)	Monzonite	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma

COMMENTS:
The sulphide-rich and gold-bearing veins are associated with wollastonite-quartz skarn. Gmelinite is closely related chemically to the mineral chabazite.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
714	**082FSW102** EVENING STAR ROSSLAND	49 05 23 117 47 40	QN	PAPR	Au Ag Cu Ni Co Mo Bi Zn As	Garnet Amphibole Pyroxene Epidote Chlorite	Pyrrhotite Arsenopyrite Native Gold Chalcopyrite Molybdenite Sylvanite Danaite Pyrite Cobaltite Native Bismuth Bismuthinite Sphalerite	Au (Cu)	Siltstone Tuff Argillite	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma

COMMENTS:
Production was mainly from an irregular, northeast trending sulphide vein system that is associated with garnet-pyroxene wallrock alteration. The veins have a high cobalt and nickel content (Drysdale,
1915). Three sulphide drillcore samples assayed up to 0.2% Cu, 1.9 g/t Au, 2.5 g/t Ag, 4500 ppm As, 438 ppm Co, 40 ppm Bi and 74 ppm Ni. No anomalous Cd or Mo was recorded (Hoy et al., 1992).

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
715	**082FSW108** GERTRUDE ROSSLAND	49 05 04 117 49 01	QN	SHOW	Mo Au Cu Zn Bi As Co	Garnet Pyroxene Actinolite Chlorite	Pyrrhotite Chalcopyrite Pyrite Arsenopyrite Molybdenite Sphalerite Native Bismuth Bismuthinite Native Gold	Au (Cu)	Siltstone Breccia Diorite	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma
	COMMENTS: Two mineralized drillcore samples assayed up to 0.12% Cu, 26 g/t Au, 3 g/t Ag, 32 ppm As, 53 ppm Co, 25 ppm Mo and 104 ppm Bi (Hoy et al., 1992). The sulphide veins are associated locally with garnet-pyroxene wallrock alteration.										
716	**082FSW122** DEER PARK	49 03 38 117 49 22	QN	PAPR	Au Cu Ag Mo Fe W Co Bi Pb As	Actinolite Garnet	Pyrrhotite Native Gold Arsenopyrite Chalcopyrite Pyrite Molybdenite Magnetite Scheelite Native Bismuth Galena Kobellite Danaite	Au (Cu)	Greenstone Breccia	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma
	COMMENTS: Mineralization consists of massive pyrrhotite and magnetite along the margins of the monzonite. A mineralized quartz vein network is also present. Local garnet-actinolite skarn is developed in the wallrock.										
717	**082FSW123** HOMESTAKE ROSSLAND	49 03 47 117 47 55	QN	PAPR	Ag Au Cu Pb Zn As	Unknown	Pyrrhotite Marcasite Sphalerite Galena Arsenopyrite Chalcopyrite Pyrite Magnetite	Cu	Monzonite	Rossland Elise Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma
	COMMENTS: Sulphide-rich veins are associated with wallrock containing magnetite- bearing skarn.										
718	**082FSW151** COLUMBIA-KOOTENAY COLUMBIA	49 05 21 117 46 58	QN	PAPR	Au Cu Ni Bi As Sb	Pyroxene Garnet	Pyrrhotite Arsenopyrite Chalcopyrite Pyrite Gersdorffite Bismuthinite Native Bismuth	Au (Cu)	Porphyry Monzonite Breccia	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma
	COMMENTS: The sulphide-rich veins are associated with some garnet-pyroxene skarn in the wallrock.										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
719	**082FSW152** CROWN POINT HIDDEN TREASURE	49 03 53 117 45 35	QN	PAPR	Au Cu Ag Co	Hornblende Garnet Chlorite Epidote	Pyrrhotite Chalcopyrite Pyrite Native Gold	Au (W)	Basalt Tuff Siltstone	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma

COMMENTS:
The deposit is described by Wilson et al, 1990a. Two sulphide-rich grab samples from the mine dump assayed up to 0.74% Cu, 25 g/t Au, 12 g/t Ag, 361 ppm Co and 170 ppm Mo. No anomalous As, Bi, Pb or Zn were recorded (Appendix 4C).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
720	**082FSW153** LILY MAY LILLY MAY	49 03 24 117 48 47	QN	PAPR	Ag Cu Pb Zn Au Sb	Sericite Chlorite	Pyrrhotite Chalcopyrite Boulangerite Sphalerite Galena Stibnite Pyrite Magnetite	Cu	Siltstone Argillite Hornfels	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic 190 Ma Monzonite Lower Jurassic 190 Ma

COMMENTS:
Minor magnetite-bearing skarn alteration occurs adjacent to the sulphide-rich veins.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
721	**082FSW179** GOLDEN EAGLE T.S.	49 23 47 117 20 42	QN	PAPR	Au Pb Zn Ag Cu	Epidote Chlorite Garnet	Pyrite Chalcopyrite Galena Sphalerite Native Gold	Pb-Zn	Tuff Dyke	Rossland Elise Lower Jurassic	Nelson Intrusions Lower Jurassic Diorite Lower Jurassic

COMMENTS:
Mineralized quartz veins, up to 1 m thick, are associated with skarn wallrock alteration.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
722	**082FSW187** SECOND RELIEF NO. 1 VEIN	49 19 20 117 23 44	QN	PAPR	Au Ag Pb Zn Cu Mo As Bi Cd	Garnet Epidote Pyroxene Biotite	Pyrite Pyrrhotite Chalcopyrite Molybdenite Magnetite Native Gold Sphalerite Arsenopyrite	Au (Cu)	Basalt Tuff Diorite	Rossland Elise Lower Jurassic	Bonnington Pluton Middle Jurassic Granodiorite Middle Jurassic 167 Ma

COMMENTS:
The property includes at least eight subparallel gold-bearing quartz veins that reach 4 m in width and over 300 m in length. The veins cut an extensive siliceous and generally barren garnet-epidote-quartz skarn. Four mineralized quartz vein grab samples from the mine dump assayed up to 10 g/t Au, 3 g/t Ag. 0.25% Cu, 1.78% Zn, 5.0% As, 25 ppm Sb, 23 ppm Mo, 5 ppm Bi, 510 ppm Cd and 1.7 ppm Te (Ray and Webster, unpublished data).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
723	**082FSW216** RAND INEZ	49 19 28 117 24 10	QN	PROS	Au Ag Cu	Garnet Epidote	Pyrite Pyrrhotite Chalcopyrite Native Gold	Au (Cu)	Argillite Siltstone Quartzite	Rossland Archibald Lower Jurassic	Bonnington Pluton Middle Jurassic Granodiorite Middle Jurassic 167 Ma

COMMENTS:
These quartz veins form part of the Second Relief mine. The age for the Bonnington pluton is given by Hoy (personal communication, 1992).

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
724	**082FSW222** WHITEWATER COLUMBIA	49 23 18 117 26 30	QN	PAPR	Au Ag Pb Zn Mo	Biotite Pyrite Epidote Chlorite Garnet	Pyrite Galena Sphalerite Molybdenite	Au	Tuff	Rossland Elise Lower Jurassic	Bonnington Pluton Middle Jurassic Granodiorite Middle Jurassic 167 Ma

COMMENTS:
Mineralized quartz veins, up to 1.8 m wide, cut both granodiorite and volcanic rocks: the latter are skarn altered. A drill intersection on the discontinuous Whitewater vein assayed 8.9 g/t Au over 0.67 m
(MINFILE).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
725	**082FSW228** LOTO 3 P S	49 16 25 117 55 40	QN	SHOW	W	Unknown	Scheelite	W	Argillite Granodiorite	Rossland Undefined Formation Lower Jurassic	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic

COMMENTS:
Several scheelite-bearing quartz veins (up to 9 m wide) cut skarn-altered hostrocks.

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
726	**092F 197** EAGLE GORGE	49 51 17 125 19 29	WR	SHOW	Cu Ag	Epidote Pyroxene Garnet	Chalcocite Chalcopyrite Native Copper Cuprite Pyrite Magnetite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age

COMMENTS:
This property includes mineralized quartz veins as well as a magnetite-bearing skarn (Ass. Rpt. 13602).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
727	**092L 006** TAGORE ELDORADO	50 00 20 126 50 48	WR	PAPR	Au Ag Cu Zn Pb	Epidote Chlorite Pyroxene Garnet Albite Apatite	Pyrrhotite Pyrite Sphalerite Chalcopyrite Galena Native Gold	Au	Tuff Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Unknown Uncertain Age

COMMENTS:
This occurrence consists of a mineralized, locally anastomosing quartz vein, up to 0.3 m wide, that cuts garnet skarn alteration.
It is uncertain whether the skarn is associated with the Eocene Catface or the Jurassic Island Plutonic Suite intrusions.

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
728	**092L 008** PRIVATEER PRIVATEER MINE	50 01 50 126 49 03	WR	PAPR	Au Ag Pb Cu Zn As	Pyroxene Wollastonite Garnet Plagioclase Biotite Ankerite	Pyrite Sphalerite Galena Chalcopyrite Arsenopyrite Pyrrhotite Native Gold	Au	Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Catface Intrusions Eocene 38 Ma +/- 14 Ma Granodiorite Eocene 38 +/- 14 Ma

COMMENTS:
Numerous gold and sulphide-bearing quartz veins are locally associated with skarn wallrock alteration.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
729	**092L 029** BARNACLE EXTENSION 1,3	50 03 20 126 49 45	WR	PAPR	Au Cu	Garnet	Pyrite Native Gold Chalcopyrite Pyrrhotite	Au	Andesite Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Upper Jurassic 148 +/- 8 Ma Diorite Upper Jurassic 148 +/- 8 Ma

COMMENTS:
Mineralized quartz veins cut a garnet skarn.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
730	**092L 149** MAJOR ZEBALLOS DOME	50 02 00 126 44 25	WR	PAPR	Cu Au	Garnet Epidote	Chalcopyrite Pyrite Magnetite Bornite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Catface Intrusions Eocene 38 +/- 14 Ma Granodiorite Eocene 38 +/- 14 Ma

COMMENTS:
The property includes mineralized quartz veins as well as garnet- epidote-magnetite-pyrite skarn developed along volcanic-limestone contacts (GSC Paper 40-12, page 36).

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
731	**094E 067** LAKE 21 LAKE	57 03 53 126 50 09	ST	SHOW	Cu Ag Zn Pb	Unknown	Chalcopyrite Galena Pyrite Sphalerite	Cu	Andesite Monzonite Marble	Takla Unknown Formation Upper Triassic	Quartz Monzonite Jurassic

COMMENTS:
A mineralized vein cuts skarn developed along marble-andesite contact. A 2 m chip sample from the vein assayed 4.86% Cu, 1.04% Zn and 89.9 g/t Ag (Ass. Rpt. 18241).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
732	**094E 072** PAU	57 16 03 127 09 09	ST	SHOW	Ag Au Cu Pb Sb	Unknown	Galena Chalcopyrite Tetrahedrite	Pb-Zn	Limestone	Takla Undefined Formation Upper Triassic	Unknown Uncertain Age

COMMENTS:
An 80 m long mineralized quartz vein is associated with skarn wallrock alteration.

TECTONIC BELT: Coast Crystalline

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
733	**103G 031** QUARTZ HILL CLIFF	53 21 50 130 07 05	AX	SHOW	Au Ag Zn Pb Mo	Chlorite Sericite Actinolite Garnet	Pyrite Sphalerite Galena Molybdenite Chalcopyrite	Pb-Zn	Marble	Undefined Group Unknown Formation Permian	Coast Plutonic Complex Uncertain Age Quartz Monzonite Uncertain Age

COMMENTS:
Skarn is cut by large quartz veins. Samples from the Cliff Zone assayed 2.0% Zn, 0.71% Pb, 27.4 g/t Ag and 3.4 g/t Au (Ass. Rpt. 14171).

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
734	**103P 163** LE ROY	55 35 14 129 23 42	ST	SHOW	Zn Pb Ag Mo Cu Sb	Epidote Garnet Albite	Pyrite Sphalerite Galena Tetrahedrite Molybdenite Chalcopyrite	Pb-Zn	Unknown	Stuhini Undefined Formation Upper Triassic	Quartz Monzonite Unknown

COMMENTS:
A flat lying mineralized quartz vein is associated with skarn. The associated intrusions also hosts the Ajax molybdenum deposit (103P 223).

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	VEIN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
735	**104O 016** LOGTUNG LOG JAM CREEK	59 59 45 131 36 00	DY	DEPR	W Mo Bi Cu Be F As	Garnet Pyroxene Biotite Hornblende Fluorite Beryl	Scheelite Molybdenite Chalcopyrite Bismuthinite Wolframite Pyrite Arsenopyrite	W (Mo)	Granite Dyke Argillite	 Undefined Formation Paleozoic-Mesozoic	Logtung Stock Cretaceous 118 Ma +/- 2 Ma Granite Cretaceous 118 +/- 2 Ma

COMMENTS:
The property includes several generations of molybdenite-scheelite bearing quartz veins, the youngest generation of which includes beryl, fluorite and bismuthinite.
A zone of garnet-pyroxene skarn surrounds the Mo-W quartz veins.

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
1	**092B 025** MILLSTREAM HIGHLAND	48 28 55 123 30 25	WR	PAPR	LS	Wollastonite	Unknown	I.M.	Limestone	Wark-Colquitz Gneiss Mount Mark ? Uncertain Age	Diorite Lower Jurassic
	COMMENTS: This skarn contains irregular lenses of wollastonite in marble.										
2	**092B 034** FINLAY PACIFIC STAR	48 40 39 123 41 12	WR	SHOW	Cu Ag Zn	Pyroxene Epidote Chlorite Garnet	Magnetite Pyrrhotite Chalcopyrite Pyrite Sphalerite	Cu	Limestone Basalt	Buttle Lake Mount Mark Miss.-Permian	Feldspar Porphyry Uncertain Age
	COMMENTS: A 1.8 m chip sample assayed 0.9% Cu and 7 g/t Ag (Ass. Rpt. 13997).										
3	**092B 035** VIVA EVA	48 40 55 123 41 44	WR	PAPR	Cu Ag	Epidote	Chalcopyrite Pyrrhotite Pyrite	Cu	Chert	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS:										
4	**092B 036** ROBERTSON STERLING	48 38 55 123 49 36	WR	SHOW	Ag Au Pb Zn Cu Mo	Garnet	Galena Pyrite Sphalerite Chalcopyrite Molybdenite	Pb-Zn	Basalt Gneiss	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Diorite Uncertain Age
	COMMENTS: Samples from the dump assayed 206 g/t Ag, 0.69 g/t Au and trace Cu (MMAR 1917, page 270). Skarn occurs in a shear zone with quartz veins.										
5	**092B 045** WILLORON 6 STAR FR	48 36 39 123 34 36	WR	SHOW	Fe	Epidote Garnet Pyroxene	Magnetite Pyrite Pyrrhotite	Fe	Limestone Basalt	Vancouver Quatsino Upper Triassic	Diorite Lower Jurassic
	COMMENTS:										
6	**092B 048** WALLACE IRON HILL	48 40 48 123 41 24	WR	SHOW	Cu Fe	Unknown	Unknown	Fe	Chert	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS:										
7	**092B 056** WILLORON 1-3,9,10 JUMBO	48 36 54 123 35 27	WR	PROS	Fe Cu Ag	Garnet Pyroxene Epidote	Magnetite Pyrrhotite Pyrite Chalcopyrite	Fe	Limestone Greenstone	Wark-Colquitz Gneiss Quatsino Upper Triassic	Unknown Uncertain Age
	COMMENTS:										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
8	**092B 057** STRIP WESTERN	48 41 44 123 42 36	WR	SHOW	Cu Ag	Garnet Epidote Chlorite	Pyrite Magnetite Pyrrhotite Chalcopyrite	Cu	Limestone Chert Basalt	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic
	COMMENTS: A 1.1 m sample assayed 2.34% Cu and 6.2 g/t Ag (Ass. Rpt. 13997).										
9	**092B 058** CHEMAINUS MAINE	48 37 07 123 36 04	WR	SHOW	Cu Fe	Garnet Epidote Pyroxene	Magnetite Pyrrhotite Pyrite Chalcopyrite	Fe	Limestone Greenstone	Wark-Colquitz Gneiss Quatsino Upper Triassic	Diorite Lower Jurassic
	COMMENTS:										
10	**092B 059** SIL 4 NORTHSTAR	48 40 39 123 39 59	WR	SHOW	Cu Ag Au	Garnet	Pyrite Pyrrhotite Chalcopyrite Magnetite	Cu	Limestone Marble Pelite	Buttle Lake Mount Mark Miss.-Permian	Koksilah Stock Lower Jurassic Diorite Lower Jurassic
	COMMENTS: A grab sample assayed 4% Cu, 30.9 g/t Ag and 0.07 g/t Au (Ass. Rpt. 15218).										
11	**092B 060** STAR WILLORON 15	48 36 28 123 34 11	WR	PROS	Fe Au Ag Cu	Garnet Epidote Pyroxene	Magnetite Pyrrhotite Pyrite Chalcopyrite	Fe	Limestone Greenstone	Wark-Colquitz Gneiss Quatsino Upper Triassic	Diorite Lower Jurassic
	COMMENTS: A 1.2 m chip sample assayed 56.7% Fe, 0.15% Cu, 12 g/t Ag and 4.8 g/t Au (Aho, 1961).										
12	**092B 063** IRON MASK	48 27 18 123 28 41	WR	SHOW	Cu	Garnet Pyroxene Epidote	Magnetite Pyrrhotite Pyrite Chalcopyrite	Cu	Amphibolite Limestone	Wark-Colquitz Gneiss Undefined Formation Paleozoic-Mesozoic	Quartz Diorite Lower Jurassic
	COMMENTS:										
13	**092B 064** PENTON	48 33 30 123 26 30	WR	SHOW	Cu Fe	Garnet Epidote Pyroxene	Magnetite Chalcopyrite Pyrite	Fe	Limestone Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS:										
14	**092B 080** BLUEBELL BLUE BELL	48 40 56 123 41 54	WR	PAPR	Cu Ag Zn	Garnet Epidote	Chalcopyrite Pyrite Magnetite Hematite	Cu	Chert Garnetite Limestone	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A 2 m chip sample from the Bluebell pit assayed 3.66% Cu, 0.28% Zn and 25.3 g/t Ag (Ass. Rpt. 13997). Specular hematite is present.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
15	**092B 082** W.A.E. FALLSIDE	48 40 09 123 41 29	WR	SHOW	Cu Zn Au	Garnet Actinolite Epidote Pyroxene	Chalcopyrite Magnetite Pyrite Pyrrhotite	Cu	Limestone Chert	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Sphalerite has not been identified but one grab sample assayed 1.9% Zn (MMAR 1952, page 214).										
16	**092B 083** DORA-MABEL DORA	48 41 19 123 42 21	WR	SHOW	Cu Ag	Epidote	Chalcopyrite Pyrolusite Hematite Pyrite Magnetite	Cu	Marble Chert	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic 185-190 Ma
	COMMENTS: A 50 cm chip sample assayed 0.97% Cu and 4 g/t Ag (Ass. Rpt. 13997). Specular hematite is present.										
17	**092B 100** BLOCK 383 BLOCK 217 **COMMENTS:**	48 41 01 123 40 45	WR	SHOW	Cu	Epidote	Pyrite Chalcopyrite Pyrrhotite	Cu	Chert Limestone	Buttle Lake Mount Mark Miss.-Permian	Diorite Uncertain Age
18	**092B 133** VV ANT	48 57 32 123 56 14	WR	SHOW	Cu Mo	Garnet	Pyrite Pyrrhotite Chalcopyrite Molybdenite	Cu	Tuff Argillite	Sicker Nitinat Devonian	Island Plutonic Suite Middle Jurassic
	COMMENTS: A 1.7 m drill intersection assayed 0.11% Cu and 0.007% Mo (Ass. Rpt. 7323).										
19	**092C 001** SAN MATEO LINDA	48 57 47 124 54 09	WR	SHOW	Cu Zn Ag Pb	Epidote Garnet Pyroxene	Chalcopyrite Galena Sphalerite Pyrite Magnetite	Zn	Limestone	Vancouver Quatsino Upper Triassic	Diorite Middle Jurassic
	COMMENTS: The mineralized zone is less than 0.60 m wide. A grab sample assayed 1.53% Cu, 5.98% Zn and 25.37 g/t Ag (Ass. Rpt. 9671).										
20	**092C 002** CROWN PRINCE SECH 2	48 58 19 125 13 14	WR	DEPR	Fe As	Epidote Garnet	Magnetite Pyrite Arsenopyrite	Fe	Tuff Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: This is a massive magnetite skarn with estimated reserves of 67500 t of high grade iron ore and additional possible reserves of 180000 t (MMAR 1916, page 291). No As, Au or Hg geochemical anomalies are reported (Ass. Rpt. 12196).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
21	**092C 003** IRON CHIEF WESTERN STEEL	48 58 37 125 14 53	WR	DEPR	Fe	Garnet Epidote	Magnetite Pyrite Pyrrhotite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: Mineralization is similar to the Crown Prince (092C 002) showing.										
22	**092C 004** BALD EAGLE SECH 2	48 58 26 125 14 36	WR	SHOW	Fe	Garnet	Magnetite Pyrite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
23	**092C 005** LORD OF THE ISLES SECH 2	48 58 27 125 13 52	WR	SHOW	Fe	Garnet	Magnetite Pyrite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
24	**092C 006** DOER RC 4	48 53 10 124 59 50	WR	SHOW	Cu Zn Au Ag As	Epidote Chlorite	Magnetite Pyrrhotite Pyrite Arsenopyrite Chalcopyrite Sphalerite	Cu	Limestone Tuff	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: One grab sample assayed 1.35% Cu, 0.05% Zn, 18 g/t Ag and 0.43 g/t Au (Ass. Rpt. 5472).										
25	**092C 007** MONITOR LEONARD	48 59 10 124 56 27	WR	PAPR	Cu Ag Au	Garnet Epidote Actinolite Chlorite	Chalcopyrite Pyrrhotite Magnetite Pyrite Hematite	Cu	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A 0.6 m chip sample assayed 6.1% Cu, 17.14 g/t Ag and trace gold (MMAR 1919, page 253).										
26	**092C 008** HAPPY JOHN LIQUID SUNSHINE	48 59 25 124 57 05	WR	SHOW	Cu Ag Au	Garnet Pyroxene Actinolite Chlorite Epidote	Chalcopyrite Magnetite Pyrite Pyrrhotite Marcasite	Cu	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Hornblende diorite Middle Jurassic
	COMMENTS: A bulk sample assayed 0.09% Cu, 0.12 g/t Au and 6.5 g/t Ag (Ass. Rpt. 19484).										
27	**092C 009** DEFIANCE	48 59 58 124 56 59	WR	PROS	Fe Cu Ag	Garnet Siderite	Magnetite Chalcopyrite	Fe (Cu)	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Hornblende diorite Middle Jurassic
	COMMENTS: A sample assayed 52.6% Fe, 3.3% Cu and 41.14 g/t Ag (MMAR 1917, page 288).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
28	**092C 012** RED DOG FROST LAKE	48 41 02 124 09 30	WR	PROS	Cu Fe Ag Zn	Garnet Actinolite Epidote	Pyrite Chalcopyrite Magnetite Covellite Pyrrhotite Sphalerite	Cu	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: Six samples assayed from 0.14 to 1.71% Cu, 2.74 to 15.43 g/t Ag and 0.03 to 0.10 g/t Au (Ass. Rpt. 6502).										
29	**092C 017** BLUE GROUSE SUNNYSIDE	48 50 28 124 13 21	WR	PAPR	Cu Ag Au Zn	Epidote Actinolite Garnet Chlorite	Chalcopyrite Pyrrhotite Pyrite Sphalerite Magnetite Hematite	Cu	Limestone Basalt Tuff	Vancouver Karmutsen Upper Triassic	Feldspar Porphyry Lower Jurassic
	COMMENTS:										
30	**092C 018** COMEGO WIDOW	48 55 44 124 11 04	WR	SHOW	Cu Au Ag Mo W Zn Sb Bi As	Garnet Actinolite Epidote Chlorite	Chalcopyrite Pyrite Pyrrhotite Molybdenite Magnetite Scheelite Sphalerite Tetrahedrite Arsenopyrite Bornite Tennantite	Cu	Chert Tuff Agglomerate	Buttle Lake Fourth Lake Miss.-Permian	Diorite-Gabbro Jurassic
	COMMENTS: The skarn zones are associated with quartz-carbonate veins.										
31	**092C 022** BUGABOO CONQUEROR (L.172)	48 39 36 124 30 34	WR	DEPR	Fe	Pyroxene Garnet Actinolite	Magnetite Pyrite Pyrrhotite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: Indicated reserves for the two orebodies (Daniel & Conqueror) are 2 606 000 t grading 55% Fe and 3.04% S (MEMRR Property Files, Menzies and Nicolls, 1960).										
32	**092C 023** DAVID CONQUEROR	48 39 33 124 30 07	WR	SHOW	Fe	Pyroxene Actinolite Garnet Epidote	Magnetite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
33	**092C 024** ELIJAH CONQUEROR	48 39 46 124 30 05	WR	SHOW	Fe	Garnet Tremolite Pyroxene Epidote	Magnetite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
34	**092C 025** SIRDAR GENERAL WHITE **COMMENTS:**	48 39 33 124 28 58	WR	DEPR	Fe	Pyroxene Garnet Epidote	Magnetite Pyrite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
35	**092C 027** BADEN POWELL LITTLE BOBS **COMMENTS:**	48 39 19 124 29 17	WR	SHOW	Fe	Unknown	Magnetite Pyrite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Quartz Diorite Lower Jurassic
36	**092C 030** ROSE THORN **COMMENTS:**	48 38 06 124 26 19	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
37	**092C 031** TALLY HARRIS CREEK **COMMENTS:** Massive magnetite samples assayed up to 1.5% Cu, 0.5% Co and 17.4 g/t Ag (MINFILE).	48 39 32 124 12 06	WR	SHOW	Fe Cu Co Ag	Garnet Epidote	Magnetite Pyrite	Fe (Cu)	Limestone	West Coast Complex Quatsino Upper Triassic	Diorite Lower Jurassic
38	**092C 032** SARITA RIVER BRITISH PACIFIC **COMMENTS:** This property includes skarns, veins and mineralized breccias. The skarns contain massive magnetite.	48 52 45 124 59 10	WR	SHOW	Cu Zn Pb Au Ag Fe	Garnet Pyroxene Chlorite Actinolite Epidote	Pyrite Pyrrhotite Chalcopyrite Sphalerite Galena Magnetite	Fe	Limestone Marble Basalt	Vancouver and/or Bonanza Quatsino U Trias.-M Juras.	Island Plutonic Suite Middle Jurassic
39	**092C 033** MOUNTAIN COPPER ISLAND **COMMENTS:**	48 55 23 125 04 00	WR	DEPR	Fe	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Fe	Tuff Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
40	**092C 034** ROB BORNITE **COMMENTS:** Weighted average of 90 chip samples over 235 m was 1.73% Cu and 6.86 g/t Ag (Ass. Rpt. 2115).	48 55 26 124 35 50	WR	PAPR	Cu Ag Pb	Garnet Epidote Ilvaite Actinolite	Chalcopyrite Bornite Pyrite Pyrrhotite Galena Magnetite Hematite	Cu	Limestone Andesite	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
41	**092C 036** HILLCREST MAXI	48 44 53 124 04 39	WR	SHOW	Cu	Unknown	Magnetite Pyrrhotite Chalcopyrite	Cu	Andesite Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Assays up to 2.18% Cu and 5.49 g/t Ag over 1 m (Ass. Rpt. 8209).										
42	**092C 037** AVALLIN FD	48 51 48 124 33 35	WR	SHOW	Cu Ag	Actinolite Chlorite Epidote Pyroxene	Chalcopyrite Bornite Magnetite Pyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Feldspar Porphyry Uncertain Age
	COMMENTS: Grab samples assayed up to 3.79% Cu and 20.56 g/t Ag (Ass. Rpt. 11196).										
43	**092C 039** ALPHA-BETA ALPHA	48 44 01 124 05 24	WR	PAPR	Cu Ag Au	Garnet Epidote	Chalcopyrite Magnetite Pyrite	Cu	Andesite Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Combined ore reserves are reported to be 11482 t grading 2.2% Cu (Progress Report 1963, Alberta Mines Ltd.).										
44	**092C 040** CROWN ROSEA	48 44 34 124 05 15	WR	SHOW	Cu Fe Au	Garnet Epidote Actinolite Pyroxene	Chalcopyrite Magnetite Pyrrhotite	Cu	Andesite Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: Assays over 5.5 m averaged 0.9% Cu and 8.2 g/t Au (MINFILE).										
45	**092C 041** ANOMALY MAXI	48 44 50 124 04 07	WR	SHOW	Cu Ag	Actinolite Garnet	Chalcopyrite Pyrrhotite Pyrite	Cu	Basalt Greywacke Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A 1.3 m sample assayed 2.46% Cu and 19.89 g/t Ag (Ass. Rpt. 8209).										
46	**092C 047** GLADYS	48 58 21 124 56 20	WR	SHOW	Cu Ag Au As	Garnet	Pyrite Chalcopyrite Arsenopyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Assays up to 16.43% Cu, 79.54 g/t Ag and 6.86 g/t Au (MMAR 1907, page 194).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
47	**092C 048** EDITH BLACK BEAR	48 58 22 124 55 56	WR	SHOW	Cu Ag Au	Garnet	Chalcopyrite Pyrrhotite Pyrite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A grab sample assayed 8.2% Cu and 74.43 g/t Ag (MMAR 1916, page 321).										
48	**092C 050** MARBLE COVE MARBLE COVE 1-5	48 54 57 125 06 07	WR	SHOW	Cu Ag	Garnet Epidote Hornblende	Chalcopyrite Pyrite Pyrrhotite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS: A grab sample from the dump near the adit assayed 2.3% Cu and 3.43 g/t Ag (MMAR 1917, page 245).										
49	**092C 051** BENSON	48 53 00 125 22 56	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS:										
50	**092C 054** COPPER KING COPPER KING 1,4,6	48 58 45 124 45 17	WR	SHOW	Cu Au	Hornblende Epidote Garnet	Chalcopyrite Pyrrhotite	Cu	Unknown	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS:										
51	**092C 062** PANTHER	48 54 00 124 37 48	WR	SHOW	Cu Ag	Garnet	Chalcopyrite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic 185-190 Ma
	COMMENTS: A grab sample from an open cut assayed 3.8% Cu and 13.7 g/t Ag (MMAR 1918, page K299).										
52	**092C 067** SOUTHERN CROSS LIGUID SUNSHINE	48 59 44 124 59 06	WR	PAPR	Cu Ag	Garnet Pyroxene Actinolite Chlorite Epidote	Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diabase Uncertain Age
	COMMENTS: A grab sample assayed 2.9% Cu and 23.7 g/t Ag (Ass. Rpt. 15199).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
53	**092C 077** EBB 1-12 RW	48 41 58 124 45 21	WR	SHOW	Cu Zn Au Ag	Garnet Epidote Pyroxene	Pyrite Pyrrhotite Sphalerite Chalcopyrite	Cu	Unknown	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Quartz Diorite Lower Jurassic
	COMMENTS: Assays up to 1.92% Cu, 13.71 g/t Ag and 0.69 g/t Au are reported (Geology and Exploration in B.C. 1972, page 258).										
54	**092C 079** NAN	48 44 18 124 15 12	WR	SHOW	Cu Zn	Garnet Epidote Pyroxene	Magnetite Chalcopyrite Sphalerite Hematite	Cu	Andesite Limestone	Vancouver Karmutsen and/or Quatsino Upper Triassic	Monzonite Uncertain Age
	COMMENTS:										
55	**092C 090** REKO 3	48 39 28 124 17 56	WR	PROS	Fe Cu	Garnet Epidote Pyroxene	Magnetite Chalcopyrite Pyrrhotite Pyrite	Fe	Limestone Andesite	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
56	**092C 091** REKO 10	48 38 36 124 17 30	WR	PROS	Fe Cu Au	Garnet Epidote Pyroxene	Magnetite Chalcopyrite Pyrrhotite Pyrite	Fe (Cu)	Limestone Andesite	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: Ore reserves are reported to be 4.5 Mt grading 22% Fe (George Cross Newsletter #207, 1975). One 4.6 m drill intersection assayed 1.5% Cu and 6.86 g/t Au.										
57	**092C 096** A1 GAMBLER	48 52 48 124 58 35	WR	SHOW	Cu Ag Sb	Garnet Epidote Pyroxene	Chalcopyrite Bornite Tetrahedrite Pyrrhotite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS:										
58	**092C 098** CR HANK	48 48 12 124 29 48	WR	PROS	Cu Ag Zn	Garnet Epidote Actinolite Ilvaite	Pyrite Chalcopyrite Sphalerite Magnetite Hematite	Cu	Limestone Basalt Diorite	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: A 1.55 m section over the CR zone assayed 2.02% Cu, 0.045% Zn and 7.3 g/t Ag (Ass. Rpt. 12618).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
59	**092C 104** DL DORE 153 **COMMENTS:**	48 43 07 124 16 36	WR	SHOW	Cu	Unknown	Magnetite Pyrrhotite Chalcopyrite	Cu	Andesite Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
60	**092C 107** HARRIS **COMMENTS:**	48 44 23 124 16 25	WR	SHOW	Cu	Unknown	Magnetite Chalcopyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
61	**092C 108** SUNNYSIDE HERE-IT-IS **COMMENTS:**	48 50 15 124 13 23	WR	PAPR	Cu Ag As	Garnet Epidote Actinolite Zeolite	Chalcopyrite Pyrrhotite Pyrite Arsenopyrite	Cu	Limestone Tuff	Vancouver Undefined Formation Upper Triassic	Feldspar Porphyry Uncertain Age
62	**092C 110** REKO 38 **COMMENTS:**	48 39 14 124 18 25	WR	PROS	Cu	Unknown	Magnetite Pyrrhotite Chalcopyrite Pyrite	Cu	Limestone Andesite	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
63	**092C 146** REKO NORTH **COMMENTS:**	48 39 59 124 19 12	WR	PROS	Fe	Garnet	Magnetite	Fe	Limestone Andesite	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
64	**092C 147** HELGA **COMMENTS:**	48 40 22 124 08 23	WR	SHOW	Fe Cu	Garnet	Magnetite Chalcopyrite	Fe (Cu)	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Feldspar Porphyry Middle Jurassic
65	**092C 149** ROACH MAXI **COMMENTS:**	48 44 20 124 03 27	WR	SHOW	Cu	Epidote Garnet	Pyrite Chalcopyrite Pyrrhotite	Cu	Andesite Limestone	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
66	**092E 001** GLENGARRY HEAD BAY **COMMENTS:**	49 48 28 126 30 55	WR	PAPR	Fe Cu	Garnet	Magnetite Pyrite Chalcopyrite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
67	**092E 002** BEANO BANKO	49 59 33 126 49 03	WR	PAPR	Au Ag Cu Sb Co Bi Te	Actinolite Pyroxene Apatite Amphibole	Pyrrhotite Chalcopyrite Magnetite Hedleyite	Au	Limestone Tuff	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Island &/or Catface Intrusions Jurassic-Eocene Granodiorite Jurassic-Eocene
	COMMENTS: Mineralization includes: (1) quartz-carbonate-pyrrhotite stringers, (2) disseminated pyrrhotite and (3) lenses of massive pyrrhotite. Grab sample of amphibole-pyrrhotite skarn assayed 0.07% Cu, 25 g/t Au, 1.0 g/t Ag, 162 ppm Co and 150 ppm Bi (Ettlinger and Ray, 1989).										
68	**092E 010** GEO STAR OF THE WEST	49 55 05 126 39 55	WR	PAPR	Au Ag Cu Pb Zn As	Garnet Epidote Pyroxene Wollastonite	Chalcopyrite Galena Sphalerite Magnetite Arsenopyrite Bornite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A 700 kg bulk sample graded 5.2% Cu, 4.6 g/t Au and 10.3 g/t Ag (reported in Ettlinger & Ray, 1989).										
69	**092E 011** INDIAN CHIEF DEWDNEY	49 26 52 126 18 38	WR	PAPR	Cu Ag Au Fe	Garnet Epidote Actinolite Wollastonite	Magnetite Bornite Chalcopyrite Pyrite	Cu (Fe)	Limestone	Vancouver Undefined Formation Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS:										
70	**092E 013** AGNES 1-2 VI 1 & 3	49 30 03 126 22 20	WR	PROS	Cu Fe	Garnet Epidote	Magnetite Chalcopyrite Bornite	Fe	Limestone Greenstone	Sicker Undefined Formation Pennsylvanian-Perm.	Muchalat batholith Lower Jurassic Diorite Lower Jurassic
	COMMENTS: Samples assay between 25 and 41% Fe and 0.08 and 1.18% Cu (Ass. Rpt. 462 and 464).										
71	**092E 014** PACO	49 29 27 126 24 40	WR	SHOW	Zn	Garnet	Sphalerite	Zn	Limestone Greenstone	Sicker Undefined Formation Pennsylvanian-Perm.	Muchalat batholith Lower Jurassic Diorite Lower Jurassic
	COMMENTS:										
72	**092E 015** ROB ROY PRINCE CHARLIE	49 48 12 126 30 54	WR	PROS	Fe	Garnet	Magnetite Pyrite Chalcopyrite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS: This property has probable reserves of 45360 t grading 56.8% Fe (MMAR 1916, page 294).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
73	**092E 016** BROWN JUG HESQUIAT	49 29 20 126 23 15	WR	DEPR	Ag Cu Fe As	Sericite Epidote Garnet	Chalcopyrite Magnetite Pyrite Pyrrhotite Cuprite	Fe (Cu)	Limestone	Sicker Undefined Formation Pennsylvanian-Perm.	Muchalat batholith Lower Jurassic Diorite Lower Jurassic

COMMENTS:
The property includes magnetite-rich skarns as well as polymetallic veins. The latter contain sphalerite, galena, arsenopyrite, cuprite, chalcopyrite together with armenite and barite (Ass. Rpt. 14694).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
74	**092E 017** SILVERADO DANZIG	49 37 20 126 21 40	WR	PAPR	Zn Au Ag Cu	Pyroxene Garnet Zoisite Epidote	Sphalerite Chalcopyrite Pyrrhotite Magnetite	Cu (Zn)	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Muchalat batholith Lower Jurassic Granodiorite Lower Jurassic

COMMENTS:
The skarn includes both zinc and copper-rich mineralization.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
75	**092E 019** OKTWANCH	49 55 00 126 17 30	WR	SHOW	Cu Fe	Epidote Garnet	Chalcopyrite Pyrite Pyrrhotite Magnetite	Fe	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Muchalat batholith Lower Jurassic Granodiorite Lower Jurassic

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
76	**092E 024** NOMASH WATER	49 58 45 126 42 40	WR	SHOW	Cu Ag Au	Garnet	Chalcopyrite	Cu	Carbonate	Vancouver Parson Bay Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

COMMENTS:
Mineralization is described in GSC Memoir 272, page 56. A grab sample gave low values in Cu, Au and Ag (Ass. Rpt. 10659).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
77	**092E 025** NIMPKISH COPPER HK 1-2	49 58 06 126 18 30	WR	SHOW	Cu	Garnet	Chalcopyrite Bornite Chalcocite Magnetite Hematite	Cu	Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

COMMENTS:
Two separate Cu skarn showings are present on the property. The showing on Campbell Creek assayed 30% Cu over 1.1 m (Ass. Rpt. 4102).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
78	**092E 029** VIOLET HESQUIAT 17	49 30 55 126 23 30	WR	PROS	Fe	Garnet	Magnetite	Fe	Limestone Greenstone	Sicker Undefined Formation Pennsylvanian-Perm.	Muchalat batholith Lower Jurassic Diorite Lower Jurassic

COMMENTS:

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
79	**092E 030** PACO 11-12 **COMMENTS:**	49 31 06 126 23 40	WR	PROS	Fe Cu Ag	Garnet	Magnetite Chalcopyrite	Fe	Limestone Greenstone	Sicker Undefined Formation Pennsylvanian-Perm.	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
80	**092E 031** THELMA HESQUIAT **COMMENTS:**	49 29 30 126 23 20	WR	PAPR	Ag Fe Cu Au	Garnet	Magnetite	Fe	Limestone Tuff	Sicker Undefined Formation Pennsylvanian-Perm.	Muchalat batholith Lower Jurassic Granodiorite Lower Jurassic
81	**092E 032** PRINCE BLACKBIRD **COMMENTS:**	49 27 30 126 19 30	WR	DEPR	Fe Cu	Garnet Epidote Actinolite	Magnetite Bornite Chalcopyrite	Fe	Limestone	Vancouver Undefined Formation Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
82	**092E 034** ORMOND 2 CONTACT **COMMENTS:** The skarn contains a 1 m wide lens of massive magnetite (MMAR 1916, page 336). The area also has quartz veins that contain chalcopyrite sphalerite and galena and assay high in Au and As.	49 17 31 126 03 55	WR	PROS	Ag Cu Fe	Epidote Garnet	Chalcopyrite Magnetite	Fe	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Catface Intrusions Eocene Diorite Eocene
83	**092E 052** ESP ESP 3.6 **COMMENTS:**	49 56 03 126 57 06	WR	SHOW	Cu	Garnet Tremolite Epidote	Chalcopyrite	Cu	Limestone Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Catface Intrusions Eocene Microdiorite Eocene
84	**092E 064** SAT **COMMENTS:**	49 30 40 126 22 20	WR	SHOW	WL	Wollastonite	Unknown	I.M.	Limestone Greenstone	Sicker Undefined Formation Pennsylvanian-Perm.	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
85	**092F 001** BRYNNOR KENNEDY LAKE **COMMENTS:**	49 03 00 125 26 00	WR	PAPR	Fe	Garnet Epidote Serpentine Chlorite Sericite	Magnetite Pyrite Pyrrhotite	Fe	Tuff Limestone Andesite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
86	**092F 003** NOR	49 03 35 125 27 40	WR	SHOW	Fe	Pyroxene Epidote	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS:										
87	**092F 004** TONY CAP	49 04 05 125 27 05	WR	SHOW	Au Cu Ag As	Garnet Pyroxene	Magnetite Pyrrhotite Arsenopyrite Pyrite	Cu	Limestone Andesite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A 0.3 m chip sample assayed 0.47% Cu, 3.8 g/t Au and 2.6 g/t Ag (Ass. Rpt. 14704).										
88	**092F 009** WHITE DOUGLAS	49 14 52 125 35 15	WR	DEPR	Cu Au Ag Co	Pyroxene Epidote Amphibole	Chalcopyrite Magnetite Pyrite Pyrrhotite Bornite	Cu	Limestone Andesite	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: At least 4 exploratory adits are on the property. A grab sample from the #4 Adit assayed 5.8% Cu, 0.09% Co, 20.57 g/t Ag and 1.27 g/t Au (Ass. Rpt. 14807).										
89	**092F 010** FOREMOST COPPER CLEAR CREEK	49 14 45 125 35 42	WR	PROS	Fe Cu	Garnet Pyroxene Epidote Amphibole	Magnetite Chalcopyrite Pyrrhotite	Fe (Cu)	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
90	**092F 011** TOFINO CREEK WINTER	49 14 29 125 35 41	WR	PROS	Cu Mo	Garnet Pyroxene Amphibole	Chalcopyrite Magnetite Molybdenite	Cu	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: The exoskarn contains magnetite and chalcopyrite. Trace molybdenite is present in altered intrusion.										
91	**092F 015** HETTY GREEN BOUNCE	49 14 39 125 35 29	WR	PAPR	Cu Mo Ag Au	Garnet Epidote Pyroxene Amphibole	Chalcopyrite Magnetite Molybdenite Pyrite Pyrrhotite Powellite	Cu	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS: A 194 t bulk sample of selected ore shipped in 1905 contained 13.3 t Cu, 5.2 kg Ag and 62 g Au. A 20 m chip sample assayed 0.5% MoS2 (Ass. Rpt. 8138).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
92	**092F 016** HORSE HUMP FOREMOST 8	49 14 29 125 35 12	WR	PROS	Cu	Garnet Epidote Pyroxene Amphibole	Chalcopyrite	Cu	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
93	**092F 018** CENTRAL MOLY PAWNEE	49 14 16 125 35 02	WR	PROS	Mo Cu	Garnet Pyroxene Epidote Amphibole	Molybdenite Chalcopyrite Magnetite	Cu	Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
94	**092F 022** JUMBO PAWNEE	49 14 04 125 35 06	WR	PROS	Cu Mo	Unknown	Chalcopyrite Bornite Molybdenite Powellite	Cu	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
95	**092F 025** CROW LADY S	49 14 10 125 34 32	WR	DEPR	Fe Cu	Garnet Epidote Pyroxene Amphibole	Magnetite Chalcopyrite Pyrite Pyrrhotite	Fe (Cu)	Limestone Greenstone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Diorite Lower Jurassic
	COMMENTS:										
96	**092F 030** O.K.	49 08 26 125 30 25	WR	PROS	Cu Au Ag	Unknown	Chalcopyrite Pyrite Pyrrhotite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Catface Intrusions Eocene Granodiorite Eocene
	COMMENTS: A sample assayed 4.7% Cu and 27.4 g/t Ag (MMAR 1918, page 263).										
97	**092F 035** IRON MOUNTAIN CHIEFTAN	49 08 27 125 27 30	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: This area includes skarn as well as gold-bearing quartz veins.										
98	**092F 038** ROCK BACON	49 58 34 125 37 02	WR	SHOW	Fe Cu Ag Zn Co	Garnet Epidote Actinolite	Magnetite Erythrite Pyrite Chalcopyrite Pyrrhotite Hematite	Fe	Tuff Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Magnetite skarn occurs in two localities. One sample of endoskarn assayed 0.25% Cu and 5.25% Zn (Ass. Rpt. 18946).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
99	**092F 043** AMERICAN WONDER B.C. WONDER **COMMENTS:**	49 14 20 125 38 20	WR	SHOW	Cu Ag Fe	Garnet Epidote	Chalcopyrite Magnetite Pyrrhotite Pyrite	Fe (Cu)	Limestone Argillite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
100	**092F 054** SEATTLE **COMMENTS:**	49 23 56 125 45 38	WR	SHOW	Au Cu Zn Ag	Garnet Epidote	Pyrite Chalcopyrite Sphalerite Magnetite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
101	**092F 056** GALENA BAT **COMMENTS:** One grab sample assayed 3.1% Cu and 6.86 g/t Ag (MMAR 1916, page 334).	49 24 26 125 45 10	WR	SHOW	Cu Fe	Pyroxene Chlorite	Chalcopyrite Magnetite	Cu	Diabase Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
102	**092F 064** BIG I 1-4 PTARMIGAN **COMMENTS:**	49 27 35 125 34 00	WR	PROS	Cu Au Ag Mo	Garnet Epidote	Chalcopyrite Molybdenite Pyrite Pyrrhotite Magnetite	Cu	Basalt Tuff	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
103	**092F 075** IRON HILL ARGONAUT **COMMENTS:** This deposit is described by Sangster (1964, 1969).	49 51 45 125 32 40	WR	PAPR	Fe	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Fe	Basalt Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
104	**092F 076** IRON RIVER QUINSAM RIVER **COMMENTS:** Probable reserves reported as 725 680 t grading 36% Fe, 0.9% S and 0.35% Cu (MMAR 1956, page 131).	49 55 20 125 26 10	WR	DEPR	Fe Cu	Garnet Epidote Actinolite Pyroxene	Magnetite Chalcopyrite Pyrite Hematite	Fe	Basalt Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
105	**092F 083** THISTLE **COMMENTS:** This property includes magnetite-pyroxene skarn, mineralized shear zones and veins.	49 06 24 124 38 08	WR	PAPR	Au Ag Cu	Pyroxene Epidote	Pyrite Chalcopyrite Magnetite Pyrrhotite	Cu	Limestone Basalt	Sicker McLaughlin Ridge Upper Devonian	Diorite Uncertain Age

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
106	**092F 086** BLACK PRINCE	49 01 11 124 58 42	WR	SHOW	Fe Cu	Garnet	Magnetite Pyrite Pyrrhotite	Fe	Limestone Tuff	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Hornblende diorite Middle Jurassic
107	**092F 096** TB CAPTAIN HOOK	49 10 09 125 25 04	WR	SHOW	Au Ag Cu	Chlorite Epidote Pyroxene Garnet	Pyrite Chalcopyrite Bornite Pyrrhotite Magnetite Hematite	Cu	Limestone Andesite	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
108	**092F 105** LITTLE BILLIE LITTLE BILLY	49 45 31 124 32 44	WR	PAPR	Au Cu WL Ag Mo Zn Pb Te	Garnet Wollastonite Pyroxene Tremolite Vesuvianite Epidote	Chalcopyrite Bornite Molybdenite Sphalerite Galena Scheelite Magnetite Hessite Petzite Wehrlite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Unknown Uncertain Age 120 Ma Tonalite Lower Cretaceous 120 Ma
109	**092F 106** TEXADA MINES-PRESCOTT MIDWAY	49 42 12 124 32 57	WR	PAPR	Fe Cu Ag Au Zn Co As Mo	Garnet Pyroxene Amphibole Actinolite Epidote Scapolite Albite	Magnetite Chalcopyrite Pyrite Pyrrhotite Arsenopyrite Sphalerite Molybdenite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Gillies Stock Low-Mid Jurassic 178 Ma Monzonite Low-Mid Jurassic 178 Ma

106 COMMENTS:
The skarn contains massive magnetite with some unspecified copper minerals.

107 COMMENTS:
The property contains several areas of magnetite-garnet skarn as well as an auriferous vein (TB vein). A sample of one skarn assayed 2.78% Cu, 9.6 g/t Ag and 2.33 g/t Au. Another assayed 10.53% Cu, 40.46 g/t Ag and 1.44 g/t Au (Ass. Rpt. 18693).

108 COMMENTS:
This skarn is probably related to the Cretaceous, tonalitic Little Billy stock (dated by U/Pb method at 120 Ma, J.E. Gabites, personal communication, 1992). It includes substantial amounts of wollastonite (White, 1989) as well as some wrigglite textures comprising layers of wollastonite, pyroxene and bornite. The system formed in an oxidized, low sulphur environment.

109 COMMENTS:
Gold occurs in late sulphide veins and disseminations. Sphalerite and arsenopyrite are rare. This deposit is described by Sangster (1964, 1969). Five magnetite-rich and sulphide-poor grab samples average
5 ppb Au, 0.6 ppm Ag, 46 ppm Cu, 70 ppm Zn and 30 ppm Co. Two sulphide-rich magnetite grab samples average 1800 ppb Au, 65 ppm Ag, 8.5% Cu, 1120 ppm Zn and 550 ppm Co (Appendix 4A).

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
110	**092F 107** PAXTON-TEXADA MINES	49 42 17 124 32 12	WR	PAPR	Fe Cu Ag Au Mo Zn Co As	Garnet Pyroxene Amphibole Epidote Actinolite Scapolite Albite	Magnetite Chalcopyrite Molybdenite Sphalerite Pyrite Pyrrhotite Arsenopyrite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Gillies Stock Low-Mid Jurassic 178 Ma Monzonite Low-Mid Jurassic 178 Ma
	COMMENTS: Four magnetite-rich, sulphide-poor grab samples average 47 ppb Au, 2 ppm Ag, 1052 ppm Cu, 31 ppm Zn and 41 ppm Co. Five sulphide-bearing magnetite grab samples average 279 ppb Au, 33 ppm Ag, 2.9% Cu, 715 ppm Zn and 242 ppm Co (Appendix 4A).										
111	**092F 108** GRAD BLACK PRINCE **COMMENTS:**	49 42 05 124 26 15	WR	SHOW	Fe Cu Au	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Quartz Diorite Uncertain Age
112	**092F 111** RAVEN RED CLOUD	49 44 07 124 29 47	WR	PAPR	Cu Fe Co	Garnet	Magnetite Pyrite Chalcopyrite Erythrite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Diorite Uncertain Age
	COMMENTS: This skarn contains massive magnetite lenses. Production data are uncertain.										
113	**092F 112** CORNELL	49 44 35 124 32 17	WR	PAPR	Cu Ag Au Mo Sb W	Garnet Pyroxene Epidote Serpentine	Bornite Chalcopyrite Molybdenite Tetrahedrite Native Silver Pyrite Magnetite Pyrrhotite Native Gold Scheelite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Cornell Stock Middle Jurassic 175 Ma Hornblende diorite Middle Jurassic 175 Ma
	COMMENTS: The gold in this skarn is associated with bornite-rich zones along limestone-diorite contacts (Ettlinger and Ray, 1989).										
114	**092F 118** TORSE BLUE BELL	49 01 31 125 01 03	WR	PROS	Cu Ag	Garnet Epidote	Pyrrhotite Pyrite Chalcopyrite	Cu	Limestone Andesite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: A sample taken across 3.7 m assayed 0.8% Cu and 13.71 g/t Ag (MMAR 1916, page 323).										
115	**092F 124** SUMPTER LORRAIN FR.	49 57 40 125 36 44	WR	SHOW	Cu Ag	Garnet Epidote	Chalcopyrite Bornite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A grab sample assayed 3% Cu and 96 g/t Ag (MMAR 1916, page 327).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
116	**092F 129** SUNSHINE FERN **COMMENTS:** 6.3 t of ore produced 758 kg of copper (MMAR 1928).	49 00 28 124 59 35	WR	PAPR	Cu Ag Fe	Garnet Epidote Tremolite	Chalcopyrite Magnetite Pyrrhotite Pyrite	Fe (Cu)	Limestone Andesite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
117	**092F 130** IRON MOUNTAIN MAGNETIC NO. 1 **COMMENTS:**	49 06 51 125 06 17	WR	DEPR	Fe	Garnet Epidote	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
118	**092F 135** JERVIS ISLAND SIR CHET **COMMENTS:** Several steeply dipping shear zones are associated with chalcocite- bearing skarns. One sample assayed 4.7% Cu and 6.8 g/t Ag (MMAR 1926, page A320).	49 30 47 124 14 27	WR	SHOW	Cu Ag	Garnet Epidote	Chalcocite	Cu	Unknown	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
119	**092F 138** KITCHENER MODOC **COMMENTS:**	49 02 14 124 50 00	WR	PAPR	Cu Ag Au	Hornblende	Magnetite Pyrrhotite Pyrite Chalcopyrite	Cu	Limestone Volcanic	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
120	**092F 140** THREE JAYS JJJ **COMMENTS:** Several high grade Cu skarn orebodies are hosted in Karmutsen, Quatsino and Bonanza rocks.	49 02 27 124 53 05	WR	PAPR	Cu Au Ag	Epidote Garnet Actinolite	Chalcopyrite Pyrite Bornite Magnetite	Cu	Limestone Tuff Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
121	**092F 142** OCEAN WAVE BIG BEAR **COMMENTS:** The property includes skarn (Ocean Wave) and a 3.7 m wide quartz vein (Big Bear). One 5 m drill intersection of skarn assayed 1.2% Cu and 13.37 g/t Ag (Ass. Rpt. 2856).	49 02 45 125 01 09	WR	SHOW	Cu Ag	Unknown	Chalcopyrite Pyrite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
122	**092F 152** GENERAL JAMES M. B.C. WONDER	49 14 48 125 38 45	WR	SHOW	Cu Ag Zn	Garnet Epidote	Chalcopyrite Pyrrhotite Magnetite Pyrite	Cu	Limestone	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: A 1 m chip sample assayed 4.32% Cu, 36.7 g/t Ag and 0.15% Zn. The zinc mineral is not identified (Ass. Rpt. 16354).										
123	**092F 153** IRON DUKE B.C. WONDER	49 14 12 125 38 00	WR	SHOW	Cu Ag Fe	Garnet Epidote	Chalcopyrite Magnetite	Cu	Limestone	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS:										
124	**092F 156** SAUCY LASS SAUCY LASS NO. 1	49 00 45 125 00 05	WR	SHOW	Cu Ag	Garnet Epidote	Chalcopyrite Magnetite	Cu	Limestone	Vancouver Undefined Formation Upper Triassic	Quartz Diorite Lower Jurassic
	COMMENTS: A grab sample assayed 14.5% Cu and 27.43 g/t Ag (MMAR 1920, page 194).										
125	**092F 157** CASCADE	49 00 27 125 00 24	WR	PAPR	Cu Au Ag	Garnet Epidote Hornblende	Chalcopyrite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diabase Uncertain Age
	COMMENTS: One grab sample assayed 5.5% Cu, 4.11 g/t Ag and 2.06 g/t Au (MMAR 1906, page 190).										
126	**092F 162** DARBY AND JOAN DARBY-JOAN	49 02 35 124 50 01	WR	PROS	Fe	Garnet Epidote	Magnetite	Fe	Tuff Basalt	Vancouver Karmutsen Upper Triassic	Diorite Lower Jurassic
	COMMENTS:										
127	**092F 163** SYOUTL MW 46	49 11 12 125 49 48	WR	PROS	Cu Ag Au	Unknown	Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone Tuff	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Tofino Intrusive Suite Eocene 48 +/- 12 Ma Quartz Diorite Eocene 48 +/- 12 Ma
	COMMENTS: This property includes several skarn zones.										
128	**092F 166** RAINY DAY LAKE SHORE	49 03 06 125 01 20	WR	PROS	Cu	Garnet Epidote Hornblende	Pyrite Pyrrhotite Marcasite Chalcopyrite Magnetite	Cu	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Four mineralized zones occur along the limestone-volcanic contact. Samples assayed between 4.5 and 16% Cu but generally the mineralization is low grade (MMAR 1916, page 325).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
129	**092F 171** P.D. HILL	49 22 17 124 42 56	WR	PROS	Zn Ag Cu As	Unknown	Sphalerite Arsenopyrite Pyrite Marcasite	Zn	Limestone	Buttle Lake Mount Mark Miss.-Permian	Unknown Uncertain Age
	COMMENTS: A 0.5 m wide zone assayed 21.98% Zn, 0.39% Cu and 43.89 g/t Ag (Ass. Rpt. 13105).										
130	**092F 173** NORTHERN CROWN JEM	49 11 15 125 31 38	WR	PROS	Cu Ag	Garnet Epidote	Pyrrhotite Chalcopyrite Pyrite	Cu	Limestone Diorite	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: A sample across 1m assayed 8.4% Cu and 27.43 g/t Ag (MMAR 1918, p. 263)										
131	**092F 181** GAM DONNER LAKE	49 45 06 125 57 25	WR	PROS	Fe Cu Ag Au Zn	Garnet Epidote	Magnetite Chalcopyrite Native Copper Sphalerite	Fe (Cu)	Basalt Limestone Diorite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: Over 20 skarn occurrences are present in limestone, basalt and quartz diorite. Drill core samples assayed from 0.13 to 0.89% Cu. One sample of unknown character assayed 13.5% Cu, 230 g/t Ag and 1.75 g/t Au (Ass. Rpt. 8037).										
132	**092F 182** SKARN	49 04 55 124 27 40	WR	PROS	Cu Ag Zn	Epidote Garnet Pyroxene Vesuvianite Phlogopite	Chalcopyrite Pyrite Pyrrhotite Sphalerite Galena Magnetite Hematite	Cu	Limestone Tuff	Buttle Lake Mount Mark Miss.-Permian	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: An 18.6 m drill intersection assayed 0.91% Cu and 14 g/t Ag. Another 4.6 m intersection assayed 3.72% Cu, 53.5 g/t Ag and 0.12% Zn (Ass. Rpt. 8487).										
133	**092F 198** SIHUN CREEK QUINSAM I	49 51 16 125 32 45	WR	SHOW	Cu	Epidote Garnet	Chalcopyrite Magnetite Pyrite	Cu	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Granodiorite Middle Jurassic
	COMMENTS:										
134	**092F 209** ORPHAN BOY	49 02 27 125 01 25	WR	SHOW	Cu Ag Au	Epidote Ilvaite Garnet Pyroxene	Pyrite Chalcopyrite Pyrrhotite Magnetite	Cu (Fe)	Limestone Tuff	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: A sample assayed 2.35% Cu, 39.4 g/t Ag and 0.17 g/t Au (Ass Rpt 777).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
135	**092F 210** J AND S FLORENCE **COMMENTS:**	49 03 13 125 01 05	WR	SHOW	Fe Cu	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Fe	Limestone Diorite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
136	**092F 234** BOLD **COMMENTS:** A grab sample assayed 2.5% Cu and 8.9 g/t Ag (Ass. Rpt. 13003).	49 51 20 125 32 00	WR	SHOW	Cu Ag Zn	Garnet Epidote Pyroxene	Magnetite Chalcopyrite Sphalerite	Cu (Fe)	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
137	**092F 237** BIG G GILKIE **COMMENTS:** Production data (Appendix 6) suggest the ore graded 16.8% Cu and 49 g/t Ag. Vesuvianite may be present.	49 59 58 125 37 44	WR	PAPR	Cu Ag Au	Amphibole Garnet Chlorite	Magnetite Pyrrhotite Chalcopyrite	Cu	Tuff Limestone	Vancouver Karmutsen Upper Triassic	Granodiorite Middle Jurassic
138	**092F 248** GRETNA GREEN **COMMENTS:** A grab sample assayed 17.8% Cu, 51 g/t Ag and 48 g/t Au (MMAR 1921, page 208).	49 08 47 125 07 31	WR	SHOW	Cu Au Ag	Garnet Epidote	Chalcopyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
139	**092F 256** BACON LAKE WILLY **COMMENTS:** A massive magnetite sample with visible cobaltite assayed 15.6 g/t Au, 0.8 g/t Ag and 0.6% Co (Ass. Rpt. 17395).	49 58 03 125 37 30	WR	PROS	Fe Cu Au Co	Garnet Epidote	Magnetite Cobaltite Erythrite Pyrite Chalcopyrite Marcasite	Fe	Tuff Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
140	**092F 258** TEXADA MINES-YELLOW KID LE ROI **COMMENTS:** Arsenopyrite occurs only in trace amounts. Three magnetite-rich samples averaged 221 ppm Cu, 15 ppb Au, 27 ppm Co, 123 ppm Zn and 0.8 ppm Ag (Appendix 4A).	49 42 20 124 32 47	WR	PAPR	Fe Cu Ag Au Zn Co As	Garnet Pyroxene Amphibole Epidote Actinolite Albite Scapolite	Magnetite Chalcopyrite Sphalerite Pyrrhotite Pyrite Arsenopyrite Erythrite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Gillies Stock Low-Mid Jurassic 178 Ma Monzonite Low-Mid Jurassic 178 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
141	**092F 259** TEXADA MINES-LAKE LAKE EXTENSION	49 42 10 124 31 37	WR	PAPR	Fe Cu Zn Co Ag Au	Garnet Pyroxene Amphibole Epidote Actinolite	Magnetite Chalcopyrite Sphalerite Pyrrhotite Pyrite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Gillies Stock Low-Mid Jurassic 178 Ma Monzonite Low-Mid Jurassic 178 Ma

COMMENTS:
Three magnetite-rich samples with some sulphides averaged 40 ppb Au, 484 ppm Cu, 42 ppm Co, 43 ppm Zn and 1.5 ppm Ag; a pyrite-rich sample assayed 360 ppb Au, 6600 ppm As, 230 ppm Co, 0.37% Cu and 5 ppm Ag (Appendix 4A).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
142	**092F 265** LOYAL	49 47 42 124 36 00	WR	PAPR	Cu Au Ag Pb Zn Sb Co Bi As Te	Garnet Epidote	Chalcopyrite Bornite Pyrite Galena Sphalerite Tetrahedrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diorite-Gabbro Low-Mid Jurassic

COMMENTS:
Five bulk samples averaged 13.1% Cu, 1.1% Pb, 521 g/t Ag and 3.56 g/t Au (Ass. Rpt. 2918). A mineralized grab sample assayed 14.9% Cu, 3.7% Zn, 0.17% Bi, 715 ppm Pb, 420 g/t Ag, 0.36 g/t Au, 540 ppm As, 680 ppm Co and 7 ppm Te (Appendix 4B).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
143	**092F 266** PARIS	49 47 26 124 36 35	WR	PROS	Cu Au Ag Zn As	Garnet Pyroxene Actinolite	Magnetite Chalcopyrite Pyrrhotite Pyrite Sphalerite Native arsenic	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diorite Low-Mid Jurassic

COMMENTS:
Crystalline native arsenic is reported (Webster & Ray, 1990).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
144	**092F 267** CANADA CANADA TRENCH	49 47 12 124 35 56	WR	SHOW	Cu Au Pb Zn	Garnet Pyroxene Amphibole Epidote Wollastonite	Pyrite Bornite Chalcopyrite Pyrrhotite Sphalerite Galena Magnetite	Cu	Limestone Diorite	Vancouver Quatsino Upper Triassic	Diorite Low-Mid Jurassic

COMMENTS:
Samples of massive magnetite with chalcopyrite assayed up to 15.94 g/t Au (Ass. Rpt. 18672). A mineralized grab sample assayed 0.12% Cu, 1.92 g/t Au and 5 g/t Ag (Appendix 4B).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
145	**092F 268** VOLUNTEER	49 45 16 124 34 02	WR	PROS	Au Ag Cu Fe	Garnet Pyroxene Epidote	Magnetite Chalcopyrite Pyrite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Diorite Low-Mid Jurassic

COMMENTS:
A sample of magnetite-garnet skarn assayed 20.56 g/t Ag and 11.65 g/t Au (Ass. Rpt. 14814).

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
146	**092F 269** FLORENCE - SECURITY FLORENCE	49 45 07 124 33 13	WR	PROS	Cu Au Ag Co Mo	Garnet Pyroxene Epidote Wollastonite	Magnetite Chalcopyrite Pyrite Chalcocite Bornite Molybdenite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diorite-Gabbro Low-Mid Jurassic
	COMMENTS: Assays over a 1.2 m width averaged 1.59% Cu and 23.7 g/t Au, 29.3 g/t Ag and 310 ppm Co (Ettlinger & Ray, 1989; Ass. Rpt. 16749).										
147	**092F 270** MARBLE BAY	49 45 25 124 33 25	WR	PAPR	Cu Au Ag Mo Sb	Garnet Pyroxene Tremolite Wollastonite Epidote	Chalcopyrite Bornite Native Silver Molybdenite Native Gold Tetrahedrite Magnetite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diorite-Gabbro Low-Mid Jurassic
	COMMENTS:										
148	**092F 271** COPPER QUEEN VAN ANDA	49 45 12 124 32 42	WR	PAPR	Cu Au Ag Mo W Sb	Garnet Pyroxene Epidote	Bornite Chalcopyrite Tetrahedrite Molybdenite Native Silver Native Gold Scheelite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Diorite Low-Mid Jurassic
	COMMENTS:										
149	**092F 274** CAP SHEAF MAXIE FR.	49 42 14 124 29 06	WR	SHOW	Cu Au Ag	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Cu	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Diorite Uncertain Age
	COMMENTS: Grab samples assayed up to 4.6% Cu, 17.14 g/t Ag and 18.51 g/t Au (Ass. Rpt. 5749).										
150	**092F 281** ROBIN 1-2 MANDARIN	49 18 27 125 20 25	WR	SHOW	Cu	Tremolite Garnet Pyroxene	Magnetite Pyrite Chalcopyrite	Cu (Fe)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Lower Jurassic Quartz Diorite Middle Jurassic
	COMMENTS:										
151	**092F 294** JACK S1	49 08 08 125 29 47	WR	SHOW	Cu Fe	Garnet	Chalcopyrite Pyrite Pyrrhotite Magnetite	Fe (Cu)	Tuff Chert	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
	COMMENTS:										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
152	**092F 300** DE OAR **COMMENTS:**	49 44 02 124 30 08	WR	SHOW	Cu Fe	Unknown	Magnetite Pyrite Chalcopyrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
153	**092F 301** STURT 1 **COMMENTS:**	49 45 40 124 34 23	WR	SHOW	Cu	Garnet Pyroxene	Malachite	Cu	Limestone Diorite	Vancouver Quatsino Upper Triassic	Diorite Uncertain Age
154	**092F 304** BUTTERFLY WOODPECKER **COMMENTS:**	49 44 36 124 31 55	WR	SHOW	Fe Cu	Epidote Garnet	Magnetite Chalcopyrite Pyrite	Fe (Cu)	Limestone	Vancouver Quatsino Upper Triassic	Unknown Uncertain Age
155	**092F 355** DECEMBER **COMMENTS:**	49 44 04 124 31 35	WR	SHOW	Cu	Unknown	Chalcopyrite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Unknown Uncertain Age
156	**092F 360** SKARN A SKARN **COMMENTS:** This property includes magnetite and sulphide-rich skarns, as well as sulphide-rich veins and lenses (Ass. Rpt. 16918).	49 12 18 124 54 54	WR	PROS	Cu Au Ag Fe	Garnet Epidote	Pyrrhotite Pyrite Chalcopyrite Bornite Magnetite Azurite	Cu	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
157	**092F 367** KEEGAN SKARN **COMMENTS:** Chip samples assayed 7.15% Cu and 49.3 g/t Ag (Ass. Rpt. 6305).	49 15 22 124 30 51	WR	SHOW	Cu Ag	Epidote Garnet	Magnetite Chalcopyrite Bornite Pyrite	Cu	Limestone Basalt Tuff	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
158	**092F 368** GLADYS C - CADET GLADYS C **COMMENTS:** Two mineralized grab samples assayed 1.58 and 8.64 g/t Au (Ass. Rpt. 18672).	49 45 03 124 33 48	WR	SHOW	Cu Au Zn Pb Fe	Garnet Pyroxene	Magnetite Sphalerite Chalcopyrite Galena	Fe (Cu)	Limestone	Vancouver Quatsino Upper Triassic	Diorite Uncertain Age

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
159	**092F 382** CAMPBELL **COMMENTS:**	49 11 56 124 48 16	WR	SHOW	Cu	Unknown	Magnetite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
160	**092F 415** ROUND LAKE PATERSON LAKE **COMMENTS:** One mineralized grab sample assayed 3.21% Cu, 57.0 g/t Ag and 1.5 g/t Au (Ass. Rpt. 16101).	49 20 50 125 01 40	WR	SHOW	Cu Au Ag	Chlorite Epidote Garnet	Chalcopyrite Malachite Bornite Pyrite	Cu	Volcanic Basalt	Vancouver Karmutsen Upper Triassic	Diorite Middle Jurassic
161	**092F 486** MULLER **COMMENTS:**	49 15 39 125 36 38	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	West Coast Complex Undefined Formation Paleozoic-Mesozoic	Quartz Diorite Lower Jurassic
162	**092F 507** BOLT **COMMENTS:**	49 41 43 124 28 52	WR	SHOW	Cu Fe	Unknown	Magnetite Chalcopyrite Pyrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
163	**092F 511** M-21 TEXADA **COMMENTS:** A 0.7 m wide garnet-magnetite-pyrrhotite zone assayed 4.26 g/t Au (Ass. Rpt. 18672).	49 45 25 124 34 28	WR	SHOW	Cu Au	Garnet	Magnetite Pyrrhotite Chalcopyrite Pyrite	Cu (Au)	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
164	**092F 516** YEW **COMMENTS:** The massive flat-lying sulphide-rich zone is between 0.3 and 1.8 m thick. Visible gold occurs along shears.	49 44 45 124 33 21	WR	DEPR	Au Cu Ag	Garnet Epidote	Pyrite Magnetite Pyrrhotite Chalcopyrite Bornite Native Gold	Cu (Au)	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
165	**092F 522** MOLLY SKARN **COMMENTS:** A mineralized grab sample assayed 2% Cu, 0.16% Co and 13 g/t Ag (Ass. Rpt. 7843).	49 44 32 124 31 21	WR	SHOW	Cu Co Ag	Unknown	Magnetite Chalcopyrite Erythrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
166	**092K 010** GEILER	50 11 29 125 15 35	WR	PAPR	Au Ag Cu As	Garnet Amphibole Epidote	Chalcopyrite Pyrrhotite Pyrite Arsenopyrite Magnetite	Cu (Au)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: Caimes (1913) reports 3 types of mineralization: (1) skarns, (2) a 0.9 m wide quartz-calcite vein and (3) a silicified shear-breccia zone up to 9 m wide. The latter contains chalcopyrite, native gold and the telluride mineral sylvanite.										
167	**092K 013** SANTANA SANTANNA	50 11 27 125 09 38	WR	PAPR	Cu Au Ag	Unknown	Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone	Vancouver Undefined Formation Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										
168	**092K 014** TRILBY	50 12 29 125 16 13	WR	PROS	Au Ag Cu	Garnet Epidote Hornblende	Pyrrhotite Chalcopyrite	Cu	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: A grab sample assayed 6.2% Cu, 89.14 g/t Ag and 3.43 g/t Au (MMAR 1916, page 345).										
169	**092K 015** LUCKY JIM	50 12 20 125 16 43	WR	PAPR	Au Ag Cu Te	Epidote Garnet	Pyrrhotite Chalcopyrite Pyrite Marcasite Native Gold Sylvanite Magnetite	Cu (Au)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: A grab sample assayed 4.13% Cu and 8.2 g/t Au (MMAR 1908). The presence of gold and sylvanite is reported in GSC Summary Report (1913).										
170	**092K 043** IRON MIKE HARTT	50 18 40 125 58 20	WR	PAPR	Fe Cu	Garnet Epidote	Magnetite Chalcopyrite Pyrite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Quartz Diorite Middle Jurassic
	COMMENTS:										
171	**092K 055** WHITE	50 15 00 125 57 00	WR	SHOW	Ag Pb Zn Cu Cd	Unknown	Sphalerite Galena Chalcopyrite Greenockite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Quartz Diorite Middle Jurassic
	COMMENTS:										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER / NAME	LATITUDE / LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
172	**092K 059** WHITE SWAN SUNRISE	50 11 17 125 15 29	WR	DEPR	Cu Ag As	Garnet Epidote	Pyrrhotite Chalcopyrite Arsenopyrite Pyrite	Cu	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: This property includes a mineralized skarn and a 6 m wide quartz vein (MMAR 1913, page 285).										
173	**092K 085** CONTACT 7-10 GOLD	50 10 39 125 14 37	WR	PROS	Cu	Unknown	Chalcopyrite Pyrite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										
174	**092K 094** MAGNET DARKWATER	50 14 28 125 20 39	WR	DEPR	Cu	Garnet Epidote Hornblende	Pyrrhotite Pyrite Chalcopyrite Magnetite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										
175	**092K 095** NICKEL PLATE	50 13 54 125 19 39	WR	SHOW	Cu	Garnet Epidote Chlorite Hornblende	Pyrrhotite Chalcopyrite Pyrite Magnetite	Cu	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Quartz Diorite Middle Cretaceous
	COMMENTS:										
176	**092K 111** ANACONDA TED	50 11 09 125 14 59	WR	PROS	Au Ag Cu	Garnet Epidote	Pyrrhotite Pyrite Chalcopyrite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Quartz Diorite Middle Cretaceous
	COMMENTS: A 0.6 m wide pyritic zone assayed 6.86 g/t Au and 6.86 g/t Ag (MMAR 1913, pages 284-286).										
177	**092K 115** PELICAN CORMORANT	50 11 49 125 15 16	WR	SHOW	Cu	Epidote Garnet Amphibole	Pyrrhotite Chalcopyrite	Cu	Basalt Limestone	Vancouver Karmutsen and/or Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										
178	**092K 141** NAT 4 GREAT GOLD	50 13 01 125 16 15	WR	PROS	Au Ag Cu W Zn	Pyroxene Garnet	Chalcopyrite Pyrite Pyrrhotite Ferberite	Cu	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: Ferberite ($FeWO_4$) has been identified in the granite and basalt. A 9.14 m sample assayed 2.0% Cu, 0.25% Zn, 0.1% W, 30.86 g/t Ag and 3.09 g/t Au (Ass. Rpt. 16142).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
179	**092K 156** GREENSTONE CREEK **COMMENTS:**	50 00 40 125 35 35	WR	SHOW	Zn Pb Cu	Wollastonite Pyroxene Garnet	Sphalerite Galena Pyrite Chalcopyrite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Quartz Diorite Middle Jurassic
180	**092L 002** POWER LIT 16-23 **COMMENTS:**	50 15 25 127 30 52	WR	PROS	Fe	Epidote Pyroxene	Magnetite	Fe	Basalt	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Diorite-Gabbro Middle Jurassic
181	**092L 003** LITTLE LAKE LIT 1-56 **COMMENTS:**	50 14 24 127 27 58	WR	DEPR	Fe	Pyroxene Chlorite Epidote	Magnetite Pyrite Pyrrhotite	Fe	Basalt	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
182	**092L 004** CORDOVA SIWASH **COMMENTS:**	50 02 55 126 49 10	WR	SHOW	Fe	Pyroxene	Magnetite	Fe	Tuff Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
183	**092L 018** EXTENSION 10 CENTRAL ZEBALLOS SKARN **COMMENTS:** A 2m drill section assayed 3.1% Cu, 102.9 g/t Ag and 3.5 g/t Au (Ass. Rpt. 12077).	50 02 05 126 46 52	WR	DEPR	Cu Au Ag	Pyroxene Garnet	Chalcopyrite Magnetite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Catface Intrusions Eocene Granodiorite Eocene
184	**092L 028** FORD FL **COMMENTS:**	50 02 55 126 50 00	WR	PAPR	Fe	Pyroxene Epidote Garnet	Magnetite Pyrite	Fe	Limestone Tuff	Vancouver Quatsino Upper Triassic	Zeballos batholith Middle Jurassic Hornblende diorite Middle Jurassic
185	**092L 031** CHURCHILL MAGNETITE CHURCHILL EXTENSION **COMMENTS:**	50 04 18 126 49 50	WR	DEPR	Fe	Garnet Epidote	Magnetite Pyrite Pyrrhotite Limonite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
186	**092L 032** CAVALIER 4 WREN 2 **COMMENTS:**	50 03 40 126 49 12	WR	SHOW	Fe	Garnet	Magnetite Pyrrhotite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
187	**092L 034** IRON CROWN NIMPKISH IRON **COMMENTS:** Four magnetite-rich grab samples averaged 52 ppb Au, 0.7 ppm Ag, 63 ppm Cu, 153 ppm Zn and 43 ppm Co. One magnetite-sulphide grab sample assayed 3600 ppm Cu and 400 ppm Co (Appendix 4A).	50 15 30 126 51 30	WR	PAPR	Fe Cu Zn Co	Sericite Garnet Actinolite Epidote K-Feldspar	Magnetite Chalcopyrite Sphalerite Pyrite Pyrrhotite	Fe	Limestone Andesite	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Monzonite Middle Jurassic
188	**092L 035** OLD SPORT OLD SPORT MINE **COMMENTS:** Six mineralized grab samples averaged 1751 ppb Au, 18 ppm Ag, 7.1% Cu, 136 ppm Zn, 56 ppm As and 195 ppm Co (Appendix 4B).	50 22 45 127 14 10	WR	PAPR	Cu Ag Au Co As Fe	Garnet Epidote Chlorite Pyroxene Sericite Amphibole	Magnetite Chalcopyrite Bornite Pyrite Pyrrhotite Arsenopyrite	Cu (Au)	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
189	**092L 036** NIMPKISH COPPER KINMAN **COMMENTS:** GSC Memoir 272, page 72, reports that samples assayed between 11.46 & 13.75% Cu, 0.3 and 0.6% Zn, 81 and 104 g/t Ag and 4.8 and 13.03 g/t Au.	50 19 56 126 50 50	WR	DEPR	Cu Au Zn Mo Cd	Garnet Epidote Actinolite Chlorite Sericite	Chalcopyrite Sphalerite Magnetite Molybdenite Bornite Greenockite Covellite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Nimpkish batholith Middle Jurassic Granodiorite Middle Jurassic
190	**092L 037** SMITH COPPER SMITH **COMMENTS:** A 1 m chip sample assayed 1.6% Cu, 0.14% Zn and 12 g/t Ag (Awmack, 1988, Summary Report Hercules Ventures Inc.).	50 21 47 126 54 37	WR	PROS	Cu Zn Ag	Garnet Epidote Pyroxene Actinolite Chlorite	Pyrrhotite Magnetite Chalcopyrite Sphalerite	Cu	Limestone	Vancouver Karmutsen and/or Quatsino Upper Triassic	Nimpkish batholith Middle Jurassic Quartz Diorite Middle Jurassic
191	**092L 040** SHAMROCK **COMMENTS:**	50 22 25 127 15 15	WR	PROS	Fe	Garnet	Magnetite Pyrite	Fe	Limestone Tuff	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
192	**092L 041** BLACKJACK	50 22 10 127 15 00	WR	PROS	Fe	Unknown	Magnetite	Fe	Limestone Tuff	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS:										
193	**092L 042** AJAX	50 21 55 127 14 42	WR	SHOW	Fe	Garnet Chlorite	Magnetite	Fe	Limestone Basalt	Vancouver and/or Bonanza Quatsino U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS:										
194	**092L 043** SUMMIT	50 21 50 127 14 45	WR	SHOW	Fe		Magnetite	Fe	Greenstone Limestone	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS:										
195	**092L 044** MERRY WIDOW 5 EMPIRE	50 21 20 127 15 07	WR	PAPR	Fe Cu Au Zn Ag Co As	Epidote Garnet Actinolite Pyroxene Chlorite	Magnetite Chalcopyrite Sphalerite Arsenopyrite Pyrrhotite Pyrite Marcasite Cobaltite Erythrite Cuprite Bornite Native Gold	Fe	Limestone Tuff Greenstone	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS: Dixon (1989) reports the presence of tellurobismuthite. Gold is found in pyrrhotite-pyrite-rich veins and pockets that postdate the magnetite. Sulphide-rich grab samples assayed up to 17% Cu, 2.9% Zn, 10.7% As, 0.27% Co, 200 g/t Ag and 32 g/t Au (Ettlinger & Ray, 1989; Ray & Webster 1991). Seven magnetite grab samples averaged 56 ppb Au, 204 ppm Cu and 44 ppm Co whereas six magnetite-sulphide grab samples averaged 6270 ppb Au, 4.2% Cu and 853 ppm Co (Appendix 4A).										
196	**092L 045** KINGFISHER	50 21 27 127 14 52	WR	PAPR	Fe Co	Garnet Pyroxene Phlogopite	Magnetite Pyrrhotite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8Ma Gabbro Low-Mid Jurassic 178+/- 8 Ma
	COMMENTS: This deposit consists ot two sub-vertical , sub-circular pipes of massive colloform magnetite (Stevenson & Jeffrey, 1964; Sangster, 1965). Skarn wallrock alteration is minimal and sulphides are rare. Magnetite samples assay very low in Au, Ag, Cu and As (Appendix 4A). However, the ore has enhanced values of F (up to 1800 ppm F), probably due to the presence of phlogopite.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
197	**092L 046** RAVEN BLUEBIRD 3 **COMMENTS:** This has a similar mineralogy as the Merry Widow deposit. The Raven pit is now covered by waste material derived from the Merry Widow open pit.	50 21 28 127 15 07	WR	PAPR	Fe Cu Au Ag Zn	Garnet Epidote Actinolite Pyroxene Chlorite	Magnetite Pyrite Pyrrhotite Chalcopyrite Sphalerite	Fe	Limestone Tuff Greenstone	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
198	**092L 047** WHISKEY JACK MERRY WIDOW 1 **COMMENTS:**	50 21 35 127 14 55	WR	SHOW	Fe	Garnet Epidote Actinolite Chlorite Pyroxene	Magnetite	Fe	Limestone Tuff	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
199	**092L 048** RAMBLER **COMMENTS:**	50 21 30 127 14 33	WR	SHOW	Fe	Garnet Epidote Actinolite Chlorite Pyroxene	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
200	**092L 049** KEYSTONE MERRY WIDOW 6 **COMMENTS:**	50 21 15 127 14 30	WR	SHOW	Fe	Garnet Epidote Actinolite Chlorite Pyroxene	Magnetite	Fe	Limestone Greenstone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
201	**092L 050** MARTEN MERRY WIDOW 5 **COMMENTS:** Probably represents a sulphide-rich manto with minor skarn alteration. Two grab samples assayed up to 0.73% Cu, 16.2% As, 792 ppm Zn, 360 ppm Co, 13 g/t Ag and 2 g/t Au (Appendix 4A). The occurrence consists of irregular pods of massive sulphide between 0.2 and 2.0 m wide. It is hosted at the contact between marble and greenstone. The latter may represent Bonanza tuffs.	50 21 10 127 14 59	WR	SHOW	Cu Au Zn As Co	Garnet Pyroxene Chlorite Epidote	Magnetite Chalcopyrite Pyrrhotite Pyrite Arsenopyrite Sphalerite Marcasite Cobaltite Native Gold	Cu (Au)	Greenstone Limestone	Vancouver and/or Bonanza Quatsino U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
202	**092L 051** SNOWLINE	50 21 12 127 15 10	WR	SHOW	Fe	Garnet Pyroxene	Magnetite	Fe	Tuff Greenstone Limestone	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS: This occurrence contains several magnetite-rich lenses close to the contact between Bonanza tuffs, Quatsino limestone and a diorite dike. Only minor amounts of skarn minerals are present.										
203	**092L 052** YREKA YREKA MINE	50 27 25 127 34 02	WR	PAPR	Cu Ag Au	Epidote Garnet	Pyrrhotite Chalcopyrite Pyrite Magnetite Hematite	Cu	Tuff Limestone	Vancouver Undefined Formation Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Mineralized skarn is developed along three tuff horizons. Sphalerite and galena occur on the Edison occurrence, 500 m north of the mine. Specular hematite is present. Two grab samples of mineralized float assayed up to 853 ppb Au, 2.4% Cu, 5.1% Zn, 2 ppm Te and 16 ppm Se (Appendix 4B).										
204	**092L 056** JUNE HELEN	50 26 08 127 24 35	WR	PROS	Fe Cu Au Ag Zn Pb As	Epidote Garnet Chlorite Actinolite Tremolite	Magnetite Chalcopyrite Sphalerite Galena Bornite Arsenopyrite Pyrrhotite	Fe (Cu)	Limestone Basalt	Vancouver Undefined Formation Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: A 45 t ore shipment assayed 5.95% Cu, 86.47 g/t Ag and 4.14 g/t Au (MMAR 1907, page L151)										
205	**092L 057** PILGRIM PEERLESS	50 25 50 127 23 40	WR	DEPR	Zn Ag Au Pb Cd Sb As	Unknown	Sphalerite Pyrrhotite Pyrite Arsenopyrite Galena	Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: B.C. Minfile reports reserves of 46 266 t of proven ore grading 8.7% Zn. Two mineralized grab samples assayed up to 10% Zn, 8.8% As and 149 ppm Sb (Ray and Webster, unpublished data).										
206	**092L 061** CALEDONIA CASCADE	50 38 40 127 36 11	WR	PAPR	Ag Cu Zn Pb Au	Epidote Garnet Actinolite Sericite	Chalcopyrite Bornite Magnetite Hematite Pyrite Sphalerite Galena	Pb-Zn (Cu)	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: This property includes Pb-Zn and Cu-rich skarns. A chip sample across 1.8 m assayed 10% Zn, 2.0% Cu, 0.8% Pb and 418.2 g/t Ag (MMAR 1926). Underground work outlined reserves of 68 000 t grading 7.45% Zn, 6.04% Cu, 0.6% Pb, 704.1 g/t Ag and 0.01 g/t Au (National Mineral Inventory 092L12: George Cross Newsletter #221, 1981). Specular hematite is present.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
207	**092L 068** ARTLISH 3-6 OLS 7-8	50 05 14 126 50 40	WR	SHOW	Fe	Amphibole Pyroxene Chlorite	Magnetite Pyrrhotite	Fe	Tuff Limestone	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: The property contains three zones, each containing pods of massive magnetite. Reserves are reported as 635 000 t grading 44.1% Fe, and 0.08% Cu (MEMPR Property Files, Sauko, 1965).										
208	**092L 069** HPH 1 NAHWITTI LAKE	50 41 42 127 47 38	WR	PROS	Ag Pb Zn Cu Au Sb	Epidote Garnet Pyroxene Actinolite	Galena Sphalerite Chalcopyrite Magnetite Tetrahedrite Dyscrasite Pyrite Pyrrhotite	Pb-Zn	Limestone Andesite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS: A 2 m chip sample assayed 38.1% Pb , 10.6% Zn and 3743 g/t Ag (Ass. Rpt. 16347). Another 1 m sample assayed 39.4% Pb, 12.12% Zn, 1065.4 g/t Ag and 0.07 g/t Au (Ass. Rpt. 17393).										
209	**092L 074** SOUTH SHORE NORMAN	50 42 03 127 51 11	WR	PROS	Zn Ag Pb Cu	Garnet Epidote	Sphalerite Galena Chalcopyrite Pyrite Pyrrhotite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A chip sample of unknown length assayed 8.8% Zn, 0.36% Cu, 0.10% Pb and 15.1 g/t Ag (Ass. Rpt. 870).										
210	**092L 075** SUN ST. CLAIRE	50 41 25 127 48 53	WR	SHOW	Cu Zn Pb As	Garnet Epidote	Magnetite Pyrite Pyrrhotite Chalcopyrite Sphalerite Galena Arsenopyrite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic
	COMMENTS:										
211	**092L 076** DORLON UCAN	50 41 22 127 45 21	WR	PROS	Ag Cu Pb	Epidote Chlorite Garnet Pyroxene Actinolite	Sphalerite Chalcopyrite Galena Pyrite Pyrrhotite Magnetite Greenockite	Cu	Limestone Argillite	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Monzonite Middle Jurassic
	COMMENTS: This property includes magnetite-chalcopyrite-garnet skarn, as well as masses and stringers of sphalerite (Au-bearing) associated with silicified breccia zones. The mineralization probably represents a Cu skarn with distal Pb-Zn veins.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
212	**092L 077** NORTH SHORE LAKE	50 42 38 127 51 59	WR	SHOW	Ag Cu	Epidote Garnet Pyroxene	Chalcopyrite Magnetite Pyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Monzonite Middle Jurassic
	COMMENTS: Magnetite-chalcopyrite skarn with distal veins of sphalertie and galena occur on the property. A 1.8 m chip sample of the skarn assayed 1.63% Cu and 12.3 g/t Ag (Ass. Rpt. 1610).										
213	**092L 079** ABAN ANAN	50 42 46 127 54 30	WR	SHOW	Zn Pb Ag	Unknown	Sphalerite Galena	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Granodiorite Middle Jurassic
	COMMENTS: A 2.4 m chip sample assayed 1.81% Zn, 0.97% Pb and 2.06 g/t Ag (Ass. Rpt. 870).										
214	**092L 085** IRON QUEEN IRON BUNKER	50 25 20 127 38 15	WR	SHOW	Fe	Unknown	Magnetite Pyrite	Fe	Andesite Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Monzonite Middle Jurassic
	COMMENTS:										
215	**092L 091** BENSON LAKE INDEPENDENT 1-3	50 21 25 127 13 50	WR	PAPR	Cu Au Ag Co As	Garnet Epidote Actinolite Pyroxene Chlorite	Chalcopyrite Bornite Magnetite Pyrite Pyrrhotite Arsenopyrite	Cu (Au)	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
	COMMENTS: Two mineralized grab samples assayed up to 8.65% Cu, 38.6 g/t Ag, 307 ppm Co and 89 ppm As (Ray & Webster, 1991a). The skarn forms part of the Old Sport deposit - see assays of grab samples listed in Appendix 4B).										
216	**092L 097** MAGNET EXCEL - EXCELSIOR	50 24 30 126 57 36	WR	PROS	Fe Cu	Epidote Pyroxene Garnet	Magnetite Chalcopyrite Pyrite Pyrrhotite	Fe	Limestone	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS:										
217	**092L 098** JEAN (NORTH SHORE)	50 42 31 127 50 58	WR	SHOW	Zn Pb	Unknown	Sphalerite Galena	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Monzonite Middle Jurassic
	COMMENTS:										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
218	**092L 102** SNOWBIRD OWL	50 22 58 127 16 35	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
219	**092L 104** EDISON SUPERIOR	50 27 35 127 34 13	WR	SHOW	Cu Ag	Epidote Garnet	Chalcopyrite Pyrrhotite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Monzonite Middle Jurassic

COMMENTS:
This property lies 0.5 km north of Yreka Mine (092L 052). Three Cu showings are present. One of these assays 7.75% Cu and 126.9 g/t Ag over 1.37 m (MEMPR Property Files, Uke Resources). In Edison Creek,
sphalerite-galena veins cut altered limestone.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
220	**092L 107** CALEDONIA (KAS) WATERLOO	50 12 54 127 20 00	WR	SHOW	Cu	Epidote Garnet	Magnetite Chalcopyrite Hematite Bornite	Cu	Limestone Andesite	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
221	**092L 112** MINERVA FR. OLGA	50 26 20 127 25 00	WR	PROS	Zn Cu	Epidote Garnet Chlorite Actinolite Tremolite	Sphalerite Magnetite Pyrite Pyrrhotite Chalcopyrite	Zn	Limestone Basalt	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic

COMMENTS:
An assay of 11% Zn and 0.2% Cu is reported over 1.37 m (Ass. Rpt. 502: MMAR, 1916).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
222	**092L 113** FRANCES	50 38 00 127 27 00	WR	SHOW	Cu Zn	Unknown	Chalcopyrite Sphalerite Pyrite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
223	**092L 115** DRY HILL YOUNG SPORT 4	50 21 15 127 14 00	WR	SHOW	Cu As Co Mo	Garnet Epidote Serpentine Graphite	Cobaltite Chalcopyrite Pyrite Erythrite	Cu	Limestone Tuff	Vancouver Karmutsen and/or Quatsino Upper Triassic	Keystone Suite Low-Mid Jurassic Diorite Low-Mid Jurassic

COMMENTS:
The occurrence lies in faulted rocks close to contact between Quatsino limestone and the dioritic Keystone Intrusion. A grab sample assayed 0.48% Co, 0.74% As, 251 ppm Mo, 0.5 g/t Ag and 64 ppm
Cu (Ray & Webster, unpublished data).

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
224	**092L 118** HAZEL 7 (NIMPKISH COPPER) CYPRESS 3	50 19 53 126 51 33	WR	DEPR	Cu Zn Cd Co Ag	Garnet Epidote Pyroxene	Chalcopyrite Sphalerite Pyrite Magnetite	Cu (Zn)	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A massive chalopyrite-sphalerite grab sample assayed 10% zinc, 9.32% Cu, 1669 ppm Cd, 168 ppm Co and 122 g/t Ag (Ray & Webster, unpublished data).										
225	**092L 121** WOLF STOREY	50 22 10 126 53 25	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone Greenstone	Vancouver Karmutsen and/or Quatsino Upper Triassic	Nimpkish batholith Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: Mineralization occurs along the Quatsino-Karmutsen contact.										
226	**092L 122** MAGNET	50 15 50 126 52 17	WR	SHOW	Fe Cu Zn	Unknown	Magnetite Pyrite Chalcopyrite Sphalerite	Fe	Limestone Andesite Granodiorite	Vancouver Karmutsen and/or Quatsino Upper Triassic	Nimpkish batholith Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: The occurrence lies 1.2 km from, and on strike with, the Iron Crown occurrence (099L 034).										
227	**092L 123** KLAANCH NIMPKISH IRON	50 15 45 126 52 00	WR	SHOW	Fe Cu Zn	Unknown	Magnetite Chalcopyrite Pyrite Sphalerite	Fe	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Nimpkish batholith Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: The occurrence lies 0.6 km from, and on strike with, the Iron Crown occurrence (092L 034).										
228	**092L 127** HILLER 4-5 HILLER	50 05 40 126 51 48	WR	DEPR	Au Ag Cu Bi Te	Garnet Epidote Actinolite Amphibole Pyroxene Chlorite Scapolite	Magnetite Pyrrhotite Chalcopyrite Pyrite Hedleyite Native Gold	Cu (Au)	Argillite Limestone Siltstone	Bonanza Undefined Formation Low-Mid Jurassic	Zeballos batholith Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: This property includes both amphibole-rich and pyroxene-rich skarns. Chlorine-rich ferrohastingsite is reported. Gold occurs in magnetite- pyrrhotite skarn and is enriched in cross-cutting shear zones (Ettinger and Ray, 1989).										
229	**092L 128** RIDGE EXTENSION 4	50 02 55 126 50 40	WR	PROS	Fe	Pyroxene	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
	COMMENTS: Skarn occurs in the Quatsino limestone near its contact with the Bonanza Group.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
230	**092L 130** BLACKBIRD BLUEBIRD **COMMENTS:**	50 02 06 126 49 52	WR	PROS	Cu	Garnet Actinolite Epidote Pyroxene Wollastonite	Magnetite Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Zeballos batholith Middle Jurassic Diorite Middle Jurassic
231	**092L 133** MARTHA 4 BONANZA **COMMENTS:**	50 22 30 126 54 42	WR	SHOW	Fe	Garnet Epidote	Magnetite	Fe	Limestone	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic Quartz Diorite Middle Jurassic
232	**092L 134** BOB 21 **COMMENTS:**	50 19 12 126 45 40	WR	SHOW	Cu Fe	Garnet Epidote	Chalcopyrite Magnetite Pyrite	Fe	Limestone	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic Quartz Diorite Middle Jurassic
233	**092L 144** SINKER KLASKINO **COMMENTS:** The nickel and cobalt minerals are not known.	50 18 58 127 45 05	WR	SHOW	Cu Ni Co Mo	Actinolite Chlorite	Chalcopyrite Pyrrhotite Molybdenite	Cu	Unknown	Vancouver Parson Bay Upper Triassic	Island Plutonic Suite Middle Jurassic Microdiorite Middle Jurassic
234	**092L 145** CONTACT **COMMENTS:**	50 03 00 126 48 20	WR	SHOW	Fe Cu	Garnet	Magnetite Chalcopyrite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Zeballos batholith Middle Jurassic Diorite Middle Jurassic
235	**092L 147** KING RUGGED **COMMENTS:** A grab sample assayed 5.14% Cu, 31 g/t Ag and 2.7 g/t Au (GSC Summary Report 1932, Part A11, page 44).	50 02 40 126 45 03	WR	SHOW	Cu Ag Au	Garnet Epidote	Chalcopyrite Pyrite Pyrrhotite Magnetite	Cu	Limestone Tuff	Vancouver Karmutsen Upper Triassic	Granitic dyke Uncertain Age
236	**092L 148** NOOTKA **COMMENTS:**	50 02 25 126 44 45	WR	SHOW	Cu Au Ag	Garnet	Chalcopyrite Magnetite Pyrite Pyrrhotite	Cu	Limestone	Vancouver Karmutsen Upper Triassic	Catface Intrusions Eocene 38 +/- 14 Ma Granodiorite Eocene 38 +/- 14 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
237	**092L 157** CLIMAX SONNY **COMMENTS:**	50 02 20 126 46 20	WR	SHOW	Cu Sb As	Garnet	Chalcopyrite Bornite Allemontite Pyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Catface Intrusions Eocene Granodiorite Eocene 38 +/- 14 Ma
238	**092L 159** RAINBOW 1-4 LITTLE JOE **COMMENTS:** Two 18 kg samples assayed up to 4.88% Cu, 4.42% Zn, 0.1% Pb, 91.8 g/t Ag and 0.14 g/t Au (Ass. Rpt. 8284). Specular hematite is present.	50 38 00 127 28 42	WR	PROS	Cu Zn Ag Pb Au	Garnet Ilvaite Pyroxene Chlorite Tremolite Epidote	Chalcopyrite Sphalerite Galena Bornite Magnetite Pyrite Hematite	Cu (Zn)	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
239	**092L 164** BONANZA (BOB) BOB 9-10 **COMMENTS:**	50 18 30 126 45 18	WR	PAPR	Cu Ag Au Zn	Garnet Pyroxene Epidote Actinolite Chlorite	Chalcopyrite Magnetite Pyrite Pyrrhotite Sphalerite	Cu	Limestone	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic Quartz Diorite Middle Jurassic
240	**092L 176** BRAD K **COMMENTS:**	50 19 25 127 39 50	WR	SHOW	Cu	Unknown	Chalcopyrite Pyrite	Cu	Unknown	Vancouver Parson Bay Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
241	**092L 181** MO BUD **COMMENTS:** A chip sample over 4.9 m assayed 6.02% Zn, 0.04% Pb, and 4.8 g/t Ag (Ass. Rpt. 5758).	50 43 04 127 55 41	WR	PROS	Ag Pb Zn	Epidote Garnet Amphibole	Sphalerite Galena Magnetite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Granodiorite Middle Jurassic
242	**092L 183** BON 22,24 **COMMENTS:**	50 15 36 126 41 06	WR	PROS	Fe Cu	Garnet Epidote	Magnetite Chalcopyrite Pyrite Pyrrhotite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic Granodiorite Middle Jurassic
243	**092L 188** BON 20 BIG MAC **COMMENTS:**	50 15 36 126 40 38	WR	SHOW	Fe Pb	Epidote	Magnetite Galena Pyrite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
244	**092L 190** BLUEBIRD 1 **COMMENTS:** Mineralization occurs in a flatlying sulphide-rich lens (manto) that is associated with minor skarn minerals.	50 21 07 127 14 55	WR	PROS	Fe Cu Zn Au Co	Epidote Garnet Chlorite	Magnetite Chalcopyrite Native Gold Sphalerite Marcasite Cobaltite Pyrite	Cu (Au)	Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic 178 +/- 8 Ma
245	**092L 191** JARR **COMMENTS:**	50 18 40 127 41 40	WR	SHOW	Cu	Unknown	Chalcopyrite Pyrite Pyrrhotite Magnetite	Cu	Unknown	Vancouver Parson Bay Upper Triassic	Granodiorite Middle Jurassic
246	**092L 206** EAST HAZEL (NIMPKISH CU) KINMAN **COMMENTS:** This occurrence is 600 m east of the Hazel 7 (092L 118). A 0.7 m drill intersection assayed 0.29% Cu and 85.04 g/t Au. A grab sample from a nearby trench assayed 17.6% Zn and 0.73% Cu (Ass. Rpt. 456).	50 19 50 126 51 05	WR	SHOW	Au Cu Zn Mo Cd	Garnet Epidote Actinolite Chlorite Sericite	Chalcopyrite Sphalerite Magnetite Molybdenite Bornite Greenockite Covellite Marcasite Pyrrhotite	Cu (Zn)	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
247	**092L 208** SMITH COPPER (MAIN) ZIP **COMMENTS:** This skarn follows the contact between Quatsino limestone and Karmutsen basalt. Reserves were calculated to be 84 140 t grading 12.5% Zn, 1.69% Cu, 3.7% Pb and 64g/t Ag (Ass. Rpt. 10337). However, subsequent drilling did not confirm these figures.	50 21 52 126 55 00	WR	DEPR	Zn Cu Pb Ag	Epidote Pyroxene Garnet Chlorite	Sphalerite Chalcopyrite Galena Pyrite Pyrrhotite	Pb-Zn	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
248	**092L 209** CALEDONIA **COMMENTS:**	50 38 48 127 36 00	WR	SHOW	Fe Cu Zn Pb	Garnet Epidote Actinolite	Magnetite Chalcopyrite Sphalerite Galena	Fe	Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
249	**092L 213** EXTENSION 5 CENTRAL ZEBALLOS SKARN **COMMENTS:** A grab sample assayed 6.18% Cu, 44.5 g/t Ag and 0.58 g/t Au (Ass. Rpt. 12077).	50 02 15 126 47 20	WR	SHOW	Cu Au Ag	Pyroxene	Chalcopyrite Bornite Magnetite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Catface Intrusions Eocene Granodiorite Eocene

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
250	**092L 214** ZEBALLOS DOLOMITE CENTRAL ZEBALLOS **COMMENTS:**	50 02 30 126 47 10	WR	SHOW	MB	Garnet Pyroxene	Magnetite	I.M.	Limestone Dolomite	Vancouver Quatsino Upper Triassic	Granodiorite Uncertain Age
251	**092L 236** TUSCARORA UKE 1 **COMMENTS:**	50 27 45 127 33 55	WR	SHOW	Zn Cu Pb	Epidote Garnet	Sphalerite Chalcopyrite Bornite Galena Pyrite Pyrrhotite	Pb-Zn	Rhyolite Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
252	**092L 237** RUF 41 MEXICAN **COMMENTS:**	50 18 10 127 43 35	WR	SHOW	Cu Mo	Actinolite Chlorite	Chalcopyrite Pyrite Pyrrhotite Molybdenite	Cu	Limestone	Vancouver Parson Bay Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
253	**092L 242** HPH 3 NAHWITTI LAKE **COMMENTS:** Mineralization occurs in the Quatsino limestone near its contact with basalts in the underlying Karmutsen Formation.	50 41 47 127 47 58	WR	SHOW	Ag Pb Zn Cu Au	Unknown	Galena Sphalerite Magnetite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
254	**092L 244** SOUTH SHORE (RAS 4) RAS 4 **COMMENTS:** A 6.1 m chip sample assayed 7.17% Zn, 0.26% Cu, 6.9 g/t Ag and 0.04% Cd (Ass. Rpt. 870).	50 42 04 127 51 34	WR	PROS	Zn Ag Cu Pb Cd	Garnet Actinolite Ilvaite	Sphalerite Chalcopyrite Magnetite Greenockite Pyrite Pyrrhotite	Zn	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
255	**092L 245** SOUTH SHORE (HSW 3) HSW 3 **COMMENTS:** A 2.4 m chip sample assayed 2.49% Zn, 0.4% Pb, 0.01% Cu and 3.4 g/t Ag (Ass. Rpt. 870).	50 41 59 127 50 51	WR	PROS	Ag Zn Pb Cu	Unknown	Sphalerite Galena Pyrite Pyrrhotite Chalcopyrite	Pb-Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
256	**092L 254** HAB 11 **COMMENTS:**	50 19 20 126 44 28	WR	SHOW	Cu	Garnet Epidote	Chalcopyrite Magnetite Pyrite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
257	**092L 255** WHITE FANG BOB 4 **COMMENTS:**	50 17 50 126 44 25	WR	PROS	Cu	Garnet Pyroxene Epidote Actinolite Chlorite	Chalcopyrite Magnetite	Cu	Limestone	Vancouver Karmutsen Upper Triassic	Nimpkish batholith Middle Jurassic Quartz Diorite Middle Jurassic
258	**092L 264** KUQ **COMMENTS:**	50 12 25 127 11 28	WR	SHOW	Cu	Garnet Pyroxene	Chalcopyrite	Cu	Limestone Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
259	**092L 279** BEAVER COVE TSULTON RIVER **COMMENTS:** Some marble was quarried from the south end of the skarn (MMAR 1904, page 249).	50 31 00 126 53 30	WR	PAPR	MB	Epidote Garnet	Pyrrhotite	I.M.	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
260	**092L 300** HILLER 1 **COMMENTS:** Magnetite-rich skarn occurs close to the contact between Quatsino limestone and the Parson Bay Formation.	50 04 48 126 50 08	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
261	**092L 301** HILLER 8-12 HILLER **COMMENTS:** Five massive magnetite lenses occur close to the contact between Quatsino limestone and the Parson Bay Formation.	50 06 25 126 52 40	WR	DEPR	Fe	Unknown	Magnetite	Fe	Andesite Limestone	Vancouver Quatsino Upper Triassic	Zeballos batholith Middle Jurassic Granodiorite Middle Jurassic
262	**092L 302** A25 HILLER 25 **COMMENTS:** Tellurobismuthinite is reported.	50 07 05 126 53 35	WR	PROS	Au Cu Te Bi Fe	Unknown	Native Gold Chalcopyrite Magnetite Pyrrhotite	Fe	Tuff Argillite	Bonanza Undefined Formation Low-Mid Jurassic	Zeballos batholith Middle Jurassic Quartz Diorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
263	**092L 312** GREEN STAR **COMMENTS:**	50 01 07 126 48 30	WR	SHOW	Cu	Garnet	Chalcopyrite Pyrrhotite	Cu	Tuff	Bonanza Undefined Formation Low-Mid Jurassic	Zeballos batholith Middle Jurassic Quartz Diorite Middle Jurassic
264	**092L 314** BIG ZINC CLANCY **COMMENTS:**	50 26 20 127 25 58	WR	PROS	Zn	Unknown	Sphalerite	Zn	Limestone	Vancouver Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
265	**092L 316** WEST CLIFF **COMMENTS:** A grab sample assayed 6.7% Cu, 44.6 g/t Ag and 0.31 g/t Au (Ass. Rpt. 8284).	50 38 00 127 29 00	WR	SHOW	Cu Ag Au	Unknown	Chalcopyrite Pyrite	Cu	Limestone Tuff	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
266	**092L 317** SWAMP CLIFF **COMMENTS:** An 8.4 m drill intersection assayed 7.72% Zn, 1.26% Cu, 0.28% Pb, 57.25 g/t Ag and 0.17 g/t Au (Ass. Rpt. 11407).	50 38 12 127 29 20	WR	PROS	Cu Zn Ag Pb Au	Garnet Chlorite	Chalcopyrite Sphalerite Galena Bornite Pyrite Magnetite	Pb-Zn	Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Low-Mid Jurassic Granodiorite Low-Mid Jurassic
267	**092L 318** SOUTH BRANCH 7 **COMMENTS:** This property includes several mineralized skarn occurrences. A grab sample from the Branch 7 skarn assayed 8.45% Cu, 65.13 g/t Ag and 0.69 g/t Au (Ass. Rpt. 8284).	50 38 00 127 28 07	WR	PROS	Cu Ag Au	Unknown	Chalcopyrite Magnetite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
268	**092L 320** IDAHO FR OLD SPORT **COMMENTS:**	50 23 00 127 14 10	WR	DEPR	Cu	Epidote	Chalcopyrite Magnetite Pyrite Pyrrhotite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Granodiorite Middle Jurassic
269	**092L 322** HAPPY JACK **COMMENTS:**	50 22 25 127 13 55	WR	SHOW	Cu Zn	Unknown	Chalcopyrite Sphalerite Magnetite	Cu (Zn)	Limestone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic Gabbro Low-Mid Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
270	**092L 336** BLUEGROUSE (YREKA) MOUNTAIN KING **COMMENTS:** Specular hematite is present.	50 27 20 127 33 25	WR	SHOW	Cu Ag	Epidote Garnet	Chalcopyrite Pyrrhotite Pyrite Magnetite Hematite	Cu	Tuff Limestone	Vancouver Undefined Formation Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
271	**092L 337** BOB 17 CLIFF **COMMENTS:** McDougall (1961) estimates the deposit contains 12 608 t averaging 3% Cu and 30% magnetite with trace gold and silver.	50 18 06 126 45 01	WR	PROS	Cu Au Ag Fe	Garnet Pyroxene Epidote Actinolite Chlorite	Chalcopyrite Magnetite Pyrite	Fe (Cu)	Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Quartz Diorite Middle Jurassic
272	**092L 338** HK 10 BON **COMMENTS:**	50 24 00 126 49 00	WR	SHOW	Cu	Unknown	Unknown	Cu	Limestone Basalt	Vancouver Karmutsen and/or Quatsino Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
273	**092L 340** BLUEBIRD 2 **COMMENTS:** The occurrence consists of a irregular lens of massive sulphide between 0.3 and 1.5 m wide. It probably represents a small manto. The footwall is marble and the hanging wall comprises Bonanza tuffs or a greenstone sill.	50 21 15 127 14 55	WR	PROS	Cu Zn Au Co As	Epidote Chlorite Garnet	Pyrrhotite Magnetite Chalcopyrite Sphalerite Arsenopyrite Native Gold Cobaltite	Cu (Au)	Limestone Tuff	Vancouver and/or Bonanza Undefined Formation U Trias.-M Juras.	Coast Copper stock Low-Mid Jurassic 178 +/-8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
274	**092L 341** SNOWLINE 2 **COMMENTS:** The mineralogy of this occurrence resembles the Marten (092L 050). However the narrow massive sulphide zone is subvertical and may represent a chimney. The southern margin of the zone is in contact with marble whereas the northern margin lies adjacent to a thin altered greenstone dike.	50 21 13 127 15 13	WR	PROS	Cu Au Zn As	Garnet Chlorite	Magnetite Chalcopyrite Pyrrhotite Arsenopyrite Sphalerite	Cu (Au)	Limestone Greenstone	Vancouver Quatsino Upper Triassic	Coast Copper stock Low-Mid Jurassic 178 +/- 8 Ma Gabbro Low-Mid Jurassic 178 +/- 8 Ma
275	**102I 001** STRANBY CS **COMMENTS:**	50 50 35 128 09 20	WR	SHOW	Cu Fe	Garnet Epidote	Chalcopyrite Magnetite Bornite	Fe (Cu)	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
276	**102I 002** ORI **COMMENTS:**	50 50 24 128 06 48	WR	SHOW	Zn Cu Mo	Garnet	Sphalerite Chalcopyrite Magnetite Molybdenite Pyrite	Zn	Limestone	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Diorite Middle Jurassic
277	**102I 003** ED CREEK CS **COMMENTS:**	50 49 12 128 08 24	WR	SHOW	Cu	Garnet Epidote	Chalcopyrite Magnetite Bornite	Cu	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Island Plutonic Suite Middle Jurassic Granodiorite Middle Jurassic
278	**103B 001** IRON DUKE **COMMENTS:**	52 59 30 131 43 10	WR	DEPR	Fe Cu	Garnet Chlorite Epidote	Magnetite Pyrite Chalcopyrite	Fe	Limestone Basalt	Kunga Sadler Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 Ma +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
279	**103B 002** GEORGE ISLAND **COMMENTS:** From 1903 to 1912 the deposit was mined for copper but production records are unavailable.	52 21 00 131 12 30	WR	PAPR	Cu As	Garnet	Chalcopyrite Magnetite Pyrite Bornite Tennantite Cuprite	Cu	Limestone Basalt	Kunga Undefined Formation U Trias.-M Juras.	Unknown Uncertain Age
280	**103B 008** APEX STAR **COMMENTS:** McDougall (1964) estimates from drill data that the deposit has reserves of 180 000 t grading 34% Fe, 0.90% Cu and 24.6 g/t Ag.	52 41 45 131 53 30	WR	DEPR	Fe Cu Ag	Garnet Epidote	Magnetite Chalcopyrite Pyrite Pyrrhotite	Fe (Cu)	Limestone	Kunga Sadler Upper Triassic	San Christoval Plutonic Suite Low-Mid Jurassic Monzodiorite Middle Jurassic 166 +/- 3 Ma
281	**103B 011** ARCHIE - ADIT CREEK **COMMENTS:**	52 18 20 131 09 25	WR	SHOW	Fe Cu	Epidote	Magnetite Chalcopyrite Pyrite	Fe	Limestone	Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
282	**103B 013** LOBSTALK MARVEN **COMMENTS:**	52 40 10 131 40 10	WR	SHOW	Fe	Unknown	Magnetite Pyrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
283	**103B 017** ALDER ISLAND **COMMENTS:**	52 26 40 131 19 00	WR	SHOW	Au Cu Ni Mo As Sb	Garnet Actinolite Pyroxene Zoisite	Pyrrhotite Chalcopyrite Molybdenite Magnetite Allemontite	Cu	Siltstone Carbonate	Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
284	**103B 018** NICK'S SHOWINGS **COMMENTS:**	52 25 40 131 18 35	WR	SHOW	Cu Mo	Unknown	Pyrite Chalcopyrite Pyrrhotite Molybdenite	Cu	Argillite Limestone	Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
285	**103B 019** MAC JONES MAGNETITE **COMMENTS:**	52 24 55 131 17 40	WR	SHOW	Fe	Garnet	Magnetite	Fe	Limestone Greenstone	Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
286	**103B 020** JIB POOLE **COMMENTS:** Total reserves are 7 438 220 t grading 49.45% Fe (Western Miner, Volume 38, page 97, Oct. 1965).	52 21 10 131 15 30	WR	DEPR	Fe Cu Zn	Garnet Epidote Actinolite Pyroxene Chlorite	Magnetite Pyrite Chalcopyrite Pyrrhotite Sphalerite Hematite	Fe	Greenstone Limestone	Kunga Sadler Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 Ma +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
287	**103B 021** SKINCUTTLE ISLAND **COMMENTS:**	52 20 50 131 13 30	WR	SHOW	Cu Ag As	Garnet	Chalcopyrite Magnetite Pyrite Tennantite Cuprite Bornite	Cu	Andesite Limestone	Kunga Undefined Formation U Trias.-M Juras.	Monzodiorite Middle Jurassic

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
288	**103B 022** EAST COPPER ISLAND RED RAVEN **COMMENTS:**	52 21 30 131 10 30	WR	PAPR	Cu Ag As	Hornblende Garnet	Chalcopyrite Magnetite Bornite Tennantite Cuprite Pyrite	Cu	Andesite Limestone	Kunga Undefined Formation U Trias.-M Juras.	Unknown Uncertain Age
289	**103B 023** GIGGER SEA KING **COMMENTS:**	52 20 45 131 16 35	WR	PAPR	Fe Cu MA	Unknown	Magnetite Chalcopyrite Pyrite	Cu	Limestone Magnetite Skarn	Kunga Undefined Formation U Trias.-M Juras.	Unknown Uncertain Age
290	**103B 025** TIP TIP 1 **COMMENTS:**	52 18 20 131 13 10	WR	SHOW	Cu	Garnet	Magnetite Chalcopyrite Pyrite	Cu	Greenstone Limestone	Kunga Undefined Formation U Trias.-M Juras.	Unknown Uncertain Age
291	**103B 026** JESSIE JEDWAY **COMMENTS:**	52 17 35 131 11 50	WR	PAPR	Fe	Amphibole Chlorite Garnet	Magnetite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
292	**103B 027** ADONIS SWEET PEA **COMMENTS:** The orebody occurs along the contact between the Karmutsen Formation and the Kunga Group. Production data are uncertain.	52 17 30 131 11 20	WR	PAPR	Fe Cu	Garnet	Magnetite Pyrite Chalcopyrite	Fe	Basalt Limestone	Vancouver and/or Kunga Undefined Formation Upper Triassic	Diorite Middle Jurassic
293	**103B 028** LILY LILY (IKEDA) **COMMENTS:** The Lily mine contains 4 orebodies, one of which is a lens of magnetite-rich skarn along the Karmutsen-Kunga contact. Production data are uncertain.	52 17 25 131 10 45	WR	PAPR	Cu Ag Au Zn	Chlorite Actinolite	Pyrite Chalcopyrite Pyrrhotite Magnetite Sphalerite	Cu	Basalt Limestone	Vancouver and/or Kunga Undefined Formation Upper Triassic	Jedway stock Middle Jurassic Monzodiorite Middle Jurassic 164 +/- 3 Ma
294	**103B 029** ROSE CHRYSANTHEMUM **COMMENTS:** Production data are uncertain.	52 17 30 131 09 00	WR	PAPR	Fe Au Cu	Garnet Epidote Chlorite Pyroxene	Magnetite Pyrrhotite Pyrite Chalcopyrite Hematite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
295	**103B 030** TOGO A.J.	52 18 00 131 14 00	WR	SHOW	Cu	Garnet	Magnetite Chalcopyrite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Unknown Uncertain Age
	COMMENTS: A sample assayed 3% Cu (MMAR 1914, page 162).										
296	**103B 032** RECO	52 17 20 131 13 25	WR	SHOW	Cu Au Ag	Garnet	Magnetite Pyrite Chalcopyrite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
	COMMENTS:										
297	**103B 033** BLUE BELLE DINGO	52 17 00 131 13 30	WR	SHOW	Fe	Garnet	Magnetite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Monzodiorite Middle Jurassic
	COMMENTS:										
298	**103B 034** MAGNET IRON MOUNTAIN	52 16 50 131 13 45	WR	DEPR	Fe Cu Zn	Epidote Garnet	Magnetite Chalcopyrite Pyrite Sphalerite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
	COMMENTS: Reserves are estimated to be between 161 480 t and 453 590 t averaging 60% Fe (EMPR Bulletin 54, page 209).										
299	**103B 035** COPPER QUEEN	52 16 45 131 13 20	WR	SHOW	Cu Fe	Garnet Actinolite	Magnetite Chalcopyrite Pyrite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3Ma
	COMMENTS:										
300	**103B 036** MORESBY ISLAND TATE	52 16 55 131 13 00	WR	SHOW	Cu Fe Ag	Garnet Epidote Actinolite	Magnetite Chalcopyrite	Fe (Cu)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
	COMMENTS: This skarn includes a small body of massive magnetite as well as a zone of disseminated chalcopyrite. A chip sample over the latter averaged 1.1% Cu and 34 g/t Ag (EMPR Bulletin 54, page 210).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
301	**103B 037** EAGLE TREE	52 16 50 131 12 20	WR	SHOW	Cu Ag Au	Unknown	Magnetite Chalcopyrite Pyrite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Jedway stock Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
	COMMENTS: Grab samples averaged 2.6% Cu, 34.3 g/t Ag and 3.5 g/t Au (National Mineral Inventory Card 103B6, Cu7).										
302	**103B 038** IDA JIM	52 16 05 131 11 30	WR	SHOW	Fe	Garnet	Magnetite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Carpenter Bay Pluton Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
	COMMENTS:										
303	**103B 039** HERCULES JIM	52 16 05 131 11 10	WR	SHOW	Cu Au Fe	Garnet Pyroxene	Magnetite Chalcopyrite Pyrite	Fe (Cu)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Carpenter Bay Pluton Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
	COMMENTS: A grab sample of skarn assayed 0.75% Cu and a sample of silicified basalt in contact with magnetite skarn assayed 4.4 g/t Au (Ass. Rpt. 9207).										
304	**103B 041** THUNDER DEAKINS	52 16 25 131 10 00	WR	PROS	Fe Cu Ag Au	Chlorite Epidote Garnet	Magnetite Chalcopyrite Pyrite	Fe (Cu)	Basalt Limestone	Vancouver and/or Kunga Undefined Formation U Trias.-M Juras.	Unknown Uncertain Age
	COMMENTS: This property includes several magnetite-rich skarns that locally contain chalcopyrite. A 2 m sample from an adit assayed 2.6% Cu, 103 g/t Ag and 1.4 g/t Au (MMAR 1918, page 44).										
305	**103B 042** MEAL TICKET COLLISON BAY	52 16 25 131 09 55	WR	SHOW	Cu Fe Ag Au	Garnet Epidote Chlorite	Magnetite Pyrrhotite Chalcopyrite Pyrite	Fe (Cu)	Limestone Basalt	Vancouver Karmutsen Upper Triassic	Kano Plutonic Suite Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
	COMMENTS: A 2.6 m channel sample assayed 2.47% Cu, 8.5 g/t Ag and 1.2 g/t Au (Ass. Rpt. 14189).										
306	**103B 043** MAPLE LEAF COLLISON BAY	52 16 05 131 09 25	WR	PROS	Cu Ag Au	Garnet	Magnetite Pyrrhotite Pyrite Chalcopyrite	Cu	Basalt	Vancouver Karmutsen Upper Triassic	Monzodiorite Middle Jurassic
	COMMENTS: A 2 m chip sample assayed 1.4% Cu, 14.7 g/t Ag and 0.7 g/t Au (Ass. Rpt. 14189).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
307	**103B 044** WIRELESS TELEPHONE **COMMENTS:** A 3 m chip sample assayed 2.0% Cu, 41.8 g/t Ag and 1 g/t Au (Ass. Rpt. 14189). However the ore mined during 1916-1917 graded 29 g/t Au.	52 16 50 131 09 20	WR	PAPR	Cu Au Ag	Unknown	Chalcopyrite Bornite	Cu (Au)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
308	**103B 045** OCEANIC CU **COMMENTS:**	52 16 55 131 09 15	WR	PAPR	Cu Ag	Unknown	Chalcopyrite Bornite	Cu	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
309	**103B 046** PLUNGER IVAN **COMMENTS:**	52 15 35 131 11 20	WR	SHOW	Fe Cu	Garnet	Magnetite Chalcopyrite Pyrite	Fe (Cu)	Basalt	Vancouver Karmutsen Upper Triassic	Kano Plutonic Suite Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
310	**103B 047** CARNATION ROY'S SHOWING **COMMENTS:** A 30 cm drill intersection assayed 0.5% Cu, 31.3 g/t Ag and 3.3 g/t Au (Ass. Rpt. 14818).	52 16 55 131 11 05	WR	SHOW	Cu Ag Au	Chlorite Epidote	Chalcopyrite Pyrrhotite Pyrite Magnetite	Cu	Basalt Limestone	Vancouver and/or Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
311	**103B 051** TREAT BAY **COMMENTS:** Skarn occurs at the contact between Karmutsen Formation basalt and Kunga Group limestone.	52 04 10 131 01 30	WR	SHOW	Cu	Unknown	Magnetite Chalcopyrite Pyrite Pyrrhotite	Cu	Basalt Limestone	Vancouver and/or Kunga Undefined Formation Upper Triassic	Unknown Uncertain Age
312	**103B 052** FLO SWAN **COMMENTS:**	52 22 30 131 17 30	WR	SHOW	Fe Cu	Unknown	Magnetite Chalcopyrite	Fe (Cu)	Limestone	Kunga Sadler Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
313	**103B 053** CARPENTER BAY CAR	52 15 05 131 09 50	WR	SHOW	Fe Cu	Unknown	Magnetite Chalcopyrite	Fe (Cu)	Basalt	Vancouver Karmutsen Upper Triassic	Carpenter Bay Pluton Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
	COMMENTS:										
314	**103B 054** HOPE	52 15 50 131 11 30	WR	SHOW	Fe Cu Au Ag	Garnet	Magnetite Chalcopyrite Pyrite Pyrrhotite Ilmenite	Fe (Cu)	Diorite Basalt	Vancouver Karmutsen Upper Triassic	Carpenter Bay Pluton Oligocene 32 +/- 1 Ma Monzodiorite Oligocene 32 +/- 1 Ma
	COMMENTS: The massive magnetite skarn contains sporadic chalcopyrite. A 3 m sample assayed 2.7% Cu with trace Ag and Au (MMAR 1918, page 39-40).										
315	**103B 065** ROSE	52 05 35 131 06 25	WR	SHOW	Cu Au Mo	Chlorite Garnet	Pyrite Chalcopyrite Molybdenite Pyrrhotite	Cu	Argillite Limestone	Kunga Undefined Formation U Trias.-M Juras.	San Christoval Plutonic Suite Middle Jurassic Monzodiorite Middle Jurassic 166 +/- 3 Ma
	COMMENTS:										
316	**103B 067** WATER LILY	52 17 50 131 09 25	WR	SHOW	Fe Cu	Garnet	Magnetite Chalcopyrite Pyrrhotite Pyrite	Fe	Basalt Limestone	Vancouver Karmutsen Upper Triassic	Monzodiorite Middle Jurassic
	COMMENTS:										
317	**103B 069** CARNATION CREEK	52 17 20 131 09 45	WR	SHOW	Cu Ag Au Fe	Chlorite	Pyrite Magnetite Chalcopyrite	Fe (Cu)	Basalt	Vancouver Karmutsen Upper Triassic	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
	COMMENTS: A grab sample of massive magnetite assayed 1.25% Cu, 12.8 g/t Ag and 0.25 g/t Au (Ass. Rpt. 14818).										
318	**103B 070** COLLISON BAY ADIT	52 17 10 131 08 40	WR	SHOW	Cu Ag Au Fe	Garnet	Magnetite Pyrite Chalcopyrite Hematite	Fe (Cu)	Basalt	Vancouver Karmutsen Upper Triassic	Monzodiorite Middle Jurassic
	COMMENTS: A grab sample assayed 0.74% Cu, 7.4 g/t Ag and 0.09 g/t Au (Ass. Rpt. 14818).										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
319	**103B 071** ARCHIE (CAMP CREEK) ARCHIE	52 18 00 131 09 50	WR	SHOW	Cu	Epidote	Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone	Kunga Undefined Formation U Trias.-M Juras.	Burnaby Island Plutonic Suite Middle Jurassic 164 +/- 3 Ma Monzodiorite Middle Jurassic 164 +/- 3 Ma
320	**103C 003** TASU TASSOO	52 45 25 132 02 30	WR	PAPR	Fe Cu Ag Au Zn	Chlorite Sericite Epidote Garnet Actinolite Tremolite Anthophyllite	Magnetite Chalcopyrite Pyrite Pyrrhotite Sphalerite	Fe	Basalt Limestone	Vancouver and/or Kunga Undefined Formation Upper Triassic	San Christoval Plutonic Suite Middle Jurassic Monzodiorite Middle Jurassic 166 +/- 3 Ma
321	**103C 004** GARNET KING NEPTUNE	52 46 15 132 01 05	WR	PROS	Cu Mo Fe Zn Ag Au Pb	Chlorite Actinolite Sericite	Chalcopyrite Magnetite Pyrite Sphalerite Molybdenite	Fe (Cu,Zn)	Basalt Limestone	Vancouver Karmutsen Upper Triassic	San Christoval Plutonic Suite Middle Jurassic 166 +/- 3 Ma Monzodiorite Middle Jurassic 166 +/- 3 Ma
322	**103C 005** OLD TASU TOWNSITE	52 45 05 132 01 20	WR	SHOW	Fe Cu	Unknown	Magnetite Chalcopyrite Pyrite	Fe	Limestone Greenstone	Kunga Undefined Formation U Trias.-M Juras.	San Christoval Plutonic Suite Middle Jurassic Monzodiorite Middle Jurassic 166 +/- 3 Ma
323	**103F 004** NORTHWESTER MAGNET	53 17 45 132 29 30	WR	SHOW	Fe Cu	Actinolite Garnet	Chalcopyrite Magnetite Pyrrhotite Pyrite	Fe (Cu)	Basalt Limestone	Vancouver and/or Kunga Undefined Formation Upper Triassic	Kano Plutonic Suite Oligocene 32.2 +/- 1.0 Ma Monzodiorite Oligocene 32 +/- 1 Ma

319 COMMENTS:

320 COMMENTS:
Massive magnetite orebodies occur at the contact between the Kunga limestones and the Karmutsen basalts. Sphalerite is rare.

321 COMMENTS:
Three types of mineralization occur on the property: (1) massive magnetite skarn (2) massive sphalerite and (3) low grade chalcopyrite, pyrite and molybdenite (EMPR Property File, Elwel, J.P., 1964).

322 COMMENTS:

323 COMMENTS:
Massive magnetite with lesser chalcopyrite occurs along the contact between Karmutsen basalt and Kunga limestone.

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
324	**103F 005** GUDAL DAL	53 14 30 132 33 10	WR	SHOW	Cu Fe	Epidote Garnet	Magnetite Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone Basalt	Vancouver and/or Kunga Undefined Formation Upper Triassic	Kano Plutonic Suite Oligocene 32.2 +/- 1.0 Ma Monzodiorite Oligocene 32.2 +/- 1 Ma
	COMMENTS: Skarn occurs along the contact between Karmutsen basalts and Kunga limestone.										
325	**114P 007** MAID OF ERIN	59 34 15 136 35 05	AX	PAPR	Ag Cu Au Zn Bi Mo Cd	Garnet Monticellite Wollastonite Vesuvianite Pyroxene Zoisite Biotite Gahnite	Bornite Chalcocite Chalcopyrite Sphalerite Wittichenite Magnetite Molybdenite Covellite Native Silver	Cu	Tuff Marble Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: Four mineralized grab samples assayed up to 24.8% Cu, 1.95% Zn, 765 ppm As, 490 ppm Pb, 1600 g/t Ag, 42 ppm Co, 0.33% Bi, 0.1% Cd, 8 ppm Te, 177 ppb Au and 48 ppm Se (Appendix 4B).										
326	**114P 008** STATE OF MONTANA	59 34 00 136 32 55	AX	PAPR	Ag Cu Au Bi Te Zn Se	Garnet Actinolite Vesuvianite Pyroxene Biotite	Bornite Chalcocite Sphalerite Wittichenite Pyrrhotite	Cu	Quartzite Marble	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: Three mineralized grab samples assayed up to 35.3% Cu, 0.17% Zn, 335 ppm As, 188 ppm Pb, 1800 g/t Ag, 29 ppm Co, 0.82% Bi, 39 ppm Cd, 29 ppm Te, 144 ppb Au and 210 ppm Se (Appendix 4B).										
327	**114P 009** VICTORIA	59 33 30 136 33 20	AX	PROS	Ag Zn Pb Cu	Garnet Wollastonite Pyroxene	Sphalerite Galena Chalcopyrite	Pb-Zn	Marble Quartzite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: Two 1.8 and 2.1 m chip samples averaged 15.4% Pb, 23.1% Zn and 188.6 g/t Ag (EMPR Bull. 25, page 55).										
328	**114P 010** ADAMS CUSTER	59 33 40 136 31 15	AX	PROS	Pb Zn Ag Cu Cd Bi	Wollastonite Garnet Epidote	Galena Sphalerite Chalcopyrite Pyrrhotite	Pb-Zn	Marble Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: A sphalerite-rich grab sample assayed 3.10% Zn, 410 ppm Cd, 810 ppm Cu, 16 ppm Pb, 2.2 g/t Ag, 14 ppm Co, 2 ppm As and 53 ppm Bi (Appendix 4E). MINFILE reports a sample from a 0.9 m wide sulphide lens assayed 10.2% Pb, 9.1 % Zn and 44.6 g/t Ag.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
329	**114P 011** LAWRENCE	59 35 00 136 29 40	AX	PROS	Ag Pb Zn Au Cu	Pyroxene Garnet Wollastonite	Galena Sphalerite Chalcopyrite	Pb-Zn	Marble Argillite Quartzite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: MINFILE reports a 1.8 m chip sample assayed 12.2% Zn, 5.3% Pb and 246.9 g/t Ag. A grab sample assayed 16.8% Zn, 210 ppm Cd and 17 ppm Se (Appendix 4E).										
330	**114P 012** SIMCOE THREE GUARDSMEN	59 35 55 136 23 40	AX	SHOW	Au Cu Mo	Actinolite Pyroxene Garnet Epidote	Chalcopyrite Molybdenite Magnetite	Cu	Marble Quartzite Argillite	Unknown Group Unknown Formation Devonian	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: MINFILE reports a grab sample assayed 1.03 g/t Au and 0.8% Cu.										
331	**114P 013** MILDRED THREE GUARDSMEN	59 35 40 136 24 25	AX	SHOW	Ag Cu	Actinolite Pyroxene Garnet Epidote	Chalcopyrite Magnetite	Cu	Marble Quartzite Argillite	Unknown Group Unknown Formation Devonian	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: MINFILE reports a 3 m chip sample assayed 0.3% Cu and 6.86 g/t Ag.										
332	**114P 014** CANADIAN VERDEE THREE GUARDSMEN	59 35 15 136 24 20	AX	SHOW	Ag Cu Zn Au Bi	Actinolite Garnet Pyroxene Epidote	Bornite Chalcocite Sphalerite Chalcopyrite Wittichenite Magnetite	Cu	Marble Quartzite Argillite	Unknown Group Unknown Formation Devonian	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: MINFILE reports that mineralization includes a 0.9 m wide lens of massive magnetite which assayed 2.5% Cu and 96 g/t Ag and a smaller bornite-sphalerite lens which assayed 20.5% Cu, 14.6% Zn, 809 g/t Ag, 1.03 g/t Au and 0.55% Bi.										
333	**114P 029** HIBERNIAN	59 33 30 136 34 05	AX	SHOW	Cu Ag Pb Zn	Garnet Actinolite	Chalcopyrite Galena Sphalerite Pyrrhotite Magnetite	Pb-Zn	Limestone Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: A grab sample assayed 44.5 g/t Ag (MMAR 1914, page 96).										
334	**114P 039** CAMP CREEK	59 36 10 136 40 55	AX	SHOW	Ag Cu	Unknown	Chalcopyrite	Cu	Siltstone Limestone Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
	COMMENTS: MINFILE reports that samples assayed from 0.62 to 14.3% Cu and 13.7 to 336 g/t Ag with only trace gold.										

TECTONIC BELT: Insular

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
335	**114P 040** KLEHINI RIVER NE **COMMENTS:**	59 35 45 136 39 30	AX	SHOW	Ag Pb Zn Cu	Epidote Chlorite	Sphalerite Chalcopyrite Galena	Cu (Zn)	Greenstone	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
336	**114P 042** INSPECTOR CREEK **COMMENTS:**	59 35 15 136 33 00	AX	SHOW	Cu Ag As	Pyroxene Epidote	Arsenopyrite Chalcopyrite Pyrrhotite	Cu	Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene
337	**114P 048** SAM - MAIN GLACIER **COMMENTS:** The occurrence consists of a trail of mineralized boulders at the base of the Main Glacier. MINFILE reports the boulders assay up to 12.4% Pb, 14.3% Zn, 5.8% Cu, 150.8 g/t Ag and 0.07 g/t Au.	59 42 00 136 53 00	AX	SHOW	Cu Pb Zn Ag Au	Garnet Pyroxene Actinolite	Chalcopyrite Sphalerite Galena	Pb-Zn	Unknown	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene
338	**114P 057** ALU **COMMENTS:** This property includes scheelite-bearing skarn as well as quartz veins and lenses that carry bornite, pyrite and molybdenum.	59 07 50 137 01 00	AX	SHOW	Cu Mo W	Epidote Garnet	Chalcopyrite Bornite Molybdenite Scheelite Pyrite	Cu (W)	Limestone	Undefined Group Icefield & Alsek Ranges Silurian-Devonian	St. Elias Intrusions Jurassic-Cretaceous Granodiorite Jurassic-Cretaceous
339	**114P 070** FAIR RED MOUNTAIN **COMMENTS:**	59 42 20 137 09 30	AX	PROS	Cu Zn Pb Au Ag As	Epidote Pyroxene Garnet	Chalcopyrite Sphalerite Galena Arsenopyrite Pyrite Pyrrhotite	Cu	Limestone	Kuskawulsh Undefined Formation Ordovician-Silurian	Feldspar Porphyry Uncertain Age
340	**114P 079** FAIRFIELD **COMMENTS:** MINFILE reports a mineralized sample assayed 1.2% Cu and 45.9 g/t Ag. This occurrence is incorrectly called the Majestic in Webster et al, 1992, page 239. A pyrrhotite-rich grab sample assayed 0.44% Cu, 5 g/t Ag, 210 ppm Co and 101 ppm Bi but did not contain anomalous Au, As, Zn or Pb (Appendix 4B).	59 34 10 136 32 10	AX	SHOW	Ag Cu Bi Co	Garnet	Chalcopyrite Pyrite Pyrrhotite	Cu	Marble Argillite	Unknown Group Unknown Formation Paleozoic-Mesozoic	Tkope River Intrusions Oligocene Granodiorite Oligocene

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
341	**092F 115** KING MIDAS V1	49 40 05 124 00 05	WR	PAPR	Cu Ag	Epidote	Chalcopyrite Native Copper Pyrite Magnetite Hematite	Cu	Limestone	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: A sample taken across 1.8 m assayed 2.44% Cu and 43.9 g/t Ag (Ass. Rpt. 5444). Specular hematite is present.										
342	**092F 146** JOHN BULL	49 56 47 124 42 33	WR	PROS	Zn Ag Cu Pb Au Mo	Epidote Garnet	Sphalerite Chalcopyrite Galena Molybdenite Magnetite Pyrite Pyrrhotite	Pb-Zn	Limestone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Tonalite Middle Cretaceous
	COMMENTS: This occurence assays up to 52% Zn, 2% Pb, 0.8% Cu, 23 g/t Au and 150 g/t Ag (MMAR 1926, page A312).										
343	**092F 147** FLORENCE MALASPINA	49 56 49 124 41 44	WR	PAPR	Zn Cu Ag Pb Cd Au Sb	Epidote Garnet	Sphalerite Bornite Chalcopyrite Galena Tetrahedrite Native Copper Pyrite Pyrrhotite	Zn (Cu)	Limestone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Tonalite Middle Cretaceous
	COMMENTS: This occurence assays up to 32.8% Zn, 9.3% Cu, 321 g/t Ag and 0.68 g/t Au (Ass. Rpt. 4961).										
344	**092F 148** ROYAL ARCH	49 56 35 124 41 35	WR	SHOW	Zn Cu Ag	Epidote Garnet	Sphalerite Chalcopyrite Pyrite	Zn (Cu)	Limestone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Tonalite Middle Cretaceous
	COMMENTS: This occurence assays up to 6.9% Cu, 17.5% Zn and 75 g/t Ag (MMAR 1926, page A312).										
345	**092F 283** NEL	49 42 10 124 08 10	WR	SHOW	Fe Cu	Garnet	Magnetite Pyrite	Fe	Basalt	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: A sample of massive magnetite assayed 0.13% Cu (Ass. Rpt. 358).										
346	**092F 302** SNOWFALL SUNSHINE	49 59 48 124 37 02	WR	SHOW	Cu	Garnet Epidote Tremolite	Magnetite Pyrite Chalcopyrite	Cu	Limestone Basalt Diorite	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
347	**092GNW011** CAMBRIAN CHIEFTAN	49 40 54 123 56 17	WR	PAPR	Cu Ag Zn Au	Garnet Epidote	Chalcopyrite Pyrite Pyrrhotite Magnetite Sphalerite Hematite	Cu	Limestone Chert Greenstone	Vancouver Undefined Formation Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
348	**092GNW017** COPPER	49 50 15 123 50 30	JKG	SHOW	Cu Ag Zn Pb Mo	Garnet Epidote	Magnetite Pyrrhotite Pyrite Chalcopyrite Sphalerite Galena Molybdenite	Cu	Tuff Agglomerate Argillite	Gambier Undefined Formation Upper Jur.-Low Cret.	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
349	**092GNW031** SECHELT CARBONATE PENINSULA LIME	49 36 04 123 53 14	WR	DEPR	DO LS	Muscovite Chlorite Serpentinite Pyroxene Olivine Talc Graphite Dolomite	Unknown	I.M.	Limestone Dolomite Greenstone	Vancouver Karmutsen Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
350	**092GNW052** MINERAL HILL SNAKE BAY	49 30 56 123 48 59	WR	PAPR	LS WL Cu Zn	Garnet Pyroxene Epidote Wollastonite Tremolite Vesuvianite Rhodonite Prehnite	Chalcopyrite Sphalerite Pyrite	I.M.	Limestone	Vancouver Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous

347 COMMENTS:
This is the largest skarn producer in the Coast Belt (1421 t of ore). Many of the sulphides occur at the contact between marble and masses of garnetite. Brown, green and yellow garnets are present.
A 241 t bulk sample averaged 13.9% Cu, 262 g/t Ag and 1.93 g/t Au (MMAR 1949, page 217). Eight grab samples from the skarn average 176 ppb Au, 118 ppm Ag, 3.1% Cu, 2.8% Zn, 386 ppm Cd and 487 ppm Co.
Anomalous Te, Bi and W are also recorded (Appendix 4B).

348 COMMENTS:

349 COMMENTS:
Magnesian skarn alteration is associated with a dolomite industrial mineral deposit with geological reserves of 3.5 million tonnes averaging 19.2% MgO (Ass. Rpt. 15593).

350 COMMENTS:
Drill indicated reserves are 291 000 t grading up to 50% wollastonite (EMPR Industrial Mineral File, Goldsmith and Kallock, 1988). The deposit is decribed by Ray and Kilby (1996a and b).
The wollastonite skarn is generally sulphide-poor. However, minor sphalerite-rich mineralization occurs. Grab samples indicate anomalous Zn, Cu, Cd, Co and Hg values (Appendix 4H).

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
351	**092GNW053** WORMY LAKE SECHELT **COMMENTS:** Wollastonite skarn outcrops intermittently over 400 m at Wormy Lake although recently discovered wollastonite-rich outcrops also occur further east and north of the Lake (Ray and Kilby, 1996a and b).	49 31 53 123 50 07	WR	PROS	WL	Garnet Pyroxene Epidote Wollastonite	Pyrite Chalcopyrite Sphalerite	I.M.	Limestone	Vancouver Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
352	**092GSW001** COPPER DUKE MOUNTAIN LION **COMMENTS:** Samples assay up to 16% Cu and 68 g/t Ag (MMAR 1918, page 293).	49 24 20 123 02 08	M	SHOW	Cu Ag Au	Epidote Garnet Hornblende	Magnetite Pyrrhotite Chalcopyrite	Cu	Gneiss Schist	Unknown Group Unknown Formation Paleozoic-Mesozoic	Coast Plutonic Complex Upper Jur.-Low Cret. Diorite Upper Jur.-Low Cret.
353	**092GSW003** LYNN CREEK KEMPTVILLE EXT. **COMMENTS:** Assays average 9% Zn and up to 68 g/t Ag (Northern Miner, Nov. 31, 1963). Inferred ore reserves are 272 155 t grading 20% Zn (Western Miner & Oil Review, Nov. 1963, page 32).	49 25 16 123 03 40	JKG	DEPR	Zn Ag Pb	Garnet	Sphalerite Pyrrhotite Galena Chalcopyrite Pyrite Cubanite Marcasite Hematite	Zn	Limestone	Gambier Undefined Formation Upper Jur.-Low Cret.	Coast Plutonic Complex Upper Jur.-Low Cret. Diorite Upper Jur.-Low Cret.
354	**092HSW003** MAMMOTH FOUNDATION MINES **COMMENTS:** A sample assayed 0.7% Ni, 0.25% Cu, 27 g/t Ag and 0.3g /t Au (EMPR PF, MacKinnon, 1961).	49 13 15 121 05 15	BR	PROS	Ni Ag Au Cu W Mo As Zn	Actinolite Epidote Strontianite Anorthite Hornblende Pyroxene Wollastonite Garnet	Pyrrhotite Sphalerite Chalcopyrite Molybdenite Scheelite Arsenopyrite Pyrite Pyrolusite	unkn	Limestone Greenstone Argillite	Hozameen Undefined Formation Permian-Jurassic	Ultramafic Intrusions Uncertain Age
355	**092HSW008** EMPRESS CROWN GRANT LOTS 1804-1807 **COMMENTS:** 91 tonnes of ore produced 6.3 t Cu. One sample assayed 5.3% Cu and 48 g/t Ag (MMAR 1917, page 287).	49 16 57 121 45 00	CK	PAPR	Cu Mo Ag	Garnet Wollastonite Epidote	Chalcopyrite Molybdenite Pyrite Bornite Magnetite	Cu	Limestone	Chilliwack Undefined Formation Pennsylvanian-Perm.	Coast Plutonic Complex Oligocene Granodiorite Oligocene

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
356	**092HSW012** D & J DIAMOND **COMMENTS:** One sample assayed 4.1% Cu, 41 g/t Ag, 0.3 g/t Au with trace cobalt, nickel and zinc (MMAR 1948, page 155).	49 11 46 121 05 06	BR	PROS	Cu Au Ag Zn Co Pb As	Epidote Garnet Hornblende Wollastonite Actinolite	Pyrrhotite Arsenopyrite Chalcopyrite Sphalerite Pyrite Galena Native Copper	Cu	Greenstone Chert Limestone	Hozameen Undefined Formation Permian-Jurassic	Quartz Diorite Uncertain Age
357	**092HSW042** B.B. RAINBOW **COMMENTS:** A 7.6 t shipment graded 2.8% Zn, 0.7% Cu, 538 g/t Ag and 2.0 g/t Au (MMAR 1915, pages 264, 446).	49 12 47 121 04 32	BR	PAPR	Ag Au Zn Cu Pb Sb As	Epidote Hornblende Pyroxene Wollastonite Garnet	Arsenopyrite Pyrrhotite Galena Sphalerite Chalcopyrite Pyrite Boulangerite Jamesonite	Pb-Zn	Greenstone Chert Argillite	Hozameen Undefined Formation Permian-Jurassic	Quartz Diorite Miocene
358	**092JNE013** BRAMOOSE PERIDOT **COMMENTS:**	50 43 25 122 39 45	BR	SHOW	Cu Au LS	Epidote Garnet Pyroxene Wollastonite	Pyrrhotite Chalcopyrite	Cu	Limestone Chert Argillite	Bridge River Undefined Formation Permian-Jurassic	Bendor Pluton Upper Cretaceous 73.5 +/- 3.6 Ma Granodiorite Upper Cretaceous 73.5 +/- 3.6 Ma
359	**092JNE043** CHALCO 5 LOWER PIEBITER **COMMENTS:** Three grab samples gave maximum assays of 287 ppb Au, 1.0% Cu, 112 ppm Bi, 15 ppm Te and 2600 ppm W (Appendix 4B).	50 43 20 122 38 35	BR	SHOW	Cu Au Ag Mo W Bi	Epidote Garnet Pyroxene Actinolite Vesuvianite	Chalcopyrite Scheelite Molybdenite Pyrrhotite Magnetite	Cu	Limestone Argillite Schist	Bridge River Undefined Formation Permian-Jurassic	Bendor Pluton Upper Cretaceous 73.5 +/- 3.6 Ma Granodiorite Upper Cretaceous 73.5 +/- 3.6 Ma
360	**092JNE044** CHALCO 12 **COMMENTS:**	50 43 28 122 38 17	BR	SHOW	W Cu	Epidote Garnet Pyroxene	Chalcopyrite Scheelite Pyrite Pyrrhotite	W	Limestone Chert Argillite	Bridge River Undefined Formation Permian-Jurassic	Bendor Pluton Upper Cretaceous 73.5 +/- 3.6 Ma Granodiorite Upper Cretaceous 73.5 +/- 3.6 Ma
361	**092JNE049** SENECA **COMMENTS:**	50 31 50 122 54 55	CD	SHOW	Au Ag Cu Pb Zn	Garnet Epidote	Magnetite Pyrite Chalcopyrite Sphalerite Galena	Cu	Limestone	Cadwallader Undefined Formation Upper Triassic	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
362	**092JNE053** CROWN	50 31 02 122 54 45	CD	PROS	Ag Pb Zn Cu	Garnet Epidote	Pyrite Sphalerite Galena Chalcopyrite Native Silver Magnetite Pyrolusite Hematite	Pb-Zn	Limestone Tuff	Cadwallader Undefined Formation Upper Triassic	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS: A 5 t bulk sample averaged 4.1% Pb, 3.2% Zn and 4006 g/t Ag (GSC Summary Report 1924 - 93A).										
363	**092JNE107** OLYMPIC (BILLYO ZONE) OLYMPIC (MOLY ZONE)	50 53 45 122 44 00	BR	PROS	Mo Au Ag Cu As	Pyroxene Garnet Gypsum	Pyrite Pyrrhotite Magnetite Chalcopyrite Arsenopyrite Ferrimolybdite	unkn	Breccia	Bridge River Undefined Formation Permian-Jurassic	Unknown Uncertain Age
	COMMENTS: One grab sample assayed 5.9 g/t Au and 5.1 g/t Ag (Ass. Rpt. 11139, 14344).										
364	**092JSE009** LAKE ADIT RED JACKET	50 17 25 122 36 24	CD	SHOW	Cu Pb Zn Au Ag	Garnet Epidote	Chalcopyrite Pyrite Galena Sphalerite Magnetite Pyrrhotite Hematite	Cu	Limestone Andesite	Cadwallader Undefined Formation Upper Triassic	Quartz Diorite Middle Cretaceous
	COMMENTS: This skarn contains abundant magnetite with chalcopyrite and minor galena and sphalerite. A 2.4 m channel sample assayed 2.8% Cu, 1.9% Zn, 40 g/t Ag and 0.9 g/t Au (Ass. Rpt. 9003).										
365	**092JSE012** SQUEAK MARJERY	50 20 45 122 39 14	CD	SHOW	Cu Zn Ag Au	Garnet Epidote Pyroxene	Pyrite Chalcopyrite Magnetite Sphalerite Native Gold	Cu	Limestone Breccia Tuff	Cadwallader Undefined Formation Upper Triassic	Spetch Creek pluton Cretaceous Diorite Cretaceous
	COMMENTS: One grab sample assayed 0.57% Cu and 20.8 g/t Ag (Ass. Rpt. 18013). Free gold is described by Camsell (Geological Survey of Canada, Summary Report 1917).										
366	**092JSE029** LIZARD	50 29 00 122 41 50	CD	SHOW	W Mo	Sericite K-Feldspar Chlorite Epidote Garnet Pyroxene Tremolite Wollastonite	Scheelite Molybdenite Powellite	W	Limestone Tuff	Cadwallader Hurley Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS: One sample assayed 5.7% WO3 (Ass. Rpt. 10036). Two skarn assemblages occur: (1) garnet-pyroxene-epidote and (2) tremolite-wollastonite- calcite.										

TECTONIC BELT: Coast

NO.	MINFILE NUMBER / NAME	LATITUDE / LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
367	**092JW 024** ZONE 4 DICK	50 04 10 123 06 50	JKG	SHOW	Zn Cu Pb Au Ag	Garnet Epidote	Sphalerite Chalcopyrite Pyrrhotite Pyrite Galena Covellite Argentite Electrum	Zn	Marble Limestone Andesite	Gambier Undefined Formation Upper Jur.-Low Cret.	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS: A 1.5 m drill intersection assayed 8.2% Zn, 0.04% Cu and 7.88 g/t Ag (Ass. Rpt. 7032).										
368	**092K 032** KNIGHT INLET MARBLE-COPPER CAMBRIA COPPER	50 43 00 125 50 13	WR	SHOW	Cu Zn Ag	Garnet	Bornite Chalcopyrite Sphalerite Pyrrhotite	Cu (Zn)	Marble	Unknown Group Unknown Formation Paleozoic-Mesozoic	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS: A sample assayed 5.88% Zn, 5.7% Cu, 85 g/t Ag (MMAR 1929, page 380).										
369	**092K 039** REDONDA IRON ELSIE	50 17 31 124 52 38	WR	PAPR	Fe	Pyroxene Garnet Wollastonite Vesuvianite Epidote Sphene	Magnetite	Fe	Limestone Tuff Greenstone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS: Production data are uncertain.										
370	**092K 040** BLACK WARRIOR WEST REDONDA ISLAND	50 17 17 124 51 55	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone Greenstone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS:										
371	**092K 046** MAYFLOWER OLSON	50 07 42 124 30 49	WR	SHOW	Cu Au Ag	Hornblende Epidote Garnet	Chalcopyrite Pyrite Pyrrhotite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Granodiorite Middle Cretaceous
	COMMENTS:										
372	**092K 047** HUMMING BIRD ROMANA COPPER	50 05 07 124 26 46	WR	PAPR	Cu Ag	Garnet Epidote	Chalcopyrite Pyrite Magnetite	Cu	Unknown	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Granodiorite Uncertain Age
	COMMENTS:										

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
373	**092K 053** COPPER KING THEODOSIA **COMMENTS:** There are zinc-rich and copper/magnetite-rich zones. Assays up to 83 g/t Ag are reported (MMAR 1926, page 310).	50 06 59 124 33 22	WR	SHOW	Cu Zn Ag Pb	Epidote	Chalcopyrite Magnetite Sphalerite Galena	Cu (Zn)	Limestone Greenstone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Granodiorite Middle Cretaceous
374	**092K 063** HOMESTAKE BLACK WARRIOR **COMMENTS:**	50 16 51 124 51 49	WR	SHOW	Fe	Unknown	Magnetite	Fe	Limestone Greenstone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
375	**092K 125** CONTACT **COMMENTS:**	50 11 40 125 15 15	WR	SHOW	Cu	Epidote Garnet Amphibole	Pyrrhotite Chalcopyrite	Cu	Limestone	Vancouver Quatsino Upper Triassic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
376	**092N 026** DAISIE COPPER QUEEN **COMMENTS:** Maximum assay values of 5.1% Cu, 0.7% Zn, 0.5% W and 80 g/t Ag (McLaren 1990, page 83).	51 11 06 124 13 00	ST	PROS	Cu Mo Zn W Ag Au Pb As	Epidote Clinozoisite Garnet Pyroxene Wollastonite Actinolite Biotite Chlorite	Chalcopyrite Pyrrhotite Scheelite Sphalerite Molybdenite Arsenopyrite Bornite Galena	Cu	Limestone Tuff	Stuhini Undefined Formation Upper Triassic	Granodiorite Uncertain Age
377	**092O 056** EVA AVE **COMMENTS:** Patchy skarn with gold-sulphide-calcite veining; possibly associated with a swarm of feldspar porphyry dikes.	51 02 55 122 55 30	CD	PROS	Au Sb Cu Bi As	Pyroxene Epidote Chlorite Vesuvianite	Stibnite Arsenopyrite Bismuthinite Chalcopyrite Pyrite Hematite	unkn	Conglomerate Siltstone	Tyaughton Undefined Formation U Trias.-L Juras.	Coast Plutonic Complex Tertiary Feldspar Porphyry Tertiary
378	**093D 004** DEAN CHANNEL **COMMENTS:**	52 40 09 127 01 13	ST	PAPR	Fe	Epidote Garnet	Magnetite	Fe	Schist Granodiorite	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
379	**093D 012** PROMISE WELL EVANS ARM **COMMENTS:**	52 06 22 127 44 51	?	SHOW	Fe Cu	Garnet Epidote	Magnetite Chalcopyrite	Fe (Cu)	Granodiorite	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Granodiorite Middle Cretaceous
380	**093D 015** LAST CHANCE **COMMENTS:**	52 09 42 127 34 48	?	SHOW	Mo	Garnet Epidote	Molybdenite	Mo	Schist	Unknown Group Unknown Formation Uncertain Age	Pegmatite Uncertain Age
381	**093E 006** GG **COMMENTS:**	53 34 30 127 38 56	ST	SHOW	Cu W Bi	Unknown	Chalcopyrite Scheelite	Cu (W)	Monzonite	Unknown Group Unknown Formation Uncertain Age	Tahtsa Complex Low-Mid Jurassic Quartz Monzonite Low-Mid Jurassic
382	**093E 012** ICE **COMMENTS:**	53 26 11 127 29 05	ST	SHOW	Cu Mo Zn Pb	Garnet Sericite	Chalcopyrite Molybdenite Bornite Sphalerite Galena Pyrrhotite Pyrite Magnetite	Cu	Argillite Limestone	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Lower Jurassic Granodiorite Lower Jurassic
383	**093E 017** SANDIFER LAKE PRIMARY **COMMENTS:** The skarn carries specular hematite.	53 32 59 127 36 10	ST	SHOW	Cu Mo W Pb	Garnet Epidote Chlorite	Chalcopyrite Bornite Molybdenite Scheelite Galena Magnetite Hematite	Cu	Limestone Siltstone Argillite	Gamsby Undefined Formation U Paleozoic-L Juras.	Coast Plutonic Complex Middle Jurassic Quartz Diorite Middle Jurassic
384	**093E 102** PARK **COMMENTS:** Three types of mineralization are present: (1) bornite with wollastonite, (2) chalcopyrite with garnet and (3) discontinuous bands of sphalerite.	53 20 56 127 21 00	ST	SHOW	Cu Ag Zn	Wollastonite Epidote Garnet	Bornite Chalcopyrite Sphalerite Pyrite Magnetite	Cu	Phyllite Dacite Siltstone	Gamsby Undefined Formation U Paleozoic-L Juras.	Coast Plutonic Complex Lower Jurassic Quartz Diorite Lower Jurassic

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
385	**093E 111** MUMBO **COMMENTS:**	53 21 39 127 31 37	ST	SHOW	Cu Ag	Unknown	Chalcopyrite Pyrrhotite Magnetite	Cu	Tuff Marble	Gamsby Undefined Formation U Paleozoic-L Juras.	Coast Plutonic Complex Lower Jurassic Quartz Monzonite Lower Jurassic
386	**103A 003** HEBREW NEEKAS **COMMENTS:** It is uncertain whether this occurrence is a skarn or a metamorphosed volcanogenic deposit. A 2.5 m chip sample assayed 2.12% Zn and 0.15% Cu (Ass. Rpt. 16148).	52 28 05 128 10 04	AX	SHOW	Zn Cu Au Ag	Epidote Garnet	Pyrrhotite Sphalerite Chalcopyrite Pyrite	Zn	Schist Greenstone Marble	Unknown Group Unknown Formation Triassic	Granodiorite Middle Jurassic
387	**103G 018** GREAT WEST BAN **COMMENTS:**	53 34 27 130 16 20	AX	SHOW	Cu Mo Ag	Epidote Chlorite Garnet	Chalcopyrite Molybdenite Bornite Chalcocite Pyrite	Cu	Marble Quartzite Schist	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Diorite Middle Jurassic
388	**103G 019** KINGKOWN LAKE **COMMENTS:**	53 30 40 130 17 50	AX	SHOW	Cu Zn Mo	Garnet Epidote Hornblende	Chalcopyrite Pyrite Magnetite Sphalerite Molybdenite	Cu	Marble Schist	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic
389	**103G 024** YELLOW GIANT (BOB) BOB **COMMENTS:** A 0.46 m drill intersection assayed 4.68% Zn, 1.84% Pb, 30.9 g/t Ag and 1.7 g/t Au (Ass. Rpt. 14171). Reserves of 45 360 t grading 40.11 g/t Au are reported (Trader Resources Corp., Statement of Facts, Jan 13th, 1986).	53 22 45 130 10 50	AX	DEPR	Au Ag Cu Zn Pb As	Sericite Chlorite Pyroxene Epidote Garnet Zoisite Actinolite	Pyrite Chalcopyrite Sphalerite Galena Arsenopyrite	Au	Marble Diorite	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Diorite Middle Jurassic
390	**103G 025** YELLOW GIANT (DISCOVERY) DISCOVERY **COMMENTS:** A 15.2 m drill intersection assayed 63.77 g/t Ag and 24.69 g/t Au (Ass. Rpt. 14171)	53 21 50 130 07 30	AX	DEPR	Au Ag Zn Cu Pb As	Garnet Zoisite Actinolite	Pyrite Pyrrhotite Arsenopyrite Sphalerite Chalcopyrite Galena	Au	Marble Quartzite	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Monzonite Middle Jurassic

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
391	**103G 026** YELLOW GIANT (TEL) TEL	53 21 55 130 09 35	AX	DEPR	Au Ag Zn Pb Cu	Garnet Actinolite Chlorite	Pyrite Pyrrhotite Sphalerite Chalcopyrite Arsenopyrite Galena	Au	Marble Siltstone	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS: Tel Zone reserves are 187 243 t grading 43.89 g/t Ag and 21.94 g/t Au (Northern Miner, June 23, 1986).										
392	**103G 033** EX YELLOW GIANT	53 21 25 130 05 55	AX	SHOW	Au	Garnet Actinolite	Pyrite Native Gold	Au	Marble Siltstone	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Monzonite Middle Jurassic
	COMMENTS: Gold occurs in quartz stringers.										
393	**103G 034** INDIA YELLOW GIANT	53 21 30 130 07 05	AX	SHOW	Cu Au	Actinolite Garnet	Pyrrhotite Chalcopyrite	Cu	Marble Limestone	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Hornblende diorite Middle Jurassic
	COMMENTS: This is a sulphide-rich skarn with trace gold.										
394	**103G 035** ISLAND YELLOW GIANT	53 22 00 130 08 00	AX	SHOW	Au Zn Cu	Unknown	Pyrite Pyrrhotite Chalcopyrite Bornite Manganite	Cu	Argillite	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Hornblende diorite Middle Jurassic
	COMMENTS: Graphite is present. A sample from the Island showing assayed 1.73% Cu 0.37% Zn and 2.06 g/t Au (Ass. Rpt. 14171).										
395	**103G 040** KOOR	53 20 35 130 02 50	AX	SHOW	Cu Ag Zn	Garnet Actinolite	Pyrite Chalcopyrite Bornite Sphalerite	Cu	Marble Siltstone Quartzite	Unknown Group Unknown Formation Permian	Coast Plutonic Complex Middle Jurassic Quartz Diorite Middle Jurassic
	COMMENTS:										
396	**103H 008** JIMMY	53 18 50 129 50 55	AX	SHOW	Mo W	Garnet Actinolite	Molybdenite Pyrite Pyrrhotite	Mo	Marble Pelite	Unknown Group Unknown Formation Paleozoic	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A sample assayed 0.017% Mo and "minor" tungsten (Ass. Rpt. 14312).										

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
397	**103H 009** VG	53 16 25 129 55 40	AX	SHOW	W Zn	Pyroxene	Scheelite Sphalerite	Zn (W)	Limestone	Unknown Group Unknown Formation Paleozoic	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A sample assayed 0.36% WO3 and 0.72% Zn (Ass. Rpt. 14537).										
398	**103H 020** KILDALA BOLTON	53 49 15 128 29 00	M	SHOW	Cu	Garnet Epidote	Pyrite Chalcopyrite	Cu	Limestone Greenstone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Upper Cretaceous Granodiorite Upper Cretaceous
	COMMENTS:										
399	**103H 021** KEN COPPER CLIFF	53 20 40 128 59 30	M	SHOW	Cu	Garnet Pyroxene	Chalcopyrite Bornite	Cu	Diorite	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Cretaceous Diorite Middle Cretaceous
	COMMENTS:										
400	**103H 022** OX EMPRESS	53 19 30 128 57 10	M	PAPR	Cu Ag Au	Garnet Epidote Pyroxene	Bornite Chalcocite Covellite	Cu	Marble Schist	Unknown Group Unknown Formation Paleozoic	Coast Plutonic Complex Middle Cretaceous Quartz Diorite Middle Cretaceous
	COMMENTS:										
401	**103H 029** PINK ROSE BOLTON	53 14 40 128 40 00	AX	SHOW	Cu Ag Au	Epidote Garnet	Chalcocite Bornite Chalcopyrite	Cu	Limestone Schist	Unknown Group Unknown Formation Paleozoic	Butedale Pluton Cretaceous Granodiorite Cretaceous
	COMMENTS:										
402	**103H 037** CAL	53 13 10 129 51 10	AX	SHOW	Cu Au Zn	Epidote Garnet	Pyrite Pyrrhotite Sphalerite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A sample assayed 0.216 g/t Au and > 1.0% Cu (Ass. Rpt. 14296).										
403	**103I 013** LADY LUCK	54 23 20 128 40 25	ST	PROS	Cu Zn Mo Ag Bi Co	Epidote Garnet Pyroxene Chlorite	Chalcopyrite Sphalerite Pyrite Molybdenite Magnetite Galena	Cu	Greenstone Quartzite Limestone	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Upper Cretaceous Granodiorite Upper Cretaceous
	COMMENTS: Three grab samples gave the following maximum assayes: 1.5 ppm Au, 2.6% Cu, 1.27% Zn, 341 ppm Co and 17 ppm Te (Appendix 4B).										

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
404	**103I 014** WEDEENE IRON MOUNTAIN **COMMENTS:**	54 10 25 128 39 10	ST	DEPR	Fe Cu	Garnet Epidote	Magnetite Pyrite Chalcopyrite	Fe	Andesite Greenstone	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic
405	**103I 113** MAYNER'S FORTUNE **COMMENTS:**	54 24 34 128 39 18	ST	PROS	Fe	Epidote Garnet	Magnetite	Fe	Limestone Quartzite Argillite	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Upper Cretaceous Granodiorite Upper Cretaceous
406	**103I 123** LADY LUCK 7 **COMMENTS:**	54 23 40 128 39 50	ST	SHOW	Cu Mo	Epidote Garnet	Chalcopyrite Molybdenite Pyrite	Cu	Limestone Greenstone Shale	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Upper Cretaceous Diorite Upper Cretaceous
407	**103I 124** LUCKY FORTUNE **COMMENTS:**	54 24 25 128 37 50	ST	SHOW	Cu Mo	Epidote Garnet	Chalcopyrite Molybdenite Magnetite	Cu	Limestone Quartzite Shale	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Upper Cretaceous Diorite Upper Cretaceous
408	**103I 192** HAL **COMMENTS:**	54 24 30 128 37 00	ST	SHOW	Cu Mo Zn	Garnet Epidote	Chalcopyrite Molybdenite Sphalerite Magnetite	Cu	Limestone	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Upper Cretaceous Diorite Upper Cretaceous
409	**103J 023** POR **COMMENTS:** A chip sample assayed 7% Zn, 0.26% Cu and 2 g/t Ag (Ass. Rpt. 13051).	54 05 05 130 24 50	AX	SHOW	Zn Cu Ag Au	Unknown	Sphalerite Chalcopyrite Pyrite	Zn	Tuff Greenstone Limestone	Unknown Group Unknown Formation Ordovician-Triassic	Coast Plutonic Complex Upper Jur.-Low Cret. Diorite Upper Jur.-Low Cret.
410	**103J 027** ETTA **COMMENTS:**	54 04 35 130 25 05	AX	SHOW	Zn Cu Ag	Epidote	Sphalerite Chalcopyrite Pyrite Pyrrhotite Magnetite	Cu	Tuff Greenstone Limestone	Unknown Group Unknown Formation Ordovician-Triassic	Coast Plutonic Complex Upper Jur.-Low Cret. Diorite Upper Jur.-Low Cret.

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
411	**103J 031** STAR RUPERT **COMMENTS:**	54 02 50 130 19 00	AX	SHOW	Fe	Epidote Chlorite Garnet	Magnetite Pyrite	Fe	Schist Limestone Quartzite	Unknown Group Unknown Formation Ordovician-Triassic	Unknown Upper Jur.-Low Cret.
412	**103P 013** ELKHORN GEORGIA BAY **COMMENTS:** The property includes three silicified skarn zones: samples assayed up to 5.48 g/t Au and 17 g/t Ag (MMAR 1929, page 82).	55 37 00 129 49 32	ST	SHOW	Au Ag Pb Zn	Epidote Garnet	Pyrite Pyrrhotite Galena Sphalerite Native Gold	Au	Andesite Schist	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Tertiary Granodiorite Tertiary
413	**104B 005** CRAIG RIVER ROB **COMMENTS:**	56 36 40 131 10 12	ST	SHOW	Pb Cu	Wollastonite Chlorite	Galena Chalcopyrite Limonite	Cu	Limestone Tuff	Undefined Group Stikine Assemblage Pennsylvanian-Perm.	Coast Plutonic Complex U Trias.-L Juras. Granodiorite U Trias.-L Juras.
414	**104M 022** LAVERDIERE BUTTE **COMMENTS:** This occurrence represents a magnesian skarn. Crosscutting fractures carry molybdenite and scheelite.	59 13 25 134 07 10	NS	PROS	Cu Ag Au Mo W Co Sb	Serpentine Chlorite Epidote Tremolite Talc	Chalcopyrite Bornite Tetrahedrite Molybdenite Magnetite Pyrrhotite Pyrite Hematite Scheelite Cobaltite Erythrite Siderite	Fe (Cu)	Limestone Siltstone Schist	Unknown Group Unknown Formation Uncertain Age	Nisling Assemblage Proterozoic-Paleoz. Granodiorite Jurassic
415	**104M 048** TP-MAIN **COMMENTS:** A grab sample assayed 4.2 g/t Au, 33 g/t Ag, 1.7% Co, 2.3% As, 0.32% Bi and 0.15% Pb (Ettlinger & Ray, 1989). Other assays report up to 22.6 g/t Au (Ass. Rpt. 11300).	59 41 20 134 40 40	NS	PROS	Au Ag Co Cu Bi Te As	Actinolite Garnet Pyroxene Epidote	Native Gold Cobaltite Erythrite Arsenopyrite Magnetite Chalcopyrite Galena	Au	Gneiss Schist Marble	Yukon Undefined Formation Paleozoic	Nisling Assemblage Uncertain Age Hornblende diorite Uncertain Age
416	**104M 049** TP-CAMP **COMMENTS:** This skarn includes magnetite and pyrrhotite-rich sections.	59 40 55 134 40 35	NS	PROS	Fe	Garnet Epidote Actinolite	Magnetite Pyrrhotite	unkn	Gneiss Schist Marble	Yukon Undefined Formation Paleozoic	Nisling Assemblage Uncertain Age Hornblende diorite Uncertain Age

TECTONIC BELT: Coast

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
417	**104M 050** TP-CENTRAL	59 41 05 134 40 37	NS	SHOW	Ag Au Co Cu Bi As	Gamet Epidote	Chalcopyrite Arsenopyrite Pyrrhotite Magnetite	Au	Gneiss Schist Marble	Yukon Undefined Formation Paleozoic	Nisling Assemblage Uncertain Age Hornblende diorite Uncertain Age

COMMENTS:
A grab sample assayed 10.8 g/t Au, 147 g/t Ag and 0.02% Co (Ass. Rpt. 11300).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
418	**114P 085** LAWRENCE LIMESTONE	59 35 19 136 30 00	AX	SHOW	MB LS	Gamet Epidote	Unknown	I.M.	Marble Argillite Quartzite	Unknown Group Unknown Formation Paleozoic	Tkope River Intrusions Oligocene Diorite Oligocene

COMMENTS:
A grab sample contained 54.8% CaO, 0.24% MgO and 0.56% insolubles (Watson, 1948, page 20).

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
419	**082ENW025** IRON HORSE OKA, GRETA **COMMENTS:** Assay results for grab samples are presented by Ettlinger and Ray, 1989 and in Appendix 4C. As well as high Au values (up to 19 g/t Au), anomalous amounts of Cu, Co, As and Bi are recorded.	49 48 24 119 53 36	QN	SHOW	Cu Pb Zn Ag Au As Bi Co Mo	Garnet Pyroxene Epidote Wollastonite Tremolite Biotite Prehnite	Chalcopyrite Sphalerite Galena Arsenopyrite Pyrite Pyrrhotite Native Gold Molybdenite	Au	Limestone Siltstone	Nicola Undefined Formation U Trias.-L Juras.	Quartz Diorite Lower Jurassic
420	**082ESE004** GOLDFINCH **COMMENTS:**	49 05 10 118 03 55	KO	PAPR	Ag Au Pb Zn Cu As Sb	Unknown	Galena Sphalerite Tetrahedrite Arsenopyrite Pyrrhotite Pyrite	Pb-Zn	Limestone	Unknown Group Unknown Formation Uncertain Age	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
421	**082ESW001** DIVIDEND-LAKEVIEW GEM **COMMENTS:** Assay results for grab samples are presented in Appendix 4C and by Ettlinger & Ray (1989). As well as high Au values (up to 43 g/t Au) anomalous amounts of Cu, Co, As and Bi are recorded.	49 00 42 119 30 00	QNO	PAPR	Au Cu Co Bi As Pb Zn	Garnet Epidote Amphibole Pyroxene Wollastonite Chlorite Sphene	Pyrrhotite Pyrite Marcasite Arsenopyrite Chalcopyrite Magnetite Hedleyite Native Gold Native Bismuth	Au	Schist Limestone Greenstone	Kobau Undefined Formation Triassic	Diorite Uncertain Age
422	**082ESW047** APEX KOPR **COMMENTS:**	49 22 06 119 53 54	QNO	PAPR	Au Cu Ag As	Garnet Pyroxene	Chalcopyrite Arsenopyrite Pyrrhotite	Cu	Marble Greenstone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Granodiorite Lower Jurassic
423	**082ESW048** AUSTRALIAN KOPR **COMMENTS:**	49 22 18 119 53 30	QNO	SHOW	Cu As Ag	Garnet Pyroxene	Chalcopyrite Arsenopyrite Pyrrhotite	Cu	Marble Greenstone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Granodiorite Lower Jurassic
424	**082ESW102** CRYSTAL PEAK GARNET MOUNT RIORDAN **COMMENTS:** Drill indicated reserves totalling 40 million tonnes averaging 78% by volume garnet (Mathieu et al., 1991). Garnets range in composition from Ad45 - Ad95 (Ray et al., 1992). The Mount Riordan stock ranges in composition from gabbro to granodiorite.	49 23 35 119 55 47	QN	DEPR	GN W Cu Ag	Garnet Pyroxene Epidote Actinolite Wollastonite Chlorite Axinite	Scheelite Pyrite Pyrrhotite Chalcopyrite Bornite Magnetite Powellite	I.M.	Limestone	Nicola French Mine U Trias.-L Juras.	Mount Riordan Stock Lower Jurassic 194 +/- 2.4 Ma Granodiorite Lower Jurassic 194 +/- 2.4 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
425	**082ESW105** PA **COMMENTS:**	49 08 00 119 55 06	QNO	SHOW	W Cu Mo Zn	Unknown	Sphalerite Scheelite Chalcopyrite Molybdenite Pyrite Pyrrhotite	unkn	Argillite Limestone Greenstone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Unknown Uncertain Age
426	**082ESW124** DIVIDEND **COMMENTS:**	49 22 06 119 51 48	QNO	SHOW	Cu W	Unknown	Pyrrhotite Magnetite Chalcopyrite Scheelite	Cu	Limestone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Granodiorite Lower Jurassic
427	**082ESW135** JUN **COMMENTS:**	49 04 12 119 54 54	QNO	SHOW	Cu Zn	Unknown	Pyrite Chalcopyrite Sphalerite	Cu	Chert Argillite Greenstone	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Hornblende diorite Middle Jurassic
428	**082ESW170** JUNIPER **COMMENTS:**	49 14 25 119 48 50	QNO	SHOW	Au Ag Cu Sb	Unknown	Pyrite Pyrrhotite Chalcopyrite Tetrahedrite	Cu	Unknown	Apex Mtn. Complex Undefined Formation Paleozoic-Mesozoic	Olalla stock Uncertain Age
429	**082LSW014** FINTRY POINT SHORTS POINT **COMMENTS:**	50 08 28 119 34 08	QNH	PROS	WL	Garnet Pyroxene Tremolite Actinolite Wollastonite	Pyrite	I.M.	Limestone	Harper Ranch Undefined Formation Paleozoic-Mesozoic	Granodiorite Middle Jurassic
430	**092HNE016** CHICAGO ST. GEORGE **COMMENTS:**	49 33 54 120 54 06	QN	SHOW	Cu Zn Pb Au Pt	Garnet Epidote Amphibole	Magnetite Galena Sphalerite Chalcopyrite Pyrrhotite Pyrite	unkn	Limestone Schist	Nicola Undefined Formation U Trias.-L Juras.	Granodiorite Upper Jurassic
431	**092HNE064** ST. GEORGE LAWS **COMMENTS:**	49 34 24 120 54 30	QN	PROS	Au Ag Cu Zn Pb	Garnet Epidote Amphibole	Chalcopyrite Galena Sphalerite Pyrrhotite Magnetite Pyrite	unkn	Limestone Schist	Nicola Undefined Formation U Trias.-L Juras.	Granodiorite Upper Jurassic

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
432	**092HNE065** ST.LAWRENCE(LAWS) **COMMENTS:**	49 34 18 120 54 06	QN	SHOW	Cu Zn Pb Ag	Garnet Epidote Amphibole	Chalcopyrite Galena Sphalerite Magnetite Pyrrhotite Pyrite	unkn	Limestone Schist	Nicola Undefined Formation U Trias.-L Juras.	Granodiorite Upper Jurassic
433	**092HSE036** MASCOT FR. HEDLEY MASCOT GOLD MINES LTD **COMMENTS:** This forms part of Nickel Plate deposit. Mineralogy and alteration are similar to Nickel Plate.	49 22 18 120 02 42	QN	PAPR	Au Ag Cu Co Zn Bi As Te	Pyroxene Garnet Scapolite Biotite K-Feldspar Wollastonite Axinite Prehnite	Arsenopyrite Pyrrhotite Cobaltite Chalcopyrite Sphalerite Galena Native Bismuth Native Gold Electrum Tetrahedrite Gersdorffite Molybdenite Tetradymite Hedleyite	Au	Limestone Siltstone Conglomerate	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
434	**092HSE038** NICKEL PLATE NICKEL PLATE MINE **COMMENTS:** This is the largest gold skarn in Canada. Between 1904 and 1995 it produced over 71 t of Au from 13.4 Mt of ore. The deposit is characterised by high pyroxene:garnet and pyrrhotite:pyrite ratios. Arsenopyrite and pyrrhotite are the most common sulphides. Rare minerals include: cobaltite, pyrargyrite, lollingite, breithauptite, maldonite, galena, native bismuth, electrum, tetrahedrite, native copper, magnetite, bismuthinite and gersdorffite. The alteration also includes chlorite and vesuvianite. The skarn locally contains up to 20% scapolite which is chlorine-rich (up to 2.8% Cl, Pan et al., 1994). Assay results on grab samples are	49 21 55 120 02 00	QN	PAPR	Au Ag Cu Zn Co Bi As Te	Pyroxene Garnet Scapolite Axinite Biotite K-Feldspar Wollastonite Prehnite	Pyrrhotite Arsenopyrite Pyrite Chalcopyrite Sphalerite Galena Native Bismuth Native Gold Electrum Tetrahedrite Gersdorffite Molybdenite Tetradymite Hedleyite Cobaltite	Au	Siltstone Limestone Conglomerate	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
435	**092HSE050** LOST HORSE LOST HORSE NO. 1 **COMMENTS:** Mineralized grab samples assayed up to 0.4 g/t Au (Rice, 1947).	49 16 31 120 07 14	QN	SHOW	Au Ag	Pyroxene Garnet Scapolite	Pyrrhotite Arsenopyrite Pyrite	Au	Limestone Siltstone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
436	**092HSE051** SPECULATOR DON 65, 66 **COMMENTS:**	49 16 57 120 04 22	QN	PROS	Au Ag Cu	Pyroxene Garnet Epidote Biotite Scapolite Prehnite Wollastonite K-Feldspar	Arsenopyrite Pyrrhotite Pyrite Chalcopyrite	Au	Argillite Siltstone Limestone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
437	**092HSE055** YETI ZANDU **COMMENTS:** The intrusion contains thin mineralized quartz veins and disseminated sulphides. Local skarn alteration also occurs in the sediments adjacent to the batholith; some of the altered sediments contain pyrite, pyrrhotite, arsenopyrite and chalcopyrite (Ass. Rpt. 17430).	49 23 44 120 03 49	QN	SHOW	Au Ag Pb As	Unknown	Pyrite Pyrrhotite Galena Arsenopyrite Chalcopyrite	Cu	Argillite Siltstone Limestone	Nicola Undefined Formation U Trias.-L Juras.	Osprey Lake Batholith Middle Jurassic 166 +/- 1 Ma Granodiorite Middle Jurassic 166 +/- 1 Ma
438	**092HSE059** FRENCH MINE OREGON **COMMENTS:** There are three sulphide-rich ore bodies and the ore has abundant chalcopyrite (unlike Nickel Plate). Visible gold and visible tellurides are present. The alteration also includes vesuvianite, chlorite, axinite and biotite. Assay results on two mineralized graqb samples are presented in Appendix 4C.	49 19 30 120 01 24	QN	PAPR	Au Ag Cu Mo W Co Te As Bi	Pyroxene Garnet Albite Epidote Jasper Scapolite K-Feldspar Wollastonite	Bornite Chalcopyrite Arsenopyrite Pyrrhotite Pyrite Marcasite Native Bismuth Hedleyite Molybdenite Scheelite Covellite Cobaltite Native Gold	Au	Limestone Conglomerate	Nicola French Mine U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
439	**092HSE060** GOOD HOPE 1 **COMMENTS:** Visible gold is present. The subhorizontal ore zone is 1 m thick and 55 m long. The skarn is garnet dominant and some hedenbergite crystals are up to 10 cm long. Assay results of a mineralized grab sample are presented in Appendix 4C.	49 20 54 120 00 12	QN	PAPR	Au Cu Mo Ag As Bi Te	Pyroxene Garnet Amphibole Actinolite Chlorite	Arsenopyrite Chalcopyrite Bismuthinite Molybdenite Native Gold Pyrrhotite Pyrite Native Bismuth Hedleyite Scheelite	Au	Limestone Conglomerate	Nicola French Mine U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
440	**092HSE061** FLORENCE **COMMENTS:**	49 22 55 120 03 09	QN	SHOW	Au Cu Zn As	Garnet Pyroxene	Arsenopyrite Chalcopyrite Pyrrhotite Sphalerite	Au	Siltstone Argillite Limestone	Nicola Chuchuwayha U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
441	**092HSE062** KINGSTON **COMMENTS:**	49 21 48 120 03 18	QN	PROS	Au Cu Ag Zn As	Garnet Pyroxene Scapolite Apatite	Chalcopyrite Arsenopyrite Pyrrhotite	Au	Limestone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
442	**092HSE063** DUFFY **COMMENTS:** Maximum assays from 5 grab samples: 7.9 g/t Au and 1.16% Cu (MMAR 1926, page A217).	49 22 30 120 03 10	QN	SHOW	Au Ag Cu As	Garnet Pyroxene	Pyrrhotite Arsenopyrite Chalcopyrite	Au	Limestone Siltstone Argillite	Nicola Chuchuwayha U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
443	**092HSE064** CANTY BOSTON **COMMENTS:** A sulphide-rich grab sample assayed 34 g/t Au, 0.6% Co, 168 ppm Sb and 29% As (Ray & Dawson, 1993; Appendix 4C). Alteration includes K-feldspar.	49 22 38 120 00 12	QN	PAPR	Au Ag Cu Co As Bi	Pyroxene Garnet Epidote Prehnite Scapolite Albite Chlorite Biotite	Arsenopyrite Chalcopyrite Pyrrhotite Native Bismuth Pyrite Cobaltite Native Gold	Au	Limestone Siltstone Tuff	Nicola Whistle U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras.
444	**092HSE066** PEGGY WHIRLWIND **COMMENTS:** Assay results on grab samples are presented in Appendix 4C and by Ray & Dawson (1993). As well as high Au values (up to 21 g/t Au), anomalous Cu, Co and As are recorded. Gold with possible tellurides occurs as minute inclusions in arsenopyrite (Webster, 1988).	49 22 24 120 04 54	QN	DEPR	Au Cu Zn Ag As Bi	Garnet Pyroxene Epidote Scapolite Wollastonite Chlorite Prehnite	Arsenopyrite Chalcopyrite Sphalerite Pyrite Pyrrhotite Marcasite Tellurides Goethite Maghemite Native Gold	Au	Limestone Siltstone Tuff	Nicola Whistle U Trias.-L Juras.	Stemwinder Stock U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras.

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
445	**092HSE086** SWEDEN COPPERFIELD **COMMENTS:**	49 21 01 120 03 38	QN	SHOW	Au Ag Zn Cu As	Garnet Pyroxene Biotite	Pyrrhotite Galena Chalcopyrite Arsenopyrite Pyrite Sphalerite	Au	Limestone Siltstone Breccia	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras.
446	**092HSE087** RED TOP RED TOP FR. **COMMENTS:**	49 21 15 120 02 30	QN	SHOW	Au Ag Cu As	Garnet Pyroxene	Arsenopyrite Pyrrhotite Chalcopyrite	Au	Limestone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras.
447	**092HSE110** DON **COMMENTS:**	49 16 50 120 04 28	QN	PROS	Au Ag Cu As	Pyroxene Garnet Scapolite Prehnite	Arsenopyrite Chalcopyrite Pyrrhotite Pyrite	Au	Limestone Siltstone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
448	**092HSE156** HEDLEY NORTH CAHILL SKARN **COMMENTS:**	49 21 00 120 02 02	QN	SHOW	Cu Ag Au Zn Pb As	Garnet Epidote Pyroxene Scapolite	Pyrrhotite Chalcopyrite Arsenopyrite Galena Sphalerite Pyrite	Au	Limestone Argillite Siltstone	Nicola Hedley U Trias.-L Juras.	Hedley Intrusions U Trias.-L Juras. 194-217 Ma Diorite-Gabbro U Trias.-L Juras. 194-217 Ma
449	**092INE096** IRON RANGE HAL **COMMENTS:** Drilling intersected 10.8 m of massive magnetite as well as another 4.5 m wide zone assaying 1.67% Cu (Ass. Rpt. 820). Assay results on six grab and core samples are presented in Appendix 4B.	50 50 11 120 03 15	QN	DEPR	Cu Fe	Garnet Actinolite Epidote Pyroxene Hornblende	Magnetite Chalcopyrite Pyrite Pyrrhotite	Cu (Fe)	Limestone Argillite Tuff	Harper Ranch Undefined Formation Devonian-Triassic	Diorite Uncertain Age
450	**092ISE027** LUCKY MIKE LAST CHANCE **COMMENTS:** Drilling intersected 3.6 m grading 0.18% Cu and 38.3 g/t Ag and another 14 m grading 0.15% W (Ass. Rpt. 18583). A grab sample assayed 1.1% Cu, 22 ppm Ag and 61 ppb Au (Appendix 4B).	50 18 02 120 41 26	QN	PAPR	W Ag Cu Zn Pb Au	Garnet Epidote Hornblende Chlorite Pyroxene	Scheelite Pyrite Pyrrhotite Chalcopyrite Galena Sphalerite Magnetite	Cu (W)	Tuff Limestone	Nicola Undefined Formation U Trias.-L Juras.	Hornblende diorite Uncertain Age

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
451	**092ISE035** CRAIGMONT CRAIGMONT MINE **COMMENTS:** This is the province's largest Cu skarn producer (Appendix 6) and has produced some byproduct magnetite. Specular hematite is present. A grab sample (Appendix 4B) assayed 2.22% Cu but has very low Au and Ag values.	50 12 27 120 55 29	QN	PROD	Cu Fe Ag Au	Biotite Orthoclase Garnet Epidote Actinolite Chlorite Pyroxene Tourmaline	Magnetite Chalcopyrite Copper Chalcocite Bornite Pyrite Hematite	Cu	Limestone Tuff Greywacke	Nicola Undefined Formation U Trias.-L Juras.	Guichon Creek Batholith Upper Triassic 210 +/- 3 Ma Diorite Upper Triassic 210 +/- 3 Ma
452	**092ISE036** ERIC QUARTZITE **COMMENTS:** Specular hematite is present.	50 12 36 120 53 21	QN	SHOW	Cu	Epidote Biotite Garnet K-Feldspar	Chalcopyrite Hematite Magnetite	Cu	Limestone Siltstone Greywacke	Nicola Undefined Formation U Trias.-L Juras.	Guichon Creek Batholith Upper Triassic 210 +/- 3 Ma Diorite Upper Triassic 210 +/- 3 Ma
453	**092ISE038** HANK 30 HAWK **COMMENTS:** Specular hematite is present.	50 10 39 120 59 07	QN	SHOW	Cu Co	Epidote Garnet Chlorite Albite	Chalcopyrite Magnetite Hematite Pyrite Cobaltite	Cu	Tuff Sandstone Breccia	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
454	**092ISE039** HANK 1-4 HAWK **COMMENTS:** Specular hematite is present.	50 10 24 120 58 45	QN	SHOW	Cu	Chlorite Epidote Garnet Albite	Chalcopyrite Hematite	Cu	Tuff Sandstone Breccia	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
455	**092ISE040** ARH SID (NORTH) **COMMENTS:**	50 10 43 120 55 54	QN	SHOW	Cu	Garnet	Chalcopyrite Hematite Pyrite Magnetite	Cu	Limestone Andesite	Nicola Undefined Formation U Trias.-L Juras.	Coyle Stock Lower Jurassic Diorite Lower Jurassic
456	**092ISE045** CHASE SNO **COMMENTS:** Specular hematite is present.	50 08 48 120 46 08	QN	SHOW	Cu Zn Ag	Actinolite	Chalcopyrite Pyrite Hematite Sphalerite	Cu	Limestone	Nicola Undefined Formation U Trias.-L Juras.	Diorite dykes Uncertain Age

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
457	**092ISE051** SOO BEN **COMMENTS:**	50 06 24 120 40 18	QN	SHOW	Cu Ag	Epidote Chlorite Garnet	Chalcopyrite Magnetite Pyrite Bornite Limonite Hematite	Cu (Fe)	Limestone Breccia Tuff	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
458	**092ISE101** THELMA **COMMENTS:**	50 16 06 120 41 55	QN	PAPR	Ag Pb Zn Au Cu	Garnet Epidote	Pyrite Galena Sphalerite	Pb-Zn	Limestone Andesite Conglomerate	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
459	**092ISE102** BERNICE **COMMENTS:**	50 16 21 120 42 04	QN	SHOW	Ag Pb Zn Au Cu Sb	Garnet Epidote Ankerite	Pyrite Galena Sphalerite Tetrahedrite Chalcopyrite	Pb-Zn	Andesite	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
460	**092ISE103** OLD EVELYNN EVELYN **COMMENTS:**	50 16 38 120 42 01	QN	SHOW	Ag Pb Zn Au	Garnet Epidote	Galena Pyrite Sphalerite	Pb-Zn	Andesite Limestone	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
461	**092ISE148** LAW LEN **COMMENTS:** Specular hematite is present.	50 06 54 120 55 30	QN	PAPR	Cu Pb Zn Ag	Epidote Chlorite	Chalcopyrite Pyrite Bornite Sphalerite Magnetite Hematite Galena	Pb-Zn	Limestone	Nicola Undefined Formation U Trias.-L Juras.	Diorite Lower Jurassic
462	**092ISE160** REY RL **COMMENTS:** Indicated reserves are 21.4 Mt grading 0.23% Cu and 0.023% Mo (Canadian Mines Handbook 1985-86).	50 20 18 120 42 34	QN	DEPR	Cu Mo	Biotite Albite Epidote Garnet Orthoclase	Pyrite Chalcopyrite Molybdenite	Cu	Limestone Andesite Tuff	Nicola Undefined Formation U Trias.-L Juras.	Quartz Monzonite Unknown
463	**092ISE173** BETTY LOU BETTY **COMMENTS:**	50 12 00 120 58 58	QN	SHOW	Cu Pb Zn	Garnet Epidote Actinolite Biotite	Pyrite Galena Sphalerite Chalcopyrite Magnetite Hematite	Cu	Limestone Greywacke Argillite	Nicola Undefined Formation U Trias.-L Juras.	Guichon Creek Batholith Upper Triassic 210 +/- 3 Ma Hornblende diorite Upper Triassic 210 +/- 3 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
464	**092ISW018** BJ **COMMENTS:**	50 22 18 121 08 34	QN	SHOW	Cu	Wollastonite	Chalcopyrite	Cu	Limestone	Nicola Undefined Formation U Trias.-L Juras.	Guichon Creek Batholith Upper Triassic 210 +/- 3 Ma Quartz Diorite Upper Triassic 210 +/- 3 Ma
465	**092ISW037** MARB 72 GUS **COMMENTS:**	50 12 37 121 00 21	QN	SHOW	Cu	Epidote Garnet Actinolite Chlorite	Pyrite Pyrrhotite Chalcopyrite Magnetite	Cu	Andesite Tuff Agglomerate	Nicola Undefined Formation U Trias.-L Juras.	Guichon Creek Batholith Upper Triassic 210 +/- 3 Ma Quartz Diorite Upper Triassic 210 +/-3 Ma
466	**092ISW058** BOB COP **COMMENTS:**	50 24 38 121 36 20	QN	SHOW	Cu Mo	Garnet Epidote Chlorite	Chalcopyrite Bornite Pyrite Magnetite Molybdenite Hematite	Cu	Limestone Amphibolite	Unknown Group Unknown Formation Uncertain Age	Mount Lytton Complex Triassic Diorite Triassic
467	**092JNE057** LUBRA FLORA **COMMENTS:**	50 45 15 122 22 25	BR	SHOW	W Mo Cu As	Garnet	Scheelite Molybdenite Pyrrhotite Pyrite Arsenopyrite Chalcopyrite Powellite	W (Mo)	Limestone	Bridge River Undefined Formation Permian-Jurassic	Bendor Pluton Upper Cretaceous 73.5 +/- 3.6 Ma Granodiorite Upper Cretaceous 73.5 +/- 3.6 Ma
468	**092JNE086** OLYMPIC (MANNERS ZONE) MANNERS **COMMENTS:**	50 53 40 122 43 35	BR	PROS	Au Ag Mo Cu	Garnet	Magnetite Molybdenite Chalcopyrite	Cu	Diorite	Bridge River Undefined Formation Permian-Jurassic	Bendor Pluton Upper Cretaceous 73.5 +/- 3.6 Ma Granodiorite Upper Cretaceous 73.5 +/- 3.6 Ma
469	**092P 008** SILVER **COMMENTS:**	51 32 42 120 23 24	QN	SHOW	Cu Zn Ag Au	Unknown	Magnetite Chalcopyrite Pyrrhotite Pyrite	Cu	Limestone Andesite Tuff	Nicola Unknown Formation U Trias.-L Juras.	Thuya Batholith Lower Jurassic Microdiorite Lower Jurassic

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
470	**093B 004** IRON MOUNTAIN BRENDA **COMMENTS:**	52 27 51 122 15 25	CC	SHOW	Cu Mo	Garnet Pyroxene Epidote	Pyrite Magnetite Chalcopyrite Molybdenite Hematite	Cu	Tuff Limestone Schist	Cache Creek Undefined Formation Miss.- Upper Trias.	Granite Mountain Pluton Lower Jurassic Quartz Diorite Lower Jurassic 204 +/- 6 Ma
471	**093B 020** AXEL **COMMENTS:**	52 32 00 122 20 54	CC	SHOW	Cu	Unknown	Chalcopyrite Pyrite	Cu	Limestone Basalt Diorite	Cache Creek Undefined Formation Miss.- Upper Trias.	Granite Mountain Pluton Lower Jurassic Quartz Diorite Lower Jurassic 204 +/- 6 Ma
472	**093B 057** TARN AND **COMMENTS:** A grab sample assayed 2.44% Cu, 15.7 g/t Ag and 1.2 g/t Au (Ass. Rpt. 9891).	52 46 50 122 08 19	QN	SHOW	Cu Ag Au Mo	Unknown	Chalcopyrite Chalcocite Molybdenite Pyrrhotite Pyrite	Cu	Unknown	Nicola Undefined Formation U Trias.-L Juras.	Hornblende diorite Uncertain Age
473	**093B 058** BUD 7 GREEN **COMMENTS:** Specular hematite is present.	52 29 30 122 15 30	CC	SHOW	Cu Mo	Chlorite Sericite Epidote	Chalcopyrite Bornite Molybdenite Pyrite Hematite Magnetite	Cu	Tuff Limestone Diorite	Cache Creek Undefined Formation Miss.- Upper Trias.	Granite Mountain Pluton Lower Jurassic 204 +/- 6 Ma Quartz Diorite Lower Jurassic 204 +/- 6 Ma
474	**093E 034** DEUCE **COMMENTS:**	53 24 38 127 03 59	ST	SHOW	Cu	Epidote Actinolite Garnet	Chalcopyrite Magnetite Pyrrhotite	Cu	Tuff Andesite	Hazelton Undefined Formation Low-Mid Jurassic	Unknown Uncertain Age
475	**093E 067** CORE B **COMMENTS:** Specular hematite is present.	53 26 20 127 10 20	ST	SHOW	Cu Au Ag Fe	Epidote Chlorite Calcite	Chalcopyrite Hematite Pyrite Magnetite	Cu	Porphyry Diabase Rhyolite	Hazelton Telkwa Low-Mid Jurassic	Unknown Uncertain Age

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
476	**093F 017** EXO	53 24 53 125 42 22	ST	PROS	W Cu Mo Ag Zn	Garnet Pyroxene	Scheelite Chalcopyrite Molybdenite Sphalerite Pyrrhotite Pyrite	W (Cu)	Unknown	Hazelton Undefined Formation Low-Mid Jurassic	Topley Intrusions Lower Jurassic Granodiorite Lower Jurassic
	COMMENTS: Two mineralized zones are present. One 22 m wide zone averaged 0.56% WO3 and 0.44% Cu (Ass. Rpt. 15129).										
477	**093F 034** TAT	53 30 21 124 12 08	ST	SHOW	Cu	Garnet Epidote	Chalcopyrite Bornite Magnetite	Cu	Andesite Basalt	Hazelton Undefined Formation Low-Mid Jurassic	Topley Intrusions Lower Jurassic Granite Lower Jurassic
	COMMENTS:										
478	**093F 043** GRAN	53 12 19 125 08 46	ST	SHOW	Ag Pb Zn Au Cu	Epidote K-Feldspar Chlorite Garnet Tourmaline	Galena Sphalerite Chalcopyrite Pyrrhotite Pyrite Magnetite	Pb-Zn	Tuff Andesite Volcanic	Hazelton Undefined Formation Low-Mid Jurassic	Capoose Lake Batholith Lower Tertiary Quartz Monzonite Lower Tertiary
	COMMENTS:										
479	**093K 077** DEM	54 45 06 124 26 42	QN	SHOW	As	Biotite Pyroxene Epidote Tremolite Actinolite	Arsenopyrite Pyrite	unkn	Sandstone Siltstone Argillite	Nicola Unknown Formation U Trias.-L Juras.	Monzonite Uncertain Age
	COMMENTS: The property includes veins and skarns. Nelson et al. (1991) report a skarn grab sample assayed 204 ppb Au and 41 ppm Cu, whereas a vein sample assayed 2.1% As, 361 ppb Au and 66 ppm Sb.										
480	**093K 083** LYNX	54 51 13 124 04 07	QN	SHOW	Cu	Garnet Epidote Ankerite Biotite Pyroxene	Chalcopyrite Pyrite Pyrrhotite Hematite Covellite	Cu	Tuff Siltstone	Nicola Undefined Formation U Trias.-L Juras.	Unknown Uncertain Age
	COMMENTS:										
481	**093L 031** WALCOTT CANYON	54 26 20 126 49 10	ST	SHOW	Cu Ag Au	Garnet Epidote Pyroxene Chlorite	Magnetite Chalcopyrite Pyrite	Cu	Chert Basalt Rhyolite	Hazelton Telkwa Low-Mid Jurassic	Diorite Uncertain Age
	COMMENTS: Several skarn zones are present. A 2.25 m section from one zone assayed 0.5% Cu and 1.47 g/t Au (Ass. Rpt. 17057).										

TECTONIC BELT: Intermontane

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482	**093L 066** DUCHESS	54 28 04 127 27 11	ST	SHOW	Cu Ag Au Sb	Epidote Garnet	Chalcopyrite Tetrahedrite Hematite Pyrite	Cu	Andesite Tuff Breccia	Hazelton Undefined Formation Low-Mid Jurassic	Diorite Lower Jurassic
	COMMENTS:										
483	**093L 186** GSC 1971 - 18	54 40 23 127 48 27	ST	SHOW	Cu	Wollastonite Tremolite Epidote Chlorite Garnet	Bornite Chalcopyrite Chalcocite Manganite	Cu	Volcanic Monzonite Felsite	Hazelton Telkwa Low-Mid Jurassic	Nanika Intrusions Eocene Quartz Monzonite Eocene
	COMMENTS:										
484	**093L 202** SHOLTO MOUND	54 17 00 126 48 00	ST	SHOW	Cu Au Ag	Epidote Garnet Actinolite Tremolite	Chalcopyrite Pyrite	Cu	Limestone Basalt	Hazelton Telkwa Low-Mid Jurassic	Nanika Intrusions Eocene Quartz Monzonite Eocene
	COMMENTS: One sample assayed 4.9% Cu, 61.7 g/t Ag and 1.03 g/t Au (MMAR 1930, page 142).										
485	**093L 240** LUNLIK TEL	54 23 00 127 05 00	ST	SHOW	Cu Au	Epidote Garnet Orthoclase	Chalcopyrite Bornite Pyrite	Cu	Diorite	Hazelton Telkwa Low-Mid Jurassic	Bulkley Intrusions Upper Cretaceous Quartz Diorite Upper Cretaceous
	COMMENTS: A grab sample assayed 0.01% Cu and 0.85 g/t Au (Ass. Rpt. 18032).										
486	**093M 111** KAZA COPPER FIRE	55 58 43 126 19 59	ST	SHOW	Cu Au Ag	Hornblende Epidote Garnet	Chalcopyrite Bornite Sphalerite Pyrite Magnetite	Cu (Au)	Limestone Tuff Breccia	Hazelton Telkwa Low-Mid Jurassic	Kastberg Intrusions Eocene Granodiorite Eocene
	COMMENTS: A 4 m chip sample assayed 0.88% Cu, 15.4 g/t Au and 12.7 g/t Ag (Ass. Rpt. 4477).										
487	**093N 121** AWL GIL	55 21 01 124 39 57	QN	SHOW	Cu	Epidote Garnet	Pyrite Magnetite	Cu	Agglomerate Basalt Diorite	Nicola Undefined Formation U Trias.-L Juras.	Takla Intrusions Uncertain Age Diorite Uncertain Age
	COMMENTS: This skarn is associated with a weak copper anomaly in soils (Ass. Rpt. 19505).										

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
488	**094D 025** OLD SOUP **COMMENTS:** Several magnetite-rich skarns occur on this property. A 1 m chip sample assayed 27.08 g/t Au and 0.41% Cu (1988 Prospectus, Athlone Resources Ltd.).	56 27 12 126 03 54	QN	SHOW	Cu Au	Garnet Epidote Actinolite	Chalcopyrite Pyrite Magnetite Hematite	Cu	Tuff Andesite	Nicola Undefined Formation U Trias.-L Juras.	Kliyul Creek stock Lower Cretaceous Diorite Lower Cretaceous
489	**094D 105** SOUTH SOUP **COMMENTS:** This resembles the Old Soup occurrence (094D 025).	56 29 42 126 04 12	QN	SHOW	Cu Au	Garnet Epidote Actinolite	Pyrite Chalcopyrite Magnetite	Cu	Tuff Andesite	Nicola Undefined Formation U Trias.-L Juras.	Kliyul Creek stock Lower Cretaceous Diorite Lower Cretaceous
490	**094E 047** VIP 7 VIP **COMMENTS:** Maximum assays from two garnet-magnetite samples: 9.4% Cu, 1.44% Zn, 20.98 g/t Ag and 0.34 g/t Au (Ass. Rpt. 13057). Specular hematite is present.	57 10 04 126 52 48	ST	SHOW	Ag Cu Zn Au	Garnet Pyroxene Epidote Wollastonite Talc Sericite Chlorite	Chalcopyrite Sphalerite Pyrite Hematite Magnetite	Cu	Limestone Siltstone	Unknown Group Unknown Formation Uncertain Age	Black Lake stock Lower Jurassic 204 +/-9 Ma Granodiorite Lower Jurassic 204 +/- 9 Ma
491	**094E 048** VIP 30 VIP **COMMENTS:** A 3 m drill intersection assayed 0.47% Cu, 7.85 g/t Ag and 1.47 g/t Au (Ass. Rpt. 13057). Specular hematite is present.	57 09 43 126 52 39	ST	PROS	Ag Cu Au Zn	Garnet Pyroxene Wollastonite Epidote Chlorite Talc	Chalcopyrite Sphalerite Hematite Magnetite	Cu	Limestone Siltstone Conglomerate	Unknown Group Unknown Formation Uncertain Age	Black Lake stock Lower Jurassic 204+/-9 Ma Granodiorite Lower Jurassic 204 +/- 9 Ma
492	**094E 058** AMIGO **COMMENTS:** The main skarn outcrop is 800 m long by 600 m wide (Ass. Rpt. 11106). Assays up to 3.7% Zn, 3.25% Cu and 178 g/t Ag (Ass. Rpt. 6762).	57 11 03 126 55 09	ST	SHOW	Ag Zn Cu Pb Sb	Garnet Pyroxene Wollastonite	Sphalerite Chalcopyrite Galena Tetrahedrite	Zn (Cu)	Limestone Schist Andesite	Asitka Undefined Formation Devonian-Permian	Black Lake stock Lower Jurassic 204 +/- 9 Ma Quartz Diorite Lower Jurassic 204 +/- 9 Ma
493	**094E 109** LAKE 23 LAKE **COMMENTS:** A mineralized skarn sample assayed 2.78% Zn, 0.73% Pb, 0.06% Cu and 92.1 g/t Ag (Ass. Rpt. 13022).	57 04 04 126 50 07	ST	SHOW	Zn Ag Pb Cu	Unknown	Sphalerite Galena Chalcopyrite	Pb-Zn	Andesite Conglomerate	Stuhini Undefined Formation Upper Triassic	Quartz Monzonite Lower Jurassic

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
494	**094E 129** GRACE 1 GRACE **COMMENTS:** Drilling intersected three mineralized zones totalling 5 m. Weighted values over this section were 0.5% Cu, 112 g/t Ag and 0.3 g/t Au (Ass. Rpt. 13057).	57 10 22 126 51 41	ST	PROS	Ag Au Cu Zn	Garnet Epidote Chlorite Jasper	Chalcopyrite Sphalerite Pyrite Magnetite Hematite	Cu	Limestone Siltstone Conglomerate	Takla Undefined Formation Upper Triassic	Black Lake stock Lower Jurassic 204 +/- 9 Ma Granodiorite Lower Jurassic 204 +/- 9 Ma
495	**094E 134** STAR 1 STAR **COMMENTS:** Magnetite skarn sample from drillcore assayed 2.67% Cu, 93.6 g/t Ag and 1.87 g/t Au. Silicate skarn generally has a lower grade but one sample assayed 13.2 g/t Au and 243 g/t Ag (Ass. Rpt. 16463).	57 11 37 126 57 48	ST	PROS	Cu Ag Au	Garnet Pyroxene Epidote Chlorite Wollastonite	Chalcopyrite Magnetite Hematite Pyrite	Cu	Limestone Schist Andesite	Asitka Undefined Formation Devonian-Permian	Black Lake stock Lower Jurassic 204 +/- 9 Ma Quartz Diorite Lower Jurassic 204 +/- 9 Ma
496	**094E 135** STAR 2 STAR **COMMENTS:** Skarns contain chalcopyrite and galena; while narrow veinlets in adjacent limestone contain galena and sphalerite.	57 12 03 126 57 24	ST	SHOW	Ag Au Pb Cu Zn	Garnet Pyroxene Wollastonite	Chalcopyrite Sphalerite Pyrite Galena Magnetite Pyrrhotite Bornite	Cu	Limestone Schist Andesite	Asitka Undefined Formation Devonian-Permian	Black Lake stock Lower Jurassic 204 +/- 9 Ma Quartz Diorite Lower Jurassic 204 +/- 9 Ma
497	**094E 137** PUL 1 PUL **COMMENTS:** Two grab samples assayed 75 and 144 g/t Ag with no detectable Au (Ass. Rpt. 11106).	57 11 46 126 56 42	ST	SHOW	Ag Au Pb Cu	Garnet Pyroxene Wollastonite	Chalcopyrite Galena	Cu	Limestone	Asitka Undefined Formation Devonian-Permian	Black Lake stock Lower Jurassic 204 +/- 9 Ma Quartz Diorite Lower Jurassic 204 +/- 9 Ma
498	**103G 137** DUNDEE GLA **COMMENTS:** A sulphide-rich grab sample assayed 17.5% Cu, 0.49% Cu, 106 g/t Ag, 1.3 g/t Au and 243 ppm Co (Webster and Ray, 1991; Appendix 4B). Radiometric dating (Drobe et al., 1992; Logan and Koyanagi, 1994) suggest this is one of the oldest skarns in British Columbia.	57 00 06 130 51 49	ST	SHOW	Cu Au Ag Zn Co	Garnet Epidote Pyroxene Wollastonite K-Feldspar Barite	Pyrrhotite Magnetite Chalcopyrite Pyrite Sphalerite	Cu	Limestone Tuff Siltstone	Unknown Group Stikine Assemblage Lower Devonian	Forrest Kerr Pluton Upper Devonian 370 +/- 2 Ma Diorite Upper Devonian 370 +/- 2 Ma

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
499	**103I 086** AVON LOWRIE	54 33 10 128 03 50	ST	SHOW	Cu Au Ag	Garnet Epidote	Chalcopyrite Bornite Chalcocite Pyrite Magnetite	Cu	Limestone Andesite	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Middle Jurassic Granodiorite Middle Jurassic

COMMENTS:
A 61 cm channel sample assayed 2.1 g/t Au and 1.4 g/t Ag (GSC Memoir 212).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
500	**103I 131** COPPER QUEEN SURPRISE	54 22 00 128 20 00	ST	SHOW	Pb Zn Cu Ag Au	Epidote Garnet	Chalcopyrite Pyrite Galena Sphalerite Bornite Pyrrhotite Magnetite	Pb-Zn	Tuff Limestone	Hazelton Undefined Formation Low-Mid Jurassic	Coast Plutonic Complex Lower Tertiary Granodiorite Lower Tertiary

COMMENTS:
A 46 cm wide chip sample assayed 11% Zn, 7% Pb, 1% Cu and 223 g/t Ag (MMAR 1929). Skarn contains magnetite pods up to 2.4 m wide.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
501	**103P 072** SWAN AJAX	55 57 40 129 57 24	ST	SHOW	Zn	Garnet Epidote Pyroxene	Sphalerite Pyrrhotite	Zn	Unknown	Hazelton Unuk River Low-Mid Jurassic	Hyder Pluton Eocene 54.8 Ma Quartz Monzonite Eocene 54.8 Ma

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
502	**103P 085** MOLLY B ORAL M	55 56 13 129 58 12	ST	PAPR	Ag Cu Mo W Zn Co	Garnet Epidote Pyroxene Biotite	Pyrrhotite Pyrite Chalcopyrite Molybdenite Scheelite Sphalerite	Cu	Siltstone Argillite Limestone	Hazelton Unuk River Low-Mid Jurassic	Hyder Pluton Eocene 54.8 Ma Quartz Monzonite Eocene 54.8 Ma

COMMENTS:
The Molly B is a garnet-rich Cu skarn whereas the nearby Oral M is an auriferous, sulphide-rich quartz vein that cuts barren skarn and hornfels. Three sulphide-rich garnet skarn samples from the
Molly B assayed up to 1.10% Cu, 0.58% W, 0.21% Mo, 620 ppm Co and 10 g/t Ag. No anomalous values of Au, As, Bi, Sb, Te, Pb, Zn or Cd were recorded. Two mineralized grab samples from the Oral M quartz vein
assayed up to 2.64% Cu, 7.9 g/t Au and 34 g/t Ag. No anomalous values of Pb, Zn, W, As, Bi, Sb, Te, Co, Mo or Cd were recorded (Appendix 4B).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
503	**103P 094** RED REEF PRINCEMONT	55 55 30 129 58 10	ST	SHOW	Cu	Garnet Epidote Pyroxene Biotite	Pyrrhotite Pyrite Chalcopyrite Galena Sphalerite Bornite	Cu	Limestone Tuff Argillite	Hazelton Unuk River Low-Mid Jurassic	Hyder Pluton Eocene 54.8 Ma Quartz Monzonite Eocene 54.8 Ma

COMMENTS:
Siliceous skarn zones up to 3 m wide contain chalcopyrite and bornite. Galena and sphalerite occur in cross cutting-quartz veins.

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504	**103P 136** LOUISE DOT	55 58 48 129 58 03	ST	SHOW	W	Unknown	Scheelite	W	Schist Tuff	Hazelton Unuk River Low-Mid Jurassic	Hyder Pluton Eocene 54.8 Ma Quartz Monzonite Eocene 54.8 Ma

COMMENTS:
The skarn zone is up to 1.8 m wide. Maximum assays from grab samples: 0.27% WO3 (Stevenson, 1941, page 54)

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
505	**104B 009** HAR JIM	56 26 43 130 32 58	ST	SHOW	Cu	Epidote Garnet	Chalcopyrite Pyrite Magnetite Hematite	Cu	Limestone Schist Diorite	Stuhini Undefined Formation Upper Triassic	Quartz Diorite Triassic

COMMENTS:
Specular hematite is present.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
506	**104B 013** MAX GRANDUC IRON	56 25 57 130 33 47	ST	DEPR	Fe Cu	Epidote Garnet Pyroxene Actinolite	Magnetite Chalcopyrite Pyrite Pyrrhotite	Fe (Cu)	Limestone	Stuhini Undefined Formation Upper Triassic	Quartz Diorite Upper Triassic 226 Ma

COMMENTS:
Minor molybdenite and chalcopyrite are found within the adjacent, altered quartz diorite. Drilling indicates 11,176,550 t grading 45% Fe (Granduc Mines Ltd. Annual Report, 1962).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
507	**104B 023** SHAN (JOSH) SHAN 1-6	56 39 11 130 49 54	ST	SHOW	Zn Cu Ag Pb Bi Sb Te	Actinolite Epidote Garnet	Sphalerite Chalcopyrite Pyrite Magnetite Galena Tetrahedrite	Cu (Zn)	Limestone	Undefined Group Stikine Assemblage Devonian-Permian	Lehto pluton Lower Jurassic 192 +8, -1 Ma Quartz Monzonite Lower Jurassic 192 +8,-1 Ma

COMMENTS:
Assays for three grab samples of mineralized skarn are presented in Appendix 4B. A sphalerite-bearing quartz vein that cuts the skarn contained 0.16% Bi and 12 ppm Te (Webster & Ray, 1991).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
508	**104B 027** KEN DIRK	56 52 32 130 56 10	ST	SHOW	Cu Au Ag Co	Garnet Epidote Wollastonite Barite	Magnetite Chalcopyrite Pyrite Native Gold Hematite Barite	Cu	Limestone Tuff	Undefined Group Stikine Assemblage Mississippian	Granodiorite Lower Jurassic

COMMENTS:
Drilling intersected 15.2 m assaying 1.5% Cu and 1.5 m assaying 7.5 g/t Au (Ass. Rpt. 17120). Maximum assays from three grab samples: 1.38% Cu, 18 g/t Ag, 9.3 g/t Au and 147 ppm Co (Webster & Ray, 1991).
Complete assay data on the three grab samples are presented in Appendix 4B. Specular hematite is present.

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NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
509	**104B 028** LAKE ZONE GOSSAN 22 **COMMENTS:**	56 33 28 130 51 17	ST	SHOW	Cu Pb Zn Au Ag	Chlorite Epidote Pyroxene	Chalcopyrite Sphalerite Galena Pyrite	Cu	Limestone Pyroclastic Siltstone	Hazelton Unuk River Low-Mid Jurassic	Coast Plutonic Complex Lower Jurassic Granodiorite Lower Jurassic
510	**104B 076** RAY RAY NO. 1 **COMMENTS:** The Ray No.1 showing occurs at the faulted contact between limestone and garnet-chlorite bearing schists. The narrow mineralized zone assayed 1.34 g/t Au, 44.5 g/t Ag, 0.14% Pb and 2% Zn across 0.34 m (MMAR 1966, page 35).	56 42 12 131 08 15	ST	SHOW	Au Ag Pb Zn Cu	Chlorite Epidote Garnet	Sphalerite Galena Chalcopyrite Pyrite	Pb-Zn	Limestone Siltstone	Stuhini Undefined Formation Upper Triassic	Unknown Uncertain Age
511	**104B 109** ELBOW MOUNTAIN **COMMENTS:**	56 42 01 131 49 55	ST	SHOW	Fe	Wollastonite	Magnetite	Fe	Hornblendite Schist Gneiss	Undefined Group Stikine Assemblage Pennsylvanian-Perm.	Quartz Diorite Cretaceous-Tertiary
512	**104B 114** DIRK KEN **COMMENTS:** Maximum assays from three grab samples: 5.06% Cu, 0.21% Zn, 43 g/t Ag and 29 g/t Au (Appendix 4B).	56 49 20 131 01 34	ST	SHOW	Au Ag Cu Zn	Garnet Epidote	Pyrite Chalcopyrite Bornite Chalcocite Magnetite Hematite Sphalerite	Cu (Au)	Limestone Argillite Tuff	Undefined Group Stikine Assemblage Upper Permian	Syenite Uncertain Age
513	**104B 125** CHRIS ANNE **COMMENTS:**	56 26 46 130 29 50	ST	SHOW	Cu Ag	Chlorite Garnet Pyroxene	Magnetite Pyrrhotite Chalcopyrite Pyrite	Cu	Limestone Tuff Siltstone	Stuhini Undefined Formation Upper Triassic	Quartz Diorite Upper Triassic 226 Ma
514	**104B 167** TENNYSON **COMMENTS:** As well as garnet-epidote-magnetite skarns, the property includes stratabound sulphide and pelitic horizons, mineralized quartz veins, carbonaceous quartz-carbonate stockworks and breccia zones. Gold is found mainly in the pelite horizons (Ass. Rpt. 15789).	56 15 50 130 09 42	ST	SHOW	Au Ag Pb Zn Cu Sb	Chlorite Epidote Garnet Sericite	Pyrite Sphalerite Galena Electrum Tetrahedrite Chalcopyrite Magnetite Native Gold	unkn	Tuff Pelite	Hazelton Unuk River Low-Mid Jurassic	Unknown Uncertain Age

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
515	**104B 207** PYRAMID HILL GOSSAN 10-13 **COMMENTS:** A 1 m chip sample assayed 0.13% Cu, 1.75% Zn, 2.9 g/t Ag and 0.17 g/t Au (Ass. Rpt. 16931). The skarn includes zones of massive magnetite.	56 34 54 130 56 21	ST	SHOW	Cu Zn Au Ag Mo	Biotite Chlorite Pyroxene Epidote Garnet Actinolite Tremolite	Magnetite Chalcopyrite Pyrite Molybdenite Sphalerite	Zn	Siltstone Tuff	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Lower Jurassic Granodiorite Lower Jurassic
516	**104B 219** JIM FLORY **COMMENTS:** Assays of approximately 64 g/t Au are reported from this skarn (MMAR 1911, page 66-67).	56 21 21 130 39 40	ST	SHOW	Cu Au	Epidote Garnet Chlorite	Chalcopyrite Pyrite Magnetite Pyrrhotite	Cu	Tuff Limestone Shale	Stuhini Undefined Formation Upper Triassic	Coast Plutonic Complex Lower Tertiary Granodiorite Lower Tertiary
517	**104B 256** WOLVERINE (INEL) INEL 6 **COMMENTS:** The property includes several types of mineralization including a gold -bearing copper skarn.	56 37 25 130 53 33	ST	SHOW	Zn Ag Cu Pb Au	Actinolite	Chalcopyrite Magnetite Pyrite	Cu	Limestone Volcaniclastic	Unknown Group Unknown Formation Uncertain Age	Alaskite Lower Jurassic
518	**104B 281** NORTHWEST (MCLYMONT) MCLYMONT 3 **COMMENTS:** This represents an oxidized retrograde-altered Cu-Au skarn. Arsenopyrite is rare. Gold occurs as fine grained inclusions in pyrite . Galena-lead isotope ratios suggest the mineralization is Early Jurassic or older (Ray et al., 1991; Godwin et al., 1991). Drilling intersected a 3.9 m section assaying 0.11% Cu, 10.59 g/t Au and 3.43 g/t Ag (Gulf International Minerals Ltd., press release, 1989). See Appendix 4B for assay results on seven drill-core grab samples.	56 50 22 130 56 50	ST	SHOW	Au Ag Cu Pb Zn Sb As	Garnet Chlorite Jasper Barite	Pyrite Chalcopyrite Magnetite Hematite Barite Tetrahedrite Covellite Native Gold Sphalerite Galena Arsenopyrite	Au	Marble Siltstone Tuff	Undefined Group Stikine Assemblage Mississippian	Unknown Uncertain Age
519	**104B 290** JOSH SHAN **COMMENTS:** Mineralization includes skarns in calcareous rocks and late quartz veins and stockworks in the intrusions. Mineralization is mostly in the veins and stockworks; a grab sample of the latter assayed 1.29% Mo, 0.02% Cu and 1 g/t Ag (Ass. Rpt. 11306). Assay results on two grab samples of skarn with minor sulphides are seen in Appendix 4D .	56 39 06 130 48 50	ST	SHOW	Mo Cu Ag	Chlorite Epidote	Molybdenite Chalcopyrite Barite Pyrite	Mo	Limestone Andesite	Undefined Group Stikine Assemblage Devonian-Permian	Coast Plutonic Complex Lower Jurassic Syenodiorite Lower Jurassic

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
520	**104B 291** JOSH 3 JOSH **COMMENTS:** Property includes skarns, quartz veins and breccias. A 1.2 m chip sample across a skarn zone assayed 4.2% Cu and 3.7 g/t Au (Ass. Rpt. 13321).	56 38 28 130 47 38	ST	SHOW	Au Ag Cu Zn Pb	Epidote Chlorite Garnet	Pyrite Chalcopyrite Sphalerite Bornite Galena Magnetite	Cu	Limestone Volcanic Breccia	Unknown Group Stikine Assemblage ? Devonian-Permian	Syenodiorite Lower Jurassic
521	**104B 312** ISKUT 2 MERIDOR **COMMENTS:** Property includes porphyry Mo and Cu mineralization, quartz and sulphide veins, and skarn.	56 42 25 131 07 35	ST	SHOW	Au Cu Ag Pb Zn	Chlorite Garnet Biotite	Chalcopyrite Pyrite Magnetite Pyrrhotite Sphalerite Galena Molybdenite Bornite	Cu	Argillite Chert	Unknown Group Stikine Assemblage ? Uncertain Age	Syenite Uncertain Age
522	**104B 313** MAGNETITE (STU) STU 2 **COMMENTS:** Blanchflower (1988) reports trace galena, sphalerite and possible scheelite. Grab samples assayed up to 2.02% Cu, 1.51% Zn, 34.6 g/t Ag, 0.86 g/t Au, 402 ppm Co and 330 ppm As (Ass. Rpt. 16930; Webster and Ray, 1991).	56 38 24 130 53 29	ST	SHOW	Cu Au Ag Zn Pb Co As	Tremolite Actinolite Epidote Garnet Chlorite	Magnetite Chalcopyrite Pyrite Pyrrhotite Sphalerite	Cu	Limestone Argillite Siltstone	Unknown Group Unknown Formation Uncertain Age	Unknown Uncertain Age
523	**104B 323** PYRAMID SADDLE GOSSAN 10-13 **COMMENTS:** A grab sample of skarn assayed 1.2% Cu, 18.4 g/t Ag and 1.62 g/t Au (Ass. Rpt. 16931).	56 34 48 130 56 58	ST	SHOW	Cu Au Ag Zn	Chlorite Epidote Pyroxene Garnet Tremolite Actinolite Biotite	Pyrite Chalcopyrite Sphalerite	Cu	Siltstone Tuff	Stuhini ? Undefined Formation Uncertain Age	Granodiorite Cretaceous-Tertiary
524	**104B 324** IAN 4 IAN **COMMENTS:** Minor skarn development. A grab sample assayed 3.05% Zn and 0.27% Cu (Ass. Rpt. 16953).	56 42 44 130 57 53	ST	SHOW	Zn Cu	Unknown	Pyrite Sphalerite	Zn	Limestone	Undefined Group Stikine Assemblage Devonian-Permian	Coast Plutonic Complex Lower Jurassic Granodiorite Lower Jurassic

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NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
525	**104B 326** CAM 9 NORMAN	56 38 55 130 45 51	ST	SHOW	Cu Ag Zn Au	Actinolite Garnet	Pyrite Sphalerite Chalcopyrite Magnetite	Cu	Limestone Argillite Chert	Unknown Group Unknown Formation Uncertain Age	Coast Plutonic Complex Lower Jurassic Granodiorite Lower Jurassic
	COMMENTS: A grab sample of pyrite-magnetite skarn assayed 10.99% Cu, 0.26% Zn, 187 g/t Ag and 0.11 g/t Au (Ass. Rpt. 16955).										
526	**104B 328** GIGI (CAM 6) CAM 5-6	56 39 44 130 51 21	ST	SHOW	Cu Ag	Rhodochrosite Actinolite Epidote Garnet	Pyrite Chalcopyrite Magnetite Hematite	Cu	Limestone Argillite	Unknown Group Unknown Formation Uncertain Age	Quartz Monzonite Uncertain Age
	COMMENTS:										
527	**104B 362** KIRK MAGNETITE	56 37 14 130 47 48	ST	SHOW	Fe	Epidote Garnet Pyroxene Chlorite K-Feldspar Antigorite Serpentine Barite	Magnetite Pyrite Chalcopyrite	Fe	Limestone Tuff Siltstone	Stuhini ? Undefined Formation Uncertain Age	Lehto pluton Lower Jurassic Quartz Monzonite Lower Jurassic 192 +8, -1 Ma
	COMMENTS: The skarn contains a zone of massive magnetite that is 2-8 m thick and 150 m long. Two grab samples gave low values of Cu, Ag and Au (Webster and Ray, 1991).										
528	**104B 367** TIC	56 47 11 130 44 50	ST	SHOW	Fe Cu Au As Sb	Garnet Feldspar Epidote	Magnetite Pyrite Chalcopyrite Arsenopyrite	Cu (Au)	Marble	Undefined Group Stikine Assemblage Devonian-Permian	Quartz Diorite Upper Devonian 370 +/- 2 Ma
	COMMENTS: The skarn contains a zone of magnetite up to 7 m thick. Maximum assays from two grab samples are 0.98% As, 0.31% Cu, 2.9 g/t Au, 1.6 g/t Ag, 78 ppm Sb, 83 ppm Se (Appendix 4B). Radiometric dating on the associated pluton (Drobe et al., 1992) suggests that this is one of the oldest skarns in B.C.										
529	**104B 368** ELMER	56 36 50 130 46 10	ST	SHOW	Cu	Epidote K-Feldspar Tremolite Garnet	Magnetite Pyrite Chalcopyrite	Cu	Limestone	Stuhini ? Undefined Formation Uncertain Age	Quartz Monzonite Lower Jurassic
	COMMENTS: Chalcopyrite is seen only in trace amounts. Two grab samples gave only low values of copper, gold and silver (Ray and Webster, unpublished data).										

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530	**104G 011** DRAPICH **COMMENTS:** A sample contained 55 g/t Ag and trace Cu (MMAR 1930, page A118).	57 37 09 131 41 32	ST	SHOW	Cu Ag Pb Zn	Garnet Siderite	Chalcopyrite Sphalerite Galena Magnetite Pyrite Pyrrhotite Hematite	unkn	Limestone Marble	Undefined Group Stikine Assemblage Permian	Granodiorite Middle Jurassic
531	**104G 012** STIKINE DEVILS ELBOW **COMMENTS:** Maximum assays from two grab samples: 2.01% Pb, 1.59% Zn, 0.87% Cu, 43 g/t Ag, 60 ppm Bi, 194 ppm Cd and 290 ppm Co (Appendix 4E). Pb-Pb dating on galena gave Tertiary age (C.I. Godwin, personal communication, 1991). Assays up to 7% WO3 have been reported.	57 34 13 131 41 25	ST	PROS	Ag Au Pb Zn Cu W Bi	Garnet Epidote Wollastonite	Galena Sphalerite Magnetite Chalcopyrite Scheelite Pyrite Pyrrhotite	Pb-Zn (W)	Limestone Argillite Tuff	Undefined Group Stikine Assemblage Devonian-Permian	Sawback Granite Tertiary Diorite Tertiary
532	**104G 013** APEX **COMMENTS:** Kerr (1948) reports that the mineralogy is similar to the Devils Elbow (104G 012), situated approximately 4 kn further north.	57 31 53 131 40 00	ST	SHOW	Ag Au Pb Zn Cu W	Garnet Epidote Wollastonite	Galena Sphalerite Magnetite Chalcopyrite Scheelite Pyrite Pyrrhotite	Pb-Zn (W)	Limestone	Undefined Group Stikine Assemblage Devonian-Permian	Unknown Uncertain Age
533	**104G 050** HUMMINGBIRD TROPHY **COMMENTS:**	57 09 59 131 17 10	ST	SHOW	Cu Au Ag	Garnet Pyroxene Chlorite	Pyrite Pyrrhotite Chalcopyrite	Cu	Limestone Siltstone Shale	Unknown Group Unknown Formation Middle Triassic	Hickman Pluton Upper Triassic Monzodiorite Upper Triassic
534	**104G 067** STIKINE NORTH **COMMENTS:**	57 10 33 131 26 41	ST	SHOW	Cu	Garnet Amphibole Epidote K-Feldspar	Chalcopyrite Pyrite Magnetite	Cu	Andesite Limestone Syenite	Stuhini Undefined Formation Upper Triassic	Syenite Lower Jurassic
535	**104G 081** VB 20 **COMMENTS:** Specular hematite is present.	57 56 48 131 39 55	ST	SHOW	Cu	Garnet Epidote Actinolite Pyroxene	Chalcopyrite Pyrite Pyrrhotite Magnetite Hematite	Cu	Limestone Tuff	Stuhini Undefined Formation Upper Triassic	Hornblende diorite Uncertain Age

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
536	**104G 082** VB 5	57 56 36 131 39 45	ST	SHOW	Cu	Garnet Epidote Actinolite Pyroxene	Chalcopyrite Magnetite Pyrrhotite Pyrite Hematite	Cu	Limestone Tuff	Stuhini Undefined Formation Upper Triassic	Hornblende diorite Uncertain Age
	COMMENTS: Specular hematite is present.										
537	**104G 083** VB 12	57 56 23 131 38 15	ST	SHOW	Cu	Garnet Epidote Actinolite Pyroxene	Chalcopyrite Pyrite Pyrrhotite Magnetite Hematite	Cu	Limestone Tuff	Stuhini Undefined Formation Upper Triassic	Hornblende diorite Uncertain Age
	COMMENTS: Specular hematite is present.										
538	**104I 020** MAC	58 34 24 129 41 06	CC	SHOW	Cu W	Unknown	Pyrrhotite Chalcopyrite Scheelite Pyrite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Quartz Monzonite Uncertain Age
	COMMENTS:										
539	**104K 009** ERIKSEN-ASHBY APEX-BADGER	58 39 30 133 28 23	ST	DEPR	Ag Pb Zn Au	Garnet Rhodonite	Sphalerite Galena Argentite Freibergite Pyrite Magnetite	Pb-Zn	Rhyolite Breccia Limestone	Stuhini Undefined Formation Upper Triassic	Feldspar Porphyry Uncertain Age
	COMMENTS: Rhodonite and magnetite are found in small skarns near sulphide-rich zones. A 20.2 m drill intersection assayed 567 g/t Ag, 4.9% Pb and 4.22% Zn (Ass. Rpt. 10026).										
540	**104K 021** ERIKSEN - ASHBY ZONE 8 EA 2	58 40 05 133 28 12	ST	DEPR	Ag Pb Zn Sb	Tremolite Hornblende Actinolite Garnet Pyroxene Rhodonite	Pyrrhotite Galena Sphalerite Stibnite Magnetite Pyrite	Pb-Zn	Limestone Tuff	Stuhini Undefined Formation Upper Triassic	Feldspar Porphyry Uncertain Age
	COMMENTS: A 15.1 m drill intersection assayed 173 g/t Ag, 1.2% Pb and 1.37% Zn (Ass. Rpt. 10026).										
541	**104K 035** BING	58 21 14 132 07 32	ST	SHOW	Cu Mo	Epidote Actinolite Garnet Pyroxene	Chalcopyrite Molybdenite Pyrite Pyrrhotite	Cu	Limestone Phyllite Siltstone	Asitka Undefined Formation Devonian-Permian	Feldspar Porphyry Cretaceous-Tertiary
	COMMENTS:										

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
542	**104K 107** BARB BARB 3-4 **COMMENTS:** Grab samples assayed up to 0.7 g/t Au and contain anomalous As and Sb (Ass. Rpt. 9541).	58 45 01 132 53 42	ST	SHOW	Au Cu Pb Ag As Sb	Epidote Pyroxene Tremolite	Magnetite Chalcopyrite Galena Pyrite Hematite	Cu	Limestone Chert	Undefined Group Sinwa Upper Triassic	Coast Plutonic Complex Lower Tertiary Quartz Diorite Lower Tertiary
543	**104N 057** DAM DAMBOULEO **COMMENTS:** A 2 m sample assayed 0.16% WO3, 0.08% Cu, 1.24% Pb and 2.32% Zn (Ass. Rpt. 7282). Ass. Rpt. 14438 reports a Ag assay of 154.29 g/t.	59 41 37 133 23 16	CC	SHOW	W Zn Au Pb Cu Ag	Unknown	Sphalerite Galena Chalcopyrite Scheelite Pyrrhotite	W (Pb-Zn)	Limestone Alaskite	Cache Creek Kedahda Carboniferous	Surprise Lake Batholith Upper Cretaceous 70.6 +/- 3.8 Ma Granite Upper Cretaceous 70.6 +/- 3.8 Ma
544	**104N 069** SILVER DIAMOND BUB **COMMENTS:** Assays up to 2.5% Sn, 1% WO3, 5.3% Zn. 0.35% Cu and 390 g/t Ag (Ass. Rpt. 2672). Five mineralized grab (Appendix 4G; Ray et al., 1997) assayed up to 16.5% Zn, 1.0% Pb, 1.02% Cu, 459 g/t Ag, 0.55% W, 0.29% Cd, 0.24% Bi and 81 ppm Te. Tin and Au values are very low.	59 40 00 133 26 24	CC	PROS	Sn W Ag Zn Cu Pb F Bi Cd Sb	Talc Actinolite Garnet Pyroxene Amphibole Biotite Sericite Fluorite	Pyrrhotite Cassiterite Scheelite Galena Sphalerite Chalcopyrite Tetrahedrite Molybdenite Pyrite	Sn (W)	Marble Greenstone Ultramafic	Cache Creek Kedahda Carboniferous	Mount Leonard Boss Upper Cretaceous Granite Upper Cretaceous
545	**104N 126** ATLIN MAGNETITE **COMMENTS:** Assay results on five grab samples are presented in Appendix 4G and by Ray et al. (1997). The occurrence contains concordant layers of magnetite up to 0.6 m thick. The andraditic garnets vary in colour from red, orange, yellow-green, amber and black (Webster et al., 1992) .	59 43 10 133 19 03	CC	SHOW	Cu Sn Zn Ag	Garnet Pyroxene Actinolite Epidote Rhodonite Wollastonite	Magnetite Chalcopyrite Pyrrhotite Pyrite	Sn	Marble Greenstone Ultramafic	Cache Creek Kedahda Carboniferous	Surprise Lake Batholith Upper Cretaceous 70.6 +/- 3.8 Ma Granite Upper Cretaceous 70.6 +/- 3.8 Ma
546	**104N 134** DAYBREAK **COMMENTS:** This occurrence includes two types of skarn (1) proximal, thinly layered, magnetite-garnet-fluorite-vesuvianite wrigglite skarn and (2) more distal, garnet-vesuvianite vein skarn that cuts a biotite hornfels. Some silicates are enriched in Sn, F and Cr (Ray et al., 1997).	59 42 40 133 18 41	CC	SHOW	Sn F Be W	Pyroxene Garnet Fluorite Vesuvianite Biotite Clinozoisite Gahnite	Magnetite Cassiterite Pyrite Scheelite Acanthite Stannite Canfieldite Pyrrhotite	Sn (W)	Hornfels Skarn Marble	Cache Creek Kedahda Carboniferous	Surprise Lake Batholith Upper Cretaceous 70.6 +/- 3.8 Ma Granite Upper Cretaceous

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE	COMMENTS
547	**082ENW050** JAMES LAKE	49 57 27 119 15 14	M	PROS	WL Cu	Garnet Pyroxene Wollastonite	Chalcopyrite Pyrite	Cu	Gneiss Calc-silicate	Undefined Group Undefined Formation Eocene	Okanagan Gneiss Eocene	
548	**082ESE013** BROOKLYN-IDAHO BROOKLYN	49 06 00 118 36 00	QN	PAPR	Cu Au Ag	Epidote Chlorite Amphibole	Chalcopyrite Magnetite Hematite Pyrite	Cu	Limestone Tuff	Undefined Group Brooklyn Upper Triassic	Unknown Uncertain Age	Two mineralized grab samples assayed up to 5.32% Cu, 41 g/t Ag, 2.03 g/t Au, 41 ppm Co and 0.45% Mn. No anomalous Bi, As, Cd, Zn, Pb, or Te was recorded (Appendix 4B).
549	**082ESE014** STEMWINDER MONTEZUMA	49 06 12 118 35 54	QN	SHOW	Cu Ag Au	Garnet Epidote Chlorite Amphibole	Chalcopyrite Pyrite Hematite Magnetite	Cu	Limestone Sharpstone Siltstone	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age	
550	**082ESE015** GILT EDGE	49 06 24 118 35 48	QN	SHOW	Cu Au Ag	Garnet Epidote Chlorite	Chalcopyrite	Cu	Limestone Siltstone	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age	
551	**082ESE016** RED ROCK	49 05 12 118 36 06	QN	PAPR	Cu Au Ag	Garnet Epidote Chlorite	Chalcopyrite	Cu	Limestone Siltstone	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age	Production data are uncertain.
552	**082ESE019** WAR EAGLE GREY EAGLE	49 05 18 118 36 12	QN	PAPR	Cu Au Ag	Epidote Garnet Chlorite	Chalcopyrite Hematite Magnetite Pyrite	Cu	Limestone Siltstone Tuff	Undefined Group Brooklyn Upper Triassic	Microdiorite Uncertain Age	This property includes the Bald Eagle claims.

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
553	**082ESE020** PHOENIX OLD IRONSIDES	49 05 24 118 36 00	QN	PAPR	Cu Au Ag	Garnet Epidote Chlorite Amphibole	Chalcopyrite Native Gold Hematite Magnetite	Cu	Limestone Sharpstone Tuff	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age

COMMENTS:
The deposit is the largest skarn producer of Ag and second largest skarn producer of Au (after Nickel Plate) in B.C. A small altered diorite body occupies the southern end of the open pit. This is
surrounded by a garnet-rich zone which passes out to a wider epidote- rich zone. It is uncertain whether the gold was coeval with the copper skarn mineralization or was introduced during later Tertiary
mineralization (J.T. Fyles, personal communication, 1992). This property includes the Aetna, Victoria and Knob Hill claims. Assay results on three grab samples are presented in Appendix 4B.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
554	**082ESE024** CURLEW	49 05 36 118 35 30	QN	PAPR	Cu Au Ag	Garnet Epidote Chlorite	Chalcopyrite Native Gold Silver	Cu	Sharpstone Limestone Argillite	Undefined Group Brooklyn Upper Triassic	Microdiorite Uncertain Age

COMMENTS:
Production data are uncertain.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
555	**082ESE025** SNOWSHOE	49 05 36 118 35 30	QN	PAPR	Cu Au Ag Sb	Epidote Chlorite Amphibole	Chalcopyrite Pyrite Hematite Magnetite Native Gold	Cu	Limestone Siltstone Tuff	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age

COMMENTS:
Two mineralized grab samples assayed up to 2.07% Cu, 13.3 g/t Au, 23 g/t Ag, 150 ppm As, 68 ppm Co, 16 ppm Sb and 0.18% Mn. No anomalous Bi, Te, Cd, Mo, Pb, or Zn was recorded (Appendix 4B).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
556	**082ESE026** RAWHIDE	49 05 36 118 35 30	QN	PAPR	Cu Au Ag	Garnet Epidote Chlorite Amphibole	Chalcopyrite Pyrite Magnetite	Cu	Limestone Siltstone Tuff	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
557	**082ESE027** MONARCH	49 05 36 118 35 30	QN	PAPR	Cu Au Ag	Garnet Epidote Amphibole Chlorite	Chalcopyrite Hematite Pyrite	Cu	Limestone Sharpstone Argillite	Undefined Group Brooklyn Upper Triassic	Microdiorite Uncertain Age

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
558	**082ESE028** GOLD DROP	49 05 36 118 35 30	QN	PAPR	Cu Au Ag	Epidote Amphibole Chlorite	Chalcopyrite Pyrite	Cu	Sharpstone Limestone Argillite	Undefined Group Brooklyn Upper Triassic	Microdiorite Uncertain Age

COMMENTS:

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
559	**082ESE029** BANK OF ENGLAND **COMMENTS:**	49 05 06 118 35 24	QN	PAPR	Au Ag Cu	Epidote Amphibole Chlorite	Chalcopyrite	Cu	Sharpstone Limestone Argillite	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age
560	**082ESE030** YELLOW JACKET **COMMENTS:** Production data are uncertain.	49 05 36 118 34 36	QN	PAPR	Cu Au Ag	Garnet Epidote Chlorite	Chalcopyrite Native Gold	Cu	Sharpstone Limestone Argillite	Undefined Group Brooklyn Upper Triassic	Microdiorite Middle Jurassic
561	**082ESE031** MARSHALL BRANDON **COMMENTS:** Drilling on the Sylvestor K outlined approximately 50 000 t of pyritic ore in a zone 245 m long and up to 6 m wide. Gold grades locally exceed 10 g/t (Church, 1986). Specular hematite is present.	49 06 06 118 32 02	QN	PAPR	Au Ag Cu Pb Zn Cd	Garnet Epidote Chlorite	Native Gold Chalcopyrite Sphalerite Galena Hematite Pyrite Pyrrhotite Marcasite Magnetite	Cu	Limestone Conglomerate Argillite	Undefined Group Brooklyn Upper Triassic	Providence Lake Microdiorite Lower Jurassic 206 Ma +/- 8 Microdiorite Lower Jurassic 206 +/- 8 Ma
562	**082ESE034** MOTHER LODE SUNSET **COMMENTS:** Remaining ore reserves are estimated to be 300 000 t grading 0.65% Cu, 4.5 g/t Ag and 0.5 g/t Au (Church, 1986). Three mineralized grab samples assayed up to 2.6% Cu, 3.6 g/t Au, 18 g/t Ag, 460 ppm As, 178 ppm Co and 0.39 % Mn. No anomalous Bi, Sb, Te, Pb or Zn was recorded (Appendix 4B).	49 06 43 118 43 01	QN	PAPR	Cu Au Ag As Co	Garnet Epidote Actinolite Tremolite Chlorite	Chalcopyrite Magnetite Pyrite Hematite	Cu	Limestone Tuff	Undefined Group Brooklyn Upper Triassic	Wallace Creek Batholith Lower Cretaceous 143 +/- 5 Ma Granodiorite Lower Cretaceous 143 +/- 5 Ma
563	**082ESE040** THREE JACKS **COMMENTS:**	49 12 24 118 01 54	QN	SHOW	Ag Cu Sb As	Garnet Epidote Tremolite	Tetrahedrite Pyrite Chalcopyrite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Coryell Intrusions Eocene Syenite Eocene
564	**082ESE049** AH THERE **COMMENTS:** Pyrrhotite is very rare.	49 05 54 118 42 06	QN	SHOW	Cu Ag Au	Garnet Epidote Chlorite Actinolite	Chalcopyrite Hematite Pyrite Pyrrhotite Magnetite	Cu	Limestone Tuff	Undefined Group Brooklyn Upper Triassic	Greenwood Stock Jurassic-Cretaceous Granodiorite Jurassic-Cretaceous

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
565	**082ESE050** GREYHOUND	49 06 06 118 42 06	QN	PAPR	Cu Au Ag Co Mo	Garnet Actinolite Chlorite Epidote	Chalcopyrite Magnetite Hematite Pyrite Pyrrhotite	Cu	Limestone Carbonate	Undefined Group Brooklyn Upper Triassic	Greenwood Stock Jurassic-Cretaceous Granodiorite Jurassic-Cretaceous
	COMMENTS: The skarn is dominated by epidote and pyrite with lesser garnet and chalcopyrite. Pyrrhotite is very rare. One mineralized grab sample assayed 0.6% Cu, 740 ppm Co, 186 ppm Mo, 11 ppm Sb and 4 g/t Ag. No anomalous Au, As, Pb, Zn, Cd or Te was recorded (Appendix 4B).										
566	**082ESE052** MORRISON	49 06 18 118 43 30	QN	PAPR	Cu Ag Au Zn	Epidote Amphibole	Chalcopyrite Pyrite Pyrrhotite	Cu	Limestone Chert	Undefined Group Brooklyn Upper Triassic	Wallace Creek Batholith Lower Cretaceous 143 +/- 5 Ma Granodiorite Lower Cretaceous 143 +/- Ma
	COMMENTS: One mineralized grab sample assayed 0.2% Cu, 237 ppm Zn, 6 g/t Ag and 704 ppb Au. No anomalous As, Pb, Cd, Te, Mo, Sb, or Bi was recorded (Appendix 4B).										
567	**082ESE060** B.C. B.C. EHOLT MINE LTD	49 07 54 118 31 06	QN	PAPR	Cu Au Ag Zn Co As	Garnet Pyroxene Wollastonite K-Feldspar Actinolite Epidote	Chalcopyrite Pyrrhotite Pyrite Hematite Sphalerite	Cu	Limestone Greenstone	Undefined Group Brooklyn Upper Triassic	Diorite Uncertain Age
	COMMENTS: Skarn contains abundant green and brown garnet. Three grab samples assayed up to 5.2 % Cu, 2000 ppm As, 1.2 % Zn, 1600 ppm Co, 157 ppm Bi and 191 ppb Au (Appendix 4B).										
568	**082ESE062** EMMA MOUNTAIN ROSE	49 07 48 118 32 54	QN	PAPR	Cu Au Ag Co Sb	Garnet Epidote Pyroxene Chlorite Scapolite Amphibole Clinozoisite	Chalcopyrite Pyrite Magnetite Hematite Tetrahedrite	Cu	Limestone Argillite	Undefined Group Brooklyn Upper Triassic	Wallace Creek Batholith Lower Cretaceous 143 +/- 5 Ma Granodiorite Lower Cretaceous 143 +/- 5 Ma
	COMMENTS: Two mineralized grab samples assayed up to 0.16% Cu, 1.2 g/t Ag, 0.14% Co and 100 ppm Se. No anomalous Au, Pb, Zn, Te or As values was recorded (Appendix 4B).										
569	**082ESE063** ORO DENORO NUMBER 37	49 07 36 118 33 12	QN	PAPR	Cu Au Ag Sb Co	Garnet Chlorite Epidote	Chalcopyrite Hematite Pyrite Magnetite Tetrahedrite	Cu	Limestone Conglomerate	Undefined Group Brooklyn Upper Triassic	Wallace Creek Batholith Lower Cretaceous 143 ± 5 Ma Granodiorite Lower Cretaceous 143 +/- 5 Ma
	COMMENTS: Four grab samples assayed up to 2.2% Cu, 9 g/t Ag, 1.2 g/t Au and 328 ppm Co. No anomalous Bi, Te, As, Zn or Pb was recorded (Appendix 4B).										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
570	**082ESE064** R. BELL **COMMENTS:**	49 07 00 118 31 12	QN	PAPR	Cu Au Ag	Garnet Epidote	Chalcopyrite Sphalerite Hematite Magnetite	Cu	Limestone Conglomerate Siltstone	Unknown Group Unknown Formation Uncertain Age	Unknown Uncertain Age
571	**082ESE077** SAILOR BOY SHICKSHOCK **COMMENTS:**	49 09 06 118 29 12	QN	SHOW	Cu Zn Ag Au Pb	Garnet Epidote	Chalcopyrite Sphalerite Magnetite Pyrrhotite Pyrite	Cu	Argillite Limestone Conglomerate	Undefined Group Brooklyn Upper Triassic	Nelson Intrusions Middle Jurassic Diorite Middle Jurassic
572	**082ESE082** MOLLY GIBSON **COMMENTS:** The skarn contains abundant pyrrhotite and is gold bearing.	49 10 18 118 06 54	QN	PAPR	Au Ag Cu	Biotite Epidote	Chalcopyrite Pyrrhotite Pyrite Magnetite Native Gold	Cu (Au)	Limestone Argillite	Unknown Group Unknown Formation Uncertain Age	Monzodiorite Uncertain Age
573	**082ESE132** STAN ROCKLAND **COMMENTS:**	49 07 30 118 35 36	SM	SHOW	Cu Mo Au Zn	Garnet Amphibole Epidote	Chalcopyrite Bornite Chalcocite Molybdenite Magnetite Hematite Pyrite	Cu	Quartzite Argillite Limestone	Knob Hill Unknown Formation Paleozoic	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
574	**082ESE134** POPPY **COMMENTS:**	49 07 24 118 46 06	QN	SHOW	Cu F	Pyroxene Garnet Fluorite	Chalcopyrite Bornite Chalcocite	Cu	Sharpstone Argillite Limestone	Unknown Group Unknown Formation Uncertain Age	Quartz Diorite Middle Jurassic
575	**082ESE137** PBE 71 AND 73 **COMMENTS:**	49 06 18 118 27 18	QN	SHOW	Mo	Unknown	Molybdenite Pyrite	Mo	Limestone	Unknown Group Unknown Formation Uncertain Age	Syenite Uncertain Age
576	**082ESE138** PBE 68 **COMMENTS:**	49 05 54 118 26 54	QN	SHOW	Mo Cu Zn	Unknown	Chalcopyrite Molybdenite Sphalerite Pyrite	Mo (Cu)	Limestone	Unknown Group Unknown Formation Uncertain Age	Syenite Uncertain Age

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
577	**082ESE139** PBE 66 **COMMENTS:**	49 05 30 118 26 54	QN	SHOW	Mo Cu	Unknown	Molybdenite Pyrite Chalcopyrite	Mo	Limestone	Unknown Group Unknown Formation Uncertain Age	Syenite Uncertain Age
578	**082ESE140** PBE 64 **COMMENTS:**	49 05 24 118 27 00	QN	SHOW	Mo Cu	Unknown	Magnetite Molybdenite Pyrite Chalcopyrite	Mo (Cu)	Limestone	Unknown Group Unknown Formation Uncertain Age	Syenite Uncertain Age
579	**082ESE141** PBE 31 AND 32 **COMMENTS:**	49 03 24 118 26 00	QN	SHOW	Cu	Unknown	Chalcopyrite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Syenite Uncertain Age
580	**082ESE146** IKE 22 SEATTLE? **COMMENTS:**	49 08 42 118 29 06	QN	SHOW	Cu	Unknown	Chalcopyrite Magnetite Pyrite	Cu	Tuff Porphyry	Unknown Group Unknown Formation Uncertain Age	Granodiorite Middle Jurassic
581	**082ESE158** SEATTLE LOYAL CANADIAN **COMMENTS:**	49 07 54 118 28 12	QN	PAPR	Cu Au Ag Zn	Unknown	Chalcopyrite Chalcocite Magnetite Pyrite Sphalerite	Cu	Limestone	Unknown Group Unknown Formation Uncertain Age	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
582	**082ESE159** FANNY JOE **COMMENTS:**	49 03 24 118 37 12	SM	SHOW	Ag Pb Zn Cu As	Unknown	Chalcopyrite Galena Arsenopyrite	Cu	Limestone	Unknown Group Unknown Formation Paleozoic	Diorite Middle Jurassic
583	**082ESE160** SUNNYSIDE **COMMENTS:**	49 03 18 118 37 00	KO	PAPR	Ag Pb Zn Cu Au As	Unknown	Chalcopyrite Sphalerite Galena Arsenopyrite Pyrrhotite	Pb-Zn	Limestone Greywacke	Atwood Unknown Formation Paleozoic	Diorite Middle Jurassic
584	**082ESE164** JEWEL CREEK **COMMENTS:**	49 08 00 118 38 06	SM	SHOW	Cu	Garnet	Chalcopyrite Pyrite Magnetite Pyrrhotite	Cu	Limestone Greywacke Greenstone	Anarchist Unknown Formation Paleozoic	Granodiorite Middle Jurassic

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
585	**082ESE169** EVA BELL BURNT BASIN **COMMENTS:** Production data are uncertain. Skarn minerals are rare. Two grab samples assayed up to 7.8% Zn, 3.5% Pb, 91 ppm Ag, 57 ppm Sb and 371 ppm Cu. Anomalous Hg (180 ppb), Se (5.6 ppm) and Te (6.2 ppm) was recorded (Appendix 4E).	49 10 06 118 07 06	KO	PAPR	Ag Pb Zn	Epidote Garnet Wollastonite Actinolite	Sphalerite Galena Pyrite Chalcopyrite Magnetite	Pb-Zn	Limestone Argillite	Unknown Group Unknown Formation Uncertain Age	Unknown Uncertain Age
586	**082ESE181** TOP BUTCHER BOY **COMMENTS:**	49 07 00 118 43 00	QN	SHOW	Cu Au Ag	Unknown	Chalcopyrite	Cu	Unknown	Unknown Group Unknown Formation Uncertain Age	Unknown Uncertain Age
587	**082ESE198** LOIS BRUCE **COMMENTS:**	49 01 24 118 49 54	SM	SHOW	Cu	Unknown	Chalcopyrite Magnetite	Cu	Conglomerate	Anarchist Undefined Formation Paleozoic	Unknown Uncertain Age
588	**082ESE228** DEADWOOD CRK LIMESTONE MOTHER LODE **COMMENTS:**	49 06 46 118 43 00	QN	SHOW	LS	Actinolite Garnet Epidote	Pyrite	I.M.	Limestone	Undefined Group Brooklyn Upper Triassic	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
589	**082FNE004** BAKER **COMMENTS:**	49 36 30 116 39 18	NA	SHOW	Mo	Garnet Actinolite	Molybdenite	Mo	Schist	Purcell Kitchener-Siyeh Helikian	Unknown Uncertain Age
590	**082FNE152** HARP ZWICKY **COMMENTS:**	49 55 48 116 58 42	KO	SHOW	RO Mn	Garnet Rhodonite	Chalcopyrite Pyrrhotite	I.M.	Unknown	Unknown Group Unknown Formation Uncertain Age	Unknown Uncertain Age
591	**082FNW129** PIEDMONT HOPE NO. 2 **COMMENTS:** The Piedmont had the largest production of Pb-Zn from skarn in B.C. Three mineralized grab samples assayed up to 13.0% Zn, 4.69% Pb, 950 ppm Cu, 124 g/t Ag, 240 ppm As, 350 ppm Bi, 135 ppm Sb and 0.24% Cd (Appendix 4E). The minor enrichment in Cu, Sb and As suggests tetrahedrite-tennanite may be present. The deposit is described briefly by Webster et al., 1992),	49 43 34 117 24 52	QN	PAPR	Zn Pb Ag Au Cu Cd Sb Bi	Garnet Pyroxene Epidote Biotite	Galena Sphalerite Chalcopyrite Pyrite Pyrrhotite	Pb-Zn	Limestone Quartzite Argillite	Slocan Undefined Formation Upper Triassic	Nelson Intrusions Middle Jurassic Quartz Diorite Middle Jurassic

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
592	**082FNW220** SILVER QUEEN	49 58 00 117 42 12	QN	SHOW	Pb Zn Au Ag Cu As Sb	Garnet Tremolite Actinolite Clinozoisite Epidote K-Feldspar	Sphalerite Galena Tetrahedrite Pyrite Pyrrhotite Pyrargyrite Arsenopyrite	Pb-Zn	Marble	Rossland Hall Lower Jurassic	Monzodiorite Uncertain Age
	COMMENTS: The garnets are manganiferous, averaging 68 mole % pyralspite. (Ettlinger and Ray, 1989). The host rocks are correlated with the Hall Formation (Ray and Spence, 1986).										
593	**082FNW234** TILLICUM HEINO-MONEY	49 59 04 117 42 41	QN	PAPR	Au Ag Pb Zn Cd Cu W As Sb Bi	Tremolite Actinolite Clinozoisite Plagioclase Pyroxene Garnet Microcline	Native Gold Pyrrhotite Pyrite Galena Sphalerite Arsenopyrite Marcasite Tetrahedrite Chalcopyrite Electrum Bismuthinite Tellurides	Au	Tuff Basalt Siltstone	Rossland Elise Lower Jurassic	Monzodiorite Uncertain Age
	COMMENTS: Bismuthinite and tellurides are reported (D. Peterson, pers. comm., 1991). There are uncertainties whether this deposit is a skarn or deformed and thermally overprinted quartz-rich Au mineralization. The garnets are manganiferous, ranging from 45-55 mole % pyralspite (Ettlinger and Ray, 1989). The host rocks are correlated with the Elise Formation (Ray and Spence, 1986).										
594	**082FNW247** IRON KING BODIE	49 30 12 117 29 24	QN	SHOW	Cu	Unknown	Pyrite Pyrrhotite Magnetite Chalcopyrite Marcasite	Cu	Unknown	Unknown Group Unknown Formation Uncertain Age	Nelson Intrusions Middle Jurassic
	COMMENTS:										
595	**082FNW255** CARIBOU HAILSTORM MOUNTAIN	49 58 08 117 39 09	KO	PROS	Au Pb Cu As Zn Sb	Pyroxene Garnet Actinolite Biotite	Native Gold Pyrite Pyrrhotite Galena Arsenopyrite Chalcopyrite Manganite Gypsum	Cu (Au)	Marble Siltstone Argillite	Milford Undefined Formation Carboniferous	Quartz Monzonite Jurassic
	COMMENTS:										
596	**082FSW001** ASPEN SALMO-MALARTIC	49 11 08 117 11 15	NA	PAPR	Ag Au Pb Zn	Olivine Serpentine Talc Pyroxene Wollastonite Humite	Tetrahedrite Galena Sphalerite Chalcopyrite	Pb-Zn	Breccia Limestone Dolomite	Undefined Group Laib Lower Cambrian	Nelson Intrusions Middle Jurassic
	COMMENTS: Probably represents a magnesian skarn-related manto deposit. It contains three distinct stratabound ore horizons: an upper sphalerite- rich zone, a middle silver-rich zone, that locally assays up to 14 g/t Au, and a lower lead-zinc-silver zone. A drill sample graded 3.95% Zn, 0.39% Pb, 246.8 g/t Ag and 2.4 g/t Au (Ass. Rpt. 9053).										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
597	**082FSW002** BUNKER HILL MORMON GIRL	49 03 44 117 23 12	NA	PAPR	Au Ag W Mo Pb	Garnet Epidote Sphene	Pyrite Galena Scheelite Molybdenite Pyrrhotite	W	Limestone Argillite Quartzite	Undefined Group Laib Lower Cambrian	Nelson Intrusions Middle Jurassic
	COMMENTS: This property includes pyrite-molybdenote bearing quartz veins and pyrrhotite-scheelite bearing skarns. A chip sample of one skarn assayed 0.09% W and 1.6 g/t Au (Ass. Rpt. 12758).										
598	**082FSW006** BLACK ROCK NORTH BLACK ROCK NO. 10	49 08 20 117 12 48	NA	SHOW	Zn Pb Cu Ge Ga	Wollastonite	Sphalerite Galena	Pb-Zn	Limestone Quartzite Phyllite	Badshot-Mohican Laib Lower Cambrian	Unknown Paleozoic-Mesozoic
	COMMENTS: This occurrence may represent Paleozoic stratabound lead-zinc mineralization overprinted by younger skarn alteration. MINFILE reports that mineralized limestone samples assay up to: 2.35% Zn, 0.62% Pb, 0.03% Cu, 187 g/t Ge and 2 g/t Ga.										
599	**082FSW010** EMERALD TUNGSTEN JERSEY	49 06 25 117 13 37	NA	PAPR	W Mo F Sn	Garnet Pyroxene Tourmaline Vesuvianite Wollastonite Biotite K-Feldspar Fluorite	Scheelite Wolframite Molybdenite Pyrrhotite Pyrite Chalcopyrite Powellite Cassiterite Arsenopyrite	W	Limestone Argillite Dolomite	Undefined Group Laib Lower Cambrian	Emerald Stock Cretaceous Granite Cretaceous
	COMMENTS: This camp includes two Paleozoic stratabound Pb-Zn deposits (Jersey and Emerald Pb-Zn) as well as several Cretaceous tungsten skarns (Emerald Tungsten, Feeney, Invincible and Dodger). Three styles of Cretaceous mineralization occur: (1) molybdenite, pyrite and tourmaline bearing quartz veins,(2) gold-arsenopyrite-pyrrhotite-rich pods and (3) scheelite-rich skarns containing Mn-rich garnets (up to 16 wt. % MnO) and F-rich vesuvianite (up to 1.94% F). Assay results on grab samples of the sulphide-poor scheelite ore and the sulphide-rich pods are presented in Appendix 4F.										
600	**082FSW011** DODGER EAST DODGER	49 06 49 117 12 47	NA	PAPR	W Mo Cu F Sn	Garnet Pyroxene Biotite Wollastonite Vesuvianite	Scheelite Molybdenite Pyrrhotite Powellite Wolframite Chalcopyrite Cassiterite	W	Limestone Argillite Dolomite	Undefined Group Laib Lower Cambrian	Dodger Stock Cretaceous Granite Cretaceous
	COMMENTS: The skarn mineralogy and styles of Cretaceous mineralization are similar to the Emerald Tungsten (082FSW010). Likewise the garnets are manganiferous and the vesuvianite is F-rich. The Emerald and Dodger stocks locally carry garnet phenocrysts that contain up to 25% MnO and 0.23% F (Ray and Webster, unpublished data).										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
601	**082FSW012** JACKPOT MAIN JACKPOT **COMMENTS:** This occurrence may represent a Paleozoic stratabound Pb-Zn deposit overprinted by Cretaceous tungsten skarn mineralization.	49 14 28 117 09 22	NA	DEPR	Pb Zn Cd W	Pyroxene Tremolite Serpentine	Pyrite Pyrrhotite Sphalerite Galena Scheelite	Pb-Zn (W)	Dolomite Limestone	Undefined Group Laib Lower Cambrian	Hidden Creek Stock Lower Cretaceous Granite Lower Cretaceous
602	**082FSW013** JACKPOT EAST JACKPOT **COMMENTS:** This occurrence may represent a Paleozoic stratabound Pb-Zn deposit overprinted by Cretaceous W skarn mineralization.	49 14 38 117 08 44	NA	DEPR	Zn Pb W Cd	Pyroxene Tremolite	Pyrite Pyrrhotite Sphalerite Galena Scheelite	Pb-Zn (W)	Dolomite Limestone	Undefined Group Laib Lower Cambrian	Hidden Creek Stock Lower Cretaceous Granite Lower Cretaceous
603	**082FSW016** JUMBO JUMBO 1 **COMMENTS:** This property includes scheelite-bearing skarn and quartz veins containing pyrite, galena, sphalerite and molybdenite.	49 06 09 117 11 24	NA	SHOW	W Mo Pb Zn	Unknown	Scheelite Molybdenite Pyrite Galena Sphalerite	W	Limestone Argillite	Undefined Group Active Lower Ordovician	Lost Creek stock Lower Cretaceous Granite Lower Cretaceous
604	**082FSW021** MOLLY MOLYBDENITE **COMMENTS:** Several small scheelite-bearing skarn zones are associated with a possible porphyry Mo deposit that contains rare uraninite.	49 05 00 117 11 40	NA	PAPR	Mo W U	Unknown	Molybdenite Scheelite Pyrite Pyrrhotite Uraninite	W (Mo)	Argillite	Undefined Group Active Lower Ordovician	Lost Creek stock Lower Cretaceous Granite Lower Cretaceous
605	**082FSW023** PETE CREEK PY **COMMENTS:**	49 03 11 117 18 19	NA	SHOW	Zn Pb Ag	Pyroxene Tremolite	Pyrite Pyrrhotite Sphalerite Galena	Pb-Zn	Limestone Quartzite Dolomite	Undefined Group Laib Lower Cambrian	Granite Lower Cretaceous
606	**082FSW032** SILVER BELL MCCOLMANS **COMMENTS:**	49 11 28 117 08 29	NA	SHOW	Zn BA	Garnet Actinolite	Sphalerite Pyrite Barite	Zn	Limestone	Undefined Group Active Lower Ordovician	Hidden Creek Stock Lower Cretaceous Granite Lower Cretaceous

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
607	**082FSW057** ELM RAINY DAY **COMMENTS:**	49 15 47 117 07 40	NA	SHOW	Zn W F Ag Au	Fluorite	Pyrite Pyrrhotite Sphalerite Scheelite	Zn	Limestone Argillite Slate	Undefined Group Active Lower Ordovician	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
608	**082FSW058** UDIVILLE VICTORY TUNGSTEN **COMMENTS:** This occurrence may represent Palezoic stratabound Pb-Zn mineralization overprinted by Cretaceous W skarn mineralization.	49 08 26 117 10 15	NA	SHOW	Pb Zn Ag W Mo	Garnet Pyroxene	Galena Sphalerite Pyrite Scheelite Molybdenite	W	Limestone Dolomite	Undefined Group Laib Lower Cambrian	Granite Lower Cretaceous
609	**082FSW059** VICTORY TUNGSTEN LAST CHANCE **COMMENTS:**	49 08 24 117 10 37	NA	DEPR	W Mo	Garnet Tremolite Pyroxene Amphibole Titanite	Scheelite Molybdenite Pyrrhotite Pyrite	W	Argillite Limestone	Undefined Group Active Lower Ordovician	Granite Lower Cretaceous
610	**082FSW082** QUEEN VICTORIA ORINOCO **COMMENTS:** Three mineralized grab samples assayed up to 9.4% Cu, 76 g/t Ag and 602 ppb Au. Values for Pb, Zn, Co, Mo, As, Ni, Sb, Bi, Cd, W and Te are very low (Appendix 4B).	49 29 38 117 27 00	QN	PAPR	Cu Ag Au	Garnet Epidote Actinolite Pyroxene Albite Microcline	Pyrite Chalcopyrite Pyrrhotite Magnetite Bornite	Cu	Limestone Quartzite Argillite	Ymir Undefined Formation Lower Jurassic	Nelson Intrusions Middle Jurassic Quartz Diorite Middle Jurassic
611	**082FSW106** GOLDEN QUEEN SURPRISE **COMMENTS:** Reserves are calculated to be 17 690 t grading 0.30% MoS2 (David Minerals, Statement of Facts, 1985).	49 05 22 117 49 13	KO	DEPR	Mo W Cu	Epidote	Molybdenite Scheelite Pyrrhotite Chalcopyrite	Mo	Siltstone Breccia	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic Diorite Middle Jurassic 165 +/- 1 Ma
612	**082FSW107** NOVELTY GIANT **COMMENTS:** The Novelty may be related to a porphyry Mo breccia system. Three grab samples assayed up to 1.40% Mo, 13.8% As, 4.84% Co, 1.27% Ni, 0.35% Bi, 47 g/t Au, 65 ppm W and 103 ppm Sb. Values for Ag, Cu, Pb were very low. The high nickel values suggest the presence of nickel arsenide minerals (Appendix 4D). Production data are uncertain.	49 05 11 117 49 18	KO	PAPR	Au Mo Co U Bi As Ni Sb	Epidote Pyroxene	Arsenopyrite Molybdenite Uraninite Bismuthinite Pyrrhotite Pyrite Native Gold Cobaltite Chalcopyrite Erythrite	Mo (Au)	Breccia Siltstone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic Granodiorite Middle Jurassic 165 +/- 1 Ma

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
613	**082FSW109** GIANT NOVELTY **COMMENTS:** The Giant may be related to a porphyry Mo breccia system. One grab sample assayed 1.26% Co, 1.06% Mo, 30.5% As, 0.11% Ni, 0.21% Cu, 7.5 g/t Au, 2 g/t Ag, 0.14% Bi and 100 ppm Se (Appendix 4D). data).	49 05 04 117 49 28	KO	PAPR	Au Mo Cu Co Ni Bi W	Garnet Epidote Pyroxene	Molybdenite Pyrrhotite Chalcopyrite Arsenopyrite Native Gold Cobaltite Native Bismuth Bismuthinite Pyrite Magnetite Scheelite	Mo (Au)	Breccia Siltstone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic Granodiorite Middle Jurassic 165 +/- 1 Ma
614	**082FSW110** COXEY RED MOUNTAIN **COMMENTS:** The Coxey may be related to a porphyry Mo breccia system. Garnet is rare. Five mineralized grab samples assayed up to 0.35% Cu, 3.18% Mo, 10 g/t Ag, 220 ppb Au, 137 ppm Co, 36 ppm As, 84 ppm Bi, and 2.3% W. (Appendix 4D). The deposit is described by Fyles (1984) and Webster et al., 1992).	49 05 23 117 49 36	KO	PAPR	Mo Cu W Au	Garnet Epidote Vesuvianite Chlorite Actinolite	Molybdenite Pyrrhotite Chalcopyrite Scheelite Pyrite Magnetite	Mo (W)	Breccia Siltstone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic Granodiorite Middle Jurassic 165 +/- 1 Ma
615	**082FSW111** JUMBO **COMMENTS:** The Jumbo may be related to a porphyry Mo breccia system. It contains two types of mineralization: (1) a pyrrhotite-arsenopyrite-molybdenite -bismuthinite-Au-bearing quartz-carbonate vein that reaches 9 m in width and (2) molybdenite-arsenopyrite-chalcopyrite bearing skarn associated with an intrusive breccia. Assay results on three grab samples of skarn are presented in Appendix 4C.	49 05 20 117 50 00	KO	PAPR	Au Ag Mo Cu Bi As	Garnet Epidote Ankerite	Pyrrhotite Chalcopyrite Arsenopyrite Native Gold Molybdenite Bismuthinite Native Bismuth Pyrite Magnetite Hematite	Au	Breccia Siltstone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic 165 +/- 1 Ma Granodiorite Middle Jurassic 165 +/- 1 Ma
616	**082FSW134** ST. ELMO **COMMENTS:** Reserves are calculated to be 59 060 t grading 0.28% MoS_2 (David Minerals, Statement of Facts, 1985).	49 05 27 117 48 59	KO	PAPR	Mo Cu W Ag Au Pb	Epidote	Molybdenite Scheelite Pyrrhotite Chalcopyrite Pyrite Galena Sphalerite	Mo	Siltstone Breccia	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic 165 +/- 1 Ma Granodiorite Middle Jurassic 165 +/- 3 Ma

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
617	**082FSW140** MOUNTAIN VIEW RED MOUNTAIN	49 05 27 117 49 21	KO	PAPR	Mo W Cu Au Ag Pb	Garnet Epidote	Molybdenite Scheelite Pyrrhotite Chalcopyrite Pyrite Galena	Mo (W)	Breccia Siltstone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Jurassic Granodiorite Middle Jurassic 165 +/- 1 Ma
	COMMENTS: Mineralization at this property is similar to the Coxey (082FSW110). Production data are uncertain.										
618	**082FSW141** GOOD FRIDAY NORTHERN BELLE	49 05 33 117 49 36	KO	SHOW	Pb Zn Mo Au W	Garnet Epidote	Galena Sphalerite Pyrite Magnetite Scheelite Pyrrhotite Molybdenite	Mo	Agglomerate Siltstone Breccia	Undefined Group Mount Roberts Pennsylvanian-Perm.	Nelson Intrusions Middle Jurassic
	COMMENTS: This skarn may be related to a porphyry Mo breccia system.										
619	**082FSW163** LORD ROBERTS BADDEN POWELL	49 12 20 117 46 40	KO	PAPR	Fe Cu Ag	Garnet Epidote Hornblende	Magnetite Pyrrhotite Pyrite Chalcopyrite	Fe	Siltstone Quartzite Greywacke	Undefined Group Mount Roberts Pennsylvanian-Perm.	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: The skarn includes a massive magnetite zone up to 10 m thick. Bismuthinite may be present.										
620	**082FSW167** SDR GEM	49 03 53 117 46 00	QN	SHOW	Au Cu As Zn Ag	Epidote Hornblende Garnet Muscovite Graphite	Magnetite Arsenopyrite Pyrite Pyrrhotite Chalcopyrite	Cu (Au)	Siltstone	Rossland Elise Lower Jurassic	Rossland Monzonite Lower Jurassic Monzonite Lower Jurassic 190 Ma
	COMMENTS: Mineralization consists of a central zone of massive arsenopyrite flanked by wider zones of massive magnetite, pyrite, pyrrhotite and trace chalcopyrite. A grab sample assayed 1.03 g/t Au, 1.03 g/t Ag and 0.16% Cu (Ass. Rpt. 9827).										
621	**082FSW211** MAMMOTH MONARCH	49 21 27 117 17 05	QN	SHOW	Cu Mo Ag Pb Zn Au	Epidote Garnet Mariposite Actinolite	Pyrite Chalcopyrite Molybdenite Pyrrhotite Galena Sphalerite	Cu	Argillite Agglomerate Andesite	Rossland Elise Lower Jurassic	Bonnington Pluton Middle Jurassic Granodiorite Middle Jurassic 167 Ma
	COMMENTS: The age date for Bonnington pluton is given by Hoy (pers. comm. 1992).										
622	**082FSW218** INVINCIBLE	49 06 57 117 13 08	NA	PAPR	W Mo	Garnet Pyroxene Biotite Vesuvianite	Scheelite Molybdenite Powellite Pyrrhotite Pyrite Wolframite	W	Limestone Dolomite Argillite	Undefined Group Laib Lower Cambrian	Dodger Stock Cretaceous Granite Cretaceous
	COMMENTS: This mine forms part of the Emerald Tungsten mining camp.										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
623	**082FSW225** ST. LOUIS GREY 3-7 **COMMENTS:**	49 06 26 117 49 44	KO	SHOW	Cu	Unknown	Pyrrhotite Pyrite Chalcopyrite	Cu	Siltstone Argillite	Undefined Group Mount Roberts Pennsylvanian-Perm.	Trail Pluton Middle Jurassic 165 +/- 1 Ma Granodiorite Middle Jurassic 165 +/- 1 Ma
624	**082FSW247** FEENEY **COMMENTS:** This mine forms part of the Emerald Tungsten mining camp.	49 06 40 117 13 21	NA	PAPR	W Mo	Garnet Pyroxene Vesuvianite Actinolite Epidote	Scheelite Pyrrhotite Pyrite Wolframite Molybdenite Powellite	W	Limestone Argillite	Undefined Group Laib Lower Cambrian	Emerald Stock Cretaceous Granite Cretaceous
625	**082FSW255** JACKPOT WEST WEST **COMMENTS:**	49 14 20 117 09 40	NA	DEPR	Zn Pb Cd W	Pyroxene Tremolite	Pyrite Sphalerite Galena Pyrrhotite Scheelite	Pb-Zn	Dolomite Limestone	Undefined Group Laib Lower Cambrian	Hidden Creek Stock Lower Cretaceous Granite Lower Cretaceous
626	**082FSW256** JACKPOT LERWICK JACKPOT **COMMENTS:**	49 14 18 117 09 05	NA	DEPR	Zn Pb Cd W	Dolomite Pyroxene Tremolite	Sphalerite Pyrite Pyrrhotite Galena Scheelite	Zn	Limestone	Undefined Group Laib Lower Cambrian	Hidden Creek Stock Lower Cretaceous Granite Lower Cretaceous
627	**082FSW265** BIG HORN TEXANS **COMMENTS:** One grab sample assayed 6.17 g/t Au, 5.49 g/t Ag, 0.09% Cu and trace Zn and W (Ass. Rpt. 8652).	49 13 11 117 06 41	NA	SHOW	Au Ag Cu Zn W	Epidote Tourmaline Wollastonite	Pyrite Pyrrhotite Sphalerite Chalcopyrite Magnetite	Cu	Quartzite Schist Argillite	Hamill Reno Lower Cambrian	Granodiorite Cretaceous
628	**082FSW266** BEAVER CREEK RELIANCE **COMMENTS:** A 3 m wide chip sample assayed 130 g/t Ag, 13 g/t Au, 0.27% Pb, 0.03% Zn and 0.01% Cu (Ass. Rpt. 12762).	49 12 21 117 27 31	QN	PAPR	Au Ag Pb Zn Cu	Garnet Epidote	Pyrite Pyrrhotite Galena Sphalerite Chalcopyrite	Pb-Zn	Greywacke Limestone Argillite	Rossland Archibald Lower Jurassic	Bonnington Pluton Middle Jurassic Granodiorite Middle Jurassic 167 Ma

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
629	**082FSW280** M.U.T. MUT **COMMENTS:**	49 04 35 117 11 42	NA	SHOW	Mo W U F	Garnet Pyroxene Fluorite	Scheelite Molybdenite Pyrite Pyrrhotite Uranophane Autunite Sphalerite Powellite	Mo (W)	Argillite Limestone	Undefined Group Active Lower Ordovician	Lost Creek stock Lower Cretaceous Granite Lower Cretaceous
630	**082FSW282** MONARCH ELK **COMMENTS:** A 153 t bulk sample assayed 3.0% Cu, 201 g/t Ag and 3.4 g/t Au (MMAR 1918, pages 173, 174 and 197).	49 29 36 117 29 00	QN	PAPR	Cu Ag Au Mo Pb Zn	Garnet Epidote K-Feldspar	Pyrite Pyrrhotite Chalcopyrite Molybdenite Galena Sphalerite Magnetite	Cu	Limestone Quartzite Argillite	Rossland Elise Lower Jurassic	Granodiorite Jurassic
631	**082FSW310** EMERALD PB-ZN IRON MOUNTAIN **COMMENTS:** This deposit may represent Paleozoic stratabound Pb-Zn mineralization overprinted by Cretaceous Mo skarn mineralization.	49 06 30 117 13 15	NA	PAPR	Pb Ag Zn Mo	Garnet	Sphalerite Galena Pyrite Pyrrhotite Molybdenite	Pb-Zn (Mo)	Limestone Dolomite	Undefined Group Laib Lower Cambrian	Emerald Stock Cretaceous Granite Cretaceous
632	**082FSW311** ARROW TUNGSTEN STEWART 13 **COMMENTS:**	49 17 40 117 15 56	QN	PROS	W Mo Zn Cu Pb	Pyroxene Garnet	Scheelite Molybdenite Sphalerite Chalcopyrite Galena Pyrite Powellite	W	Argillite Siltstone Sandstone	Rossland Hall Lower Jurassic	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
633	**082FSW320** COMET CONTACT **COMMENTS:**	49 05 23 117 13 53	NA	SHOW	W	Unknown	Scheelite	W	Limestone	Undefined Group Laib Lower Cambrian	Granite Cretaceous
634	**082FSW321** ALFIE CLUBINE **COMMENTS:**	49 05 09 117 13 30	NA	SHOW	W	Pyroxene Garnet Tremolite	Scheelite	W	Limestone Argillite	Undefined Group Laib Lower Cambrian	Emerald Stock Cretaceous Granite Cretaceous

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
635	**082FSW326** KIMBARB SPUNKY	49 22 00 117 56 00	KO	SHOW	Mo	Garnet Olivine	Pyrrhotite Pyrite Magnetite Molybdenite	Mo	Limestone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Ladybird stock Tertiary Granite Tertiary
	COMMENTS: This skarn occurs as xenoliths in the Ladybird stock. The xenoliths are presumed to be altered Mount Roberts Formation.										
636	**082FSW340** STRAWBERRY FLATS	49 12 24 117 53 32	KO	SHOW	Au Ag Cu Pb Zn As Sb	Pyroxene Epidote Chlorite	Pyrrhotite Pyrite Chalcopyrite Galena Sphalerite Stibnite Arsenopyrite Magnetite	Cu (Au)	Limestone Shale	Undefined Group Mount Roberts Pennsylvanian-Perm.	Nelson Intrusions Middle Jurassic Granodiorite Middle Jurassic
	COMMENTS: A silicified sample from a trench assayed 39.1 g/t Au and 6.5 g/t Ag (Ass. Rpt. 19741).										
637	**082FSW341** ROSSLAND WOLLASTONITE	49 09 36 117 50 02	KO	SHOW	WL	Wollastonite Pyroxene Garnet Epidote	Unknown	I.M.	Limestone	Undefined Group Mount Roberts Pennsylvanian-Perm.	Coryell Intrusions Eocene Syenite Eocene
	COMMENTS: This skarn includes zones of course, massive wollastonite (over 90%) with rare pyroxene and brown garnet. No sulphides were observed.										
638	**082KNW102** MAKALU	50 47 48 117 09 36	KO	SHOW	W Mo	Tremolite Actinolite Garnet	Scheelite Molybdenite Powellite	W	Phyllite Schist	Windermere Undefined Formation Upper Proterozoic	Granodiorite Middle Cretaceous
	COMMENTS:										
639	**082KNW107** ESCALADE OASIS	50 55 36 117 25 24	NA	SHOW	W	Unknown	Scheelite	W	Quartzite Limestone	Hamill Mohican Lower Cambrian	Battle Range Batholith Cretaceous Granite Cretaceous
	COMMENTS:										
640	**082KSE069** PEGLEG	50 04 30 116 43 00	NA	SHOW	F	Fluorite Garnet	Unknown	I.M.	Limestone Quartzite	Windermere Undefined Formation Upper Proterozoic	Bayonne Batholith Middle Cretaceous Monzonite Middle Cretaceous
	COMMENTS:										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
641	**082LNE041** WALLED CLIFTON **COMMENTS:**	50 36 37 118 38 05	KO	PROS	MB	Pyroxene Tremolite Garnet Wollastonite	Pyrite	I.M.	Marble	Undefined Group Eagle Bay Paleozoic	Unknown Lower Tertiary
642	**082M 002** MOUNT COPELAND JOAN **COMMENTS:** It is uncertain whether this deposit is a skarn. It may represent early magmatic-related Mo mineralization that was overprinted by later amphibolite facies regional metamorphism.	51 07 50 118 27 35	MO	PAPR	Mo Zn Pb Cu F	Garnet Biotite Epidote Chlorite Sericite Fluorite Apatite	Molybdenite Pyrite Pyrrhotite Bornite Chalcopyrite Galena	Mo	Gneiss Calc-silicate Marble	Monashee Undefined Formation Upper Proterozoic	Syenite Uncertain Age
643	**082M 051** EBL REM **COMMENTS:** The property includes skarns, mineralized veins and zones of massive sulphide (Ass. Rpt. 2989).	51 19 50 119 46 20	KO	PROS	Cu Pb Zn Ag Au Mo	Garnet Epidote Chlorite	Pyrite Pyrrhotite Chalcopyrite Sphalerite Galena	Cu	Schist Phyllite	Undefined Group Eagle Bay Paleozoic	Bayonne Batholith Middle Cretaceous Granodiorite Middle Cretaceous
644	**082M 056** TU **COMMENTS:** A 2 m trench sample assayed 2.04% W (Ass. Rpt. 14380).	51 48 00 119 35 20	KOB	SHOW	W Zn	Tremolite Garnet Pyroxene Vesuvianite	Scheelite Sphalerite	W	Schist Gneiss	Undefined Group Eagle Bay Paleozoic	Granite Middle Cretaceous
645	**082M 115** HILLTOP 9 **COMMENTS:**	51 29 07 119 37 00	KO	SHOW	Cu	Epidote Garnet Pyroxene Chlorite	Chalcopyrite Pyrite Pyrrhotite	Cu	Limestone	Undefined Group Eagle Bay Lower Cambrian	Baldy Batholith Cretaceous Quartz Monzonite Cretaceous
646	**082M 116** RIO CAN **COMMENTS:**	51 19 30 119 11 00	KO	SHOW	W Cu	Garnet Pyroxene	Chalcopyrite Scheelite Pyrrhotite	W	Schist Limestone	Shuswap Metamorphic Complex Undefined Formation Proterozoic-Paleoz.	Quartz Monzonite Cretaceous

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
647	**082M 118** STEEP PAT 2	51 00 20 119 44 40	KO	PROS	Zn Pb Cu Ag Au Te Bi Sb	Garnet Epidote Amphibole Chlorite Biotite Sphene Apatite	Pyrrhotite Sphalerite Galena Chalcopyrite Silver Native Gold Magnetite Native Bismuth Tellurides Pyrite	Au	Limestone Phyllite Schist	Undefined Group Sicamous Paleozoic	Unknown Uncertain Age
	COMMENTS: This concordant zone of alteration is traceble for 10 km along strike and its origin is uncertain (Miller et al., 1988; Ettlinger and Ray, 1989).										
648	**082M 123** DIMAC SILENCE LAKE	51 50 00 119 41 30	KOB	PAPR	W	Garnet Pyroxene Actinolite Vesuvianite Wollastonite	Scheelite Pyrrhotite	W	Marble Gneiss	Shuswap Metamorphic Complex Undefined Formation Proterozoic-Paleoz.	Raft Batholith Cretaceous Granite Cretaceous
	COMMENTS: The Dimac contains extremely coarse grained and euhedral garnet, vesuvianite and scheelite crystals (up to 7, 15 and 1.5 cm long respectively). Three scheelite and pyrrhotite-bearing skarn grab samples assayed between 2.3 and 7.0% W (Appendix 4F). Microprobe analyses of garnets indicate they contain up to 0.34% F. XRD analyses of large hand-picked garnet and vesuvianite crystals indicate they are enriched in Sn (up to 317 and 2106 ppm Sn respectively)(Webster et al 1992; Ray & Webster, unpublished data). Dawson et al. (1983) report chemically zoning in some garnets.										
649	**082M 146** FIM FR1	51 31 40 118 15 00	KO	SHOW	W	Pyroxene Garnet	Scheelite	W	Marble Argillite Phyllite	Lardeau Index Cambrian	Quartz Monzonite Cretaceous
	COMMENTS:										
650	**082M 156** RUGER SORCERER CREEK	51 29 10 118 11 40	KO	SHOW	W Cu Ag Mo	Garnet Pyroxene	Scheelite Pyrrhotite Chalcopyrite Molybdenite Pyrite Magnetite	W (Mo)	Phyllite Limestone	Lardeau Index Cambrian	Bigmouth Creek stock Middle Jurassic Monzonite Middle Jurassic
	COMMENTS:										
651	**082M 157** PAT 1300	51 35 00 118 19 20	KO	SHOW	Zn	Garnet Epidote	Pyrrhotite Pyrite Sphalerite	Zn	Gneiss Calc-silicate	Lardeau Index Cambrian	Quartz Monzonite Triassic
	COMMENTS:										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
652	**082M 162** BISCHOFF LAKES **COMMENTS:** MINFILE reports that the vesuvianite contains up to 0.05% Be.	51 36 00 119 02 00	KO	SHOW	Be	Garnet Epidote Vesuvianite	Vesuvianite	I.M.	Marble	Undefined Group Eagle Bay Paleozoic	Bayonne Batholith Middle Cretaceous Granite Middle Cretaceous
653	**082M 184** HYDRO **COMMENTS:**	51 51 30 119 20 00	KO	SHOW	Cu Mo Ag W	Amphibole	Chalcopyrite Pyrite Molybdenite Pyrrhotite Scheelite Powellite	Cu (Mo)	Schist Gneiss	Undefined Group Eagle Bay Paleozoic	Granite Middle Cretaceous
654	**082M 187** THANKSGIVING **COMMENTS:** This occurrence is described by Donnelly et al. (1983).	51 12 40 118 11 55	KO	SHOW	W	Pyroxene Vesuvianite Garnet Sphene Clinozoisite Actinolite Wollastonite	Scheelite Pyrite Pyrrhotite Marcasite	W	Limestone Schist Argillite	Undefined Group Eagle Bay Paleozoic	Unknown Uncertain Age
655	**082M 188** TM 1 **COMMENTS:** This property is similar to the Dimac W skarn (082M 123).	51 48 30 119 47 25	KOB	SHOW	W	Vesuvianite Garnet Wollastonite	Scheelite	W	Schist Marble	Undefined Group Eagle Bay Paleozoic	Granodiorite Middle Cretaceous
656	**082M 189** TM 8 **COMMENTS:**	51 48 20 119 50 40	KOB	SHOW	W	Vesuvianite Garnet Wollastonite	Scheelite	W	Schist Marble	Undefined Group Eagle Bay Paleozoic	Granodiorite Middle Cretaceous
657	**082M 192** BEARTREE **COMMENTS:**	51 29 10 118 17 00	KO	SHOW	W Mo Cu	Pyroxene Garnet Powellite	Scheelite Molybdenite Pyrite Chalcopyrite	W	Siltstone Sandstone Limestone	Lardeau Undefined Formation Cambrian	Downie Creek pluton Uncertain Age Quartz Monzonite Uncertain Age
658	**082M 202** MEL 600 **COMMENTS:**	51 34 00 118 23 30	KO	SHOW	Cu	Unknown	Chalcopyrite Pyrrhotite	Cu	Unknown	Lardeau Undefined Formation Cambrian	Quartz Monzonite Triassic

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
659	**082M 203** MEL 200	51 34 00 118 26 30	KO	SHOW	Cu	Unknown	Chalcopyrite Pyrrhotite	Cu	Unknown	Lardeau Undefined Formation Cambrian	Quartz Monzonite Triassic

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
660	**082M 232** MAR	51 43 30 119 33 30	KO	SHOW	W Mo Cu	Garnet Pyroxene Amphibole Vesuvianite	Scheelite Molybdenite Pyrite Chalcopyrite	W	Marble	Undefined Group Eagle Bay Paleozoic	Quartz Monzonite Eocene

COMMENTS:
A chip sample over 0.14 m assayed 0.35% WO3 (Ass. Rpt. 9544).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
661	**093J 001** SAMSON GISCOME	54 04 17 122 19 44	SM	SHOW	Zn Pb Ag Cu Nb U	Epidote Garnet	Sphalerite Galena Chalcopyrite Pyrite Pyrrhotite Pyrochlore	Pb-Zn	Marble Gneiss	Slide Mountain Undefined Formation Devonian-Triassic	Granodiorite Tertiary

COMMENTS:
A 1 m drill intersection of mineralized skarn assayed 10.5% Zn, 10.2% Pb, 85.7 g/t Ag and 0.06% Cu (Ass. Rpt. 4907). The property also includes some sulphide-rich zones, one of which has pyrochlore
associated with sphalerite that contains up to 8% niobium (Ass. Rpt. 4938).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
662	**093O 042** KOOTS SEAN	55 05 25 123 23 10	CA	SHOW	Mo W Cu Pb Zn	Garnet	Pyrrhotite Magnetite Pyrite Molybdenite Scheelite Chalcopyrite Sphalerite Galena	Mo (W)	Schist Marble Argillite	Ingenika Undefined Formation Upper Proterozoic	Granite Cretaceous

COMMENTS:
A chip sample of schistose, mineralized garnet skarn assayed 3.1% Mo (Ass. Rpt. 9921).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
663	**093O 043** NITE	55 05 46 123 18 40	CA	SHOW	Mo W Cu Zn	Biotite Garnet Pyroxene	Pyrrhotite Magnetite Pyrite Molybdenite Scheelite Chalcopyrite Bornite Sphalerite	Mo (W)	Schist Marble	Ingenika Undefined Formation Upper Proterozoic	Granite Cretaceous

COMMENTS:
A channel sample assayed 0.06% Mo, 0.08% W and 0.02% Cu (Ass. Rpt. 9746).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
664	**104I 025** EWE RAM	58 40 48 128 08 12	CA	SHOW	W	Unknown	Scheelite	W	Limestone Granite	Unknown Group Unknown Formation Uncertain Age	Cassiar Batholith Middle Cretaceous

COMMENTS:

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
665	**104I 031** HERB	58 41 06 128 10 00	CA	SHOW	Pb Zn Ag Cu Bi Sn	Unknown	Galena Sphalerite	Pb-Zn	Unknown	Unknown Group Unknown Formation Uncertain Age	Cassiar Batholith Middle Cretaceous
	COMMENTS: Kissen and Owens (1983) report the presence of the mineral potosiite. This occurrence is primarily a vein with minor skarn alteration.										
666	**104I 070** MAY	58 41 18 128 05 18	CA	SHOW	W	Epidote Chlorite	Scheelite	W	Dolomite	Windermere Unknown Formation Upper Proterozoic	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous
	COMMENTS:										
667	**104O 005** BLUE LIGHT	59 39 00 130 28 00	CA	PROS	W Be F Sn	Pyroxene Garnet Amphibole Biotite Fluorite Fluorapatite	Scheelite Beryl Magnetite Pyrite	W (Sn)	Hornfels	Undefined Group Oblique Creek Carboniferous	Granite Eocene
	COMMENTS: Mineralization is associated with a small Eocene intrusion that cuts the Cretaceous Cassiar batholith (Nelson et al. 1988). The property includes a W skarn and a separate occurrence containing magnetite-pyrite-quartz lenses that assay up to 0.89% Sn.										
668	**104O 011** ARSENAULT TOP	59 48 20 131 42 30	SM	PROS	Cu	Chlorite Epidote Sericite Actinolite	Chalcopyrite Pyrrhotite Pyrite	Cu	Gneiss Schist Marble	Big Salmon Complex Undefined Formation Mississippian	Simpson Peak Batholith Lower Jurassic Granodiorite Lower Jurassic
	COMMENTS:										
669	**104O 013** NANCY TOOT	59 58 30 130 25 30	CA	PROS	Mo Pb Zn W	Sericite Garnet Pyroxene Vesuvianite	Molybdenite Galena Sphalerite Scheelite Pyrite Pyrrhotite Chalcopyrite	W (Mo)	Unknown	Kechika Undefined Formation Cambrian-Ordovician	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous
	COMMENTS: The property includes a scheelite-bearing skarn zone as well as quartz veins containing molybdenite and minor galena and sphalerite.										
670	**104O 021** ASH MOUNTAIN	59 17 30 130 31 45	CA	SHOW	W Sn Be	Garnet Vesuvianite Pyroxene	Scheelite	W (Sn)	Limestone	Undefined Group Oblique Creek Carboniferous	Parallel Creek Batholith Upper Cretaceous 78 +/- 4 Ma Granite Upper Cretaceous 78 +/- 4 Ma
	COMMENTS: Scheelite occurs in skarn and in quartz veins. Pyroxene and garnet contain up to 0.9% Sn; the vesuvianite is enriched in Be (Watson and Mathews, 1944, pages 42-43; Mulligan and Jambor, 1968).										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
671	**104O 022** ASH MOUNTAIN - AP	59 19 00 130 31 00	CA	SHOW	W Sn	Garnet Vesuvianite Pyroxene	Scheelite Pyrite	W (Sn)	Limestone	Undefined Group Oblique Creek Carboniferous	Parallel Creek Batholith Upper Cretaceous 78 +/- 4 Ma Granite Upper Cretaceous 78 +/- 4 Ma
	COMMENTS: Grab samples assay up to 0.15% WO3 (Ass. Rpt. 8196). Anomalous Sn values are probably due to Sn enrichment in the garnet and pyroxene.										
672	**104O 023** PARALLEL CREEK	59 20 00 130 31 00	CA	SHOW	Pb Zn	Garnet Vesuvianite Pyroxene	Galena Sphalerite	Pb-Zn	Limestone	Undefined Group Oblique Creek Carboniferous	Parallel Creek Batholith Upper Cretaceous 78 +/- 4 Ma Granite Upper Cretaceous 78 +/- 4 Ma
	COMMENTS:										
673	**104O 032** GUNNAR BERG SUE	59 59 20 130 23 30	CA	PROS	Ag Pb Zn W Mo	Wollastonite Chlorite Talc	Galena Sphalerite Scheelite Molybdenite	W (Mo)	Dolomite Quartzite	Unknown Group Unknown Formation Paleozoic	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous
	COMMENTS: Skarn zones contain disseminated scheelite. Molybdenite occurs in quartz veins and along fractures. The galena and sphalerite occur in a quartzite breccia zone.										
674	**104O 034** RANCHERIA ROOT 1	59 58 20 130 24 40	CA	PROS	Mo W Pb Zn	Tremolite Wollastonite Pyroxene Actinolite	Molybdenite Scheelite Galena Sphalerite Powellite	W (Mo)	Limestone Quartzite	Unknown Group Unknown Formation Paleozoic	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous
	COMMENTS: The property contains skarns, veins and breccia zones similar to the Gunnar Berg occurrence (104O 032).										
675	**104O 049** BEAR REG	59 56 45 130 31 50	CA	SHOW	W Mo Pb	Garnet Pyroxene	Scheelite Molybdenite Galena Powellite	W (Mo)	Phyllite Limestone	Kechika Undefined Formation Cambrian-Ordovician	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous
	COMMENTS:										
676	**104P 003** LAMB MOUNTAIN STAR	59 23 20 129 53 36	CA	PROS	W Mo MA F	Garnet Pyroxene Tremolite Actinolite Epidote Scapolite	Scheelite Molybdenite Magnetite Pyrrhotite Chalcopyrite	W (Mo)	Marble Argillite	Atan Rosella Lower Cambrian	Lamb Mountain Stock Upper Cretaceous 73.9 +/- 2.5 Ma Granite Upper Cretaceous 73.9 +/- 2.5 Ma
	COMMENTS: Assay results for one sulphide-rich grab sample of skarn and two grab samples of endoskarn with sulphide veins are presented in Appendix 4F. All samples are F-rich.										

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
677	**104P 004** CONTACT	59 19 12 129 52 17	CA	PAPR	Ag Pb Zn Bi W Mn Sb As Cd	Garnet Scapolite Rhodonite Biotite Pyroxene	Galena Sphalerite Chalcopyrite Tetrahedrite Molybdenite Arsenopyrite Dyscrasite Antimony Bismuthinite Pyrargyrite Pyrrhotite Native Silver Albandite Scheelite Cosalite Magnetite	Pb-Zn	Marble Siltstone	Ingenika Stelkuz Hadrynian	Granite Upper Cretaceous 72.5 +/- 1.5 Ma

COMMENTS:
The skarn is dominated by a steeply dipping zone of massive magnetite up to 2 m thick. Two mineralized skarn grab samples assayed up to 12.2% Zn, 2.64% Pb, 159 g/t Ag, 250 ppm As, 0.11% Sb, 880 ppm Cd.
Values for Bi, Au, W, Mo, Co and Cu were low (Appendix 4E). The deposit is described by McDougall (1954) and Webster et al. (1992)

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
678	**104P 020** HASKINS MOUNTAIN SNOW	59 20 30 129 29 30	CA	PROS	Ag Zn Pb Sn Cu	Garnet	Sphalerite Galena Chalcopyrite Pyrrhotite Arsenopyrite	Pb-Zn (Sn)	Siltstone Limestone	Atan Undefined Formation Lower Cambrian	Mount Haskin Stock Eocene Granite Eocene 50.9 +/- 1.5 Ma

COMMENTS:
A 3.6 m drill intersection assayed 9.0% Zn, 4.5% Pb and 67 g/t Ag (Ass. Rpt. 48). An assay of 0.1% Sn was reported by Barnhill (1982).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
679	**104P 022** MCDAME BELLE CARIBOO	59 16 15 129 22 30	CA	PAPR	Ag Pb Zn Cu W	Garnet Pyroxene Tremolite Scapolite	Galena Sphalerite Chalcopyrite Scheelite Pyrite Pyrrhotite Hematite	Pb-Zn	Dolomite Limestone Quartzite	Atan Undefined Formation Lower Cambrian	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous

COMMENTS:
The deposit includes several mineralized skarn zones (Cariboo, Yellowjack and Canyon Top) as well as the China and North Creek veins that are interpreted to be distally related to the skarns. Inferred
reserves for the Cariboo are 27 210 t grading 294 g/t Ag, 3.6% Pb, 3.0% Zn and 0.35% Cu, whereas reserves for the Yellowjack are 5 442 t grading 257 g/t Ag, 4.2% Pb, 1.2% Zn and 0.2% Cu (MMAR 1965, page 14
and 15).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
680	**104P 026** LOW GRADE DAVIS BERYL	59 08 20 129 46 20	CA	SHOW	Be Zn Bi Sn MA F	Chlorite Garnet Pyroxene Fluorite	Danalite Sphalerite Native Bismuth Pyrrhotite Magnetite	Zn	Limestone	Atan Undefined Formation Lower Cambrian	Cassiar Batholith Middle Cretaceous Granite Middle Cretaceous

COMMENTS:

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
681	**104P 037** M HUNTSMAN **COMMENTS:**	59 14 55 129 50 45	CA	SHOW	Mo W F	Sericite Garnet Pyroxene Actinolite Fluorite Gypsum	Molybdenite Pyrite Scheelite	W	Unknown	Atan Undefined Formation Lower Cambrian	Granite Upper Cretaceous 72.5 +/- 2.5 Ma
682	**104P 038** JOEM RAIN **COMMENTS:**	59 19 50 129 28 00	CA	PROS	Zn Pb Ag Cu Bi	Garnet	Sphalerite Chalcopyrite Galena Pyrrhotite Native Bismuth Pyrite Bismuthinite	Pb-Zn	Limestone Chert Argillite	Atan Undefined Formation Lower Cambrian	Mount Haskin Stock Eocene 50.9 +/- 1.5 Ma Granite Eocene 50.9 +/- 1.5 Ma
683	**104P 043** MOUNT REED DOME **COMMENTS:** The Mount Reed-Mount Haskins district includes the following types of mineralization that are related to Eocene age granites: (1) intrusive and calc hornfels-hosted Mo-W stockworks, (2) oxidized W-Mo and Zn-Pb-Cu skarns, (3) Ag-Zn-Pb veins (Gower et al 1985). The skarns are B and F rich, exhibit textural and mineralogical zoning, and include some magnetite-pyroxene-chondrodite-vesuvianite wrigglite textures.	59 18 10 129 26 30	CA	PROS	Mo W Zn Pb Cu MA F As	Garnet Pyroxene Phlogopite Chondrodite Vesuvianite Wollastonite Muscovite Fluorite	Molybdenite Scheelite Magnetite Sphalerite Pyrite Arsenopyrite Chalcopyrite Galena	W (Mo)	Siltstone Quartzite Dolomite	Atan Undefined Formation Lower Cambrian	Mount Reed Stock Eocene 49.6 +/- 1.9 Ma Granite Eocene 49.6 +/- 1.9 Ma
684	**104P 056** PI JOAN **COMMENTS:**	59 18 15 129 30 20	CA	SHOW	Mo W Zn	Unknown	Molybdenite Scheelite Sphalerite	W (Mo)	Limestone	Kechika Undefined Formation Cambrian-Ordovician	Unknown Uncertain Age
685	**104P 058** TIBOR COBRA **COMMENTS:** A 2.4 m drill intersection assayed 6.4% Zn, 2.6% Pb and 65 g/t Ag (Ass. Rpt. 5121).	59 19 40 129 29 15	CA	PROS	Zn Ag Cu Pb	Garnet Pyroxene	Sphalerite Chalcopyrite Galena Pyrrhotite	Pb-Zn	Limestone Argillite	Atan Undefined Formation Lower Cambrian	Mount Haskin Stock Eocene 50.9 +/- 1 Ma Granite Eocene 50.9 +/- 1 Ma
686	**104P 059** JOEM HASKIN MOUNTAIN NW **COMMENTS:**	59 20 50 129 30 45	CA	DEPR	Mo Zn Pb Cu	Sericite	Molybdenite Sphalerite Galena Chalcopyrite Pyrrhotite	Mo	Limestone Phyllite	Atan Undefined Formation Lower Cambrian	Mount Haskin Stock Eocene 50.9 Ma +/- 1.5 Ma Granite Eocene 50.9 +/- 1 Ma

TECTONIC BELT: Omineca

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
687	**104P 071** KUHN WINDY	59 21 04 129 51 48	CA	DEPR	W Mo Zn Sb Cu FL	Garnet Pyroxene Actinolite Fluorite	Scheelite Molybdenite Pyrrhotite Pyrite Magnetite Sphalerite Stibnite Chalcopyrite Powellite	W (Mo)	Marble	Atan Undefined Formation Lower Cambrian	Kuhn Stock Upper Cretaceous 72.4 Ma +/- 2.5 Ma

COMMENTS:
Two mineralized grab samples assayed up to 0.18% Zn, 0.18% Mo, 480 ppm W and 0.98% F. Anomalous Ce (up to 420 ppm) and Li (up to 205 ppm) are also recorded (Appendix 4F). The geology of this skarn is described by Cooke and Godwin (1984). Drilling intersected scheelite-rich zones; one 12 m section averaged 1.3% WO3 (A. Panteleyev, pers. comm. 1992).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
688	**104P 079** DEAD GOAT BALSAM	59 20 23 129 52 40	CA	DEPR	W Cu Zn Mo Mn Cd F	Garnet Pyroxene Actinolite Epidote Biotite Fluorite	Scheelite Chalcopyrite Sphalerite Molybdenite Pyrrhotite Pyrite Magnetite Rhodonite	W	Marble Argillite	Ingenika Undefined Formation Hadrynian	Granite Upper Cretaceous 76.1 +/- 2.7 Ma

COMMENTS:
This skarn has drill indicated and inferred reserves of 100 900 t grading 0.49 % WO3 (Ass. Rpt. 10 512).
Two mineralized grab samples assayed up to 1800 ppm W, 9.7% Zn and 3% F (Appendix 4F).

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
689	**104P 120** DALZIEL	59 14 41 129 30 05	CA	SHOW	Zn	Pyroxene	Pyrite Sphalerite	Zn	Marble	Unknown Group Rosella Uncertain Age	Mount Haskin Stock Eocene 50.9 +/- 1.5 Ma Granite Eocene 50.9 +/- 1.5 Ma

COMMENTS:

TECTONIC BELT: Foreland

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
690	**082FNE073** MOLLY	49 56 12 116 18 12	NA	PROS	W Mo	Epidote Tremolite	Scheelite Molybdenite	W (Mo)	Dolomite Siltstone	Purcell Kitchener Middle Proterozoic	White Creek batholith Middle Cretaceous Granite Middle Cretaceous

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
691	**082GNW049** APRIL	49 49 15 115 30 56	NA	SHOW	Cu	Garnet	Chalcopyrite	Cu	Quartzite Argillite Limestone	Purcell Gateway Middle Proterozoic	Syenite Uncertain Age

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
692	**082GNW060** CEDAR	49 44 10 115 29 34	NA	SHOW	W Cu Ag Mo	Tremolite	Scheelite Chalcopyrite Pyrite Molybdenite	W (Mo)	Limestone Dolomite	Purcell Kitchener Middle Proterozoic	Monzonite Uncertain Age

COMMENTS:

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
693	**082KNE032** HORSETHIEF CREEK	50 33 53 116 24 50	NA	PROS	WL W	Tremolite Wollastonite Garnet	Scheelite	I.M.	Limestone Quartzite Calc-silicate	Purcell Mount Nelson Middle Proterozoic	Horsethief Batholith Cretaceous Monzonite Cretaceous

COMMENTS:
A northerly trending zone of tremolite with minor wollastonite is traceable over a 1500 m strike length (Ray and Webster, unpublished data). Tremolite occurs in gash fractures and along fold axial planes.

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
694	**094M 021** BOYA	59 16 00 127 30 00	NA	SHOW	Mo W Cu As Zn Pb Au	Epidote Biotite K-Feldspar Garnet Pyroxene Clinozoisite	Pyrrhotite Chalcopyrite Scheelite Molybdenite Arsenopyrite Sphalerite Galena	W (Mo)	Limestone	Hyland Undefined Formation Proterozoic-Cambrian	Quartz Diorite Uncertain Age

COMMENTS:
This occurrence includes (1) W-rich veins with barren skarn and (2) (2) zones of W and Mo-bearing clinozoisite skarn. Peripheral veins contain As-Zn-Pb-Cu-Au mineralization (Morton et al., 1983).

TECTONIC BELT: Intermontane

NO.	MINFILE NUMBER NAME	LATITUDE LONGITUDE	TERRANE	STATUS	COMMODITIES/ PATHFINDER ELEMENTS	SILICATES/ etc.	SULPHIDES/ OXIDES/etc.	SKARN CLASS	HOST LITHOLOGY	GROUP FORMATION AGE	ASSOCIATED INTRUSIVES AND AGE
695	**082LSW045** KENALLAN BUM	50 26 21 119 49 02	QNH	PROS	Mo Cu Au W	Garnet Wollastonite Pyroxene K-Feldspar Tremolite Biotite	Molybdenite Chalcopyrite Pyrite Scheelite	Mo	Siltstone Argillite Skarn	Harper Ranch Undefined Formation Paleozoic-Mesozoic	Alaskite Triassic-Jurassic

COMMENTS:
Assay results of six grab samples are presented in Appendix 4D. Maximum assays are: 1.6% Mo, 1805 ppm Cu, 684 ppb Au, 113 ppm Bi and 4800 ppm W (Appendix 4D). Garnets vary in colour from light brown to black.