

THE GANGUE

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GEOLOGY OF THE ESKAY CREEK #21 DEPOSITS

by J. Blackwell
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INTRODUCTION

The Eskay Creek Project is a joint venture exploration and development project between Calpine Resources Incorporated and Stikine Resources Limited. The project is located in the upper headwaters area of the Unuk River drainage, approximately 80 kilometers north of Stewart, B.C. Access to the area is by helicopter.

Exploration activity at Eskay Creek dates back to 1932, when a syndicate directed by Tom McKay staked the area. Prior to the current Eskay Creek Joint Venture, eleven companies explored the property, undertaking various diamond drill programs totalling over 4000 metres in 84 holes. Underground development was carried out on the #22 and McKay Zones, south of the area of current interest. This latest and most significant discovery, announced by Calpine in November, 1988, is the result of a six-hole drill program based upon a detailed office evaluation of prior exploration results, surface geological mapping and a soil geochemistry program.

GEOLOGY

The Eskay Creek Property is underlain by Lower to Middle Jurassic volcanic and sedimentary rocks of the Hazelton Group. Rock units are west-facing, strike 050°N and dip 15-50°W. Dips are steepest in the southern portion of the #21 Zone and become less steep to the north. Metamorphic rank is believed to be subgreenschist.

Well-preserved belemnites and radiolarians are locally abundant in most sedimentary units, including mineralized sediments. Hyaloclastic debris, pillowed flows, perlitic textures and fossiliferous debris-breccias are common within the volcanic units. These features indicate a predominately subaqueous depositional environment.

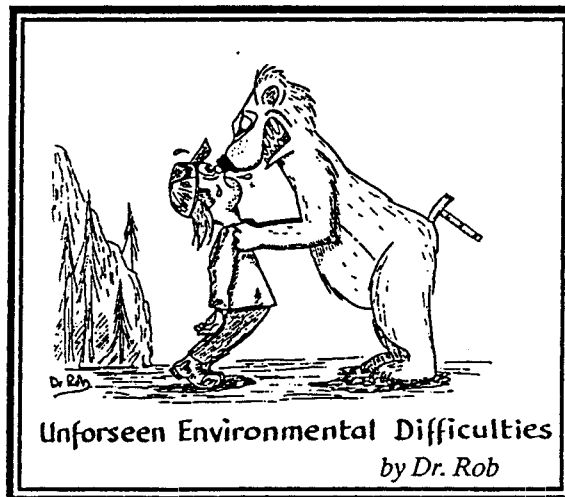
Within the drilled area of the #21 Zone, geology is relatively layercake and predictable. Stratigraphy (Figure 1) is subdivided into a Hangingwall Andesite unit, the Contact unit, the Rhyolite unit and the Footwall Dacite unit. The

The Hangingwall Andesite Unit is a flow and sill complex. The extrusives are fine grained and buff-green coloured; they occur commonly as pillowed flows and flow breccias while intrusive sills are dark green and massive.

Palagonite ash horizons are also present. Intercalated mudstone units are black, pyritic and discontinuous. Some mudstones are particularly fossiliferous and calcareous, and are useful markers within the hangingwall complex. Pillow and pillow breccia units are most frequently cemented by grey calcite or black chert, with heavy impregnations of pyrobitumen, pyrrhotite and white, sparry calcite present locally. Amygdules are filled by dark green chlorite, quartz, calcite or pyrite.

The Contact Unit hosts the most important mineralization. Thickness is variable, up to 60 meters, though generally much less. The unit comprises a spatially extensive, highly carbonaceous upper mudstone overlying a more restricted rhyolite-mudstone breccia. The upper mudstone is a thin to medium bedded, medium to finely laminated carbonaceous mudstone, with tuffaceous, chert and pyritic laminae. The lower subunit of this interval is a debris breccia (Transition Zone) containing rhyolite and mudstone blocks and chips supported by a black, carbonaceous matrix. The breccia is variably foliated and mineralized. In thin section a myriad of clast sizes and compositions, including chert, rhyolite, mineralized and altered fragments, and quartz eyes are observed. The matrix comprises exceedingly fine grained chaledonic quartz, muscovite, chlorite, pyrobitumen and graphite.

The Rhyolite Unit, which is approximately 80 metres thick, comprises grey to white aphyric breccia, lapilli-breccia, tuff and subordinate massive rhyolite. Local subunits of mudstone and waterlain tuff are present. Rhyolite fragments are massive to flow-banded in a tuffaceous matrix. Subunits



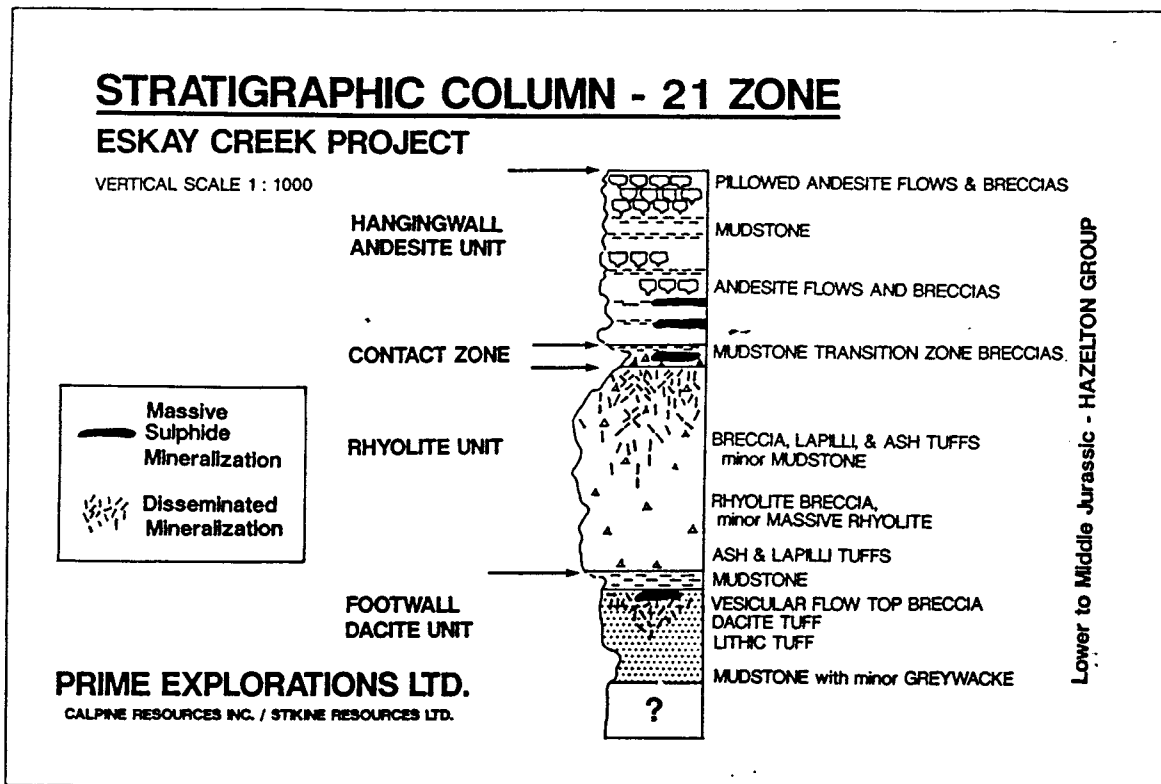


Figure 1.

of highly altered vitrophyre (or perhaps hyaloclastite) are present, often displaying perlitic or lithophysal textures. These rocks may appear massive to schistose and are mineralogically simple: quartz, muscovite and chlorite. Alteration effects are most dramatic within the matrix, however, clasts are also strongly altered. The base of the rhyolite is frequently massive, aphanitic and weakly brecciated.

Footwall to the rhyolite is an unknown thickness of fossiliferous mudstone, wacke and dacite tuff. Epiclastic units are medium to thick bedded, medium laminated, tuffaceous and pyritic. Dacitic pyroclastic units comprise a relatively continuous sequence of feldspar-phyric dacite tuff, lapilli-tuff and ash tuff.

MINERALIZATION

Exploration diamond drilling has delineated a mineralized body known overall as the #21 Zone, with a net length of 1400 metres, open along strike to the northeast and at depth. The #21 Zone is further subdivided into two principal deposits, the 21A and 21B, based upon distinctive mineralogy and grade continuity.

Current reserves on the property, using a 0.25 ounce per ton Au cut-off and a minimum 2 meter thickness are:

Probable Reserves:

21A zone
183 000 tons at 0.71oz/t Au, 6.8 oz/tAg

21B zone
1 073 000 tons at 1.66 oz/t Au, 43.3 oz/t Ag,
2.1% Pb and 5.2% Zn;

Possible Reserves:

21B zone
437 000 tons at 0.88 oz/t Au, 32.8 oz/t Ag,
2.1 Pb, and 4.8% Zn.








The 21A Deposit (previously known as the "South Zone") is hosted within Contact Unit carbonaceous mudstone and breccia, as well as the underlying Rhyolite breccia. Two styles of mineralization are present. The first is dominated by a visually striking assemblage of disseminated to near-massive stibnite and realgar within the Contact Unit. The second style occurs in the adjacent footwall rhyolite, and features a stockwork-style quartz-muscovite-chlorite breccia mineralized with disseminated sphalerite, tetrahedrite and pyrite. Highest gold and silver grades and widths are encountered where the Contact Unit is thickest and the immediately underlying rhyolite breccia is highly fractured and altered. Initial drilling in the 21A area has outlined a mineralized zone approximately 280 metres long and up to 100 metres wide. Thickness is variable, 10 metres on average, with locally much greater thicknesses indicated (e.g. CA89-23 returned a core length of 34.51 metres grading 14.93 g/t Au and 103.1 g/t Ag).

Exploration drilling on the 21A Deposit is currently suspended in favour of an accelerated drill program on the 21B Deposit, where initial results suggest the presence of a major mineralized body of high grade gold and silver mineralization associated with base metals. The change from a complex antimony and arsenic-dominated association in the 21A Deposit to a more conventional zinc, lead and copper sulphide association in the 21B Deposit is regarded as being of major significance to the overall mining economics of the project. The two deposits are separated by a 140-metre long segment of weakly-mineralized mudstone and rhyolite.

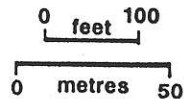
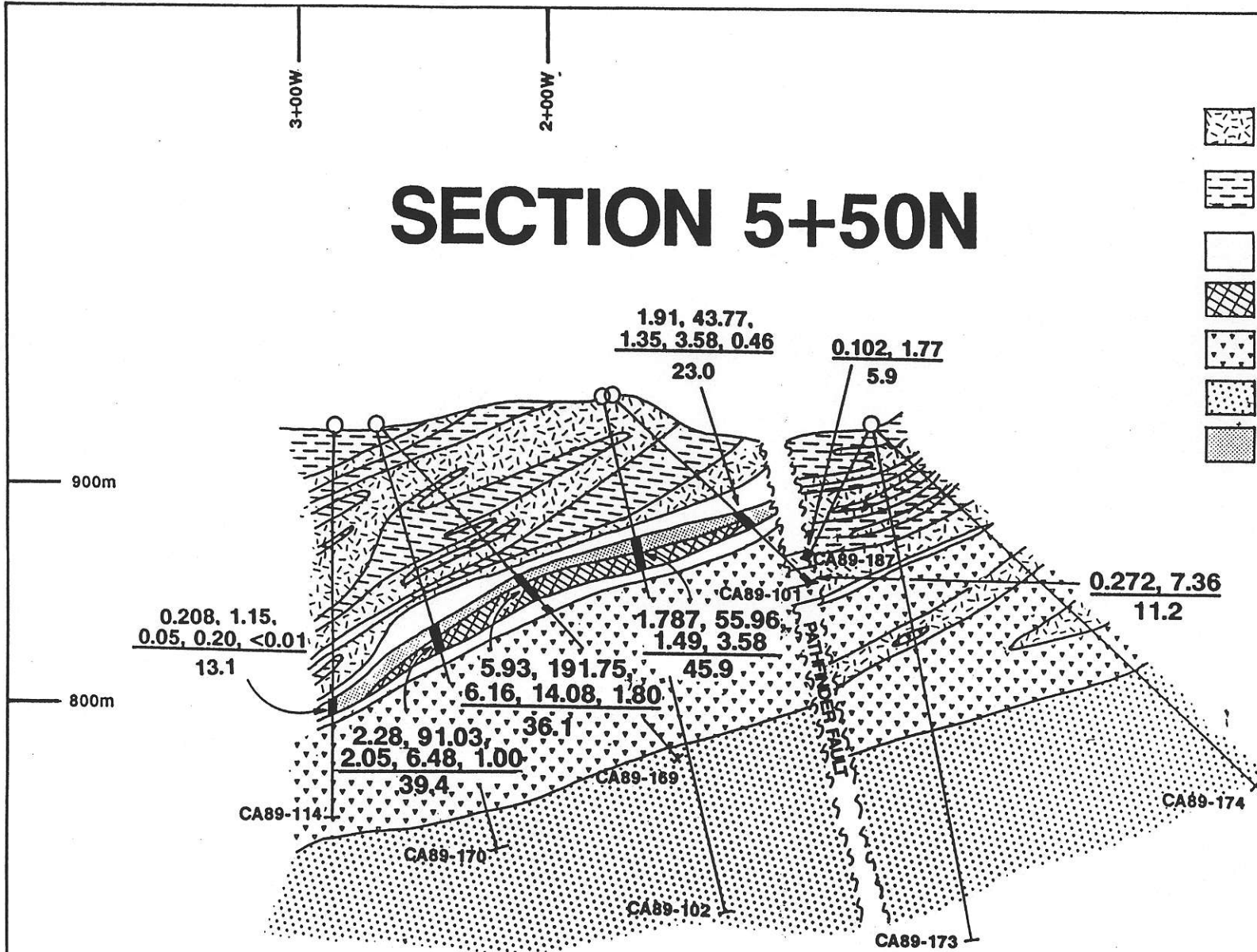
The 21B Deposit (formerly the "Central" and "North" Zones, now linked by drilling), is approximately 900 metres long, from 60 to 200 metres wide and locally in excess of 40 metres thick. The southernmost 600 metre segment possesses the greatest grade and geological continuity, the northern 300 metres appears to contain mineralized intervals at several stratigraphic positions. Disruption of the deposit by post-

SECTION 5+50N

LEGEND

-  Hangingwall Andesite
-  Argillite (minor Andesite)
-  Contact Argillite
-  Massive Sulphides
-  Rhyolite Breccia
-  Dacite
-  >0.1 oz/t Au

Au, Ag (oz/t)
Pb, Zn, Cu (%)
feet



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CALPINE RESOURCES INC. / STIKINE RESOURCES LTD.

ESKAY CREEK PROJECT

mineralization faults appears to be more pronounced in the northern segment.

The deposit is displaced on the east by the major northeast-trending Pumphouse Creek fault zone. Associated north-trending splay faults also cut and displace mineralization in a similar manner. The limits of the deposit are yet to be defined at depth to the west, to the northeast along strike, and immediately east on the fault-offset portion of the deposit.

Within the 21B Deposit there are three differing mineralized regimes. The most significant is a sheet of massive sulphide mineralization hosted within the Contact Unit. Also present is an areally restricted grouping of Hangingwall Unit-hosted stacked sulphide lenses (in the northern segment), and more widespread, less continuous disseminated mineralization within the Rhyolite Unit.

Contact Unit mineralization in the southern segment of the 21B Deposit comprises a continuous stratiform sheet of banded high-grade gold and silver-bearing base metal sulphide layers, from 2 to 12 meters thick. Mineralization appears to be bedding-parallel. Of note is the abundance of mineralized bands containing slump structures, graded beds and tuffaceous debris. Sulphide minerals present include sphalerite, tetrahedrite, boulangerite, bourmonite plus minor galena and pyrite. Gold and silver is associated with electrum, which occurs as abundant grains associated with sphalerite. Peripheral and footwall to the banded sulphide mineralization are areas of micro-fracture veinlet hosted disseminated tetrahedrite, pyrite and minor boulangerite mineralization. Significant results from recent drilling within this area include CA89-169, which contains a core length intercept of 11 metres grading 203.04 g/t Au and 6,565 g/t Ag, 14.08% Zn, 6.16% Pb and 1.80% Cu (Figure 2). Overall this portion of the 21B Deposit is outstanding in terms of the predictability of its geology and tenor, and its relatively well-defined contact-controlled assay boundaries. The bulk of the currently stated reserves fall within this area, incorporating the Contact Unit mineralization.

The host rock stratigraphy in the northernmost 300 metres of the 21B deposit is similar to that found to the south, however in the northern portion all three mineralized regimes are important. Contact-hosted bedded-type mineralization extends northerly through the western, or downdip portion of the zone, comprising semi-massive to massive sphalerite, galena and tetrahedrite bands up to 10 metres thick. Hangingwall Unit mineralization is also present as two lenses of massive sphalerite, galena, chalcopryrite, pyrite and tetrahedrite. Footwall Rhyolite Unit mineralization occurs as siliceous and carbonate-rich breccias containing crustiform veinlets and disseminations of sphalerite, galena and minor pyrite and chalcopryrite. Gold mineralization occurs as spectacular films, wires, and blebs intimately associated with sphalerite. Within this portion of the deposit is a corridor of shearing and fracturing (the Pathfinder Fault Zone) which transects the axis of the deposit, and is the locus of intense alteration. It appears that both Hangingwall and Rhyolite-hosted mineralization are at least spatially associated with this corridor.

Current activity at Eskay Creek includes a winter program utilizing six drilling rigs. It is intended to take the 21B Deposit data base to 25 metre drill penetration centres, as well as continue testing both strike and dip projections. Numerous other targets are also being evaluated, both within

the #21 area and elsewhere on the property. A program of underground exploration and development is in the planning stages.

Fossil Stamps !

Contributed by A.D. McCracken
Paleontology Division - GAC

On 12 July 1990 the first four of a series of sixteen stamps depicting Canadian fossils will be issued by Canada Post Corp. The series is called "Prehistoric Life in Canada" and illustrates fossils from the Precambrian to Pleistocene. Plants, bacteria and invertebrate and vertebrate fossils may all eventually be illustrated.

The four 39-cent stamps issued in 1990 are entitled "The Age of Primitive Life". These represent a columnar stromatolite from the precambrian of western Quebec (GSC Paper 69-39, fig.20), the trilobite *Paradoxides davidis* from the Cambrian of Newfoundland (GSC Bulletin 88, p68), a soft-bodied marine invertebrate of unknown affinities - *Opabinia regalis* from the Cambrian Burgess Shale in southern British Columbia (GSC Misc Report 43, fig.26), and the eurypterid *Eurypterus remipes* from the Silurian of southern Ontario (GSC Econ. Geol. Report 1, p.592).

The first day cover cancellation will be at Field, British Columbia on 12 July 1990.

For information on ordering stamps, contact the National Philatelic Centre, Canada Post Corporation, Antigonish, Nova Scotia, Canada, B2G 2R8; or, from within Canada Tel: 1-800-565-4362, from outside Canada Tel: (902) 863-6550.

Murphy's Laws of Exploration

- Only God knows where all the orebodies are. Accountants are his little helpers in keeping this information secret.
- Coincident anomalies should be avoided - they only promote arguments as to which technique found the ore.
- Geological mapping is the only known way of proving a prospect is not worth mapping.
- A Chief Geologist may be defined as the person who discovers a critical outcrop 20 metres beyond the end of a field geologist's traverse.
- The most critical outcrop is always on the other side of the valley.
- The orebody will always be 50 metres beyond the end of the last drill hole.
- If an exploration geologist buys stock in a 'hot prospect' - the stock value will decrease by at least 80% within the week.
- The richest part of the orebody is located directly under the exploration camp; if not, it can be located by drilling a pilot hole for the main shaft.

For minerals industry management worldwide

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MINING

Magazine



The Eskay Creek discovery — a view from the #22 Adit looking east to the exploration camp. In the photograph, from left to right, are Bob Sibthorpe (Stikine Resources Ltd), Gerry McArthur (Prime Explorations Ltd) and Chet Idziszek (Prime Resources).



Prime Resources Corporation

The Eskay Creek Discovery

By C. Idziszek, J. Blackwell, R. Fenlon,
G. MacArthur and D. Mallo

The Eskay Creek Project is a Joint Venture between Calpine Resources Incorporated and Stikine Resources Limited. The project is managed by Calpine, with Prime Explorations Ltd as Project Operator. The project site is located 960 km northwest of Vancouver, British Columbia, in the Iskut River-Stewart Mining Camps.

A number of mining and advanced exploration and development projects are active in the region. Significant gold and silver operations in the Iskut Camp include the Snip preproduction programme (Prime Resources Group Inc./Cominco Ltd) and the Johnny Mountain Mine (Skyline Gold Corporation) and in the Stewart Camp the Premier Gold Project (Westmin Resources Limited/Prime Resources Group Inc./Pioneer Metals Corporation) and Sulphurets underground exploration programme (Newhawk Gold Mines Ltd/Corona Corporation/Granduc Mines Ltd). Access to the Eskay Creek site is currently by aircraft, with construction of an all-weather road into the nearby Iskut River valley tentatively scheduled to commence later this year.

Exploration activity at Eskay Creek dates back to 1932, when a syndicate directed by Tom McKay staked the area. The property holdings were optioned to Premier Gold Mines, who undertook an extensive programme of trenching and diamond drilling on the numerous outcropping gold-silver zones in the area. It was during this period that most of the showings were discovered and named, such as the #21, #22 etc., names which are in use to this day. Premier relinquished its option in 1938, however McKay continued work on the property in subsequent years through a series of publicly and privately-financed companies and third party option agreements. Prior to the Eskay Creek Joint Venture, eleven companies explored the property, undertaking various

diamond drill campaigns totalling over 4,000 m in 84 holes and underground development on the #22 and McKay Zones, south of the area of current interest.

Calpine announced its discovery in November, 1988, during an initial (\$300,000 budget) phase of a \$900,000 programme, to earn a 50% interest in the property. Five of six holes were planned to test the #21 Zone and its possible extensions. Holes CA88-2, 4 & 5 penetrated strong mineralization within the deposit footwall, with 50 m step-out holes CA88-3 & 6 actually intersecting the immediately overlying high grade sulphide body located at the rhyolite-andesite contact. The latter two holes are considered to be the discovery holes, with hole CA88-6 returning a 29.42 m interval grading 25.75 g/t gold and 38.7 g/t silver. Subsequent

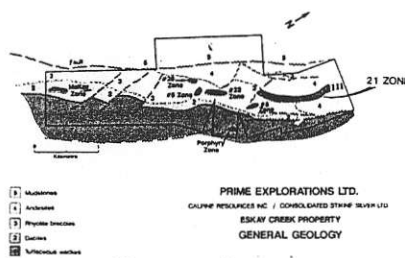


Fig. 1: General geology and location map ("Consolidated Stikine Silver" is now Stikine Resources Ltd.).

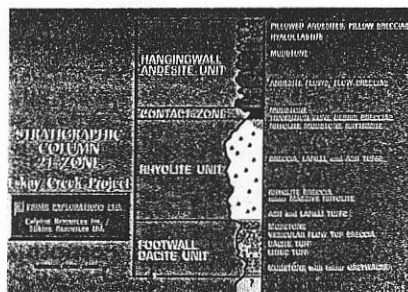


Fig. 2: Stratigraphic column showing the order of formations.

step-out drilling (totalling 46,000 m in 204 holes to January, 1990) has extended the zone 1,400 m to the northeast. The zone remains open to the northeast and downdip.

The discovery area is underlain by a shallow-dipping sequence of Middle Jurassic-age Hazelton Group volcanic and sedimentary rocks. Within the drill area, the stratigraphic section is subdivided into a Hangingwall Unit of pillowed andesite flows, breccia and interbedded mudstone; the "Contact" Unit mudstone and breccia; a Footwall Unit of mixed rhyolite tuff and breccia; and a Lower Unit of dacite tuff with interbedded mudstone. Well-preserved fossils and rock textures indicate a sub-aqueous depositional environment. Metamorphic rank is sub-greenschist.

Exploration diamond drilling has delineated a mineralized body known overall as the #21 Zone, with a net length of 1,400 m open along strike to the northeast and at depth. The #21 Zone is further subdivided into two principal deposits, the 21A and 21B, based upon distinctive mineral associations and grade continuity.

The 21A deposit

The 21A Deposit (previously known as the "South Zone") is hosted within Contact Unit carbonaceous mudstone and breccia, as well as the underlying rhyolite breccia. Two styles of mineralization are present. Mineralization within the Contact unit is dominated by a visually striking assemblage of disseminated to near-massive stibnite and realgar. The second style occurs in the adjacent footwall rhyolite, which is cut by a stockwork-style quartz-mica breccia hosting disseminated sphalerite, tetrahedrite and pyrite. Highest gold and silver grades and widths are encountered where the Contact Unit is thickest and the immediately underlying rhyolite breccia is highly fractured and altered. Initial drilling in the 21A area has outlined a mineralized zone approximately 280 m long and up to 100 m wide. Thickness is variable, and is about 10 m on average, with locally much greater thicknesses indicated (i.e. CA89-23 returned a core length of 34.51 m grading 14.93 g/t Au and 103.1 g/t Ag).

Exploration drilling on the 21A Deposit is currently suspended in favour of an accelerated drill programme on the 21B Deposit and testing of additional targets elsewhere. Initial 21B Deposit results suggest the presence of a major mineralized body of high grade gold and silver mineralization associated with base metals. The change from a complex antimony and arsenic-dominated association in the 21A Deposit to a more conventional zinc, lead

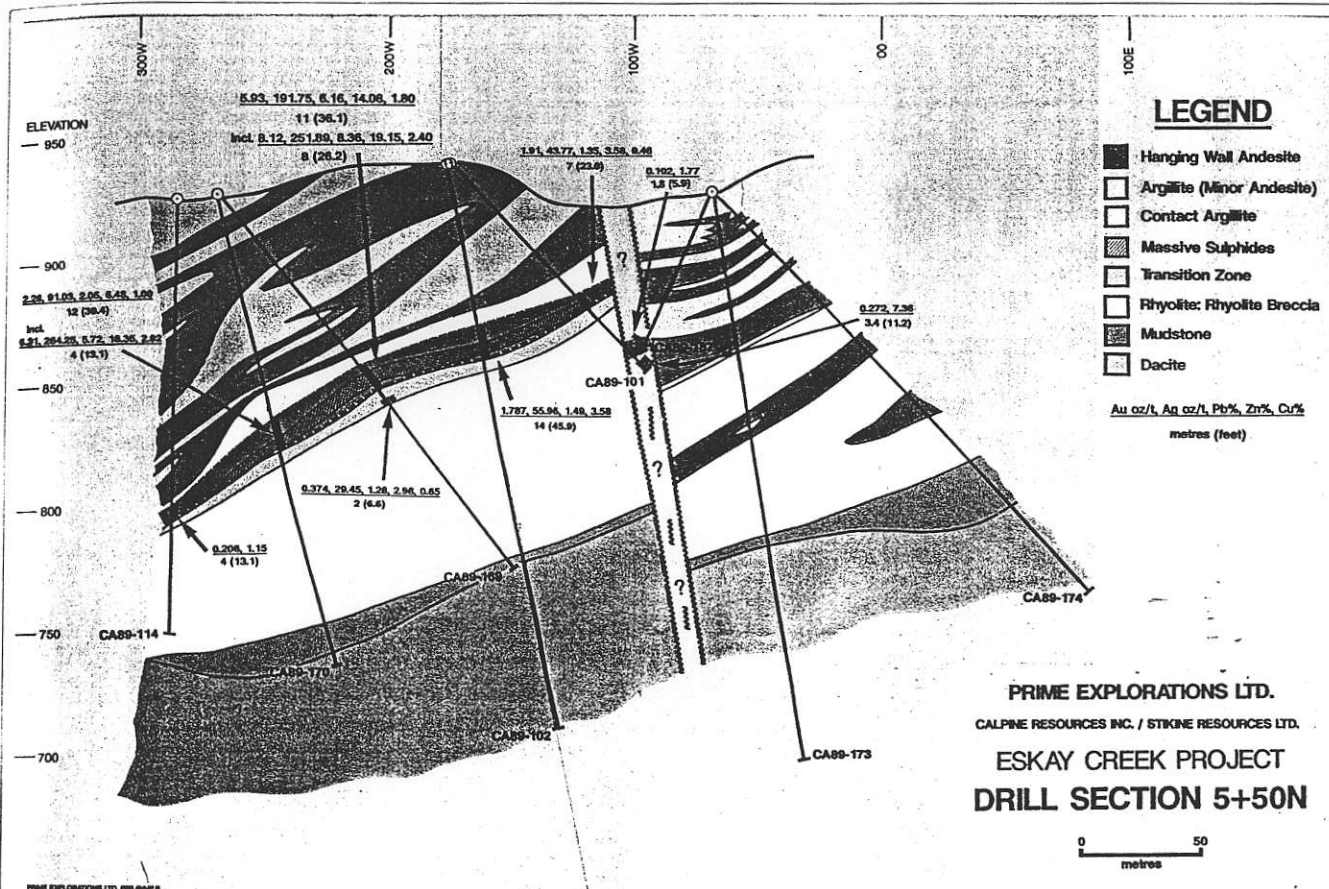


Fig. 3: Details of drill section 5+50, through a portion of the 21B deposit.

and copper sulphide association in the 21B Deposit is regarded as being of major significance to the overall mining economics of the project. The 21A and B Deposits are separated by a 140 m long segment of weakly-mineralized mudstone and rhyolite.

The 21B deposit

The 21B Deposit (formerly the "Central" and "North" Zones, now continuously linked by drilling), is approximately 900 metres long, from 60 to 200 metres wide and locally in excess of 40 metres thick. The deposit is displaced on the east by the major northeast-trending Pumphouse Creek fault zone. Associated north-trending splay faults appear to similarly cut and displace mineralization. The deposit is yet to be defined to the west at depth, to the northeast along strike, and immediately east on the fault-offset portion of the deposit.

The southernmost 600 metre long segment of the 21B Deposit is characterized by high-grade gold and silver-bearing base metal sulphide layers hosted by tuffaceous mudstones of the Contact unit. Sulphide mineralization occurs as semi-massive to massive bands arranged parallel to bedding, and from 2 to 12 metres thick. Significant results from recent drilling within this area include CA89-169, reporting a

core length intercept of 11 metres grading 203.04 g/t Au and 6,565 g/t Ag, 14.08% Zn, 6.16% Pb and 1.80% Cu. Overall this portion of the 21B is outstanding in terms of the predictability of its geology and tenor, and its relatively well-defined contact-controlled assay boundaries. Footwall rhyolite-hosted stockwork mineralization is volumetrically insignificant in this area.

The northern portion of the 21B Deposit is of particular significance owing to the presence of gold, silver and base metal-rich mineralization in Hanging-wall inter-flow mudstones as well as in the Contact unit mudstone and underlying rhyolite. Hole CA89-109 intersected a cumulative core length of 208 metres grading 29.96 g/t Au, 33.2 g/t Ag, 2.26% Zn, and 1.12% Pb. Within this interval is a Hangingwall intercept of 3.0 metres grading 22.94 g/t Au, 1,159 g/t Ag, 16.13% Zn, 5.99% Pb and a combined Contact Unit-upper Rhyolite Unit intersection of 61 metres of 98.27 g/t Au, 29 g/t Ag, 3.44% Zn and 1.86% Pb. Step-out drilling along strike from hole 109 has successfully traced all three mineralized horizons, however the degree and intensity of mineralization is variable. Unlike its southern extension, which is remarkably consistent and predictable, this area is as yet unresolved both geologi-

cally and structurally. Thus detailed drilling to 25 metre centres is required to establish continuity and define reserve blocks.

New type

The Eskay Creek #21 Zone discovery represents a new and important type of gold deposit to the Iskut River-Stewart Camp. Previous exploration within the region has emphasized smaller, vein-type lode deposits, however it is now apparent that potential for much larger, high grade, bulk tonnage-type deposits is present. Within the Eskay Creek property itself there remains considerable untested mineral potential. In addition to definition of the #21 Zone depth and strike extensions, other showings and anomalies are present, including the McKay and #22 Zones, which will receive renewed evaluation based upon the geological insights gained to date.

Current plans for the #21 Zone call for a winter diamond drill programme to define the limits of the zone, to provide detailed information to establish a set of reserve figures, and to test by drilling additional targets. Concomitant metallurgical, engineering and environmental studies are in progress to ensure sufficient lead-time to plan and execute an accelerated development programme. □