

**EXPLORATION HEATS UP THE ISKUT-SULPHURETS GOLD BELT**

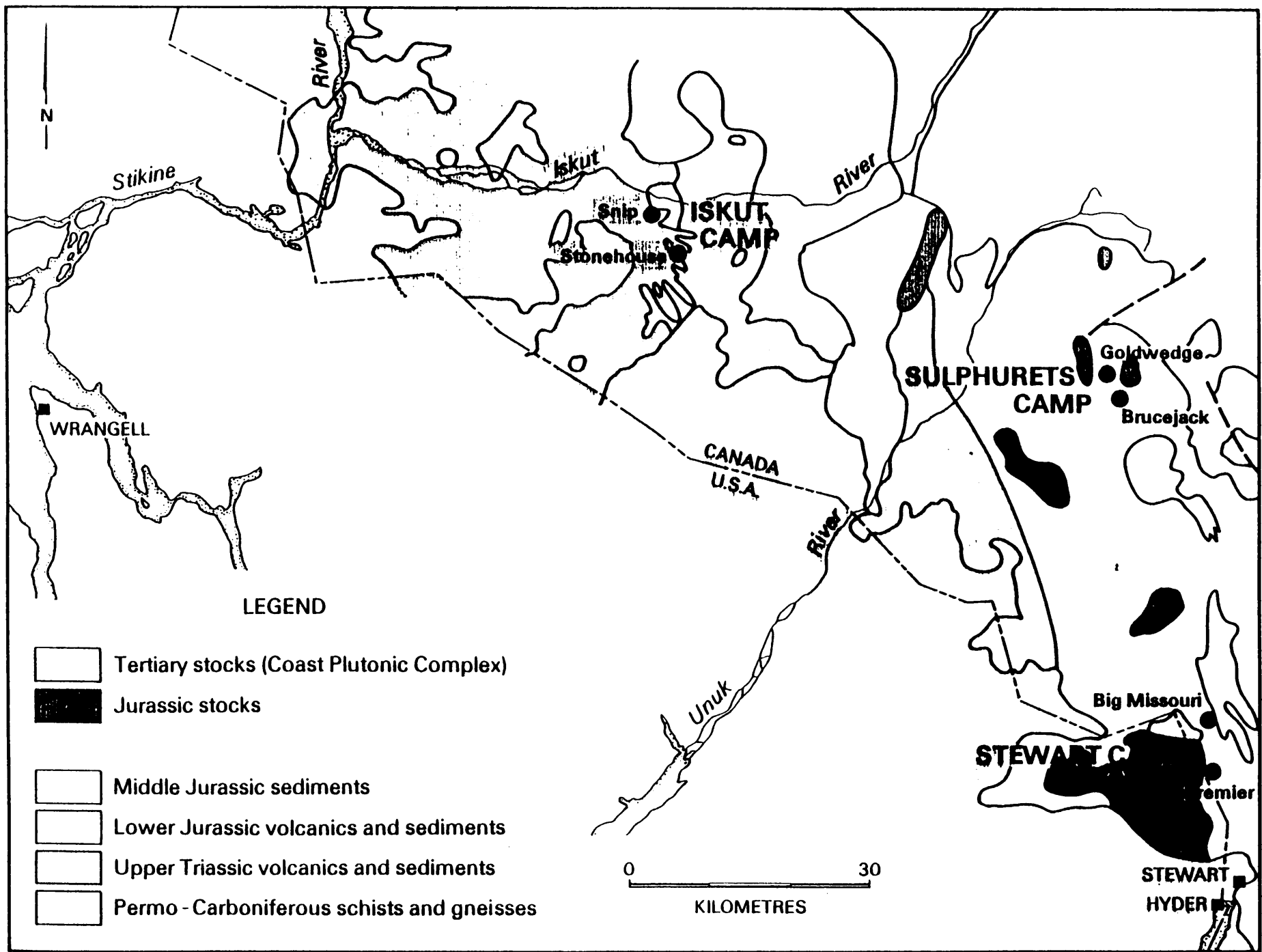
**By**

**D.J. Alldrick(1), T.J. Drown(2), E.W. Grove(3),  
E.R. Kruchkowski(4) and R.F. Nichols(5)**

1. B.C. Ministry of Energy, Mines and Petroleum Resources
2. Newhawk Gold Mines Ltd.
3. E.W. Grove Consultants Ltd.
4. Catear Resources Ltd.
5. Cominco Exploration Ltd.

DEC - 1 1988

E.W.G.



The rugged Boundary Ranges separate the Alaska Panhandle from northwest British Columbia. The southern end of this remote mountain chain is bustling with air traffic, exploration crews and mine construction camps, all lured to Canada's newest gold district.

The Iskut-Sulphurets gold belt is at an early stage of exploration, new surface showings continue to be found and the winter of 1987-1988 saw the region fully staked for the first time. Despite its frontier status, two new gold mines have begun production and two more properties are in advanced stages of underground development and fill-in drilling; a tribute to the persistence of the operators and the power of flow-through financing. Reserves of the four largest gold-silver deposits are moderate so far, but all are still open along strike and to depth. Geological similarities with the 6.5-million-ton Silbak-Premier orebody to the south provide good cause for optimism.

The area first attracted interest at the turn of the century when prospectors heading south from the Yukon goldfields searched for placer gold and staked bedrock gossans. In the 1970s the porphyry copper boom again drew prospectors and companies into the area, but the new golden age began with the 1979 option of the Sulphurets claim block by Esso Minerals Canada and the 1980 acquisition of the Mount Johnny claims by Skyline Explorations Ltd.

In the Iskut area, Skyline Explorations Ltd. announced its production decision in 1987 and the mill was commissioned in July 1988. Early exploration work was helicopter supported but now a 4800-foot runway has been completed at the minesite. The adjacent Snip property also relied heavily on helicopter support, but the Bronson airstrip has been lengthened and widened to allow fixed-wing transport of heavy freight.

In the Sulphurets area, Catear Resources Ltd. began mine construction in August 1987 and started mill production in June 1988. The entire operation is helicopter supported. The nearby Brucejack Lake deposits of Newhawk Gold Mines Ltd. have been developed with helicopter support as well, but when work required heavy equipment and larger camp facilities, the company completed a 27-mile barge-and-road link to the Stewart-Cassiar Highway.

Departure points for supplies and staff are Stewart and Terrace in British Columbia, and Wrangell in Alaska.

Ground acquisition was relatively slow in this remote camp until the fall of 1987 when the results of summer exploration programs became known and the provincial government announced upcoming release of analytical results from a regional stream sediment geochemical survey for the area. By April 1988 all open ground was staked in anticipation of the busiest field season yet. At least 60 companies hold ground in the Iskut-Sulphurets belt, with the most advanced development on properties held by Catear Resources Ltd., Cominco Ltd., Delaware Resources Corporation, Echo Bay Mines Ltd., Granduc Mines Ltd., Magna Ventures Ltd., Newhawk Gold Mines Ltd., Silver Princess Resources Corporation and Skyline Explorations Ltd. To date, only small areas within this 25 by 50 mile district have received intensive exploration. Its full potential is essentially untested.

Since 1979 more than 70 new mineral prospects have been identified and more than \$110 million spent on exploration and development in the district. For 1987 alone, expenditures reached \$25 million. Estimated reserves of 3.5 million ounces of gold and 46.1 million ounces of silver with a gross metal value of C\$2,000 million have been identified in eight deposits. Apart from early placer gold recovery from some creeks the area has no mineral production history, but clearly has a glittering future.

Geologically, the Iskut-Sulphurets district represents the northward extension of the historic Stewart gold-silver mining camp. Country rocks are Upper Triassic to Lower Jurassic Hazelton Group andesitic pyroclastics and related sedimentary rocks. Characteristic ore minerals include electrum, native gold and silver, and silver sulphosalts. Base metals are present in recoverable amounts in some deposits. The ore deposits and alteration assemblages are typical of mesothermal to epithermal vein systems in island arc environments. Combined age dates and lead isotope studies indicate the early Jurassic volcanic and intrusive host rocks and the mineralization are essentially coeval; they formed about 195 million years ago. This age is similar to deposits in the Stewart and Alice Arm mining camps to the south, and the Toodoggone camp to the east -- all hosted in Hazelton Group rocks.

Deposit size ranges from 319,000 tons grading 0.80 ounce gold per ton to 1.57 million tons grading 0.64 ounce gold per ton. High-grade ore shoots have been outlined within some of these deposits and larger tonnage, lower grade deposits have also been located. Several exciting new prospects have not yet been sufficiently drilled to provide reserve data.

All original discoveries resulted from prospecting programs, although follow-up rock geochemistry surveys have

identified additional mineral zones nearby and induced polarization surveys have successfully delineated high sulphide areas within large alteration zones. Typical prospect evaluation involves initial sampling of blasted bedrock trenches followed by large-diameter diamond drilling. Regionally the two mining camps stand out as strong geochemical anomalies in gold and silver, but associated or "pathfinder" elements differ between the camps: the Iskut area is anomalous in Pb, Zn, Cu, and Co; the Sulphurets area is anomalous in Cu, As, Sb, Hg, Ba, and F.

The federal government plans to map the region at 1:250,000 scale to study the tectonic setting of the belt. Detailed examination of the mineralogy and geochemistry of the Sulphurets camp is in progress by the Geological Survey of Canada Mineral Deposits Group to determine the chemistry of the mineralizing system and the conditions of mineral deposition. The provincial government has ongoing geological mapping programs at 1:20,000 scale within this mineral district to define stratigraphic and structural controls of the mineral deposits.

Jointly, the two levels of government have just completed a 20-element stream sediment and water geochemical survey of the entire region and a side-looking radar survey proposed by the province has been commissioned by Canada Centre for Remote Sensing, Energy Mines and Resources Canada, to outline major structures in both camps.

#### SNIP

The Snip property, located on the lower slopes of Johnny Mountain, adjoins the north boundary of the Skyline Explorations Ltd. Stonehouse property where gold production commenced in 1988.

The first claims on the northeast flank of Johnny Mountain date from 1910 and Cominco prospectors staked and prospected claims in the area in 1929. Native gold was first observed in outcrop by a Cominco exploration crew prospecting the ground around Johnny Mountain for base metals in 1965. Trenching in 1966 revealed a strong calcite-quartz-chlorite-sericite shear vein hosting pyrite, sphalerite, galena, and native gold. Assays of 1.36 ounces per ton gold over 11 feet, 0.44 ounce per ton gold over 18 feet and 6.54 ounces per ton gold over 4 feet were obtained over a 60-foot strike length. The property was abandoned in the early 1970s but restaked by Cominco in late 1980. Cominco carried out geological mapping, soil geochemistry and trenching in the 1981 to 1983 period. This work confirmed the existence of high gold grades and outlined strong gold geochemical anomalies in soil -- including extensive areas of 200 to 1000 ppb gold.

In early 1986, Cominco Ltd. signed an option agreement with Delaware Resources Corporation. During 1986-1987, programs financed by Delaware led to the completion of 85 diamond-drill holes (50,350 feet) which intersected several high-grade veins. The best of these is the Twin Zone, a 3 to 25-foot-thick, discordant shear vein cutting a thickly bedded sequence of intensely carbonate-altered feldspathic greywacke and siltstone.

The Twin Zone structure strikes 120 degrees, dips 50 degrees southwest and has been traced over a strike length of 3,500 feet and through a vertical range of 1,500 feet. During 1988, underground drifting on the Twin Zone system on the 300 Level has demonstrated the existence of two distinctly different ore types. Type A ore occurs in a complex banded shear vein composed of alternating bands of massive calcite, heavily disseminated to massive pyrite, crackle quartz, and thin bands of biotite-chlorite. Pyrite averages 15 per cent in Type A mineralization. Other sulphide minerals include pyrrhotite, chalcopyrite, sphalerite, galena and arsenopyrite. Molybdenite is also common locally. Minor to trace amounts of bismuth and lead tellurides, including tellurobismuthite, cosalite, hessite and volynskite have been observed in polished thin sections.

Type B mineralization is dominated by pyrite-pyrrhotite mineralogy (quartz and calcite are absent) and tends to be more attenuated and discontinuous than the Type A ore. Both types lie within the Twin Zone structure with Type B ore located eastward and down-dip from the more mineralogically complex Type A ore.

Polished sections reveal that native gold is in free form. It occurs with gangue minerals (biotite, sericite, quartz, carbonate) and commonly at the margins of pyrite, arsenopyrite and lead-bismuth tellurides. It also fills late-stage fractures in pyrite and arsenopyrite.

The current ore reserve estimate comprises 1.57 million short tons of 0.64 ounce gold per ton in indicated and inferred categories. The reserve includes 25 per cent mining dilution at zero grade, based on a minimum mining width of 6 feet. Individual assays greater than 5 ounces per ton have been cut to 5 ounces per ton. Metallurgical tests on underground bulk samples and drill-core composites spaced throughout the ore reserve produced combined gold recoveries (gravity + cyanidation) of 91 to 98 per cent. The gold:silver ratio in the deposit is approximately 3:1.

Underground exploration and development of the deposit is now in progress and preliminary engineering for construction of mill, tailings disposal sites and surface facilities is underway in preparation for late 1989 start-up of a 330 ton per day operation.

## STONEHOUSE

Johnny Mountain gold mine, 100 per cent owned by Skyline Explorations Ltd., was officially opened on August 17, 1988. Skyline staked the REG claims in 1980 and outlined five major areas of gold-bearing sulphide mineralization of which the Stonehouse deposit was judged the major economic target. Men and supplies were first flown in from Terrace, British Columbia, but currently Wrangell, Alaska, is the key air transport centre. The mill, bunkhouses and major equipment were flown to the site by Hercules and S-61 aircraft in early 1988 and were largely in place by April 1988.

The Stonehouse deposit includes a number of extensive subparallel sulphide-potassium feldspar-quartz vein and stockwork systems which have been only partly explored. The deposit extends for 5000 feet on surface and has been drilled to a depth of 700 feet. Surface exploration was followed by trackless underground development in July 1986 in order to prove the continuity of both grade and vein structures. Development has concentrated on the "16" and "Discovery" vein systems which trend northeasterly with steep northerly dips. The deposit has been developed on the 1125 and 1075 levels and a decline is now being driven to reach the deeper vein systems. Development ore and ore from shrinkage stopes on both the 1125 and 1075 levels has been stockpiled on the surface for mill feed during the first year of operation. The 400-ton-per-day mill utilizes standard flotation and cyanide circuits as well as new cyanide regeneration technology.

The gold-silver-copper-bearing sulphides comprise mainly pyrite and chalcopyrite with some sphalerite, galena and minor pyrrotite. Gangue is mainly potassium feldspar (orthoclase) with variable quartz. The host rock is part of a K-feldspathized syenite-syenodiorite stock of probable Lower Jurassic age that has intruded a thick Upper Triassic sedimentary sequence. The Triassic strata are overlain by a younger, gently dipping volcanic-sedimentary sequence. The veins and sulphide stockworks are found entirely within fracture systems cutting altered and deformed syenite and sedimentary rock pendants. High-grade gold mineralization appears to be concentrated along phyllonite/massive syenite contacts.

Geological reserves as of January 1988 included 1.09 million tons of proven, probable and inferred ore grading about 0.70 ounce gold per ton, about 1.0 ounce silver per ton, 1 per cent copper, plus minor zinc and lead. Both surface and underground drilling are continuing to develop further reserves.

## GOLDWEDGE

The Goldwedge fractional claim group is owned 100 per cent by Catear Resources Ltd. The claims cover an area of fragmental andesites and derived sedimentary rocks of the Hazelton Group. All rocks in the area of interest have been foliated and sericitized, and are cut by quartz stockworks containing pyrite, electrum, tetrahedrite, arsenopyrite, sphalerite, galena and pyrargyrite. Pyrite is also common in the volcanic host rocks and the sericite-altered rocks. These altered zones are interpreted as structurally controlled, high-level, mesothermal-epithermal vein systems associated with syenodiorite intrusions.

The gold occurs as fine fracture fillings, as near-massive seams, and as specks within white quartz. It also occurs as narrow sheets and seams within the sericitic wallrocks, generally where the quartz veinlets have pinched out. Coarse sheets of gold are also present within fault gouge and along slippage surfaces.

The property has been explored by 58 surface drill holes and 62 underground drill holes totalling 26,000 feet. Results of the surface drilling indicated a grade of 0.837 ounce per ton gold while the drifting has indicated a grade of 0.825 ounce per ton gold along 178 feet of drift. In addition, the company has completed 1032 feet of decline, 344 feet of drifting, 135 feet of raising and has started a small stope 96 feet in length on the No. 1 Level. Based on the drifting and drilling, proven ore reserve are calculated at 40,000 tons grading 0.825 ounce gold per ton and total reserves in all categories of 319,000 tons at 0.80 ounce gold per ton.

At least three other structures on the property have the potential to develop reserves. Fifteen underground drill holes have been completed in the Discovery vein; two of the holes intersected coarse native gold.

A 50-ton-per-day mill is currently in place and is in the final stages of commissioning with low-grade ore currently being run through the system prior to processing of the high-grade stockpile. The deister tables will produce gold concentrate, sulphide concentrate and tailings. Metallurgical work carried out by Catear indicates an 80 per cent recovery of gold at the deister tables in the form of a gold concentrate. The overall recovery is estimated to be in the region of 97 per cent after flotation of the sulphides.

It is planned to stockpile the sulphides for processing during the summer while flotation and additional milling equipment are installed. Following the installation of this equipment the mine will be able to process 250 tons per day.



## SULPHURETS (BRUCEJACK)

The Sulphurets property is a joint venture between Newhawk Gold Mines Ltd. (60 per cent) as operator and Granduc Mines Ltd. (40 per cent). Present access to the property is by helicopter, by a barge-road link, or by fixed-wing aircraft to a strip near Knipple Lake.

The property covers 25 gold, silver, copper and molybdenum showings in a 35-square-mile claim block. Exploration and development have focused in the southeast corner of the property on the Brucejack Lake West Zone. Work on the West Zone includes 72,853 feet of surface diamond drilling and 26,327 feet of underground diamond drilling plus 2,266 feet of decline, 4,119 feet of drifting and 1,771 feet of raising.

West Zone mineralization is localized in quartz-filled shear zones and subsidiary tension veins. The shear zones developed along the contact between andesitic tuffs and sandstones. Early syenite bodies have intruded both rock types. Later plagioclase porphyry stocks appear to be genetically related to the gold-silver mineralization. Ore consists of electrum, tetrahedrite, polybasite, pyrargyrite, acanthite, sphalerite, galena and pyrite. Gangue is predominantly quartz and carbonate. Electrum occurs as free grains in gangue and as aggregates with the silver-bearing minerals.

There are two styles of mineralization. Quartz veins with argentiferous tetrahedrite, pyrite, sphalerite, galena and electrum typically grade 0.3 ounce gold per ton and 20 ounces silver per ton. A second type consists of the preceding mineral suite with an overprint of bonanza-style disseminated to massive ruby silver (pyrargyrite), argentiferous tetrahedrite, sphalerite and minor galena. Electrum is common in these bonanza shoots as coarse blebs and leaves. This ruby silver type of mineralization commonly grades 5 to 6 ounces gold per ton and 500 to 700 ounces silver per ton.

Ore shoots have strike lengths of 120 to 500 feet, and depths to over 1,000 feet. Measured, indicated and inferred ore reserves in the immediately accessible area of the West Zone are 854,072 tons grading 0.354 ounce gold per ton and 22.94 ounces silver per ton, using a cutoff grade of 0.20 ounce gold equivalent per ton and a minimum width of five feet.

The current \$4.0 million development program consists of advancing the decline to the 1250 metre level, and additional raising, drifting and underground diamond drilling. This program will further define the West Zone, its strike extension, and several newly discovered adjacent zones. A pre-feasibility study is underway.