Location/Identification

MINFILE Number: 092HSE067

Name(s): **RED STAR**

REDSTAR, RED STAR (L.399), ANACONDA (L.400), SPHENO, SAILOR JACK (L.273), SAILOR LASS, HINGE 1-8, BELL CREEK, BELL, ROCHE, PASAYTEN, TELL, AU, STAR

Status: Past Producer
Mining Method Underground
Regions: British Columbia
BCGS Map: 092H017
NTS Map: 092H02E
Latitude: 49 08 59 N
Longitude: 120 36 36 W
Elevation: 1158 metres
Location Accuracy: Within 500M

Mining Division: Similkameen
Electoral District: Yale-Lillooet
Resource District: Cascades Forest District

UTM Zone: 10 (NAD 83)
Northing: 5446850
Easting: 674279

Comments: Adit in the Red Star Main zone, 300 metres northwest of Highway 3 on the northwest bank of the Similkameen River, 2.2 kilometres southwest of the river's confluence with the Pasayten River and 35 kilometres south-southwest of Princeton (Assessment Report 21491, Figure 6).

Mineral Occurrence

Commodities: Zinc, Copper, Silver, Gold, Lead, Molybdenum

Minerals
Significant: Chalcopyrite, Sphalerite, Pyrite, Galena, Bornite, Molybdenite, Pyrrhotite, Chalcocite
Significant Comments: Trace of cadmium in samples from underground workings.
Associated: Quartz, Barite, Kaolinite, Sericite
Alteration: Silica, Biotite, Magnetite, Chlorite, Sericite, Pyrite
Alteration Type: Silicific'n, Biotite, Chloritic, Sericitic, Pyrite
Mineralization Age: Unknown

Deposit
Character: Vein, Disseminated, Podiform, Massive
Classification: Volcanogenic, Hydrothermal, Epigenetic
Type: G06: Noranda/Kuroko massive sulphide Cu-Pb-Zn, I05: Polymetallic veins Ag-Pb-Zn+/-Au
Dimension: 480x0x0 metres
Comments: Mineralized zone trends north for 480 metres. Four distinct types of mineralization occur. Shear-hosted quartz veins and sweats are the best mineralization of the Main zone.

Host Rock

Dominant Host Rock: Metavolcanic

Stratigraphic Age	Group	Formation	Igneous/Metamorphic/Other
Upper Triassic	Nicola	Undefined Formation	------

Isotopic Age	Dating Method	Material Dated
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Lithology: Sericite Chlorite Schist, Argillite, Siltstone, Massive Chlorite Schist, Chlorite Sericite Schist, Quartz Sericite Schist, Dacite Lapilli Tuff, Rhyolite Lapilli Tuff

Comments: The 'western facies' of the Nicola Group.

Geological Setting

Tectonic Belt: Intermontane
Terrane: Quesnel
Physiographic Area: Thompson Plateau

Metamorphic Type: Regional **Relationship:** Syn-mineralization, Post-mineralization

Grade: Greenschist

Comments: Deposit is situated in the Nicola belt, near its south end.

Inventory

Ore Zone: SAMPLE **Year:** 2012

Category: Assay/analysis **Report On:** N

NI 43-101: N

Sample Type: Grab

Commodity	Grade
Copper	1 per cent
Zinc	1 per cent

Comments:

Reference: Sample 5, Assessment Report 33378, page 5

Ore Zone: SAMPLE **Year:** 2012

Category: Assay/analysis **Report On:** N

NI 43-101: N

Sample Type: Grab

Commodity	Grade
Copper	0.55 per cent
Zinc	1 per cent

Comments:

Reference: Sample 7, Assessment Report 33378, page 5

Ore Zone: DRILLHOLE **Year:** 1994

Category: Assay/analysis **Report On:** N

NI 43-101: N

Sample Type: Drill Core

Commodity	Grade
Silver	10.6000 grams per tonne
Copper	0.2600 per cent
Zinc	0.7600 per cent

Comments: Sample 942600, taken over the 1.46-metre interval between 225.70 and 227.16 metres in drillhole 94-02.

Reference: Assessment Report 23981.

Ore Zone: LENS **Year:** 1991

Category: Assay/analysis **Report On:** N

NI 43-101: N

Sample Type: Channel

Commodity	Grade
Silver	38.4000 grams per tonne
Gold	0.9500 grams per tonne
Copper	3.7200 per cent
Zinc	40.0000 per cent

Comments: This sample was taken over a thickness of 1.1 metres.

Reference: Assessment Report 21491, page 15 (sample 95875).

Summary Production

		Metric		Imperial	
Mined:		36	tonnes	39	tons
Milled:		36	tonnes	39	tons
Recovery	Silver	2,613	grams	84	ounces
	Gold	31	grams	1	ounces
	Zinc	2,932	kilograms	6,464	pounds
	Copper	2,345	kilograms	5,170	pounds

Capsule Geology

The Red Star deposit is situated on the northwest bank of the Similkameen River, just above Highway 3 and approximately 35 kilometres south-southwest of Princeton.

The property is underlain by Upper Triassic Nicola Group volcanics consisting of a varied assemblage of intermediate to mafic and locally felsic to intermediate calc-alkaline volcanic flows and pyroclastics with associated greywacke, argillite and minor limestone. The Nicola Group rocks form a northeast-trending belt, 5 to 6 kilometres wide, which is metamorphosed to greenschist facies and amphibolite facies along the eastern margin of the Late Jurassic to Early Cretaceous Eagle Plutonic Complex granodiorite. The resulting chloritic and sericitic schists strike 165 to 180 degrees with an average dip of 65 degrees west.

To the north, the Nicola Group rocks are unconformably overlain by andesite and basalt flow rocks of the Eocene Princeton Group. The relatively fresh andesites and basalts form a capping over the Nicola rocks and are represented by a resistant topographic high.

In the immediate vicinity of the deposit, Nicola Group rocks include sericite-quartz(±chlorite) schist, argillite, siltstone, massive chlorite schist, chlorite-sericite schist, quartz-sericite schist, and dacite and rhyolite lapilli tuff that form up to seven locally defined lithological units. The dominant foliation strikes south-southeast to south, dips moderately to steeply west and parallels the contact between the Nicola Group and the Eagle Plutonic Complex. Open kinks and isoclinal folds in compositional layering are observed on an outcrop scale. Fold hinges plunge shallowly to the north and south. Faults parallel the regional and local foliation. A series of low to high angle anastomosing shears occur in association with alteration around the Red Star occurrence. These structures appear to be concentrated on the west side of the Red Star horizon but can be found to the east as well.

Well-developed secondary biotite and magnetite, in the form of disseminated grains, lenses and seams, occurs in some units. Chloritization, silicification and sericitization are the most common forms of alteration.

Mineralization is hosted by a wide zone of strongly sheared, locally faulted, strongly schistose quartz-sericite-pyrite schist, sericite schist and chlorite schist containing large boudinaged quartz veins and smaller fractured quartz veins along gouge-filled subvertical structures. Intense sericitization is characteristic over the entire Red Star horizon and is observed along strike to the north and south but is cut off abruptly in the structural hangingwall. The sericitization has produced a 'talcose-like' texture. Other variably hydrothermal alteration types include silicification and pyritization. The rocks associated with the Red Star occurrence have anomalously high K2O/Na2O ratios, enriched SiO2, magnesium and barium contents, and a depleted CaO content. Barite is a significant component of the mineralization at the Red Star occurrence.

Alteration and remobilization of the mineralization has resulted in several types of ore (Geological Survey of Canada Memoir 243): 1) general pyritization of the silicified schists; 2) further silicification of the fracture zones resulting in the production of white sugary quartz carrying pyrite, sphalerite, chalcopyrite and galena (these deposits are approximately 0.9 metre in width and are the ore-bearing sources); 3) small persistent and distinct veins of white quartz, usually less than 46 centimetres in width; and 4) glassy quartz with patches of blebs of pyrite, chalcopyrite and rarely bornite with chalcocite.

The best mineralization is associated with the Main zone, which extends north-south for 480 metres, and generally consists of disseminated sphalerite and chalcopyrite in quartz veins and sweats within highly sheared, sericitic schist. Significant sphalerite, chalcopyrite with galena, silver and gold mineralization was reported from the underground workings which have since caved in. Trace cadmium was reported in all samples. Locally, within the Main zone, 3 to 40-centimetres thick, highly folded and boudinaged quartz veins host trace to pods of chalcopyrite and sphalerite.

A lens of massive sulphide mineralization believed to be of volcanogenic origin occurs within the Main zone. The lens is 0.15 to 1.2 metres thick and has been traced over a strike length of 16 metres. The lens appears to closely parallel the foliation of the enclosing pyritic sericite chlorite schists. The lens consists of coarse-grained sphalerite, pyrite and chalcopyrite, which display weak banding. Minor bornite, galena, molybdenite and pyrrhotite are

also present. Gangue minerals include quartz, barite, kaolinite and sericite.

Exploration work has been conducted in the Bell Creek area since 1900. Most of this work was focused on several showings near the eastern boundary of Manning Provincial Park, just north of Eastgate, British Columbia. The Redstar showing has received the most exploration attention, although the Knob Hill (MINFILE 092HSE069), Golden Crown (MINFILE 092HSE191) and Paw (MINFILE 092HSE093) occurrences have also been explored. There are at least five adits with raises and shafts on the former Red Star claims, with a total known length of 565 metres.

The Red Star mineral claim was first staked in 1900 by Charles Bonnevier and Gus Pouwels. That year, development work consisted of a 7.62-metre open cut and a 4.57-metre tunnel in a silicified fissure in country rock schists. Bonnevier also conducted additional work on the Anaconda claim situated approximately 76 metres to the south. By 1916, a cross-cut tunnel had been driven 91.4 metres at the foot of the hill with an 18.28-metre-deep shaft driven within the tunnel. In 1920, development work continued towards a mineralized intersection on the lower crosscut; by the following year, the lower crosscut tunnel had to be abandoned due to bad air at 152.4 metres depth without intersecting the target vein. Surface trenching was completed in an effort to better understand structure in the area. Three tunnels, referred to as the upper workings, were driven 76.2, 137.2 and 19.8 metres, respectively. Work on the lower crosscut resumed in 1924. A 4.9-metre-wide mineralized vein with pyrite and chalcopyrite was interested 182.9 metres from the portal.

By 1927, most of the old underground workings on the Red Star claims were inaccessible due to caving. As of 1938, Bonnevier had driven the lowermost tunnel 332 metres from the portal before ceasing work once again due to poor ventilation conditions.

In 1955, Woodburry Mines Limited optioned the Red star property and completed a bulldozer trenching program in the area around the upper (No. 1) adit. The following year, additional trenching was completed around the portals of the No. 1, 2 and 3 adits. A new tunnel, situated approximately 228.6 metres south of the caved No. 3 adit, was driven 143.3 metres.

Between 1964 and 1965, the property was leased by A.W. Hendrickson and H. Hopkins, who began a new adit and completed considerable trenching. A mineralized vein was intersected and mined using a trackless mining method, resulting in 40 tonnes of sorted ore being mined from the Main zone. The copper-silver-gold ore yielded 31.1 grams of gold, 2612.7 grams of silver, 2345.5 kilograms of copper and 2932.5 kilograms of zinc, with an average grade of 72 grams per tonne silver, 6.5 per cent copper and 8.1 per cent zinc (Assessment Report 25443, page 6).

Between 1966 and 1970, Spenho Mines Limited carried out an exploration program of geological mapping, soil sampling, diamond drilling and magnetometer and horizontal-loop electromagnetic geophysical surveying over the Knob Hill and Red Star claim area.

In 1980, Cominco Limited optioned the claims covering the Red Star occurrence from Carl Wabnegger and conducted a comprehensive exploration program for volcanogenic massive sulphide deposits. Exploration consisted of mapping, soil geochemical sampling and induced polarization, magnetometer and very low-frequency geophysical surveying. A strong electromagnetic conductor coinciding with an induced polarization conductor was defined. Weak copper and zinc soil anomalies associated with the favourable Red Star horizon were also coincident with geophysical results.

From 1986 to 1987, Bukara Resources Limited completed additional geological, geochemical and geophysical exploration, including 1100 metres of trenching and induced polarization resistivity geophysical surveying. Work focused on gold-bearing pyritiferous schists in the Red Star horizon. The Red Star massive sulphide lens was excavated over caved underground workings. Assays returned less than 0.4 gram per tonne gold (Assessment Report 25443, page 8) causing Bukara to drop the option on the property.

In 1990, the Red Star occurrence and surrounding area were restaked by Pamicon Developments Limited. Many of the old surface workings, including the massive sulphide lens, were resampled and mapped. In 1992, Westmin Resources Limited optioned the claims from Pamicon Developments and conducted a comprehensive two-phase exploration program consisting of reconnaissance-scale geological mapping, lithogeochemical and stream sediment sampling. In 1993, Westmin Resources laid a 43.1 line kilometre grid out over the Red Star and Knob Hill area and conducted geological mapping, geochemical sampling and geophysical surveying. The following year, the grid was extended to the east and additional soil sampling and geophysical surveying was completed. Five diamond drill holes totalling 1406.34 metres were drilled across stratigraphy north of the Red Star showing. Further work was recommended; however, Westmin Resources allowed the option to lapse in 1995.

In 1997, Teck began a planned 1200-metre drilling program to earn a 70 per cent interest in the property from Redstar Resources. In total, 1515.6 metres were drilled in five holes beneath and along strike to the south of the Red Star showing.

In 2012, property owner Christopher Delorme conducted a reconnaissance exploration program aimed at locating and geochemically assaying reported mineralization at the old workings. In total, 15 rock samples were collected from the historical workings, including adit faces and waste dump float. Two samples taken from the workings and dumps near the Red Star underground workings returned anomalous values for copper and zinc.

In the late 1960s, two diamond drill holes, 210 metres apart, intersected 75.9 and 45.4 metres grading 1.17 per cent and 0.65 per cent zinc, respectively (Assessment Report 8170). A channel sample taken over a thickness of 1.1 metres, assayed 0.95 gram per tonne gold, 38.4 grams per tonne silver, 3.72 per cent copper and 40.0 per cent zinc (Assessment Report 21491, page 15, sample 95875). In 1994, the best intersections of the five drillholes completed on the Red Star occurrence were from drillhole 94-02. Sample 942565, taken over the 1.22-metre interval between 94.5 and

95.72 metres, yielded 0.16 per cent zinc, 0.20 per cent copper, 1.2 grams per tonne silver and 0.13 per cent barium (Assessment Report 23981). Sample 942600, taken over the 1.46-metre interval between 225.70 and 227.16 metres, yielded 0.76 per cent zinc, 0.26 per cent copper, 10.6 grams per tonne silver and 0.51 per cent barium. Sample 942602, taken over the 1.50-metre interval between 235.23 and 236.73 metres, yielded 0.22 per cent zinc, 0.16 per cent copper and 10.6 grams per tonne silver.

From the 2012 sampling program, samples 5 and 7 from the Red Star underground workings returned greater than 1 per cent copper and zinc and 0.55 per cent copper and greater than 1 per cent zinc, respectively (Assessment Report 33378, page 5).

Bibliography

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Date Coded:	1985/07/24	**Coded By:**	BC Geological Survey (BCGS)	**Field Check:**	N
Date Revised:	2014/03/04	**Revised By:**	Nicole Barlow (NB)	**Field Check:**	N