

Location/Identification **MINFILE Number:** 104B 179 Name(s): SNOWFIELD SULPHURETS (SNOWFIELD), BRUCEJACK, PRETIUM, PRETIVM **Mining Division:** Skeena Developed Prospect Status: Stikine **Electoral District: Regions:** Skeena Stikine Natural Resource District **Resource District:** 104B059 **BCGS Map:** 104B09E NTS Map: **UTM Zone:** 09 (NAD 83) 56 30 58 N Latitude: 6264193 Northing: Longitude: 130 13 21 W Easting: 424777 1597 metres **Elevation:** Within 100M **Location Accuracy:** Located about 1.3 kilometres south of Mitchell Glacier (Open File 1988-4). **Comments:** Mineral Occurrence Gold, Molybdenum, Silver, Copper, Rhenium, Lead, Zinc **Commodities:** Pyrite, Electrum, Molybdenite, Tetrahedrite, Tennantite, Acanthite, Chalcopyrite, Sphalerite, Galena Minerals Significant: Associated: Quartz, Calcite, Barite, Rutile Sericite, Quartz, Pyrite, Chlorite, Tourmaline, Biotite, Garnet, Magnetite Alteration: Sericitic, Chloritic, Pyrite, Tourmalinz'n, Potassic, Argillic **Alteration Type:** Unknown **Mineralization Age:** Disseminated, Stockwork, Breccia Character: Deposit Porphyry, Hydrothermal, Epigenetic **Classification:** L02: Porphyry-related Au, L04: Porphyry Cu +/- Mo +/- Au, H08: Alkalic intrusion-associated Type: Au 2000x1500x0 metres **Dimension:** Area of mineralization. **Comments:** Host Rock **Dominant Host Rock:** Volcanic Stratigraphic Age Group Formation Igneous/Metamorphic/Other Jurassic Hazelton Unuk River Lower Jurassic Unnamed/Unknown Formation **Isotopic Age Dating Method Material Dated** \_\_\_\_\_ \_\_\_\_ \_\_\_\_\_ Lithology: Mafic Volcanic Breccia, Mafic Tuff, Basaltic Andesite, Syenite **Geological Setting Tectonic Belt:** Intermontane Boundary Ranges **Physiographic Area:** Stikine Terrane: Inventory Year: 2011 SNOWFIELD Ore Zone:

0	Combined	Repor	t On: N		
Quantity:	1,370,100,000 tonnes	NI 43	-101: Y		
	<b>a w</b>				
	Commodity	Grade			
	Silver	1.72 grams per tonne			
	Gold	0.59 grams per tonne			
	Copper	0.10 per cent			
	Molybdenum	0.00855 per cent			
	Rhenium	0.000051 per cent			
Comments:	Based on a cut-off grade of 0.30 gram	s of gold-equivalent/tonne. Measured and Indicated.			
Reference:	Technical Report and Updated Resou Date: February 18, 2011; Signing Dat	rce Estimate on the Snowfield Property, for Pretium Reour e: March 4, 2011.	rces, Effective		
Ore Zone:	SNOWFIELD	Y	Year: 2011		
Category:	Indicated	Repor	t On: Y		
			-101: Y		
Quantity:	1,180,300,000 tonnes	11143	1911 -		
	Commodity	Grade			
	Silver	1.73 grams per tonne			
	Gold	0.55 grams per tonne			
	Copper	0.10 per cent			
	Molybdenum	0.00836 per cent			
	Rhenium	0.000050 per cent			
Comments:	Based on a cut-off grade of 0.30 gram	s of gold-equivalent/tonne.			
Reference:	Technical Report and Updated Resource Estimate on the Snowfield Property, for Pretium Reources, Effective Date: February 18, 2011; Signing Date: March 4, 2011.				
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Category:	SNOWFIELD Inferred 833,200,000 tonnes	N Repor NI 43	t On: Y		
Category:	SNOWFIELD Inferred 833,200,000 tonnes Commodity	N Repor NI 43 Grade	t On: Y		
Category:	SNOWFIELD Inferred 833,200,000 tonnes Commodity Silver	N Repor NI 43 Grade 1.90 grams per tonne	t On: Y		
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Category:	SNOWFIELD Inferred 833,200,000 tonnes Commodity Silver Gold Copper	N Repor NI 43 Grade 1.90 grams per tonne 0.34 grams per tonne 0.06 per cent	t On: Y		
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Ore Zone:	SNOWFIELD		Year:	2009
Category:	Combined		<b>Report On:</b>	Y
Quantity:	861,700,000 tonnes		NI 43-101:	Y
	Commodity	Grade		
	Silver	1.8 grams per tonne		
	Gold	0.71 grams per tonne		
	Copper	0.12 per cent		
	Molybdenum	0.0092 per cent		
<b>Reference:</b>	Stockwatch News Release December	1, 2009		
Dre Zone:	SNOWFIELD	1, 2009	Year:	2009 V
re Zone:		1, 2009	Report On:	Y
Dre Zone: Category:	SNOWFIELD	1, 2009		Y
Ore Zone: Category:	SNOWFIELD Inferred	1, 2009 Grade	Report On:	Y
Reference: Ore Zone: Category: Quantity:	SNOWFIELD Inferred 948,900,000 tonnes		Report On:	Y
Ore Zone: Category:	SNOWFIELD Inferred 948,900,000 tonnes Commodity	Grade	Report On:	Y
Dre Zone: Category:	SNOWFIELD Inferred 948,900,000 tonnes Commodity Silver	Grade 1.4 grams per tonne	Report On:	Y
re Zone: ntegory:	SNOWFIELD Inferred 948,900,000 tonnes Commodity Silver Gold	Grade 1.4 grams per tonne 0.33 grams per tonne	Report On:	Y
e Zone: tegory:	SNOWFIELD Inferred 948,900,000 tonnes Commodity Silver Gold Copper	Grade 1.4 grams per tonne 0.33 grams per tonne 0.07 per cent 0.0081 per cent	Report On:	Y

Technical Report and Updated Resource Estimate on the Snowfield Property, for Pretium Reources, Effective

## Capsule Geology

The Snowfield deposit is underlain by Lower Jurassic andesitic volcanic rocks that correlate with the 'Upper Andesite' unit of the Unuk River formation from the lower portion of the Hazelton Group. The rocks that host the gold mineralization are of greenschist facies grade metamorphism with subsequent pervasive hydrothermal alteration, making the identification of protoliths difficult. The mineralized rocks are interpreted to be a marine volcanic back-arc sequence forming a moderate north-westerly-dipping sequence of predominantly andesitic autochthonous breccia flow, lithic, crystal, and lapilli tuff. Early Jurassic porphyritic quartz-syenite is exposed approximately three km west of the Snowfield Zone where it occurs in the upper plate of the Sulphurets thrust fault.

The Mitchell Thrust Fault, located on the south side of the Mitchell Valley, separates potassically-altered quartz-syenite and other rocks above it from dominantly sericitically altered rocks and the Mitchell quartz stockwork beneath. This low-angle thrust fault appears to have been transferred to a higher-angle, oblique-slip movement along the Snowfield Fault, producing a horst within the Snowfield Zone. Snowfield comprises two separate mineral zones: the Main (or North) copper-gold zone and the Upper gold-molybdenum zone. The Main zone is considered to be the upper portion of the Mitchell deposit (104B 103) displaced by the Mitchell thrust fault. Two northerly-striking, post-mineralization high-angle faults occurring east and west of the Snowfield Zone are called the Brucejack and Snowfield Faults respectively. The left-lateral and eastside-down, vertical Snowfield Fault was apparently formed during southeast-directed thrusting which produced the Mitchell and Sulphurets thrusts. The Brucejack Fault is a more regional northerly-striking structure that transects the Sulphurets district, truncating geological features and influencing topography.

The Snowfield zone is situated within the eastern of two structural blocks separated by the northerly-trending Snowfield Fault. The eastern, down-dropped block of volcanic rocks has been pervasively altered to advanced argillic facies, has a quartz stockwork zone, and is rarely affected by potassic alteration east of the fault. In contrast, the western block which has been uplifted has potassic, sericitic and rare advanced argillic alteration accompanying the quartz-syenite intrusion.

Chlorite-rich quartz-sericite-pyrite alteration of the andesitic volcanic rocks is pervasive east of the Snowfield Fault and throughout the Snowfield Zone, in contrast to the chlorite-poor alteration west of the fault. The altered host rocks contain abundant disseminations and fracture filling molybdenite and tourmaline which are cut by pyrophyllite veins in the advanced argillic zone and by massive pyrite veins elsewhere in the area. There is evidence that the quartz-sericite-pyrite-chlorite alteration replaced potassic alteration which was rich in hydrothermal biotite, magnetite, and chalcopyrite. Beyond the known limits of the Snowfield zone, the quartz-sericite-pyrite-chlorite altered rocks are poorly mineralized, except for molybdenite.

**Reference:** 

The gold mineralization at the Snowfield deposit is hosted by schistose, pervasively altered (quartz-sericite-chlorite) volcanic and volcaniclastic rocks that contain 1 to 5 per cent disseminated pyrite, minor disseminations, veinlets of tourmaline, molybdenite, and abundant younger calcite veinlets.

Gold mineralization occurs as microscopic grains of electrum that are encased within fine-grained, pervasively disseminated pyrite in close association with trace amounts of galena and sphalerite. Other associated minerals within the gold-mineralized zone include: tetrahedrite-tennantite, barite, acanthite, minor manganese-rich calcite, and rare chalcopyrite. Minute clusters of pyrite and rutile (+ barite) are also observed within the gold-bearing mineralization.

Molybdenite mineralization appears to have been emplaced during an earlier hydrothermal event. Pyrite-tetrahedrite veinlets from the gold-bearing mineral assemblage are observed cutting molybdenite veinlets. Weakly disseminated and minor fracture filling molybdenite mineralization is widespread and common throughout the Snowfield Deposit and nearby area. Fine-grained tourmaline crystals are often associated with molybdenite in quartz veinlets.

Hydrothermal alteration within the Snowfield deposit includes quartz-sericite-pyrite with varying amounts of chlorite, calcite, and garnet. The dark reddish-brown, rounded garnets are less than 7 mm and appear to have been crystallized during the gold mineralizing event(s). They are probably of hydrothermal origin as they are well fractured and exhibit deformational features consistent with the tectonic event that caused the deformation, alteration, and schistosity of the host rocks (Margolis, 1993). Chalcopyrite mineralization with minor sphalerite and galena increases at depth coincident with a change in lithology from the medium-grained andesitic tuff to fine-grained ash-crystal-lithic tuff. Increasing base metal mineralization with depth may indicate possible porphyry-style copper mineralization associated with the cupola of a buried alkalic intrusion.

One of 5 holes drilled in 1985 assayed 1.89 grams per tonne gold across 151 metres with the first 68 metres grading 2.47 grams per tonne gold (Northern Miner, September 23, 1985).

Reserves in Snowfield are 6,984,670 tonnes grading 2.57 grams per tonne gold based on 5 drillholes and 24 trenches (George Cross News Letter August 24, 1989).

The property is held by Newhawk Gold Mines Ltd. Newhawk merged with Silver Standard Resources Inc. in September 1999.

In 2007 Silver Standard reported a drill hole which intersected 259 metres of 0.71 gram per tonne Au and 0.14 per cent Cu (Technical Report and Resource Estimate on the Snowfield Property by P&E Mining Consultants Inc. 2009).

In 2009 Silver Standard released updated resource estimates for the Snowfield Zone of 861.7 million tonnes combined Measured and Indicated grading 0.71 gram per tonne Au, 1.8 grams per tonne Ag, 0.12 per cent Cu, and 0.0092 per cent Mo and 948.9 million tonnes Inferred grading 0.33 gram per tonne Au, 1.4 grams per tonne Ag, 0.07 per cent Cu, and 0.0081 per cent Mo; based on a cut-off of 0.35 g/t Au (Stockwatch News Release Dec 1, 2009).

Snowfield Mineral Resource Summary – February 2011 (Based on a cut-off grade of 0.30 grams of gold-equivalent/tonne) Category Tonnes Gold Silver Copper Moly Rhen

Cutegory	1 Onnes	Gold	Shiver	Copp	or wrony	Ittleff
~~~~~ (	(million)	(g/t)	(g/t)	(%)	(ppm)	(ppm)
Measured	189.8	0.82	1.69	0.09	97.4	0.57
Indicated	1,180.3	0.55	1.73	0.10	83.6	0.50
M+I	1,370.1	0.59	1.72	0.10	85.5	0.51
Inferred	833.2	0.34	1.90	0.06	69.5	0.43

Main source for above description and February 2011 Resource Summary from: Technical Report and Updated Resource Estimate on the Snowfield Property, for Pretium Reources, Effective Date: February 18, 2011; Signing Date: March 4, 2011.

## WORK HISTORY

The Property and the surrounding region have a history rich in exploration for precious and base metals dating back to the late 1800s. This section describes the mineral exploration, including the historical drilling carried out prior to Pretium's acquisition of Brucejack, and post-acquisition. The historical data have been summarized mostly from various Assessment Reports available through the BC Ministry of Energy, Mines and Petroleum Resources.

In 1935, prospectors discovered copper-molydenum mineralization on the Sulphurets Property in the vicinity of the Main Copper zone, approximately six km north-west of Brucejack Lake; however, these claims were not staked until 1960.

From 1935 to 1959, the area was relatively inactive with respect to prospecting; however, it was intermittently evaluated by a number of different parties and several small copper and gold-silver occurrences were made in the Sulphurets-Mitchell Creek area.

The Snowfield property was initially staked in 1959 by Granduc Mines Ltd. to cover various porphyry copper and precious metal vein showings between Mitchell Glacier and Brucejack Lake. Between 1960 and 1975 the property was intermittently explored by Granduc, who completed geologic mapping, geochemical sampling, geophysical surveying and limited drilling primarily over known porphyry showings.

From 1960-1979, Granduc continued exploration, conducting further geological mapping, lithogeochemical sampling, trenching, and diamond drilling on known base and precious metal targets north and north-west of Brucejack Lake resulting in the discovery of gold-silver mineralization in the Hanging Glacier area and molydenum on the south side of Mitchell. In 1968, Granduc Mines drilled two diamond drill holes over the Quartz Stockwork zone (104B 178) totaling 711.12 metres. Results showed the system contained extensive anomalous, gold values of less than 0.5 gram per tonne but carried no significant base metal values (as reported in Assessment Report 32047).

From 1980, Esso optioned the entire Sulphurets property from Granduc and subsequently completed an extensive program consisting of mapping, trenching, and geochemical sampling that resulted in the discovery of several showings including the Snowfield, Shore, West, and Galena zones. Gold was discovered on the peninsula at Brucejack Lake near the Shore zone.

From 1982 to 1983, exploration was confined to gold and silver-bearing vein systems in the Brucejack Lake area at the southern end of the property from

From 1982 to 1983, drilling was concentrated in 12 silver and gold-bearing structures including the Near Shore and West zones, located 800 metres apart near Brucejack Lake. Drilling commenced on the Shore zone. Regional mapping and sampling continued along the Sulphurets-Mitchell Ridge in 1982.

In 1983, Esso continued work on the property and (in 1984) outlined a deposit on the west Brucejack zone. The Josephine zone gold-silver veins were discovered.

In 1985, Esso dropped the option on the Sulphurets property.

In 1985, the property was optioned by Newhawk and Lacana Mining Corp. (Lacana) from Granduc under a three-way joint venture (the Newcana JV). The Newcana JV completed work on the Snowfield, Mitchell, Golden Marmot, Sulphurets Gold, and Main Copper zones, along with lesser known targets.

In 1986-1991, Between 1986 and 1991, the Newcana JV spent approximately \$21 M developing the West zone and other smaller precious metal veins on what would later become the Bruceside Property.

Since 1985 on the Brucejack area, Newhawk completed extensive exploration programs including additional regional and detailed geologic mapping and sampling, rock saw and backhoe trenching, limited soil geochemical sampling, airborne geophysical surveying, and 35,241.6m of surface diamond drilling in 511 holes. In addition to surface work, a total of 5276m of exploratory underground drifting and 35,981 metres of underground drilling in 422 holes was completed on the West zone between 1986 and 1989. This work succeeded in outlining significant proven and probable on the West zone, and on the Shore zone (as reported in Assessment Report 24610). At least forty additional showings of precious metal mineralization have been located across the property, some of which have associated small reserves.

In 1985 on the Snowfield area, Newhawk completed five diamond drill holes totalling 740.0 metres on the Snowfield Gold zone. This work outlined a tabular, shallow south dipping zone, approximately 70 metres thick, of low grade disseminated gold mineralization. A preliminary geologic inventory based on surface trenching and five diamond drill holes was calculated at 7.04 million tonnes at 2.85 grams per tonne gold. In 1989, Newhawk and Corona Corporation completed a program consisting of grid emplacement and rock sampling over the Snowfield Gold zone to further define the zone. This led to the discovery of the Coffee Pot zone; a gold - silver bearing quartz vein system of limited size located 800 metres northwest of the Gold zone. In 1991, Newhawk, in conjunction with Granduc. completed additional mapping and sampling on the Snowfield Gold zone, and drilled two holes totalling 350 metres. The results of this program further defined the zone, but did not change its basic configuration. In early 1992, Newhawk purchased Granduc's interest in the Snowfield property. A small mapping and sampling program was completed later that year over the Dawson-Ross I and 3 claims which cover the Quartz Stockwork zone.

From 1991-1992, Newhawk officially subdivided the Suphurets claim group into the Sulphside and Bruceside properties and optioned the Sulphside property (including Sulphurets and Mitchell zones) to Placer Dome Inc. Throughout the period from 1991 to 1994, joint venture exploration continued on the Sulphurets-Bruceside property including property-wide trenching, mapping, airborne surveys, and surface drilling, evaluating various surface targets including the Shore, Gossan Hill, Galena Hill, Maddux, and SG zones. Newhawk purchased Granduc's interest in the Snowfield Property in early 1992.

In 1991, six holes were drilled at the Shore zone, totalling 1,200 metres, to test its continuity and to determine its relationship to the West and R-8 zones. Results varied from 37 grams per tonne gold over 1.5 metres to 13 grams per tonne gold over 4.9 metres (www.infomine.com).

Diamond drilling continued in 1993 as Newhawk-International Corona Corp (Hornestake) completed 1,164 metres of drilling with three deep holes south of the known mineralization of the Snowfield zone and also drill tested the Josephine Vein system with three more drill holes totaling 295 metres.

In 1994, exploration in the Brucejack area consisted of detailed mapping and sampling in the vicinity of the Gossan Hill zone, and 7,352 metres of diamond drilling (over 20 holes), primarily on the West, R8, Shore, and Gossan Hill zones. Mapping, trenching, and drilling of the highest priority targets were conducted on 10 of the best deposits (including the West zone).

In 1996, Granduc merged with Black Hawk to form Black Hawk Mining Inc.

In 1997-1998, no exploration or development work was carried out on the Brucejack property (Budinski et al., 2001).

In 1999, Silver Standard acquired Newhawk and with it, Newhawk's 60% interest and control of the Brucejack.

In 2001, Silver Standard entered into an agreement with Black Hawk whereby Silver Standard acquired Black Hawk's 40% direct interest in the Brucejack property, resulting in 100% interest in the property.

During the summer of 2006, Silver Standard Resources conducted a diamond drill program in order to test the economic potential of the low-grade disseminated gold occurrence at Snowfield. After completing 27 drill holes totaling approximately 6,000 metres, an inferred resource summary was completed for the Snowfield Gold zone. Utilizing a 0.5 gram per tonne gold cut-off; 64 million tonnes of material averaged 1.47 grams per tonne gold (as reported in Assessment Report 32047).

In 2007, Silver Standard drilled 29 NQ-2 size diamond drill holes, totalling 8666.29 metres. There were 21 drill holes tested at the Snowfield zone, 6 drill holes tested at the nearby Coffeepot zone situated immediately west of the Snowfield zone, and 1 drill hole tested at the Mitchell East zone (now recognized to be the northern extension of the Snowfield zone). A total of 5,484 samples were collected from the 2007 drill core. In 2008, Silver Standard drilled 6945 metres in 31 holes. A resource estimate was prepared by Minorex Consulting Ltd. In 2007 Silver Standard reported a drill hole which intersected 259 metres of 0.71 gram per tonne Au and 0.14 per cent Cu (Technical Report and Resource Estimate on the Snowfield Property by P&E Mining Consultants Inc. 2009).

In 2009 Silver Standard began work on the Brucejack part of the property. The 2009 program included drilling, rock-chip and channel sampling, and re-sampling of historical drill core. Silver Standard collected a total of 1,940 drill core samples from 25 historical drillholes stored. Field work included the collection of 2739 rock-chip and channel samples. Specifically, rock-chip and channel sampling were completed at the Galena Hill, Bridge, SG, and Mammoth zones (where drilling was carried out in 2009), as well as at the Hanging Glacier zone, where historical surface sampling had identified rocks enriched in gold and silver. A total of 17,846 metres of diamond drilling were completed in 37 holes during the 2009 field season.

In 2009 Silver Standard released updated resource estimates for the Snowfield Zone of 861.7 million tonnes combined Measured and Indicated grading 0.71 gram per tonne Au, 1.8 grams per tonne Ag, 0.12 per cent Cu, and 0.0092 per cent Mo and 948.9 million tonnes Inferred grading 0.33 gram per tonne gold, 1.4 grams per tonne silver, 0.07 per cent copper, and 0.0081 per cent molybdenum; based on a cut-off of 0.35 grams per tonne gold.

In 2010, Silver Standard sold to Pretium all the Brucejack Project and the adjacent Snowfield Project. In 2010 a total of 33,400 metres of diamond drilling was completed in 75 holes. Of this, 11 holes comprising 3693 metre were targeted at VOK (Valley of the Kings), and 2 holes, totalling 1119 metres at the footwall of West zone. 47 holes were drilled on the Snowfield project totalling 17,967 metres. Known Snowfield mineralization was extended to the northwest and southeast. A higher grade gold-copper core with silver and molybdenum credits was defined, and continuity of grade in the northern half of the zone was proven. Two resource estimates were prepared in 2009 and one in 2010

In 2011 Pretium's diamond drill program was the first in almost 20 years that was focused specifically on defining high grade resources. In this year a total of 178 holes was completed totaling 72,805 metre. Included in this were 97 holes (41,219 metre) on the VOK, 16 holes (7,471 metres) on the West zone, and 21 holes (7,220 metres) targeting the surrounding areas. The remaining drilling was focused on expansion of Shore zone, testing for structurally controlled high grade mineralization in Galena Hill and Bridge zones, and testing new target areas. On the West zone, crews were in the process of de-watering the underground workings in order to advance exploration efforts.

The 2012 diamond drill program was focused on defining the high grade resource at the Valley of the Kings, specifically targeting geological and structural features believed to be associated with gold mineralization. Diamond drilling is also focused on expanding the VOK zone, both west of the Brucejack Fault and along trend to the east of the main mineralized zone. A total of 175 holes (55,849 metres) were competed.

Refer to West (104B 193) for details of related Brucejack property mineralization and work history. Pretium Resource has defined a large area for its Snowfield zone (about 1.5 X 2 km) that encompasses the Quartz Stockwork zone (104B 178) (Figure 10.1, Technical Report on the Snowfield Zone for Pretium Resources Inc, March 4, 2011).

**Bibliography** 

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Date Coded:	1988/03/31	Coded By:	Gordon S. Archer (GSA)	Field Check:	Ν
Date Revised:	2020/07/09	<b>Revised By:</b>	Karl A. Flower (KAF)	Field Check:	Ν