Location/Identification

MINFILE Number: 093M 001
National Mineral Inventory Number: 093M1 Cu9
Name(s): **BELL**
BELL COPPER, NEWMAN, BABINE, KRAFT

Status: Past Producer
Mining Method Open Pit
Regions: British Columbia
BCGS Map: 093M009
NTS Map: 093L16E, 093M01E
Latitude: 55 00 10 N
Longitude: 126 13 55 W
Elevation: 777 metres
Location Accuracy: Within 500M
Comments: Centre of the open pit on Newman Peninsula at the north end of Babine Lake.

Mining Division: Omineca
Electoral District: Bulkley Valley-Stikine
Resource District: Nadina Forest District

UTM Zone: 09 (NAD 83)
Northing: 6098605
Easting: 677033

Mineral Occurrence

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

Minerals
Significant: Chalcopyrite, Chalcocite, Bornite, Electrum, Galena, Sphalerite, Molybdenite
Significant Comments: Rare molybdenite.
Associated: Quartz, Pyrite
Alteration: Biotite, Chlorite, Sericite, Carbonate, Gypsum, Anhydrite, Azurite, Malachite
Alteration Type: Potassic, Silicific'n, Sericitic, Propylitic, Oxidation, Argillic
Mineralization Age: Eocene

Isotopic Age: 51.0 Ma **Dating Method:** Potassium/Argon **Material Dated:** Biotite

Deposit
Character: Stockwork, Vein, Disseminated
Classification: Porphyry, Hydrothermal
Type: L04: Porphyry Cu +/- Mo +/- Au
Dimension: 90x60x0 metres
Comments: The age of mineralization is from the age of intrusion (Bulletin 64). Supergene enrichment adds younger mineralization. Better grades are contained in a 90 by 60-metre flat-lying, blanket-like deposit.

Host Rock

Dominant Host Rock: Plutonic

Stratigraphic Age	Group	Formation	Igneous/Metamorphic/Other
Lower Cretaceous	Skeena	Undefined Formation	------
Jurassic	Hazelton	Telkwa	------
Eocene	------	------	Babine Intrusions

Isotopic Age	Dating Method	Material Dated
------	------	------
------	------	------
51.0 Ma	Potassium/Argon	Biotite

Lithology: Biotite Feldspar Porphyry, Fine Grained Greywacke, Siltstone, Andesite, Tuff
Comments: The orebody is primarily (75 per cent) hosted within the intrusion. The age date is from Bulletin 64.

Geological Setting

Tectonic Belt: Intermontane
Physiographic Area: Nechako Plateau
Terrane: Stikine

Comments: Intrusions associated with the Skeena Arch.

Inventory

Ore Zone: TOTAL
Year: 1990
Category: Unclassified
Report On: Y
Quantity: 71,752,960 tonnes
NI 43-101: N

Commodity	Grade
Silver	0.4800 grams per tonne
Gold	0.2300 grams per tonne
Copper	0.4600 per cent

Comments: Reserves in the present open pit and in the Extension zone.

Reference: Noranda Inc. Annual Report 1990.

Summary Production

		Metric		Imperial	
Mined:		77,146,088	tonnes	85,039,005	tons
Milled:		77,165,645	tonnes	85,060,563	tons
Recovery	Silver	38,319,730	grams	1,232,008	ounces
	Gold	12,885,964	grams	414,293	ounces
	Copper	304,795,539	kilograms	671,959,140	pounds

Capsule Geology

The Bell copper deposit is located on Newman Peninsula on the north end of Babine Lake. Two other large porphyry-type deposits, the Granisle (093L 146) and Morrison (093M 007), also occur in the area.

The area was initially explored in 1913 for veins with lead and zinc mineralization. Reconnaissance geophysics and anomalous copper in a soil geochemical survey in 1962 led Noranda Exploration Company to an area 800 metres northeast of the old adits. By 1967, mineable reserves of 42 million tonnes of ore had been defined grading 0.50 per cent copper, 0.35 gram per tonne gold and 1.0 gram per tonne silver, within an overall geological ore reserve of 116 million tonnes grading 0.48 per cent copper, 0.35 gram per tonne gold, 1.0 gram per tonne silver and less than 0.005 per cent molybdenum (Canadian Institute of Mining and Metallurgy Special Volume 15). Production began in 1972, and by December 31, 1990 approximately 71 million tonnes of ore had been processed.

The Bell mine is a porphyry copper deposit hosted primarily in a biotite-feldspar porphyry stock of the Eocene Babine Plutonic Suite. The stock is crosscut by the northwest trending Newman fault which juxtaposes the two groups that host the intrusion. These groups are the Lower Jurassic Telkwa Formation (Hazelton Group) and the Lower Cretaceous Skeena Group. Telkwa Formation rocks are primarily fine-grained tuffs and andesites and the younger Skeena Group rocks are mostly fine-grained greywackes. The deposit overlaps onto both of these assemblages. The mineralization has been dated at 51.0 million years (Bulletin 64).

Recent government compilations (MapPlace) indicate the Hazelton rocks belong to the Saddle Hill Formation.

Chalcopyrite and lesser bornite occur as disseminations in the rock matrix, in irregular quartz lenses and in a stockwork of 3 to 6 millimetre quartz veinlets which cut the feldspar porphyries and the siltstones. Molybdenite is rare, and occurs in the feldspar porphyry in the northern part of the mineralized zone. Gold occurs as electrum associated with the copper mineralization. Specular hematite and magnetite are common in quartz veinlets and hairline fractures. There is also significant supergene enrichment with chalcocite coating chalcopyrite. A supergene chalcocite zone capped the deposit and extended to depths of 50 to 70 metres. Some gypsum together with copper-iron sulphate minerals and iron oxides were also present (Open File 1991-15).

The ore zone has pervasive potassic (mainly biotitization) alteration with a surrounding concentric halo of chlorite and sericite-carbonate alteration (propylitic and argillic) which corresponds to the two kilometre pyrite halo which surrounds the deposit. A late quartz-sericite-pyrite-chalcopyrite alteration has been superimposed on part of the earlier biotite-chalcopyrite ore at the western part of the orebody. A number of late-stage breccia pipes cut the central part of the ore zone near the Newman fault and alteration associated with their intrusion has apparently depleted the copper grades in the area of the pipes. Veinlets of gypsum are present in the upper part of the orebody. Anhydrite is a significant component in the biotite-chalcopyrite zone but is not present in other alteration facies. Monominerallic veinlets of anhydrite are rare (Open File 1991-15).

The copper mineralization occurs in a crescent-shaped zone along the western contact of the porphyry plug. Better grades of copper mineralization are contained in a 60 by 90-metre thick flat-lying, blanket-like deposit which is connected to a central pipe-like zone, centred on the western contact of the intrusive. The pipe-like zone of copper mineralization is 150 metres in diameter and extends to a depth of at least 750 metres.

Reserves in the open pit and in the Extension zone were (in 1990) 71,752,960 tonnes grading 0.23 gram per tonne gold, 0.46 per cent copper and 0.48 gram per tonne silver (Noranda Inc. Annual Report 1990).

HISTORY

Showings on the west shore of the peninsula were staked by Mr. C. Newman in about 1913. Two adits, 12 and 20 metres long, were subsequently driven northeasterly at lake level.

The property was restaked in 1962 by Noranda Exploration Company, Limited following a reconnaissance geophysical survey which indicated a broad anomalous zone. Staking was done in the Newman, Linda, Lad, and other claim groups and subsequently expanded to about 180 claims. Detailed soil sand silt sampling was carried out in 1963 and 3 short drill holes put down, just short of the ore zone. The first drill hole put down in 1964 intersected the ore zone and during 1964 and 1965, 12,176 metres feet of diamond drilling was done in 132 holes. This work indicated 136,050,000 tonnes of ore averaging 0.5 per cent copper, of which 46,000,000 tons averaging 0.5 per cent copper could be mined by open pit. Design work for a mining and milling operation began in 1966 but was suspended the following year. Further exploration work during the period 1966 to 1969, inclusive, included geophysical and geochemical surveys and some 17,677 metres of diamond drilling.

Noranda Mines Limited in May 1970 began construction of facilities for a production rate of 10,000 tons per day; the mill was put into operation in October 1972. Before mining commenced, geological reserves were 116,000,000 tonnes averaging 0.48 per cent copper, about 0.35 parts per million gold and less than 0.005 per cent molybdenum, to a 300 metre depth and 0.3 per cent copper cut-off (C.I.M. Special Vol. 15, pp. 245, 247). Mill capacity was gradually increased in subsequent years. About one sixth of the mined material grades 0.3 to 0.45 per cent copper and is stockpiled. A strike closed the mine for a 29 week period during 1976. An October 1978, agreement to sell the property to Granby Mining Corporation, operator of the nearby Granisle mine, failed to receive approval of the Foreign Investment Review Agency and the agreement was aborted. A $20 million mine-mill expansion begun in May 1979 resulted in the mill capacity being raised from 13,000 to 15,400 tonnes per day in the latter half of 1980. Open pit reserves were reported as 40,384,000 tonnes at 0.52 per cent copper and 0.38 gram per tonne gold (Noranda Mines Limited, 1979 Annual Report). With the purchase, in November 1979, of the Granisle mine some 8 kilometres to the southeast both operations were combined to form the Babine Division of Noranda Mines Limited.

Noranda reported that the mine would close in June 1992 due to depleted ore reserves (Northern Miner - March 16, 1992). Total production from 1972 to 1992 was 77,146,088 tonnes yielding 38,319,730 grams of silver, 12,885,964 grams of gold and 304,795,539 kilograms copper.

In 2012, ten seismic refraction lines were completed, in the Bell Mine Area, the Hagan Area and the Granisle Mine Area. Coincident multi-electrode resistivity surveying was carried out in line RL-2 in the Bell Mine site area and on lines RL-4 and RL-5 in the Hagan area. The seismic refraction data for the Bell Mine area indicates the site is underlain by three or four distinct velocity layers (Assessment Report 33965). The Bell Mine area includes survey lines SL-1 to SL-3, and SL-6 to SL-9 and encompasses the central peninsula of the survey area. Seismic refraction surveying on lines SL-1 to SL-3in the northern sector was augmented by resistivity surveying on line SL-2. Seismic lines SL-6, SL-7 and SL-9 are in the tailings expansion pond area.

See Ketza (093L 219) and Granisle (093L 146) for related information.

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Date Coded:	1985/07/24	**Coded By:**	BC Geological Survey (BCGS)	**Field Check:**	N
Date Revised:	2015/02/17	**Revised By:**	Garry J. Payie (GJP)	**Field Check:**	N