Location/Identification

MINFILE Number: 092ISW045
National Mineral Inventory Number: 092I6 Cu2
Name(s): **LORNEX**
LORNEX MINE, HIGHLAND VALLEY COPPER, HIGHLAND VALLEY, HVC

Status: Producer
Mining Method Open Pit
Regions:
BCGS Map: 092I045
NTS Map: 092I06E
Latitude: 50 27 01 N
Longitude: 121 02 35 W
Elevation: 1455 metres
Location Accuracy: Within 500M
Comments: Open pit at the Discovery zone. See also Valley (092ISW012).

Mining Division: Kamloops
Electoral District: Fraser-Nicola
Resource District: Thompson Rivers Natural Resource District

UTM Zone: 10 (NAD 83)
Northing: 5590526
Easting: 638929

Mineral Occurrence

Commodities: Copper, Molybdenum, Silver, Gold, Zinc

Minerals
Significant: Chalcopyrite, Bornite, Pyrite, Molybdenite, Chalcocite, Covellite, Copper
Associated: Quartz, Malachite, Limonite, Pyrolusite, Azurite, Cuprite
Alteration: Quartz, K-Feldspar, Sericite, Kaolinite, Chlorite, Epidote, Calcite, Gypsum
Alteration Type: Silicific'n, Potassic, Sericitic, Argillic, Propylitic, Oxidation
Mineralization Age: Unknown

Deposit
Character: Stockwork, Vein
Classification: Porphyry, Hydrothermal
Type: L04: Porphyry Cu +/- Mo +/- Au
Dimension: 1900x750x500 metres
Comments: Lornex deposit

Host Rock

Dominant Host Rock: Plutonic

Stratigraphic Age	Group	Formation	Igneous/Metamorphic/Other
Triassic-Jurassic	------	------	Guichon Creek Batholith

Isotopic Age	Dating Method	Material Dated
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Lithology: Granodiorite, Quartz Diorite, Quartz Porphyry Dike
Comments: Skeena variety.

Geological Setting

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

Inventory

No inventory data

Summary Production

		Metric		Imperial	
	Mined:	270,660,429	tonnes	298,352,052	tons
	Milled:	271,565,809	tonnes	299,350,062	tons
Recovery	Silver	269,140,857	grams	8,653,079	ounces
	Gold	98,171	grams	3,156	ounces
	Copper	971,081,151	kilograms	2,140,867,473	pounds
	Molybdenum	29,236,832	kilograms	64,456,181	pounds

Capsule Geology

The Lornex deposit lies in the central core of the Late Triassic-Early Jurassic Guichon Creek batholith and occurs within Skeena variety granodiorite to quartz diorite. This rock is medium to coarse-grained and slightly porphyritic. The Lornex property straddles the north trending, west dipping Lornex fault which juxtaposes Skeena rocks on the east side with Bethsaida phase quartz monzonite on the west. A pre-mineral quartz porphyry dyke, probably related to the Bethsaida phase, trends northwest and pinches out in the Lornex deposit.

Mineralization is controlled by the distribution and density of fracture sets. Three major sets of copper-molybdenum veins strike north-northeast to east and dip moderately southeastward. There are two sets of post-mineral fault and fracture systems; one which roughly parallels the mineralized veins and another which offsets the first up to 2 metres. The most prominent structural feature is the Lornex fault which dips 55 degrees to the west in the southern part of the orebody, and steepens to nearly vertical in the north. This fault truncates the northwestern part of the deposit. It is characterized by a 10 centimetre to 1.5-metre wide black gouge on the footwall and discontinuous mylonite pods 1 to 50 metres wide in the hanging wall.

Five main types of hydrothermal alteration are related to quartz and sulphide mineralization. Pervasive silicification, consisting of close spaced quartz veins with associated quartz alteration, is hosted by the Skeena rocks. The quartz porphyry dyke is only weakly affected by hydrothermal alteration. Potassium feldspar veinlets and hydrothermal biotite are erratically distributed. Argillic alteration is pervasive throughout the ore zone and is characterized by quartz, sericite, kaolinite, montmorillonite and chlorite. Copper grades generally correspond to the intensity of argillization. Within the argillic zone, phyllic alteration consists of grey quartz-sericite envelopes on mineralized veins. Pervasive propylitization, consisting of epidote (zoisite), chlorite and carbonates (calcite), is peripheral to the argillic zone. There is also an irregular zone of late-stage gypsum.

The Lornex deposit is 1900 metres long, 500 metres wide and plunges northwest to a depth of at least 750 metres. Chalcopyrite, bornite and pyrite constitute 1.5 per cent of the ore zone and occur in three roughly concentric sulphide zones respectively. Sulphides occur mainly with quartz as fracture-fillings and coatings. Veins average 5 to 15 millimetres in width. Molybdenite occurs as thin laminae in banded quartz veins and less often as rosettes in vuggy quartz veins.

The oxide zone averages 3 to 30 metres in thickness and thins toward the east. Supergene minerals are malachite, limonite, pyrolusite, azurite, cuprite, chalcocite, covellite, and native copper.

Highland Valley Copper was created in mid-1986 by bringing together the Highland Valley mining operations of Lornex Mining Corporation Ltd. and Cominco Ltd. into a new single entity, structured as a partnership.

On the south side of the valley was the Lornex mine which started mining in 1972. In 1981, the Lornex concentrator had been expanded to become one of the largest in the industry.

On the north side was Bethlehem Copper (092ISE001) which started mining in 1963. In 1981, this operation was absorbed by Cominco who already owned the Valley orebody (092ISW012) located west of the Lornex pit on the south side of the valley. Mining of the original Bethlehem Copper pits ceased in 1982.

The Highmont mill on the south side of the valley was acquired in 1988 when Highmont Mining Company joined the partnership. This mill had been closed down in 1984 when the Highmont deposit (092ISE013) became uneconomical.

Lornex Mining Corporation Ltd. was wound up at the end of 1988 with the result that Rio Algom Limited, Teck Corporation and Highmont Mining Company obtained direct participation in the cash flow from the partnership. Today's participation in the cash flow is:

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50. per cent-Cominco Ltd.

33.6 per cent-Rio Algom Limited
13.9 per cent-Teck Corporation (including 2.5 per cent from Highmont)
 2.5 per cent-Highmont Mining Company (excluding Teck's 2.5 per cent)

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Highland Valley Copper operates two distinct mines, the Valley mine and the Lornex mine, and between the two has measured and indicated ore reserves of 761 million tonnes of 0.408 per cent copper and 0.0072 molybdenum. The ore reserves of each mine are: Valley mine - 627 million tonnes at 0.418 per cent copper and 0.0056 per cent molybdenum; Lornex mine - 135 million tonnes at 0.364 per cent copper and 0.0144 per cent molybdenum. The individual mine reserves are calculated at an equivalent cutoff grade of 0.25 per cent copper using a molybdenum multiplying factor of 3.5 (CIM Bulletin July/August 1992, pages 73,74).

Mining is carried out in the two mines simultaneously at a proportion of 80 per cent in the Valley mine and 20 per cent in the Lornex mine, and the ratio is projected to remain much the same over mine life. Based on current plans, the property has a life of approximately 18 years at conservative metal prices and an average stripping ratio of 0.8 (CIM Bulletin July/August 1992, pages 71-73).

Published reserves at January 1, 1995 were 539.7 million tonnes grading 0.42 per cent copper and 0.0073 per cent molybdenum. The mine life is estimated to be about fourteen more years (Information Circular 1995-9, page 6).

See Valley mine (092ISW012) for reserves, and production figures from 1987 onward.

Bibliography

EMPR AR 1964-88; 1965-148; 1966-155-158; 1967-157; 1968-187
EMPR BC METAL MM00038
EMPR BULL 56; 62
EMPR ENG INSP Annual Report 1989, 1990
EMPR EXPL 1986-A37; 1987-A37; 1988-A4; 1989-3
EMPR GEM 1969-260; 1970-344; 1971-340; 1972-150; 1973-169; 1974-135
EMPR INF CIRC 1994-19, p. 4; 1995-1, p. 4; 1996-1, p. 6; 1997-1,
p. 8; 1998-1, p. 8
EMPR MAP *30; 65 (1989)
EMPR MIN STATS 1985, pp. 47,48; 1987, pp. 35,37,65,66
EMPR MINING Vol.1 1975-1980; 1981-1985; 1986-1987; 1988
EMPR OF 1992-1; 1998-10
EMPR PF (Numerous air photos; Map of Final Blast, Section 4472 North;
Lornex Mining Corporation Ltd. Information brochure)
EMR MIN RES BR FILE (Lornex)
EMR MIN BULL MR 166
EMR MP CORPFILE (Lornex Mining Corp. Ltd.; Rio Algom Mines Ltd.;
The Yukon Consolidated Gold Corp. Ltd.)
EMR MP RESFILE (Lornex Mine)
GSC MAP 886A; 1010A; 42-1989
GSC MEM 242; 249; 262
GSC OF 980; *2167, pp. 99-124
GSC P 46-8; 47-10; 77-9; 77-12
CIM Bulletin *July/August 1992, pp. 71-88
CIM Special Volume *15 (1976), pp. 120-129; *46, pp. 161-191
CMH 1987-251
CMJ Vol.94, No.8 (1973), pp. 23-26
GAC FIELDGUIDE No. 1 (Geology and Ore Deposits of the Highland Valley
Camp by W.J. McMillan, 1985)
GCNL Feb.28, 1975; Apr.29,Sept.9,Oct.27, 1976; Feb.23,Mar.29,Nov.11,
1977; Feb.22,Mar.2,Apr.21,Jul.24,Oct.25, 1978; #77,#145,#204, 1979;
#145,#209, 1980; #155,#217, 1981; #46,#68,#152,#216, 1982; #207,
1983; #96,#209, 1984; #78(Apr.24), 1989
N MINER Mar.24, 1977; Mar.2, 1978; Apr.26, Oct.25, Nov.29, 1979; Mar.
27, 1980; Jan.15, Aug.20, 1981; Jan.28, Mar.11, Apr.18, May 13,
Jul.29, Oct.28, Nov.4, Dec.23, 1982; Mar.3, Apr.21, Jul.28,
Oct.27, 1983; Mar.15,29, Jul.26, 1984; May 1, 1989;
Mar.(Anniversary Issue),19, 1990, Apr. 28, 1997

N MINER MAG July 1989
W MINER Aug. 1972; Apr. 1977; Feb.,Apr.,May,Dec., 1979; Dec. 1980;
Apr.,May, 1982
WWW http://www.teckcominco.com; http://www.infomine.com;
http://www.mining-technology.com/projects/highland/index.html
Cominco Ltd., 1991 Annual Report
Falconbridge File
Globe and Mail Nov. 25, 1981
Hansen, Poul (1992): A temporary use of the land at Highland Valley Copper, CIM Bulletin, Vol. 85, No. 962, pp. 71-88.
Highland Valley Copper, 1994 The Year in Summary
Northcote, K.E. (1968): Geology and Geochronology of the Guichon
Creek Batholith, British Columbia, Unpublished Ph.D. Thesis, The
University of British Columbia
Teck Cominco Limited Annual Reports
Witt, P. (2007-04-26): Technical Report - Review of Highland Valley Copper Operations
Graden, R. (2011-04-08): NI 43-101 Technical Report - Teck Highland Valley Copper
Graden, R. (2013-03-06): NI 43-101 Technical Report - Teck Highland Valley Copper

EMPR PFD 1691, 903585, 10915, 10916, 10917, 10918, 10919, 10920, 10921, 10922, 10923, 10924, 10925, 10926, 10927, 10928, 10929, 10930, 10931, 10932, 10933, 10934, 10935, 10936, 10937, 10938, 10939, 10940, 10941, 10942, 10943, 10944, 10945, 10946, 10947, 10948, 10949, 10950, 10951, 10952, 10953, 10954, 10955, 10956, 10957, 10958, 10959, 10960, 10961, 10962, 10963, 10964, 10965, 10966, 10967, 10968, 10969, 10970, 10971, 10972, 10973, 10974, 10975, 10976, 10977, 10978, 10979, 10980, 10981, 10982, 10983, 10984, 10985, 10986, 10987, 10988, 10989, 10990, 10991, 10992, 10993, 10994, 10995, 10996, 10997, 10998, 10999, 11000, 11001, 11002, 11003, 11004, 11005, 11006, 11007, 11008, 11009, 11010, 810692, 810693, 810718, 810752, 810753, 750157, 860072, 822327, 822398, 822408, 812970, 820314, 820315, 820931, 820932, 820933, 885096, 885097, 885098, 885099, 886360, 883322, 883984, 883985, 883986, 883988, 883989, 883991, 883992, 883995, 883999, 884002, 884003, 884004, 884005, 884006, 884007, 884008, 884010, 884011, 884012, 884015, 884017, 884018, 884019, 884021, 884022, 884024, 884025, 884026, 884027, 826891, 801514, 802038, 802056, 802057, 802058, 802059, 802060, 802061, 802062, 802063, 802271, 802383, 802412, 802413, 801734, 861983, 671923, 673567, 502966, 502978, 502987, 502988, 502989, 502990, 502992, 502993, 502995, 502999, 503072, 503073, 503077, 503078, 503079, 504097, 504098, 504099, 504100, 504101, 504102, 504103, 504104, 504105, 504370, 504540, 504541, 504542, 504543, 504544, 504545, 504547, 504548, 504549, 504550, 504551, 504552, 504553, 504554, 504555, 504556, 504557, 504558, 504559, 504560, 504561, 504562, 504563, 504564, 504565, 504566, 504567, 504568, 504570, 504571, 504572, 504573, 504726, 505286, 505297, 505298, 505607, 505609, 505627, 505630, 505632, 505633, 505635, 505636, 505637, 505638, 505639, 505645, 505646, 505647, 505648, 505649, 505650, 505651, 505652, 505653, 505654, 505655, 505656, 505659, 507801, 507802, 831180, 831181, 831182, 831183, 675640, 675657, 675662, 676886, 676888, 676889, 676893, 676894, 896102, 896104, 896105, 896106, 896107, 896108, 896109, 896113, 896117, 896245, 896246, 896306, 896315, 896316, 896322, 896323, 896324, 896363, 896364, 896365, 896366, 896367, 896368, 896369, 896372, 896373, 896375, 896396, 896398, 896401, 896414, 896421, 896428, 896432, 896433, 896436, 896437, 896475, 896495, 896515, 896517, 896533, 896651, 896675, 896676, 896677, 520458

Date Coded:	1987/03/27	**Coded By:**	Allan Wilcox (AFW)	**Field Check:**	N
Date Revised:	2020/06/09	**Revised By:**	Karl A. Flower (KAF)	**Field Check:**	N