

Location/Identification

MINFILE Number:	103P 120	National Mineral Inventory Number:	103P6 Mo1
Name(s):	KITSAULT CLARY CREEK, B.C. MOLYBDENUM, ALICE, LIME CREEK, LYNX, CARIBOO		
Status:	Past Producer	Mining Division:	Skeena
Mining Method	Open Pit	Electoral District:	Skeena
Regions:	British Columbia	Resource District:	Coast Mountains Natural Resource District
BCGS Map:	103P043		
NTS Map:	103P06W	UTM Zone:	09 (NAD 83)
Latitude:	55 25 19 N	Northing:	6141827
Longitude:	129 25 10 W	Easting:	473451
Elevation:	542 metres		
Location Accuracy:	Within 500M		
Comments:	Open pit, approximately 6 kilometres southeast of the head of Alice Arm of Observatory Inlet (Assessment Report 10443).		

Mineral Occurrence

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

Minerals

Significant:	Molybdenite, Galena, Sphalerite, Scheelite, Chalcopyrite, Tetrahedrite, Neyite
Associated:	Quartz, K-Feldspar, Sericite, Clay, Gypsum, Pyrite, Pyrrhotite, Fluorite
Alteration:	K-Feldspar, Sericite, Clay
Alteration Type:	Potassic, Sericitic, Argillic
Mineralization Age:	Unknown

Deposit

Character:	Stockwork, Disseminated
Classification:	Porphyry, Hydrothermal, Epigenetic
Type:	L05: Porphyry Mo (Low F- type), I05: Polymetallic veins Ag-Pb-Zn+/-Au
Shape:	Regular Modifier: Faulted, Fractured
Dimension:	700x560x180 metres
Comments:	Mineralization is in a 700 by 560 metre annular zone, 30 to 180 metres wide.

Host Rock

Dominant Host Rock: Plutonic

Stratigraphic Age	Group	Formation	Igneous/Metamorphic/Other
Jurassic-Cretaceous	Bowser Lake	Undefined Formation	-----
Eocene	-----	-----	Alice Arm Intrusion

Isotopic Age	Dating Method	Material Dated
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52.6 Ma	Potassium/Argon	Biotite

Lithology: Porphyritic Quartz Monzonite, Granodiorite, Quartz Diorite, Alaskite, Siltstone, Greywacke, Lamprophyre Dike

Comments: Isotopic age from Open File 1986-2.

Geological Setting

Tectonic Belt:	Intermontane	Physiographic Area:	Boundary Ranges
Terrane:	Stikine, Bowser Lake		
Metamorphic Type:	Contact		
Grade:	Hornfels		

Comments: Stock intrudes Bowser Lake foredeep clastic wedge.

Inventory

Ore Zone: TOTAL **Year:** 2017
Category: Combined **Report On:** Y
Quantity: 228,200,000 tonnes **NI 43-101:** Y

Commodity	Grade
Silver	5.0 grams per tonne
Molybdenum	0.083 per cent

Comments: Combined Proven and Probable reserves.

Reference: Information Circular 2018-1, page 126.

Ore Zone: TOTAL **Year:** 2017
Category: Combined **Report On:** Y
Quantity: 321,800,000 tonnes **NI 43-101:** Y

Commodity	Grade
Silver	4.8 grams per tonne
Molybdenum	0.071 per cent

Comments: Combined Measured and Indicated resource.

Reference: Information Circular 2018-1, page 126.

Summary Production

	Metric	Imperial
Mined:	38,342,950 tonnes	42,265,867 tons
Milled:	13,399,217 tonnes	14,770,108 tons
Recovery		
Molybdenum	13,572,999 kilograms	29,923,341 pounds

Capsule Geology

The Kitsault mine is located approximately 8.0 kilometres south of Alice Arm on the southeast fork of Lime Creek. The mine was a major producer of molybdenum between 1967 and 1972 and considerable reserves of molybdenum remained in place when mining operations ceased. Stockpiled ore was processed in 1981-82.

The deposit is developed in the Eocene Lime Creek stock of the Alice Arm Plutonic Suite. The stock consists of an ellipsoidal, north trending, 1000 by 600 metre body of quartz monzonite to quartz diorite, with a 500 by 300 metre eastern appendage of quartz diorite. The stock intrudes Middle Jurassic to Upper Cretaceous Bowser Lake Group siltstones and greywackes, which are contact metamorphosed to biotite hornfels 500 to 1000 metres outward from the stock. These rocks are all intruded by 1 to 10 metre wide lamprophyre dikes.

The main body is differentiated into a core of porphyritic quartz monzonite that grades outward through granodiorite to quartz diorite on the east and west sides of the stock. It is cut by dikes and irregular masses of fine-grained alaskite.

Potassic alteration consisting of secondary potassium feldspar, rims mineralized quartz veinlets and replaces plagioclase in the rock matrix. Plagioclase has also been subjected to sericitic and argillic alteration, especially near northeast-striking faults and shears.

Molybdenite mineralization is contained in a 700 metre (east-west) by 560 metre (north-south) ellipsoidal annular zone in the north half of the main body of the stock. It varies in width from 30 to 180 metres and the zone roughly follows the north, east and west margins of the stock. The zone is developed around a 300 by 350 metre core of largely barren quartz monzonite.

Mineralization consists of molybdenite along fractures and along margins of closely spaced, randomly oriented, 0.3 to 0.6 centimetre wide quartz veinlets that form a stockwork. They are cut by later quartz veins, up to 1 metre wide, containing pyrite, galena, sphalerite, neyite, scheelite, chalcopyrite, tetrahedrite, pyrrhotite, fluorite and gypsum. Disseminated molybdenite occurs only in the alaskite. Higher grade mineralization is found in zones of more intense fracturing and faulting, especially in the northwest contact area.

Between 1967 and 1972, a total of 9,329,669 tonnes grading 0.112 per cent molybdenum were mined. During 1981 and 1982, 4,069,548 tonnes of stockpiled ore grading 0.076 per cent molybdenum were milled.

Combined (proven, probable) reserves are 104,316,500 tonnes grading 0.11 per cent molybdenum; grade given was 0.186 per cent MoS₂; conversion to Mo using a factor of 1.6681 (Amax Inc., 10-K Report, December 31, 1985).

In 2008, Avanti Mining Inc. purchased the property from Aluminerie Lauralco Inc., a subsidiary of Amax of Canada. The mine had been inactive since 1982, all infrastructure had been removed, and the site partially reclaimed. Avanti conducted a technical report on the property which included an updated resource calculation. Reported indicated resources are 158 million tonnes grading 0.100 per cent molybdenum, 4.31 grams per tonne silver, 0.022 per cent lead, 0.008 per cent WO₃; inferred resources are 133 million tonnes grading 0.080 per cent molybdenum, 3.70 grams per tonne silver, 0.018 per cent lead and 0.007 per cent WO₃. Resources were calculated using a 0.04 per cent molybdenum cut-off value (Technical Report on Resources, Avanti Mining Inc., Kitsault Molybdenum Property British Columbia, Canada August 4, 2008; www.sedar.com).

In April 2009, Avanti Mining released an updated resource statement. Reported measured resources were 54 million tonnes grading 0.112 per cent molybdenum, 4.54 grams per tonne silver, 0.022 per cent lead and 0.007 per cent WO₃; indicated resources were 153 million tonnes grading 0.088 per cent molybdenum, 5.24 grams per tonne silver, 0.025 per cent lead and 0.006 per cent WO₃; inferred resources were 26 million tonnes grading 0.069 per cent molybdenum, 4.15 grams per tonne silver, 0.019 per cent lead and 0.005 per cent WO₃. Resources were calculated using a 0.04 per cent molybdenum cut-off value (Stockwatch News Release - April 6, 2009).

In a December 15, 2009 technical report prepared for Avanti Mining, proven reserves were reported as 59.5 million tonnes grading 0.104 per cent molybdenum and probable reserves as 155.7 million tonnes grading 0.079 per cent molybdenum. These reserves were calculated using variable cut-off values of 0.036 per cent molybdenum and 0.027 per cent molybdenum, respectively (www.sedar.com).

In December 2010, Avanti Mining released updated reserves and resources:
(Stockwatch News Release - December 16, 2010)

Classification	Tonnage	Mo (%)	Ag (g/t)
Measured	73,000,000	0.093	4.28
Indicated	225,800,000	0.065	4.17
Inferred	157,100,000	0.05	3.65
Proven	69,700,000	0.097	
Probable	162,800,000	0.075	

Resources were calculated using a 0.021 per cent molybdenum cut off.
Reserves were calculated using a 0.026 per cent molybdenum cut off.

In 2012, Avanti Mining Inc. released an updated mineral estimate including a measured and indicated resource of 321.8 million tonnes at 0.071 per cent molybdenum, 236 parts per million lead and 4.8 parts per million silver; an inferred resource of 317.6 million tonnes at 0.041 per cent molybdenum, 237 parts per million lead and 4.6 parts per million silver at a 0.018 per cent molybdenum cutoff grade.

In 2013, an updated combined measured and indicated resource of 321.8 million tonnes grading 0.071 per cent molybdenum and 4.8 grams per tonne silver with an additional inferred resource of 317.6 million tonnes grading 0.041 per cent molybdenum and 4.6 grams per tonne silver was reported (Christie, G., Thomas, D.G.(2013-02-04): NI 43-101 Technical Report on Updated Feasibility Study).

The Kitsault deposit was first staked in 1911 and early stage investigations focused on a polymetallic vein, located to the southeast of the current open pit (deposit). Exploration continued on the project in the 1920s and early 1930s. No further exploration occurred until 1959 when Kenenco Exploration (Western) Limited (KEL) completed a diamond drilling program. In 1964, KEL discovered an orebody of 36 million tonnes on site averaging 0.138 per cent molybdenum (0.23 per cent MoS₂), leading to construction of the Kitsault mine. KEL commenced mining the property in 1968 and approximately 9.3 million tonnes of ore was produced with about 10.3 million kilograms of molybdenum being recovered until mining ceased in 1972 due to low metal prices. Climax Molybdenum Company of British Columbia purchased the property in 1973 and recommenced production in 1981. Mining was again halted because of low metal prices in 1982.

One drillhole was drilled in 1979. Small faults and fractures were found, and the only mineralization encountered was calcite veins 1 to 5 millimetres in width. No assays were done (Assessment Report 7186).

In 2012, Avanti Mining Inc. released an updated mineral estimate including a Measured and Indicated resource of 321.8 million tonnes at 0.071 per

cent molybdenum, 4.8 grams per tonne silver, and 0.0236 per cent lead; an Inferred resource of 317.6 million tonnes at 0.041 per cent molybdenum, 4.6 grams per tonne silver, and 0.0237 per cent lead at a 0.018 per cent molybdenum cut-off grade (Press Release - Avanti Mining Inc., April 30, 2012).

In March 2014, Avanti Mining Inc. released a National Instrument (NI) 43-101 technical report which included updated reserves of 129 million tonnes Proven grading 0.092 per cent molybdenum, 5.2 grams per tonne silver, and 0.0252 per cent lead; 101.6 million tonnes Probable grading 0.070 per cent molybdenum, 5.4 grams per tonne silver, and 0.0264 per cent lead; 231.1 million tonnes combined Proven and Probable grading 0.082 per cent molybdenum, 5.3 grams per tonne silver, and 0.0257 per cent lead. These were calculated using a 0.032 per cent molybdenum cut-off (NI 43-101 Technical Reported dated March 14, 2014).

In December 2014, Avanti Mining Inc. changed their name to Alloycorp Mining Inc. (News Release - December 1, 2014).

In 2017, the Kitsault project is owned by Alloycorp Mining Inc., a privately owned company. The project is currently on hold but has environmental assessment approval from both the provincial and federal governments. Pre-production costs are estimated to be \$1.2 billion. The proposed operation would have a 45,500 tonnes-per-day throughput which will recover both molybdenum and silver. Proven plus Probable reserves are 228.2 million tonnes at 0.083 per cent molybdenum and 5.0 grams per tonne silver; Measured plus Indicated resources are 321.8 million tonnes at 0.071 per cent molybdenum and 4.8 grams per tonne silver (Information Circular 2018-1, page 126)

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Date Coded:	1985/07/24	Coded By:	BC Geological Survey (BCGS)	Field Check:	N
Date Revised:	2020/05/07	Revised By:	Karl A. Flower (KAF)	Field Check:	N