Occurrence Details

Occurrence Number: 105M 086
Occurrence Name: Bermingham
Occurrence Type: Hard-rock
Status: Deposit
Date printed: 8/5/2025 2:23:35 PM

General Information

Primary Commodities: gold, lead, silver, zinc
Aliases: Bermingham Vein, Bermingham Footwall Vein
Deposit Type(s): Vein Polymetallic Ag-Pb-Zn+/-Au
Location(s): 63°54'28.49" N - -135°25'57.8" W
NTS Mapsheet(s): 105M14
Location Comments: Location marks middle of Etta zone.
Hand Samples Available: No
Last Reviewed: Aug 15, 2018

Capsule

WORK HISTORY

The Bermingham property currently consists of 42 surveyed quartz mining leases. The 2012 mineral resource estimate for the property covers 4 quartz mining leases; the Arctic (14089) staked May/21, the Mastiff (14168) and the Etta (14169) staked in Jul/21 and the Atlantic (14998) staked in Jun/24.

The claims were staked and optioned by several individual until Sep/23 when C. Settlemier and C. Bermingham purchased the majority of claims in the area, built a camp and began mining. The various workings produced approximately 1 895 tonnes of ore grading 4 956 g/t silver, 55.50% lead and 0.6 % zinc between 1923 and 1928 when the property was optioned by the Treadwell Yukon Company Ltd. Treadwell Yukon relinquished the lease in 1930 due to low silver prices and the absence of ore grade material.

Various small mining companies and individual miners worked the claims between 1930 and 1940 extracting approximately 676 tonnes of ore grading 7 856 g/t silver, and 70% lead. In Aug/48 United Keno Hill Mines Ltd purchased the property as part of the district consolidation. Between 1948 and 1951 the company drove an adit and drift about 9 m below the Treadwell workings and in 1952 United Keno surveyed and sampled all of the accessible workings. The company recovered very little ore from these efforts. Between 1952 and 1954 United Keno salvaged approximately 4 537 tonnes of ore from various dumps located within the property.

In 1977 United Keno Hill began stripping the main pit (located approximately 200 m northwest of the occurrence location) and the pit continued producing ore until 1983. Production was estimated at 82 672 tonnes grading 572.6 g/t silver. A small open pit, located southeast of the earlier pit and partially covering the area of 2012 resource estimate operated during the mid-1980's.

At the end of 1996 United Keno Hill Mines published a historic estimate (not National Instrument (NI) 43-101 compliant) for the underground portion of the historic Bermingham Mine. Resources were estimated at 12 480 tonnes grading 1 132 g/t silver. Figures for lead, zinc and gold were not calculated (United Keno Hill Mines Annual Information Form, Dec 31/1996, available on SEDAR). Cathro (2006) estimated total production from Bermingham property between 1923 to end of the 1980's at approximately 169 903 tonnes grading 696 g/t silver, 4.2 % lead, and 0.65 % zinc over its lifetime.

In 2000 United Keno Hill Mines declared bankruptcy resulting in the Bermingham property and United Keno's other various claim holdings remaining tied up in bankruptcy court proceedings due to the pre-existing environmental clean-up costs associated with the property. In 2004 PricewaterhouseCoopers Inc the court-appointed receiver and receiver-manager of the Keno Hill properties advised the Federal and Territorial governments that United Keno Hill Mines former properties could likely be sold if the pre-existing environmental clean-up costs could be separated from the property. The governments held an open season for bids and in June 2005 Alexco Resource Corporation was selected as the preferred purchaser of the mining assets.

Alexco Resource Corp entered negotiations with the Federal and Territorial governments and in Feb/2006 finalized a purchase agreement. As part of the agreement Alexco assigned its interests in the purchase agreement to its wholly owned subsidiary, Elsa Reclaimation and Development Company Ltd. In addition to purchasing all of the assests of United Keno Hill Mines Ltd and UKH Minerals Limited, the subsidiary entered into Sub-Agreement with Alexco, the Federal and Yukon governments in respect of the pre-existing environmental condition and the enviromental care and maintence and reclaimation of the United Keno Hill Mines site. As part of the Sub-Agreement, the Federal Government indemnified Elsa Reclaimation and Development Company Ltd and Alexco for all liabilities arising directly or indirectly as a result of the pre-existing condition of United Keno Hill Mines various properties. In a separate agreement the Yukon Government hired Elsa Reclaimation and Development as a paid contrator to assume responsibility for the envirommental care and maintanence of the properties. On February 15, 2006 the Supreme Court of the Yukon Territory granted a vesting order approving the sale of assets to Alexco and its subsidiary Elsa Reclaimation and Development Company Ltd.

Following acquisition of United Keno Hill Mines' properties, Alexco began a program of scanning and digitizing all historic documents related to the various historic mines and exploration properties. The company used the resulting database to build 3-D models reflecting the geology, mineralization, structure, grade and configuration of known mineralization. A district-wide surface geological mapping and structural study was carried out between 2007 and 2011 and a soil-gas survey was conducted over the Bermingham property in 2010. An induced polarity and resistivity geophysical survey was also completed.

Alexco Resources collared 2 diamond drill holes (523 m) in 2009, 8 diamond drill holes (2 558 m) in 2010 and to 25 holes (6 898 m) in 2011 to explore and define the Bermingham vein. In Jun/2012 the company announced an initial NI 43-101 compliant mineral resource estimate for the Bermingham deposit. The resource estimate covers mineralization outlined in the Etta zone, which is comprised of portions of the Bermingham vein and the Bermingham Footwall vein lying in the hangingwall of the northwest trending post-mineral Mastiff Fault.

In 2012 Alexco drilled an additional 17 diamond drill holes (5 599 m) to confirm previous drilling and explore the footwall side of the Mastiff fault.

2012-2014 not updated yet.

A technical report prepared by SRK Consulting dated August 08 2012 includes a resource estimate, which itself is dated June 27 2012.

GEOLOGY

The Bermingham property is situated within the Keno Hill mining district in central Yukon. The property lies southeast of the town of Elsa, Yukon although the actual mineralized vein lies approximately 3 km southeast of the town and 5 km northwest of Alexco's Keno Hill district ore processing mill. Mineralization at the Bermingham deposit is confined to the Basal Quartzite Member, located at the base of the larger Mississippian age Keno Hill Quartzite formation. The Keno Hill Quartzite formation is about 700 m thick and is structurally overlain by phyllite and sericite schist of the Late Proterozoic-Early Cambrian Hyland Group, and underlain by graphitic schist, phyllite and sericite schist of the Devonian-Mississippian Earn Group. The sequence is cut by greenstone sills which consist predominantly of meta-diorite and have yielded a U-Pb age of 232.2 ± 1.5 Ma (Triassic).

Within the Bermingham property, mineralized veins are generally hosted by the quartzite and sericite schist units assigned to the Basal Quartzite member. The Basal Quartzite member is generally interbedded with sericite schist and quartzite lying higher within the Keno Hill Quartzite unit. The various rocks units have been cut and displaced by various faults and shears leading to the juxtaposition of the various rocks units and making stratigraphic relationships difficult to determine.

The Bermingham property is characterized by a complex network of fault and vein structures. The attitudes of faults which are predominantly non-mineralized appear bimodal, with one set striking 280 to 293 degrees and the other at 314 to 317 degrees, although they may represent end members of a single fault set. The faults cut and displace all mineralized veins and although they are typically non-mineralized, mineralization is sometime observed where they cut mineralized veins. This is generally considered to represent the post-mineral transport of vein material drawn from the fault rather than primary mineralization.

The most important fault in the area is the Mastiff Fault which strikes at 137 degrees, dips 51 degrees to the south and displaces the Bermingham vein by an estimated 77 m of oblique, right lateral normal displacement. The majority of the historic workings and the main open pit are located on the footwall side of the fault and the fault itself is well exposed in the main open pit. The Etta zone which hosts the current resource is located in the hangingwall and the newly outlined Arctic zone is located in the footwall of the fault.

The Bermingham vein (main vein in the area), has a stike of between 029 and 42 degrees and dips between 57 and 64 degrees to the southeast. In the Etta zone the Bermingham vein converges with the Aho vein at the southwestern end of the zone. To the northeast, at the Arctic zone the Bermingham vein converges with the Bermingham Footwall vein. Further drilling is required to determine if the Bermingham vein and the Bermingham Footwall vein display a cross-cutting relationship or if they are splays of the same structure. The maximum strike length of the Bermingham vein in the Etta zone is 240 at surface tapering to a point about 215 m down-dip from surface.

Diamond drilling conducted in 2011 outlined a mineralized structure located close to the footwall of the Bermingham vein which Alexco termed the Bermingham Footwall vein. The vein strikes between 50 and 59 degrees and dips between 63 and 69 degrees to the southeast. In the Etta zone (hangwall side of Mastiff Fault) the Bermingham Footwall vein appears to join or terminate against the Bermingham vein up-dip and to the northwest; however the nature of this intersection is pooly understood. To the northeast and down-dip, the Bermingham Footwall is offset by the Mastiff Fault. To the southwest, the Bermingham Footwall vein structure is open and may intersect the Aho vein.

Diamond drilling in 2010 located a second vein, the Aho vein, in the hangingwall of the of the Bermingham vein. This newly discovered vein sub-parallels the Bermingham vein.Thes northeast extension of the Aho vein was subsequently outlined in the Arctic zone located in the footwall of the Mastiff Fault. The Aho vein strikes between 67 and 70 degrees and dips 72 degress to the south. The Sericite Schist Marker unit shows approximately 100 m of dip-slip seraration on this vein.

The Bermingham vein and the Bermingham Footwall vein typically exist within a 5 to 10 wide structurally damaged zone containing numerous stringers, veinlets, breccias and gouge. In most cases a discrete vein 0.5 to 2.5 m wide exists within this zone consisting predominantly of carbonate (dolomite, ankerite and siderite), quartz and calcite gangue and sulphides: sphalerite, galena, pyrite and arsenopyrite with accessory, chalcopyrite, argentian tetrahedrite (freibergite), jamesonite, ruby silver and native silver. Higher silver values are common within the vein and in stringers and veinlets within the wider and lower grade damage zone.

The Aho vein comprises predominantly quartz and occurs over several metres width within a wide halo of structurally damaged rocks. Sulphides are present but constitute only a small proportion of the vein, usually less than 2 %, of which arsenopyrite and pyrite are the most abundant, followed by galena and sphalerite. Where the Aho vein intercepts the Bermingham and Bermingham Footwall veins, the vein can host more abundant iron-rich carbonates, likely due to later overprinting by hydrothermal fluids related to these veins. Silver, lead and zinc values are anomalous within the Aho vein but are uneconomic, typically returning values of a few tens of grams per tonne of silver. The gold/silver ratio is higher than observed in the other Bermingham veins and the gold is likely associated with arsenopyrite. Pressure solution figures are noticable within the Aho vein.

The compilation of historical data by Alexco allowed the company to digitize all data and enter the data into 3-D geological modelling software. The company used the models created to direct their diamond drill programs. The 2009 drilling program was designed to test the Bermingham vein at depth in the hangingwall of the Mastiff Fault. Results were significant enough for the company, to warrant follow-up drilling in 2010. Six of the 8 holes collared in 2010 intersected the Bermingham vein, while one hole was abandoned and the final missed the vein due to unforseen structural integrity. Further research found that the hole that missed the vein actually intersected a second, subparallel vein, referred to as the Aho vein located in the hangingwall of the Bermingham vein.

The 2010 soil-gas survey and the induced polarity and resistivity geophysical surveys were conducted over the same area and identified numerous targets, however neither method provided a definitive method of identifying mineralization.

In 2011,13 diamond drill holes were collared in the hangingwall of the Mastiff Fault to explore for additional mineralization and to provide infill drilling in the vicinity of the 2009 and 2010 drill programs. Interpretation of the results outlined the presence of the Bermingham Footwall vein. The remaing 12 holes tested the presence of mineralization on the footwall side of the Mastiff Fault.

The 2012 initial NI 43-101 compliant mineral resource only targeted mineralization outlined in Bermingham vein and the Bermingham Footwall vein residing in the Etta zone which is located on the hangingwall side of the Mastiff Fault. Indicated Resources for the Etta zone total 257 000 tonnes grading 460 g/t silver, 2.0 % lead, 2.10 % zinc and 0.06 g/t gold. Inferred resources total 102 000 tonnes grading 372 g/t silver, 1.12 % lead, 1.83 % zinc and 0.09 g/t gold. The resources are reported at a Net Smelter Return cut-off grade of C$185.00/t using metal prices and recoveries of silver - US$23.00/oz, recovery 96 %, lead - US$0.95/lb, recovery 97 %, zinc - US$0.95/lb, recovery 88 % and gold - US$1350/oz - recovery 72 %. Metal prices were calculated from long term price models and recovery figures employed were calculated from preliminary test work contracted by Alexco. Breakdown of mineralization in individual veins is reported in the Reserves portion of the database.

The 2012 drilling program was designed to infill around the Etta resource and to identify extensions of the major mineralized structures along strike to the west and in the footwall of the Mastiff Fault. Results confirmed high grade mineralization in the Arctic zone located in the footwall of the fault and extended the mineralization 100 m northeast. Drilling also confirmed tha the Aho vein located in the hangingwall of the fault carries significant gold values (hole K-12-0485 returned 0.99 m true width that assayed 14.85 g/t gold). Drilling also extended mineralization 90 southwest on the hangingwall side of the fault.

Alexco has not yet announced a production decision regarding the Bermingham property. It appears they are concentrating on increasing mineral resources within the property. The Bermingham mineralized system remains open in all directions especially to the northeast where linkage to the Hector-Calumet mine remains to be resolved, but also to the southwest where there remains a kilometre of untested ground to the Coral Wigwam mines.

Work History

Date	Work Type	Comment
8/8/2012	Studies	SRK, August 2012.
12/13/2012	Drilling	17 holes; 5,599 m
12/13/2011	Drilling	25 holes; 6,898 m. Collared for infill drilling and expanding Bermingham vein resources.
12/13/2011	Geology	
12/13/2010	Drilling	8 holes; 2,558 m
12/13/2010	Ground Geophysics	Company undertook IP and resistivity studies.
12/13/2010	Studies	Soil-gas study undertaken.
12/13/2009	Drilling	2 holes; 523 m
12/13/2006	Airphotography	
12/13/2006	Airphotography	
12/13/2006	Pre-existing Data	Alexco Resources digitized historic data, prepared 3-D models of mineralized structures.
12/13/2006	Airborne Geophysics	

12/13/2006	Airborne Geophysics	
12/13/2006	Remote Sensing	
12/13/1996	Studies	Historic estimate of remaining resources prepare by United Keno Hill Mines.
12/13/1983	Development, Surface	Between 1978 and 1983 main open pit mined.
12/13/1977	Development, Surface	Main open pit stripped.
12/13/1954	Development, Surface	Between 1952 and 1954 United Keno mined ore from all of property's waste dumps.
12/13/1952	Geochemistry	United Keno Hill sampled all underground workings.
12/13/1951	Development, Underground	United Keno Hill drove adits and raises between 1948 to 1951.
12/13/1930	Development, Underground	Treadwell Yukon mined property 1928 to 1930.
12/13/1928	Development, Underground	Between 1923 and 1928 proiperty was mined by C. Settlemeir and C. Bermingham.
12/13/1925	Geology	
12/13/1925	Studies	

Assessment Reports that overlap occurrence

Report Number	Year	Title	Worktypes	Holes Drilled	Meters Drilled
096732	2014	Assessment Report Describing Metallurgical Test Pits, Metallurgical Auger Drilling, Geotechnical Auger Drilling, Geotechnical Study, Environmental Baseline Studies, Heritage Evaluation, and Water Quality and Climate Monitoring Surveys	Auger - Drilling, Water - Geochemistry, Metallurgical Tests - Lab Work/Physical Studies, Environmental Assessment/Impact - Studies, Geotechnical - Studies, Heritage/Archeological - Studies	9	96.77
094943	2006	2006 Geological, Aerial Photography and Orthophoto Assessment Report on the Keno Hill Property	Electromagnetic - Airborne Geophysics, Magnetic - Airborne Geophysics, Interpretation - Airphotography, Orthophoto - Airphotography, Digitizing Data - Pre-existing Data, Photogrammetry - Remote Sensing		
090564	1979	Geological, Geochemical, and Geophysical Report	Rock - Geochemistry, Silt - Geochemistry, Soil - Geochemistry, Bedrock Mapping - Geology, EM - Ground Geophysics, Seismic - Ground Geophysics, Research/Summarize - Pre-existing Data		
019927	1925	[Galena Hill-Geological Map-Hector Mine Sections and Block Diagrams]	Bedrock Mapping - Geology, Geotechnical - Studies		

Related References

Number	Title	Page(s)	Reference Type	Document Type
YEG2009_OV	Yukon Exploration and Geology Overview 2009	39-40, 58.	Yukon Geological Survey	Annual Report
YEG2010_OV	Yukon Exploration and Geology Overview 2010	46-47, 64.	Yukon Geological Survey	Annual Report
YEG2011_OV	Yukon Exploration and Geology Overview 2011	37, 72.	Yukon Geological Survey	Annual Report
YEG2012_OV	Yukon Exploration and Geology Overview 2012	31.	Yukon Geological Survey	Annual Report
GM1997-1	Bedrock geology of Mayo map area, central Yukon (NTS 105M)		Indian & Northern Affairs Canada/Department of Indian & Northern Development: Exploration & Geological Services Division	Geoscience Map (Geological - Bedrock)
7	Geology of the Mayo Map Area, Yukon Territory (NTS 105M)		Indian & Northern Affairs Canada/Department of Indian & Northern Development: Exploration & Geological Services Division	Bulletin
GM1996-5	Geological map of Keno Hill area, Yukon (105M/14)		Indian & Northern Affairs Canada/Department of Indian & Northern Development: Exploration & Geological Services Division	Geoscience Map (Geological - Bedrock)
1989-3	Yukon Gold-Silver File Description of Occurrences		Indian & Northern Affairs Canada/Department of Indian & Northern Development: Exploration & Geological Services Division	Open File (Geological - Bedrock)
6	Geology of the McQuesten River Region, Northern McQuesten and Mayo Map Areas, Yukon Territory (115P/14, 15, 16; 105M/13, 14)		Indian & Northern Affairs Canada/Department of Indian & Northern Development: Exploration & Geological Services Division	Bulletin

Resource/Reserve

Year	Zone	Type	Commodity	Grade	Tonnage	Amount	Reported Amount	43-101 Compliant	Cut-off
2019	Arctic (Underground)	Inferred	zinc	1.5 %	175,950	2655700	Yes	Yes	Unknown
2019	Bear (Underground)	Inferred	zinc	1 %	101,200	970700	Yes	Yes	Unknown

2019	Etta (Underground)	Inferred	zinc	2.1 %	145,500	3048500	Yes	Yes	Unknown
2019	North East (Underground)	Inferred	zinc	1.5 %	61,600	919800	Yes	Yes	Unknown
2019	West Dipper (Underground)	Inferred	zinc	1.6 %	25,150	414600	Yes	Yes	Unknown
2019	Arctic (Underground)	Indicated	zinc	1.5 %	545,250	7992600	Yes	Yes	Unknown
2019	Bear (Underground)	Indicated	zinc	1.6 %	290,600	4567300	Yes	Yes	Unknown
2019	Etta (Underground)	Indicated	zinc	2.4 %	189,950	4505100	Yes	Yes	Unknown
2019	North East (Underground)	Indicated	zinc	2.2 %	61,000	1336000	Yes	Yes	Unknown
2019	West Dipper (Underground)	Indicated	zinc	1.4 %	15,500	210500	Yes	Yes	Unknown
2019	Arctic (Underground)	Inferred	silver	748 g/t	175,950	131610600	Yes	Yes	Unknown
2019	Bear (Underground)	Inferred	silver	1025 g/t	101,200	103730000	Yes	Yes	Unknown
2019	Etta (Underground)	Inferred	silver	482 g/t	145,500	70131000	Yes	Yes	Unknown
2019	North East (Underground)	Inferred	silver	588 g/t	61,600	36220800	Yes	Yes	Unknown
2019	West Dipper (Underground)	Inferred	silver	930 g/t	25,150	23389500	Yes	Yes	Unknown
2019	Bear (Underground)	Indicated	silver	1307 g/t	290,600	379814200	Yes	Yes	Unknown
2019	Etta (Underground)	Indicated	silver	702 g/t	189,950	133344900	Yes	Yes	Unknown
2019	North East (Underground)	Indicated	silver	800 g/t	61,000	48800000	Yes	Yes	Unknown
2019	West Dipper (Underground)	Indicated	silver	1085 g/t	15,500	16817500	Yes	Yes	Unknown
2019	Arctic (Underground)	Indicated	silver	816 g/t	545,250	444924000	Yes	Yes	Unknown
2019	Arctic (Underground)	Inferred	gold	.22 g/t	175,950	38709	Yes	Yes	Unknown
2019	Bear (Underground)	Inferred	gold	.17 g/t	101,200	17204	Yes	Yes	Unknown
2019	Etta (Underground)	Inferred	gold	.07 g/t	145,500	10185	Yes	Yes	Unknown
2019	North East (Underground)	Inferred	gold	.12 g/t	61,600	7392	Yes	Yes	Unknown
2019	West Dipper (Underground)	Inferred	gold	.13 g/t	25,150	3269	Yes	Yes	Unknown
2019	Bear (Underground)	Indicated	gold	.19 g/t	290,600	55214	Yes	Yes	Unknown
2019	Etta (Underground)	Indicated	gold	.09 g/t	189,950	17095.50	Yes	Yes	Unknown
2019	North East (Underground)	Indicated	gold	.15 g/t	61,000	9150	Yes	Yes	Unknown
2019	West Dipper (Underground)	Indicated	gold	.16 g/t	15,500	2480	Yes	Yes	Unknown
2019	Arctic (Underground)	Indicated	gold	.14 g/t	545,250	76335	Yes	Yes	Unknown
2019	Arctic (Underground)	Inferred	lead	1.9 %	175,950	3343950	Yes	Yes	Unknown
2019	Bear (Underground)	Inferred	lead	1.9 %	101,200	1914200	Yes	Yes	Unknown
2019	North East (Underground)	Inferred	lead	1.8 %	61,600	1104600	Yes	Yes	Unknown
2019	West Dipper (Underground)	Inferred	lead	3.4 %	25,150	863150	Yes	Yes	Unknown
2019	Bear (Underground)	Indicated	lead	3.1 %	290,600	9147150	Yes	Yes	Unknown
2019	Etta (Underground)	Indicated	lead	2.3 %	189,950	4419650	Yes	Yes	Unknown
2019	North East (Underground)	Indicated	lead	2.1 %	61,000	1266400	Yes	Yes	Unknown
2019	West Dipper (Underground)	Indicated	lead	1.6 %	15,500	252600	Yes	Yes	Unknown
2019	Arctic (Underground)	Indicated	lead	2.2 %	545,250	11725200	Yes	Yes	Unknown
2018	Etta (Underground)	Inferred	lead	1.1 %	145,500	1663500	Yes	Yes	Unknown