Occurrence Details

Occurrence Number: 105M 087
Occurrence Name: Flame and Moth
Occurrence Type: Hard-rock
Status: Deposit
Date printed: 8/5/2025 6:33:56 PM

General Information

Primary Commodities: gold, lead, silver, zinc
Deposit Type(s): Vein Polymetallic Ag-Pb-Zn+/-Au
Location(s): 63°54'20.59" N - -135°19'45.4" W
NTS Mapsheet(s): 105M14
Location Comments: Approximately centre of highest grade intersection in Lightning Zone.
Hand Samples Available: No
Last Reviewed:

Capsule

WORK HISTORY

The Flame and Moth property consists of 42 surveyed quartz mining leases and 14 un-surveyed quartz mining claims. The early history of the area covered by the current mineral resource is sketchy. Prospecting and claim staking is believed to have begun in 1920 and by 1923 numerous workings and a 13 m inclined shaft with a 4.6 m crosscut had been developed on the area covered by the present Moth claim. A second 30.5 m deep shaft is believed to have been sunk in the same vicinity. An adit measuring approximately 12.2 m is believed to have been developed on the Frances 7 claim at the same time. Production for this period is unknown but was likely was insignificant.

Near the end of the 1920's low silver prices forced a shutdown of all mining activities in the area and it appears the original claims were dropped. The current mineral resource estimate for the property covers 4 quartz mining leases; the Flame (3863) and the Moth (3864) staked in Nov/29 and the Frances 5 (56401) and Frances 7 (56403) staked in Mar/47. No significant exploration was carried out until just prior to 1950 when United Keno Hill Mines acquired the property.

In the early 1950's, United Keno sank a 27.4 m inclined shaft to a vertical depth of 21.3 m along the footwall of the Moth vein. The company drove a crosscut through the vein, at a depth of 13.7 m and drifted 47.3 m along the bottom of the shaft intersecting a quartz-carbonate vein hosting mineralization averaging 342.3 g/t silver, 16% lead and 5 % zinc. The vein is reported to have been hosted in a zone comprised of quartzite and greenstone measuring approximately 30.5 m long and up to 9.1 m wide. Thirteen horizontal diamond drill holes totaling 193 m were drilled from the drift, but the core recovery was poor.

During 1954 and 1956, pyrite and minor arsenopyrite mineralization was reported up to 240 m along strike to the north. The company explored the area with bulldozer trenching, soil sampling and ground geophysics but was unsuccessful due to the depth of gravel overburden; reported to be up to 12 m in depth.

In 1961 United Keno carried out soil sampling, self-potential, magnetic and Ronka-EM surveys and drilled 5 diamond drill holes (unknown depth) from surface. The soil samples and geophysics yielded little information and no veining was intercepted in the drilling.

In 1965 United Keno drilled 28 vertical overburden holes (unknown depth) and attempted soil sampling and ground geophysics again. In 1974 the company drilled four lines of angled overburden drill holes (989 m) with limited success due to deep overburden and broken ground conditions, although a weakly mineralized structure was located at a depth of 76 m in the footwall of the vein.

Further overburden drilling was completed in 1984 and 4 diamond drill holes (unknown depth) were collared to test the downward projection of known mineralization. The diamond drilling returned only very low values from a wide but diffuse pyritic vein zone located 60 to 90 m below surface.

In 1987 United Keno began stripping the overburden over a portion of the Flame and Moth deposit. A small sample of ore was sent to the mill to test mill recovery. At the end of 1987 the company released an historic estimate of 11 797 tonnes grading 593 g/t silver. This estimate is not National Instrument (NI) 43-101 compliant, (United Keno Hill Mines Ltd – 1987 Annual Report, company classified the reserve as probable reserve). It appears the open pit was never put into production. In Jan/89 mining ceased on all of United Keno Hill Mines' various properties.

In 1996 D. Tenney, Chief Geologist, for United Keno Hill Mines prepared a series of "Historical Estimates" for all of United Keno's deposits including the Flame and Moth property. According to Tenney, the Flame and Moth property hosted an open pit, non-NI 43-101 compliant historical estimate of 15 189 tonnes grading 656 g/t silver, 1.39 % lead and 6.41 % zinc, (these resources were described by the company as "probable reserves").

Cathro (2006) estimated total historic production from the Flame and Moth property at 1 442 tonnes grading 627 g/t silver, 1.1 % lead and 0.9 % zinc.

In 2000 United Keno Hill Mines declared bankruptcy resulting in the Flame and Moth 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 Reclamation and Development Company Ltd. In addition to purchasing all of the assets 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 environmental care and maintenance and reclamation of the United Keno Hill Mines site. As part of the Sub-Agreement, the Federal Government indemnified Elsa Reclamation 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 Reclamation and Development as a paid contractor to assume responsibility for the environmental care and maintenance 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 Reclamation 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.

Between 2008 and 2010 Alexco carried out a district-wide surface geological mapping and structural study of their Keno Hill properties including the Flame and Moth property. In 2010 the company flew an airborne magnetic and electromagnetic survey over the property which was successful in identifying hidden structures and buried stratigraphy. The results of the airborne survey were used to generate drill targets.

In 2010 Alexco completed 12 diamond drill holes (3 974 m) on the Flame and Moth property. During the drill program the company carried out a soil geochemical and ground magnetic geophysical surveys over the property. In 2011, 24 diamond drill holes (6 708 m) were completed on the property.

In Jun/2012 Alexco released an initial NI 43-101 compliant mineral resource for the Flame and Moth deposit. Following release of the report the company completed an additional 39 diamond drill holes (8 610 m) in 2012.

In Mar/2013 Alexco released an updated NI 43-101 compliant mineral resource estimate for the Flame and Moth deposit. The technical report which accompanied the update mineral resource estimate recommended that Alexco continue to explore the Flame vein along strike and depth. It also recommended the company continue with geotechnical, mineralogical, metallurgical and baseline environmental studies to support the preparation of a preliminary economic assessment.

An updated Preliminary Economic Assessment report dated Nov 2013 was prepared by SRK. In it, the resource statement for the Flame & Moth is re-stated from the resource dated Jan 2013 and is quoted below.

GEOLOGY

The Flame and Moth exploration property is situated within the Keno Hill mining district in central Yukon. The property lies west and south of the Town of Keno City, Yukon and adjacent to the site of the company's district ore processing mill. Mineralization at the property is confined to the Mississippian Central Quartzite also known as the Keno Hill Quartzite. This quartzite 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).

The Flame and Moth property is blanketed by a thick cover of fluvio-glacial overburden deposited on an irregular erosional surface that in places measures up to 50 m in depth. Mineralization occurs within the upper section of the Basal Quartzite Member,which lies at the base of the Keno Hill Quartzite Formation. The host rocks predominantly comprise medium to thick bedded quartzite with interbedded graphitic schist. Within this sequence, two distinct horizons of sericite schist, up to 10 m in thickness, occur at 65 m and 90 m respectively below the top of the unit. Up to five greenstone sills that may be up to 50 m in thickness are found within the quartzite sequences below these horizons. The mineralized sequence is overlain by upper quartzite, sericite schist and graphitic schist units lying higher up within the main Keno Hill Quartzite Formation. The sequence generally strikes east to east-southeast and dips moderately to the southwest.

The Flame and Moth deposit comprises the north-northeast striking, moderately southeast dipping Flame vein that is divided into two segments by the west- northwest trending, Mill Fault. The Mill Fault dip approximately 66 degrees to the southwest with the mineralization in the hanging wall section referred to as the Lightning zone and the that in the footwall section referred to as the Christal zone. The Christal zone appears to be cut at its northern end by another smaller post-mineral fault, but any offset on this is not yet resolved.

The Flame and Moth deposit has been traced along surface for approximately 600 m and has been drilled to a depth of 350 m from surface. The structure hosting the deposit is characterized by broad structural zones ranging between 2 m and 33 m in true thickness. The mineralization comprises multiple phase quartz and siderite veining up to11.7 m true width developed within the host fault structure and locally contains massive galena, sphalerite, pyrite and pyrrhotite with associated silver sulphosalts, arsenopyrite and chalcopyrite. Gold is locally present at grades up to 6.85 grams per tonne. The deposit remains open to the south and east, and also westerly up-dip toward surface at the northern extent of existing drilling.

Historically most exploration work conducted in the Keno Hill district was conducted in support of mining activities until mining ceased in Jan/89. Although United Keno Hill Mines carried out various exploration programs poor sample recovery from drill holes and deep overburden hampered the acquisition of useable data on the Flame and Moth deposit. At the time of the company's bankruptcy in 2000, open pit reserves at the Flame and Moth property were estimated at 15 189 tonnes grading 656 g/t silver, 1.39 % lead and 6.41 % zinc. This figure is considered a non-NI 43-101 compliant**"Historical Estimate"** and no details regarding methodology were reported (these resources were described by the company as "probable reserves", - taken from United Keno Hill Mines Ltd - Annual Information Form December 31, 1996).

Cathro (2006) estimated historic production from the Flame and Moth property at 1 442 tonnes grading 627 g/t silver, 1.1 % lead and 0.9 % zinc. Geological modelling carried out by new owners Alexco, has shown that the historical workings were likely centred on the Moth Vein structure, located in the footwall of the Flame vein.

Between 2006 and 2008 Alexco catalogued and digitized all known data relating inherited from United Keno Hill Mines. A district mapping program begun in 2008 and continued to the present identified the presence of two northeast trending vein faults on the Flame and Moth property. The 2010 airborne magnetic and electromagnetic surveys were successful in identifying hidden structures and covered stratigraphy and were used to guide the initial 2010 drill program.

Eleven of the drill holes completed in 2010 intercepted silver-lead-zinc mineralization in a mineralized structure (later named the Christal zone), striking 025 degrees and dipping 62 degrees southeast. The remaining hole was drilled further to the southwest and encountered silver-lead-zinc mineralization much deeper than anticipated and implied a right lateral fault offset of the structure. Results include 4.26 m grading 1,712 g/t silver, 8.0% lead, 9.8% zinc and 1.5 g/t gold from hole K10-320 and 1.13 m grading 1 336 g/t silver, 15.7 % lead, 1.7 % zinc and 0.141 g/t gold from hole K10-285.

In 2011, twenty-four of thirty-two drill holes were successfully completed. The majority of the holes targeted the up-dip extension of the mineralized vein located in the hanging wall of the Mill fault in an area referred to as the Lightning zone.

In Jun/2012 before the start of the 2012 drill program Alexco released an initial mineral resource estimate for the Flame and Moth property. The resource calculation was prepared by SRK Consulting Canada (Inc).

Zone	Class	Tonnes	Silver g/t	Lead %	Zinc %	Gold g/t
Christal	Indicated	263 000	508	2.31	4.91	0.47
	Inferred	213 000	299	1.19	3.38	0.27
Lightning	Indicated	496 000	425	1.42	8.06	0.35
	Inferred	174 000	329	1.16	4.89	0.24
Total	**Indicated**	**759 000**	**453**	**1.73**	**6.97**	**0.39**
	Inferred	**387 000**	**312**	**1.18**	**4.06**	**0.26**

Cut-off = Net Smelter Return of C$185.00/t, Prices and Recoveries = Silver US$23.00/oz, recovery 96%; Lead US$0.95/lb, recovery 97%; Zinc US$0.95/lb, recovery 88%; Gold US$ 1,350/oz, recovery 72%.

This resource estimate represents a strike length of 500, to a depth of 350 m below surface.

The 2012 drill program saw a further 39 drill holes completed. Approximately half of the holes targeted the upper part of the Lightning zone not previously drilled, while the remaining holes were drilled in the lower and southwestern part of the Lightning zone and various infill areas within the Christal zone. Results from the 2012 drilling program confirmed and expanded silver mineralization approximately 100 m up-dip of the previously defined indicated resource as well as identifying a second mineralized structure located approximately 10 m from the main vein.

In Jan/2013 Alexco released an updated mineral resource for the Flame and Moth deposit. The calculation was prepared by Geostrat Consulting Services Inc.

Zone	Class	Tonnes	Silver g/t	Gold g/t	Lead %	Zinc %

Christal	Indicated	450 000	545	0.48	1.74	3.64
	Inferred	57 000	320	0.28	1.08	2.38
Lightning	Indicated	829 000	496	0.40	1.73	7.02
	Inferred	50 000	302	0.26	0.61	6.27
Lightning V2	Indicated	99 000	548	0.27	1.61	3.97
	Inferred	1 000	614	0.12	1.73	4.54
Total	**Indicated**	**1 378 000**	**516**	**0.42**	**1.72**	**5.70**
	Inferred	**107 000**	**313**	**0.27**	**0.86**	**4.21**

Cut-off = Net Smelter Return of C$185.00/t, Prices and Recoveries = Silver US$24.00/oz, recovery 96%; Lead US$0895/lb, recovery 97%; Zinc US$0.95/lb, recovery 88%; Gold US$ 1,400/oz, recovery 72%.

This resource estimate represents an 82 % increase in indicated resources and a 14 % increase in inferred resources. The accompanying report also outlined additional geological, geotechnical, mineralogical, metallurgical, and baseline environmental work need to support the preparation of a preliminary economic assessment study on the deposit.

The 2013 Updated PEA (SRK) re-states the resource dated Jan 2013 quoted above and lists the following features: The Flame & Moth deposit can be mined by underground methods incorporating full backfilling without causing surface disturbance that could put the mill at risk. Flame & Moth's potentially mineable tonnes, 73% of LoM plant feed, are estimated at 593 kt with average metal grades of 690 gpt silver, 0.52 gpt gold, 2.18% lead, and 5.44% zinc, and NSR value of $391/t. Based on an April 1, 2014 development start and permitting timelines, the project is expected to begin providing plant feed in Q2 2015, with commercial production scheduled for Q4 2015.

Work History

Date	Work Type	Comment
12/13/2013	Studies	Alexco, March 2013, by Farrow and McOnie.
12/13/2012	Studies	Initial NI 43-101 compliant resource estimate released.
12/13/2012	Drilling	9 holes, 2,045 m
12/13/2012	Geochemistry	
12/13/2012	Geochemistry	
12/13/2012	Drilling	Thirty-nine holes (8 610 m) completed after resource estimate released.
12/13/2011	Drilling	Twenty-four holes (6 708 m).
12/13/2010	Drilling	Twelve holes (3 974 m) collared on property.
12/13/2010	Geochemistry	Soil sampling carried out in conjunction with drill program.
12/13/2010	Ground Geophysics	Carried out during drill program.
12/13/2010	Airborne Geophysics	Magnetic and electromagnetic surveys flown to produce targets for follow-up drilling.
12/13/2009	Pre-existing Data	
12/13/2009	Geochemistry	
12/13/2009	Geochemistry	
12/13/2009	Lab Work/Physical Studies	
12/13/2009	Other	
12/13/2008	Geology	Company began district wide mapping program.
12/13/2006	Airphotography	
12/13/2006	Airphotography	
12/13/2006	Airborne Geophysics	
12/13/2006	Airborne Geophysics	
12/13/2006	Pre-existing Data	
12/13/2006	Remote Sensing	
12/13/2006	Studies	Company began gathering and digitizing are known data, created wire frame models of known mineralization.
12/13/1999	Geochemistry	

12/13/1999	Geochemistry	
12/13/1999	Other	
12/13/1997	Studies	Non NI 43-101 compliant historical estimate released by company, no details regarding methodology.
12/13/1987	Development, Surface	Company stripped ground but never mined.
12/13/1987	Studies	Company compiled non- compliant historical estimate, no details regarding methodology used released.
12/13/1984	Drilling	Four holes collared (no details) to test down dip of known mineralization.
12/13/1974	Drilling	Four lines of angled holes (989 m), limited success due to overburden and broken ground.
12/13/1965	Drilling	Twenty 28 vertical holes, no details.
12/13/1965	Ground Geophysics	Attempted geophysics again, not successful. No details released.
12/13/1961	Drilling	Company drilled 5 holes, no details on depth, no veining intercepted.
12/13/1961	Geochemistry	Soil sampling over claims but unsuccesful due to depth of overburden.
12/13/1961	Ground Geophysics	Also magnetic, Ronka-EM surveys carried out, unsuccesful due to depth of overburden.
12/13/1955	Trenching	Vein was bulldozer trenched 250 m along strike.
12/13/1950	Drilling	During 1950's 13 horizontal drill holes collared from drift, no record of results.
12/13/1950	Development, Underground	Early 1950's shaft dug and crosscut driven.
12/13/1923	Development, Underground	Shafts and crosscuts dug.
11/15/2013	Studies	SRK, Nov 15 2013.

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
096458	2012	2012 Assessment Report Property Comprising the Following Claims: The "Blue Group" Blue, Blue Fr. 2 and Blue Fr. 3 Claims	Diamond - Drilling, Drill Core - Geochemistry, Soil - Geochemistry	11	1377
095675	2009	Blue Vein Petrographic Study Assessment Report-Blue Claim	Rock - Geochemistry, Soil - Geochemistry, Petrographic - Lab Work/Physical Studies, Prospecting - Other, Data Compilation - Pre-existing Data		
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		
094161	1999	Geochemical Report on the Blue Claim	Rock - Geochemistry, Soil - Geochemistry, Prospecting - Other		
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
YEG2012_OV	Yukon Exploration and Geology Overview 2012	30-31, 63, 65.	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
YEG2010_OV	Yukon Exploration and Geology Overview 2010	46, 62, 64.	Yukon Geological Survey	Annual Report
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)
	Geology of the McQuesten River Region, Northern McQuesten and Mayo Map		Indian & Northern Affairs Canada/Department of Indian & Northern	

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
99-058	Summary Report YMIP Grant #99-058 - 1999 Prospecting and Geochemical Surveys on the Highland Lake, Little Salmon Lake, and Keno Hill Areas		Yukon Government: Energy, Mines and Resources	YMEP Report
YEG2011_OV	Yukon Exploration and Geology Overview 2011	37,69, 72.	Yukon Geological Survey	Annual Report

Resource/Reserve

Year	Zone	Type	Commodity	Grade	Tonnage	Amount	Reported Amount	43-101 Compliant	Cut-off
2019	Flame & Moth (Underground)	Probable	silver	672 g/t	704,211	473229792	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Probable	gold	.49 g/t	704,211	345063.39	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Probable	lead	2.7 %	704,211	19013697	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Probable	zinc	5.7 %	704,211	40140027	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Indicated	silver	498 g/t	1,679,000	836142000	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Indicated	gold	.4 g/t	1,679,000	671600	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Indicated	lead	1.9 %	1,679,000	31901000	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Indicated	zinc	5.3 %	1,679,000	88987000	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Inferred	silver	356 g/t	365,200	130011200	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Inferred	gold	.3 g/t	365,200	109560	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Inferred	lead	.5 %	365,200	1826000	Yes	Yes	Unknown
2019	Flame & Moth (Underground)	Inferred	zinc	4.3 %	365,200	15703600	Yes	Yes	Unknown

Production

Date	Commodity	Amount	Comment
1/1/1923	Ag	904 kilograms	1 442 tonnes grading 627 g/t silver, 1.1 % lead and 0.9 % zinc.