Location/Identification

MINFILE Number: 082ENE017
National Mineral Inventory Number: 082E15 Ag1
Name(s): **WATERLOO**
WATERLOO NO.3 (L.4815), LIGHTNING PEAK CAMP

Status: Past Producer
Mining Method Underground
Regions: British Columbia
BCGS Map: 082E098
NTS Map: 082E15E
Latitude: 49 54 03 N
Longitude: 118 33 30 W
Elevation: 1680 metres
Location Accuracy: Within 500M

Mining Division: Vernon
Electoral District: Vernon-Monashee
Resource District: Okanagan Shuswap Natural Resource Distr

UTM Zone: 11 (NAD 83)
Northing: 5528769
Easting: 388092

Comments: Portal of adit no. 2, about 3.1 kilometres northwest of Lightning Peak (Property File - Falconer, 1988). See also the MORNING (082ENE022) deposit.

Mineral Occurrence

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

Minerals
Significant: Sphalerite, Galena, Silver, Acanthite, Pyrargyrite, Proustite, Stephanite, Chalcopyrite, Tetrahedrite
Associated: Quartz, Calcite, Pyrite, Pyrrhotite
Mineralization Age: Unknown

Deposit
Character: Shear, Vein, Breccia
Classification: Hydrothermal, Epigenetic
Type: I05: Polymetallic veins Ag-Pb-Zn+/-Au

Comments: The vein is hosted by an east striking, steeply north dipping shear zone.

Host Rock

Dominant Host Rock: Sedimentary

Stratigraphic Age	Group	Formation	Igneous/Metamorphic/Other
Tertiary	Chilcotin	Undefined Formation	------
Paleozoic-Mesozoic	Harper Ranch	Undefined Formation	------
Middle Jurassic	------	------	Unnamed/Unknown Informal

Isotopic Age	Dating Method	Material Dated
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Lithology: Limestone, Hornfels, Greenstone, Quartz Porphyry Dike, Diorite, Granodiorite, Basalt

Comments: Quartz porphyry dikes commonly intrude the Harper Ranch Group in the Lightning Peak area. The Chilcotin Group is Miocene-Pliocene in age.

Geological Setting

Tectonic Belt: Omineca
Physiographic Area: Okanagan Highland
Terrane: Harper Ranch, Plutonic Rocks

Inventory

Ore Zone: DRILLHOLE
Year: 2012
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Drill Core

Commodity	Grade
Silver	112.93 grams per tonne
Zinc	11.48 per cent

Comments: Over a true width of 0.7 metres.

Reference: Press Release, Tower Resources, December 4, 2012

Ore Zone: SAMPLE
Year: 2012
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Grab

Commodity	Grade
Silver	1482 grams per tonne
Lead	1.81 per cent
Zinc	26.77 per cent

Comments:

Reference: Press Release, Tower Resources, November 21, 2012

Ore Zone: DRILLHOLE
Year: 1983
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Drill Core

Commodity	Grade
Silver	6600.6 grams per tonne

Comments: across a true width of 0.9 metre

Reference: Property File - Cous Creek Copper Mines Ltd. [1983-12-09]: News - Cous Creek Copper Mines Ltd. - Waterloo Mine

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Ore Zone: UNDERGROUND
Year: 1954
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Chip

Commodity	Grade
Silver	701.1 grams per tonne
Lead	4.6 per cent
Zinc	13.8 per cent

Comments: a chip sample of mineralized vein from a stope pillar between adit no.3 and 4 across 85 centimetres

Reference: Property File - J.C. Stephen [1967-10-20]: Report - Lightning Peak Area - Mastodon Highland Bell Mines Ltd.

Ore Zone: UNDERGROUND
Year: 1954
Category: Assay/analysis
Report On: N

NI 43-101: N

Sample Type: Chip

Commodity	Grade
Silver	106.0 grams per tonne
Lead	4.19 per cent
Zinc	3.87 per cent

Comments: a chip sample from the end of the stope above the no.2 adit across 75 centimetres

Reference: Property File - J.C. Stephen [1967-10-20]: Report - Lightning Peak Area - Mastodon Highland Bell Mines Ltd.

Ore Zone: PIT
Year: 1950
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Grab

Commodity	Grade
Silver	1675.8 grams per tonne
Zinc	1.4 per cent

Comments: A sample of 'high-grade' ore from a pit above the no.4 portal

Reference: Property File - Unknown [Unknown]: Report - Lightning Peak Area

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Ore Zone: SHAFT
Year: 1950
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Grab

Commodity	Grade
Silver	153.2 grams per tonne
Gold	4.1 grams per tonne
Lead	0.7 per cent
Zinc	1.1 per cent

Comments: a sample from a shallow shaft at the most eastern surface workings

Reference: Property File - Unknown [Unknown]: Report - Lightning Peak Area

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Ore Zone: ADIT
Year: 1948
Category: Assay/analysis
Report On: N
NI 43-101: N

Sample Type: Chip

Commodity	Grade
Silver	106 grams per tonne
Lead	4.19 per cent
Zinc	3.67 per cent

Comments: chip sample from No.2 adit

Reference: Property File - James S. Falconer [1988-08-24]: Prospectus Report - Waterloo Mine Property - Eros Resources Ltd.

Summary Production

	Metric		Imperial	
Mined:	982	tonnes	1,082	tons
Milled:	1,011	tonnes	1,114	tons

Recovery	Silver	1,723,791	grams	55,421	ounces
	Gold	2,644	grams	85	ounces
	Zinc	41,060	kilograms	90,522	pounds
	Lead	22,128	kilograms	48,784	pounds
	Cadmium	123	kilograms	271	pounds
	Copper	5	kilograms	11	pounds

Capsule Geology

The Waterloo mine is located on Crown-granted lot 4815, approximately 3.1 kilometres northwest of Lightning Peak and 33 kilometres west-northwest of the Arrow Lake community of Edgewood.

The Lightning Peak area is underlain by limestone and greenstone of the Devonian-Triassic Harper Ranch Group. These are underlain and intruded by granodiorite and diorite of an unnamed Middle Jurassic intrusion. Quartz porphyry dikes are common in the Harper Ranch Group; pegmatitic variations are sometimes associated with mineralization in the Lightning Peak camp. Several remnants of Miocene-Pliocene Chilcotin Group plateau basalts are found in the area, including the summit of Lightning Peak.

The Waterloo mine occurs in an easterly striking shear zone that dips steeply to the north. The shear zone, which averages approximately 1.3 metres in width, is hosted by Harper Ranch limestone. The Waterloo vein follows the shear zone and is sporadically mineralized with streaks and disseminations of sphalerite and galena along much of its length. A limestone-calcite breccia in the shear is well mineralized with sphalerite. A high-grade oreshoot, offset by a southeast-dipping fault, contains massive lenses of sphalerite, galena, native silver, acanthite, ruby silver (both pyrargyrite and proustite) and stephanite. Quartz and calcite are associated with the lenses. Tetrahedrite was noted in adit No. 3. Elsewhere, a hornfels zone near a granodiorite intrusion contains minor amounts of chalcopyrite, pyrite and pyrrhotite.

A sample of ‘high-grade’ ore from a pit above the no.4 portal assayed 1675.8 grams per tonne silver and 1.4 per cent zinc, whereas a sample from a shallow shaft at the most eastern surface workings yielded 4.1 grams per tonne gold, 153.2 grams per tonne silver, 0.7 per cent lead and 1.1 per cent zinc (Property File - Unknown [Unknown]: Report - Lightning Peak Area).

In 1948, a chip sample from the No. 2 adit, collected by Paycheck Mining, assayed 106 grams per tonne silver, 4.19 per cent lead and 3.67 per cent zinc (Property File - James S. Falconer [1988-08-24]: Prospectus Report - Waterloo Mine Property - Eros Resources Ltd.).

In 1954, a chip sample of a mineralized vein from a stope pillar between adits No. 3 and 4 assayed 701.1 grams per tonne silver, 4.6 per cent lead and 13.8 per cent zinc across 0.85 metre, whereas a chip sample from the end of the stope above the No.2 adit assayed 106.0 grams per tonne silver, 4.19 per cent lead and 3.87 per cent zinc across 0.75 metre (Property File - J.C. Stephen [1967-10-20]: Report - Lightning Peak Area - Mastodon Highland Bell Mines Ltd.).

The Lightning Peak mining camp saw considerable activity around the end of the 19th century. The earliest recorded work on the Waterloo dates from 1904, when two small shipments of ore were made. In 1918, G. Borg and C. Hammarstadt carried out exploration work. In 1922, the Waterloo No. 3 claim was Crown granted to F.E. Rendell and C.M. Kingston. Over the next 7 years some exploration work was carried out, resulting in several opencuts and four short adits. Additional development work was carried out by Waterloo Consolidated Mines Limited in 1930. In 1931, Waterloo Gold Mines Limited acquired the property and minor development and production was carried out over the next six years. By 1939, a total of 211 tonnes of ore had been produced from the Waterloo mine, and the underground workings totalled 680 metres of drifting in four adits over a vertical range of 45 metres. The upper three adits total approximately 138 metres in length, and the lowest, the No. 4 adit, is 542 metres long.

In 1948, the Paycheck Mining and Development Company Limited acquired the Waterloo property. In 1948 and 1949, 12 tonnes were mined, this possibly came from the Director 5 (MINFILE 082ENE022) dump.

In 1954, Paycheck Mining rehabilitated adit No. 4 and stoped the vein to the surface. At least five holes were diamond-drilled on the property at this time. A 68-tonne-per-day mill operated in 1954, milling 1011 tonnes, of which 263 tonnes came from existing dumps. A total of 11.8 tonnes of lead concentrates were shipped to the Trail smelter in 1954. In 1967, concentrates left on the site, estimated to be 2.7 tonnes and 42 tonnes of lead and zinc concentrates, respectively, were cleaned up by the Great Horn Mining Syndicate Inc.

Bralorne Pioneer Mines Limited briefly held an option on the property in 1966. They carried out a geochemical survey of the property and surrounding area and were able to identify the Waterloo vein where it was covered by overburden. In 1967, Mastodon-Highland Bell Mines prospected and sampled the area. In 1968 and 1969, International Mine Services Ltd. carried out geochemical and geological surveys and a diamond drill program for the Great Horn Mining Syndicate. The drill program consisted of 16 holes, totalling 1793 metres, on the surface and 16 holes, totalling 529 metres, underground. The drilling, together with underground sampling of the Waterloo vein, indicated variable and, overall, low-grade silver mineralization. No further work was recommended.

In 1978, W.G. Botel carried out a 16.9-kilometre VLF-EM survey over the area. Known shear zones and their projections were identified. Underground development work began in 1980 and by 1984, Botel had driven adit No. 5 a total of 228 metres. In addition, roads were upgraded and track installed in the adits. In 1983, Cous Creek Copper Mines is reported to have removed 11 tonnes of crude ore averaging 2101.6 grams per tonne silver, 0.05 per cent copper, 0.5 per cent lead and 1.1 per cent zinc from the occurrence (Property File - Cous Creek Copper Mines Ltd. [1983-12-09]: News - Cous Creek Copper Mines Ltd. - Waterloo Mine). Diamond drilling performed at this time yielded up to 6600.6 grams per tonne silver across a true width of 0.9 metre (Property File - Cous Creek Copper Mines Ltd. [1983-12-09]: News - Cous Creek Copper Mines Ltd. - Waterloo Mine).

In 1984, Mohawk Oil Co. Ltd. carried out a program of trenching, geological mapping and IP surveying on the adjacent Jon (MINFILE 082ENE024) claim. They found quartz veins and mineralization similar to that on the Waterloo property. During 1987 through 1989, Eros Resources Ltd. upgraded access to the workings and re-opened the No. 4 and 5 adits. In 1992, Zalmac Mines completed a program of geological mapping, soil and rock sampling, surveying and aerial photograph studies on the area as the P and Z claims.

In 2011, Tower Resources optioned the property and completed a program of geological mapping and sampling from outcrops, trenches and dump piles located near old workings. New areas of precious-metal–enriched rocks were also identified during this work. The 39 samples, collected over an area of 4 by 1.3 kilometres, average 112 grams per tonne silver and 0.9 gram per tonne gold. Highlights from this sampling program include two grab samples of dump material that returned up to 2790.0 grams per tonne silver, 1.94 per cent lead and 3.82 per cent zinc (http://www.towerresourcesltd.com).

In early 2012, Tower Resources conducted a predrilling exploration program consisting of geological mapping, prospecting, ground magnetic and VLF electromagnetic surveys and confirmation soil geochemistry. Highlights of this sampling program include a grab sample from the Waterloo mine that yielded 1482 grams per tonne silver, 1.81 per cent lead and 26.77 per cent zinc (Press Release, Tower Resources, November 21, 2012).

Later in 2012, Tower Resources completed a 1200-metre, 11-hole drill program. Hole WL-12-006 intersected the mineralized Waterloo structure at approximately 55 metres below surface. This intersection is well mineralized with sphalerite and lesser galena and assayed 112.93 grams per tonne silver with 11.48 per cent zinc over a true width of 0.7 metre (Press Release, Tower Resources, December 4, 2012).

Bibliography

EMPR AR 1904-G224; 1917-F199; 1918-K203,K221; 1919-N167,174; 1920-N156; 1921-G187; 1922-N355; 1925-A197; 1927-C227; 1930-A224; 1931-A122; 1932-A125; 1933-A149; 1934-A25, A29, D3; 1935-A25,D15; 1936-D57; 1937-A36, D35; 1939-37; 1948-A150; 1949-A138; 1950-A118; 1951-A133,A331; 1952-A140; 1953-A109,A270; 1954-A49,A119; 1955-45; 1966-191; 1967-223; 1968-224
EMPR ASS RPT 817, 1812, 2330, 5200, 7221, 13319
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EMPR RGS 29
GSC MAP 6-1957; 1701A; 1712A; 1713A; 1714A; 1736A
GSC OF 409; 637; 736; 1969
GSC SUM RPT 1930A, p.99A
GCNL #151,#161,#230,#235,#236, 1983
INT PROS & DEV MAG NOV/DEC 1983
PR REL Tower Resources, Nov. 21, 2012, Dec. 4, 2012
WWW http://www.towerresourcesltd.com/s/Waterloo.asp
EMPR PFD 828, 829, 830, 831, 848, 851, 853, 903842, 750796, 600449, 672513, 672514, 672516, 673296

Date Coded:	1985/07/24	**Coded By:**	BC Geological Survey (BCGS)	**Field Check:**	N
Date Revised:	2019/09/29	**Revised By:**	Karl A. Flower (KAF)	**Field Check:**	N