#### REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:

17307,15967,14346, 09075, 05195, 03508, 02877, 02311, 37100

Next Page
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BRITISH COLUMBIA The Best Place on Earth	BC Geological Survey Assessment Report 39823
<b>Ministry of Energy and Mines</b> BC Geological Survey	Assessment Report Title Page and Summary
TYPE OF REPORT [type of survey(s)]: Geophysical Work Performed o	n the Silver Lake Property <b>TOTAL COST</b> : \$ 84,100.43
AUTHOR(S): M.Patitucci	SIGNATURE(S): Mathim
NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):	у <b>еар оf work</b> : 2020
STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S):	SoW #5853744, SoW #5924687
PROPERTY NAME: Silver Lake	
CLAIM NAME(S) (on which the work was done): SILVER SAM ORION	SOUTH SHORE SILVER, GILLIAM LINK, LAKE LINK
GOOSLY LAKE, SILVER LAKE N. SILVER LAKE W	
COMMODITIES SOUGHT: Ag, Zn, Au, Cu MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 093L 260, 093L	. 330
	NTS/BCGS: 093L/01
LATITUDE: <u>54</u> <u>10</u> <u>37</u> LONGITUDE: <u>126</u> OWNER(S): 1) ROBERT FREDERICK WEICKER	_ <sup>0</sup> <u>21</u> <u>32</u> (at centre of work) 2)
MAILING ADDRESS: SUITE 2801 - 1166 MELVILLE ST,	
VANCOUVER, BC, CANADA, V6E 4P5	
OPERATOR(S) [who paid for the work]:   1) Prosperity Exploration Corp.	2)
MAILING ADDRESS: #1240, 789 W. Pender St.	
Vancouver, BC, V6C 1H2	
PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, Cretaceous Skeena Group, Kasalka GroupLower Jurassic Hazel	alteration, mineralization, size and attitude): on Group, Ag-Zn Mineralization,
breccia, lenticular discontinuous massiveand semi-massive sulph	ide mineralization.

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne 181 line-kilometers			\$84,100.43
GEOCHEMICAL (number of samples analysed for)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/t	rail		
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST:	\$84,100.43



# Mineral Titles Online

# Mineral Claim Exploration and Development Work/Expiry Date Change Confirmation

Recorder:HANSON, JEREMY<br/>ANDREW (279251)Recorded:2021/DEC/03D/E Date:2021/DEC/03

Submitter:HANSON, JEREMY<br/>ANDREW (279251)Effective:2021/DEC/03

#### Confirmation

If you have not yet submitted your report for this work program, your technical work report is due in 90 days. The Exploration and Development Work/Expiry Date Change event number is required with your report submission. **Please attach a copy of this confirmation page to your report.** Contact Mineral Titles Branch for more information.

Event	Number:	5853744

Work Type:	Technical Work
Technical Items:	Geophysical
Work Start Date:	2020/DEC/09

work Start Date:	2020/DEC/09
Work Stop Date:	2020/DEC/16
Total Value of Work:	\$ 78850.43
Mine Permit No:	

#### Summary of the work value:

Title Number	Claim Name	Issue Date	Good To Date	New Good To Date	# of Days For- ward	Area in Ha	Applied Work Value	Sub- mission Fee
1077550	SILVER SAM	2020/JUL/25	2021/JUL/25	2026/NOV/20	1944	283.90	\$ 14152.18	\$ 0.00
1077551	ORION	2020/JUL/25	2021/JUL/25	2026/NOV/20	1944	75.80	\$ 3778.61	\$ 0.00
1077663	SOUTH SHORE SILVER	2020/JUL/29	2021/JUL/29	2026/NOV/20	1940	265.08	\$ 13170.59	\$ 0.00
1077709	GILLIAM LINK	2020/JUL/31	2021/JUL/31	2026/NOV/20	1938	397.77	\$ 19730.59	\$ 0.00
1077710	LAKE LINK	2020/JUL/31	2021/JUL/31	2026/NOV/20	1938	18.93	\$ 938.92	\$ 0.00
1079808	GOOSLY LAKE	2020/NOV/29	2021/NOV/29	2026/NOV/20	1817	189.32	\$ 8449.30	\$ 0.00
1079809	SILVER LAKE N	2020/NOV/29	2021/NOV/29	2026/NOV/20	1817	227.11	\$ 10135.77	\$ 0.00
1079811	SILVER STAR W	2020/NOV/29	2021/NOV/29	2026/NOV/20	1817	189.34	\$ 8450.09	\$ 0.00

#### **Financial Summary:**

Total applied work value:\$ 78806.05

<b>* 0 0</b>
\$ 0.0
Robert Weicker \$ 0.0 \$ 44.38

Please print this page for your records.

The event was successfully saved.

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Print and Close

Confirmation

#### Mineral Titles Online

#### Mineral Claim Exploration and Development Work/Expiry Date

Change

Recorder: HANSON, JEREMY ANDREW (279251) Recorded: 2022/FEB/11 D/E Date: 2022/FEB/11 Submitter: HANSON, JEREMY ANDREW (279251) Effective: 2022/FEB/11

#### **Confirmation**

If you have not yet submitted your report for this work program, your technical work report is due in 90 days. The Exploration and Development Work/Expiry Date Change event number is required with your report submission. **Please** attach a copy of this confirmation page to your report. Contact Mineral Titles Branch for more information.

#### Event Number: 5924687

Work Type:	Technical Work				
Technical Items:	Geophysical				
Work Start Date: Work Stop Date: Total Value of Work: Mine Permit No:	2020/DEC/09 2022/FEB/11 \$ 5250.00				

#### Summary of the work value:

Title Number	Claim Name	Issue Date	Good To Date	New Good To Date	# of Days For- ward	Area in Ha	Applied Work Value	Sub- mission Fee
1077550	SILVER SAM	2020/JUL/25	2026/NOV/20	2027/FEB/05	77	283.90	\$ 898.37	\$ 0.00
1077551	ORION	2020/JUL/25	2026/NOV/20	2027/FEB/05	77	75.80	\$ 239.86	\$ 0.00
1077663	SOUTH SHORE SILVER	2020/JUL/29	2026/NOV/20	2027/FEB/05	77	265.08	\$ 838.82	\$ 0.00
1077709	GILLIAM LINK	2020/JUL/31	2026/NOV/20	2027/FEB/05	77	397.77	\$ 1258.70	\$ 0.00
1077710	LAKE LINK	2020/JUL/31	2026/NOV/20	2027/FEB/05	77	18.93	\$ 59.90	\$ 0.00
1079808	GOOSLY LAKE	2020/NOV/29	2026/NOV/20	2027/FEB/05	77	189.32	\$ 599.08	\$ 0.00
1079809	SILVER LAKE N	2020/NOV/29	2026/NOV/20	2027/FEB/05	77	227.11	\$ 718.65	\$ 0.00
1079811	SILVER STAR W	2020/NOV/29	2026/NOV/20	2027/FEB/05	77	189.34	\$ 599.13	\$ 0.00

#### **Financial Summary:**

Total applied work value: \$ 5212.51

Total Paid:	\$ 0.0
Total Submission Fees:	\$ 0.0
PAC name: Debited PAC amount: Credited PAC amount:	ROBERT WEICKER \$ 0.0 \$ 37.49

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# **Technical Report for Geophysical Work** Performed on the Silver Lake Property

OMINECA MINING REGION, BRITISH COLUMBIA, CANADA

Located Within: NTS Sheet: 093L/01E and 093L/01W

**Centered at Approximately:** Latitude 54°10'37" North by Longitude 126°21'32" West

Work Start Date Work Stop Date 2020/dec/09 2020/dec/16

**Report Prepared for:** 

# **Prosperity Exploration Corp.**

#1240, 789 W. Pender St. Vancouver, BC, V6C 1H2

**Report Prepared by:** 

Mitchell Patitucci, G.I.T

Hardline Exploration Corp 7351 Cedar Rd Smithers, BC, Canada VOJ2N2



EFFECTIVE DATE: February 14<sup>th</sup>, 2022



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## Summary

The Silver Lake project is an exploration stage project approximately 30 km southeast of Houston, BC in the Omineca Mining Division. In 2021 an airborne geophysical survey was flown for Prosperity Exploration Corp ("Prosperity" or "the Company"). The report presents the results of the analysis and interpretation of the data regarding the Helicopter-borne versatile time domain electromagnetic (VTEM) and aeromagnetic geophysical survey completed in December 2020.

The object of the survey was to aid in geologic interpretation of the property and detect and delineate zones and structures potentially associated with mineralization and confirm the presences of historic geophysical anomalies.

The survey area was flown in a west-east direction, with line spacing of 150 metres. Tie lines were flown perpendicular at 1500 metre line spacing. A total of 181 line-kilometers were completed on the Silver Lake Property.

The property is comprised of eight contiguous mineral claims totalling 1647.24 ha. Mineral exploration on and in the immediate vicinity of the property has been intermittent since the mid-1900's and focused on silver, gold, copper, and molybdenum. Reasonable access to the property and well-maintained road networks from nearby towns may permit year-long work programs at the Silver Lake Project.

The property lies within the Stikine terrane and is underlain by Mesozoic to Cenozoic sedimentary and volcanic rocks and related intrusive stocks. Rocks at the Silver Lake property are ascribed to the Cretaceous Skeena and Kasalka Groups and Eocene Endako Group and Goosly Lake and Nanika plutonic suites. Mineralization on the property occurs as Cu-Ag-Au and polymetallic Ag-Pb-Zn+/-Au style mineralization and massive sulfide vein systems in altered volcanics of the Goosly Lake formation. This report is a compilation of work completed on the project to date.

The 2020 VTEM survey outlined three areas with anomalous VTEM responses with coincident magnetic signatures. The VTEM survey outlined an anomalous EM trend that strikes N-S and is coincident with a historically defined ZTEM anomaly. Depth inversions of the ZTEM data indicates that both the Equity Mine anomaly and Silver Lake anomaly have large depth extents in excess of 1 km. The magnetic data acquired by the ZTEM and VTEM surveys show a close proximity of elevated magnetic susceptibility to both the Equity Silver mine and the Silver Lake anomaly. Geologically, the presence of intrusive bodies consisting of granitic stocks and syenomonzonite-gabbro stocks appear to be similar in both the Equity Silver mine and the L&L Silver Lake anomaly. Modelling of the VTEM L&L response indicates a weak to moderately conductive body in excess of 2 km in strike length and 1 km in width with depth to top in the range of 100 meters.

A total expenditure of \$84,100.43 was incurred.

# 1. Introduction

## 1.1 Location, Access, Physiography and Climate

### 1.1.1 Location and Property Description

The Silver Lake Property is situated around Goosly Lake, approximately 30km southeast of the town of Houston, BC in north-central British Columbia. The Property consists of eight contiguous mineral claims totalling 1647.24 ha within the Omineca Mining Division (Table 1). The mineral claims are located on Crown Land and administered by the Government of British Columbia's Mineral Titles Online system ("MTO"). The Property claims (Figure 1) lie within NTS Map sheet 093L with the center coordinates of 671658mE, 6005105mN (WGS 84, UTM 9N; Lat: 54°9'54" and Long: -126°22'12").

Upon filing Statement of Work Events #5853744 and #5924687, new good to dates are listed in Table 1 below.

Tenure ID	Claim Name	Issue Date	New Good to Date	Client ID	Area	
1077709	GILLIAM LINK	2020/07/31	2027/02/05	128515 (100%)	397.7721	
1077710	LAKE LINK	2020/07/31	2027/02/05	128515 (100%)	18.9287	
1077550	SILVER SAM	2020/07/25	2027/02/05	128515 (100%)	283.8992	
1077551	ORION	2020/07/25	2027/02/05	128515 (100%)	75.8006	
1077663	SOUTH SHORE SILVER	2020/07/29	2027/02/05	128515 (100%)	265.0822	
1079809	SILVER LAKE N	2020/11/29	2027/02/05	128515 (100%)	227.106	
1079811	SILVER STAR W	2020/11/29	2027/02/05	128515 (100%)	189.3359	
1079808	GOOSLY LAKE	2020/11/29	2027/02/05	128515 (100%)	189.3183	

#### Table 1: Silver Lake Property Claims as of February 11<sup>th</sup>, 2022.



Figure 1: Silver Lake Mineral Claims.

#### 1.1.2 Access

The Project area can be accessed via two primary routes from Houston, BC.

The Equity Mine Road, a 38km gravel road leads to the northern claims. Or to the south, a series of active and deactivated forest service roads provide access the rest of the property. Alternatively access to southern claims can be made from Highway 16 via the Buck Flats Road which stems to the Goosly Forest Service Road, however off-road vehicles may be required along old under-maintained logging roads (Figure 2).

The road downhill from the mine site to Goosly Lake is maintained in winter by Equity Mine to provide access to the Bessemer Creek water monitoring pond and other stream check stations; therefore, it may be feasibly possible for year-round work programs to be conducted on the Property. Labour and services are readily available from the communities of Houston, Smithers, Vanderhoof and Prince George. Trucking, expediting, industrial supplies, heavy duty machinery and operators are available locally as well. Mining and exploration personnel and services are readily available including numerous helicopters, drilling, expediting, heavy equipment, pad and camp construction companies as well as the Smithers Branch of the Ministry of Energy and Mines.



Figure 2: Access to Property from nearby community of Houston, BC. Access Roads via Equity Mine Rd or Goosly FSR

## 1.1.3 Physiography and Climate

The climate at the Silver Lake Project property is typical of north-central BC. The nearby community of Houston lies 596m above sea level. The climate is cold and temperate. There is a moderate amount of rainfall even in the driest months. Climate data from nearby Smithers Regional Airport Station is listed below in (Table 5.2.1) provides a historical average of the monthly temperatures and precipitation of the region.

													Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Daily Average (°C)	-7.2	-4.4	0.1	4.8	9.4	13	15.2	14.6	9.9	4.4	-2.1	-7.1	
Record High (°C)	15.6	11.9	18.9	25.8	35.8	34.2	36	35.2	31.1	24.4	15.6	13.6	
Record Low (°C)	-43.9	-35.6	-33.3	-18.3	-7.2	-4.1	-1.1	-2.2	-6.7	-22	-32.4	-39	
Avg Precipitation (mm)	42.7	23.4	20.6	23.8	38.1	55.2	45.6	43.8	53.8	64.8	55	41.9	508.5
Avg Rainfall (mm)	10.1	5.5	6.7	18.7	37.4	55.2	45.6	43.8	53.8	56.9	25.6	8	367.2
Avg Snowfall (cm)	44.5	23.5	16.7	5.6	0.7	0	0	0	0	8.6	37.4	45.6	182.7
1981 to 2010 Canadian Climate Normals station data; Smithers BC; 54°49'29.000" N 127°10'58.000" W 521.8 m													

Figure 3: Average Climate Data for Smithers, BC. Source climate.weather.gc.ca.

The area ranges from elevations of 900m in the southwest corner of the property to 1300m in the northeastern claim. The area is forested by mixed stands of predominantly second growth sub alpine pine and spruce. Many portions of the property have undergone logging over the past 20+ years. Cut blocks from previous logging around the area are commonly seen from satellite imagery, vegetation including spruce, fir and hemlock, or spruce and pine.

The region is characterized by low mountainous terrain and gently rolling hills that rise above flat areas of swampy ground with few streams. Thick overburden is common as glacial veneer layers (5-18 m thick) and gravel deposits up to 50m. Percussion drilling and diamond drilling confirm these extensive blankets of overburn. Outcrop is typically found along bluffs, hillsides and road cuts.

#### 1.2 History

The history of work on the Silver Lake Project area dates backs to 1969, after the discovery of the Equity Silver Mine to the east of the project area sparked an extensive period of exploration and claim staking. Extensive geochemical sampling, geophysical surveys, physical work, percussion and diamond drilling have been conducted on various cells within the Silver Lake Property. To the date of this report, no mineral resource or reserve estimates have been produced and there is no record of historical production on the Property. The history of exploration on the Property is summarized in the section below (Table 1).

Assessment Year History of exploration on the Silver Lake Project **Report No.** 1969 Bayland Mines Ltd. conducted geochemical soil on the KG claims group to 2196 the south of Goosly Lake. No anomalous values were observed in soils. 2239 Mark V Mines carried out a limited geochemical survey on the southern portion FKE/NRG claims. The results were inconclusive due to depth of overburden or glacial till in the area. Silver Standard Mines Ltd completed geochemical soil sampling and 2311 240.0 km of grid line physical work on behalf of owner Dorita Silver Mines on their Goosly property. Results indicated three broad anomalous regions with elevated silver and two copper outlines. Claim groups Goosly West and Goosly North West are applicable to this report. 2335 Orequest Exploration Synd. completed 500 soil samples over the Goosly Lake Project claims. Two areas of slightly anomalous copper with were outlined on the north side of Goosly Lake, referred to as Cu-1 and Cu-2. 2207 Physical line cutting of 66.0 km on the KG property claims to the south of Goosly Lake was completed on behalf of Panther Mines Ltd. 1970 2726 Mark V Mines completed a secondary geochemical in complement to their 1969 field work; however, focus was on the previously unsampled northern portion of the claims. Soil geochemistry was unable to outline anomalous regions of silver or copper-in-soil. 2863 Lewes River Mines conducted a geochemical soil sampling survey on the Goosly property with limited outcrop mapping. Two anomalous silvercopper regions were outlined to the south of Goosly Lake near the Buck Flats / Goosly Lake Forest Service Road. Aerial extent of Anomaly 1 is approximately 3000 feet x 400 feet. 2971 Orequest Exploration Synd. conducted additional geochemical, geophysical and geological work on the Goosly Lake project claims. 400 soil samples were collected within the mapped 4500 ha area. Nine (9) bulldozer trenches were dug, three of which reached bedrock. Two (2) percussion drillholes completed (totalling 219.5 m). No significant metal values from drilling were observed. GL-1 tested an elevated zinc-in-soil outline (Zn-1), while GL-2 tested Cu-2 (anomalous copper-in soil) areas from 1969 fieldwork.

Table 2: History of exploration on the Silver Lake Property and historical claim groups. Source ARIS BC website.

1971	3508	Payette River Mines conducted the first geophysical work reported on the Goosly property with 10.1 line-kms of induced polarization (IP) surveying focused on the "anomalous" regions indicated by Silver Standard Resources in 1969 (AR 2311). The survey was able to outline a "thumbprint: chargeability anomaly at approximately 90 feet depth within the DG 1 claim block.
1974	5195	Payette River Mines completed ~250 meters of percussion drilling over 4 drill holes to test the source of the IP anomaly outlined in 1971 work. Holes P-1, P-2 and P-3 intersected a dacite unit which contained 5-10% pyrite within the current property claims. The pyrite content was likely the causative source of the IP anomaly. No economically significant mineralization was observed, though zinc values ranged between 65 – 1100 ppm, and silver ranges from 0.6 to 4.8 ppm in sampled cuttings.
1976	6151	Gillian Mines Ltd carried out initial geochemical surveying of soils (830 samples), geological mapping, 51.0 line-kms of IP and one-VLF survey. Soil surveying identified few low-level Cu and Ag anomalies. Geophysical surveys outlined a VLF and coinciding IP anomaly to the north area along a mapped the contact between gabbro and volcanic units; in addition to four (4) more VLF conductors in the Gillian property.
	6148	Gillian Mines Ltd completed a phase 2 program in late 1976 on the Gillian property. A total of 11 percussion drillholes tested the area around the rhyolitic stock on the Gillian West claims, PG-9 to PG-11 lie within the claim boundaries of this report. Drilling was unable to successfully answer the IP anomalies although alteration and pyrite mineralization were noted in the drill-logs. Though no ore-grade mineralization was intersected, anomalous silver values above 2.0 ppm threshold were noted in holes PG -9 and -10.
1979- 1981	8189	Gillian Mines Ltd further advanced the Gillian project and completed 3 NQ-sized drillholes, totalling 116.4 meters in late 1979. Drilling in the area of the rhyolite breccia dome failed to intersect any significant mineralization. A 16.5 line-km survey of vector pulse-electro- magnetometer survey was conducted over the property. Results indicate a conductive surface overburden layer, but no strong conductors were observed. Early 1980 began the second stage of drilling with completion of and additional 33 drillholes (80-1 thru 80-33) by end of year. Total meterage drilled is unknown publicly for that year (Referenced in AR 10851). Drill results are not readily available, though drilling alluded to cutting a zone which represents a lower rhyolite horizon.
1980	8828	Geokor Energy Holdings Ltd completed two (2) diamond drillholes totalling 41.1 meters, using a winkie drill on the Tow property. Drilling was to test recent geochemical and geophysical work done to the west at the Gillian property and test similarities in local geology. Weak sulfide mineralization was noted but no assay results are publicised.
1981	10851	Gillian Mines Ltd completed the most extensive drill program to date on the Loyd North Claims (on Gillian Property) totalling 2332.3 meters of NQ sized drillholes (81-34 thru 81-45). No economic intervals from drilling were reported. A detailed ground magnetometer survey was conducted and outlined 3 anomalies to test following a northeastern trend through the property.
1985	14346	Normine Resources Ltd completed 10.5-line kms of line cutting to complete geochemical soil samples (117), IP and magnetometer surveys on the Goosly 2 claim group. Several parallel mercury-in-soil anomalies were outlined along the southwest of previous percussion drilling along the quartz-sericite-sulfide zone.

	14183	Normine Resources Ltd completed 14.1-line kms of line cutting to complete IP, magnetic and VLF surveys over the claims. Three strong chargeability anomalies were identified; however, no electromagnetic targets are associated
1986	15967	Normine Resources Ltd. completed 24 percussion drillholes on the Goosly 1 and Goosly 2 claims in additional to 319 soil geochemical samples. Though no significant intervals were reported in drilling, "anomalous geochemical signatures" expected to the peripheral of an Equity Silver-Copper type deposit were observed in PH 86-07 and PH 86-08. Physical construction of 5.8 km of roads were built to access the 29 drill pad sites.
1984- 1986	17307	Faraway Gold Mines drilled fifteen (15) percussion holes in 1984, followed by another twenty-five (25) percussion holes in 1985 in the 200 meters by 240-meter-long quartz-sericite alteration zone on the Sam claims. Highlights included a 3- meter interval of 50 ppm silver and 15,000 ppm zinc. No record of drillhole logs or assay data was found publicly. Between 1986-1987, Faraway Gold Mines drilled a total of 45 NQ-sized diamond drill holes. Drillholes collared on the Property are identified in Section 6.5 (Drilling). Successful diamond drilling in the East, West, Central and South Zones returned elevated silver values. Mineralization encountered was primally semi-massive to massive sulfide zones of pyrite with minor chalcopyrite, magnetite, sphalerite and lesser tetrahedrite, diamond drilling noted similarities to the nearby Equity Silver Mine in terms of rock sequences and tuffaceous units. During this exploration campaign, 3.5 km of roads were constructed allowing access via old logging roads to drill sites.
2008 - 2009	GBC 2008-10, GBC 2009-06, GBC 2009-11, GBC 2009-18, GBC 2009-24	Geoscience BC launched regional QUEST-West Project in June 2008 to help identify mineral potential with two airborne geophysical surveys, one ground geophysical survey and additional geoscience data compilation. Further follow-up reanalysis and compilation of maps are publicly available through this source.
2009	31051	Owners B.Church and D.Haughton conducted a 1.6 reconnaissance self- potential (SP) geophysical survey on the Gillian Silver property, to the south of Goosly Lake. The survey aided in the extent of bedrock geology observation which may be buried by thick overburden; however, no sulfide ore was detected/recognized by the survey. Fifteen field grab/chip samples were collected for analysis and comparison to geophysical interpretation. One gossanous float sample assayed highest values for Cu (99.7 ppm), S (0.4%), and very high Sb (85.4 ppm).
2017	37100	Copper Mountain Mining Corp. completed 40-line kms of a helicopter- borne AFMAG Z-axis Tipper electromagnetic (ZTEM) surveying across the Goose 1 property. Data interprets a conductive zone that trends 160° from the southern part of Equity Mine to Goose 1 property.



Figure 4: 2020 VTEM coverage on Silver Lake Property

# 2 Geology

# 2.1 Geologic Setting and Regional Geology

The Silver Lake property is located within the Intermontane tectonic province of British Columbia and underlain by rock assemblages of the allochthonous Stikine terrane (Figure 4). The Stikine terrane formed outboard of ancestral North America starting in the Late Paleozoic and was accreted initially to other allochthonous terranes including Quesnel and Cache Creek terranes. These terranes were subsequently sutured to the North American margin in the Middle Jurassic. The mosaic of terranes has since been intruded by post accretion plutonic suites and covered by siliciclastic deposits.



Figure 5: Geologic terranes of British Columbia. Yellow star indicates Silver Lake Property, south of Houston, BC.

#### 2.1.1 The Stikine Terrane

The Stikine terrane generally trends northwest spanning over 1,500 km across the length of British Columbia and varies in width from over 300 km wide to less than 100 km. It is the largest terrane in BC

among the most metallogenetically significant. The Philippine microplate with complex, opposite-facing arcs is considered a present-day analog (Marsden and Thorkelson, 1992).

The Stikine terrane is a complex volcanic arc assemblage built during three episodes of island arc formation between the late Paleozoic and early Mesozoic. Each is represented by an unconformity bounded volcanic-sedimentary sequence and coeval intrusive suite: 1) Devonian to Permian Stikine assemblage and Asitka Group and Forrest Kerr and More Creek plutons, (Logan et al. 2000; Gunning et al. 2006); Middle to Upper Triassic Stuhini and Takla Groups and accompanying intrusions such as the Hotailuh and Hickman batholiths (Souther, 1977; Monger, 1977; Dostal et al. 1999); and Lower to Middle Jurassic Hazelton Group and related high-level intrusions such as the Texas Creek suite (Barresi et al., 2015). Much of the porphyry related metal endowment is contained within sub-volcanic intrusive complexes related to the Stuhini and Hazelton Groups.

### 2.1.2 Post Accretionary Stratigraphic Rocks

Middle – late Mesozoic Bowser Lake Group and Skeena Group rocks formed in syn -post accretionary basins and cover much of the north-central part of the Stikine terrane. The Bowser Lake Group sedimentary sequence spans the former basin between the Stikine Arch and Skeena Arch and consists of nine different sedimentary assemblages (Evanchick et al., 2001).

The Mesozoic volcano-sedimentary packages of Stikinia form the basement rocks in the area, which are comprised of Late Triassic to Middle Jurassic arc volcanic rocks and their erosional products. The Bowser formation records marine deposition from the Upper Jurassic until the mid-Cretaceous as overlapping basinal assemblages, with subsequent deposition of the Skeena Group in the Early Cretaceous. Continental margin arcs were episodically deposited unconformably during the Late Cretaceous to Eocene producing the Kasalka, Ootsa Lake, and Endako groups (Kim et al., 2015).

#### 2.1.3 Post Accretionary Intrusions

During late Mesozoic to Cenozoic time, intrusive rocks formed in an intracontinental setting, after the outboard host arc and related terranes accreted to the western margin of North America and accumulated siliciclastic cover rocks. The intrusive rocks are interpreted to occur in continental back arc settings and individual deposits are generally hosted by older country rocks referred to above. Deposits are generally hosted within the Hazelton group and show a spectrum of metal associations and deposit styles; porphyry copper-molybdenum at the Huckleberry mine (currently on care and maintenance status); porphyry copper-gold at past producing Bell and Granisle mines; porphyry molybdenum at the past producing Kitsault mine. Precious and base metal vein deposits can occur peripheral to intrusive stocks, such as at the Equity Silver Mine.

## 2.1.4 Structure and Folding

Braided sets of post-accretionary, northwest trending, strike-slip faults, transect the mosaic of terranes and set the overall structural grain of the Cordillera. Faults record mainly dextral displacement from mid Cretaceous to Eocene and with a cumulative offset up to 800 km (Gabrielse et al., 2006). The Skeena Arch is a northeast - southwest structural corridor which transects approximately the middle of the Stikine terrane.

The Skeena Arch is the topographic highland which separates the Bowser basin sediments to the north and the Netchako plateau to the south. Faults in this area create a mesh-like map pattern which cross-cut the general northwest trend of the Cordillera with east-northeast trending host and graben faults.

The Skeena Arch is endowed with over 800 known mineral occurrences detailed in the BC geological Survey's MINFILE database.

The broader Silver Lake property region lies in the Skeena Fold Belt, a regional fold and thrust belt primarily expressed in thinly layered strata of the Bowser Basin but also present within Stuhini and Hazelton strata. The majority of fold and thrust faults trend northwest and accommodate northeasterly shortening during the Cretaceous. Northeast trending folds in the domains on the western side of the fold belt have similar geometry and scale as northwest trending folds.

The Silver Lake property lies in a block-faulted depression controlled by a system of en echelon strikeslip faults linked by pull-aparts referred to by some authors as the Buck Creek Basin (Dostal et al., 2005). Basin fill is comprised of intermittent sedimentary and volcanic rocks and associated intrusive stocks, dikes, and sills.

## 2.2 Property Geology

The Silver Lake property and surrounding area is underlain by sedimentary rocks of the Skeena Group (Red Rose Formation), andesitic volcanics of the Kasalka Group, and volcanics of the Endako Group (Buck Creek, Goosly Lake formations). A stock belonging to the Goosly Lake plutonic suite is mapped intruding Kasalka Group sediments in the western portion of the Gillian Link claim (1077709). Property geology map shown in Figure 7.7.1.

#### 2.2.1 Skeena Group

The Skeena group is comprised of marine and continental sedimentary rocks and volcanic strata deposited in the Early to Late Cretaceous following regional uplift and erosion of the Skeena Arch. Sediments of the Skeena Group were transported southwest across the arch from the Pinchi belt and Columbian orogen (Tipper and Richards, 1976). The Skeena Group has been separated into the Lower Cretaceous Red Rose Formation and the Upper Cretaceous Brian Boru Formation (Sutherland Brown, A. 1960). Volcanics in the Skeena Group have been separated into the Brian Boru Formation, consisting of grey to green basaltic to rhyolitic breccias, tuffs, and flows. Andesites occur as flows or breccias ranging from purple to green to grey.

Sedimentary rocks of the Skeena Group at the Silver Lake Property have been ascribed to the Red Rose Formation, and are described as greywacke, sandstone, shale, and conglomerate with common coal seams. Skeena Group sediments are, in places, difficult to distinguish from Bowser Lake and Hazelton group sediments, and are differentiated based on the presence of fine flakes of detrital muscovite which are lacking in Hazelton and Bowser Lake sediments.

## 2.2.2 Kasalka Group

The Kasalka Group has a wide distribution in British Columbia, from Kemano to the west and as far north as Smithers. Kasalka Group rocks have been interpreted to be either Jurassic andesite or younger Eocene felsic rocks with a basal unconformity of conglomerate overlying deformed, older rocks. Basal conglomerates are unconformably overlain by thick packages of andesite flows and volcaniclastic rocks. The youngest members of the Kasalka group consist of rhyolitic flows that unconformably overlie the andesitic flows and volcaniclastic rocks (MacIntyre, 1977, 1985).

Kasalka Group volcanics are associated with several mineral deposits, including the large Blackwater epithermal-style Au-Ag deposit. The Capoose Au-Ag deposit south of Fraser Lake is hosted in similar rock

types of comparable age to the Kasalka group, as well as the Newton deposit located southeast of the Blackwater deposit hosted in Late Cretaceous felsic volcanic rocks likely representing a southerly occurrence of the Kasalka Group (Kim ert al., 2015).

The Kasalka Group basal conglomerate is characterized by polymict, poorly sorted, clast supported, cobble to boulder conglomerate. Exposures of basal conglomerate of the Kasalka Group can be found north and south of Francois Lake and trending northwest for 28km. Cobble-sized clasts are generally well-rounded and comprised of fine-grained green and maroon volcanics and flow-banded rhyolite. Conglomerate matrix is either volcanic, similar to the green-maroon lithoclasts, or of sedimentary origin as dominantly dark red quartz-feldspar and matrix with green-grey silica cement (MacIntyre, 1977). These conglomerates form the base of the Kasalka Group, which unconformably overlie the Jurassic Hazelton and Middle Cretaceous Skeena groups.

Andesite flows form the largest component of the Kasalka Group, sitting unconformably on top of the basal conglomerate. Outcrops are found along a similar northwest trend from Burns Lake to Knewstubb Lake. Andesites are described as pale grey-brown to grey-purple weathering andesite to dacite flows, with grey to maroon fresh surfaces and ubiquitous plagioclase and hornblende phenocrysts.

Rhyolites of the Kasalka Goup are described as whitish-pink to grey weathering rhyolitic ash to crystal tuffs. They are light pink-grey to bright pink on fresh surfaces and chalky green lithic fragments of altered green pumice in fine-grained matrix. Lithic fragments make up to 15% of the unit.

A large portion of the Silver Lake property is interpreted to be underlain by Kasalka group andesitic volcanic rocks.

#### 2.2.3 Ootsa Lake and Endako Group

The Ootsa Lake Group is defined as an Eocene to Oligocene assemblage of mainly rhyolitic to dacitic lavas, volcaniclastic rocks, and minor basalt, andesite, and sedimentary rocks. The Endako Group is comprised of flat-lying to gently dipping strata of amygdaloidal, plagioclase-phyric, and rarely pyroxene or olivine phyric dacitic, basaltic to andesitic lavas up to 600m thick (Bordet, Hart, and Mihalynuk, 2014). Endako Group strata are only reported in the Nechako Plateau south of Fort Fraser and at Blackdome mine, where they unconformably overlie the Ootsa Lake Group.

Endako Group rocks at the Silver Lake property belong to the Goosly Lake and Buck Creek formations. The Goosly Lake formation is comprised of trachyandesite flows, dikes, and stocks. Goosly Lake volcanics and associated intrusions have been dated to 52+/-1Ma (Dostal et al., 2001). At the Silver Lake property, the Goosly formation occurs as alkaline volcanics ascribed to the Endako Group and as monzodiorite to gabbroic intrusive rocks located in the southwest portion of the claim block. Buck Creek formation rocks are described as intermediate to mafic flows and breccias dating to 50+/-1Ma (Dostal et al. 2001). Rocks belonging to the Buck Creek formation in the area surrounding the Silver Lake property are described as basaltic volcanic rocks.



Figure 6: Silver Lake Property Geology and Minfile Occurrences

### 2.3 Local Mineral Occurrences

There are at least two known MINFILE showings on the Silver Lake property and ten additional showings, prospects, and past producers in the area immediately surrounding the claims. Mineralization style is predominantly polymetallic base and precious metal veins within Eocene volcanics of the Goosly Lake formation and associated intrusive rocks and porphyry-style copper +/- molybdenum +/- gold mineralization in Nanika intrusive rocks. The Equity Silver mine lies roughly seven kilometers to the northeast of the center of the Silver Lake claim block and is a past producing silver mine. Mineralization at the Equity Silver mine is interpreted to be epigenetic in origin, resulting from hydrothermal metal-bearing fluid incursions into volcaniclastic country rocks. The source of the hydrothermal fluid is thought to be nearby intrusive activity.

#### ORION, DOE showing (MINFILE 093L 330)

The Orion showing is located in the Orion claim block (1077551) and is reported to host exposures of pyrite and float of massive sulfides. The showing is underlain by sedimentary rocks of the Red Rose formation with nearby gabbro stock intruding volcanic rocks. In 1967, North Pacific mines completed a magnetic survey and identified two anomalous areas in the vicinity of the showing. Some diamond drilling is reported to have been completed on these zones, but no records are available.

#### SAM, NWB, DG Showing (MINFILE 093L 260)

The SAM showing is located in the northeast portion of the property on the Silver Sam tenure (1077550). It is reported to host subvolcanic Cu-Ag-Au and polymetallic Ag-Pb-Zn+/-Au style mineralization. The showing occurs in sericite-carbonate-chlorite-quartz altered Eocene volcanics belonging to the Goosly Lake formation. Massive sulfide veins ranging from 0.1 to 3.0 meters thick are reported to occur along the southeast side of an altered belt of andesitic tuffs and volcanic breccias. The dominant sulfide is pyrite with minor sphalerite and traces of chalcopyrite, tetrahedrite, and arsenopyrite. The alteration zone strikes 120 degrees and dips steeply north, ranging from 70 to 200 meters thick. In 1986 and 1987, drilling intersected several massive to semi-massive sulfide intervals in the East zone within pyritic quartz-calcite-silicate alterations zones. Silver values within massive sulfide intervals massive sulfide intervals ranged from 25.0 to 715.0 grams per tonne.

# 3 2020 Exploration Program

## 3.1 Airborne Geophysical Survey

An airborne geophysical survey was flown by Geotech Ltd in between December 9<sup>th</sup> and December 16<sup>th</sup>, 2020. In total 181 line-kilometers of data were collected. The logistics and final report are included in Appendix 3.

Filtered and processed results were presented to Prosperity Exploration Corp as EM profiles, a late-time gate gridded EM channel, and a colour magnetic TMI contour map.

The survey covered most of the mineral claims which comprise the Silver Lake Property, though tenure 1077551 was not included within this coverage. SEE FIGURE

The geophysical surveys consisted of helicopter borne EM using the versatile time domain electromagnetic (VTEM terrain<sup>™</sup>) system with Full-Waveform processing. Measurements consisted of Vertical (Z) component and aeromagnetics using a caesium magnetometer. A total of 181 line-km of geophysical data were acquired during the survey. The crew was based out of Burns Lake Airport, British Columbia for the acquisition phase of the survey. Survey flying started and was completed on December 14<sup>th</sup>, 2020.

## 3.2 Geotech VTEM

Versatile time domain electromagnetics (VTEM) is an electromagnetic system that generates an electromotive force (emf) by turning current on and off in a large transmitter loop, a time varying field is produced (dB/dt) and an electro-motive force (emf) is created as a finite impulse response. A smoke-ring like current ring around the transmitter loop expands outward and downward with time. When conductive rocks and mineralization are encountered, a secondary field is created by mutual induction and measured by the receiver at the centre of the transmitter loop. Measurements are made during the off time, when only the secondary field (representing the conductive targets encountered in the ground) is present. Efficient modeling of the results can be carried out on regularly shaped geometries, thus yielding close approximations to the parameters of the measured targets. The following is a description of a series of common models made for the purpose of promoting a general understanding of the measured results. Variation of Plate Depth Geometries represented by plates of different strike length, depth extent, dip, plunge and depth below surface can be varied with characteristic parameters like conductance of the target, conductance of the host and conductivity/thickness and thickness of the overburden layer.

The most useful parameters for the Silver Lake project were the dB/dt time constant and the B-field, a magnetic field generated from the EM pulse. The EM Time Constants for dB/dt and B-field were calculated using the "sliding Tau" proprietary program developed at Geotech. The EM decays are obtained from all available decay channels, starting at the latest channel. The sliding Tau method determines that, as the amplitudes increase, the time-constant is taken at progressively later times in the EM decay. Conversely, as the amplitudes decrease, Tau is taken at progressively earlier times in the decay.



Figure 7: GeoTech Ltd. VTEM Waveform

The final survey report describes the procedures for data acquisition, equipment used, processing, final image presentation and the specifications for the digital data set.

## 4 Interpretations and Conclusions

The author reviewed the report provided by Geotech Ltd. with recommendations from colleague John Buckle P.Geo(P.Geo) for the Silver Lake Property (Buckle, 2021, personal communication). The author has reproduced the preliminary and final data from the digital data to create maps from the original database to compare them with the maps provided with the Geotech report. All data appears to be accurate. Some of the electromagnetic data processing software is proprietary to Geotech however, there is sufficient data to verify the accuracy of the survey data.

#### 4.1 Geotech VTEM and magnetometer data

As there is significant variation in the intrusive rock types and alteration associated with British Columbia porphyries no universal geophysical exploration model can be applied. A good understanding of local geology and magmatic composition of intrusive rocks, alteration styles, crustal depth and effect of meteoric water is required. Porphyry exploration strategy in a continental back arc setting, in British Columbia typically focuses on locating the intrusive bodies, which are commonly magnetic, resistive and of low density. However, alteration may lead to magnetite destruction, secondary magnetite development or lower resistivities of porous phyllic and argillic zones. Hydrothermal alteration can change the electrical properties of rock generally increasing their conductivity. Similarly, the distribution of magnetic minerals, electrical properties indicate the type and degree of hydrothermal alteration. The symmetrical pattern in electrical and magnetic anomalies is characteristic of buried copper porphyries. (USGS report 2010-5070-B)

Data were interpreted with some background study of the expected deposit model, associated magmatic and hydrothermal processes and local rock type. Past producing deposits in the Hazelton group show a spectrum of metal associations and deposit styles; porphyry copper-molybdenum at the Huckleberry mine; porphyry copper-gold at Bell and Granisle mines; porphyry molybdenum Kitsault mine; precious and base metal vein deposits can occur peripheral to intrusive stocks, such as at the Equity Silver Mine. Endako, Huckleberry, Morrison, Bell and Granisle are calc-alkalic porphyry deposits in

the Stikine Terrane. Endako is linked to Late Jurassic magmatism, Huckleberry to Cretaceous magmatism and Granisle, Bell and Morrison to Eocene magmatism. (Geoscience BC Report 2013-14).

## 4.2 Interpretation of Anomalies

Kasaika group of volcanic rocks cover the majority of the survey area. The Goosly Lake formation made up of trachyandesite flows, dykes and stocks. Electromagnetically the Kasaika formation appears in the mid-range of the z component of the electromagnetic B-field at gates 35. The early time B-field data show a clear delineation of the north-east fault that cuts the Kasaika group volcanics. EEG Goosly Lake formation is comprised of trachyandesite flows, dikes, and stocks. Goosly Lake volcanics. EEBv Buck Creek formation rocks are described as intermediate to mafic flows and breccias, uKK Kasaika Group Andesite flows form the largest component of the Kasalka Group. The SFz 15 early time electromagnetic response shows an irregular group of low resistivity bodies forming a subcropping unit at an estimated 50-meter depth of burial. The anomaly is not well defined in the early time channels suggesting considerable electromagnetic response from surficial material. The later channels indicate an oval intrusive target approximately 1.5 kilometers north-south by 750 meters east-west on the late-time SFz 35 channel. British Columbia Geological Survey maps this body as a stock belonging to the Goosly Lake plutonic suite. A is an alkaline body intruding Kasalka Group sediments in the western portion of the Gilliam Link claim (1077709).

#### 2008 Airborne Gravimetric, Magnetic and Electromagnetic Surveys (Geoscience BC)

In 2008, QUEST West Project by Geoscience BC airborne gravimetric, magnetic and electromagnetic surveys across a large sample area including over the Project area of Silver Lake Property in addition to a detailed survey block flown over the Equity Silver Mine. Data is readily available for public interpretation from Geoscience BC (Quest West Project). These surveys were flown as regional studies and were not specified for property scale data acquisition. The Silver Lake property lies in a broad trough in the regional data in both the gravity and the magnetics.

#### 4.2.1 Anomaly A

The late-time Geotech electromagnetic z component data indicates an oval anomaly striking 1.5 kilometers north-north-west by approximately 750 meters east-west. This anomaly is supported by the total magnetic intensity and calculated vertical derivative magnetic data. A steep magnetic trough cuts the anomaly diagonally south-west. Other smaller anomalies are also apparent in the electromagnetic data with corroborating magnetic evidence. On the north-eastern flank of the electromagnetic anomaly is a magnetic anomaly. This magnetic anomaly lies entirely within the Kasaika Group and is likely an andesitic flow and may be only proximally related to the electromagnetic anomaly. A northwest striking major fault is clearly seen in SFz15 EM data north of anomaly A cutting across the entire survey area.

#### Geoscience BC Quest West Data

The regional magnetic data shows a broad trough striking north-west across the project area. Anomaly A lies near the centre of a relative magnetic low.

#### 4.2.2 Anomaly B

An oval electromagnetic low is clearly seen in the south-west quadrant of the survey area. This anomaly is obvious in the early-time channels but disappears by the late-time channels 35 and beyond. The unit is mapped by BCGS as monzodioritic to gabbroic intrusive rocks. The geophysical expression on this

anomaly covers 1,700 meters striking northwest by 1000 meters width with an abrupt EM high anomaly on the north side, suggesting a north-east dip. The Doe showing is not directly related but is proximal to this intrusive and may be related.

#### Geoscience BC Quest West Data

Anomaly B is located on the flank of a moderate magnetic high in the regional magnetic data of the Quest West survey. The electromagnetic time constant (Tau) indicates a conductivity high associated coincident with the mapped monzodioritic intrusive. The EM z component from the data migrates northeast supporting the north-east dip hypothesis.

#### 4.2.3 Anomaly C

The SAM showing is located in the northeast portion of the property on the Silver Sam tenure (1077550). It is reported to host subvolcanic Cu-Ag-Au and polymetallic Ag-Pb-Zn+/-Au style mineralization. The showing occurs in sericite-carbonate-chlorite-quartz altered Eocene volcanics belonging to the Goosly Lake formation. Massive sulfide veins ranging from 0.1 to 3.0 meters thick are reported to occur along the southeast side of an altered belt of andesitic tuffs and volcanic breccias. The dominant sulfide is pyrite with minor sphalerite and traces of chalcopyrite, tetrahedrite, and arsenopyrite. The alteration zone strikes 120 degrees and dips steeply north, ranging from 70 to 200 meters thick. Classification: Vein, Massive, Breccia Epigenetic, Hydrothermal Type: L01: Subvolcanic Cu-Ag-Au (As-Sb), I05: Polymetallic veins Ag-Pb-Zn+/-Au.

In the early time channels a circular structure just north of the contact between Kasalka Group and the Goosly volcanics. The feature is centred at 675300 east and 6006450 north UTM zone 9N.

#### Geoscience BC Quest West Data.

Anomaly C lies on the edge of relative magnetic high in the regional data and roughly coincident with a high Tau value. The EM z component illustrates the contact between the Kasalka Group and the Goosly Lake volcanics.

These targets warrant follow-up. As the depth to top is interpreted to be 50 meters, an induced polarization survey is recommended over the anomalies. A geochemical survey would help to confirm the anomalous source. It is recommended that a deep measuring geochemical survey such as mobile metal ion (MMI) or spatiotemporal geochemical hydrocarbons (SGH) surveys be completed.



Figure 8: Isosurface of SFz15 data, surface values of 7, 8 and 9ms







# 5 Recommendations

Further exploration and evaluation of the Silver Lake Property is recommended. Prospective mineralization similar to nearby Equity Mine have been identified in addition to comparative geological stratigraphy in various areas of the project. The following recommendations are made:

- A deeper-sensing geochemical survey including MMI and/or SGH above the highlighted targets areas A thru C.
- A deep sensing IP survey method is recommended on the property, with priority at target A. Lines are best surveyed along E-W coverage to target deep sources of mineralization potential along VTEM survey NNW-SSE trending feature.
- A GIS data compilation of all historic geochemical surveys, geophysical surveys, and drilling campaigns. Areas or samples with elevated Ag, Cu, Au, Pb, Zn should be prioritized for initial field verification and exploration.
- Follow-up on known historical geochemical and geophysical anomalies at the South Shore, Northwest, Gilliam and SAM targets. An attempt to located historic drill core should be made to validate historical drilling. If historic core is located in usable condition, a series of samples should be sent for thin section and XRD for mineralogy, specifically testing for the sulfide and sulfosalt assemblage comprising the Equity mineralization. Additional geochemical surveys and mapping should be completed to define drill targets.

More extensive program may be warranted based on positive results.

## 6 References

- Aeroquest Limited (2009): Report on a helicopter-borne AeroTEM<sup>®</sup> system electromagnetic and magnetic survey; Geoscience BC, Report 2009-6, 28 p., URL [November 2009].
- Archer, A.R. (1971) Geochemical Survey and Geology of the Gail and G.M.G.W. Mineral Claims; (ARIS Report 2863)
- Ashton, A. (1969) Geochemical Survey of FKE 1-13, 15, 17, 19; NRG 1-34; (ARIS Report 2239)
- Barresi T., Nelson J.L., and Dostal J. (2015) Geochemical constraints on magmatic and metallogenic processes: Iskut River Formation, volcanogenic massive sulfide-hosting basalts, NW British Columbia, Canada. Canadian Journal of Earth Sciences, 52(1): 1–20.
- Bordet, E., Hart, C.J.R. and Mihalynuk, M.G. (2014) Stratigraphy of a voluminous felsic volcanic sequence, Eocene Ootsa Lake Group, south-central British Columbia. Canadian Journal of Earth Sciences. Volume 51 pp. 56-103. dx.doi.org/10.1139/cjes-2013-0073
- Buckle, J. (2021), Dated September 2021 "Geophysics Report Review" Personal communication.
- Burga, D., Barry, J., Feasby, D., Hutter, J., Puritch, E., Sutcliffe, R, and Wu, Y (2019): Initial Mineral Resources Estimate and Technical Report on the Number 3 Vein, Silver Queen Property, Omineca Mining Division, British Columbia, Canada. NI43-101 and NI43-101F1 Technical Report prepared for New Nadina Explorations limited; July 2019.
- Burmeister, N. (1969) Geochemical Report on the Goosly Southeast, South Central, Southwest, West Southeast, West and Northwest Groups; (ARIS Report 2311)
- Carter, N.C. (1985) Geochemical and Geophysical Report on the Goosly 2 Claim Group; (ARIS Report 14346)
- Carter, N.C. (1985) Geophysical Report on the Goosly 1 Claim Group; (ARIS Report 14183)
- Church, B.N. (2009) Geology, Geochemistry and Self Portential Investigations on the Gillian Silver Property; (ARIS Report 31051)
- Cochrane, D. (1969) Geochemical Report on JR, JT, CR, AM & FE Claims, Goosly Lake Project; (ARIS Report 2335)
- Cochrane, D. (1970) Geological, Geochemical and Geophysical Report on the JR, JJ, CR, AM, FG Claims; (ARIS Report 2971)
- Cochrane, D. and Scott, A.R. (1971) Geophysical Report on the Induced Polarization Survey of the W. and D.E. Mineral Claims; (ARIS Report 3508)
- Culbert, R.R (1976) Percussion Drilling Report on the Gillian West Group, Goosly Lake Area; (ARIS Report 6148)
- Donaldson, C. (1970) Geochemical Report on Goosly Lake Claims; (ARIS Report 2726)

Donkersloot, P. (1988) Drilling Report on the Sam Mineral Claim; (ARIS Report 17307)

- Dostal J., Gale V., and Church B.N. (1999) Upper Triassic Takla Group volcanic rocks, Stikine terrane, north-central British Columbia: Geochemistry, petrogenesis, and tectonic implications. Canadian Journal of Earth Sciences, 36(9): 1483–1494
- Dostal J., Church B.N., Reynolds P.H. and Hopkins L. (2001) Eocene volcanism in the Buck Creek basin, central British Columbia (Canada): transition from arc to extensional volcanism. Journal of Volcanology and Geothermal Research. Volume 107 pp. 149-170.
- Dostal, J., Owen, J.V., Church, B.N. and Hamilton, T.S. (2005) Episodic volcanism in the Buck Creek Complex (Central British Columbia, Canada): A history of the magmatism and mantle evolution from the Jurassic to the Early Tertiary. International Geology Review. Volume 47, pp. 551-572.
- Evenchick C.A. (2001) Northeast-trending folds in the western Skeena fold belt, northern Canadian Cordillera: a record of Early Cretaceous sinistral plate convergence. Journal of Structural Geology, 23: 1123–1140.
- Gabrielse H., Murphy D.C. and Mortensen J.K. (2006) Cretaceous and Cenozoic dextral orogen-parallel displacements, magmatism, and paleogeography, north-central Canadian Cordillera. In: Haggart, J.W., Enkin, R.J. and Monger, J.W.H., eds., Paleogeography of the North American Cordillera: Evidence For and Against Large-Scale Displacements: Geological Association of Canada, Special Paper 46, p. 255-276.
- Gruenwald, W. (2015) 2014 Diamond Drilling Assessment Report On The Silver Hope Property; (ARIS Report 35888)
- Gunning, M.H., Hodder, R.W.H., and Nelson, J.L. (2006) Contrasting volcanic styles within the Paleozoic Stikine assemblage, western Stikine terrane, northwestern British Columbia. In Paleozoic evolution and metallogeny of pericratonic terranes at the Ancient Pacific Margin of North America, Canadian and Alaskan Cordillera. Edited by M. Colpron and J.L. Nelson. Geological Association of Canada, Special Paper 45. pp. 201–227.
- Harris, S. and Labrenz, D. (2009): 2009 Mineral Resource Estimate on the Berg Copper-Molybdenum Silver Property, Tahtsa Range, British Columbia; NI43-101 Technical Report prepared for Terrane Metals Corp; June 2009.
- Holbek, P.M. (2017) 2016 Reconnaissance ZTEM Survey on the Goose Property; (ARIS Report 37100)
- John, D.A., Vikre, P.G., du Bray, E.A., Blakely, R.J, Fey, D.L., Rockwell, B.W., Mauk, J.L., Anderson, E.D., and Graybeal, F.T. 2010. Descriptive Models for Epithermal Gold-Silver Deposits. Mineral Deposit Models for Resource Assessment. USGS Scientific Investigations Report 2010-5070-Q. <u>https://doi.org/10.3133/sir20105070Q</u>.
- Kim, R., Hart, C.J.R., Angen, J.J, and Westberg, E. (2015) Characterization of Late Cretaceous volcanic suites in the TREK project area, Central British Columbia (NTS 093F, K). Geoscience BC Summary of Activities 2014, Geoscience BC, Report 2015-1, p. 33-40.
- Lee, F. and White, G. (2008): Technical Report on the Lucky Ship Molybdenum Project, Morice Lake Area, NI43- 101 Technical report prepared for Nanika Resources Inc. by A.C.A. Howe International Ltd. dated June 30, 2008 and filed on SEDAR (under subsequent company name Goldbar).

- Logan J.M., Drobe J.R. and McLelland W.C. (2000) Geology of the Forrest Kerr-Mess Creek area, Northwestern British Columbia (NTS 104B/10, 15 & 104G/2 & 7W). British Columbia Ministry of Energy and Mines. Energy and Minerals Division. Geological Survey Branch. Bulletin 104.
- MacDonald, A. (1974) Percussion drilling report on the DG claim group, Sam Goosley Lake, Houston area; (ARIS Report 5195)
- MacIntyre, D.G. (1977) Evolution of upper Cretaceous volcanic and plutonic centres and associated porphyry copper occurrences. Tahtsa Lake area, British Columbia. University of Western Ontario, Ph.D. thesis.
- MacIntyre, D.G. (1985) Geology and mineral deposits of the Tahtsa Lake District, west-central British Columbia. BC Ministry of Energy and Mines, BC Geological survey, Bulletin 75. http://www.empr.gov.bc.ca/Mining/ Geoscience/PublicationsCatalogue/BulletinInformation/ BulletinsAfter1940/Documents/Bull75.pdf
- Marsden H. and Thorkelson D.J. (1992). Geology of the Hazelton volcanic belt in British Columbia: Implications for the Early to Middle Jurassic evolution of Stikinia. Tectonics. Volume 11:6, pp 1266-1286.
- Monger, J.W.H. (1977) The Triassic Takla Group in McConnell Creek map-area, north-central British Columbia. Geological Survey of Canada, Paper 76-29. 45 p.
- Norman, G. (1987) Percussion Drilling and Geochemical Report on the Goosly 1 and Goosly 2 Claim Groups; (ARIS Report 15967)
- Potter, R. (1976) Geological, Geochemical and Geophysical Report on the Gillian Claims, Houston Area; (ARIS Report 6151)
- Phendler, R.W. (1981) Assessment Work on the TOW, DOR, LAD, FIN, RUF, LAN and TRI claims (100 units); (ARIS Report 8828)
- Rogers, M., (2010): Model No. 28, Calc-Alkaline Porphyry Copper-Molybdenum-Gold-Tungsten. Saskatchewan Mineral Deposit Models, Geological Services and Mineral Resource Information.
- Sander Geophysics Limited (2008b): Airborne gravity survey, QUEST-West, British Columbia; Geoscience BC, Report 2008-10, 129 p., URL [November 27, 2008].
- Souther, J.G. (1977) Volcanism and tectonic environments in the Canadian cordillera a second look. In Volcanic regimes of Canada. Geological Association of Canada Special Paper 16. pp. 1–24
- Stevenson, J.P. (1979) Geophysical, Diamond Drilling and Line Cutting Report of the Gillian East and West, SW of Goosly Lake; (ARIS Report 8189)
- Stevenson, J.P. (1981) Diamond Drilling, Geophysical, Geological Program on the Gillian West Group, Loyd North Claims, Goosly Lake, BC; (ARIS Report 10851)
- Sutherland Brown, A. (1960) Geology of the Rocher Deboule Range. British Columbia Department of Mines and Petroleum Resources. Bulletin 43.

Tipper, H.W. and Richards, T.A. (1976) Jurassic stratigraphy and history of north-central British Columbia. Energy, Mines and Resources Canada. Geological Survey of Canada. Bulletin 270.

Wolfe, R. (1969) Geochemical Report on the KG 11-20 and 31-40 Claims; (ARIS Report 2196)

Wolfe, R. (1969) Line Cutting Report - KG Claims - Goosly Lake Area; (ARIS Report 2207

\*All Assessment Reports are available on-line at: http://aris.empr.gov.bc.ca/

Minfile descriptions are available on-line at: http://minfile.gov.bc.ca/searchbasic.aspx

Weather reports are available on-line at: http://climate.weather.gc.ca/

BC Ministry of Energy and Mines, Exploration Assistant is available online at: http://webmap.em.gov.bc.ca/mapplace/minpot/ex\_assist.cfm

All BCGS publications are available on-line at:

https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/british-columbia-geologicalsurvey/publications
# Appendix 1: Statement of Qualifications

I, Mitchell Patitucci, do hereby certify that:

- I am an employee of Hardline Exploration Corp., and currently residing at 305-131 6<sup>th</sup> St W, North Vancouver, BC, V7M 1K5, Canada
- I am a graduate of the University of Victoria with a Bachelors of Science (BSc., 2017).
- I am currently a Geoscientist in Training of the Engineers and Geoscientists of British Columbia, (License #206920)
- I have worked continuously in Mineral Exploration in Canada since 2018 as a field exploration geologist, core logging geologist and project geologist.
- I am responsible for the preparation of the report entitled 'Assessment Report for Geophysical Work Preformed on the Silver Lake Property' including the conclusions reached, and the recommendations made.
- I was directly involved with conducting and reviewing the work presented in this Assessment Report.
- As of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the report not misleading.

Dated this 14<sup>th</sup> of February, 2022

X Matitim

Mitchell Patitucci

# Appendix 2: Statement of Costs

#### SILVER LAKE PROPERTY, HOUSTON, BC

Exploration Work type	Comment	Days			Totals
Personnel (Name)* / Position	Field Days (list actual days)	Days	Rate	Subtotal*	
Martin St Pierre-Consultant Geophysicist		0.625		\$787.50	
Rf Weicker - Consultant Geologist		2.0		\$1,500.00	
				\$2,287.50	\$2,287.50
Office Studies	List Personnel (note - Office only, do not include field days				
Reprocessing of data & QAQC	John Buckle	2.0	\$1,000.00	\$2,000.00	
Report preparation	Mitchell Patitucci	5.0	\$650.00	\$3,250.00	
				\$5,250.00	\$5,250.00
Airborne Exploration Surveys	Line Kilometres / Enter total invoiced amount				
Electromagnetics	Geotech - VTEM survey	170.0	\$450.37	\$76,562.93	
				\$76,562.93	\$76,562.93
TOTAL Expenditures					\$84,100.43

Appendix 3: Geotech Ltd. Report GL200286

# **VTEM**<sup>™</sup>

REPORT ON A HELICOPTER-BORNE VERSATILE TIME DOMAIN ELECTROMAGNETIC (VTEM<sup>™</sup>) AND AEROMAGNETIC GEOPHYSICAL SURVEY

PROJECT: LOCATION: FOR: SURVEY FLOWN: PROJECT: SILVER LAKE PROPERTY NEAR HOUSTON, BC PROSPERITY EXPLORATION CORP. DECEMBER 2020 GL200286

Geotech Ltd. 270 Industrial Parkway South Aurora, ON Canada L4G 3T9 Tel: +1 905 841 5004 Web: <u>www.geotech.ca</u> Email: <u>info@geotech.ca</u>



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# APPENDICES

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E.	TAU Analysis
F.	TEM Resistivity Depth Imaging (RDI)
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## EXECUTIVE SUMMARY

#### SILVER LAKE PROPERTY NEAR HOUSTON, BC

Between December 9<sup>th</sup> and 16<sup>th</sup>, 2020, Geotech Ltd. carried out a helicopter-borne geophysical survey over Silver Lake Property situated near Houston, BC.

Principal geophysical sensors included a versatile time domain electromagnetic (VTEM<sup>™</sup>) system, and a caesium magnetometer. Ancillary equipment included a GPS navigation system and a radar altimeter. A total of 181 line-kilometres of geophysical data were acquired during the survey.

In-field data quality assurance and preliminary processing were carried out on a daily basis during the acquisition phase. Preliminary and final data processing, including generation of final digital data and map products were undertaken from the office of Geotech Ltd. in Aurora, Ontario.

The processed survey results are presented as the following maps:

- Electromagnetic stacked profiles of the B-field Z Component,
- Electromagnetic stacked profiles of dB/dt Z Component,
- B-Field Z Component Channel grid,
- dB/dt Z Component Channel grid,
- Total Magnetic Intensity (TMI),
- Calculated Vertical Derivative (CVG),
- dB/dt Z Component Calculated Time Constant (Tau) with CVG contours, and
- Resistivity Depth Images (RDI) sections and plans are presented.

Digital data includes all electromagnetic and magnetic products, plus ancillary data including the waveform.

The survey report describes the procedures for data acquisition, equipment used, processing, final image presentation and the specifications for the digital data set.



## 1. INTRODUCTION

## 1.1 GENERAL CONSIDERATIONS

Geotech Ltd. performed a helicopter-borne geophysical survey over Silver Lake Property situated near Houston, BC (Figure 1 & Figure 2).

Robert Weicker represented Prosperity Exploration Corp. during the data acquisition and data processing phases of this project.

The geophysical surveys consisted of helicopter borne EM using the versatile time-domain electromagnetic (VTEM<sup>™</sup>) system with Full-Waveform processing. Measurements consisted of Vertical (Z) component and aeromagnetics using a caesium magnetometer. A total of 181 line-km of geophysical data were acquired during the survey.

The crew was based out of Burns Lake Airport, BC (Figure 2) for the acquisition phase of the survey. Survey flying started and finished on December 14<sup>th</sup>, 2020.

Data quality control and quality assurance, and preliminary data processing were carried out on a daily basis during the acquisition phase of the project. Final data processing followed immediately after the end of the survey. Final reporting, data presentation and archiving were completed from the Aurora office of Geotech Ltd. in January 2021.



Figure 1: Survey location.



## 1.2 SURVEY AND SYSTEM SPECIFICATIONS

The Silver Lake Property survey area is is approximately 30km southeast of Houston, BC (Figure 2).



Figure 2: Survey area locations on Google Earth.

The survey area was flown in a west to east (N 90° E azimuth) direction, with traverse line spacing of 150 metres as depicted in Figure 3. Tie lines were flown perpendicular (N 0° E) to the traverse lines at 1500 metre line spacing. For more detailed information on the flight spacing and direction see Table 1.



## 1.3 TOPOGRAPHIC RELIEF AND CULTURAL FEATURES

Topographically, the survey area exhibits moderate relief with elevations ranging from 908 to 1285 metres above mean sea level over an area of 23 square kilometres.

There are roads within the Silver Lake Property survey area. There is a mine  $\sim\!2.5 \rm km$  off the northeast corner of the property.



Figure 3: Flight path over a Google Earth Image.



# 2. DATA ACQUISITION

## 2.1 SURVEY AREA

The survey area (see Figure 3 and Appendix A) and general flight specifications are as follows:

Table 1: Survey Specifications

Survey block	Line spacing (m)	Area (Km <sup>2</sup> )	Planned Line-km	Actual <sup>1</sup> Line-km	Flight direction	Line numbers
Silver Lake	Traverse: 150	23	170	181	N 90° E / N 270° E	L1000 - L1380
Property Tie: 1500	N 00° E / N 180° E	T2000 – T2040				
TOTA	L	23	170	181		

Survey area boundaries co-ordinates are provided in Appendix B.

## 2.2 SURVEY OPERATIONS

The crew were based out of Burns Lake Airport, BC during the survey. The following table shows the timing of the flying.

#### Table 2: Survey schedule

Date	Comments
09-Dec	Mobilization to Burns Lake Airport
10-Dec	System assembly
11-Dec	Complete system assembly
12-Dec	Standby - Weather day
13-Dec	Test flights
14-Dec	Production Flight - 170 km flown. Flight path completed
15-Dec	Received demobilization approval
16-Dec	Demobilization



<sup>&</sup>lt;sup>1</sup> Note: Actual Line kilometres represent the total line kilometres in the final database. These line-km normally exceed the Planned Line-km, as indicated in the survey NAV files.

## 2.3 FLIGHT SPECIFICATIONS

During the survey, the helicopter was maintained at a mean altitude of 99 metres above the ground with an average survey speed of 100 km/hour. This allowed for an average Transmitter-receiver loop terrain clearance of 62 metres and a magnetic sensor clearance of 86 metres.

The on-board operator was responsible for monitoring the system integrity. He also maintained a detailed flight log during the survey, tracking the times of the flight as well as any unusual geophysical or topographic features.

On return of the aircrew to the base camp the survey data was transferred from a compact flash card (PCMCIA) to the data processing computer. The data were then uploaded via ftp to the Geotech office in Aurora for daily quality assurance and quality control by qualified personnel.

## 2.4 AIRCRAFT AND EQUIPMENT

#### 2.4.1 SURVEY AIRCRAFT

The survey was flown using a Eurocopter Aerospatiale 350B3 helicopter, registration C-FKOI. The helicopter is owned and operated by Geotech Aviation. Installation of the geophysical and ancillary equipment was carried out by a Geotech Ltd crew.

#### 2.4.2 ELECTROMAGNETIC SYSTEM

The electromagnetic system was a Geotech Time Domain EM (VTEM<sup>™</sup>) full receiver-waveform streamed data recorded system. The "full waveform VTEM system" uses the streamed half-cycle recording of transmitter and receiver waveforms to obtain a complete system response calibration throughout the entire survey flight. VTEM with the Serial number 22 had been used for the survey. The VTEM<sup>™</sup> transmitter current waveform is shown diagrammatically in Figure 4.

The VTEM<sup>™</sup> Receiver and transmitter coils were in concentric-coplanar and Z-direction oriented configuration. The Transmitter-receiver loop was towed at a mean distance of 37 metres below the aircraft as shown in Figure 5.







The VTEM<sup>™</sup> decay sampling scheme is shown in Table 3 below. Forty-five time measurement gates were used for the final data processing in the range from 0.021 to 10.667 msec. Zero time for the off-time sampling scheme is equal to the current pulse width and is defined as the time near the end of the turn-off ramp where the dI/dt waveform falls to 1/2 of its peak value.

VTEM <sup>™</sup> Decay Sampling Scheme					
Index	Start	End	Middle	Width	
		Millisec	onds		
4	0.018	0.023	0.021	0.005	
5	0.023	0.029	0.026	0.005	
6	0.029	0.034	0.031	0.005	
7	0.034	0.039	0.036	0.005	
8	0.039	0.045	0.042	0.006	
9	0.045	0.051	0.048	0.007	
10	0.051	0.059	0.055	0.008	
11	0.059	0.068	0.063	0.009	
12	0.068	0.078	0.073	0.010	
13	0.078	0.090	0.083	0.012	
14	0.090	0.103	0.096	0.013	
15	0.103	0.118	0.110	0.015	
16	0.118	0.136	0.126	0.018	
17	0.136	0.156	0.145	0.020	
18	0.156	0.179	0.167	0.023	
19	0.179	0.206	0.190	0.027	
20	0.206	0.236	0.220	0.030	
21	0.236	0.271	0.253	0.035	
22	0.271	0.312	0.290	0.040	
23	0.312	0.358	0.333	0.046	
24	0.358	0.411	0.383	0.053	
25	0.411	0.472	0.440	0.061	
26	0.472	0.543	0.505	0.070	
27	0.543	0.623	0.580	0.081	
28	0.623	0.716	0.667	0.093	
29	0.716	0.823	0.766	0.107	
30	0.823	0.945	0.880	0.122	
31	0.945	1.086	1.010	0.141	
32	1.086	1.247	1.161	0.161	
33	1.247	1.432	1.333	0.185	
34	1.432	1.646	1.531	0.214	
35	1.646	1.891	1.760	0.245	
36	1.891	2.172	2.021	0.281	
37	2.172	2.1217	2.323	0.323	

Table 3: Off-Time Decay Sampling Scheme



VTEM <sup>™</sup> Decay Sampling Scheme							
Index	Start	End	Middle Width				
	Milliseconds						
38	2.1217	2.865	2.667	0.370			
39	2.865	3.290	3.063	0.427			
40	3.290	3.781	3.521	0.490			
41	3.781	4.341	4.042	0.560			
42	4.341	4.987	4.641	0.646			
43	4.987	5.729	5.333	0.742			
44	5.729	6.581	6.125	0.852			
45	6.581	7.560	7.036	0.979			
46	7.560	8.685	8.083	1.125			
47	8.685	9.977	9.286	1.290			
48	9.977	11.458	10.667	1.482			

Z Component: 4 - 48 time gates



VTEM<sup>™</sup> system specifications:

Transmitter	Receiver
<ul> <li>Transmitter loop diameter: 17.6 m</li> <li>Number of turns: 4</li> <li>Effective Transmitter loop area: 973 m<sup>2</sup></li> <li>Transmitter base frequency: 30 Hz</li> <li>Peak current: 311.7 A</li> <li>Pulse width: 3.55 ms</li> <li>Waveform shape: Bi-polar trapezoid</li> <li>Peak dipole moment: 303,327 nIA</li> <li>Average transmitter-receiver loop terrain clearance: 62 metres above the ground</li> </ul>	<ul> <li>Z-Coil diameter: 1.2 m</li> <li>Number of turns: 100</li> <li>Effective coil area: 113.04 m<sup>2</sup></li> </ul>



Figure 5: VTEM<sup>™</sup> System Configuration.



#### 2.4.3 Full waveform vtem<sup>™</sup> sensor calibration

The calibration is performed on the complete VTEM<sup>™</sup> system installed in and connected to the helicopter, using special calibration equipment. This calibration takes place on the ground at the start of the project prior to surveying.

The procedure takes half-cycle files acquired and calculates a calibration file consisting of a single stacked half-cycle waveform. The purpose of the stacking is to attenuate natural and man-made magnetic signals, leaving only the response to the calibration signal.

This calibration allows the transfer function between the EM receiver and data acquisition system and also the transfer function of the current monitor and data acquisition system to be determined. These calibration results are then used in VTEM full waveform processing.

#### 2.4.4 RADAR ALTIMETER

A Terra TRA 3000/TRI 40 radar altimeter was used to record terrain clearance. The antenna was mounted beneath the bubble of the helicopter cockpit (Figure 5).

#### 2.4.5 GPS NAVIGATION SYSTEM

The navigation system used was a Geotech PC104 based navigation system utilizing a NovAtel's WAAS (Wide Area Augmentation System) enabled GPS receiver, Geotech navigate software, a full screen display with controls in front of the pilot to direct the flight and a NovAtel GPS antenna mounted on the helicopter tail (Figure 5). As many as 11 GPS and two WAAS satellites may be monitored at any one time. The positional accuracy or circular error probability (CEP) is 1.8 m, with WAAS active, it is 1.0 m. The co-ordinates of the survey area were set-up prior to the survey and the information was fed into the airborne navigation system. The second GPS antenna is installed on the additional magnetic loop together with Gyro Inclinometer.

#### 2.4.6 DIGITAL ACQUISITION SYSTEM

A Geotech data acquisition system recorded the digital survey data on an internal compact flash card. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. The data type and sampling interval as provided in Table 4.

Data Type	Sampling
TDEM	0.1 sec
Magnetometer	0.1 sec
GPS Position	0.2 sec
Radar Altimeter	0.2 sec

Table 4: Acquisition Sampling Rates



## 2.5 BASE STATION

A combined magnetometer/GPS base station was utilized on this project. A Geometrics Caesium vapour magnetometer was used as a magnetic sensor with a sensitivity of 0.001 nT. The base station was recording the magnetic field together with the GPS time at 1 Hz on a base station computer.

The base station magnetometer sensor was installed away from electric transmission lines and moving ferrous objects such as motor vehicles. The base station data were backed-up to the data processing computer at the end of each survey day.



# 3. PERSONNEL

The following Geotech Ltd. personnel were involved in the project.

#### FIELD:

Project Manager:	TaiChyi Shei (Office)
Data QC:	Nick Venter (Office)
Crew chief:	Viktor Shevchenko
Operator:	Jeremy Shin

The survey pilot and the mechanical engineer were employed directly by the helicopter operator – Geotech Aviation.

Pilot:	Christian Mazeron
Mechanical Engineer:	N/A
<u>OFFICE</u> :	
Preliminary Data Processing:	Nick Venter
Final Data Processing:	Emily Data
Data QA/QC:	Zihao Han Jean M. Legault
Reporting/Mapping:	Joseli Soares Emily Data

Processing phase was carried out under the supervision of Zihao Han and Jean M. Legault, M.Sc.A, P.Eng, and P.Geo - Chief Geophysicist. The customer relations were looked after by David Hitz.



#### DATA PROCESSING AND PRESENTATION 4.

Data compilation and processing were carried out by the application of Geosoft OASIS Montaj and programs proprietary to Geotech Ltd.

## 4.1 FLIGHT PATH

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the WGS84 Datum, UTM Zone 9 North coordinate system in Oasis Montai.

The flight path was drawn using linear interpolation between x, y positions from the navigation system. Positions are updated every second and expressed as UTM easting's (x) and UTM northing's (y).

## 4.2 ELECTROMAGNETIC DATA

The Full Waveform EM specific data processing operations included:

- Half cycle stacking (performed at time of acquisition);
- System response correction;
- Parasitic and drift removal.

A three-stage digital filtering process was used to reject major sferic events and to reduce noise levels. Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 1 second or 15 metres. This filter is a symmetrical 1 sec linear filter.

The results are presented as stacked profiles of EM voltages for the time gates, in linear - logarithmic scale for the B-field and dB/dt responses in the Z component. B-field Z component time channel recorded at 1.760 milliseconds after the termination of the impulse is also presented as a colour image. Calculated Time Constant (TAU) with Calculated Vertical Derivative contours is presented in Appendix C. Resistivity Depth Image (RDI) is also presented in Appendix F and G.

VTEM<sup>™</sup> receiver coil orientation Z-axis coil is oriented parallel to the transmitter coil axis and both are horizontal to the ground. Generalized modeling results of VTEM data, are shown in Appendix D.

Z component data produce double peak type anomalies for "thin" sub vertical targets and single peak for "thick" targets.

The limits and change-over of "thin-thick" depends on dimensions of a TEM system (Appendix D, Figure D-16).





## 4.3 MAGNETIC DATA

The processing of the magnetic data involved the correction for diurnal variations by using the digitally recorded ground base station magnetic values. The base station magnetometer data was edited and merged into the Geosoft GDB database on a daily basis. The aeromagnetic data was corrected for diurnal variations by subtracting the observed magnetic base station deviations.

Tie line levelling was carried out by adjusting intersection points along traverse lines. A microlevelling procedure was applied to remove persistent low-amplitude components of flight-line noise remaining in the data.

The corrected magnetic data was interpolated between survey lines using a random point gridding method to yield x-y grid values for a standard grid cell size of 37.5 metres at the mapping scale. The Minimum Curvature algorithm was used to interpolate values onto a rectangular regular spaced grid.



# 5. DELIVERABLES

## 5.1 SURVEY REPORT

The survey report describes the data acquisition, processing, and final presentation of the survey results. The survey report is provided in two paper copies and digitally in PDF format.

## 5.2 MAPS

Final maps were produced at scale of 1:10,000 for best representation of the survey size and line spacing. The coordinate/projection system used was WGS84 Datum, UTM Zone 9 North. All maps show the flight path trace and topographic data; latitude and longitude are also noted on maps.

The results of the survey are presented as EM profiles, a late-time gate gridded EM channel, and a colour magnetic TMI contour map.

• Maps at 1:10,000 in Geosoft MAP format, as follows:

GL200286_10k_dBdt:	dB/dt profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
GL200286_10k_BField:	B-field profiles Z Component, Time Gates 0.220 – 7.036 ms in linear – logarithmic scale.
GL200286_10k_BFz35:	B-field late time Z Component Channel 35, Time Gate
	1.760 ms colour image.
GL200286_10k_SFz30:	VTEM dB/dt Z Component Channel 30, Time Gate 0.880
	ms.
GL200286_10k_TMI:	Total Magnetic Intensity (TMI) colour image and contours.
GL200286_10k_CVG:	Calculated 1 <sup>st</sup> Vertical Gradient (CVG) of TMI.
GL200286_10k_TauSF:	dB/dt Z Component Calculated Time Constant (Tau) with Calculated Vertical Derivative contours

- Maps are also presented in PDF format.
- The topographic data base was derived from 1:500,000 DIVA-GIS data.
- A Google Earth file *GL200286\_Prosperity.kml* showing the flight path of the block is included. Free versions of Google Earth software from: <u>http://earth.google.com/download-earth.html</u>



## 5.3 DIGITAL DATA

Two copies of the data and maps on DVD were prepared to accompany the report. Each DVD contains a digital file of the line data in GDB Geosoft Montaj format as well as the maps in Geosoft Montaj Map and PDF format.

5.3.1	DVD STRUCTURE
Data	contains databases, grids and maps, as described below.
Report	contains a copy of the report and appendices in PDF format.

Databases in Geosoft GDB format, containing the channels listed in Table 5.

Channel name	Units	Description
Х	metres	UTM Easting WGS84 Zone 9 North
Y	metres	UTM Northing WGS84 Zone 9 North
Longitude	Decimal Degrees	WGS 84 Longitude data
Latitude	Decimal Degrees	WGS 84 Latitude data
Z	metres	GPS antenna elevation (above Geoid)
Zb	metres	EM bird elevation (above Geoid)
Radar	metres	helicopter terrain clearance from radar altimeter
Padarb	metres	Calculated EM transmitter-receiver loop terrain clearance
Raudi D	metres	from radar altimeter
DEM	metres	Digital Elevation Model
Gtime	Seconds of the day	GPS time
Mag1	nT	Magnetic diurnal variation data
Basemag	nT	Magnetic diurnal variation data
Mag2	nT	Diurnal corrected Total Magnetic field data
Mag3	nT	Levelled Total Magnetic field data
CVG	nT/m	Calculated Magnetic Vertical Gradient
SFz[4]	pV/(A*m⁴)	Z dB/dt 0.021millisecond time channel
SFz[5]	pV/(A*m⁴)	Z dB/dt 0.026 millisecond time channel
SFz[6]	pV/(A*m⁴)	Z dB/dt 0.031 millisecond time channel
SFz[7]	pV/(A*m⁴)	Z dB/dt 0.036 millisecond time channel
SFz[8]	pV/(A*m⁴)	Z dB/dt 0.042 millisecond time channel
SFz[9]	pV/(A*m⁴)	Z dB/dt 0.048 millisecond time channel
SFz[10]	pV/(A*m⁴)	Z dB/dt 0.055 millisecond time channel
SFz[11]	pV/(A*m⁴)	Z dB/dt 0.063 millisecond time channel
SFz[12]	pV/(A*m⁴)	Z dB/dt 0.073 millisecond time channel
SFz[13]	pV/(A*m⁴)	Z dB/dt 0.083 millisecond time channel
SFz[14]	pV/(A*m⁴)	Z dB/dt 0.096 millisecond time channel
SFz[15]	pV/(A*m⁴)	Z dB/dt 0.110 millisecond time channel
SFz[16]	pV/(A*m⁴)	Z dB/dt 0.126 millisecond time channel
SFz[17]	pV/(A*m⁴)	Z dB/dt 0.145 millisecond time channel
SFz[18]	pV/(A*m⁴)	Z dB/dt 0.167 millisecond time channel
SFz[19]	pV/(A*m⁴)	Z dB/dt 0.190 millisecond time channel
SFz[20]	pV/(A*m⁴)	Z dB/dt 0.220 millisecond time channel

#### Table 5: Geosoft GDB Data Format



Channel name	Units	Description
SFz[21]	pV/(A*m⁴)	Z dB/dt 0.253 millisecond time channel
SFz[22]	pV/(A*m⁴)	Z dB/dt 0.290 millisecond time channel
SFz[23]	pV/(A*m⁴)	Z dB/dt 0.333 millisecond time channel
SFz[24]	pV/(A*m⁴)	Z dB/dt 0.383 millisecond time channel
SFz[25]	pV/(A*m⁴)	Z dB/dt 0.440 millisecond time channel
SFz[26]	pV/(A*m⁴)	Z dB/dt 0.505 millisecond time channel
SFz[27]	pV/(A*m⁴)	Z dB/dt 0.580 millisecond time channel
SFz[28]	pV/(A*m⁴)	Z dB/dt 0.667 millisecond time channel
SFz[29]	pV/(A*m⁴)	Z dB/dt 0.766 millisecond time channel
SFz[30]	pV/(A*m⁴)	Z dB/dt 0.880 millisecond time channel
SFz[31]	pV/(A*m⁴)	Z dB/dt 1.010 millisecond time channel
SFz[32]	pV/(A*m⁴)	Z dB/dt 1.161 millisecond time channel
SFz[33]	pV/(A*m⁴)	Z dB/dt 1.333 millisecond time channel
SFz[34]	pV/(A*m⁴)	Z dB/dt 1.531 millisecond time channel
SFz[35]	pV/(A*m⁴)	Z dB/dt 1.760 millisecond time channel
SFz[36]	pV/(A*m⁴)	Z dB/dt 2.021 millisecond time channel
SFz[37]	pV/(A*m⁴)	Z dB/dt 2.323 millisecond time channel
SFz[38]	pV/(A*m⁴)	Z dB/dt 2.667 millisecond time channel
SFz[39]	pV/(A*m⁴)	Z dB/dt 3.063 millisecond time channel
SFz[40]	pV/(A*m⁴)	Z dB/dt 3.521 millisecond time channel
SFz[41]	pV/(A*m⁴)	Z dB/dt 4.042 millisecond time channel
SFz[42]	pV/(A*m⁴)	Z dB/dt 4.641 millisecond time channel
SFz[43]	pV/(A*m⁴)	Z dB/dt 5.333 millisecond time channel
SFz[44]	pV/(A*m⁴)	Z dB/dt 6.125 millisecond time channel
SFz[45]	pV/(A*m⁴)	Z dB/dt 7.036 millisecond time channel
SFz[46]	pV/(A*m⁴)	Z dB/dt 8.083 millisecond time channel
SFz[47]	pV/(A*m4)	Z dB/dt 9.286 millisecond time channel
SFz[48]	pV/(A*m4)	Z dB/dt 10.667 millisecond time channel
BFz	(pV*ms)/(A*m <sup>4</sup> )	Z B-Field data for time channels 4 to 48
NchanBF		Latest time channels of TauBF calculation
TauBF	ms	Time constant B-Field calculated from late time gates
NchanSF		Latest time channels of TAU calculations
TauSF	ms	Time constant dB/dt calculated from late time gates
PLM		60 Hz power line monitor

Electromagnetic B-field and dB/dt Z component data is found in array channel format between indexes 4 – 48, as described above.



#### 5.3.2 DATABASE OF THE APPARENT RESISTIVITY DEPTH IMAGING PRODUCTS

• in Geosoft GDB format, containing the following channels:

Table 6: Geosoft Resistivity Depth Image GDB Data Format

Channel name	Units	Description
Xg	metres	UTM Easting WGS84 Zone 9 North
Yg	metres	UTM Northing WGS84 Zone 9 North
Dist	metres	Distance from the beginning of the line
Depth	metres	array channel, depth from the surface
Z	metres	array channel, depth from sea level
AppRes	Ohm-m	array channel, Apparent Resistivity
TR	metres	EM system height from sea level
Торо	metres	digital elevation model
Radarb	metres	Calculated EM transmitter-receiver loop terrain clearance
		from radar altimeter
SF	pV/(A*m^4)	array channel, dB/dT
MAG	nT	Total Magnetic Intensity
CVG	nT/m	Calculated Vertical Derivative
ΓΟΙ	motros	Depth of Investigation: a measure of VTEM depth
	metres	effectiveness
PLM		60Hz Power Line Monitor

#### 5.3.3 DATABASE OF THE VTEM WAVEFORM

• "GL200286\_Waveform.gdb" in Geosoft GDB format, containing the following channels:

Table 7: Geosoft database for the VTEM waveform

Channel name	Units	Description
Time	milliseconds	Sampling rate interval, 5.2083 microseconds
Tx_Current	amps	Output current of the transmitter



#### 5.3.4 GRIDS IN GEOSOFT GRD AND GEOTIFF FORMAT

• Grids in Geosoft GRD and GeoTIFF format, as follows:

GL200286_BFz35:	B-Field Z Component Channel 35 (Time Gate 1.760ms)
GL200286_CVG:	Calculated Vertical Derivative (nT/m)
GL200286_DEM:	Digital Elevation Model (metres)
GL200286_Mag3:	Total Magnetic Intensity (nT)
GL200286_SFz15:	dB/dt Z Component Channel 15 (Time Gate 0.110 ms)
GL200286_SFz30:	dB/dt Z Component Channel 30 (Time Gate 0.880 ms)
GL200286_SFz45:	dB/dt Z Component Channel 45 (Time Gate 7.036 ms)
GL200286_TauBF:	B-Field Z Component, Calculated Time Constant (ms) from
	late time gates
GL200286_TauSF:	dB/dt Z Component, Calculated Time Constant (ms) from late
	time gates

A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information. A grid cell size of 37.5 metres was used.



# 6. CONCLUSIONS AND RECOMMENDATIONS

A helicopter-borne versatile time domain electromagnetic (VTEM<sup>™</sup>) geophysical survey has been completed over Silver Lake Property situated near Houston, BC.

The total area coverage is 23 km<sup>2</sup>. Total survey line coverage is 181 line kilometres. The principal sensors included a Time Domain EM system, and a magnetometer system. Results have been presented as stacked profiles, and contour colour images at a scale of 1:10,000. A formal interpretation is not included in this report, however RDI resistivity-depth imaging has been performed in support of the VTEM data.

Based on the geophysical results obtained at Silver Lake Property, several prominent, anomalous EM conductive and resistive zones have been defined within the property, that also correlate well with magnetic high and low features. In particular, a large ( $\sim 0.5$ km EW x 2km NS) conductive anomaly in the west-central part of the block, is part of a more extensive NS low resistivity trend and also partly coincides with a flanking major magnetic high. To the south of this main feature, another, smaller conductive high narrower NE-trending conductive lineament, which correlates with a ring-like magnetic low that forms the edge of a magnetic high at southeastern edge of the block. The relationship between EM and magnetic anomalies are best highlighted in the EM decay time-constant (TAU) and magnetic gradient (CVG) contour map (see Appendix C) and the resistivity-depth image (RDI) results (see Appendix F).

Based on the VTEM TAU results, the conductive targets have dB/dt time constants ranging from about 0.7 up to 1.1 ms, which is relatively high. Based on the RDI results, the apparent resistivity of bedrock geology is estimated range from a high of approximately 2000 ohm-m to lows of less than 5 ohm-m. According to the RDI images over all lines, the estimated depth to the top of these bodies is 50m and maximum depths of investigation (DOI) range from 350m to >450m.

Based on the Equity Silver epithermal to porphyry signatures sought for on the property (R. Weicker, pers. comm.), where clay alteration and structure play prominent roles in mineralization, both the EM conductivity and magnetic susceptibility are important elements. We therefore recommend that more advanced 1D layered earth modeling be performed on the EM data which will prove useful in highlighting weakly anomalous resistive and conductive features of interest, as well as better establishing their depth and vertical/lateral extents. Magnetic CET structural analysis and 3D MVI magnetic inversions will be useful for mapping structure, alteration, and lithology in 2D-3D space across the property. We recommend that more advanced, integrated interpretation be performed on these geophysical data and these results further evaluated against the known geology for future targeting. Ground follow-up using IP\Resistivity will prove useful in defining sulphide mineralization associated with possible porphyry and epithermal targets.



Respectfully submitted<sup>2,</sup>

1

Nick Venter Geotech Ltd.

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Jean M. Legault, M.Sc.A, P.Eng, P.Geo. Geotech Ltd.

Elah

Emily Data Geotech Ltd.

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Joseli Soares Geotech Ltd

January 2021



<sup>&</sup>lt;sup>2</sup> Final data processing of the EM and magnetic data were carried out by Emily Data, from the office of Geotech Ltd. in Aurora, Ontario, under the supervision of Zihao Han and Jean M. Legault, M.Sc.A, P.Eng, and P.Geo - Chief Geophysicist.

# APPENDIX A

## SURVEY AREA LOCATION MAP



Overview of the Survey Area



## **APPENDIX B**

## SURVEY AREA COORDINATES

(WGS 84, UTM Zone 9 North)

Х	Y
672174.3	6008163.1
675393.5	6008168.2
675393.5	6005598.0
673575.3	6005613.5
673585.6	6003810.7
672643.0	6003810.7
672225.8	6002909.3
670783.6	6002914.5
670778.5	6002450.9
667538.7	6002445.8
667543.8	6003841.6
670181.0	6003846.8
670181.0	6007148.4
672158.9	6007153.5



## APPENDIX C - GEOPHYSICAL MAPS<sup>1</sup>



VTEM B-Field Z Component Profiles, Time Gates 0.220 to 7.036 ms, over total magnetic intensity grid contour

<sup>1</sup>Complete full size geophysical maps are also available in PDF format located in the final data maps folder





VTEM dB/dt Z Component Profiles, Time Gates 0.220 to 7.036 ms





VTEM B-Field Z Component Channel 35, Time Gate 1.760 ms





VTEM dB/dt Z Component Channel 30, Time Gate 0.880 ms.





Total Magnetic Intensity (TMI)





Calculated Vertical Derivative (CVG)





dB/dt Z Component Calculated Time Constant (Tau), with Calculated Vertical Derivative contours


#### RESISTIVITY DEPTH IMAGE (RDI) MAPS



3D View of the RDI Apparent Resistivity Voxel



## APPENDIX D

# GENERALIZED MODELING RESULTS OF THE VTEM SYSTEM INTRODUCTION

The VTEM system is based on a concentric or central loop design, whereby, the receiver is positioned at the centre of a transmitter loop that produces a primary field. The wave form is a bi-polar, modified square wave with a turn-on and turn-off at each end.

During turn-on and turn-off, a time varying field is produced (dB/dt) and an electro-motive force (emf) is created as a finite impulse response. A current ring around the transmitter loop moves outward and downward as time progresses. When conductive rocks and mineralization are encountered, a secondary field is created by mutual induction and measured by the receiver at the centre of the transmitter loop.

Efficient modeling of the results can be carried out on regularly shaped geometries, thus yielding close approximations to the parameters of the measured targets. The following is a description of a series of common models made for the purpose of promoting a general understanding of the measured results.

A set of models has been produced for the Geotech VTEM<sup>™</sup> system dB/dT Z and X components (see models D1 to D15). The Maxwell <sup>™</sup> modeling program (EMIT Technology Pty. Ltd. Midland, WA, AU) used to generate the following responses assumes a resistive half-space. The reader is encouraged to review these models, so as to get a general understanding of the responses as they apply to survey results. While these models do not begin to cover all possibilities, they give a general perspective on the simple and most commonly encountered anomalies.

As the plate dips and departs from the vertical position, the peaks become asymmetrical.

As the dip increases, the aspect ratio (Min/Max) decreases and this aspect ratio can be used as an empirical guide to dip angles from near  $90^{\circ}$  to about  $30^{\circ}$ . The method is not sensitive enough where dips are less than about  $30^{\circ}$ .













The same type of target but with different thickness, for example, creates different form of the response:



**Figure D-17**: Conductive vertical plate, depth 50 m, strike length 200 m, depth extends 150 m.

Alexander Prikhodko, PhD, P.Geo Geotech Ltd.

September 2010



## APPENDIX E

### EM TIME CONSTANT (TAU) ANALYSIS

Estimation of time constant parameter<sup>1</sup> in transient electromagnetic method is one of the steps toward the extraction of the information about conductances beneath the surface from TEM measurements.

The most reliable method to discriminate or rank conductors from overburden, background or one and other is by calculating the EM field decay time constant (TAU parameter), which directly depends on conductance despite their depth and accordingly amplitude of the response.

#### THEORY

As established in electromagnetic theory, the magnitude of the electro-motive force (emf) induced is proportional to the time rate of change of primary magnetic field at the conductor. This emf causes eddy currents to flow in the conductor with a characteristic transient decay, whose Time Constant (Tau) is a function of the conductance of the survey target or conductivity and geometry (including dimensions) of the target. The decaying currents generate a proportional secondary magnetic field, the time rate of change of which is measured by the receiver coil as induced voltage during the Off time.

The receiver coil output voltage  $(e_0)$  is proportional to the time rate of change of the secondary magnetic field and has the form,

 $e_0 \alpha (1 / \tau) e^{-(t / \tau)}$ Where,  $\tau = L/R \text{ is the characteristic time constant of the target (TAU)}$ R = resistance L = inductance

From the expression, conductive targets that have small value of resistance and hence large value of  $\tau$  yield signals with small initial amplitude that decays relatively slowly with progress of time. Conversely, signals from poorly conducting targets that have large resistance value and small $\tau$ , have high initial amplitude but decay rapidly with time<sup>1</sup> (Fig. E1).



Figure E-1: Left – presence of good conductor, right – poor conductor.



<sup>&</sup>lt;sup>1</sup> McNeill, JD, 1980, "Applications of Transient Electromagnetic Techniques", Technical Note TN-7 page 5, Geonics Limited, Mississauga, Ontario.

#### EM Time Constant (Tau) Calculation

The EM Time-Constant (TAU) is a general measure of the speed of decay of the electromagnetic response and indicates the presence of eddy currents in conductive sources as well as reflecting the "conductance quality" of a source. Although TAU can be calculated using either the measured dB/dt decay or the calculated B-field decay, dB/dt is commonly preferred due to better stability (S/N) relating to signal noise. Generally, TAU calculated on base of early time response reflects both near surface overburden and poor conductors whereas, in the late ranges of time, deep and more conductive sources, respectively. For example early time TAU distribution in an area that indicates conductive overburden is shown in Figure 2.



Figure E-2: Map of early time TAU. Area with overburden conductive layer and local sources.



Figure E-3: Map of full time range TAU with EM anomaly due to deep highly conductive target.



There are many advantages of TAU maps:

- TAU depends only on one parameter (conductance) in contrast to response magnitude;
- TAU is integral parameter, which covers time range and all conductive zones and targets are displayed independently of their depth and conductivity on a single map.
- Very good differential resolution in complex conductive places with many sources with different conductivity.
- Signs of the presence of good conductive targets are amplified and emphasized independently of their depth and level of response accordingly.

In the example shown in Figure 4 and 5, three local targets are defined, each of them with a different depth of burial, as indicated on the resistivity depth image (RDI). All are very good conductors but the deeper target (number 2) has a relatively weak dB/dt signal yet also features the strongest total TAU (Figure 4). This example highlights the benefit of TAU analysis in terms of an additional target discrimination tool.



Figure E-4: dB/dt profile and RDI with different depths of targets.



Figure E-5: Map of total TAU and dB/dt profile.



The EM Time Constants for dB/dt and B-field were calculated using the "sliding Tau" in-house program developed at Geotech2. The principle of the calculation is based on using of time window (4 time channels) which is sliding along the curve decay and looking for latest time channels which have a response above the level of noise and decay. The EM decays are obtained from all available decay channels, starting at the latest channel. Time constants are taken from a least square fit of a straightline (log/linear space) over the last 4 gates above a pre-set signal threshold level (Figure F6). Threshold settings are pointed in the "label" property of TAU database channels. The sliding Tau method determines that, as the amplitudes increase, the time-constant is taken at progressively later times in the EM decay. Conversely, as the amplitudes decrease, Tau is taken at progressively earlier times in the decay. If the maximum signal amplitude falls below the threshold, or becomes negative for any of the 4 time gates, then Tau is not calculated and is assigned a value of "dummy" by default.



Figure E-6: Typical dB/dt decays of VTEM data

Alexander Prikhodko, PhD, P.Geo Geotech Ltd.

September 2010





<sup>&</sup>lt;sup>2</sup> by A.Prikhodko

# APPENDIX F

## TEM RESISTIVITY DEPTH IMAGING (RDI)

Resistivity depth imaging (RDI) is technique used to rapidly convert EM profile decay data into an equivalent resistivity versus depth cross-section, by deconvolving the measured TEM data. The used RDI algorithm of Resistivity-Depth transformation is based on scheme of the apparent resistivity transform of Maxwell A.Meju (1998)<sup>1</sup> and TEM response from conductive half-space. The program is developed by Alexander Prikhodko and depth calibrated based on forward plate modeling for VTEM system configuration (Fig. 1-10).

RDIs provide reasonable indications of conductor relative depth and vertical extent, as well as accurate 1D layered-earth apparent conductivity/resistivity structure across VTEM flight lines. Approximate depth of investigation of a TEM system, image of secondary field distribution in half space, effective resistivity, initial geometry and position of conductive targets is the information obtained on base of the RDIs.



Maxwell forward modeling with RDI sections from the synthetic responses (VTEM system).

Figure F-1: Maxwell plate model and RDI from the calculated response for conductive "thin" plate (depth 50 m, dip 65 degree, depth extend 100 m).

<sup>&</sup>lt;sup>1</sup> Maxwell A.Meju, 1998, Short Note: A simple method of transient electromagnetic data analysis, Geophysics, **63**, 405–410.



Figure F-2: Maxwell plate model and RDI from the calculated response for "thick" plate 18 m thickness, depth 50 m, depth extend 200 m).



Figure F-3: Maxwell plate model and RDI from the calculated response for bulk ("thick") 100 m length, 40 m depth extend, 30 m thickness





Figure F-4: Maxwell plate model and RDI from the calculated response for "thick" vertical target (depth 100 m, depth extend 100 m). 19-44 chan.



Figure F-5: Maxwell plate model and RDI from the calculated response for horizontal thin plate (depth 50 m, dim 50x100 m). 15-44 chan.





Figure F-6: Maxwell plate model and RDI from the calculated response for horizontal thick (20m) plate – less conductive (on the top), more conductive (below).





Figure F-7: Maxwell plate model and RDI from the calculated response for inclined thick (50m) plate. Depth extends 150 m, depth to the target 50 m.



Figure F-8: Maxwell plate model and RDI from the calculated response for the long, wide and deep subhorizontal plate (depth 140 m, dim 25x500x800 m) with conductive overburden.





Figure F-9: Maxwell plate models and RDIs from the calculated response for "thick" dipping plates (35, 50, 75 m thickness), depth 50 m, conductivity 2.5 S/m.



Figure F-10: Maxwell plate models and RDIs from the calculated response for "thick" (35 m thickness) dipping plate on different depth (50, 100, 150 m), conductivity 2.5 S/m.



Figure F-11: RDI section for the real horizontal and slightly dipping conductive layers



## FORMS OF RDI PRESENTATION

## PRESENTATION OF SERIES OF LINES





## **3D PRESENTATION OF RDIS**





#### APPARENT RESISTIVITY DEPTH SLICES PLANS:



### 3D VIEWS OF APPARENT RESISTIVITY DEPTH SLICES:



Project GL200286 VTEM™ Report on Airborne Geophysical Survey for Prosperity Exploration Corp.



#### REAL BASE METAL TARGETS IN COMPARISON WITH RDIS:

RDI section of the line over Caber deposit ("thin" subvertical plate target and conductive overburden.



### 3D RDI VOXELS WITH BASE METALS ORE BODIES (MIDDLE EAST):







Alexander Prikhodko, PhD, P.Geo **Geotech Ltd.** April 2011



## **APPENDIX G**

# **RESISTIVITY DEPTH IMAGES (RDI)** Please see RDI Folder on DVD for the PDF's







eotech Project # GL200286



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