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Assessment Report
Based on the 2020
Volterra-TDEM Geophysical Survey
and Outcrop Mapping Program

Northwest Foy Property

Foy, Tyrone and Harty Townships

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Exploration Services

March 2021

Summary

This report describes the work completed for the Volterra Time-Domain Electromagnetic (TDEM) survey and outcrop mapping programs that were completed in 2020.

The TDEM survey was completed in 20 days between July 30th and August 18th, 2020 by SJ Geophysics Ltd and covered 24.125 line kilometers across the Foy, Tyrone and Harty townships.

The outcrop mapping program was completed in 4 days between October 2nd and November 12th, 2020. A total of 43 outcrop points were recorded in the southern portion of the property. Locational data was recorded in the NAD83 UTM 17N coordinate system using handheld GPS units.

The total expenditures for the work reported herein were $148,516.44.

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Introduction

The Northwest Foy Property, jointly owned by FNX Mining Company Inc. ("FNX", a subsidiary of KGHM International Ltd., "KGHMI") and Glencore Canada (Glencore), consists of a contiguous 21 year Mining Lease package and 2 multi-cell unpatented Mining Claims, oriented nearly north-south and running south from Wallbridge Mining Company Ltd. property at the intersection of the Foy Offset with the Hess Offset, to Vale Canada Ltd.'s (Vale) patented mining claims at the Sandcherry Creek Fault. The unpatented Mining Claims were added as a buffer to the Mining Lease in late 2019 as a means of securing land for the purpose of completing the 2020 work program.

Property Location and Access

The Northwest Foy Property is best accessed by driving north along forestry roads through the Coleman Mine property. A key to the Seal Lake Gate must be obtained from Vale's Coleman Mine, after which northward access is possible past the gate. From the gate, it is approximately 18 kilometers to the southern boundary of the property. See Figure 1 for the route to the property.

On October 28th, while traveling to the Northwest Foy Property, it was discovered that approximately 6 meters of road had been washed-out at a location 1.5 kilometers south of the property boundary, preventing any further access by pickup truck. Field work after this date required walking the remaining distance to the property.

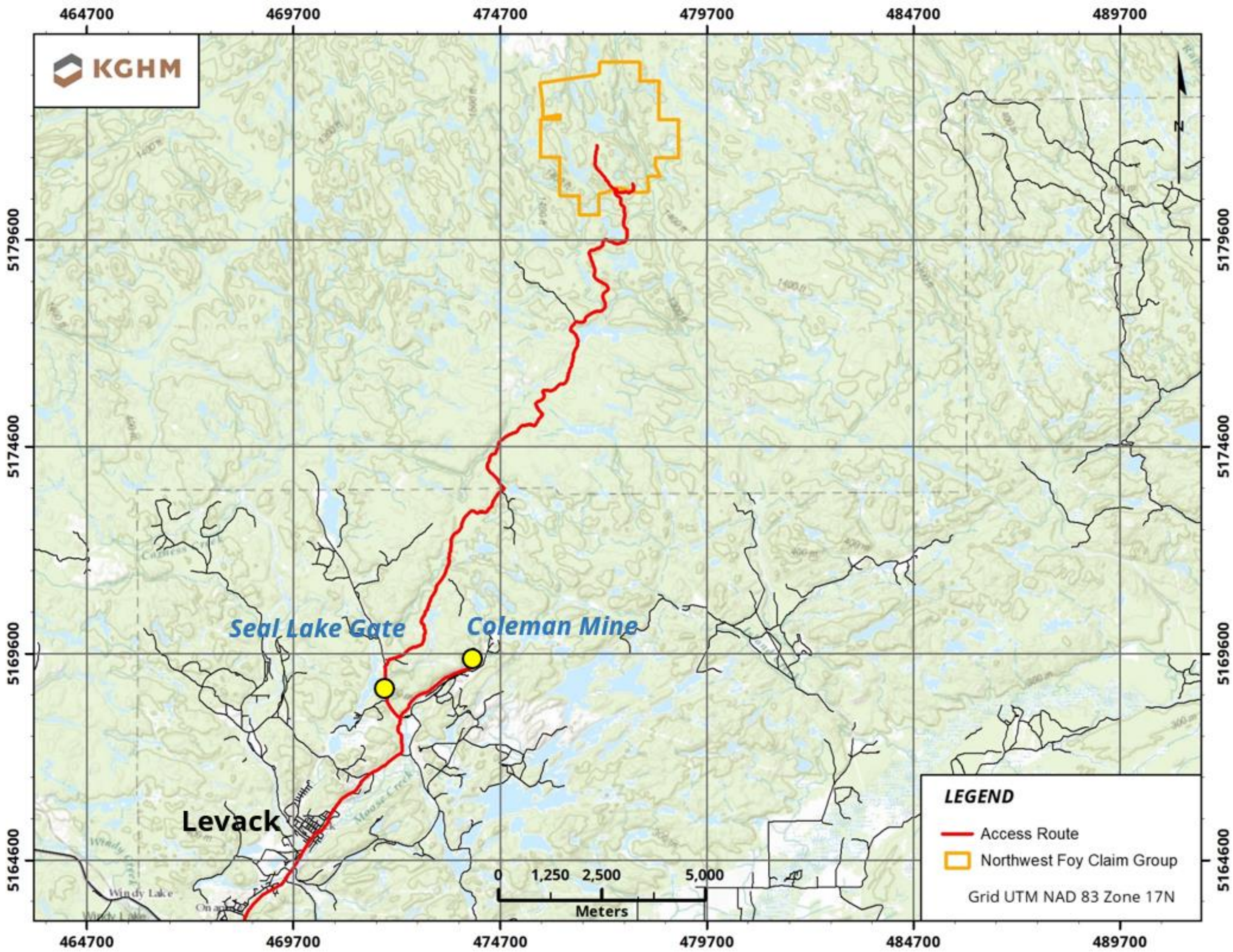

Figure 1: Northwest Foy Property Location and Access

Claim Status

Work reported herein was conducted on leased claims co-owned by FNX and Glencore, as well as multi-cell mining claims 100% owned by FNX.

The Joint Venture leased claims make up an area of approximately 358 hectares in 23 claims, and the remaining 2 100% FNX-owned claims make up an area of approximately 370 hectares.

A summary of these claims is shown in Table 1. For a layout of the Northwest Foy claims, see Figure 2.

Table 1: Summary of Individual Claim Units

Claim Number	Area (ha)	Claim Number	Area (ha)
S133930	8.8	S133779	27.7
S133934	9.5	S133774	28.3
S129705	9.5	S133783	38.6
S133932	10.2	S133791	5.5
S133775	11.5	S133784	7.7
S129706	13.0	S133786	11.3
S133777	13.1	S133789	13.4
S133776	14.2	S133785	13.9
S133778	14.3	S133780	11.1
S133787	16.9	S133781	13.1
S133782	21.0	561510	176.8
S133770	22.1	561511	287.3
S133771	23.2		

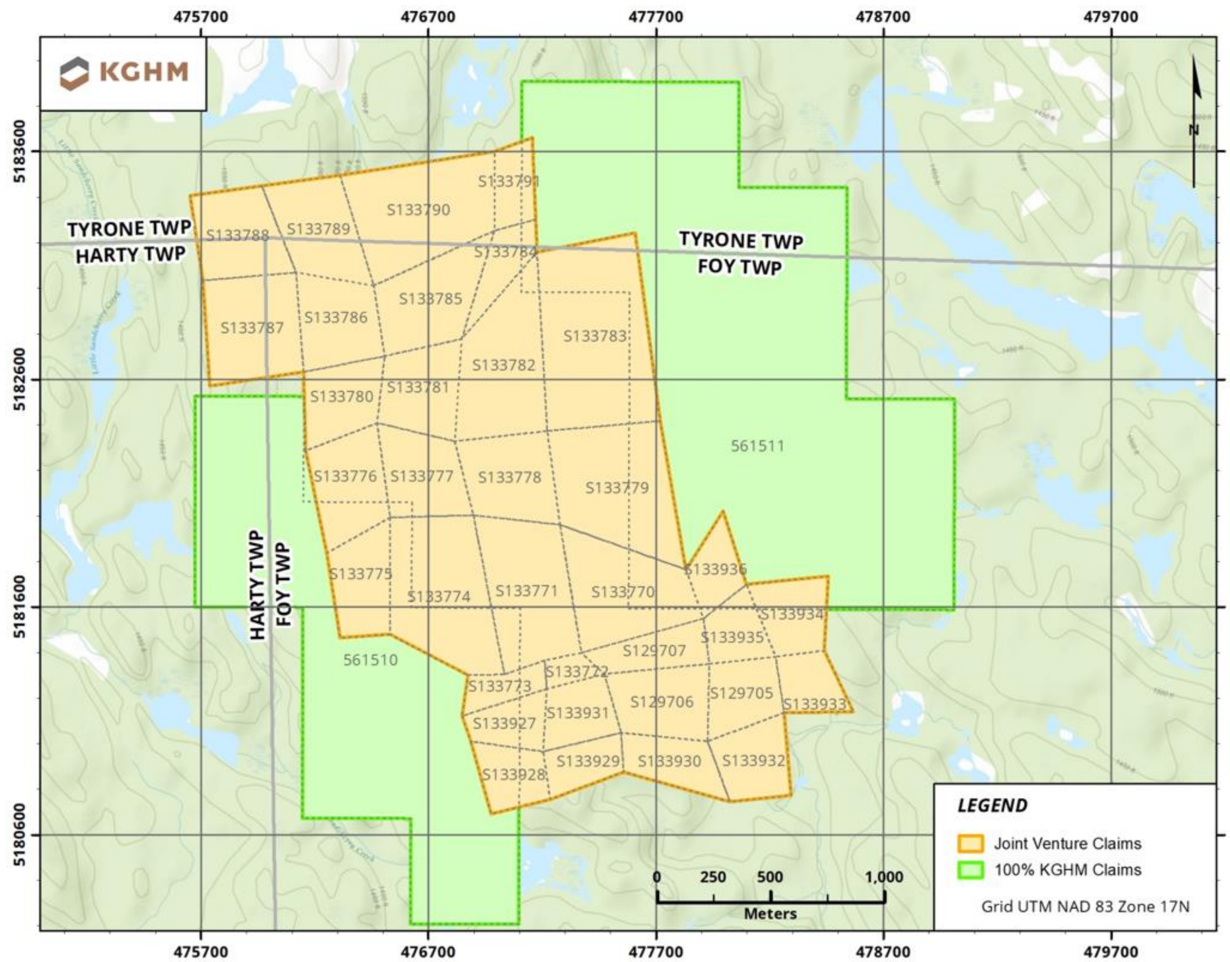

Figure 2: Northwest Foy Claims

Regional Geology

The Foy Offset Dyke is the largest of the known radial offset dykes emanating from the base of the SIC (a region referred to as the "mouth") along a west-northwest trajectory. The mouth of the Foy Offset Dyke is located in south-central Bowell Township between Roland Lake and the northern tip of Nelson Lake. At its mouth the dyke is approximately 400 meters wide, but narrows to 210 meters at Nickel Lake (1.5 kilometers to the northwest). Further west, within the Northwest Foy portion of the joint venture property, dyke width ranges between 50 to 100 meters.

Approximately 500 meters north of the Northwest Foy Property, the Foy Offset Dike is intersected by the concentric Hess Offset Dyke.

The Foy Offset Dyke intrudes Archean granitoid country rocks consisting of granite, granodiorite to hornblende granodiorite, migmatitic hornblende (biotite) gneiss and hornblende gneiss diabase. The abundance of diabase dykes striking sub-parallel to the offset may indicate that the Foy Offset Dyke intruded a previously existing structure.

At least four northwest-striking regional faults cut the offset dyke. From east to west they are: the Rand Creek Fault (lateral displacement of approximately 200 meters); the Wingekisinaw River Fault (lateral displacement of approximately 650 meters); the Bear Lake Fault (lateral displacement of approximately 200 meters); and the Sandcherry Creek Fault (lateral displacement of approximately 700 meters).

Mineralization in the Foy Offset Dyke occurs mainly as pods, lenses and veins of massive, semi-massive and disseminated sulphide minerals, mainly pyrrhotite, pentlandite and chalcopyrite in localized areas.

History

In 1950 a work program consisting of geological mapping and a magnetometer survey was conducted by Falconbridge Nickel Mines Limited. Following this program, a limited drill program including 6 drillholes was completed in 1952 in order to test the targets identified from the earlier program.

In 1968 Falconbridge Nickel Mines Limited completed 6 drillholes on the property, followed by another 2 drillholes in 1969.

In 2000 Aeroquest Limited conducted a helicopter-based AeroTEM electromagnetic and magnetic survey over the property for Aurora Platinum Corporation.

In 2002 a ground magnetometer survey was completed by Total Field Services for Aurora Platinum Corporation on the property. This was followed in 2003 by a UTEM-3 survey completed by Lamontagne Geophysics Limited.

In 2005 a helicopter-based AeroTEM II Electromagnetic and Magnetometer survey was completed in the northern half of the current Northwest Foy claims. The survey was flown by Aeroquest Limited for Tearlach Resources. In the same year Aeroquest Limited flew an identical survey for Pele Mountain Resources in the area to the southwest of the Northwest Foy Property, covering a large portion of the southwest corner of the current claims.

In 2007 an outcrop mapping and sampling program was completed by Wallbridge Mining Company Ltd. on the area covered by FNX's newly staked claim on the east side of the property.

In 2009 a helicopter-based gravimetric survey was completed by Sander Geophysics Limited for FNX. In addition to gravimetric data, high resolution LiDAR data was collected.

In 2010 and 2011 FNX completed outcrop mapping and sampling programs on the property. During these campaigns a significant portion of the Foy Offset Dyke was mapped, primarily in the northern and middle areas of the property.

In 2015 FNX (as a subsidiary of KGHMI) completed a Soil Gas Hydrocarbon (SGH) survey on the property. Analysis of samples and interpretation was performed by Activation Laboratories Ltd.

Volterra Time-Domain Electromagnetic Survey

Introduction

In 2020 KGHMI contracted SJ Geophysics Ltd. to acquire Volterra Time-Domain Electromagnetic (TDEM) fixed loop data on the Northwest Foy property. Fixed loop EM data was acquired along 15 survey lines utilizing three loops oriented at 60°. The survey grid was planned with a line spacing of 200 meters and individual station spacing of 25 meters.

The survey grid did not utilize cut lines; crew members navigated along the survey lines to planned station locations using hand-held GPS units. The transmitting loops were established in a similar fashion.

At the beginning of the survey, KGHMI directed SJ Geophysics to modify the station spacing based on the distance from the loop. A station spacing of 25 meters was used for the first 500 meters of each line, then 50 meter spacing for the next 500 meters, and then 100 meter spacing until the end of the line. Reading lengths were increased on more distal stations in order to provide cleaner data.

The initial survey plan estimated 22.9 line kilometers, however by the end of the survey a total of 24.125 line kilometers were completed. The final survey grid is shown in **Error! Reference source not found.**3.

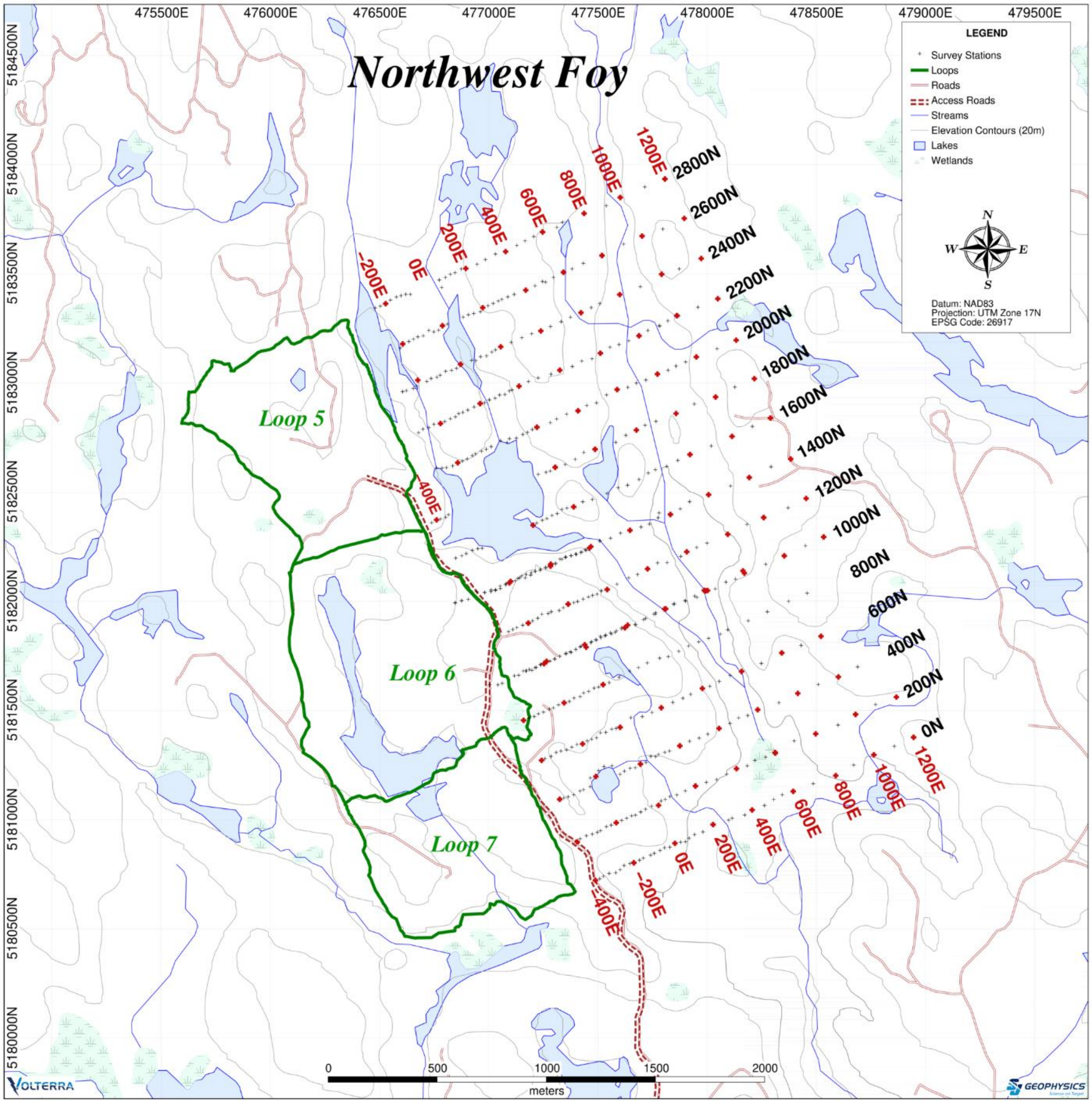

Figure 3: Final TDEM Survey Grid at Northwest Foy

Survey Methodology

Design

The Volterra Acquisition System was used to acquire time-domain electromagnetic data. Each Volterra acquisition unit records full-waveform data from attached sensors. The recorded data was then passed through proprietary signal processing software to calculate the geophysical response. Android tablets were used to view decimated raw data in real-time via a Bluetooth connection to the data acquisition unit. The signal (raw data) visible on the tablet enabled the operators to verify the transmitter waveform and to see that the sensors were functioning correctly.

Using induction magnetometers (B-field) connected to a Volterra data acquisition unit, measurements of the induced magnetic field were made along each survey line at regular intervals. At each measurement station, two components of the transient magnetic field were measured; vertical (Hz) and horizontal in-line (Hx). The induction magnetometers were aligned using a compass and bubble level and a declination of 60^{o} was used when orienting the horizontal induction magnetometers.

To investigate the possibility of deep conductors requires late time gates. Late time gates have low amplitude and can be overwhelmed by cultural noise, therefore longer measurements away from the loop edges were done in an effort to reduce late-time noise through additional stacking. A recording length of 120 seconds was used near the loop edge, lengthening to 180 seconds and finally 240 seconds on the distal edges of the loop.

Data Collection

To create the required TDEM signals for the survey, large transmitter loops were used. The primary field was generated using a single SJ Geophysics EMTX 3000 transmitter connected to the loops. The SJ Geophysics EMTX 3000 sent a square, 100% duty cycle waveform through the loop and was powered by a gas powered generator. The Northwest Foy grid used a base frequency of 6 Hz. Summaries of the survey parameters are shown in Tables 2 to 4.

Table 2: Northwest Foy EM Loop Parameters

Category	Loop 5	Loop 6	Loop 7
Dimensions (m) (approx.)	1000 x 700	1000 x 900	800 x 800
Base Frequency (Hz) (approx.)	6	6	6
Loop Resistance (Ω) (approx.)	34	38	32
Loop Peak-Peak Current (A) (approx.)	11	11	11

Table 3: TDEM Recording and Transmitting Parameters

Survey Technique	Fixed-Loop Time Domain EM
EM Signal Recording	Volterra Data Acquisition Unit (8200 Series)
Sensor (B-Field)	ANT-23 Induction Magnetometer (SN#3523, 2023, 2123) ANT-9 Induction Magnetometer (SN# 019, 029) ANT-5 Induction Magnetometer (SN# 105, 195, 215)
Measured Component	Z, X components
Sample Rate	16,000 samples/second
Reading Length	90 – 240 seconds
EM Signal Processing	CSProc
EM Transmitter	EMTX 3000 (SN# TX3009 & OS3016)
Waveform / Duty Cycle	Square / 100%
Base Frequency	6 Hz
Loop Resistance	32 to 38 Ω
Current	11 A; peak to peak

Table 4: Northwest Foy Survey Detail

Line	Loop	Start Station	End Station	Survey Length (m)	Station Spacing (m)	Components Measured	Base Frequency (Hz)
0	5	-500	1200	1,700	25,50,100	Z, X	6
200	5	-500	1200	1,700	25,50,100	Z, X	6
400	5	-500	1100	1,600	25,50,100	Z, X	6
600	5	-500	1000	1,500	25,50,100	Z, X	6
800	5	-500	1025	1,525	25,50,100	Z, X	6
1000	6	-500	1200	1,700	25,50,100	Z, X	6
1200	6	-400	1200	1,600	25,50,100	Z, X	6
1400	6	-400	1200	1,600	25,50,100	Z, X	6
1600	6	-400	1200	1,600	25,50,100	Z, X	6
1800	6	-400	1200	1,600	25,50,100	Z, X	6
2000	7	-400	1200	1,600	25,50,100	Z, X	6
2200	7	-400	1200	1,600	25,50,100	Z, X	6
2400	7	-400	1200	1,600	25,50,100	Z, X	6
2600	7	-400	1200	1,600	25,50,100	Z, X	6
2800	7	-400	1200	1,600	25,50,100	Z, X	6

GPS

Location data was collected using Stonex S900A & Garmin 64s GPS units in the NAD83 UTM 17N coordinate system. The Stonex S900A units received, via satellite link (Atlas), remote base station data to achieve RTK corrections. A local reference GPS base station was setup in case the rovers failed to achieve RTK solutions and post-processing for locations was necessary.

For transmitter loops, GPS points were acquired at 25 meter spacing or less along each loop edge. On the front edge and the first 100 meters of the side lengths of the loops locations were collected using the Stonex S900A RK GPS. The location of back loop edges and sections further than 100 meters from the front edge were collected via handheld Garmin 64s GPS units.

The location of each survey station was collected and similar to the process completed on the loop edges, two different location collection techniques were used. All stations close to the loops with a 25 meter station spacing had locations collected using the RTK GPS. Survey stations further away from the loop used both handheld

Garmin 64s and RTK GPS, depending on equipment availability and personnel constraints.

Field Logistics

The SJ Geophysics field crew consisted of one senior geophysicist, one field geophysicist, one to two field technicians and two to four field assistants depending on personnel availability. The crew was onsite at Northwest Foy from July 30th to August 18th.

KGHMI Site Visits

On June 4th, KGHMI personnel traveled to the property to verify that logging roads were still accessible. On July 30th, immediately prior to the TDEM survey, KGHMI personnel traveled to the site with SJ Geophysics personnel as a site tour following the kick-off meeting. On this trip, workers discovered that between June 4th and July 30th intense storm activity blew down a significant amount of trees halfway between Coleman Mine and the Northwest Foy property. This required some clearing by both KGHMI and SJ personnel to proceed to site; while the roads are now passable by pickup truck, much of the debris is still apparent along the logging road.

Collected Data

During the field period, preliminary processed data was sent to KGHMI's consulting geophysicist for review. Any changes to the original survey design were discussed and authorized by the consulting geophysicist, which included changes to station spacing and base frequencies.

The data collected by SJ Geophysics was received by KGHMI at the completion of the survey in the following deliverables:

- EM Data
  - Processed EM data as .TEM files
  - Profile plots as .png files
- Locations – Locations of survey stations and transmitter loop as .csv files
- Grid map – Map of loop and grid locations as .pdf, .png and .tif file
- Logistics report – relevant details included in this report

Results

No significant conductors were identified during the survey on the Northwest Foy property. This may be due in part to the decision to use a low base frequency for the transmitter. The low base frequency was chosen in an effort to identify any potentially deep-seated zones of mineralization but was unable to identify more weakly mineralized zones that had been observed on surface in past mapping programs.

2020 Outcrop Mapping Program

KGHMI geologists made 4 trips to the Northwest Foy property to complete a small mapping program: October 2nd, October 28th, November 5th and November 12th. The mapping program focused on the southern portion of the property where historically the Foy Offset was poorly mapped/interpreted. Due to recent logging activity, new roads had been created and sections of the property had been clear cut, allowing easier access for mapping.

On October 28th, while traveling to the Northwest Foy property, it was discovered that approximately 6m of road had been washed-out at a location 1.5 kilometers south of the property, preventing any further access by pickup truck. Field work after this date required hiking the remaining distance to the property, somewhat reducing the length of time spent mapping.

By the end of the program a total of 43 new outcrop points were collected. Notable newly mapped features included approximately 200 meters of the Foy Offset in the south, and a minor Sudbury Breccia belt in the east running parallel with a shear zone adjacent to a diabase dyke. Based on field observations, it appears as though the Foy Offset continues south past the southern property boundary. An overview of mapping activities can be seen in Figures 3 and 4.

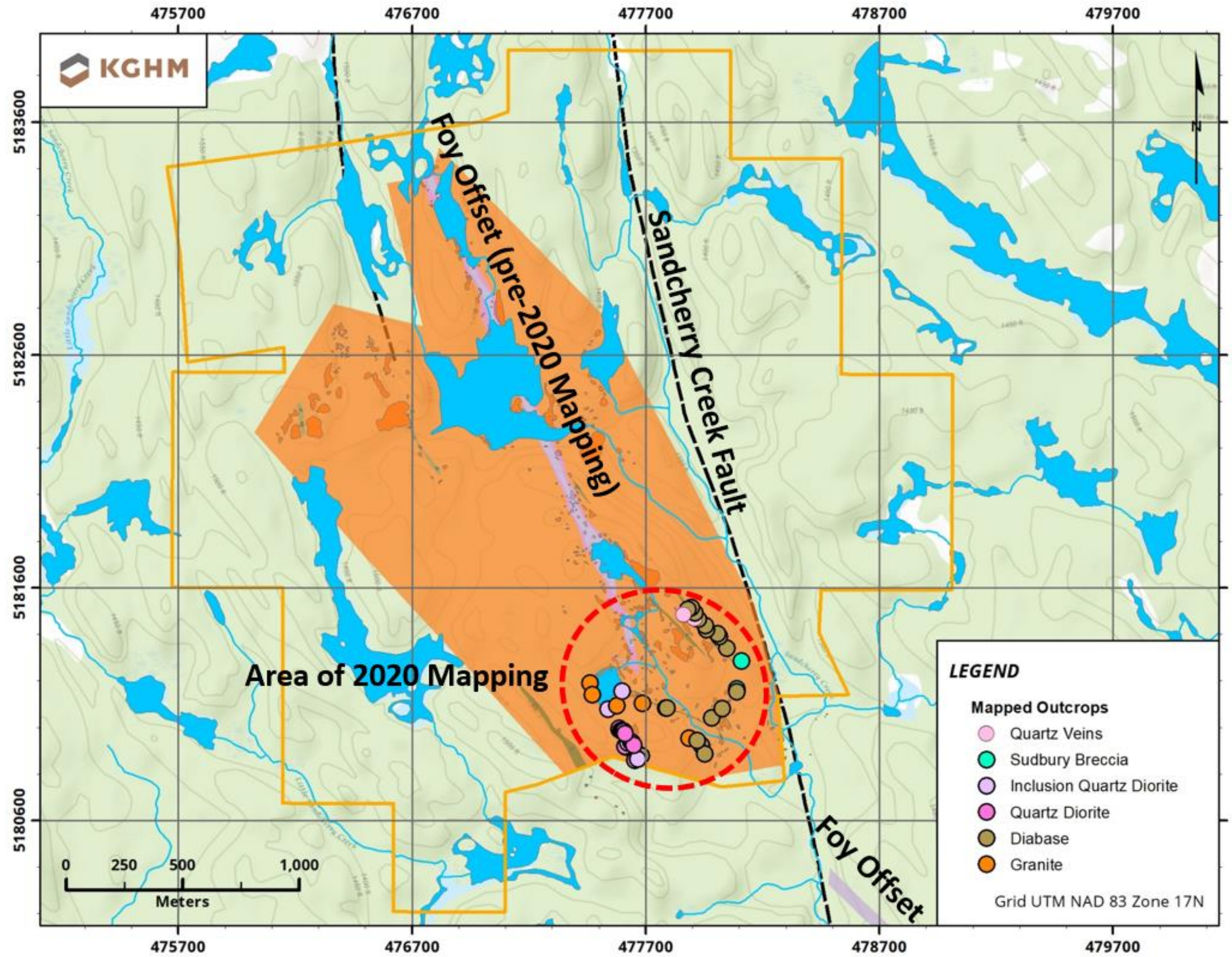

Figure 4: 2020 Northwest Foy Mapping Overview

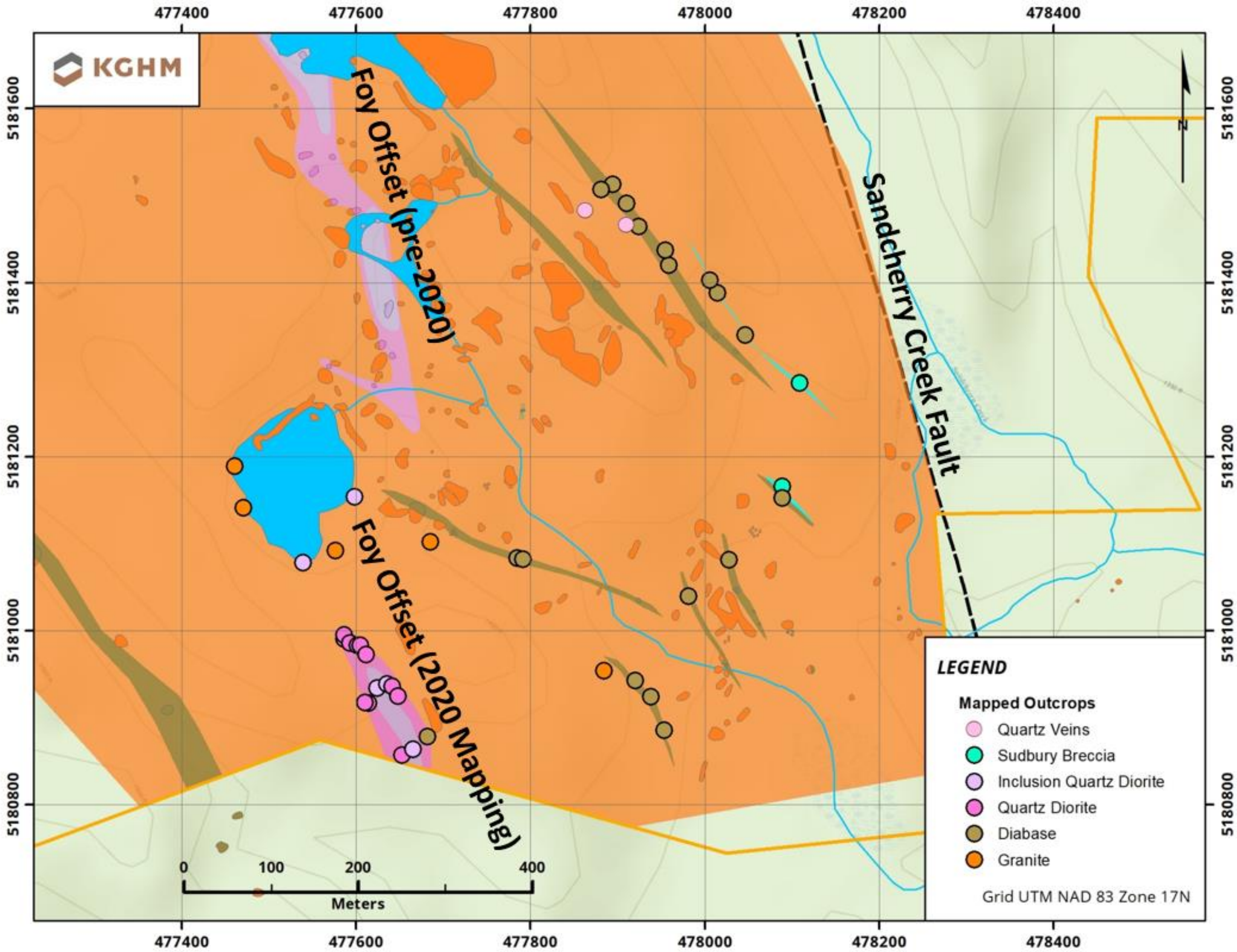

Figure 5: 2020 Northwest Foy Mapping Detail

2020 Program Costs for Northwest Foy

The program costs reported here include the geophysical program and the outcrop mapping program.

A summary of the 2020 program costs is shown in Table 5.

Table 5: Northwest Foy 2020 Expenditure Summary

Northwest Foy 2020 Work Program Expenditures		
Salaries		
Manager (Project Coordination) 1 day @ $700/day	$	700.00
Area Geologist (Project Coordination/Planning): 1 day @ $600/day	$	600.00
Senior Project Geologist (Project Supervision/Planning/Fieldwork) 16.5 days @ $500/day	$	8,250.00
Project Geologist (Field Crew/Planning): 3.5 days @ $400/day	$	1,400.00
Geologist (Fieldwork): 3 days @ $350/day	$	1,050.00
Subtotal	**$**	**12,000.00**
Consumables		
Gasoline	$	311.32
Field Supplies	$	1,711.95
Subtotal	**$**	**2,023.27**
Volterra-TDEM Geophysical Survey	**$**	**134,493.17**
2020 TOTAL	**$**	**148,516.44**

Discussion and Recommendations

As the EM survey at Northwest Foy was completed using a 6 Hz transmitting frequency rather than a higher frequency (such as 30/31 Hz at Canhorn), any response to mineralization would be relatively subtle. A suitable geophysical consultant was not available to review the EM data collected in 2020, and so it is recommended that the raw data be reviewed and reprocessed at a future date. A consultant may be able to reprocess the data in order to provide more definition than what was available at the time of writing of this report.

While a significant amount of the Foy Offset was uncovered during the 2020 mapping effort, there is still uncertainty as to the continuity of the Offset. A trenching program to extend the northern part of the mapped area would help to further delineate the Foy Offset. Since this area has been relatively recently cleared by logging activities, there is no need for extensive brush clearing or logging in order to reach the area of interest.

In addition to the newly uncovered segment of the Foy Offset in the south of the property, Sudbury Breccia was observed in what appeared to be a significant structure oriented approximately northwest-southeast. This lithology has rarely been recognized in the past in the Northwest Foy claim group, and there is opportunity to further delineate this unit in the eastern side of the property.

Future exploration programs on the property should be focused on detailed mapping between the areas covered in the 2020 and 2010-2011 mapping programs. The quartz diorite mapped in the southern part of the property in 2020 is in a significantly different area compared with past geological survey interpretations of the Foy Offset on the property. Discovering the nature of this displaced segment of the Foy Offset may illuminate further controls on mineralization observed on the property. A trenching program would be the best way to achieve this, since numerous past geophysical surveys have not provided a definitive model in this area that can be reconciled with field observations.

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Statement of Qualification

I, Christopher Verzyden of the City of Greater Sudbury, Province of Ontario, do hereby certify that:

1. I am a geologist residing at 3221 Lammi's Rd, Sudbury Ontario P3G 1M7.
2. I am a graduate of Carleton University (Ottawa, Ontario) having received a Bachelor of Science (Honours) in Earth Sciences in 2009.
3. I have been practicing in my profession as a geologist continuously since July 6^{th}, 2009.
4. I have been an employee of KGHM International Ltd. (formerly FNX Mining Company Inc.) from July 2009 to November 2015, and February 2018 to Present.
5. The information presented in this document is true and accurate to the best of my knowledge. This information was gathered from such various sources as assessment files, publications and contractor-provided reports.
6. I performed the outcrop mapping and participated in the planning of the geophysical survey covered in this report.
7. I have no personal interest in the property covered by this report.

Dated in Sudbury, Ontario, this 5^{th} day of April, 2021.

Respectfully Submitted,

Christopher Verzyden, B.Sc., P. Geo.
Senior Project Geologist
April 5^{th}, 2021

Appendix A: Outcrop Mapping Data

The following pages contain the data collected in the field for each sample station. Data has been presented in 2 tables, comprising lithological data and structural data.

Table 6: Outcrop Mapping Data

Station	Easting (m)	Northing (m)	Elevation (m)	UTM Zone	Date	Time	Type	Rock Type	Comments
NWF-20-10	477681.4	5180877.6	424.6	17N	2-Oct-20	13:17	Outcrop	Diabase	Either QD/DIA
NWF-20-11	477460.4	5181189.3	420.7	17N	5-Nov-20	11:10	Outcrop	Granite	Large, up to 2m subcrop showing contact between GR and GRPH
NWF-20-12	477469.9	5181140.9	422.9	17N	5-Nov-20	11:30	Outcrop	Granite	Massive GR, large outcrop
NWF-20-13	477538.6	5181078.3	420.7	17N	5-Nov-20	11:38	Subcrop	Inclusion Quartz Diorite	2 large boulders of IQD at water's edge
NWF-20-14	477575.6	5181091.8	422.9	17N	5-Nov-20	11:44	Outcrop	Granite	Outcrop and very large boulders/erratics
NWF-20-15	477684.4	5181101.9	424.6	17N	5-Nov-20	12:01	Outcrop	Granite	
NWF-20-16	477784.6	5181083.4	412.9	17N	5-Nov-20	12:09	Outcrop	Diabase	Greenish, massive
NWF-20-17	477791.1	5181082.0	413.4	17N	5-Nov-20	12:11	Outcrop	Diabase	Greenish, massive
NWF-20-18	477980.8	5181039.3	392.3	17N	5-Nov-20	12:30	Outcrop	Diabase	Approximately 330 contact
NWF-20-19	478088.5	5181165.5	395.6	17N	5-Nov-20	12:40	Outcrop	Sudbury Breccia	Possible SUBX, fine grained matrix, leucocractic inclusions (resistive) in coarse grained GR
NWF-20-20	478088.7	5181152.6	393.5	17N	5-Nov-20	12:45	Outcrop	Diabase	Apparent contact ~318
NWF-20-21	478027.5	5181081.4	388.6	17N	5-Nov-20	13:23	Outcrop	Diabase	
NWF-20-22	477884.0	5180953.4	398.4	17N	5-Nov-20	13:32	Outcrop	Granite	
NWF-20-23	477937.6	5180923.8	390.0	17N	5-Nov-20	13:36	Outcrop	Diabase	
NWF-20-24	477952.8	5180885.0	390.0	17N	5-Nov-20	13:41	Outcrop	Diabase	
NWF-20-33	477652.2	5180857.0	411.8	17N	5-Nov-20	14:39	Outcrop	Quartz Diorite	
NWF-20-34	477664.8	5180863.2	412.3	17N	5-Nov-20	14:43	Outcrop	Inclusion Quartz Diorite	Broken up, under overturned tree roots, possible subcrop with QD+IQD
NWF-20-35	477613.5	5180916.8	417.6	17N	5-Nov-20	14:52	Outcrop	Quartz Diorite	
NWF-20-36	477609.5	5180917.1	418.5	17N	5-Nov-20	14:54	Outcrop	Quartz Diorite	QD/GR Contact
NWF-20-37	477623.4	5180934.0	422.3	17N	5-Nov-20	14:56	Outcrop	Inclusion Quartz Diorite	
NWF-20-38	477634.8	5180938.2	421.9	17N	5-Nov-20	14:58	Outcrop	Inclusion Quartz Diorite	
NWF-20-39	477640.6	5180935.4	421.6	17N	5-Nov-20	15:02	Outcrop	Quartz Diorite	
NWF-20-40	477647.5	5180924.2	420.7	17N	5-Nov-20	15:03	Outcrop	Quartz Diorite	
NWF-20-41	477585.6	5180990.2	430.4	17N	5-Nov-20	15:17	Outcrop	Quartz Diorite	
NWF-20-42	477919.6	5180942.2	396.5	17N	12-Nov-20	11:29	Outcrop	Diabase	DIA/GR Contact, approx 136/76, DIA to west, GR to east

Station	Easting (m)	Northing (m)	Elevation (m)	UTM Zone	Date	Time	Type	Rock Type	Comments
NWF-20-43	478108.8	5181284.4	413.4	17N	12-Nov-20	11:54	Outcrop	Sudbury Breccia	Possible subcrop
NWF-20-44	478046.1	5181340.1	419.3	17N	12-Nov-20	12:00	Outcrop	Diabase	Strong chl SUBX adjacent to DIA, contact is buried, apparent 332 trace
NWF-20-45	478014.6	5181388.6	426.5	17N	12-Nov-20	12:14	Outcrop	Diabase	Strong chl SUBX in shear in contact to DIA with possible sheared/contorted granophyre, contact is buried, apparent 335 trace,
NWF-20-46	478005.8	5181402.8	425.2	17N	12-Nov-20	12:42	Outcrop	Diabase	Shear contact between DIA and GR approximately 1-2 ft wide, contacts SUBX/granophyre, DIA possibly Matachewan
NWF-20-47	477958.5	5181420.4	426.3	17N	12-Nov-20	12:52	Outcrop	Diabase	Different dike from previous 3, 5m wide, coarse grained, possibly Nippissing
NWF-20-48	477954.5	5181437.6	427.8	17N	12-Nov-20	12:54	Outcrop	Diabase	
NWF-20-49	477923.9	5181465.0	431.8	17N	12-Nov-20	12:57	Outcrop	Diabase	
NWF-20-50	477910.1	5181466.4	430.5	17N	12-Nov-20	12:59	Outcrop	Quartz Vein	Quartz shear veins in GR, approximately 138/86
NWF-20-51	477909.9	5181491.4	433.1	17N	12-Nov-20	13:06	Outcrop	Diabase	
NWF-20-52	477894.0	5181513.2	434.9	17N	12-Nov-20	13:08	Outcrop	Diabase	East contact, continuous with NWF-20-53
NWF-20-53	477880.9	5181507.0	433.4	17N	12-Nov-20	13:09	Outcrop	Diabase	West contact, continuous with NWF-20-52
NWF-20-54	477862.9	5181483.0	436.5	17N	12-Nov-20	13:16	Outcrop	Quartz Vein	Quartz shear veins in GR, approximately 139/75
NWF-20-55	477597.9	5181153.7	432.5	17N	12-Nov-20	14:09	Outcrop	Inclusion Quartz Diorite	Float
NWF-20-56	477585.7	5180994.8	443.9	17N	12-Nov-20	15:07	Outcrop	Quartz Diorite	Contact with GR to east
NWF-20-57	477592.5	5180985.7	443.8	17N	12-Nov-20	15:08	Outcrop	Quartz Diorite	Contact with GR to east
NWF-20-58	477601.1	5180983.2	442.6	17N	12-Nov-20	15:09	Outcrop	Quartz Diorite	Contact with GR to east, approximately 280/78
NWF-20-59	477604.5	5180983.1	440.7	17N	12-Nov-20	15:13	Outcrop	Quartz Diorite	Contact with GR to east
NWF-20-60	477610.8	5180972.3	439.0	17N	12-Nov-20	15:18	Outcrop	Quartz Diorite	Contact with GR to east

Table 7: Outcrop Structural Data

Station	Easting (m)	Northing (m)	Elevation (m)	UTM Zone	Time	Date	Type	Strike	Dip	Rock Type	Comments
NWF-20-20S	478088.7	5181152.6	393.5	17N	12:45	5-Nov-20	Contact	318	-90	Diabase	Apparent contact ~318
NWF-20-42S	477919.6	5180942.2	396.5	17N	11:29	12-Nov-20	Contact	136	-76	Diabase	DIA/GR Contact, approx 136/76, DIA to west, GR to east
NWF-20-44S	478046.1	5181340.1	419.3	17N	12:00	12-Nov-20	Shear	332	-90	Diabase	Strong chl SUBX adjacent to DIA, contact is buried, apparent 332 trace
NWF-20-45S	478014.6	5181388.6	426.5	17N	12:14	12-Nov-20	Shear	335	-90	Diabase	Strong chl SUBX in shear in contact to DIA with possible sheared/contorted granophyre, contact is buried, apparent 335 trace,
NWF-20-50S	477910.1	5181466.4	430.5	17N	12:59	12-Nov-20	Shear	138	-86	Quartz Vein	Quartz shear veins in GR, approximately 138/86
NWF-20-54S	477862.9	5181483.0	436.5	17N	13:16	12-Nov-20	Shear	139	-75	Quartz Vein	Quartz shear veins in GR, approximately 139/75
NWF-20-58S	477601.1	5180983.2	442.6	17N	15:09	12-Nov-20	Contact	280	-78	Quartz Diorite	Contact with GR to east, approximately 280/78

Appendix B: Geological Map

The geological map includes outcrops mapped in previous campaigns, new data points collected in the 2020 field program, as well as an interpretation of the lithology.

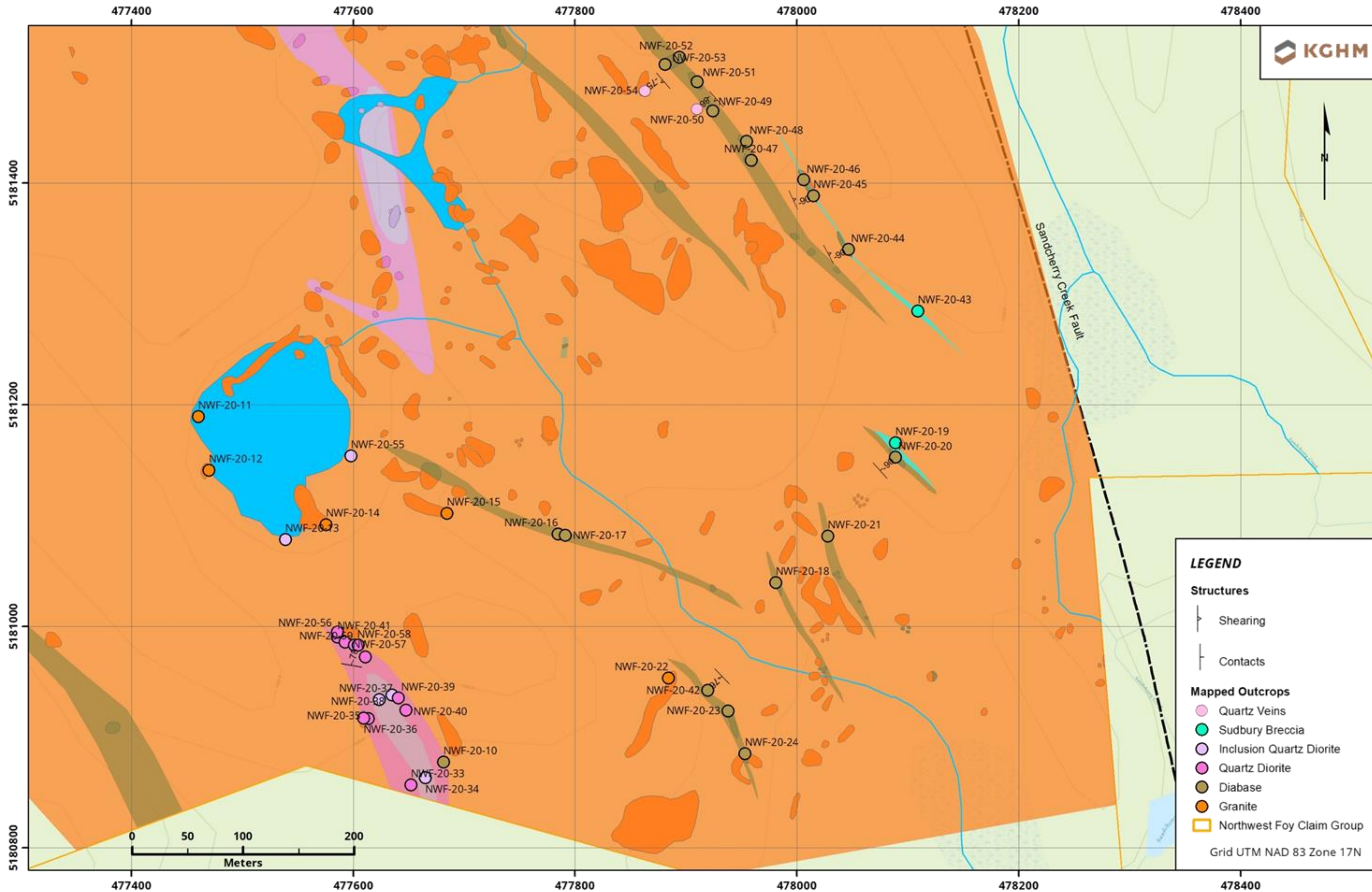

Figure 6: Geological Map for 2020 Mapping Area

Appendix C: SJ Geophysics Logistics Report

The report provided to KGHM International by SJ Geophysics Ltd, titled “Volterra-TDEM on the Foy Offset Project” is included as an attachment with this report under the folder “\Appendix D – SJ Geophysics Logistics Report”.

Logistics Report

Prepared For

KGHM Polska Miedź S.A.

Volterra-TDEM

on the

Foy Offset Project

Sudbury, Ontario, Canada

Survey conducted by SJ Geophysics Ltd.
July-September 2020

Report prepared
September 2020

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1. Survey Summary

SJ Geophysics Ltd. was contracted by KGHM Polska Miedź S.A. to acquire Volterra Time-Domain Electromagnetic (TDEM) fixed-loop data on their Foy Offset Project. Fixed loop EM data was acquired along 41 survey lines utilizing seven loops. Table 1 provides a brief summary of the project.

Client	KGHM Polska Miedź S.A.
Project Name	Foy Offset
Project Number	SJ862
Location: **Canhorn Loops** (approximate centre of the survey areas) **Northwest Foy Loops** (approximate centre of the survey areas)	 Latitude: 46°46' 14"N Longitude: 81°14' 41"W 481300E 5179700N; NAD83 UTM 17N Latitude: 46°45' 35"N Longitude: 81°12' 210"W 484500E 5178500N; NAD83 UTM 17N
Total Line Kilometres	66.125 km
Production Dates	July 29 – Sept 10, 2020

Table 1: Survey summary

The Foy Offset dyke is a 30 km long radial dyke associated with the Sudbury Igneous Complex. This project aims to identify and delineate massive sulphide nickle and copper deposits which may occur in this section of the Foy Offset Dyke. Volterra-TDEM surveying is an ideal investigative technique due to the massive nature and large conductivity contrasts of the target ore deposits.

2. Location and Access

The Foy Offset Project is located in Ontario, Canada, approximately 37 km northwest of the city of Sudbury (Figure 1).

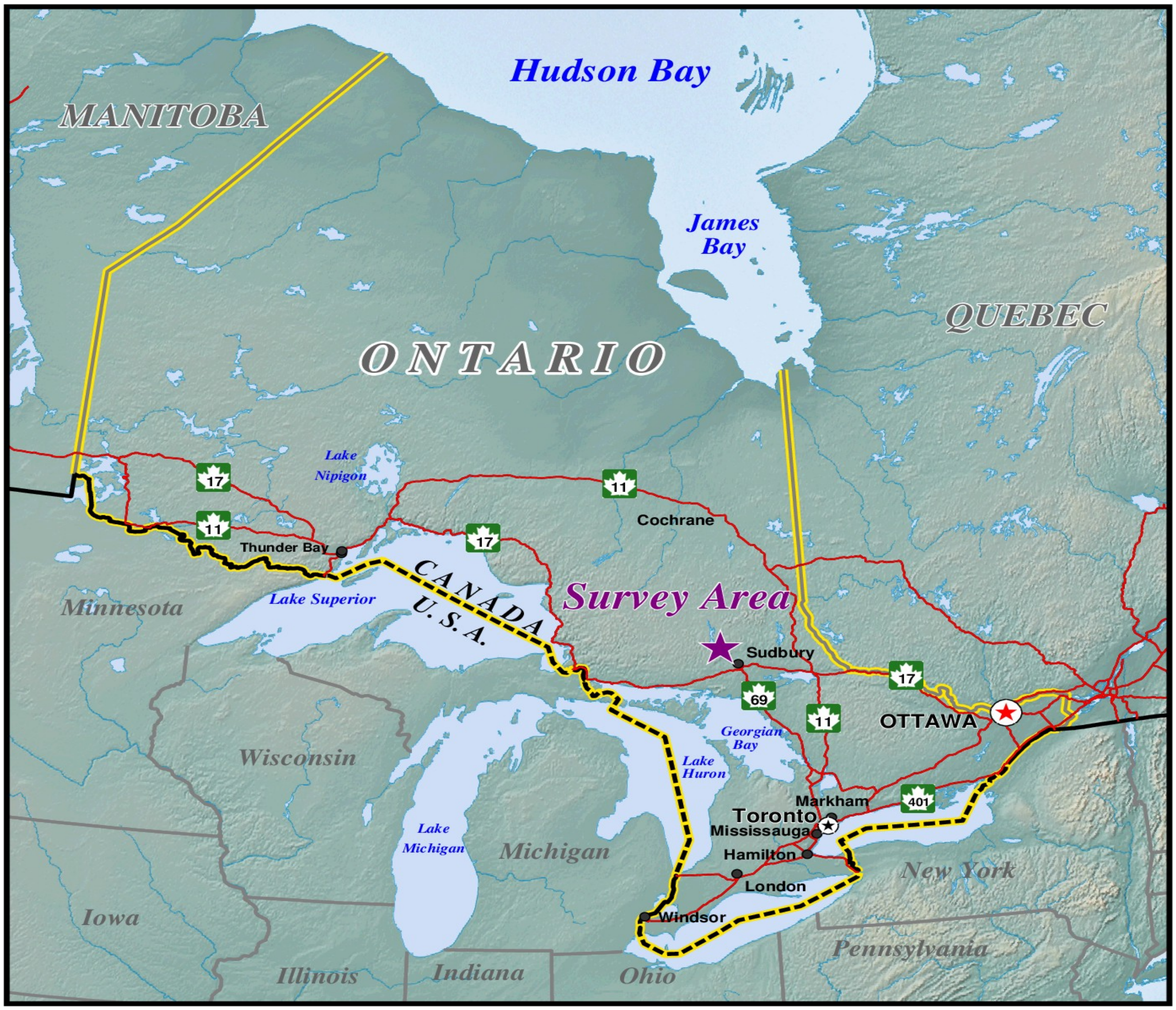

Figure 1: Overview map of the Foy Offset Project location

The project areas were accessed from Chelmsfor, 20 km northwest of Sudbury, by two different road systems. To access NW Foy, drive west on On-144N for 22 km, then right on to Regional Rd 8. Continue straight through the community of Levack and Regional Rd 8 becomes the Coleman Mine Rd. Approximately 3.5 km northeast of Levack turn left onto Seal Lake Rd.

Continue on Seal Lake Rd for 1.5 km then turn right onto an unnamed road. Continue straight for 8 km, before turning right and traveling 6.5 km to arrive at the survey area.

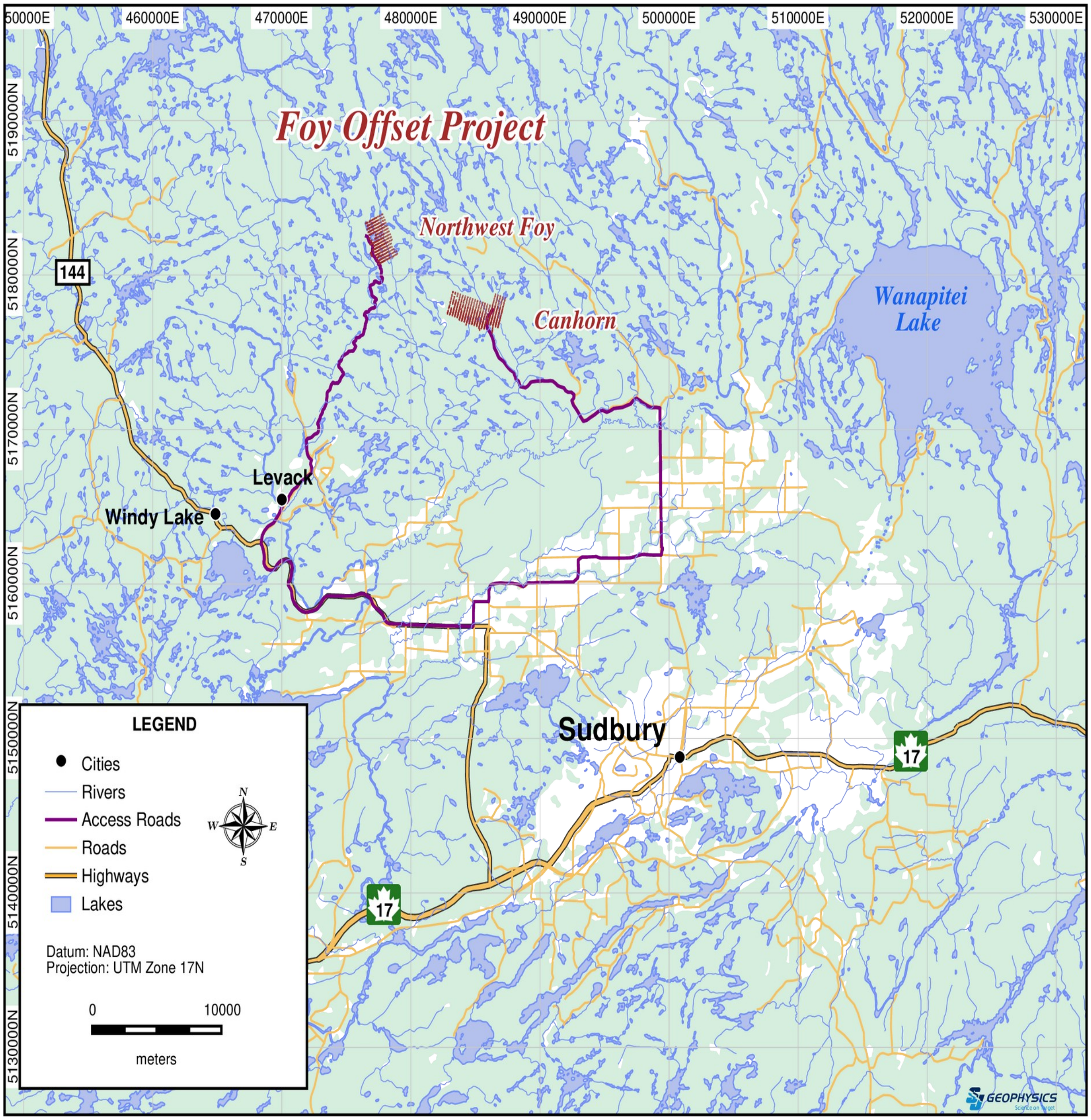

Figure 2: Local map of the survey region showing roads and access

To access Canhorn head north on Regional Rd 15 for 18 km into Val Caron, Ontario. Turn left to travel north on Regional Rd 80 for 4.6 km. Turn left onto Desmarais Rd then continue for 4.75 km onto Nelson Lake Rd. Continue on Nelson Lake Rd for 23 km. Stay left at the fork for Nelson lake fish sanctuary.

3. Survey GridVolterra-TDEM

3.1. Planned Grids

The Volterra-TDEM survey was planned to acquire data over two target areas. The first area, NW Foy, consisted of a single grid using three loops with 15 lines orientated at 60°. The second area, Canhorn, consisted of a single grid using four loops with 21 lines orientated at 20°. Orientations of the grids and loops were chosen based on local geological trends. Both grids were to have a line spacing of 200 m, and a stations spacing of 25 m.

3.2. Surveyed Grid

No line preparations were carried out in advance of the survey. Crew members navigated along the survey lines to theoretical stations in real-time using hand-held GPS units. The large loops were established in a similar fashion.

The scope of the Volterra-TDEM was reduced during data collection compared to the planned grid. At the request of the representatives of KGHM Polska Miedź S.A., the station spacing was modified to be variable depending on distance from the loop. A station spacing of 25 m was used for the first 500 m of each line, then 50 m spacing for the next 500 m and then 100 m till end of line. Reading lengths were also increased on far stations to provided cleaner data. A detailed breakdown of the survey lines is available in Appendix A. The surveyed grids are shown in Figures 3 and 4 .

There were 2 specific changes done to the Canhorn grid during the survey. The first was loops one and two were combined into one loop named Loop 1-2 due to poor site access. The second was due to preliminary results, as it was decided to survey an additional loop with six lines. The extension, labeled loop 5, focused on areas of interest identified from loop 4.

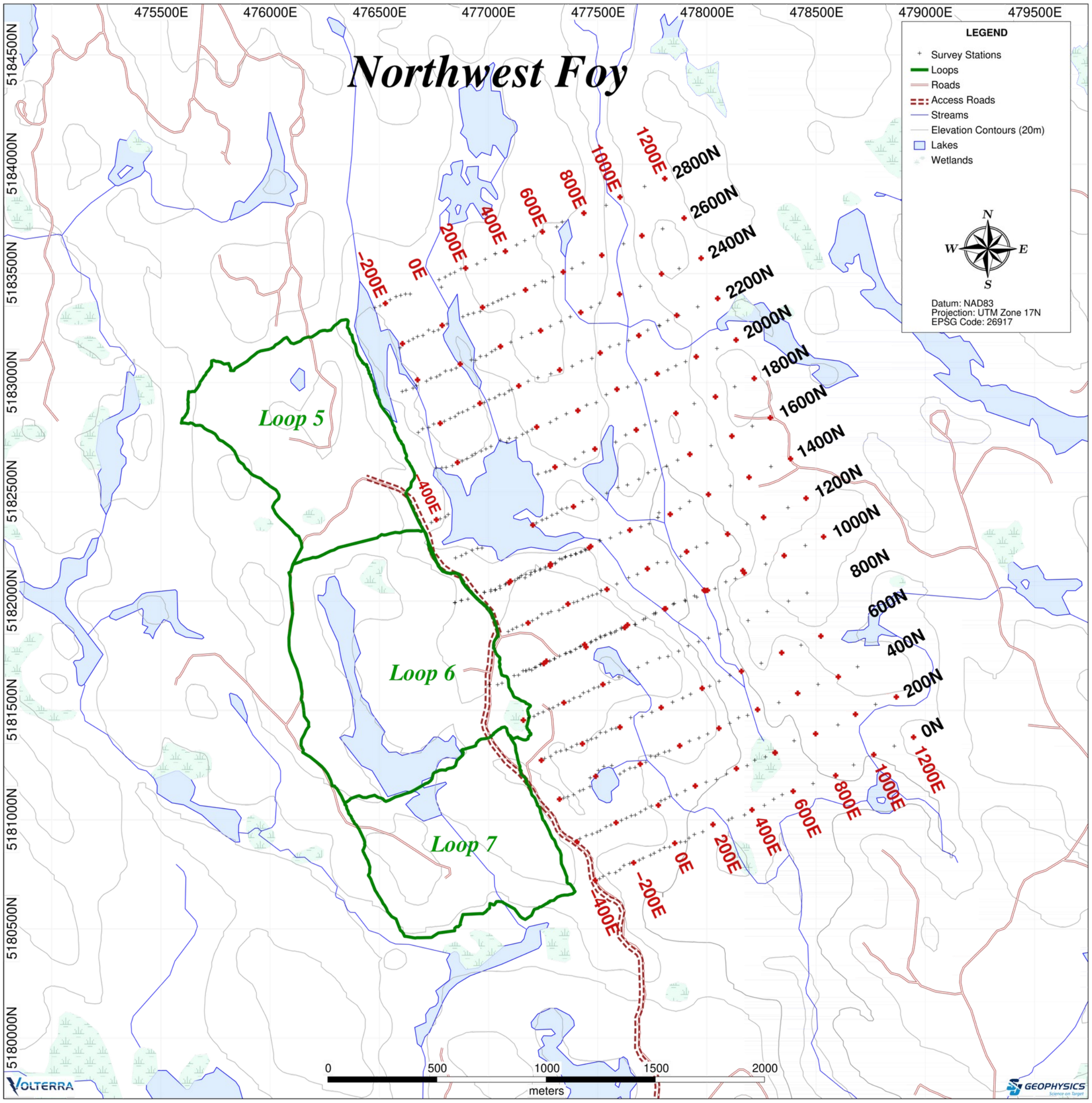

Figure 3: NW Foy grid EM loop and survey grid

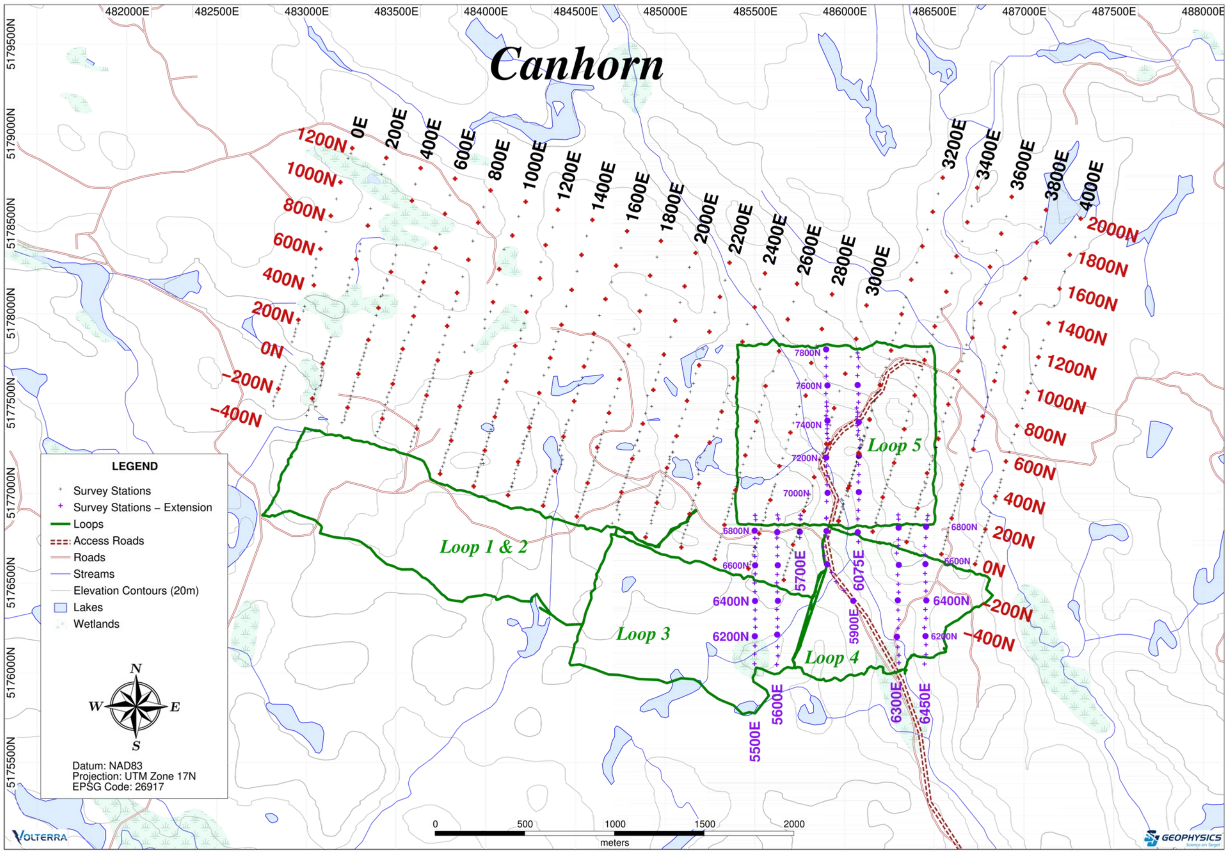

Figure 4:Canhorn EM survey area with all grid and loops including the extension, loop 5.

4. Survey Parameters and Instrumentation

4.1. Volterra-TDEM Survey Design

The Volterra Acquisition System was used to acquire time-domain electromagnetic data. Each Volterra acquisition unit records full-waveform data from attached sensors. The recorded data is then passed through proprietary signal processing software to calculate the geophysical response. Android tablets are used to view decimated raw data in real-time via a Bluetooth connection to the data acquisition unit. The signal (raw data) visible on the tablet enables the operators to verify the transmitter waveform and to see that the sensors are functioning correctly.

Using induction magnetometers (B-field) connected to a Volterra data acquisition unit measurements of the induced magnetic field were made along each survey line at regular intervals. At each measurement station two components of the transient magnetic field were measured; vertical (Hz) and horizontal in-line (Hx). The induction magnetometers were aligned using a compass and bubble level and a declination of 60º (NW Foy), 20º (Canhorn) and 0º (Canhorn extension) were used when orienting the horizontal induction magnetometers. To investigate the possibility of deep conductors requires late time gates. Late time gates have low amplitude and can be overwhelmed by cultural noise, therefore; longer measurements away from the loop edges were done in an effort to reduce late-time noise through additional stacking. A recording length of 120 seconds were used near the loop edge, lengthening to 180 seconds and finally 240 seconds on the distal edges of the loop.

4.2. EM Loops

To create the required TDEM signals for the survey, large transmitter loops were used. The primary field was generated using a single SJ Geophysics EMTX 3000 transmitter connected to the loops. The SJ Geophysics EMTX 3000 sent a square, 100 % duty cycle waveform through the loop and was powered by a gas powered generator. The NW Foy grid used a base frequency of 6 Hz while the Canhorn grid used frequencies 30 and 33 Hz. The change to 30 Hz was at the request of the client to gain more staking therefore less late time noise. It was then changed to 33 Hz to reduce power-line noise. The details of the EM loops are listed in Table 2 and Table 3.

NW Foy Grid	Loop 5	Loop 6	Loop 7
Dimensions (m) (approx.)	1000 x 700	1000 x 900	800x800
Base Frequency (Hz) (approx.)	6	6	6
Loop Resistance (Ω) (approx.)	34	38	32
Loop Peak-Peak Current (A) (approx.)	11	11	11

Table 2: NW Foy EM loop parameters

Canhorn grid	Loop 1-2	Loop 3	Loop 4	Loop 5
Dimensions (m) (approx.)	1800 x 550	1200 x 700	950 x 700	1100 x 1000
Base Frequency (Hz) (approx.)	33	33	30	33
Loop Resistance (Ω) (approx.)	52	38	34	42
Loop Peak-Peak Current (A) (approx.)	8	11	13	10

Table 3: Canhorn EM loop parameters

4.3. Acquisition Parameters

The recording and transmitting parameters used for the survey are described in Table 4. The full instrument specifications are listed in Appendix B.

Survey Technique	Fixed-Loop Time Domain EM
EM Signal Recording	Volterra Data Acquisition Unit (8200 Series)
Sensor (B-Field)	ANT-23 Induction Magnetometer (SN# 3523, 2023, 2123) ANT-9 Induction Magnetometer (SN# 019, 029) ANT-5 Induction Magnetometer (SN# 105, 195, 215)
Measured Component	Z, X components
Sample Rate	16,000 samples/second
Reading Length	90 - 240 seconds
EM Signal Processing	CSProc
EM Transmitter	EMTX 3000 (SN# TX3009 & OS3016)
Waveform / Duty Cycle	Square / 100 %
Base Frequency	6 Hz, 30 Hz & 33 Hz
Loop Resistance	32 to 52 Ω
Current	8 to 13 A; peak-to-peak

Table 4: TDEM recording and transmitting parameters

4.4. GPS

Location data was collected using Stonex S900A & Garmin 64s GPS units in the NAD83 UTM 17N coordinate system. The Stonex S900A units received, via satellite link (Atlas), remote base stations data to achieve RTK corrections. Two local reference GPS base stations were setup in case the rovers failed to achieve RTK solutions and post processing for locations was necessary. The local base stations are listed in Table 5.

For transmitter loops, GPS points were acquired at 25 m or less along each loop edge. On the front edge and first 100 m of the side lengths of the loops, locations were collected using the Stonex S900A RTK GPS. The location of back loop edges and sections further than 100 m from the front edge were collected via hand-held Garmin 64s GPS units.

The location of each survey station was collected and like loop edges, two different location collection techniques were used. All stations close to the loops with a 25 m station spacing had locations collected using the RTK GPS. Survey stations further away used both hand-held Garmin 64s and RTK GPS, depending on equipment availability and personal constraints.

Grid	**Easting (m)**	**Northing (m)**	**Elevation (m)**
Canhorn	5175955.5	486271.25	350.29
NW Foy	477028.310	5181764.065	439.035

Table 5: Local Base Station location

5. *Field Logistics*

The SJ Geophysics field crew consisted of one senior geophysicist, one field geophysicist, one to two field technicians and two to four field assistants depending on personal availability. Syd Visser , senior geophysicist, was on-site as the dedicated data processor and did not directly participate in data acquisition. He did however make many trips into the field to aid in logistics , setting up transmitter sited and discuss safety.

Crew Member Name	**Role**	**Dates on Site**
Syd Visser	Senior Geophysicist	July 30 – September 10, 2020
Alex Tryon	Field Geophysicist	July 30 – September 9, 2020
Abiola Salami	Field technician	July 30 – September 10, 2020
Dylan Cushman-Albano	Field assistants	July 30 – August 20, 2020
Katherine Cambly	Field assistants	July 30 – August 20, 2020
Morgan MacNeill	Field technician	August 11 – September 9, 2020
Thomas Sproule	Field assistants	August 23 – September 9, 2020
Anthony Zamperoni	Field Geophysicist	August 21 – September 2, 2020
Eric Laakso	Field assistants	September 1 – September 10, 2020

Table 6: Details of the SJ Geophysics crew on site

The SJ Geophysics crew's first day on site at the Foy offset project site was on July 30 and remained on site till September 10, 2020. Mobilization began on July 27, 2020 with one crew member driving gear from Emo, Ont, and finished when the rest of the crew arrived via air in

Sudbury on July 29th , 2020. Demobilization to Vancouver, BC, occurred on September 11h, 2020, with one crew member driving and the rest flying.

The SJ Geophysics crew was accommodated at two different motels during the project. At first the crew stayed at Moonlight Inn and suites before moving to the Northland motel to be closer to the worksite and reduce travel time. Both hotels provided WiFi which allowed for easy communication and data transfers from the crew to the SJ Geophysics office. Email, cell phones and satellite phones were used for communication between all parties involved in the project. The crew prepared all breakfasts and lunches at the hotels. Some dinners were purchased at local restaurants

On July 30th, KGHM' Senior Project Geologist, Christopher Verzyden, led a comprehensive safety orientation for the Foy Offset Project. Discussed were techniques and protocols aimed at minimizing risk at work, safe work practices, reporting expectations, and potential areas of dangerous terrain. The SJ Geophysics crew conducted daily safety tailgate meetings. At these meetings, personnel discussed issues related to weather conditions (including ramifications on the survey/personal safety), encounters with potentially problematic wildlife, efficient organization of daily tasks, and any other work-related questions or concerns. Comprehensive weekly safety meeting were held on Wednesdays throughout the project, with KGHM representatives present.

The crew began laying loop wire in the afternoon July 30th on the NW Foy area after the safety orientation. Data acquisition began on August 1st and continued on the NW Foy grid until August 18th. Delays during the survey of the NW Foy grid consisted of a one day delay on August 4th to reprogram equipment and a slow down on August 17th due to thunderstorms. Breaks in the loop wire did occur a couple of times, however; their impact was not significant.

Production on the Canhorn area began with loop 4 on August 19th. On August 22nd there was an equipment failure causing the transmitter to lost power and no production was obtained. The problem was rectified and surveying continued the next day. Surveying was completed on September 6th after many days of wet weather. Like the NW Foy grid, breaks in the loop wire did occur several times, however; their impact was not significant. Discussions of an extension to further characterize an anomaly located on loop 4 took place during the last few days of surveying. The crew stood on standby on September 7th while discussions were ongoing. The extension went ahead with production taking place from September 8th to September 10th. The crew demobilized from site on September 11.

All of the preliminary processed data was send to KGHM consulting geophysicist Brian Bengert for review. Any changes in survey design before and during the survey were suggested and or discussed and authorized by Brian which included changes in station spacing and base frequencies. Discussions with Brian also let to the recommendation to extend the survey on the Canhorn.

6. Data Quality

6.1. Locations

The location data collected on the Foy Offset Project was of consistently high to very high quality. Both survey teams carried differential GPS units with them during surveying and collected RTK corrected GPS points at the 25m spaced stations. The same can be said for points along the loop edge front loop edge. The bulk of the points collected by RTK were collected within an accuracy threshold of 0.5 m (3D) with the majority of those having an accuracy of < 20 cm. There were areas in the grid in which denser canopy cover impeded GPS signals or prevented radio-linking with the satellite base station. Approximately 15 % of the total recorded GPS points (loop and station points) were affected in this manner. Any points with obviously erroneous data were edited or removed from the set. Some points were collected using a Garmin GPS handheld. These locations were also of a high quality.

6.2. Volterra-TDEM

The data on the NW Foy grid was collected using a base frequency of 6 Hz. There was basically no response from any conductors including conductive half space, therefore the data basically indicated nothing but noise thus making it even more difficult to tell how well the equipment was performing. To determine that there was no issue with the equipment during the period when loop 5 was first energized, loop 7 was left connected and a short survey was completed across the near loop edge of loop 7. The response from this short survey line indicated that there was definitely no issue with the equipment and that there was simply no apparent conductive response in the survey area. The base frequency was changed to approx. 30 Hz for the

Canhorn area to reduce data noise even further through increased stacking.

The response on most of the Canhorn survey area was very similar to the response seen on the NW Foy grid. Fortunately, there was a very subtle large wavelength response from loop 4, and a more pronounced short wavelength response from the north east corner of loop 3. Due to these responses, it was determined that loop 4 and 3 were likely not well situated to interpret these conductors and it was suggested to detail the anomaly with a better positioned Canhorn loop 5. The data from loop 5 confirmed and better outlined the anomalous responses with good quality data.

7. Deliverables

This logistics report and maps are provided digitally in PDF format. A brief description of the provided data is below.

- EM Data
  - Processed EM data as .TEM files
  - Profile plots as .png files
- Locations – Locations of survey stations and transmitter loop
- Logistics report
- Grid map

The processed EM data is provided in TEM file format. The TEM files contain column separated data with the instrument parameters stored in a header. The header describes the instrument parameters, EM time gates, and loop locations. The EM data consists of the station label, UTM coordinates, loop label, and associated decay curve.

The processed EM data was divided into time gates using the “SQRT2” timing scheme. The timing scheme (ie. time gates) describes how the width of the time channels change with each subsequent channel, starting from late-time. The “SQRT2” scheme divides the previous channels width by a factor of $2^{1/2}$. The number of gates is chosen based on the minimum gate width (early time) and the sampling rate of the Volterra acquisition unit. The SQRT2 scheme for a 5 Hz base frequency provides 20 time gates. For Volterra-EM data, Channel 1 refers to the latest time gate, following the convention of the UTEM and UREM systems[1].

As the data is collected using a 100% duty cycle waveform, the results are a measurement of the total field. To obtain the secondary field, the primary field must be subtracted from the data in the direction of the sensor field. Handheld GPS units can be used to collect the location data but are usually not of sufficient quality to accurately calculate the primary field for standard processing. To correct for the error in the calculation of the primary field, it can be assumed that the latest time gate (referred to as the reference time gate) is equal to the primary field and is subtracted from the total field to obtain the secondary field. The reference time gate itself is always reduced to the calculated primary field and will show any large very late-time responses. The survey carried out on the Foy Offset Project used differentially corrected GPS units to provide the means to accurately calculate the primary field for processing.

The TEM data can be output three different ways to facilitate interpretation. The standard procedure is to deconvolve the EM data with the full-waveform transmitter current to obtain total field data with units of picoTesla per Amp. The total field data is then reduced to obtain secondary field data, which can be presented two ways. The first way is to reduce the total field data by the reference time gate or calculated primary field. Result is the secondary field presented in picoTesla per Amp. This is sometimes referred to as constant gain or point normalized measurements. The second way is to reduce the total field data by the reference time gate or calculated primary field and normalize by the calculated total primary field at that station then multiply by 100. Result is the secondary field expressed as a percentage of the total primary field. This is referred to as variable gain or continuously normalized measurements.

For the TDEM fixed-loop survey configuration, TEM files are provided for each survey line. The data is provided in folders organized by survey line as described below.

- Loop/SurveyLine
    - Total-Field: Deconvolved to the current monitor. Units are pT/A.
    - CH1red: Total-Field data reduced to the reference time gate or calculated primary field. Units are pT/A.

1 *UTEM: Lamontagne Geophysics Ltd.*
UREM: Vale Canada Ltd.

- CH1red-png: Images of the CH1 data in PNG format.
- PercentPrimary: CH1red data normalized by calculated total primary field multiplied by 100. Units are percent of the primary field.
- PercentPrimary-png: Images of the PercentPrimary data in PNG format.

Respectfully submitted,

Alex Tryon, B.Sc

Field Geophysicist

SJ Geophysics Ltd.

Syd Visser, P.Geo (BC)

Senior Geophysicist

SJ Geophysics Ltd.

Appendix A: Survey Details

Canhorn

Line	Series	Loop	Start Station	End Station	Survey Length (m)	Station Spacing (m)	Components Measured	Base Frequency (Hz)
0	E	1&2	-350	1200	1,550	25,50,100	Z, X	33
200	E	1&2	-350	1200	1,550	25,50,100	Z, X	33
400	E	1&2	-350	1200	1,550	25,50,100	Z, X	33
600	E	1&2	-350	1200	1,550	25,50,100	Z, X	33
800	E	1&2	-350	1200	1550	25,50,100	Z, X	33
1000	E	1&2	-450	1200	1,650	25,50,100	Z, X	33
1200	E	1&2	-450	1200	1,650	25,50,100	Z, X	33
1400	E	1&2	-450	1200	1650	25,50,100	Z, X	33
1600	E	1&2	-450	1200	1,650	25,50,100	Z, X	33
1800	E	1&2	-450	1200	1,650	25,50,100	Z, X	33
2000	E	1&2	-450	1200	1,650	25,50,100	Z, X	33
2200	E	3	-450	1200	1650	25,50,100	Z, X	33
2400	E	3	-450	1200	1650	25,50,100	Z, X	33
2600	E	3	-450	1200	1600	25,50,100	Z, X	33
2800	E	3	-450	1200	1650	25,50,100	Z, X	33
3000	E	3	-450	1200	1650	25,50,100	Z, X	33
3200	E	4	-50	2000	2050	25,50,100	Z, X	30
3400	E	4	-50	2000	2050	25,50,100	Z, X	30
3600	E	4	-50	2000	2050	25,50,100	Z, X	30
3800	E	4	-50	2000	2050	25,50,100	Z, X	30
4000	E	4	-50	2000	2050	25,50,100	Z, X	30

Total Linear Metres = 36100

Northwest Foy

Line	Series	Loop	Start Station	End Station	Survey Length (m)	Station Spacing (m)	Components Measured	Base Frequency (Hz)
0	N	5	-500	1200	1,700	25,50,100	Z, X	6
200	N	5	-500	1200	1,700	25,50,100	Z, X	6
400	N	5	-500	1100	1,600	25,50,100	Z, X	6
600	N	5	-500	1000	1500	25,50,100	Z, X	6
800	N	5	-500	1025	1,525	25,50,100	Z, X	6
1000	N	6	-500	1200	1,700	25,50,100	Z, X	6
1200	N	6	-400	1200	1600	25,50,100	Z, X	6
1400	N	6	-400	1200	1,600	25,50,100	Z, X	6
1600	N	6	-400	1200	1,600	25,50,100	Z, X	6
1800	N	6	-400	1200	1,600	25,50,100	Z, X	6
2000	N	7	-400	1200	1600	25,50,100	Z, X	6
2200	N	7	-400	1200	1600	25,50,100	Z, X13	6
2400	N	7	-400	1200	1600	25,50,100	Z, X	6
2600	N	7	-400	1200	1600	25,50,100	Z, X	6
2800	N	7	-400	1200	1600	25,50,100	Z, X	6

Total Linear Metres = 24125

Canhorn Extension

Line	Series	Loop	Start Station	End Station	Survey Length (m)	Station Spacing (m)	Components Measured	Base Frequency (Hz)
5500	E	5	6050	6875	825	50	Z,	33
5600	E	5	6050	6875	825	50	Z,	33
5700	E	5	6750	6875	125	50	Z,	33
5900	E	5	6400	7800	1,400	25,50	Z, X	33
6075	E	5	6750	7775	1,025	25,50	Z, X	33
6300	E	5	6050	6900	850	50	Z	33

Line	Series	Loop	Start Station	End Station	Survey Length (m)	Station Spacing (m)	Components Measured	Base Frequency (Hz)
6450	E	5	6050	6900	850	50	Z	33

Total Linear Metres = 5900

Appendix B: Instrument Specifications

Volterra Acquisition Unit (Dabtube 8000 Series)

Technical:

Input impedance:	100 MΩ
Input overvoltage protection:	5.6 V
ADC bit resolution:	24-bit
Internal memory:	Storage Capacity 32 GB
Number of inputs:	4
Synchronization:	GPS
Selectable Sampling Rates (samples/second):	128000, 64000, 32000, 16000, 8000, 4000, 2000, 1000
Common mode rejection:	More than 80 dB (for Rs=0)
Voltage sensitivity:	Range: -5.0 to +5.0 V (24 bit)
Features:	Programmable Gain

General:

Dimensions:	Diameter: 43 mm, Length: 405 mm
Weight:	0.5 kg
Battery:	5.0 VDC nominal
Operating temperature range:	-40 ºC to 40 ºC

Volterra Acquisition Unit (Dabtube 8200 Series)

Technical:

Input impedance:	20 MΩ
Input overvoltage protection:	5.6 V
ADC bit resolution:	24-bit
Internal memory:	Storage Capacity 64 GB
Number of inputs:	4
Synchronization:	GPS
Selectable Sampling Rates (samples/second):	128000, 64000, 32000, 16000, 8000, 4000, 2000, 1000
Common mode rejection:	More than 80 dB (for Rs=0)
Voltage sensitivity:	Range: -5.0 to +5.0 V (24 bit)
Features	Programmable Gain, AC/DC coupling

General:

Dimensions:	Diameter: 43 mm, Length: 405 mm
Weight:	0.5 kg
Battery:	5.0 VDC nominal
Operating temperature range:	-40 ºC to 40 ºC

Surface Induction Magnetometer (ANT-23, ANT-9, ANT- 5)

Sensor Serial Number	3523, 2023, 2123, 019, 029, 105, 195, 215
Frequency Range:	0.1 Hz to 50,000 Hz
Sensitivity in Passband:	100 mV/nT

SJ Geophysics EM Transmitter (EMTX-3000 Series)

Transmitter Output Stage:

Input Voltage:	10 to 400 V DC
Output Voltage:	20 to 800 V, peak to peak
Output Current:	0 to 18 A, peak to peak
Frequency:	0.1 to 1 kHz, adjustable in 0.001 Hz
Duty Cycle:	10 to 100 %
Waveform:	Square
Features:	Output stages can be connected in parallel (up to 4 units) for a maximum of 72 A, peak-to-peak

Transmitter Controller:

Input Voltage:	7 – 20 V DC
Output Current:	0.4 – 2 A

Power Supply:

BK Precision 9116

Appendix C: Geophysical Techniques

Time Domain EM Method

The time domain EM technique energizes the ground with a variable magnetic field known as the primary field. A transmitter sends an alternating electric current through a loop of wire laid on the surface to create the primary field (Figure 5). Each time a variation occurs in the current (e.g. succession of on-time/off-time) and therefore in the primary field, induced voltage causes eddy currents to flow within underground conductors near the loop. Circulating about these currents is another magnetic field termed the "secondary" field. The magnitude and rate of decay of the eddy currents depend on the electrical conductivity and the geometry of the medium. As the secondary field is directly proportional to the eddy currents, recordings of the secondary field can be exploited to infer information about the conductivity structure of the subsurface. In resistive media eddy currents decay rapidly, whereas in conductive media the currents will decay more slowly.

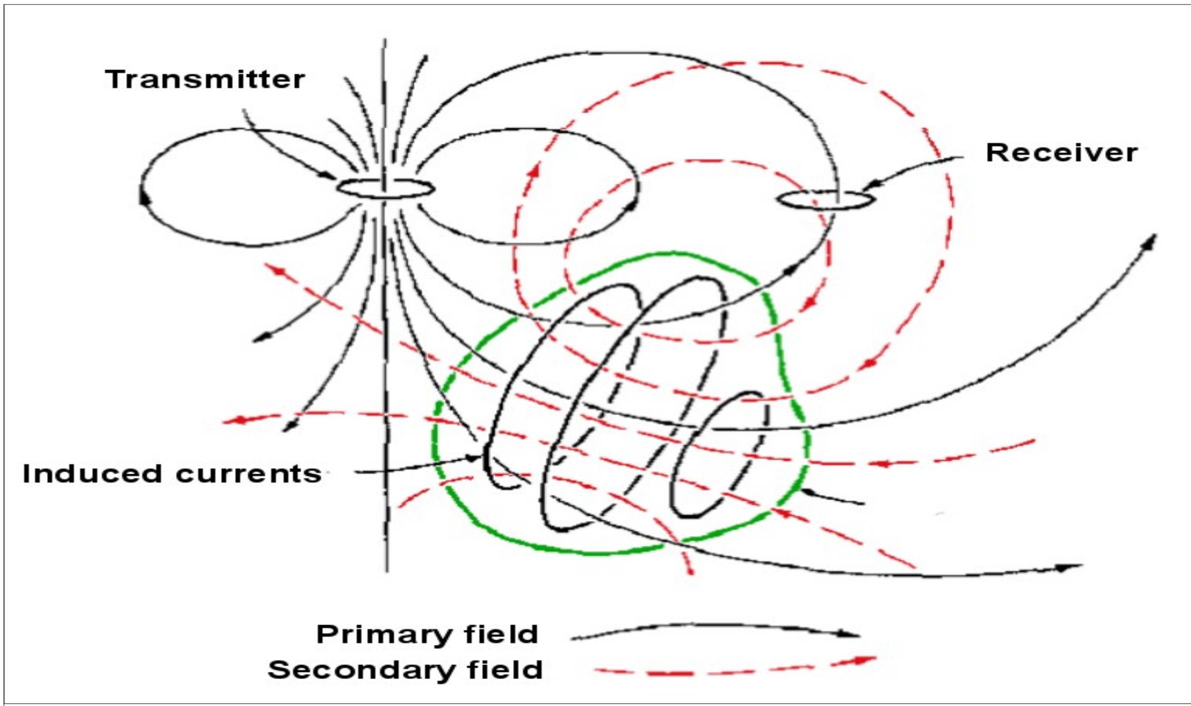

Figure 5: General Principles of TDEM (Grant & West, 1965).

Volterra-EM Method

The Volterra-EM system provides significantly more flexibility over traditional EM surveys (surface or downhole) through the use of SJ Geophysics' proprietary data acquisition units. Each data acquisition unit can be configured to record data from a unique sensor (B-field coil, dB/dt coil, fluxgate magnetometer, resistivity / IP sensors, etc.). The Volterra-EM system uses internal memory for data storage, is time synced using an onboard GPS sensor and high quality internal clock, and employs an inertial measurement unit. These advances eliminate the need for specialized receiver cables and a centralized receiver control station, making the system more portable, more versatile, and in the case of borehole surveys – much lighter. The Volterra-EM system takes advantage of SJ Geophysics' EMTX 3000 transmitter, capable of operating at variable duty cycle, although typically operated at 100% duty cycle. The SJ Geophysics' Volterra-EM system can be powered using standard batteries or a 2000 W generator, making the system that much more field ready.

A typical Volterra surface EM system will use sensitive induction magnetometer sensors connected to a data acquisition unit to measure the total magnetic field – the vector sum of the primary and secondary magnetic fields on the surface. The information carried by the secondary magnetic field will be extracted during a processing stage using filtering, modelling and normalization techniques. Downhole EM surveys will typically employ a highly sensitive induction magnetometer (B-field coil) and a three component fluxgate magnetometer, however this configuration can be altered depending on survey requirements.

Measurements are taken along a line or a borehole and can be outside, inside or crossing the transmitter loop. Moreover, two different loops using two different frequencies can stimulate the ground at the same time, and the secondary field related to each of them will be isolated in a processing stage. TDEM measurements are generally considered repeatable; however, changing field conditions such as variable water content can reduce the overall repeatability. Incorporating other data sets to assist in geological interpretation is prudent.

Appendix D: Invoices and Receipts

Records of expenditures for the 2020 exploration program are included as an attachment with this report under the folder "\Appendix D – Invoices and Receipts".