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ASSESSMENT REPORT:
A VLF ELECTROMAGNETIC SURVEY

ON THE

SHELBY LAKE PROPERTY,
SHELBY LAKE AREA,
THUNDER BAY MINING DIVISION

Prepared by Christian Carl
October 14, 2016

Summary

In December, 2015, geologists Christian Carl and Steven Siemieniuk carried out a VLF electromagnetic survey on the Shelby Lake Property (claim 4272609) in the Shelby Lake Area of the Thunder Bay Mining Division. The survey was conducted in an attempt to pinpoint conductors (and possible sulfide mineralization) along a prominent magnetic anomaly located seven kilometres south of the open pit at Lac Des Iles Mine.

A total of 168 percent in phase and 168 percent quadrature readings were taken at 15 metre intervals along a four line, north-south grid. Several moderate strength conductors were detected during this program, the strongest of which warrant follow-up investigation.

Future work should focus on delineation of the aforementioned conductors by carrying out a Surface Pulse-EM (TDEM) survey (with z and x components) to determine if near-surface PGE mineralization is responsible for the VLF anomalies recognized in this program. Additionally, follow-up geologic mapping is highly recommended in the vicinity surrounding the conspicuous conductor occurring on the southern margin of line 320E, as well as adjacent to the broader conductor occupying the northwestern region of the property. Drill testing of these targets is also warranted since these pronounced conductors occur in an area that is highly prospective for PGEs where overburden is over three metres thick (photo 1, appendix B).

1.0 Property Description and Location

The Shelby Lake Property is located approximately 80 kilometres north-northwest of the city of Thunder Bay, Ontario in the Shelby Lake Area of the Thunder Bay Mining Division (figure 1). The property consists of a two unit unpatented mining claim (table 1), enveloped by claims held by North American Palladium, contiguous to patents of Lac Des Iles Mine.

Claim Number	Township/ Area	Mining District	Units	Recorded Holder	Recording Date	Claim Due Date	Claim Type
4272609	SHELBY LAKE AREA	Thunder Bay	2	CHRISTIAN CARL (100%)	2014-Nov-14	2016-Nov-14	Unpatented

Table 1: Claim Details

Figure 1: Shelby Lake Property Location

1.1 Access

The property can be reached by heading north on Highway 527, turning left (west) onto Fensom Road, and travelling an additional 32 kilometres. At this point, the road forks left (south), revealing a recent clear-cut that superimposes the property. Alternatively, the claim can be accessed via a series of logging roads which branch off Dog River Road, north of Highway 11.

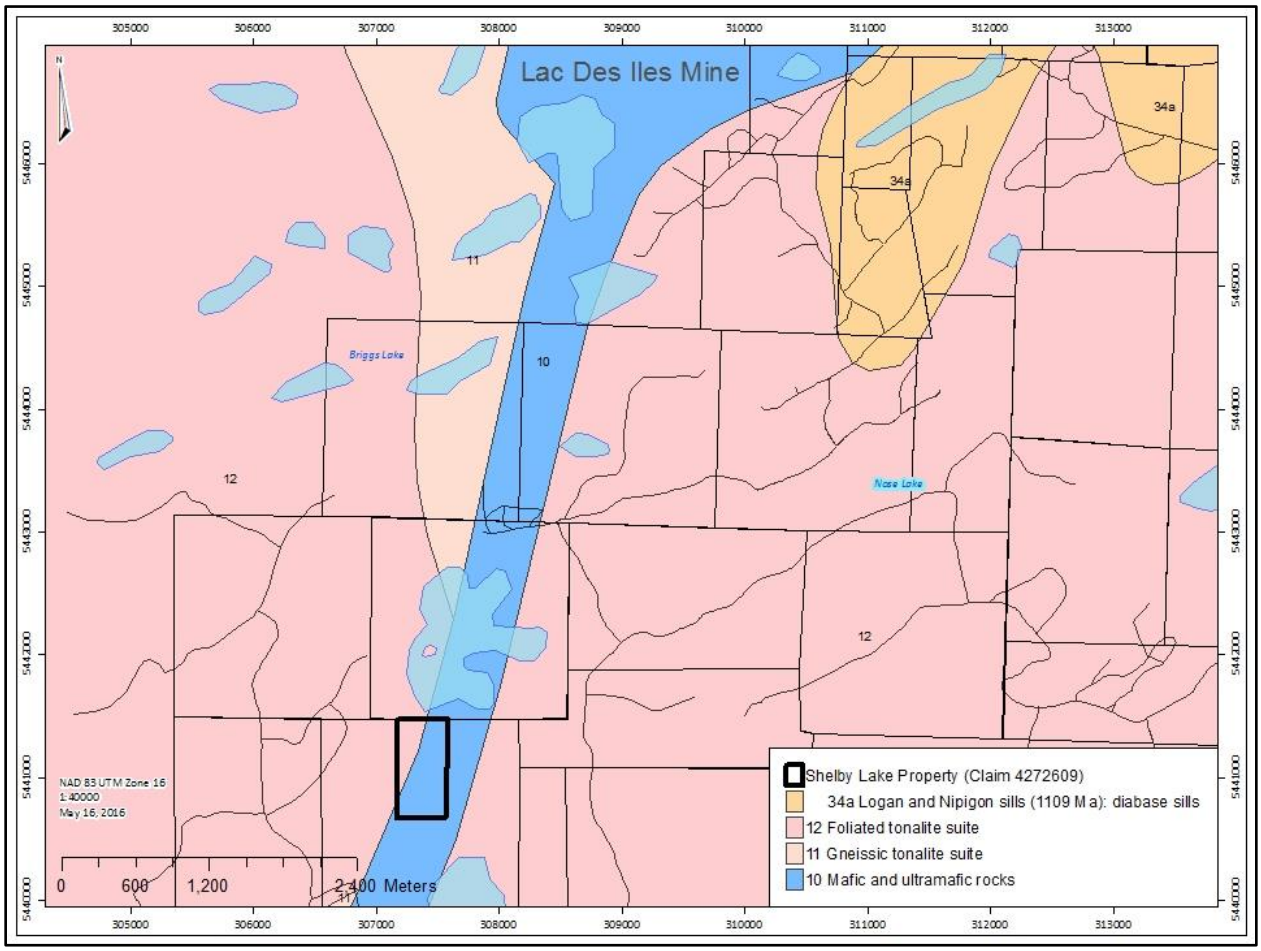

Figure 2: Geologic Map of Shelby Lake Property and Surrounding Area

1.2 Geology

The geology surrounding the property consists of metamorphosed plutons of the Quetico Subprovince embodied by the gneissic and foliated tonalitic rocks suites found throughout the Shelby Lake Area. A mafic-ultramafic dike/conduit trending south from the Lac Des Iles Mine (LDIM) bisects the property (figure 2) and is likely the source of the magnetic anomaly occupying the entirety of the claim (figure 3). The Lac Des Iles Mine (LDIM), located seven

kilometers to the north of the property, occurs within the mafic-ultramafic Lac Des Iles Intrusive Complex at the margin of the Quetico and Wabigoon Subprovinces. The LDIM is a palladium-rich deposit with current (February 2015) total proven and probable resources and reserves of 20.367 million tonnes at 2.13g/t Pd, 0.18g/t Pt, 0.16g/t Au, 0.08% Ni and 0.05% Cu, total measured and indicated resources and reserves of 71.468 million tonnes at 1.98g/t Pd, 0.20g/t Pt, 0.14g/t Au, 0.07% Ni and 0.06% Cu, and total inferred resources and reserves of 15.039 million tonnes at 2.67g/t Pd, 0.20g/t Pt, 0.17g/t Au, 0.08% Ni and 0.07% Cu, respectively[1].

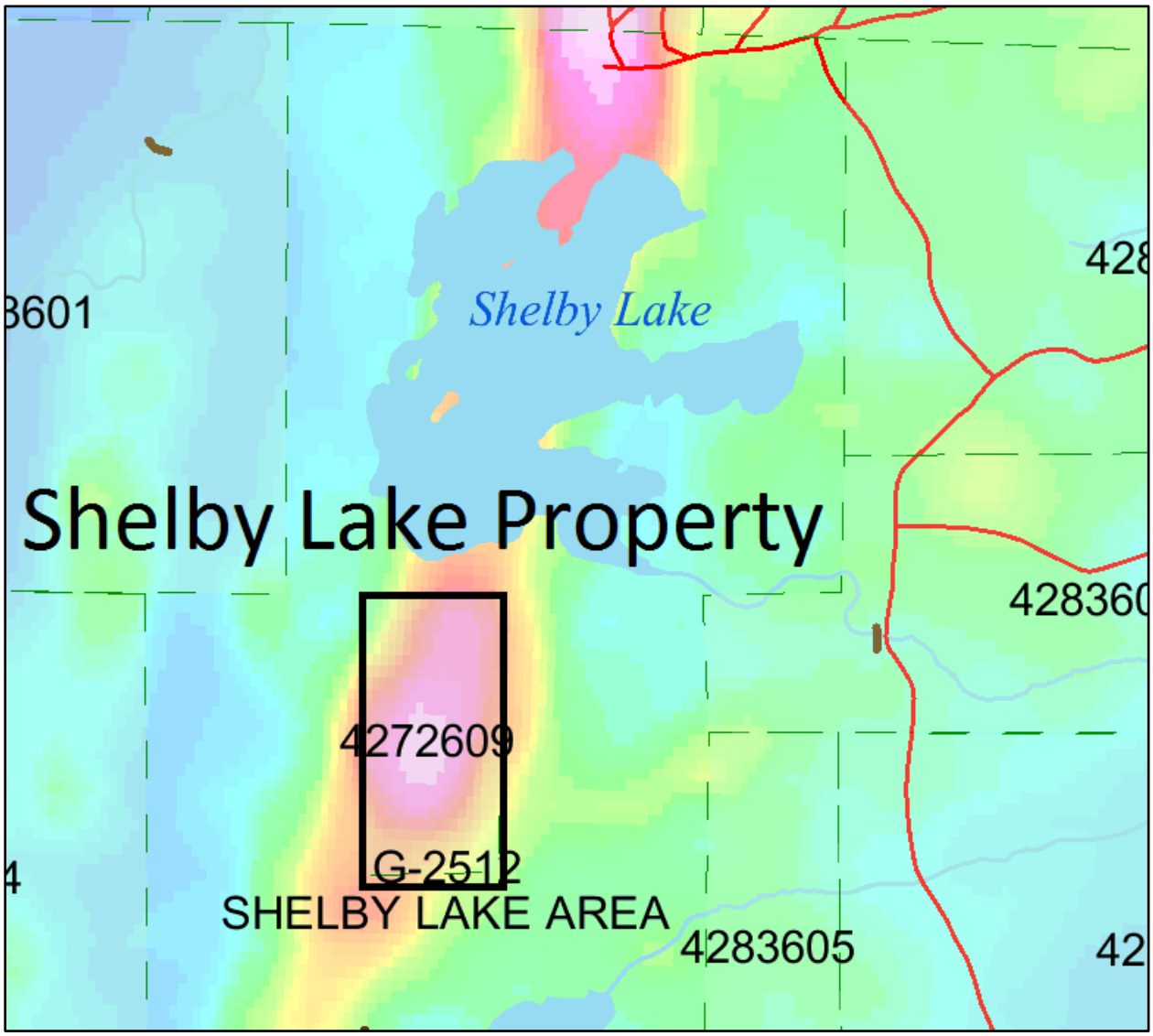

Figure 3: MNDM Airborne Magnetic Survey Map of Shelby Lake Property

[1] http://www.napalladium.com/operations/reserves-and-resources/default.aspx

2.0 VLF Survey

This survey was completed over the course of three days from December 15-17, 2015 to identify near-surface conductors and facilitate exploration for sulphide mineralization on the property. Utilizing two Geonics EM-16 units (photo 2, Appendix B), geologists Christian Carl and Steven Siemieniuk took a total of 168 percent in-phase and 168 percent quadrature measurements (appendix A). The readings were concentrated along four north-south lines spaced 60 metres apart. Survey stations were positioned at 15 metre intervals in order to maximize coverage on the claim, without sacrificing resolution (appendix C). The survey used VLF transmitter NAA at Cutler, MD., U.S.A. (17.8kHZ) as a source with the percent in-phase and percent quadrature measured facing south. Data was recorded in a field notebook and later transferred to an Excel spreadsheet. A Garmin GPSmap 62s handheld GPS receiver was used to record UTM coordinates at each survey site (appendix A).

The VLF method employed in this survey utilizes navigation signals as a primary source. The receiver measures the dip angle and vertical quadrature of the resultant electromagnetic field at the station. This method is capable of detecting weak conductors and has moderate to great depth penetration. Data are plotted as staked profiles of dip angle and vertical quadrature. Conductor axes (crossovers) are identified where the dip angle crosses from negative to positive.

Plotting of the percent in-phase and percent quadrature measurements revealed multiple crossover points, indicating the presence of multiple conductors on the property (appendix C). Most notably, line 260E and 320E intersected a sizeable conductor in the northwest of the survey area which has a considerable amplitude on the in phase-quadrature plots. The shapes of the fields of this conductor are distorted to the negative, indicating dipping of the conductive material.

A smaller, yet exceptionally well defined conductor occurs towards the southern limit of line 320E. The field of this conductor has a very pronounced amplitude and non-distorted field-shapes, indicating the presence of highly conductive, vertically-oriented material at this location.

A handful of weaker conductors are also randomly disseminated throughout the property. These poorly-defined conductors may be the result of groundwater or overburden and do not merit follow-up inspection.

3.0 Program Cost

In total, $4396 worth of work was performed on the claim throughout the course of the program. A breakdown of the total expenses is listed in below (table 2).

Shelby Lake Property VLF Survey Expenses	
VLF Surveying → 2 geologists for 3 days@ $400/geologist per day	$2,400
VLF Receiver Rental → 2 units @ $100/day per unit for 3 days	$600
Mileage → 132km (Thunder Bay to Property) x 6 = 792km @ $0.5/km	$396
Report → 1@$1000	$1,000
Total	$4,396

Table 2: VLF Survey Expenses

4.0 Supplementary Work & Other Observations

On December 15, 2016, a trench was noted within ten metres of the northern boundary of the Shelby Lake Property (photo 1, appendix B). This trench was presumably excavated by contractors of North American Palladium during the summer of 2015 as it was not observed while staking in November 2014. Unless material was backfilled into the trench, excavation did not intersect bedrock and overburden is at least three metres deep at this site.

Clear-cutting in the spring of 2015 has left the property virtually free of trees and has made it markedly more traversable. As a result of this increased ease of navigating the property, the corner posts were inspected on December 17, 2015. All four posts are still standing; however, the number four corner post has been tilted by a skidder or feller-buncher. Despite this disturbance, all posts remain in their original, pre-logging locations.

Though there was approximately 30cm of snow covering the ground during this program, a cursory attempt to locate outcrop along the survey lines was made. As expected, prospecting proved challenging, however, two large, angular amphibolite boulders were intersected while traversing between survey stations 440E-405N and 440E-390N (photo 3, appendix B). A proper mapping program is necessary to sample these boulders as well as to prospect and map outcrops on the property.

4.0 Conclusions & Next Steps

The VLF survey identified two significant conductors located on the western half of the property which warrant follow-up investigation.

As a first step, geologic mapping of the areas surrounding the conductors is required. Additional mapping of the entire property (during non-winter months) is also recommended. Sampling of all mafic outcrops is suggested since data for this area is scarce and the property has a manageable extent for thorough prospecting. Trenching may be necessary if assays returned from sampling are sufficiently elevated in PGEs and are sourced from bedrock (not float/boulders).

Despite the openness created by recent clear-cutting, line-cutting and/or erection of pickets is needed for future surveys. A Surface Pulse-EM (TDEM) survey (with z and x components) is recommended for the entire property. Pulse-EM has produced quality results in PGE exploration elsewhere in Canada and could accurately indicate if near-surface mineralization is present on the claim.

Drill testing of the two strongest conductors represents the final step in fully exploring the potential of the property. A budget of $50,000 is recommended to complete the aforementioned work. Below is a cost-breakdown of the proposed program (table 3).

Expenses of Proposed Exploration Program on Shelby Lake Property	
Geologic Mapping → 2 days, $1000/day	$2,000
Sampling → 30 samples @ $23.10/sample	$693
Line Cutting → 2km @ $1200/km	$2,400
Surface Pulse-EM (TDEM) survey → 3 days @ $5500/day	$16,500
Diamond Drilling (NQ) → 250 metres @ $85/metre	$21,250
Total Expenditures	$42,843

Table 3: Budget for Future Work.

APPENDIX A

VLF SURVEY RAW DATA

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
260E-820N	16	307260	5440821	-13	-9
260E-835N	16	307260	5440835	-18	-9
260E-850N	16	307259	5440850	-14	-5
260E-865N	16	307261	5440865	-12	-6
260E-880N	16	307259	5440879	-6	-2
260E-895N	16	307260	5440896	5	3
260E-910N	16	307261	5440910	14	7
260E-925N	16	307261	5440924	23	10
260E-940N	16	307261	5440941	19	13
260E-955N	16	307260	5440955	12	9
260E-970N	16	307259	5440969	7	7
260E-985N	16	307259	5440984	3	5
260E-000N	16	307259	5440999	1	4
260E-015N	16	307259	5441014	-1	4
260E-030N	16	307261	5441029	-5	0
260E-045N	16	307259	5441044	-9	-1
260E-060N	16	307261	5441060	-6	-1
260E-075N	16	307261	5441075	-10	1
260E-090N	16	307261	5441091	-18	-3
260E-105N	16	307260	5441104	-23	-8
260E-120N	16	307261	5441120	-31	-10
260E-135N	16	307260	5441134	-26	-4
260E-150N	16	307260	5441148	-6	3
260E-165N	16	307261	5441166	12	8
260E-180N	16	307260	5441180	10	10
260E-195N	16	307261	5441195	2	6
260E-210N	16	307259	5441210	-1	6
260E-225N	16	307261	5441225	-8	5
260E-240N	16	307260	5441240	-10	2
260E-255N	16	307260	5441256	-14	2
260E-270N	16	307259	5441269	-18	2

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
260E-285N	16	307261	5441284	-27	-6
260E-300N	16	307259	5441299	-38	-2
260E-315N	16	307261	5441315	-41	-1
260E-330N	16	307259	5441329	-7	2
260E-345N	16	307260	5441344	17	5
260E-360N	16	307260	5441360	26	10
260E-375N	16	307260	5441375	31	14
260E-390N	16	307260	5441390	27	16
260E-405N	16	307260	5441404	19	16
260E-420N	16	307260	5441419	13	12
260E-435N	16	307260	5441434	7	11
260E-450N	16	307260	5441450	2	8
320E-820N	16	307321	5440821	-8	-4
320E-835N	16	307320	5440836	-10	-6
320E-850N	16	307321	5440849	-16	-7
320E-865N	16	307319	5440866	-31	-11
320E-880N	16	307320	5440881	11	3
320E-895N	16	307319	5440895	25	9
320E-910N	16	307322	5440910	18	8
320E-925N	16	307320	5440924	12	4
320E-940N	16	307320	5440940	7	5
320E-955N	16	307318	5440955	5	4
320E-970N	16	307319	5440971	2	3
320E-985N	16	307321	5440984	1	1
320E-000N	16	307319	5441001	0	3
320E-015N	16	307321	5441015	-7	-1
320E-030N	16	307321	5441030	-4	-4
320E-045N	16	307319	5441046	-6	0
320E-060N	16	307320	5441061	-11	0
320E-075N	16	307320	5441076	-13	-2
320E-090N	16	307321	5441090	-8	-1

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
320E-105N	16	307320	5441105	-16	-4
320E-120N	16	307321	5441119	-18	-3
320E-135N	16	307322	5441134	-24	-5
320E-150N	16	307319	5441150	-30	-6
320E-165N	16	307321	5441164	-12	-4
320E-180N	16	307321	5441180	11	6
320E-195N	16	307321	5441196	7	8
320E-210N	16	307320	5441211	3	5
320E-225N	16	307320	5441226	-1	4
320E-240N	16	307321	5441241	-4	4
320E-255N	16	307320	5441256	-11	2
320E-270N	16	307322	5441270	-15	1
320E-285N	16	307320	5441285	-21	-2
320E-300N	16	307318	5441300	-30	-3
320E-315N	16	307320	5441316	-42	-8
320E-330N	16	307320	5441329	-22	-1
320E-345N	16	307320	5441344	-6	2
320E-360N	16	307318	5441360	19	6
320E-375N	16	307321	5441375	18	10
320E-390N	16	307321	5441391	26	13
320E-405N	16	307319	5441406	19	12
320E-420N	16	307321	5441421	11	13
320E-435N	16	307319	5441436	6	4
320E-450N	16	307320	5441450	-1	9
320E-820N	16	307321	5440821	-8	-4
320E-835N	16	307320	5440836	-10	-6
320E-850N	16	307321	5440849	-16	-7
320E-865N	16	307319	5440866	-31	-11
320E-880N	16	307320	5440881	11	3
320E-895N	16	307319	5440895	25	9
320E-910N	16	307322	5440910	18	8

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
320E-925N	16	307320	5440924	12	4
320E-940N	16	307320	5440940	7	5
320E-955N	16	307318	5440955	5	4
320E-970N	16	307319	5440971	2	3
320E-985N	16	307321	5440984	1	1
320E-000N	16	307319	5441001	0	3
320E-015N	16	307321	5441015	-7	-1
320E-030N	16	307321	5441030	-4	-4
320E-045N	16	307319	5441046	-6	0
320E-060N	16	307320	5441061	-11	0
320E-075N	16	307320	5441076	-13	-2
320E-090N	16	307321	5441090	-8	-1
320E-105N	16	307320	5441105	-16	-4
320E-120N	16	307321	5441119	-18	-3
320E-135N	16	307322	5441134	-24	-5
320E-150N	16	307319	5441150	-30	-6
320E-165N	16	307321	5441164	-12	-4
320E-180N	16	307321	5441180	11	6
320E-195N	16	307321	5441196	7	8
320E-210N	16	307320	5441211	3	5
320E-225N	16	307320	5441226	-1	4
320E-240N	16	307321	5441241	-4	4
320E-255N	16	307320	5441256	-11	2
320E-270N	16	307322	5441270	-15	1
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320E-330N	16	307320	5441329	-22	-1
320E-345N	16	307320	5441344	-6	2
320E-360N	16	307318	5441360	19	6
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Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
320E-390N	16	307321	5441391	26	13
320E-405N	16	307319	5441406	19	12
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320E-435N	16	307319	5441436	6	4
320E-450N	16	307320	5441450	-1	9
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380E-865N	16	307381	5440866	-5	-4
380E-880N	16	307382	5440881	-11	-5
380E-895N	16	307382	5440896	5	2
380E-910N	16	307380	5440911	5	1
380E-925N	16	307378	5440925	5	3
380E-940N	16	307380	5440941	1	-1
380E-955N	16	307381	5440956	2	3
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380E-105N	16	307380	5441107	-15	-3
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380E-135N	16	307382	5441135	-32	-8
380E-150N	16	307381	5441151	-36	-8
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380E-225N	16	307381	5441225	4	7

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
380E-240N	16	307381	5441240	-1	5
380E-255N	16	307379	5441257	-2	7
380E-270N	16	307379	5441272	-7	4
380E-285N	16	307380	5441283	-10	4
380E-300N	16	307379	5441300	-14	3
380E-315N	16	307380	5441315	-24	-1
380E-330N	16	307380	5441331	-34	-4
380E-345N	16	307379	5441345	-11	3
380E-360N	16	307380	5441359	3	3
380E-375N	16	307381	5441375	17	12
380E-390N	16	307381	5441390	18	15
380E-405N	16	307381	5441405	11	13
380E-420N	16	307380	5441421	4	9
380E-435N	16	307380	5441434	1	10
380E-450N	16	307380	5441449	-3	7
440E-850N	16	307441	5440850	-6	-3
440E-865N	16	307441	5440866	-9	-6
440E-880N	16	307441	5440880	-11	-4
440E-895N	16	307441	5440896	-14	-5
440E-910N	16	307441	5440911	-12	-5
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440E-940N	16	307440	5440941	-1	1
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440E-985N	16	307441	5440986	1	1
440E-000N	16	307440	5441001	2	2
440E-015N	16	307441	5441016	6	6
440E-030N	16	307441	5441030	3	6
440E-045N	16	307441	5441046	1	3
440E-060N	16	307441	5441061	-1	1
440E-075N	16	307441	5441076	-4	0

Waypoint ID	NAD 83, ZONE	Easting	Northing	% In Phase	% Quadrature
440E-090N	16	307440	5441090	-8	-1
440E-105N	16	307439	5441104	-10	1
440E-120N	16	307440	5441121	-11	0
440E-135N	16	307440	5441136	-15	-4
440E-150N	16	307440	5441151	-26	-6
440E-165N	16	307439	5441166	-14	-1
440E-180N	16	307438	5441180	-12	0
440E-195N	16	307440	5441197	-11	2
440E-210N	16	307442	5441211	5	6
440E-225N	16	307441	5441226	-1	4
440E-240N	16	307440	5441241	-4	4
440E-255N	16	307441	5441256	0	4
440E-270N	16	307441	5441271	-5	2
440E-285N	16	307441	5441286	2	8
440E-300N	16	307440	5441301	-6	9
440E-315N	16	307440	5441316	-7	8
440E-330N	16	307442	5441330	-11	8
440E-345N	16	307440	5441344	-19	6
440E-360N	16	307441	5441361	-29	0
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440E-405N	16	307440	5441405	1	8
440E-420N	16	307440	5441420	2	10
440E-435N	16	307440	5441435	-4	9
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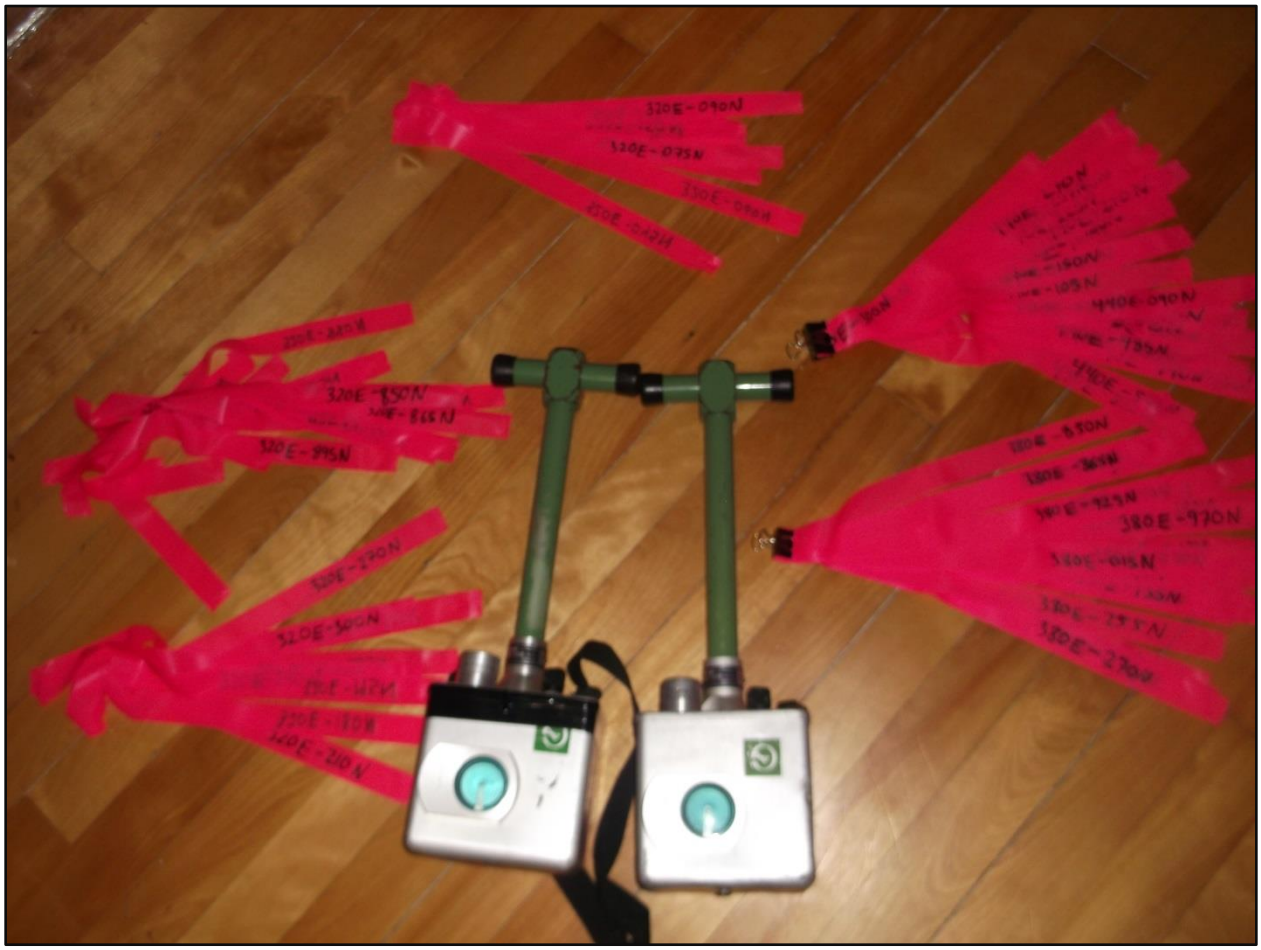
APPENDIX B

PHOTOS

1: North American Palladium Trench Immediately Adjacent to Shelby Lake Property.

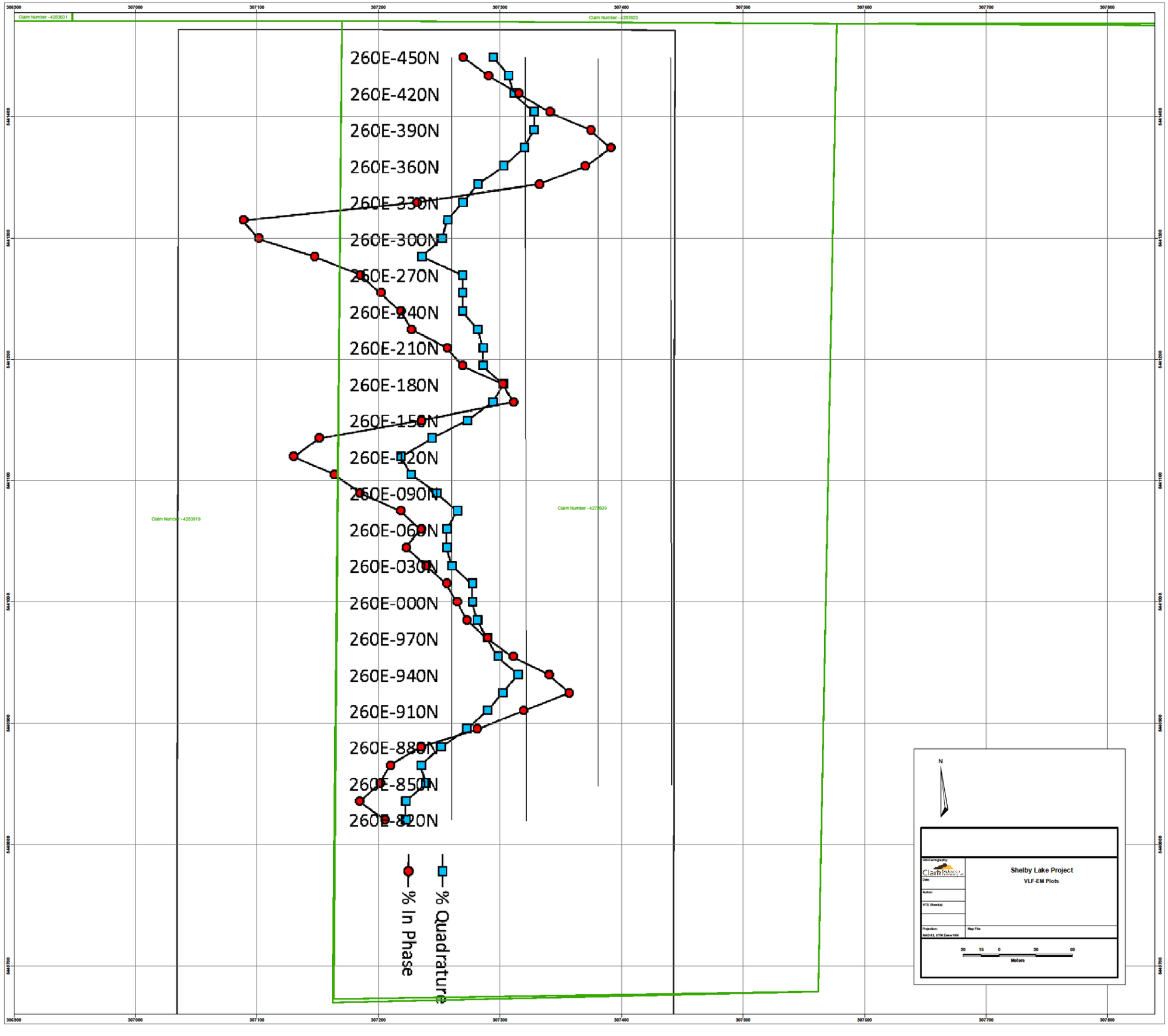


2: Geonics EM-16 VLF Receivers and Survey Station Markers.

3: Amphibolite Boulders Observed While Surveying.

APPENDIX C

VLF SURVEY PLOTS AND STATION LOCATIONS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260E-240N
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260E-180N
260E-150N
260E-120N
260E-090N
260E-060N
260E-030N
260E-000N
260E-970N
260E-940N
260E-910N
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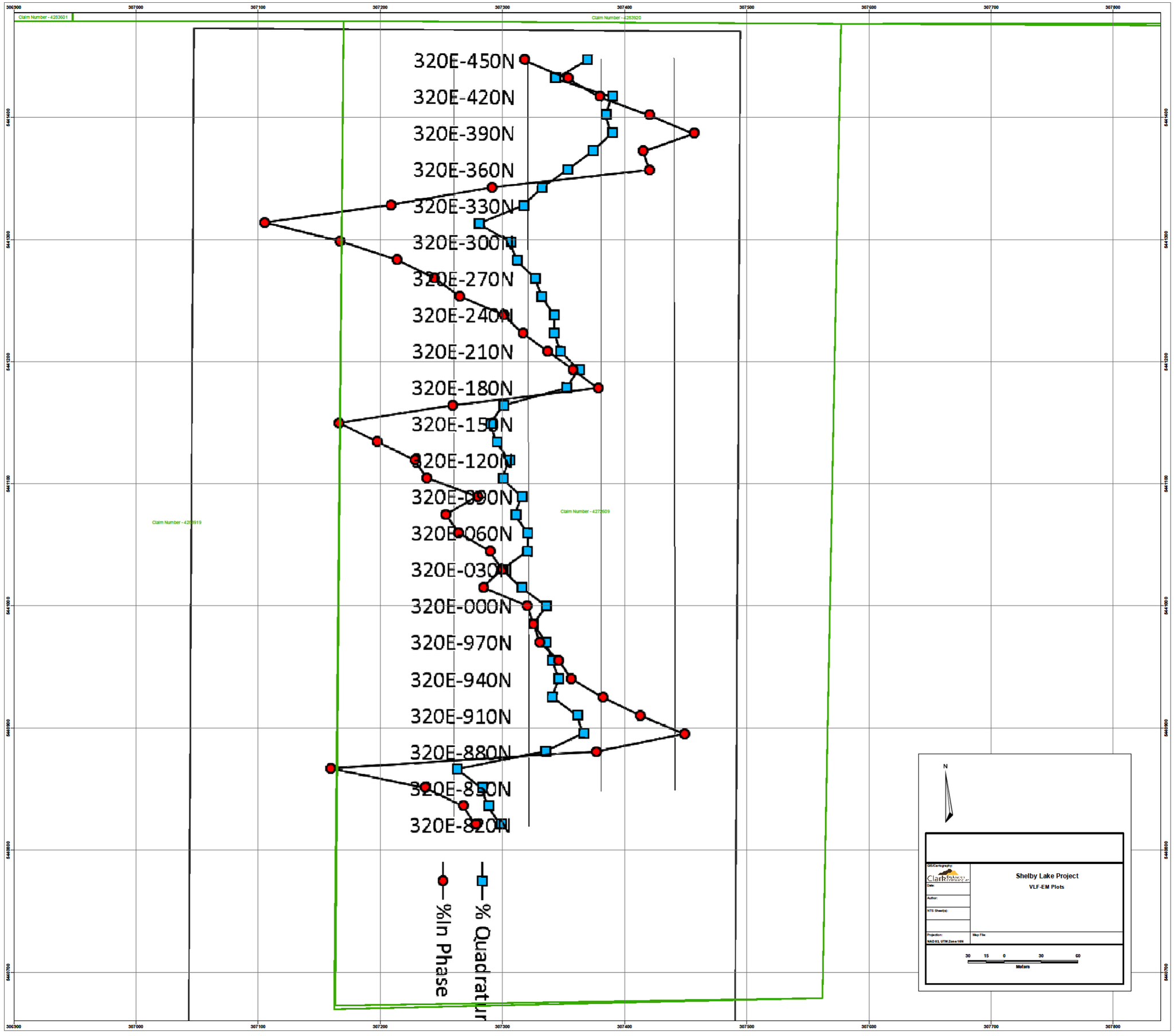
260E-850N
260E-820N
% In Phase
% Quadrature
N
Shelby Lake Project
VLF-EM Plots
Meters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VLF-EM Plots
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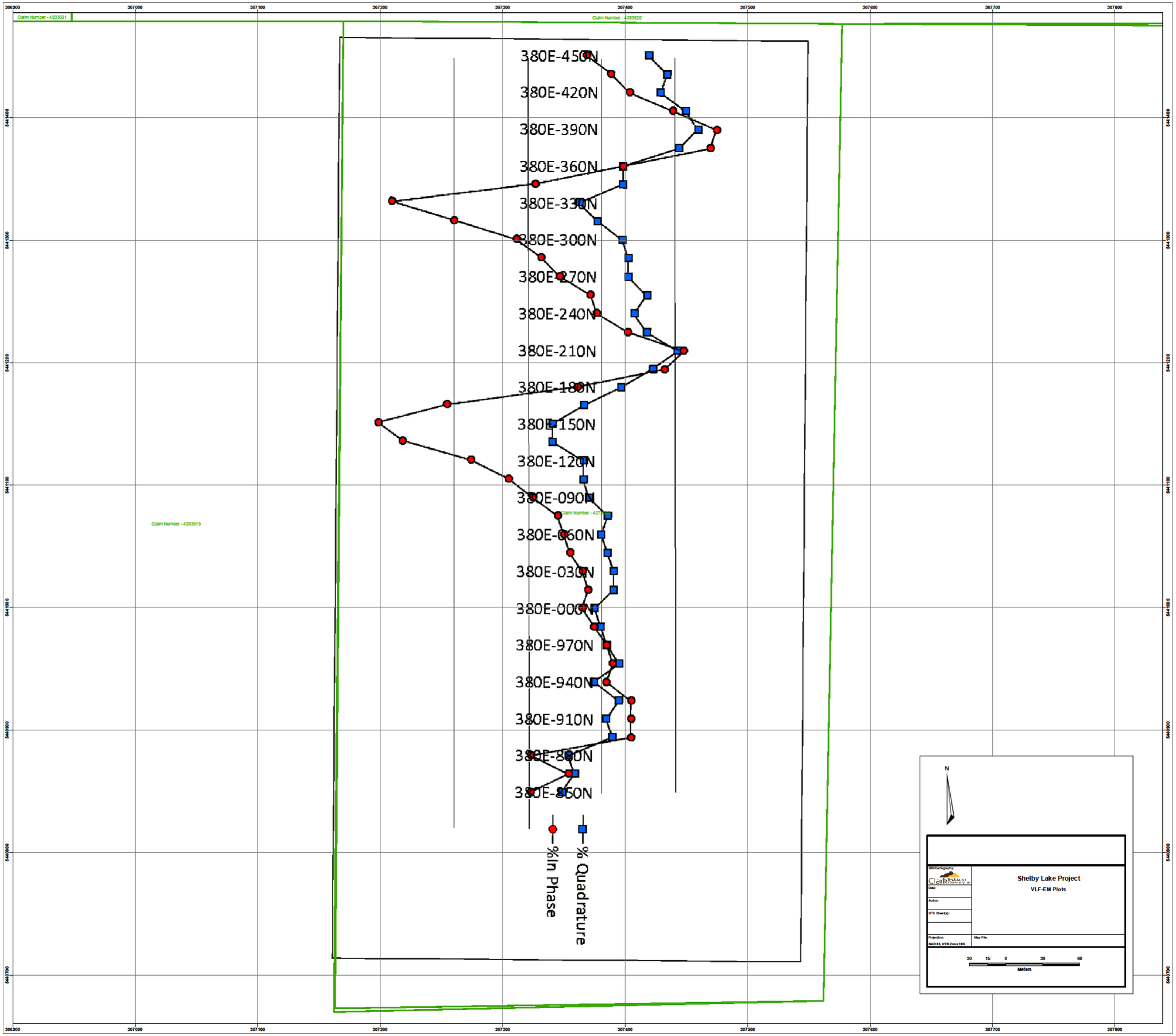
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VLF-EM Plots
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Date:
Author:
NTS Sheet(s):
Projection:
NAD 83, UTM Zone 16N
Map File:
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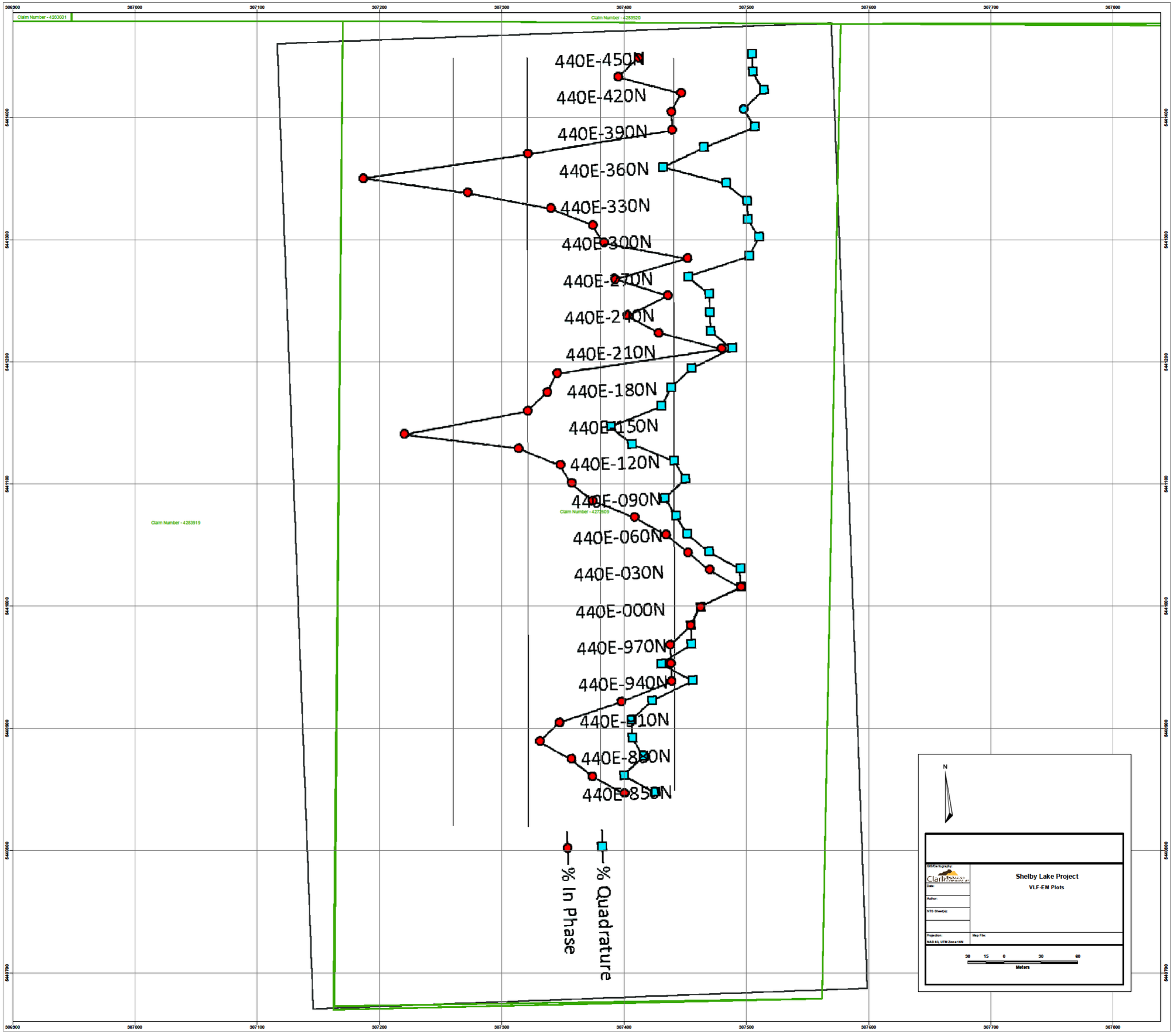
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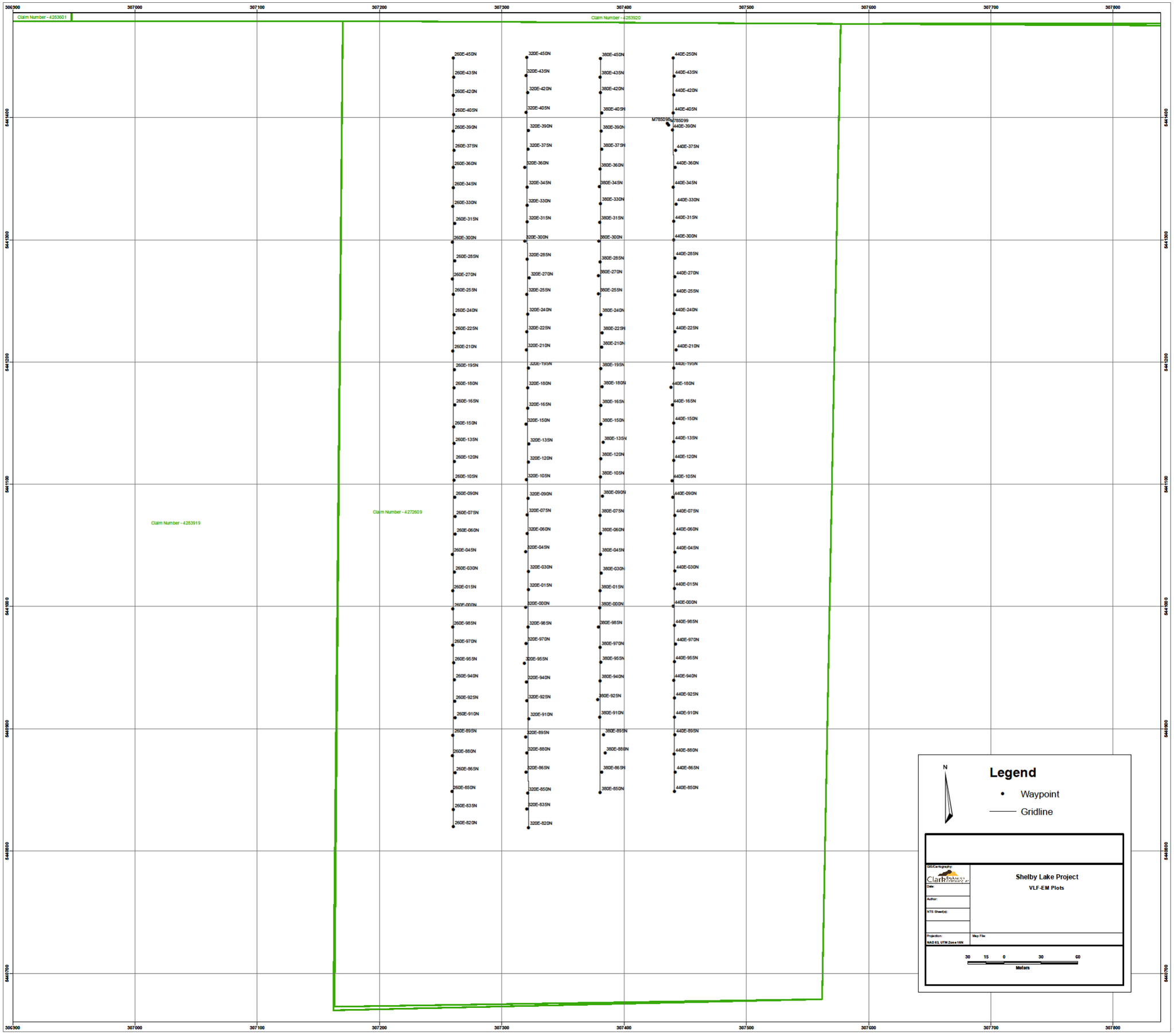
Shelby Lake Project
VLF-EM Plots
Meters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N
Legend
Waypoint
Gridline
GIS/Cartography:
Clark Exploration Consultants
Date:
Author:
NTS Sheet(s):
Projection:
NAD 83, UTM Zone 16N
Map File:
Shelby Lake Project
VLF-EM Plots
30 15 0 30 60
Meters

Appendix D

Equipment Specifications

Geonics EM-16 Specifications:

Measured Quantity - In-phase and quad-phase components of vertical magnetic field as a percentage of horizontal primary field (Tangent of the tilt angle and ellipticity).

Sensitivity - In-phase : +- 150%

Resolution Output - Nulling by audio tone. In-phase indication from mechanical inclinometer and quad-phase from graduated dial.

Operating Frequency - 17.8 kHZ radio band.

Operating Controls - On/Off switch, battery test push button, station selector switch, audio volume control, quadrature dial and inclinometer.

Power Supply - 6 Duracell 'AA' batteries

Dimensions - 42 x 14 x 9cm

Weight - Instrument: 1.6kg