Assessment Report

on

Prospecting and Magnetometer Survey

on the

Victoria Creek Property,
Arnold Township

Larder Lake Mining Division
Northeastern Ontario

NTS: 32 D/4

Written by:

Graham Stone
6 Finch Trail McDougall, Ontario
P2A 0B3

June 2015

For

Gord A. Hume

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Introduction:

The Victoria Creek Property is located in south central Arnold Township and abuts the northern boundary of Gauthier Township. The claims are within the Larder Lake Mining Division, Northeastern Ontario.
The property itself is comprised of 7 contiguous claims, #'s 4269567, 4269568, 4269575, 4269576, 4269577, 4269578 and 4269579.(65 units) covering an area of 1044 hectares.
The property is within the historic Kirkland Lake Gold Camp, but, surprisingly has seen very little exploration over the years. It is located approximately 4.5 km northwest of the Upper Beaver Gold Deposit, and 1km northwest of the Victoria Creek gold deposit
The purpose of this program was to prospect the claims and conduct a small magnetometer survey over the central portion of claim 4269576 where earlier prospecting had found sulphide bearing breccias at the intersection of two faults. A total of 8 samples were collected and sent to Swastika Labs for Fire Assay for gold.

Location and Access:

The general location of the property is approximately 13km NW of Larder Lake Ont., see Figure 1.
From the town of Larder Lake you travel west along Highway 66 for approximately 13km. Here you turn north on Highway 672 for another 7.5km's. Approximately 500 meters after crossing Victoria Creek turn right on a narrow forest road. This road can be driven by truck for about 200m and then by ATV and foot to access other parts of the property.

Regional Geology:

Regionally, the property lies on the south flank of the Blake River synclinorium. The property is underlain by Precambrian volcanic rocks, primarily dacite, andesite and basalt. Rocks strike generally east-west and pillowed flows indicate that tops are to the south.
There are a few diabase dikes in the region but only one has been noted on the property.

Historical Work:

Very little work has been filed with the MNDM on this property. Only 2 records of work were found in the MNDM files. The first was of a Magnetometer and VLF survey done on behalf of Lac Minerals in 1988. These survey's were done over a small area in the southwest portion of what is now claim# 4269576. The second was from Sudbury Contact Mines in 1993. They conducted a large regional reverse circulation drilling program in the area in the search for Diamonds. 3 holes were put down on the claims. During the course of the prospecting activities a few small trenches were found but no info was found at the MNDM about them. One pit is also marked on the Geological map 2061 "Arnold and Katrine Townships", but again no information was found.

Personnel:

Gord Hume
#3-5th Avenue
Larder Lake, Ont.
P0K 1L0

Melanie Tremblay
#3-5th Avenue
Larder Lake, Ont.
P0K 1L0

Bill Hume
#125 3rd Avenue
Box1107
Englehart, Ont.
P0J 1H0

Graham Stone
6 Finch Trail
McDougall Ont.
P2A 0B3

Personnel

The following personnel worked on this property During the period of this report and conducted the following work activities summarized below:

Personnel	Activity	Dates Worked	Man Days
Gord Hume	Trail Clearing	Sept 13, 14 2014	2 days
	Prospecting	Sept 15, 16 2014	
		May 2, 3, 9, 10, 16, 17, 18, 23, 24 2015	
		June 1, 2, 3 2015	14 days
	Mag survey	March 20, 21, 22, 25 2015	4 days
Bill Hume	Trail Clearing	Sept 13, 14 2014	2 days
	Prospecting	Sept 15, 16 2014	
		May 2, 3, 9, 10, 16, 17, 18, 23, 24 2015	
		June 1, 2, 3 2015	14 days
	Mag survey	March 20, 21, 22, 25 2015	4 days
Melanie Tremblay	Prospecting	June 1, 2, 3 2015	3 days
Graham Stone	Mag Processing/Plotting	March 30, 2015	1 day
	Prospecting	June 1, 2, 3 2015	3 days
	Assessment Report	June 10, 11, 12, 13 2015	4 days

Total 51 man days

Conclusions and Recommendations:

Magnetometer Survey: The Magnetic survey was done over a small area in the southwest corner of the property. The data shows the east west striking magnetic bedrock which is present in the area, but also shows an interesting mag low feature at the east end of a small lake. This coincides with a number of historic trenches that were found during prospecting and could indicate sulphides, although the trenches were long slumped in and no bedrock was visible. There also appears to be a north south break in the data from just east of this low and heading south.

Prospecting: Prospecting in the area of the magnetometer survey yielded a variety of interesting rocks although none had any gold values. 6 samples were taken from this general area. Shear zones found here as well as a couple of different breccias in outcrop. Further to the northeast a 240m long shear with associated qtz veining has been traced out. 2 samples from this shear were sent for Fire assay but returned no values. In areas there are sulphides present although not in large quantities.

Recommendations: The area that the mag survey covered is very complex geologically and a geologist is needed to map it and suggest how to proceed if further work is warranted due to it's proximity to the Victoria Creek Gold deposit. We feel that the magnetometer survey should be continued to the east along the creek system which is likely a fault and followed up with more prospecting should anything be found. It is also suggested that a small grid be run over shear zone that was found in claim 4269577.
Further prospecting, and a couple test IP lines, and VLF are recommended here as well to see if any conductors or disseminated sulphides associated with the shearing are present at depth.

Qualifying Statement

I, Graham Stone, residing at #6 Finch Trail, McDougall Ontario, P2A 0B3 state the following with respects to this report:

I wrote this report and produced the accompanying tables and maps based on information collected by myself and others mentioned in this report.

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Respectfully Submitted

Graham Stone

in McDougall, ON
June 13, 2015

Additional Information:

Trail Clearing: Due to 2 wide flooded water crossings, with no easy way around it was decided to spend 2 days clearing the existing access trails so that atv's could access the property. There was a great deal of windfall to contend with but it saved greatly on time during the rest of the project.

Flagged lines for Mag: The mag unit that was used had built in gps capability, however, with the heavy snow load in the trees the reception was erratic and poor. This, coupled with the deep wet snow this past spring made walking difficult and as such the orientation of the sensor was hard to maintain. It was decided that by having someone break trail ahead of the mag operator and hang flags at 25 meter intervals would allow the operator to maintain good mag sensor orientation and also help with navigation.

Prospecting: The prospecting work was carried out in teams of 2 people. One gps was used per group and represents the track of the person carrying it. The second person was walking a similar path only 10 – 20m away at a maximum. This was done for safety reasons and also to minimize the chance of missing something on the traverse.

References:

Hogg, W. A. Ontario Department of Mines, Geological Report No.29
Arnold and Katrine Townships, 1964.


Figure 1
KEY LOCATION MAP
Ontario
0 80 160 240 320
Kilometers
© World Sites Atlas (sitesatlas.com)
Project Area
HUDSON BAY
NUNAVUT
MANITOBA
Thompson
Fort Severn
Winisk
Winisk R.
Severn R.
Big Trout L.
Ekwan R.
James Bay
NUNAVUT
Attawapiskat R.
Fort Albany
QUÉBEC
Central Patricia
Albany R.
Albany R.
Moosonee
Red Lake
ONTARIO
CANADA
Lac Seul
Kenora
Dryden
L. of the Woods
L. Nipigon
Missinaibi R.
Abitibi R.
Hearst
Geraldton
Kapuskasing
Fort Frances
Nipigon
Cochrane
Iroquois Falls
Timmins
L. Abitibi
Thunder Bay
Pukaskwa Nat. Park
Kirkland Lake
Rouyn-Noranda
Wawa
L. Superior
Chapleau
New Liskeard
Duluth
Trois-Rivières
MINNESOTA
Sault Ste. Marie
Elliot Lake
Valley East
North Bay
MICHIGAN
Sudbury
Pembroke
MONTRÉAL
Ottawa R.
Algonquin Prov. Park
Minneapolis
Manitoulin I.
Georgian Bay
Ottawa
St. Paul
Huntsville
Cornwall
Parry Sound
Brockville
St. Lawrence R.
Green Bay
Orillia
Owen Sound
Peterborough
Kingston
Rochester
WISCONSIN
UNITED STATES
L. Huron
Barrie
Belleville
VT
Newmarket
Oshawa
MICHIGAN
TORONTO
L. Ontario
NEW YORK
Rochester
Kitchener
Syracuse
Madison
MILWAUKEE
Grand Rapids
Brantford
Sarnia
Albany
IOWA
Lansing
Buffalo
London
Hamilton
Cedar Rapids
Rockford
Chatham
L. Erie
Erie
DETROIT
Windsor
Des Moines
Davenport
CHICAGO
South Bend
PENNSYLVANIA
Scranton
ILLINOIS
INDIANA
Toledo
OHIO
Cleveland
NEW YORK

Figure 2

Contiguous Claims Map

Victoria Creek Project

NAD 83

Kilometers
0 0.5 1 2

584000 585000 586000 587000 588000 589000 590000

5341000 5340000 5339000 5338000

4217443 4271344 4273759 4252722 Highway 672 4269575 4269579 Victoria Creek Project ARNOLD 4271343 4252723 4269578 4269576 4269577 1111921 4269567 4269568 GAUTHIER 821273 821358 800273 800272 800261 800260 800255 821288 821290 821285 821272 821357 800274 800271 800262 800259 800256 1110596 894126 894125

Figure 3

Overview of Wapoints and Sample Locations

Victoria Creek Project

NAD 83

Kilometers

0 0.25 0.5 1

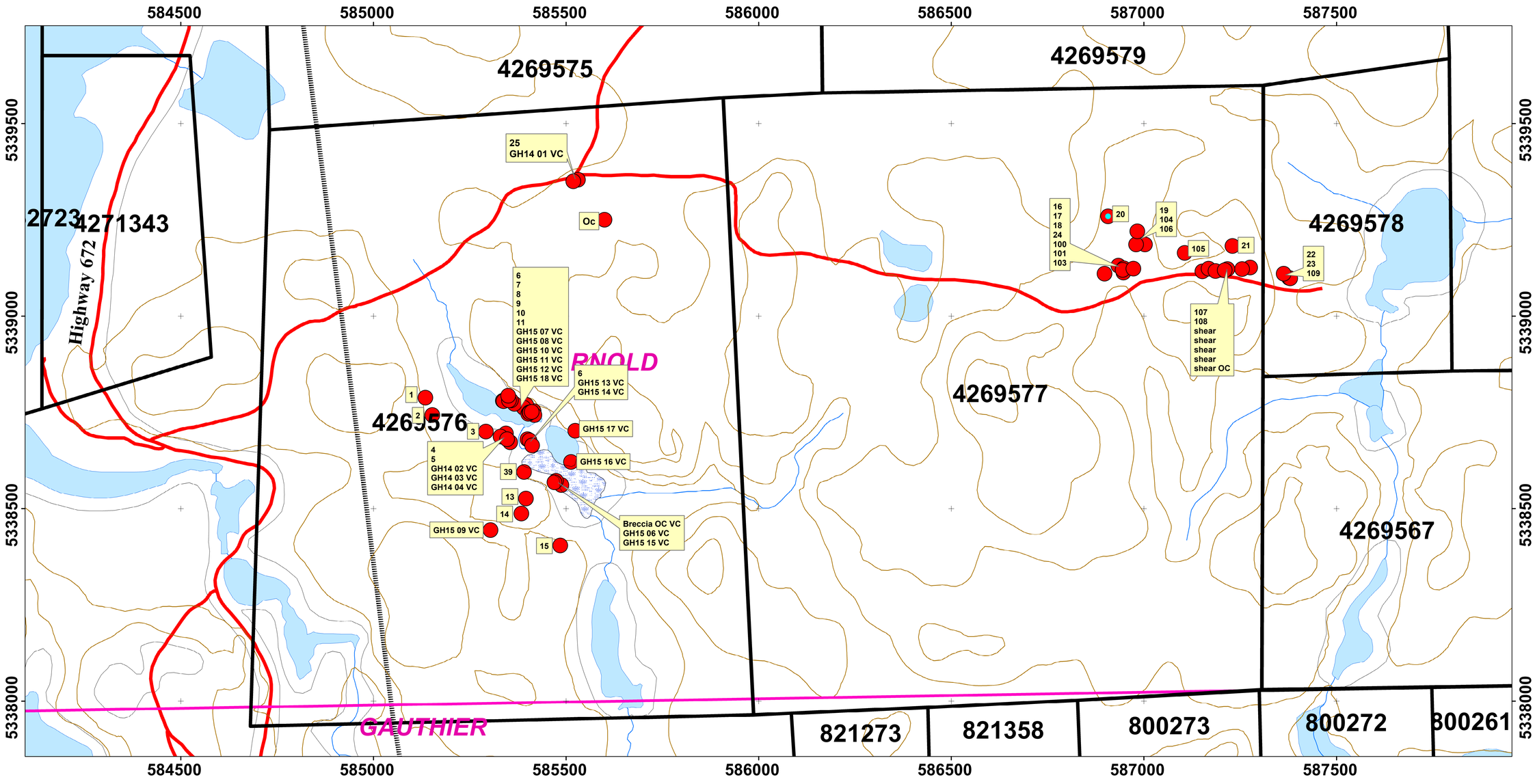


Figure 4

Prospecting Traverse Map 1

Victoria Creek Project

NAD83

Legend

- Vic_Creek_wpts_samples
- GH_Sept15_2014
- GH_Sept16_2014
- GH_May2_2015
- GH_May3_2015
- GH_May9_2015
- GH_May10_2015
- GH_May17_2015
- GH_May18_2015
- GH_June1_2015
- GS_June1_2015

N

0 62.5 125 250 375 500 Meters

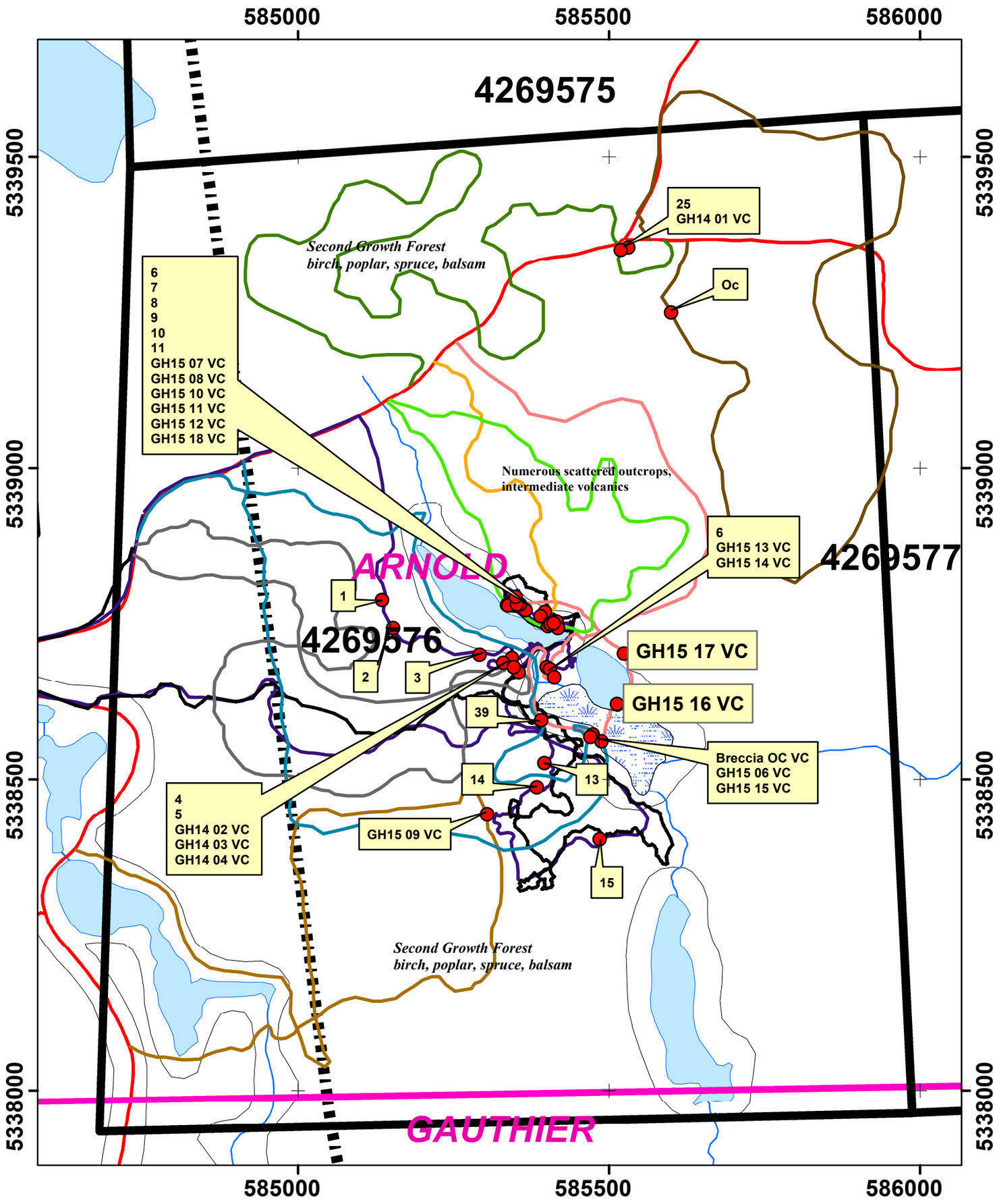


Figure 5

Prospecting and Traverse Map 2

Victoria Creek Project

NAD 83

Meters
0 125 250 500

N

Legend
- GH_May16_2015
- GH_May23_2015
- GH_May24_2105
- GH_June2_2015
- GH_June3_2015
- GS_June2_2015
- GS_June3_2015
- Vic_Creek_wpts_samples

586000 586500 587000 587500

5339500 5339000

4269575 4269579 4269578 4269577 4269576 4269567

Second Growth Forest, birch, poplar, spruce, balsam

Second Growth Forest, birch, poplar, spruce, balsam

Scattered outcrops-intermediate volcanics

Second Growth Forest, birch, poplar, spruce, balsam

thick tag alder

Second Growth Forest, birch, poplar, spruce, balsam

ARNOLD

20 106 104 19 105 21 shear 109 22 23 16 24 103 Shear 107 108 shear Shear 17 18 100 101

Figure 6

Magnetometer Survey Location Map

Victoria Creek Project

NAD 83

Kilometers
0 0.5 1 2

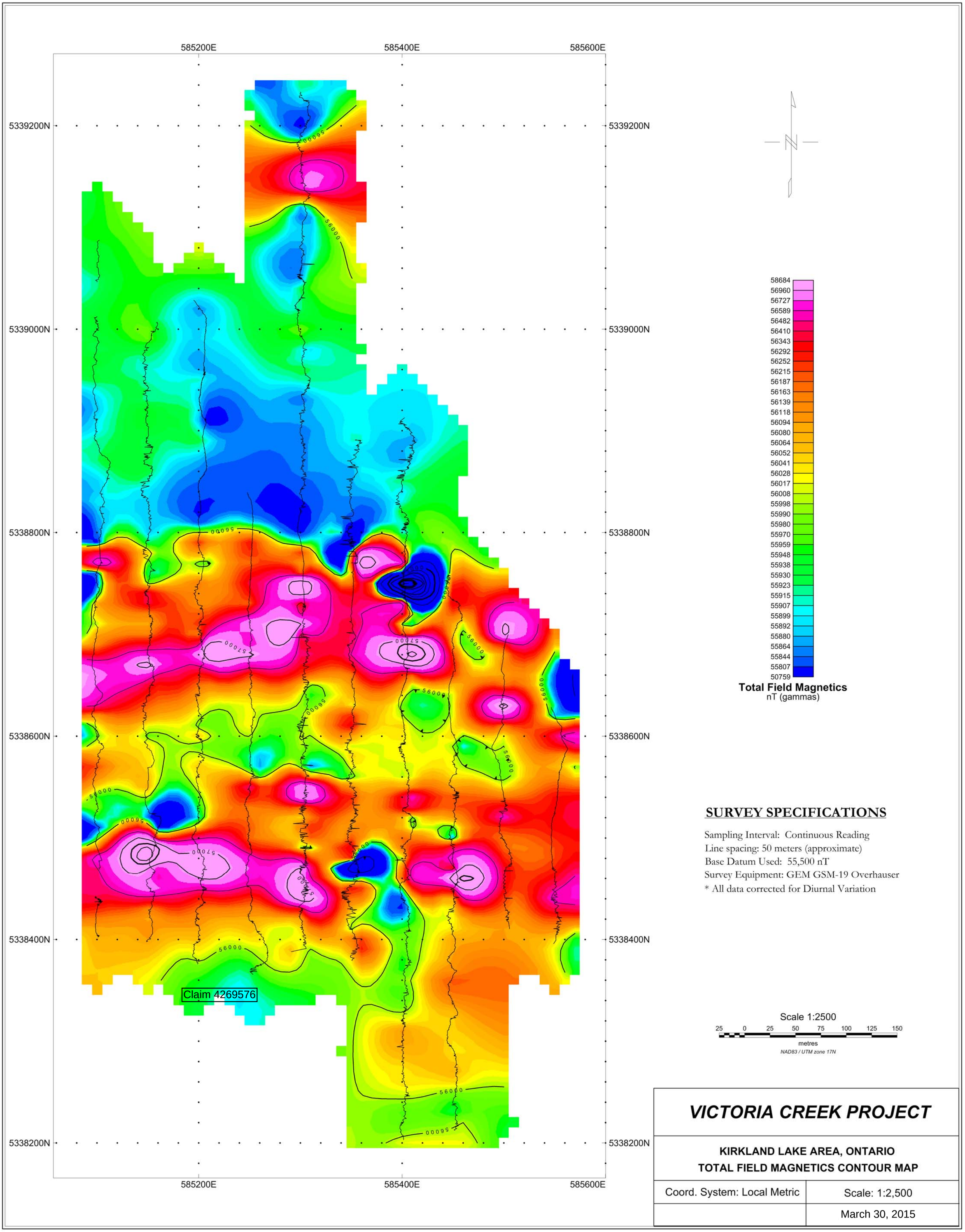
N

583000 584000 585000 586000 587000 588000 589000 590000

5341000 5340000 5339000 5338000

6631 4273759 4217443 4271344 4273060 4252722 Highway 672 4269575 4269579 ARNOLD 1111915 4271343 4269578 1919 1111920 4252723 4269577 4269576 1111922 1111921 1925 4269567 4269568 1111923 1924 982335 982336 GAUTHIER 821273 821358 800273 800272 800261 800260 800255 821285 821288 821290 821274 821357 800274 800271 800262 800259 800256 1110596 894126 894125

Figure 7



SURVEY SPECIFICATIONS

Sampling Interval: Continuous Reading
Line spacing: 50 meters (approximate)
Base Datum Used: 55,500 nT
Survey Equipment: GEM GSM-19 Overhauser
* All data corrected for Diurnal Variation

Scale 1:2500
25 0 25 50 75 100 125 150
metres
NAD83 / UTM zone 17N

VICTORIA CREEK PROJECT

KIRKLAND LAKE AREA, ONTARIO
TOTAL FIELD MAGNETICS CONTOUR MAP

Coord. System: Local Metric	Scale: 1:2,500
	March 30, 2015

Appendix I

Waypoint and Sample
Locations

WAYPOINT and SAMPLE LOCATIONS

Waypoint #	UTM Zone	NAD83_ East	NAD83_N orth	Waypoint Description	Geological Description	Acid Test	Magnetic	Date
GH14 01 VC	17	585519	5339350	outcrop	basalt with qtz veining and epidote alteration. 2% sulphide associated with qtz vein	strong pervasive	no	15-Sep-14
GH14 02 VC	17	585355	5338672	outcrop	vein material	strong pervasive	no	16-Sep-14
GH14 03 VC	17	585347	5338680	outcrop	intermediate volcanic breccia	strong pervasive	no	16-Sep-14
GH14 04 VC	17	585347	5338680	outcrop	brecciated basalt, carbonate altered	strong pervasive	no	16-Sep-14
ShearZONE	17	585411	5338751	outcrop				20-Mar-15
TRENCH1 VC	17	585352	5338781					25-Mar-15
TRENCH2 VC	17	585350	5338793					25-Mar-15
Breccia OC VC	17	585488	5338561	outcrop				2-May-15
GH15 05 VC	17	585391	5338595	outcrop				2-May-15
GH15 06 VC	17	585474	5338572	outcrop	brecciated basalt with hyaloclastites, 1% py	strong pervasive	no	2-May-15
GH15 07 VC	17	585418	5338743	outcrop		strong pervasive	no	3-May-15
GH15 08 VC	17	585336	5338780	outcrop	brecciated basalt with trace py	strong pervasive	no	3-May-15
GH15 09 VC	17	585304	5338444	outcrop				9-May-15
GH15 10 VC	17	585402	5338746	outcrop				10-May-15
GH15 11 VC	17	585405	5338750	outcrop	sheared light grey silicified volcanic, py. Shearing at 90 degrees	positive/weak/spotty	no	10-May-15
GH15 12 VC	17	585406	5338749	outcrop				10-May-15
GH15 13 VC	17	585405	5338677	outcrop				17-May-15
GH15 14 VC	17	585412	5338664	outcrop				17-May-15
GH15 15 VC	17	585470	5338568	outcrop				17-May-15
GH15 16 VC	17	585513	5338621	outcrop				17-May-15
GH15 17 VC	17	585524	5338702	outcrop				17-May-15
GH15 18 VC	17	585338	5338779	outcrop				17-May-15
Oc	17	585600	5339250	outcrop				17-May-15
1	17	585135	5338788	outcrop	fn gnd volcanic, no visible sulphides	positive/spotty	no	01-Jun-15
2	17	585153	5338743	outcrop	dark green med gnd volcanic	negative	yes	01-Jun-15
3	17	585292	5338700	outcrop	fn gnd volcanic, no visible sulphides	positive	yes/weak	01-Jun-15
4	17	585344	5338695	Trench 4m x 1.5m @ 58 degrees	breccia contact with grey andecite? Felsic	positive/spotty	no	01-Jun-15
5	17	585330	5338687	trench 5m x 1m @ 58 degrees	no rock visible	n/a	n/a	01-Jun-15
6	17	585400	5338680	outcrop	med green silicified mafic volcanic, 1% py,	positive/weak/spotty	yes/strong	01-Jun-15
7	17	585416	5338753	outcrop, site of sample GH15-11 VC	sheared light grey silicified volcanic, py. Shearing at 90 degrees	positive/weak/spotty	no	01-Jun-15
8	17	585397	5338769	outcrop	sheared light grey silicified volcanic, py. Shearing at 90 degrees	positive/weak/spotty	no	01-Jun-15
9	17	585390	5338762	trench 10m x 1m @ 20 degrees	silicified fn gnd grey breccia	positive	no	01-Jun-15
10	17	585366	5338772	trench 17m x 1.5m @ 305 degrees	no rock visible	n/a	n/a	01-Jun-15

11	17	585357	5338781	Rep Sample from trench	feldspar porphyry& sheared volcanic with pink carbonate vein	positive	no	01-Jun-15
Waypoint #	**UTM Zone**	**NAD83_ East**	**NAD83_N orth**	**Waypoint Description**	**Geological Description**	**Acid Test**	**Magnetic**	**Date**
12	17	585349	5338791	trench 20m x 1.5m @ 5 degrees	no rock visible	n/a	n/a	01-Jun-15
13	17	585396	5338526	outcrop	fn gnd silicified grey volcanic,	positive/spotty	yes/strong	01-Jun-15
14	17	585384	5338487	outcrop	sheared intermediate volcanic, shearing @ 80 degrees	negative	no	01-Jun-15
15	17	585485	5338404	outcrop	Qtz Carb vein	positive	no	01-Jun-15
16	17	586934	5339131	Float	qtz Carb, angular to sub angular 1m x1m x 3030cm	positive	no	02-Jun-15
17	17	586947	5339113	Float	local, angular white qtz boulder, 30cm x 30cm	negative	no	02-Jun-15
18	17	586948	5339124	outcrop	Qtz vein strike @ 262 degrees, dip 90(vertical)	negative	no	02-Jun-15
19	17	587003	5339186	outcrop	sheared volcanic minor disseminated py, shearing at 62 degrees, dip 85 south	positive	no	02-Jun-15
20	17	586907	5339259	outcrop	fn gnd pale green volcanic	negative	no	02-Jun-15
21	17	587230	5339182	outcrop	sheared volcanic shearing @ 95 degrees, vertical	positive/spotty	no	02-Jun-15
100	17	586945	5339120	float	qtz float, angular,py	positive	no	02-Jun-15
101	17	586945	5339120	float	qtz carb, breccia, py	positive	no	02-Jun-15
103	17	586973	5339123	float	qtz carb, py	positive	no	02-Jun-15
104	17	586980	5339186	outcrop	shear	positive	no	02-Jun-15
105	17	587106	5339164	outcrop	3 cm qtz vein,py,cpy, strike 32 degrees	positive	no	02-Jun-15
106	17	586983	5339220	outcrop	greenish basalt breccia, 2% py	positive/spotty	no	02-Jun-15
107	17	587152	5339116	outcrop	shear, dips into swamp, qtz, py, carb	positive/spotty	no	02-Jun-15
108	17	587168	5339123	outcrop	shear	positive/spotty	no	02-Jun-15
Shear	17	587186	5339117	outcrop	shear	positive/spotty	no	02-Jun-15
Shear	17	587276	5339126	outcrop	shear	positive/spotty	no	02-Jun-15
Shear	17	587255	5339122	outcrop	shear	positive/spotty	no	02-Jun-15
Shear	17	587217	5339122	outcrop	shear	positive/spotty	no	02-Jun-15
ShearOC	17	587210	5339119		shear	positive/spotty	no	02-Jun-15
22	17	587377	5339099	outcrop	shearing @ 350 degrees, minor py, intermediate volcanic?	positive	no	03-Jun-15
23	17	587380	5339098	outcrop	altered shear basalt, strong sericite alteration, strong chloritic alteration with qtz vein	positive/strong/pervasive	no	03-Jun-15
24	17	586898	5339110	trench 10m x 1m@354 degrees	filled in, no outcrop visible	n/a	n/a	03-Jun-15
25	17	585531	5339354	trench 12m x 2m@160	beside old pit	n/a	n/a	03-Jun-15
109	17	587363	5339110	Float	qtz carb boulders	positive	no	03-Jun-15

Appendix II

Gold Fire Assay
Results and Certificates

Established 1928

Swastika Laboratories Ltd

Assaying - Consulting - Representation

Assay Certificate

Certificate Number: 15-1253

Company: **Gord Hume**

Project:

Report Date: 27-May-15

Attn: Gordon Hume

We hereby certify the following Assay of 6 rock/grab samples submitted 26-May-15 by Gordon Hume

Sample Number	Au FA-MP g/Mt	Au Chk FA-MP g/Mt
GH14 01 VC	< 0.01	
GH14 03 VC	0.02	
GH14 04 VC	< 0.01	
GH15 06 VC	< 0.01	
GH15 08 VC	< 0.01	
GH15 90 VC	0.01	

Certified by J. L Lin

Jing Lin, M Sc.

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244 Fax (705) 642-3300

Established 1928

Swastika Laboratories Ltd

Assaying - Consulting - Representation

Assay Certificate

Certificate Number: 15-1355

Company: **Gord Hume**

Project: Larder Lake

Attn: Gordon Hume

Report Date: 12-Jun-15

We hereby certify the following Assay of 3 rock/grab samples submitted 08-Jun-15 by Gordon Hume

Sample Number	Au FA-MP g/Mt	Au Chk FA-MP g/Mt
WPT 23	0.01	
WPT 107	< 0.01	
P15 01	0.14	

Certified by J. f Lin

Jing Lin, M Sc.

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244 Fax (705) 642-3300

Appendix III

Authorization to Act as Agent

Gordon A. Hume
3 5th Avenue
Larder Lake, On
P0K 1L0
705 643-2295

June 3, 2015

I, Gordon A. Hume(client # 303109), hereby authorize Graham L. Stone(client # 300982) of 6 Finch Trail, McDougall Ontario (705)746-7180, to act as my agent with respect to preparing Assessment Work Reports and the application of Assessment Work credits on the following claims recorded in my name:

4269567
4269568
4269575
4269576
4269577
4269578
4269579

These Claims are located in Arnold Township, Larder Lake Mining Division.

Sincerely,

Gordon A. Hume

Appendix IV

GSM-19 Overhauser
Magnetometer specifications

Overhauser

Magnetometer / Gradiometer / VLF (GSM-19 v7.0)

Version 7.0

Our World is **Magnetic.**

GEM's unique Overhauser system combines data quality, survey efficiency and options into an instrument that takes the leading place in the industry.

And the latest v7.0 technology upgrades provide even more value:

Data export in standard XYZ (i.e. line-oriented) format for easy use in standard commercial software programs

Programmable export format for full control over output

GPS elevation values provide input for geophysical modeling
Enhanced GPS positioning resolution

Standard GPS:
<1.5m SBAS (WAAS, EGNOS, MSAS)
High resolution CDGPS Option:
<0.6m SBAS (WAAS, EGNOS, MSAS)
<0.6m CDGPS (Canada, USA, Mexico)
<0.7m OmniStar VBS2

Multi-sensor capability for advanced surveys to resolve target geometry

Picket and line marking / annotation for capturing related surveying information on-the-go

And all of these technologies come complete with the most attractive savings and warranty in the business!

Overhauser (GSM-19) console with sensor and cable. Can also be configured with additional sensor for gradiometer (simultaneous) readings.

The GSM-19 v7.0 Overhauser instrument is the total field magnetometer / gradiometer of choice in today's earth science environment -- representing a unique blend of physics, data quality, operational efficiency, system design and options that clearly differentiate it from other quantum magnetometers.

With data quality exceeding standard proton precession and comparable to costlier optically pumped cesium units, the GSM-19 is a standard (or emerging standard) in many fields, including:

- **Mineral exploration** (ground and airborne base station)
- **Environmental and engineering**
- **Pipeline mapping**
- **Unexploded Ordnance Detection**
- **Archeology**
- **Magnetic observatory measurements**
- **Volcanology and earthquake prediction**

Taking Advantage of the Overhauser Effect

Overhauser effect magnetometers are essentially proton precession devices - except that they produce an order-of magnitude greater sensitivity.

These "supercharged" quantum mag-netometers also deliver high absolute accuracy, rapid cycling (up to 5 readings / second), and exceptionally low power consumption.

The Overhauser effect occurs when a special liquid (with unpaired electrons) is combined with hydrogen atoms and then exposed to secondary polarization from a radio frequency (RF) magnetic field.

The unpaired electrons transfer their stronger polarization to hydrogen atoms, thereby generating a strong precession signal -- that is ideal for very highsensitivity total field measurements.

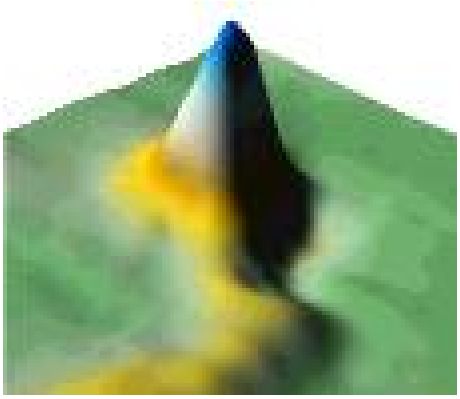
In comparison with proton precession methods, RF signal generation also keeps power consumption to an absolute minimum and eliminates noise (i.e. generating RF frequencies are well out of the bandwidth of the precession signal).

In addition, polarization and signal measurement can occur simultaneously - which enables faster, sequential measurements. This, in turn, facilitates advanced statistical averaging over the sampling period and/or increased cycling rates (i.e. sampling speeds).

Other advantages are described in the section called, "GEM's Commercial Overhauser System" that appears later in this brochure.

Maximizing Your Data Quality with the GSM-19

Data quality is a function of five key parameters that GEM has taken into consideration carefully in the design of the GSM-19. These include sensitivity, resolution, absolute accuracy, sampling rates and gradient tolerance.



Data from Kalahari Desert kimberlites. Courtesy of MPH Consulting (project managers), IGS c. c. (geophysical contractor) and Aegis Instruments (Pty) Ltd., Botswana.

Sensitivity is a measure of the signal-to-noise ratio of the measuring device and reflects both the underlying physics and electronic design. The physics of the Over-hauser effect improves sensitivity by an order of magnitude over conventional proton precession devices. Electronic enhancements, such as high-precision precession frequency counters (see the v6.0 & v7.0 - New Milestones section) enhance sensitivity by 25% or more.

The result is high quality data with sensitivities of 0.02 nT / √Hz. This sensitivity is virtually the same as the sensitivity of costlier optically-pumped cesium systems.

Resolution is the minimum step of the counter used to measure precession frequency and its conversion into magnetic field. It is generally higher than the sensiti-vity to avoid a contribution of the counter to overall system noise. The GSM-19 has unmatched resolution (0.01 nT).

This level of resolution translates into well-defined, characteristic anomalies; impro-ved visual display; and enhanced numeri-cal data for processing and modeling.

Absolute accuracy defines maximum deviation from the true value of the measu-

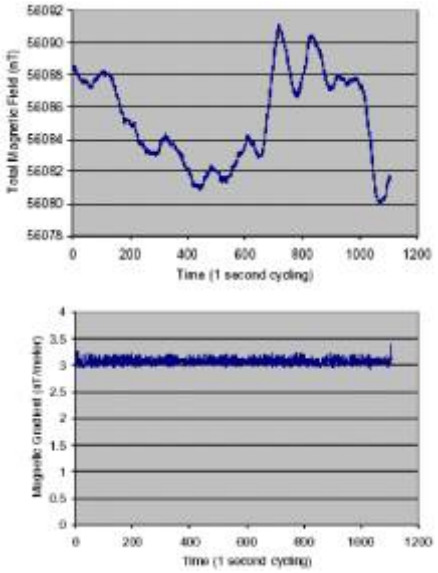
knows the true value of the field, absolute accuracy is determined by considering factors involved in determining the field value and their accuracy, including the gyromagnetic constant, maximum offset of the time base frequency, etc.

With an absolute accuracy of +/- 0.1 nT, the GSM-19 is ideal for total field work and gradient measurements maintain the same high standard of quality. Both configurations are also specially designed to minimize overall system noise, so you can be sure that results truly reflect the geologic signal that is of most interest to you.

Sampling rates are defined as the fastest speed at which the system can acquire da-ta. This is a particularly important parame-ter because high sampling rates ensure accurate spatial resolution of anomalies and increase survey efficiency.

GEM's Overhauser system has 3"measurement modes" or maximum sampling rates - "Standard" (3 sec. / reading), "Walking" (0.5 sec. / reading) and "Fast" (0.2 sec. / reading). These rates make the GSM-19 a versatile system for all ground uses (including vehicle-borne applications).

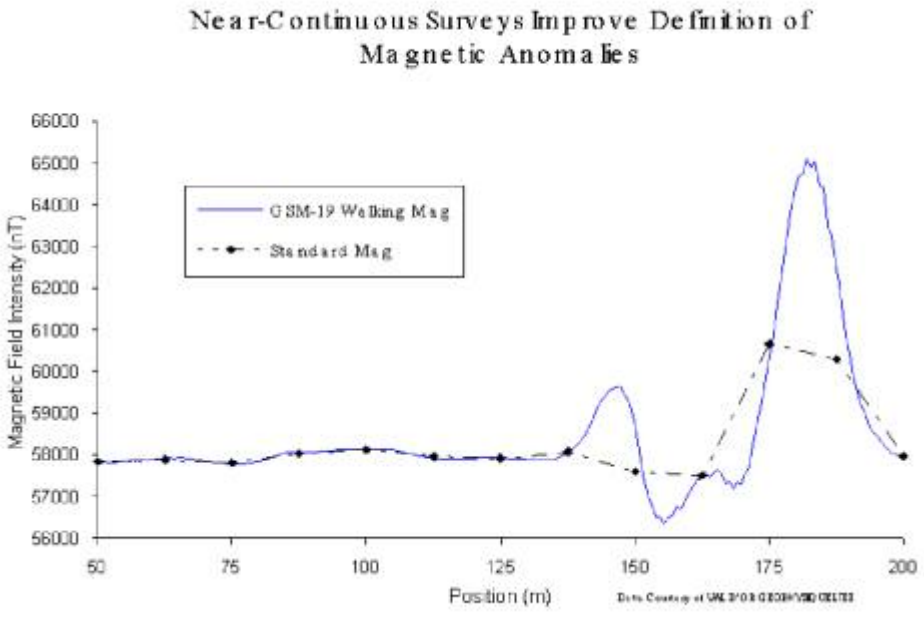
Gradient tolerance is the ability to obtain reliable measurements in the presence of extreme field variations. GSM-19 tolerance is maintained through internal



Total Field and Stationary Vertical Gradient showing the gradient largely unaffected by diurnal variation. Absolute accuracy is also shown to be very high (0.2 nT/meter).

signal counting algorithms, sensor design and Overhauser physics. For example, the Overhauser effect produces high amplitude, long-duration signals that facilitate measurement in high gradients.

The system's tolerance (10,000 nT/m) makes it ideal for many challenging environments, such as highly magnetic rocks in mineral exploration or near cultural objects in environmental, UXO or archeological applications.



Much like an airborne acquisition system, the GSM-19 "Walking" magnetometer option delivers very highly-sampled, high sensitivity results that enable very accurate target location and / or earth science decision-making.

Increasing Your Operational Efficiency

Many organizations have standardized their magnetic geophysical acquisition on the GSM-19. This reflects enhancements such as memory capacity; light weight; GPS and navigation; no warm-up time; no dead zones or heading errors; easy dumping and processing.

Memory capacity controls the efficient daily acquisition of data, acquisition of positioning results from GPS and the ability to acquire high volumes of data to meet daily survey objectives.

V7.0 upgrades have established the GSM-19 as the commercial standard for memory with over 838,000 readings (based on a basic configuration of memory, a survey with time, coordinate and field values).

Optional increments of memory to over 2 million readings making the GSM-19 an ideal system for acquisition of data with integrated GPS readings (when required).

Portability characteristics (ruggedness, light weight and power consumption) are essential for operator productivity in both normal and extreme field conditions.

GEM's Overhauser magnetometer is established globally as a robust scientific instru-ment capable of withstanding temperatu-re, humidity and terrain extremes. It has the reputation as the lightest and lowest power system available, reflecting Overhau-ser effect and RF polarization advantages.

In comparison with other systems, the GSM-19 is the choice of operators as an easy-to-use and robust instrument

GPS and navigation options are very important for earth science professionals. GPS technologies are revolutionizing data acquisition, productivity, increasing spatial resolution and providing a new level of data quality for informed decision-making.

GEM has made GPS a cornerstone of its magnetic R&D program. Real time GPS and DGPS options are now available in different survey resolutions. For more details, see the GPS and DGPS section.

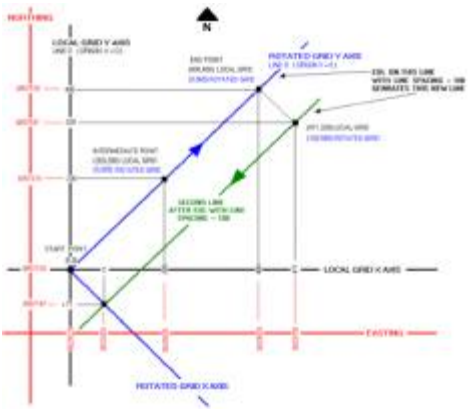
GEM has also developed a GPS Navigation feature with real-time coordinate transformation to UTM, local X-Y coordinate rotations, automatic end-of-line flag, guidance to the next line, and survey "lane" guidance with cross-track display and audio indicator.

Other enhancements include way point preprogramming of up to 1000 points. Professionals can define a complete survey on PC and download points to the magnetometer via RS-232 before leaving for the field.

The operator performs the survey using the way points as a survey guide. This capability decreases survey errors, improves efficiency and ensures more rapid survey completion.

Dumping and processing effectiveness is also critical consideration. Historically, up to 60% of an operator's "free" time can be spent on data dumping. Data dumping times are significantly reduced through GEM's implementation of high-speed, digital data links (up to 115 kBaud).

This functionality is facilitated through a new RISC processor and GEM's proprietary GEMLinkW acquisition/display software. This software serves as a bi-directional RS-232 terminal. It also has integrated processing functionality to streamline key processing steps, including diurnal data reduction. GEMLinkW is provided free to all GSM-19 customers. Regular updates are



Navigation and Lane Guidance

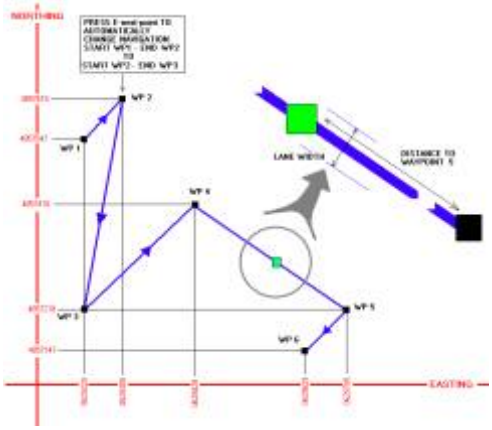
The figure above shows the Automatic Grid (UTM, Local Grid, and Rotated Grid). With the Rotated Grid, you can apply an arbitrary origin of your own definition. Then, the coordinates are always in reference to axes parallel to the grid. In short, your grid determines the map, and not the NS direction.

The Local Grid is a scaled down, local version of the UTM system, and is based on your own defined origin. It allows you to use smaller numbers or ones that are most relevant to your survey.

The figure below shows how programmable waypoints can be used to plan surveys on a point-by-point basis.

Initially, you define waypoints and enter them via PC in the office or via PC in the field or office. When you perform your survey, the unit guides you to each point.

While walking between waypoints, lane guidance keeps you within a lane of pre-defined width using arrows (< - or - >) to indicate left or right. The display also shows the distance (in meters) to the next waypoint.



Adding Value through Options

When evaluating the GSM-19 as a solution for your geophysical application we recommend considering the complete range of options offered by GEM. These options can be added at time of original purchase or later to expand capabilities as your needs change or grow.

GEM's approach with options is to provide you with an expandable set of building blocks:

o Gradiometer
o Walking Magnetometer / Gradiometer
o Fast Magnetometer / Gradiometer
o VLF (3 channel)
o GPS (built-in or external)

GSM-19G Gradiometer Option

The GSM-19 gradiometer is a versatile, entry level system that can be upgraded to a full-featured "Walking" unit (model GSM-19GW) in future. The GSM-19G configuration comprises 2 sensors and a "Standard" console that reads data to a maximum of 1 reading every 3 seconds.

An important GEM's design feature allows gradiometer sensors measure the 2 magnetic fields concurrently to avoid any temporal variations that could distort gradiometer readings. Other features, such as single-button data recording, are included for operator ease-of-use.

GSM-19W / GW "Walking" Magnetometer / Gradiometer Option

GEM Systems pioneered the innovative "Walking" option that enables the acquisi-tion of nearly continuous data on survey lines. Since introduction, the GSM-19W and GSM-19GW have become one of the most popular magnetic instruments in the world.

Similar to an airborne survey in principle, the system records data at discrete time intervals (up to 5 readings per second) as the instrument is carried along the line.

At each survey picket (fiducial), the operator touches a designated key. The system automatically assigns a picket coordinate to the reading and linearly interpolates the coordinates of all intervening readings (following survey completion during post-processing). A main benefit is that the high sample den-sity improves definition of ge-ologic struc-tures and other targets (UXO, archeological relics, drums, etc.).

It also increases survey efficiency because the operator can record data almost continuously. Another productivity feature is the instantaneous recording of data at pickets. This is a basic difference between the "Walking" version and the GSM-19 / GSM-19G (the "Standard" mode version which requires 3 sec. to obtain a reading each time the measurement key is pressed).

GSM-19W / GW Magnetometer

The GSM-19 reads up to 5 readings per sec. (sensors and console are the same as other models.) This system is ideal for vehicle-borne surveys, such as UXO, archaeological or some mineral exploration applications, where high productivity is required.

GSM-19 "Hands-Free" Backpack Option

The "Walking" Magnetometer and Gradiometer can be configured with an optional backpack-supported sensor. The backpack is uniquely constructed - permitting measurement of total field or gradient with free hands.

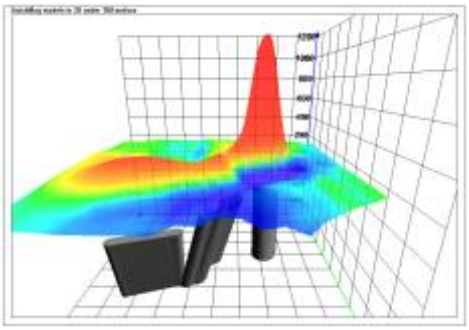
This option provides greater versatility and flexibility, which is particularly valuable for high-productivity surveys or in rough terrain.

GSM-19V / GV "VLF" Option

With GEM's omnidirectional VLF option, up to 3 stations of VLF data can be acquired without orienting. Moreover, the operator is able to record both magnetic and VLF data with a single stroke on the keypad.

3rd Party Software - A One-Stop Solution for Your Potential Field Needs

Now it's even easier to take data from the field and quality control stage through to final map preparation and modeling.



GEM-VIS provides links to fast 3D modeling via Encom's professional QuickPro software.

GEM provides very comprehensive solution available for working with magnetometer data:

o Free GEMLinkW Transfer and Internet Upgrade software
o Optional, low-cost GEM-VIS Quality Control, Visualization and Analysis
o Optional Data Processing
o Optional QuickMag Pro Automated Modeling and Inversion

V7.0 and V6.0 - Technology Developments

One of the main differences between GEM and other manufacturers is GEM's 30 years consistent focus on developing leading-edge magnetic technologies.

This commitment has led to many innovations in sensor technology; signal counting; firmware and software; and hardware and console design, culminating in the release of v7.0.

v7.0 and the previous release (v6.0) of the GSM-19 system provides many examples of the ways in which GEM continues to advance magnetics technologies for its customers.

Enhanced data quality:

o 25% improvement in sensitivity (new frequency counting algorithm)
o new intelligent spike-free algorithm (in contrast to other manufacturers, GEM does not apply smoothing or filtering to achieve high data quality)

Improved operational efficiency:

o Enhanced positioning (GPS engine with optional integrated / external GPS and real-time navigation)
o 16 times increase in memory to 32 Mbytes standard
o 1000 times improvement in processing and display speed (RISC microprocessor with 32-bit data bus)
2 times faster digital data link (115 kBaud through RS-232)

Innovative technologies:

o Battery conservation and survey flexibility (base station scheduling option with 3 modes - daily, flexible and immediate start)
o Survey pre-planning (up to 1000 programmable waypoints that can be entered directly or downloaded from PC for greater efficiency)
o Efficient GPS synchronization of field and base units to Universal Time (UTC)
o Cost saving with firmware upgrades

GEM's Proven Overhauser System

In a standard Proton magnetometer, current is passed through a coil wound around a sensor containing a hydrogen-rich fluid. The auxiliary field created by the coil (>100 Gauss) polarizes the protons in the liquid to a higher thermal equilibrium.

When the current, and hence the field, is terminated, polarized protons precess in the Earth's field and decay exponentially until they return to steady state. This process generates precession signals that can be measured as described below. Overhauser magnetometers use a more efficient method that combines electron-proton coupling and an electron-rich liquid (containing unbound electrons in a solvent con-taining a free radical). An RF magnetic field that corresponds to a specific energy level transition, stimulates the unbound electrons.

Instead of releasing this energy as emitted radiation, the unbound electrons transfer it to the protons in the solvent. The resulting polarization is much larger, leading to stronger precession signals.

Overhauser and proton precession, measure the scalar value of the magnetic field based on the proportionality of precession frequency and magnetic flux density (which is linear and known to a high degree of ac-curacy). Measurement quality is calculated using signal amplitude and its decay cha-racteristics. Values are averaged over the sampling

As the world's experienced manufacturer of commercial Overhauser systems, GEM's technical focus on the GSM-19 has resulted in a superior magnetic measuring device with high sensitivity, high cycling speed, low noise, and very low power consumption over a wide temperature range.

With minor software modifications (i.e. addition of a small auxiliary magnetic flux density while polarizing), it can be easily configured for high sensitivity readings in low magnetic fields (for equatorial work).

GPS - Positioning You for Effective Decision Making

The use of GPS technology is increasing in earth science disciplines due to the ability to make better decisions in locating anomalies, and in improving survey cost effectiveness and time management.

Examples of applications include:

o Surveying in remote locations with no grid system (Arctic for diamond exploration)

o High resolution exploration mapping

o High productivity ferrous ordnance (UXO) detection

o Ground portable magnetic and gradient surveying for environmental and engineering applications

o Base station monitoring for observing diurnal magnetic activity and disturbances with integrated GPS time

GEM addresses requests for GPS and high-resolution Differential GPS (DGPS) through internal and external options. Customer units can also be integrated. GPS surveys return a variety of real data to the user, including Time, Latitude and Longi-tude, UTM, Elevation and # of Satellites. This data is available to be applied in various ways by the user. The table below shows GPS modes, ranges and services.

Description	Range	Services
GPS Option A		Time reception only
GPS Option B	<1.5m	DGPS*
GPS Option C	<0.6m	DGPS*, OmniStar
GPS Option D	<0.6m <0.6m <0.7m	CDGPS, DGPS*, OmniStar
Output		
Time, Lat / Long, UTM, Elevation and number of Satellites		
***DGPS with SBAS (WAAS / EGNOS / MSAS)**		

Key System Components

Key components that differentiate the GSM-19 from other systems on the market include the sensor and data acquisition console. Specifications for components are provided on the right side of this page.

Sensor Technology

GEM's sensors represent a proprietary innovation that combines advances in electronics design and quantum magnetometer chemistry.

Electronically, the detection assembly includes dual pick-up coils connected in series opposition to suppress far-source electrical interference, such as atmospheric noise. Chemically, the sensor head houses a proprietary hydrogen-rich liquid solvent with free electrons (free radicals) added to increase the signal intensity under RF polarization.

From a physical perspective, the sensor is a small size, light-weight assembly that houses the Overhauser detection system and fluid. A rugged plastic housing protects the internal components during operation and transport.

All sensor components are designed from carefully screened non-magnetic materials to assist in maximization of signal-tonoise. Heading errors are also minimized by ensuring that there are no magnetic inclusions or other defects that could result in variable readings for different orientations of the sensor.

Optional omni-directional sensors are available for operating in regions where the magnetic field is near-horizontal (i.e. equatorial regions). These sensors maximize signal strength regardless of field direction.

Data Acquisition / Console Technology

Console technology comprises an external keypad / display interface with internal firmware for frequency counting, system control and data storage / retrieval. For operator convenience, the display provides both monochrome text as well as real-time profile data with an easyto-use interactive menu for performing all survey functions.

The firmware provides the convenience of upgrades over the Internet via the GEMLinkW software. The benefit is that instrumentation can be enhanced with the latest technology without returning the system to GEM -- resulting in both timely implementation of updates and reduced shipping / servicing costs.

Specifications

Performance

Sensitivity:	0.022 nT / √Hz
Resolution:	0.01 nT
Absolute Accuracy:	+/- 0.1 nT
Range:	20,000 to 120,000 nT
Gradient Tolerance:	< 10,000 nT/m
Samples at:	60+, 5, 3, 2, 1, 0.5, 0.2 sec
Operating Temperature:	-40C to +50C

Operating Modes

Manual: Coordinates, time, date and reading stored automatically at minimum 3 second interval.
Base Station: Time, date and reading stored at 1 to 60 second intervals.
Remote Control: Optional remote control using RS-232 interface.
Input / Output: RS-232 or analog (optional) output using 6-pin weatherproof connector.

Storage - 32 MB (# of Readings)

Mobile:	1,465,623
Base Station:	5,373,951
Gradiometer:	1,240,142
Walking Mag:	2,686,975

Dimensions

Console:	223 x 69 x 240 mm
Sensor:	175 x 75mm diameter cylinder

Weights

Console with Belt:	2.1 kg
Sensor and Staff Assembly:	1.0 kg

Standard Components

GSM-19 console, GEMLinkW software, batteries, harness, charger, sensor with cable, RS-232 cable and USB adapter, staff, instruction manual and shipping case.

Optional VLF

Frequency Range: Up to 3 stations between 15 to 30.0 kHz. Parameters: Vertical in-phase and out-of-phase components as % of total field. 2 components of horizontal field amplitude and total field strength in pT.

Resolution:	0.1% of total field

Our World is Magnetic.

About GEM Advanced Magnetometers

GEM Systems, Inc. delivers the world's only magnetometers and gradiometers with built-in GPS for accurately positioned ground, airborne and stationary data acquisition. The company serves customers in many fields including mineral exploration, hydrocarbon exploration, environmental and engineering, Unexploded Ordnance Detection, archeology, earthquake hazard prediction and observatory research.

Key products include the Proton Precession, Overhauser and Optically-Pumped Potassium instruments.

Each system offers unique benefits in terms of sensitivity, sampling, and acquisition of high-quality data. These core benefits are complemented by GPS technologies that provide metre to sub-metre positioning.

With customers in more than 50 countries globally and more than 25 years of continuous technology R&D, GEM is known as the only geophysical instrument manufacturer that focuses exclusively on magnetic technology advancement.

GEM SYSTEMS
ADVANCED MAGNETOMETERS

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03/09/2008