Logistics Report for

Ground Magnetic Survey

OVER THE

Tordillo Project

(Los Andes, Chile)

ON BEHALF OF

Cerro Grande Mining Corp

April 30, 2019

CH00760

Quantec Geoscience Chile Ltda
Alcantara 200, piso 6, Las Condes, Santiago, Chile
+56-2-2368-4564

QUANTEC Geoscience

EXECUTIVE SUMMARY

This report presents the logistics and results of the Ground Magnetic surveys completed from 27/03/2019 to 01/04/2019 over the Tordillo Project by Quantec Geoscience Chile Ltda on behalf of Cerro Grande Mining Corp.

The report describes the instrumentation, data acquisition and processing procedures, final data formats and contents of the digital archives. A total of 26.98 km of MAG data were acquired.

Data were inspected for quality assurance daily by the geophysicist in charge of the project. The final processed survey results delivered with the report include:

- Magnetic Data
    - Raw instrument data files
    - Raw and processed data as Geosoft .GDB database and ASCII .XYZ files
    - Plan maps at scale 1:10000 in Geosoft (.MAP), Portable Network Graphics (.PNG), GeoTiff (.TIFF), y PDF (.PDF) formats of the following:
        - Total Magnetic Intensity (TMI)
        - Reduction to Pole (RTP)
        - Vertical Derivative, from RTP upward continued 10 m (VD)
        - Analytic Signal (calculated from 10 m upward continued TMI)
        - Tilt Derivative, from RTP upward continued 10 m (TD)
        - Coverage map

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1. Introduction

This report presents the logistics and results of the Ground Magnetic surveys completed from 27/03/2019 to 01/04/2019 over the Tordillo Project by Quantec Geoscience Chile Ltda on behalf of Cerro Grande Mining Corp.

1.1. Client Information

Name:	Cerro Grande Mining Corp
Representative:	Matthew Thomson Email: mst@cegmining.com

1.2. General Project Information

Project Name:	Tordillo Project
Quantec Project Number:	CH00760
Survey Type:	Ground Magnetic
General Location:	Approximately 50 km east of the city of San Felipe, Region de Valparaiso, Chile (see Figure 1-1). Lat /Long: 32°35'18" S; 70°13'45" W UTM: 384650 E; 6393700 N
Survey Period:	From 27/03/2019 to 01/04/2019
Report Prepared by:	Juan Pablo Ensinck – Nigel Unger

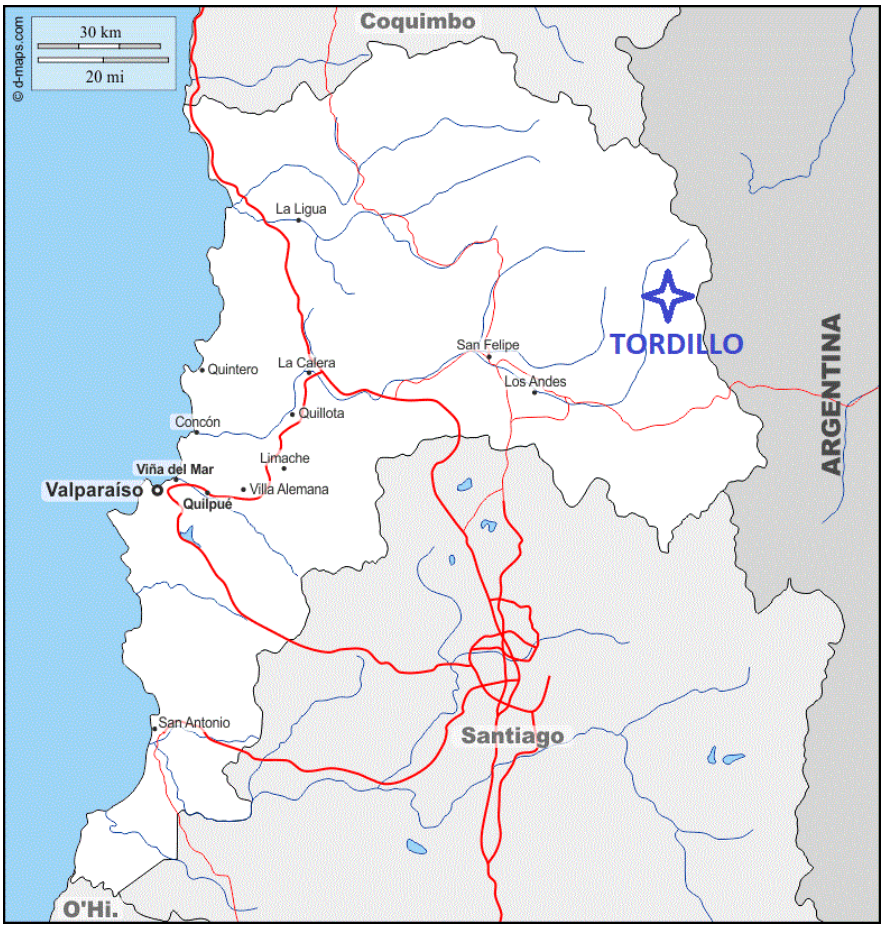


Figure 1-1: General location map.

2. Survey Logistics

2.1. Access

Base of Operations:	Project camp
Mode of Access:	4x4 and on foot

2.2. Grid Area

Established by:	Client prior to survey execution
Datum and Projection:	WGS84 – UTM19S
Grid Azimuth:	N30°E

2.3. Production Summary

Details of Survey Production:	See 0
Survey Period (Total):	From 27/03/2019 to 01/04/2019 6 days
Survey Days (Read Time):	5 days
Mobilization:	1 day

2.4. Survey Coverage Summary

Details of Survey Coverage:	see APPENDIX B
Lines Acquired:	14 lines covering 26.98 km

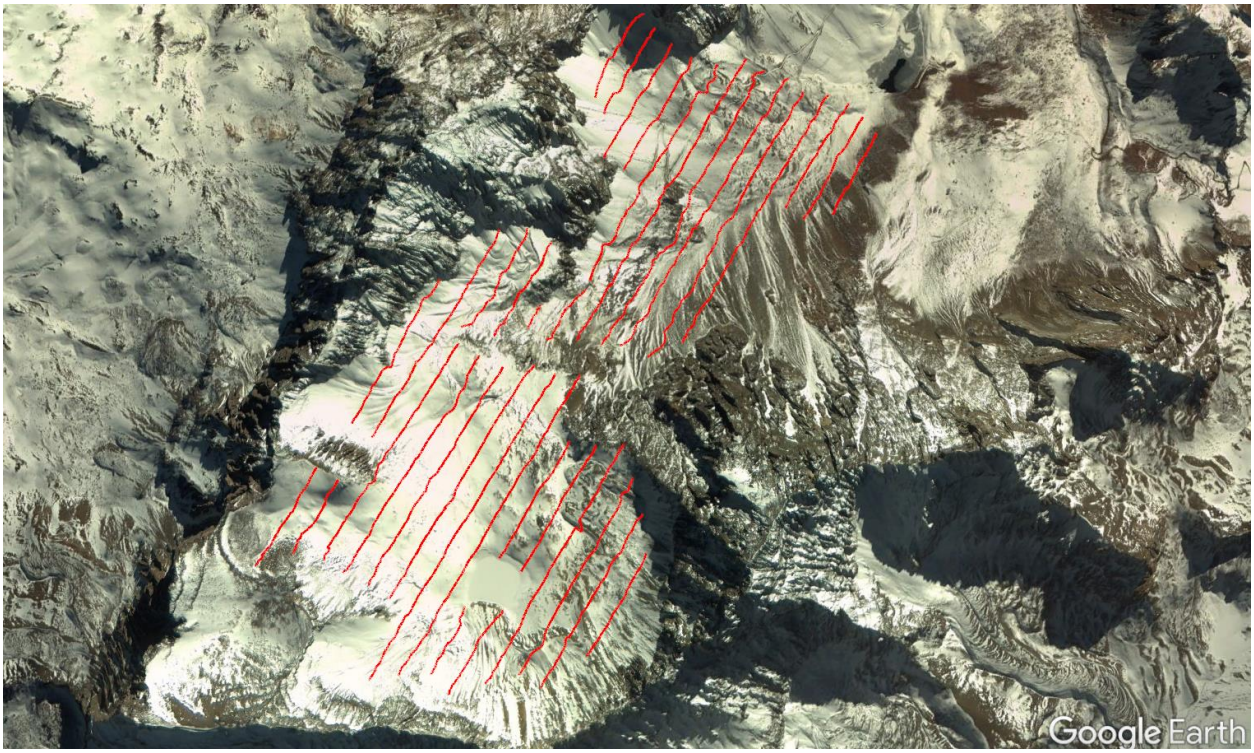


Figure 2-1: MAG surveyed path

2.5. QUANTEC PERSONNEL

Project Manager:	Nigel Unger
Field Operations Manager:	Alejandro Espinoza
Project Geophysicist:	Juan Pablo Ensinck

3. Survey Specifications

3.1. Instrumentation

Magnetometer:	GEM GSM-19
Sensor Type:	Overhauser Effect, mounted on a 2m staff

3.2. Magnetic Survey Parameters

3.2.1.Geometry

Configuration	Total Magnetic Intensity Profiling
Measurement Interval:	1s (1 Hz freq measurement)

3.2.2.Acquisition Parameters

Measured Parameters:	Total Magnetic Intensity
Data Units:	nanoTesla (nT)
Data Reduction:	Diurnal Correction
Magnetic Datum:	23795 nT
Magnetic Declination:	0.62°
Magnetic Inclination:	-33.59°
Base Station Location:	385728 – 6398814 (WGS84 – UTM19S)
Base Station Sampling:	3 s recording interval, synchronized with mobile magnetometers

3.2.3. Data Processing

The Total Magnetic Intensity (TMI) measurements from the base station and mobile magnetometers were transferred to a computer using GEMLink 5.2. Data files were edited when needed and then imported to Geosoft Oasis Montaj ™.

The data processing and correction of the data were done in the following steps:

- Raw magnetic data is corrected for diurnal drift
- Bad signal quality measurements are discarded
- Spikes and magnetic dropouts are removed
- Gridded data products are calculated:
    - Total Magnetic Intensity (TMI)
    - Reduction to Pole (RTP)
    - Vertical Derivative (calculated from RTP upward continued 10 m to smooth the data)
    - Tilt Derivative (calculated from RTP upward continued 10 m to smooth the data)
    - Analytic Signal (calculated from 10 m upward continued TMI)

3.2.4. Magnetic Data Accuracy and Repeatability

Repeatability and instrument accuracy of the magnetometer was verified by taking reference station repeat measurements at the beginning and end of each survey day. Care was taken to ensure proper magnetic sensor orientation at all times.

4. DELIVERABLES

4.1. DIGITAL DATA

The complete MAG data sets are archived in Geosoft® Oasis Montaj™ .GDB format database files, and .XYZ format ASCII files. Raw instrument data files are also archive in as ASCII format files by date and mobile number.

4.2. MAP PRODUCTS

The MAG data are presented as plan maps at 1:10000 scale, in Geosoft (.MAP), Portable Network Graphics (.PNG), GeoTiff (.TIFF), y PDF (.PDF) formats. The following products are included:

- Total Magnetic Intensity (TMI)
- Reduction to Pole (RTP)
- Vertical Derivative, from RTP upward continued 10 m (VD)
- Analytic Signal (calculated from 10 m upward continued TMI)
- Tilt Derivative, from RTP upward continued 10 m (TD)
- Coverage map

APPENDIX A. PRODUCTION SUMMARY

Date	Activities	Mobile	Line	Start	End	Total (m)
27/03/2019	Mobilización	----------	----------	----------	----------	----------
28/03/2019	MAG Survey	1	700	1800	2600	800
		1	600	2600	1900	700
		1	800	1900	2400	500
		1	900	2400	1900	500
		3	700	1800	1300	500
		3	600	1200	1900	700
		3	500	1900	2600	700
		3	400	2500	2100	400
29/03/2019	MAG Survey	1	1000	1800	2500	700
		1	1100	2400	1800	600
		1	1200	2300	1500	800
		1	1300	2200	1700	500
		1	0	1800	1400	400
		1	100	1500	1800	300
		3	800	1600	1330	270
		3	900	1300	1670	370
		3	1000	1800	1400	400
		3	1100	1500	1800	300
		3	500	1700	1500	200
		3	400	1500	2100	600
30/03/2019	MAG Survey	3	200	1600	1500	100
		3	300	1500	2500	1000
		3	500	1700	1900	200
		3	0	2000	2700	700
		3	600	2800	4260	1460
		1	200	1600	2500	900
		1	200	2600	3100	500
		1	100	2000	3000	1000
		1	500	2700	4200	1500
31/03/2019	MAG Survey	1	700	2800	4270	1470
		1	900	2880	4300	1420
		1	1200	4350	3800	550
		1	1300	3850	4310	460
		3	800	2800	4300	1500
		3	1000	3000	4330	1330
		3	1100	4350	3800	550
01/04/2019	MAG Survey	1	300	3500	4100	600
		1	400	3500	4100	600
		3	100	3700	4100	400
		3	200	3700	4100	400
		3	400	2700	2800	100
TOTAL						**26980**

APPENDIX B. SURVEY COVERAGE

	Grid Coordinates		WGS84 – UTM19S			
	Start	End	Start		End	
Line			Easting	Northing	Easting	Northing
0	1400	1800	383840	384040	6393068	6393415
0	2000	2700	384140	384490	6393588	6394194
100	1500	1800	383974	384124	6393101	6393361
100	2000	3000	384224	384724	6393534	6394400
100	3700	4100	385074	385274	6395006	6395353
200	1500	1600	384062	384112	6393053	6393139
200	1600	2500	384112	384562	6393139	6393919
200	2600	3100	384612	384862	6394005	6394438
200	3700	4100	385162	385362	6394958	6395304
300	1500	2500	384149	384649	6393004	6393870
300	3500	4100	385149	385449	6394736	6395256
400	1500	2500	384237	384737	6392956	6393822
400	2700	2800	384837	384887	6393995	6394082
400	3500	4100	385237	385537	6394688	6395207
500	1500	2600	384319	384869	6392899	6393851
500	2700	4200	384919	385669	6393938	6395237
600	1200	2600	384257	384957	6392590	6393803
600	2800	4260	385057	385787	6393976	6395240
700	1300	2600	384394	385044	6392628	6393754
700	2800	4270	385144	385879	6393927	6395200
800	1330	1600	384491	384626	6392597	6392831
800	1900	2400	384776	385026	6393091	6393524
800	2800	4300	385226	385976	6393870	6395169
900	1300	1670	384564	384749	6392523	6392843
900	1900	2400	384864	385114	6393042	6393475
900	2880	4300	385354	386064	6393891	6395121

	Grid Coordinates		WGS84 – UTM19S			
	Start	End	Start		End	
Line			Easting	Northing	Easting	Northing
1000	1400	2500	384701	385251	6392561	6393513
1000	3000	4330	385501	386166	6393946	6395098
1100	1500	2400	384839	385289	6392599	6393378
1100	3800	4350	385989	386264	6394591	6395067
1200	1500	2300	384926	385326	6392550	6393243
1200	3800	4350	386076	386351	6394542	6395018
1300	1700	2200	385114	385364	6392676	6393109
1300	3850	4310	386189	386419	6394538	6394937

APPENDIX C. PROCEDURES

Base station corrected Total Field Magnetic surveying is conducted using at least two synchronized magnetometers of identical type. One magnetometer unit is set in a fixed position in a region of stable geomagnetic gradient, and away from possible cultural effects (e.g. moving vehicles, power lines, fences, etc.) to monitor and correct for daily diurnal drift. This base station magnetometer stores the time, date and total field measurement at fixed time intervals over the survey day. The second, mobile unit stores the coordinates, time, date, and the total field measurements simultaneously. The survey procedure consists of taking total magnetic measurements of the Earth's field at stations, along individual profiles. The magnetometer sensor is mounted on a 2-metre staff to minimize localized near-surface geologic noise. The data are transferred each day from the base and mobile instruments to a computer for diurnal correction and further processing.

APPENDIX D. MAG INSTRUMENT SPECIFICATIONS

D.1. GEM GSM-19 MAGNETOMETER

Overhauser Performance

Resolution:	0.01 nT
Relative Sensitivity:	0.02 nT
Absolute Accuracy:	0.2nT
Range:	20,000 to 120,000 nT
Gradient Tolerance:	Over 10,000nT/m
Operating Temperature:	-40°C to +60°C

Operation Modes

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

Operating Parameters

Power Consumption:	Only 2Ws per reading. Operates continuously for 45 hours on standby.
Power Source:	12V 2.6Ah sealed lead acid battery standard,

	other batteries available
Operating Temperature:	-50°C to +60°C

Storage Capacity

Manual Operation:	29,000 readings standard, with up to 116,000 optional. With 3 VLF stations: 12,000 standard and up to 48,000 optional.
Base Station:	105,000 readings standard, with up to 419,000 optional (88 hours or 14 days uninterrupted operation with 3 sec. intervals)
Gradiometer:	25,000 readings standard, with up to 100,000 optional. With 3 VLF stations: 12,000, with up to 45,000 optional.

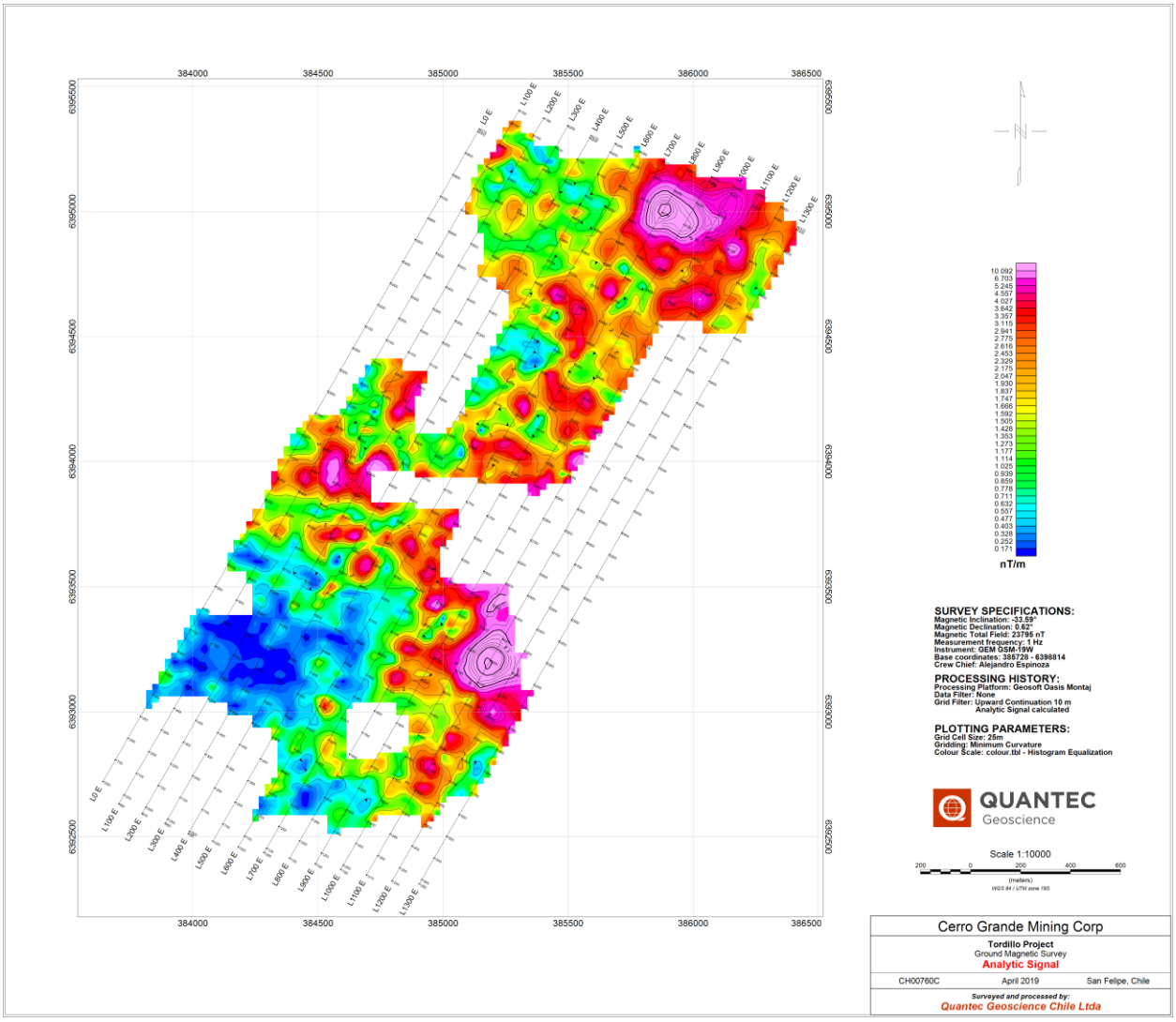
Dimensions and Weights

Console:	223 x 69 x 240mm
Sensor:	170 x 71mm diameter cylinder
Console:	2.1kg
Sensor and Staff Assembly:	2.0kg

Standard Components

GSM-19 magnetometer console, harness, battery charger, shipping case, sensor with cable, staff, instruction manual, data transfer cable and software.

APPENDIX E. MAG PLAN MAPS



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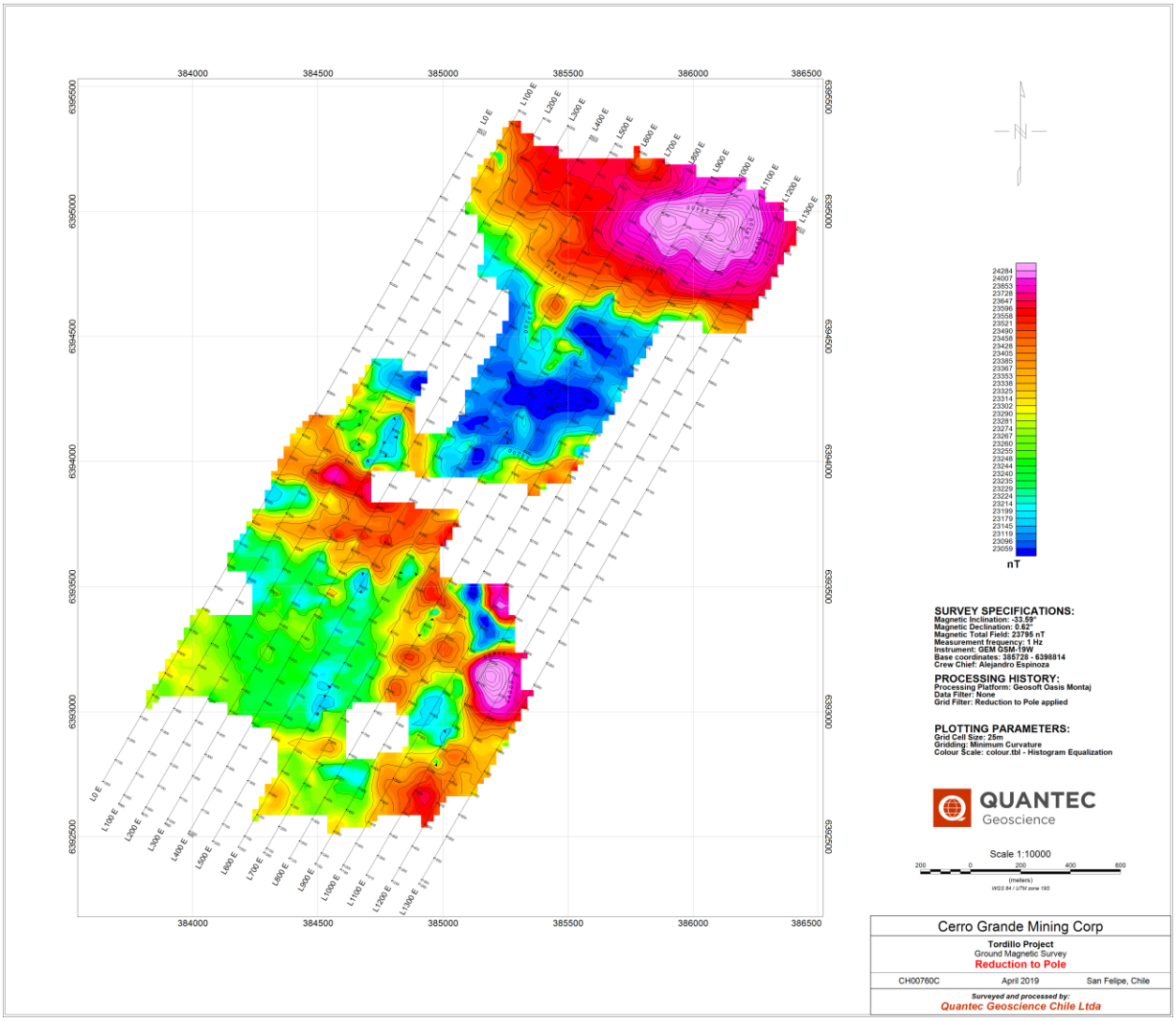
Cerro Grande Mining Corp
Tordillo Project
Ground Magnetic Survey
Coverage
CH00760C
April 2019
San Felipe, Chile
Surveyed and processed by:
Quantec Geoscience Chile Ltda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SURVEY SPECIFICATIONS:
Magnetic Inclination: -33.59°
Magnetic Declination: 0.62°
Magnetic Total Field: 23795 nT
Measurement frequency: 1 Hz
Instrument: GEM GSM-19W
Base coordinates: 385728 - 6398814
Crew Chief: Alejandro Espinoza
PROCESSING HISTORY:
Processing Platform: Geosoft Oasis Montaj
Data Filter: None
Grid Filter: Reduction to Pole applied
PLOTTING PARAMETERS:
Grid Cell Size: 25m
Gridding: Minimum Curvature
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Cerro Grande Mining Corp
Tordillo Project
Ground Magnetic Survey
Reduction to Pole
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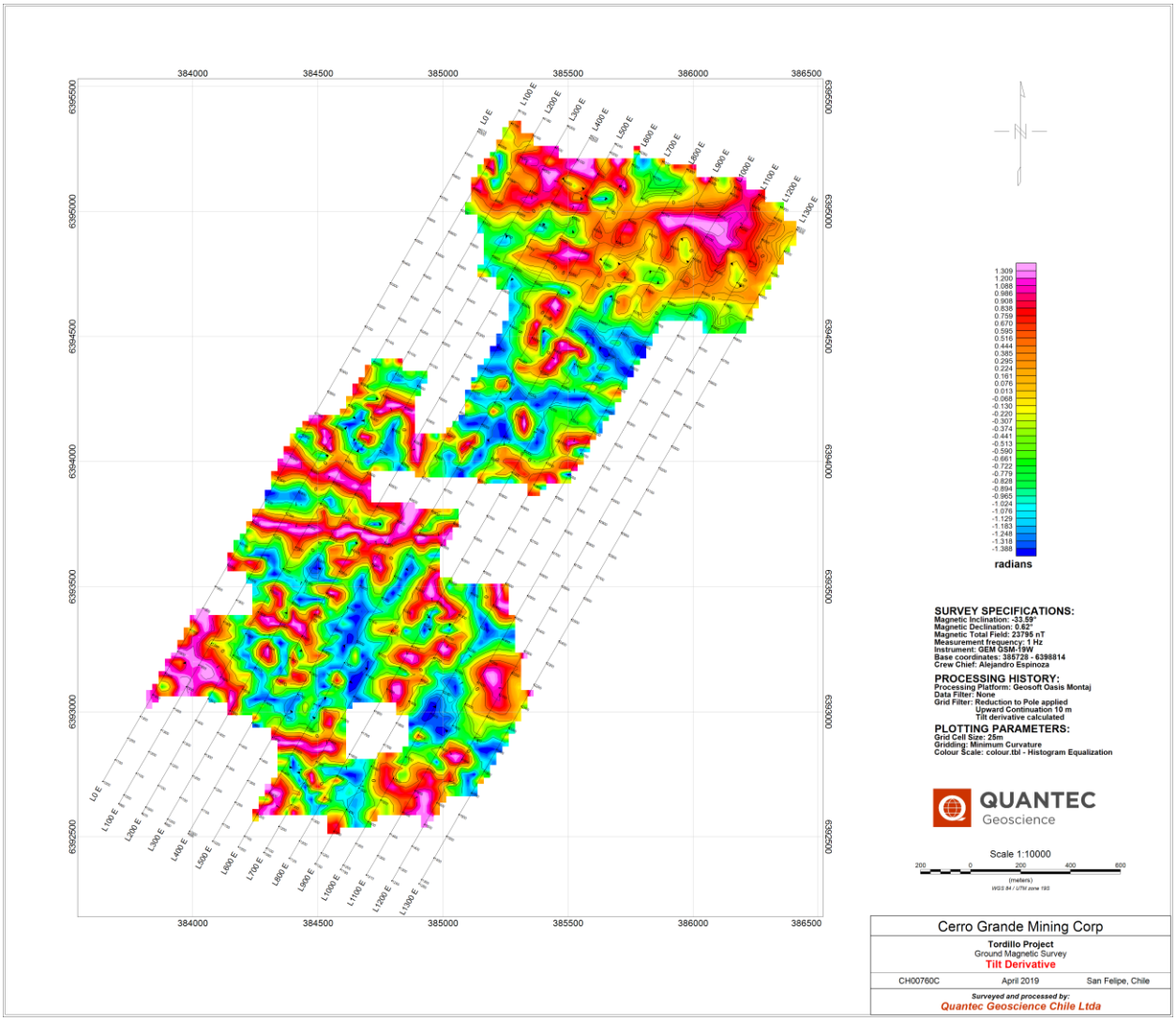
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Crew Chief: Alejandro Espinoza
PROCESSING HISTORY:
Processing Platform: Geosoft Oasis Montaj
Data Filter: None
Grid Filter: Reduction to Pole applied
Upward Continuation 10 m
Tilt derivative calculated
PLOTTING PARAMETERS:
Grid Cell Size: 25m
Gridding: Minimum Curvature
Colour Scale: colour.tbl - Histogram Equalization
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(meters)
WGS 84 / UTM zone 19S
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Tordillo Project
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Tilt Derivative
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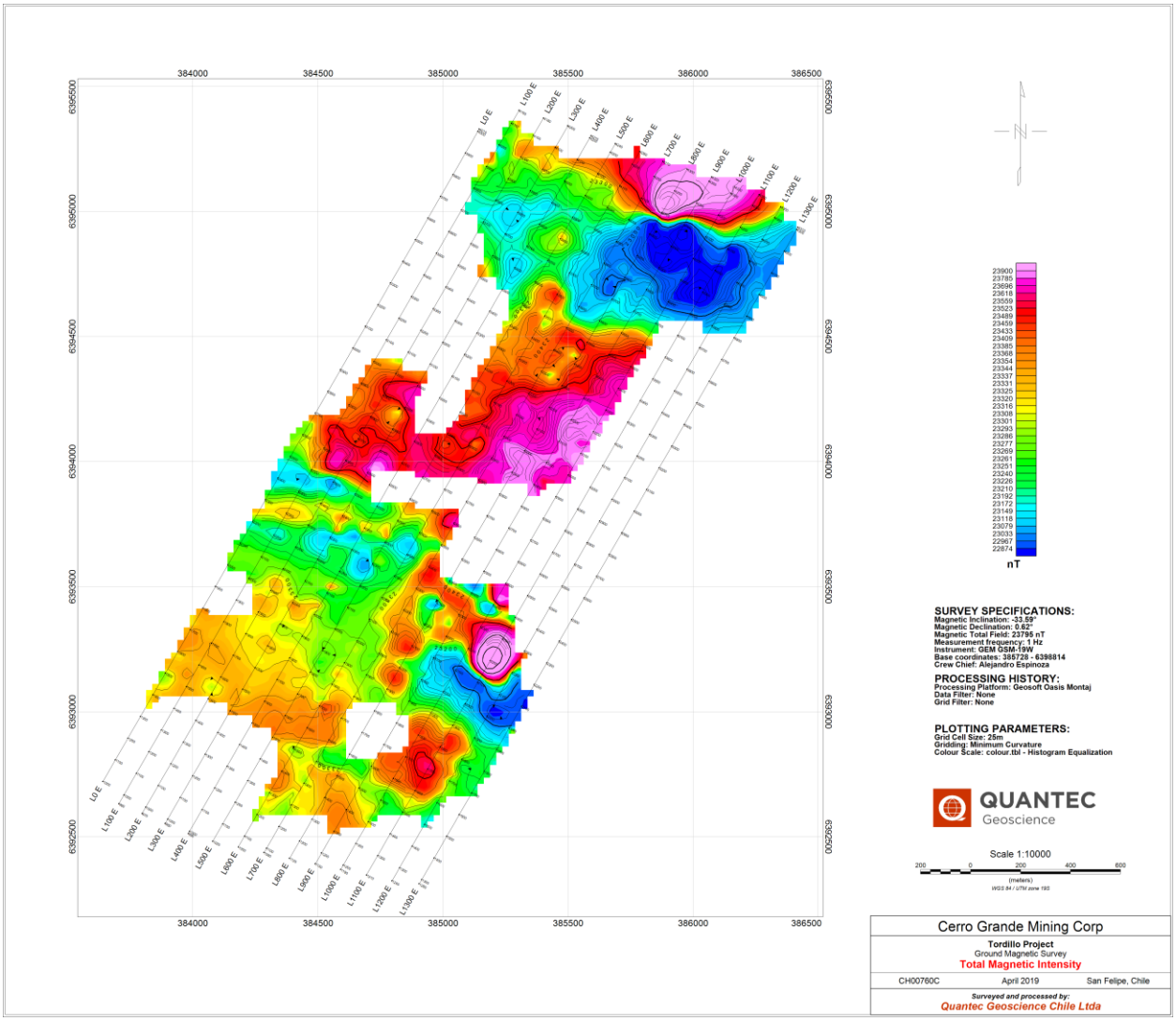
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Data Filter: None
Grid Filter: None
PLOTTING PARAMETERS:
Grid Cell Size: 25m
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Geoscience
Scale 1:10000
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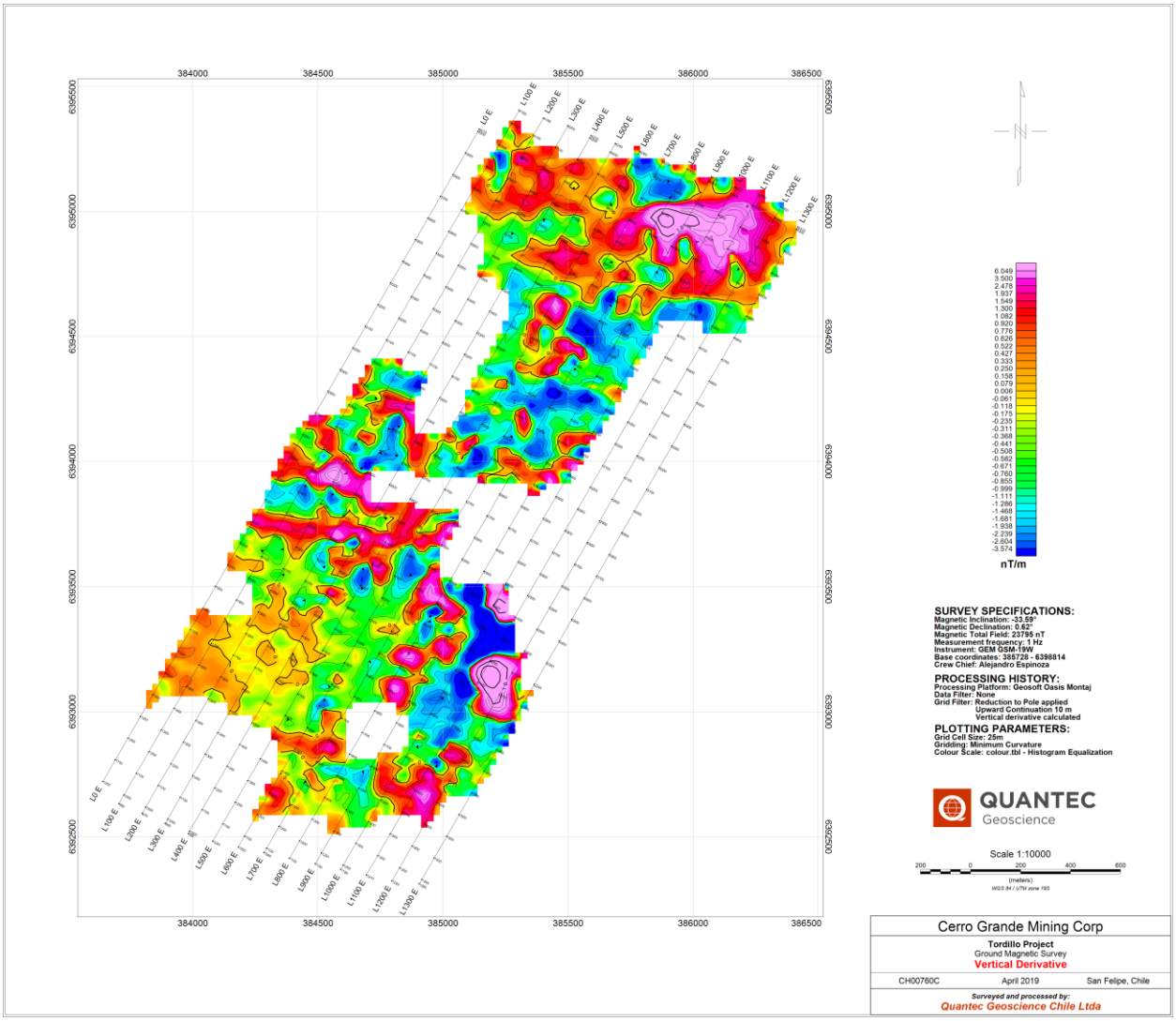
(meters)
WGS 84 / UTM zone 19S
Cerro Grande Mining Corp
Tordillo Project
Ground Magnetic Survey
Total Magnetic Intensity
CH00760C
April 2019
San Felipe, Chile
Surveyed and processed by:
Quantec Geoscience Chile Ltda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nT/m
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Vertical derivative calculated
PLOTTING PARAMETERS:
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Gridding: Minimum Curvature
Colour Scale: colour.tbl - Histogram Equalization
QUANTEC
Geoscience
Scale 1:10000
200
0
200
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(meters)
WGS 84 / UTM zone 19S
Cerro Grande Mining Corp
Tordillo Project
Ground Magnetic Survey
Vertical Derivative
CH00760C
April 2019
San Felipe, Chile
Surveyed and processed by:
Quantec Geoscience Chile Ltda

SUMMARY INFORMATION

QUANTEC OFFICE INFORMATION	
Office:	Quantec Geoscience Chile Ltda
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Phone:	+56-2-2368-4564
Web:	www.quantecgeoscience.com
PROJECT INFORMATION	
Client Name:	Cerro Grande Mining Corp
Project Name:	Tordillo Project
Project Location:	Los Andes, Chile
Project Type:	Ground Magnetic
Project Number:	CH00760
Project Manager:	Nigel Unger
Project Period:	27/03/2019 to 01/04/2019
Report Type:	Logistics Report
Report Author(s):	Juan Pablo Ensinck – Nigel Unger
Report date:	April 30, 2019