# Results of Mobile Metal Ion (MMI-M) Soil Geochemical Surveys on the Long Property of China Metallurgical Exploration Corporation, Ontario

Prepared By

M.A.F. Fedikow Ph.D. P.Eng. P.Geo. C.P.G. Mount Morgan Resources Ltd. P.O. Box 629 50 Dobals Road North Lac du Bonnet, Manitoba R0E 1A0 Tel: 204-284-6869; Cell: 204-998-0271 FAX: 204-284-6869

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# **EXECUTIVE SUMMARY**

The MMI-M partial extraction of representative unconsolidated sediment present in the Long property survey area is a viable exploration approach to base and precious metal exploration in the survey area. This approach has delineated a multi-sample, linear east-trending Cu, Pb, Zn, Ni and Sb commodity element anomaly present on Grid A. It is developed, in part, near the southern extremity of sampling and for this reason may be open to the south.

The nature and chemical makeup of the Grid A MMI anomaly suggests a zone of base metal mineralization with lesser precious metal (Au) content. The nature of the mineralization could be disseminated to massive.

The Grid A base metal anomaly is encapsulated by what appears to be a two-component lithology consisting of a very localized zone of Ba-Cs-Li-K enrichment that occurs at the east end of a much more extensive Fe-Ti-Nb-Zr-Sc-Rb-Mg-Ti-Th-Ce-Eu-Yb anomaly. Based on this element suite the lithology that hosts the base metal anomaly is interpreted to be an Fe-rich magnetite-bearing chemical sedimentary rock with an overall mafic bulk chemical composition. Depending on magnetite abundance it may be an oxide facies iron formation.

Grid B is marked by the absence of any significant base or precious metal anomalies. Single sample responses typify the grid at low-contrast response ratios, however a linear east-west-trending lithologic anomaly is present on Grid B. It consists of Fe, Ti, Nb, P, Zr, Sc, Rb, Li, K +- Al and Cs. These elements are very similar to those that characterize the Grid A anomaly and may be a continuation of the same lithologic unit. This unit is also interpreted to be an Fe-rich magnetite-bearing chemical sedimentary rock with an overall mafic bulk chemical composition and may be the lateral equivalent of the chemical sedimentary rock defined on Grid A.

The Grid A base metal anomaly should be further assessed by modeling the geophysical response to determine the potential dimensions of the causative conductive source. Maxwell modeling is one approach to assess the physical dimensions of the MMI and initial geophysical response.

Because the MMI responses for lithology on both Grid A and B is interpreted as near-iron formation or oxide facies iron formation a detailed review of magnetic survey results on the two grid areas should be undertaken.

Further MMI surveys on the property should conform to sampling and analytical protocols established during this survey.

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# INTRODUCTION

This report describes the results of a Mobile Metal Ions (MMI-M) Technology soil geochemical survey conducted at the FG3 target on the Long Lake property of China Metallurgical Exploration Corporation (CMEC) in the fall of 2014. The intent of the survey is to assess geophysical responses documented during an earlier airborne geophysical survey conducted on the property by CMEC. The metal-endowment of the source regions defined by the geophysical anomalies will be based upon geochemical signatures of the individual geophysical responses with the aim of defining conductive areas with significant potential for base and precious metal mineralization. Sample collection was contracted to Mount Morgan Resources Ltd and includes the new results (this report) which were based on follow-up from an earlier MMI orientation survey undertaken on the property.

# **PROJECT ACCESS**

The subject property is located due north of Nakina and south of the Ring of Fire (Figure 1). There is no significant infrastructure in the area with mobility in the field assisted by rotary wing aircraft.

# DESCRIPTION OF THE LONG PROPERTY

The Long Property is consists of 40 mining claims in good standing containing 588 units and covering 94.08 km<sup>2</sup> (Table 1). These claims are situated in the Treloar Lake area and are presented in a regional claims context in Figure 2. A detailed claim map is presented in Figure 3. The claims have an arcuate eat-west shape and are surrounded on all sides except the west by open ground.



Figure 1: Location of the Long Property.

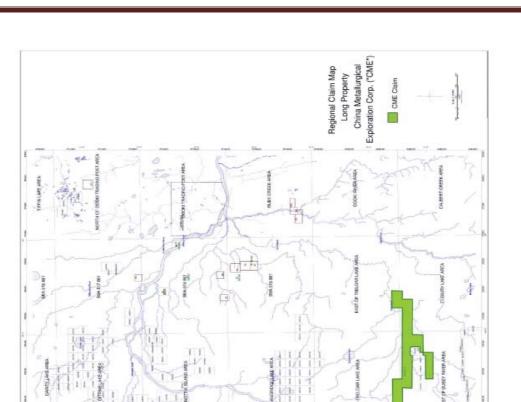


Figure 2. Regional claims setting for the Long property, CMEC.

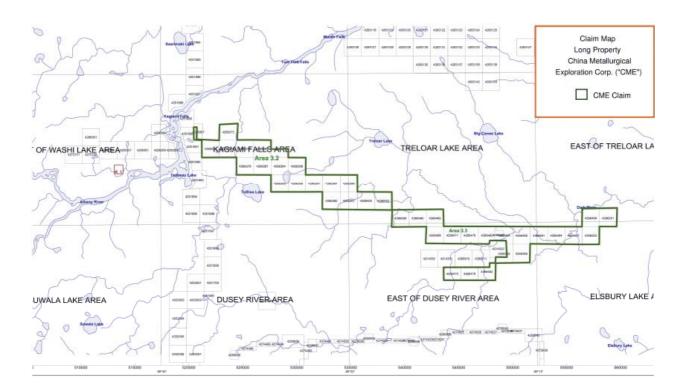


Figure 3. Detailed claims map, Long property, CMEC.

Township/Area	Claim Number	Recording Date	Claim Due Date	Status	Percent Option	Work Required	Total Applied	Total Reserve	Claim Bank
EAST OF DUSEY RIVER AREA	4266407	2011-May-30	2015-May-30	А	100%	\$3,200	\$1,600	\$353	\$0
EAST OF DUSEY RIVER AREA	<u>4266466</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
EAST OF DUSEY RIVER AREA	<u>4266471</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
EAST OF DUSEY RIVER AREA	<u>4266473</u>	2011-Jun-13	2015-Jun-13	А	100%	\$9,600	\$4,800	\$1,060	\$0
EAST OF DUSEY RIVER AREA	<u>4266476</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
EAST OF DUSEY RIVER AREA	<u>4266478</u>	2011-Jun-13	2015-Jun-13	А	100%	\$9,600	\$4,800	\$1,060	\$0
EAST OF DUSEY RIVER AREA	<u>4266480</u>	2011-Jun-13	2015-Jun-13	А	100%	\$10,400	\$5,200	\$1,148	\$0
EAST OF DUSEY RIVER AREA	<u>4266482</u>	2011-Jun-13	2015-Jun-13	А	100%	\$10,400	\$5,200	\$1,148	\$0
EAST OF DUSEY RIVER AREA	<u>4266484</u>	2011-Jun-13	2015-Jun-13	А	100%	\$8,000	\$4,000	\$883	\$0
EAST OF DUSEY RIVER AREA	4266485	2011-Jun-13	2015-Jun-13	А	100%	\$5,600	\$2,800	\$618	\$0
EAST OF DUSEY RIVER AREA	4266488	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
EAST OF DUSEY RIVER AREA	4266489	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0

Table 1. List of claims, Long Property, CMEC.

EAST OF TRELOAR LAKE	4266251	2011 Jun 12	2015 Jun 12		100%	¢12,800	¢C 400	¢1 414	έο
AREA	<u>4266251</u>	2011-Jun-13	2015-Jun-13	A	100%	\$12,800	\$6,400	\$1,414	\$0
EAST OF TRELOAR LAKE AREA	<u>4266499</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
ELSBURY LAKE AREA	<u>4266491</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
ELSBURY LAKE AREA	<u>4266494</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6 <i>,</i> 400	\$1,414	\$0
ELSBURY LAKE AREA	<u>4266497</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
ELSBURY LAKE AREA	<u>4266500</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (POR)	<u>4266391</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (POR)	<u>4266394</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (POR)	<u>4266395</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6 <i>,</i> 400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266367</u>	2011-Jun-03	2015-Jun-03	А	100%	\$4,000	\$2,000	\$410	\$0
KAGIAMI FALLS AREA (TB)	<u>4266371</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266373</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	4266374	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	4266377	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	4266378	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	4266380	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266381</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266384</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266385</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	<u>4266388</u>	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
KAGIAMI FALLS AREA (TB)	4266389	2011-Jun-03	2015-Jun-03	А	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	4266396	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	<u>4266397</u>	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	4266400	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6 <i>,</i> 400	\$1,414	\$0
TRELOAR LAKE AREA	4266453	2011-Jun-13	2015-Jun-13	A	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	4266456	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	4266460	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6,400	\$1,414	\$0
TRELOAR LAKE AREA	4266465	2011-Jun-13	2015-Jun-13	А	100%	\$12,800	\$6 <i>,</i> 400	\$1,414	\$0
					ual Work iirement:	\$470,400			
					of Claim:	40			
					of Unit:	588			
					Size:	94.08	km²		
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## MOBILE METAL IONS GEOCHEMICAL SURVEYS ON THE LONG PROPERTY

# Mobile Metal Ions ("MMI-M") Soil Geochemical Survey

A Mobile Metal Ions soil geochemical survey was undertaken on two UTM-based grids established on the property. Figure 4 depicts the locations of soil samples for the 2014 program in the Long property project area. MMI-M samples were collected at a total of 240 sites on the Property in 2014 with 194 samples collected from the A grid and 46 samples collected from the B grid. Samples were collected from hand-dug pits at a constant depth of 10-20 cm below the organic soil horizon. Sample collection was done by Mount Morgan Resources Ltd. (P.O. Box 629, Lac du Bonnet, Manitoba; Telephone 204-284-6869) by geological technician Nathaniel Astelford under the supervision of Dr. Mark Fedikow.

The sample was collected as a single continuous sample or vertical channel. Samples were referenced to UTM coordinates using a Garmin GPS (NAD83 Zone 14 Datum). All samples were analyzed for MMI-M at SGS laboratories in Vancouver, British Columbia. Sample UTM coordinates and analyses as received from SGS Mineral Services (B.C.) are presented in Appendix 1. Appendix 2 contains all derived worksheets and tables and figures are presented in Appendix 3. The following sections describe the results from MMI-M partial extraction for all elements interpreted to be useful in the survey.

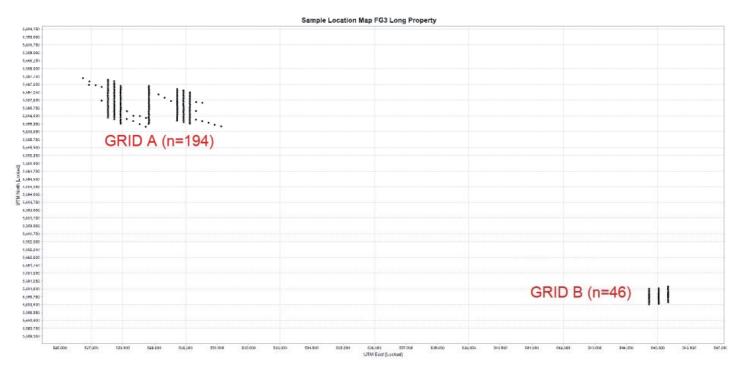


Figure 4: Location of 2014 MMI soil sample sites for grids A and B on target FG3 of the Long property.

## PREAMBLE – MOBILE METAL IONS TECHNOLOGY

The exploitation of mineral commodities in the near-surface geological environment has become increasingly difficult due to the exhaustion of mineralization exposed at surface and the mantling of prospective bedrock by residual soil or glacially transported till and its derivatives. Thick residual soils and glaciofluvial and glaciolacustrine sediments topped by organic deposits make mineral exploration in these terrains challenging. For this reason a plethora of innovative exploration geochemical selective and partial digestions, coupled with state-of-the-art instrumentation capable of measuring concentrations in the parts per billion (ppb) and sub-parts per billion ranges, have been developed. These techniques offer the explorationist tools to "see through" overburden and derive useful mineral exploration data for integration with geology and geophysics and ultimately for drill-testing multivariate anomalies.

The proprietary Mobile Metal Ions Process (MMI) soil geochemical technique has been utilized on a wide range of commodity types from base and precious metals to diamonds worldwide. The Process is based upon proprietary partial extraction techniques, specific combinations of ligands to keep metals in solution, and relies on strict adherence to sampling protocols usually established during an orientation program. Geochemical data resulting from MMI analysis of improperly collected soils cannot be ameliorated with univariate and/or multivariate statistical and graphical solutions.

The recognition of anomalies in geochemical data has progressed from simple visual inspection in small data sets to multivariate, parametric and non-parametric or robust statistical methods for large datasets usually extracted from regional geochemical surveys. Derived parameters from these statistical exercises, such as factor scores or discriminate functions, have been successfully utilized in reducing a large number of potentially useful variables to a select few variables that identify and localize anomalous geochemical signatures. These statistical approaches have been required to manipulate accurate and precise, low-cost, multi-element geochemical data.

The MMI technology uses a different approach to exploration geochemistry by analyzing soils for a select few commodity elements upon which to base property evaluations. Having stated this, the demand from explorationists for a more comprehensive package including pathfinder element suites resulted in the development of "MMI-M". The MMI-M multi-element suite was utilized to analyze inorganic soils from the Long Property project area and provides analyses for 53 elements. These are a multi-element suite that report ppb and sub-ppb analyses for base and precious metals, pathfinder elements for these commodities, as well as elements useful for mapping bedrock geology obscured by overburden and its derivatives. The large number of elements in the database provides an opportunity to assess an area of interest for a wide range of metallic mineral deposits with only minor drawbacks in terms of lower limits of determination.

# Mobile Metal Ion Sample Collection and Analysis

In MMI surveys there are some general approaches that are used to guide sample collection including preferred depths of sampling and these are described briefly here. A wealth of additional information is also available from the SGS website (<u>www.sgs/geochemistry.com</u>).

Soil samples, each weighing approximately 250 grams, are normally collected at 25-m stations in precious metal exploration and up to 50-m in the case of base metals. For larger targets such as porphyry copper systems the sampling spacing can be increased to 250 m or more. Sample spacing should be established on the basis of a "best-estimate" of the likely target being sought with estimates from historical data or exploration results from nearby/adjacent programs. Sample locations are usually documented according to grid coordinates and GPS readings at each station. Samples are then collected from a consistent depth of 10-20 cm beneath the point at which soil formation is initiated in the particular landscape environment where the survey is taking place. In the case where an orientation survey is undertaken and the optimum sample depth is not 10-20 cm then all samples in the survey are collected from this optimum depth. Samples are normally collected with a stiff vinyl trowel after the initial sample pit was dug with a shovel. The shovel is clean without paint or rust. In particularly hostile overburden scenarios where significant thickness of organic soils is encountered, samples may be collected with an auger. A Dutch auger has been found to be particularly useful for this purpose although maintaining a consistent sample depth with an auger is difficult. Samples are bagged on site without preparation and shipped to SGS Laboratories (Vancouver, B.C.) for MMI-M analysis. Analytical finish for all extractions is by inductively coupled plasma-mass spectrometry (ICP-MS).

Analytical duplicates and a standard MMI reference sample are utilized by SGS Mineral Services to monitor analytical accuracy and precision. Analytical blanks monitor laboratory-based contamination. The analytical data for all samples are presented in Appendix 1 and all other derived work data sheets are presented in Appendix 2. Figures generated for this report are presented in Appendix 3.

# Analytical Protocol: Mobile Metal Ions (MMI) Process

The proprietary Mobile Metal lons Process (MMI) soil geochemical technique has been utilized on a wide range of commodity types from base and precious metals to diamonds worldwide. The MMI Process is based upon proprietary partial extraction techniques and specific combinations of ligands to retain metals in solution once they are stripped from individual soil particles. The MMI method relies on strict adherence to sampling protocols usually established during an orientation program. An orientation survey is normally conducted prior to the full-blown exploration survey. The orientation comprises a series of hand dug pits established over a known mineralized target, geophysical anomaly or a unique lithology. The sample pit is 40 cm deep and exposes 40 cm of inorganic soil. Organic soil (peat or humus) is not recommended for sampling. A series of four samples are collected at 10 cm intervals below the organic/inorganic soil contact. Analysis of these samples using MMI extraction will determine at what depth the optimum base and/or trace element signature can be isolated. Geochemical data resulting from MMI analysis of improperly collected soils cannot be

ameliorated with univariate and/or multivariate statistical and/or graphical solutions. Samples analyzed using the MMI methodology require no preparation subsequent to collection and are shipped to Toronto (SGS Minerals Services Laboratories) and analyzed. The method targets recently arrived "mobile metal ions" that have traveled from buried/blind mineralized sources at depth and migrated vertically to surface. The method is effectively substrate independent and analyses are presented at parts per billion or sub-parts per billion concentrations. Exceptions are AI, Ca, Fe and Mg, which are quoted in ppm. Since the MMI-M extraction was utilized for the MMI surveys there are a wide range of metals reported including precious and base metals and related or "pathfinder" elements as well as lithologically-sensitive metals. Quality assurance, quality control, analytical blanks and standards ensure analytical data is both accurate and precise. The addition of new instrumentation, including an Elan DICP-MS to the SGS laboratory, permits the measurement of low-level Cr to 1 ppb, a distinct advantage that allows the differentiation between a Ni signature from a mafic or ultramafic lithology and a Ni signature from Ni sulphide mineralization.

# DATA TREATMENT

Analytical data from the Long property was examined visually for analyses less than the lower limit of detection (<LLD) for ICP-MS. Data <LLD were replaced with a value ½ of the LLD for statistical calculations and graphical representation. The 25th percentile for these data was determined using the software program SYSTAT (V13) and the arithmetic mean of the lower quartile used to normalize all analyses. The normalized data represent "response ratios" which were utilized in subsequent plots. Zeros resulting from this calculation are replaced with "1". Response ratios are a simple way to compare MMI data collected from different grids, areas and environments from year to year. This normalized approach also significantly removes or "smoothes" analytical variability due to inconsistent dissolution or instrument instability.

Some elements within the Long property dataset were excluded from statistical assessment due to the significant number of samples with values at or <LLD. These included the elements As, Bi, Cr, Hg, In, Pd, Pt, Sn, Ta, Tb, Te and W which are at or below the lower limit of determination or have very little range in concentration to be useful for interpretation purposes. Peat soils were not sampled; organic soils do not respond well, if at all to MMI partial extraction.

## DATA PRESENTATION

Analytical MMI-M data from the survey is described and presented in a number of ways: (i) as histograms, (ii) as Tukey Box plots, (iii) as Spearman Rank correlation coefficient matrices, and (iv) as two-dimensional bubble plots for elements deemed to be useful indicators of signatures related to potential mineralized zones. These plots include both commodity and lithologically-sensitive elements and are inserted in the report accompanied by a geochemical narrative. Plots were produced with IOGAS geochemical software. Bubble plots for Grid A and Grid B are plotted separately for ease of interpretation.

# DATA DESCRIPTION

The 25th percentiles and backgrounds used for the calculation of response ratios for the Long property soil samples are presented in Appendix 2. The dataset is marked by a number of elements that have numerous samples at or below the lower limit of determination (LLD). These include the elements As, Bi, Cr, Hg, In, Pd, Pt, Sn, Ta, Tb, Te and W which are at or below the lower limit of determination or have very little range in concentration to be useful for interpretation purposes. These elements are typically less mobile than Cu or Zn and their presence in measurable quantities in a small number of samples is testament to this. The high percentage of samples with Pd, Pt, Sn and Ta contents <LLD in this survey is not surprising given their very low mobility in the surficial/secondary environment. In this regard, any MMI-M analysis for Pd and/or Pt that is >LLD should be reviewed with care for its overall significance in the survey and be field checked for possible association with platinum group metal geological environments. The absence of coincident, elevated Cd responses with high-contrast Zn response ratios in some samples can be cause for concern. Generally, coincident Zn-Cd responses are interpreted to represent bedrock-hosted sphalerite mineralization. The absence of Cd is suggestive of the possible derivation of Zn from anthropogenic contamination from cultural and/or industrial activity or from the inclusion of well humified organic material in the sample. This can result in what has been described as a "false" geochemical anomaly.

For purposes of interpretation of the MMI-M data, element responses are described as follows: 1-10RR (very low-contrast and generally insignificant); 11-20RR (low-contrast); 21-50RR (moderate-contrast) and >50RR (high-contrast). These are arbitrary divisions based on observations from numerous MMI surveys undertaken in similar landscape environments however this approach is not necessarily the only method of data interpretation.

# **Histograms-Distribution of the Elements**

The distribution of select commodity and lithologically-sensitive elements are presented in histograms below. The commonality amongst this group is the positively skewed nature of many elements presented (**Figure 5-i**, -**ii**).

For the commodity elements such as Ag, Cd, Co and Cu the distributions are trending towards a more normal distribution but with long skewed tails marked by much higher concentrations. The elements As, Mo, Ni, Sb, Tl and Zn have more positively skewed distributions due to the large number of samples that report in the very low parts per billion concentration range. The presence of a long positively skewed distribution is strongly suggestive of an anomalous or elevated data population and that this population may be related to mineralization.

For lithologically-sensitive elements similar distributions are apparent (Figure 5-ii). Europium, Yb and Ba are more normally distributed but with a positively skewed distribution. Cerium, Fe, Nb and P are primarily

positively skewed with the long tail of elevated responses suggesting involvement in a process associated with mineralization and alteration of enclosing host rocks.

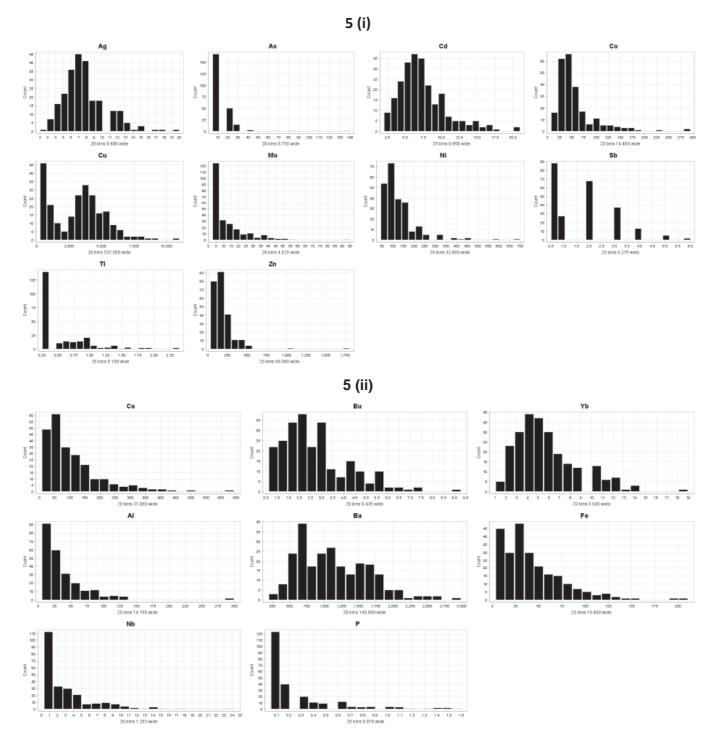
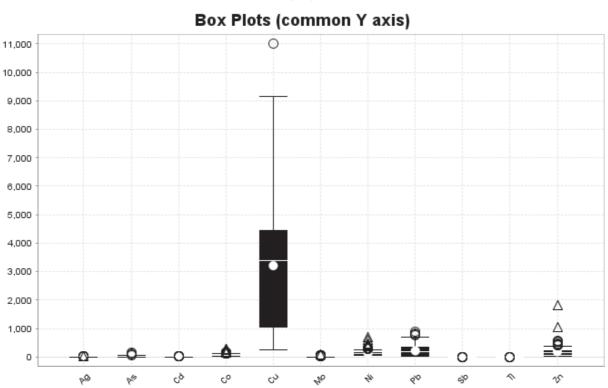


Figure 5. Histograms for (i) commodity and (ii) lithologically-sensitive elements, Long property MMI.

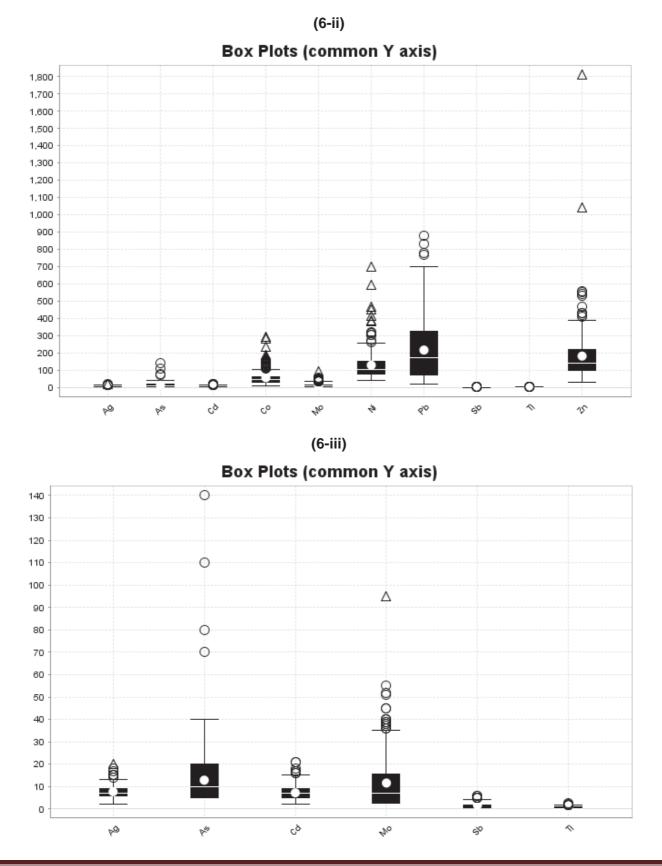
# **Tukey Box Plots**

Another method of examining commodity elements with potential to form anomalous responses based on their variance or variability of geochemical data is a Tukey box plot using a common Y axis for the elements of interest (Figure 6i through 6iv). The Box plots below illustrate the range in concentration for the same suite of elements in the histograms and suggests that the elements can be ranked in the following order on the basis of their ranges in concentration and their potential as anomaly-forming elements:

Cu>Zn>Pb>Ni>Co>As>Mo>Cd>Ag>Sb>Tl. The elements with the greatest range in concentration are most likely to be the anomaly-forming elements. Based on these data the area surveyed with MMI-M Technology on the Long property is likely to be a base metal exploration target.



(6-i)



China Metallurgical Exploration Corporation Long Property 2014 MMI Surveys

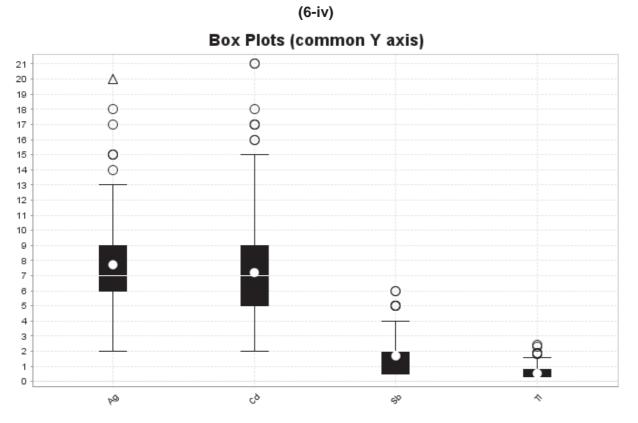


Figure 6. Tukey Box plots for all elements of interest in the Long property MMI survey.

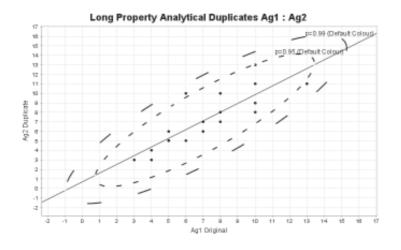
# LONG PROPERTY MMI QUALITY CONTROL "QC"

# Analytical (Figure 7) and Field Duplicates (Figure 8)

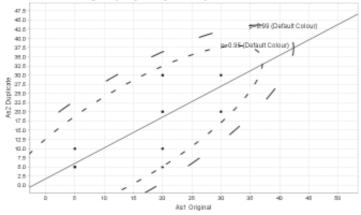
The reproducibility of MMI-M analyses in the 2014 Long property dataset was monitored with the use of analytical and field duplicates. The analytical duplicates are samples that are selected every 12<sup>th</sup> sample in the batch and re-analyzed under the same conditions as the remainder of the unknown soil samples. Field duplicates are duplicate samples collected in the field in exactly the same manner as the original sample is collected. This duplicate pair permits assessment of analytical reproducibility and the ability to reproduce a response in the field. The duplicate pairs, which illustrate the analytical reproducibility, are given in Appendix 2.

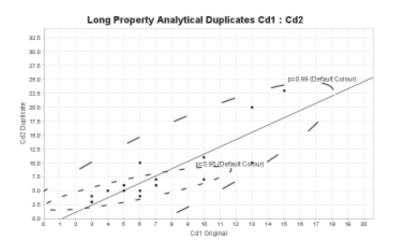
Review of these data indicates good analytical reproducibility over a broad range of concentration for most commodity elements of interest (Figure 7). The results for the commodity and lithologically-sensitive elements indicate excellent reproducibility across a wide range of concentration and this same quality of analytical data is observed for the majority of the MMI-M element suite. Some variability is noted for the elements near the LLD and at higher concentration levels. Occasionally there are duplicate pairs that exhibit variability for select elements but these sample pairs are not indicative of the majority of results for the remainder of the sample pairs. Simple linear regression for analytical duplicate pairs is given below for the elements of interest. For

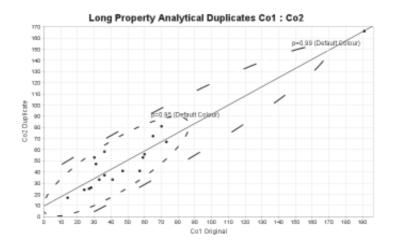
these plots simple linear regression is based upon concentration and not response ratios. The results for Au in both analytical and field duplicates are considered non-diagnostic since the overwhelming majority of analyses from duplicate pairs fall below the lower limit of detection. Overall, analytical reproducibility for the Long property MMI-M survey is interpreted to be good and not a hindrance to the recognition of anomalous responses at all concentration/contrast levels.

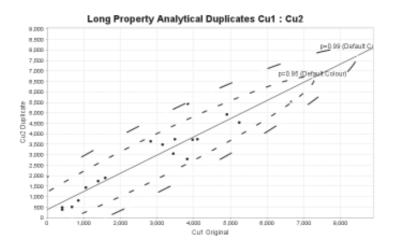




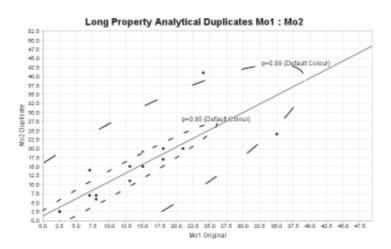




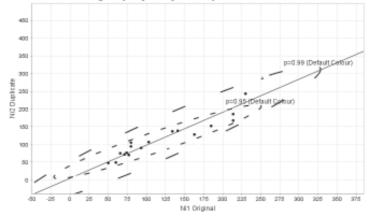


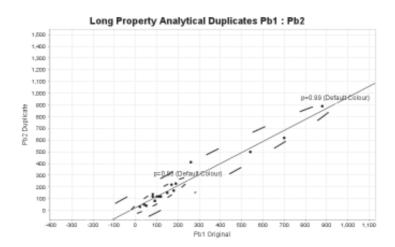


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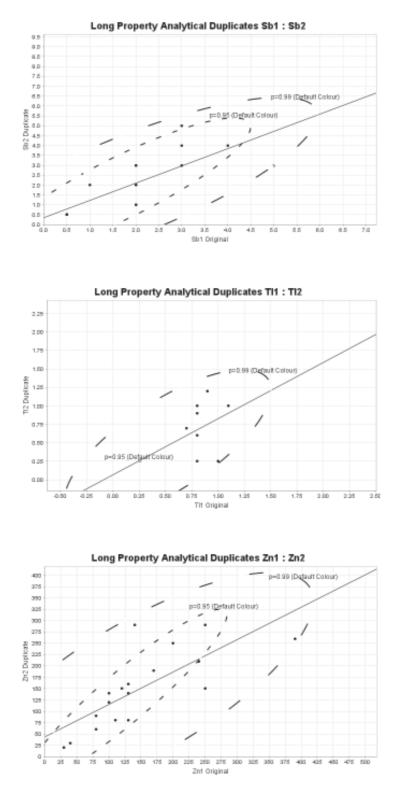
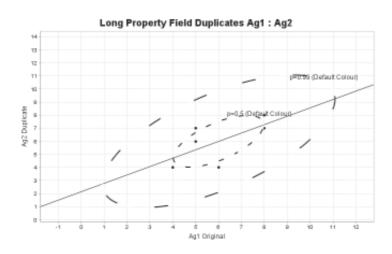
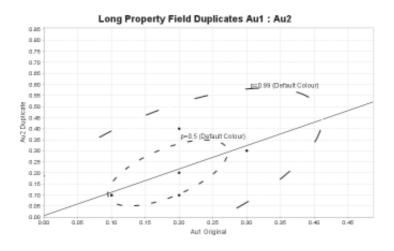
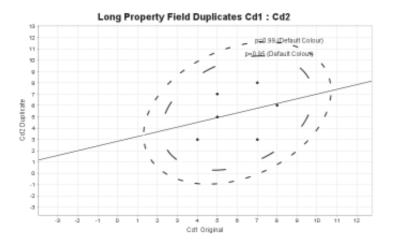
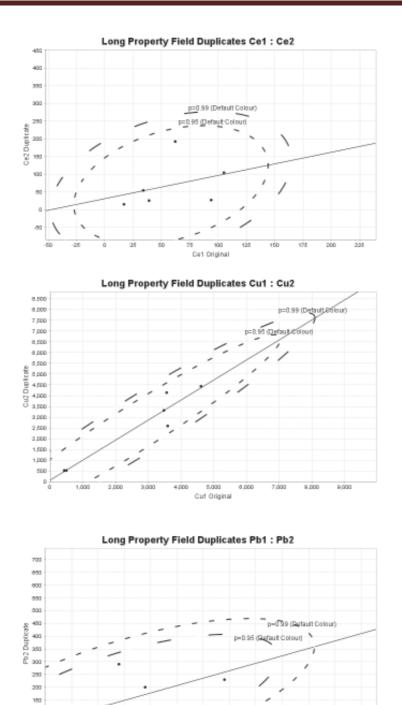


Figure 7. Simple linear regression plots for elements of interest in analytical duplicates, Long property MMI Project.









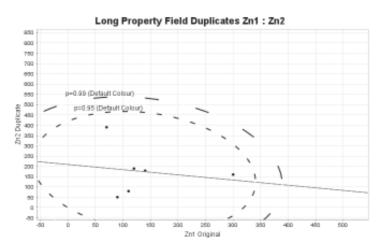
Pb1 Original

500 550 600

100 90 0

50

100 150 200 250 300 350 400



# Figure 8. Simple linear regression plots for elements of interest in field duplicates, Long property MMI Project.

#### Internal Reference Materials and the Analytical Blank

The inclusion of standard reference materials MMISRM18, MMISRM19 and AMISO169 provides a check on accuracy and reproducibility of the unknown samples. Results for the replicate analyses of these standards are presented in Appendix 2.Results indicate good reproducibility for most MMI elements that have concentrations above the lower limit of determination. There is greater variability in analyses that are at or near the LLD or at strongly elevated concentrations.

Minimal contaminants are recognized in replicate analyses of the analytical blank with no serious laboratorybased contamination noted for commodity elements (Table 2).

ANALYTE	Au	Ва	Cu	К	La	Mn	Nd	Th	Ti	U	Zr
LLD	0.1	10	10	0.1	1	10	1	0.5	3	1	5
UNITS	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb	ppb	ppb
BLANK	<0.1	<10	<10	<0.1	1	<10	<1	<0.5	<3	<1	<5
BLANK	<0.1	<10	<10	<0.1	<1	10	<1	<0.5	<3	<1	<5
BLANK	<0.1	<10	<10	<0.1	<1	<10	<1	<0.5	<3	<1	<5
BLANK	0.1	<10	<10	<0.1	1	<10	1	0.5	<3	<1	<5
BLANK	<0.1	<10	<10	<0.1	<1	10	1	0.5	<3	1	<5
BLANK	<0.1	10	<10	<0.1	<1	10	<1	<0.5	4	<1	<5
BLANK	<0.1	<10	<10	<0.1	<1	10	<1	<0.5	<3	<1	<5
BLANK	<0.1	<10	<10	0.1	<1	10	1	<0.5	<3	<1	6
BLANK	<0.1	<10	10	<0.1	<1	10	<1	<0.5	3	<1	<5
BLANK	<0.1	<10	10	<0.1	<1	10	<1	<0.5	3	<1	<5
BLANK	<0.1	<10	<10	<0.1	<1	40	<1	<0.5	<3	<1	<5

Table 2. Replicate Analy	vses of the Analyti	ical Blank, Analy	ses by GF_MMI_M.
Tuble El Replicate Anal	yses of the Analyti	icui biuritti Anury	

#### INTERELEMENT ASSOCIATIONS

#### **Spearman Rank Correlation Coefficient Matrix**

The results of the Spearman Rank Correlation Coefficient Matrix review of Long property MMI data are summarized in Table 3 below. The entire Matrix is presented in Appendix 2 and is colour-coded to assist interpretation. The most significant correlations for commodity elements include Cu-Mo-Pb-Sb and Ni-Cd-Co-Zn. These are typical metal assemblages for a base metal mineralized zone. Correlations between the various commodity elements include the following:

- (i) Cu-Fe-Ga-K-Li-Rb-Sc-Zr-Yb suggestive of an Fe-rich mafic lithologic association for Cu;
- (ii) Pb-Rb-Sc-Sm-Pr-Th-Ti-U-Y-Yb-Zr suggestive of an Fe-rich mafic lithologic association for Pb;
- (iii) Ag-Al-Li suggesting a mafic lithologic association for Ag; and
- (iv) Sb-Sc-Th-Ti-Yb-Zr suggesting a likely mafic association for Sb.

The rare earths are strongly inter-correlated (>0.800) as should be expected given good analyses because of their geochemical affinities. The elevated correlations between the REE can be used as an indirect assessment of analytical quality in that good quality analytical work will be reflected by strong correlations between the individual REE. The lack of any significant correlation in the Long property dataset between Au and Ag (0.061) and Zn with Cd (0.206) is suggestive of a lack of Zn and Au mineralization in the survey area. Of particular interest is the association and very high correlation coefficient "r" between Fe-Ti-Nb-P-Zr-Sc-Rb-Li-K (Table 4) which suggests the presence of a mafic magnetite-bearing sedimentary rock, likely of chemical sedimentary origin.

# Table 3. Summary of significant commodity-lithologically-sensitive element doublets, Long property MMI survey.

DOUBLET	"r"	DOUBLET	"r"	DOUBLET	"r"	DOUBLET	"r"
Ag With		Cu With		Pb With		Sb With	
AI	0.496	Fe	0.641	Rb	0.784	Sc	0.642
Li	0.517	Ga	0.639	Sc	0.791	Th	0.609
		К	0.569	Sm	0.624	Ti	0.662
Ni With		Li	0.512	Pr	0.617	Yb	0.525
Cd	0.63	Rb	0.675	Th	0.77	Zr	0.726
Co	0.712	Sc	0.618	Ti	0.716		
Zn	0.502	Zr	0.608	U	0.512		
		Yb	0.534	Y	0.664		
				Yb	0.724		
		Мо	0.6	Zr	0.771		

	Pb	0.83		
	Sb	0.751		

#### Table 4. Doublets with Fe, Long property MMI survey.

Doublet	"r"
Fe With	
Ti	0.881
Nb	0.885
Р	0.743
Zr	0.911
Sc	0.903
Rb	0.729
Li	0.622
K	0.602

#### LONG PROPERTY MMI RESPONSES

The observations and interpretation document the variation in concentration of elements determined by MMI extraction in the 2014 Long property survey. The survey area is divided into two areas for ease/simplicity of data interrogation with bubble plots. These are Grid A on the west and Grid B on the east. These two areas are illustrated in Figure 9 below.

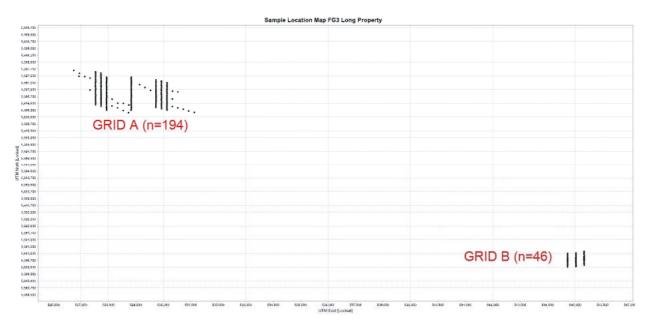


Figure 9: Location of 2014 MMI soil sample sites for grids A and B on target FG3 of the Long property.

#### **Preliminary General Observations**

Visual examination of tabled non-transformed MMI data indicates the following for both Grid areas:

- 1. Low concentrations of Au and Cd are noted.
- 2. Localized, weakly elevated Ag and Co are present in the dataset.
- 3. Highly variable Cu concentrations ranging between 400 ppb and 11,000 ppb are documented and these responses are associated with elevated Mo, Pb and Ba. This is a **bona fide** base metal anomaly. Sample sites adjacent to the 11,000 ppb response are also elevated indicating the 11,000 ppb Cu response is not a single sample anomaly. Graphical depiction will elucidate this response.
- 4. Nickel also exhibits a wide range in concentration from 50 ppb to 594 ppb and is suggestive of either a lithologic or a nickel sulphide signature. There is also a wide range in concentration for Ti (12 ppb-2340 ppb) suggesting a strong lithologic response is present in the Nakina/FG3 survey area.
- 5. Localized low-contrast Zn responses are also present in the dataset but these tend to be single sample responses.
- 6. Pd and Pt are consistently <LLD.

## **Detailed Observations: Base Metal and Related Element Responses**

## GRID A (n=194; Figure 10)

The distribution of samples collected from Grid A are depicted in Figure 10. The pattern is one of grid sampling and of samples collected from specific geophysical picks. Bubble plots illustrating commodity element responses are given in Figure 11 and for lithology-related elements in Figure 12.

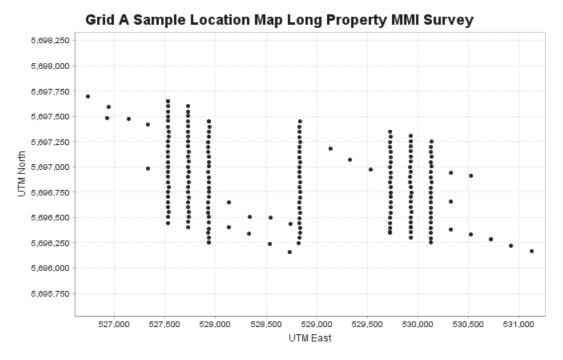
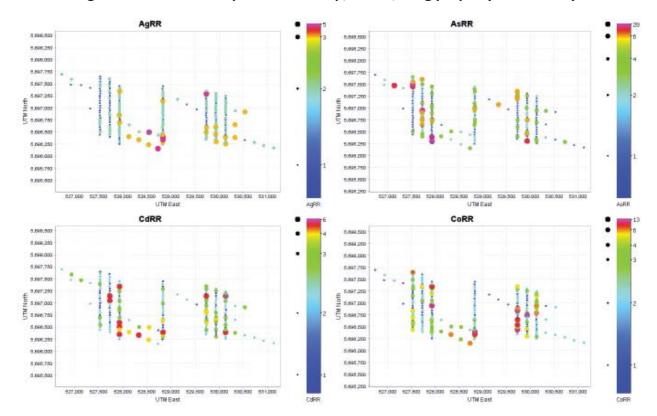


Figure 10. Detailed sample location map, Grid A, Long property MMI survey.



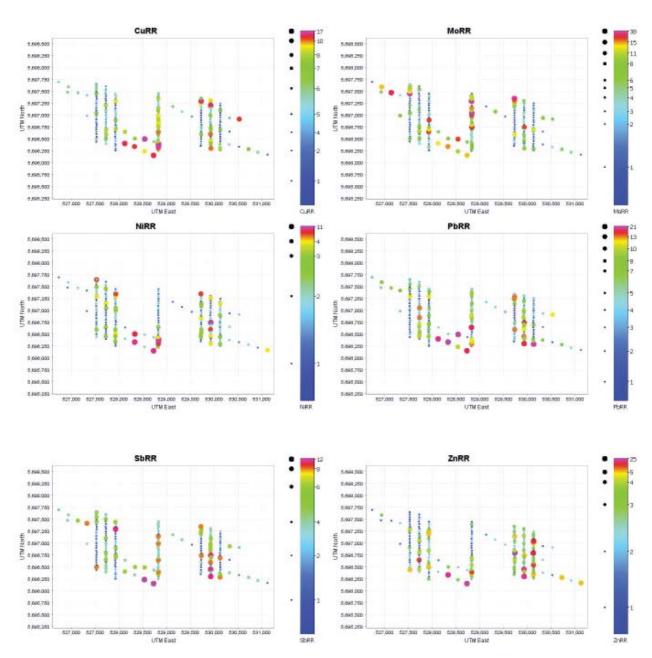
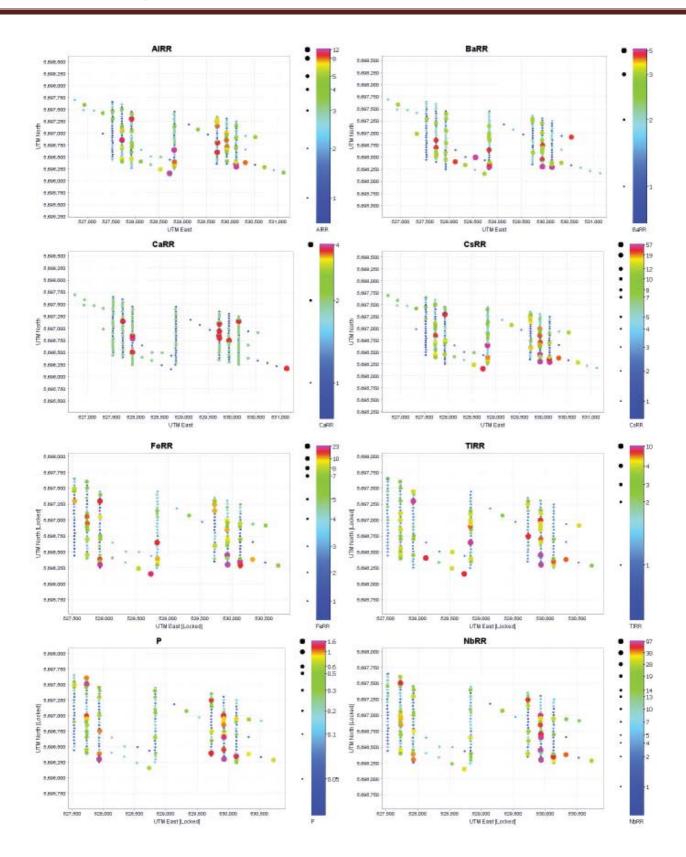
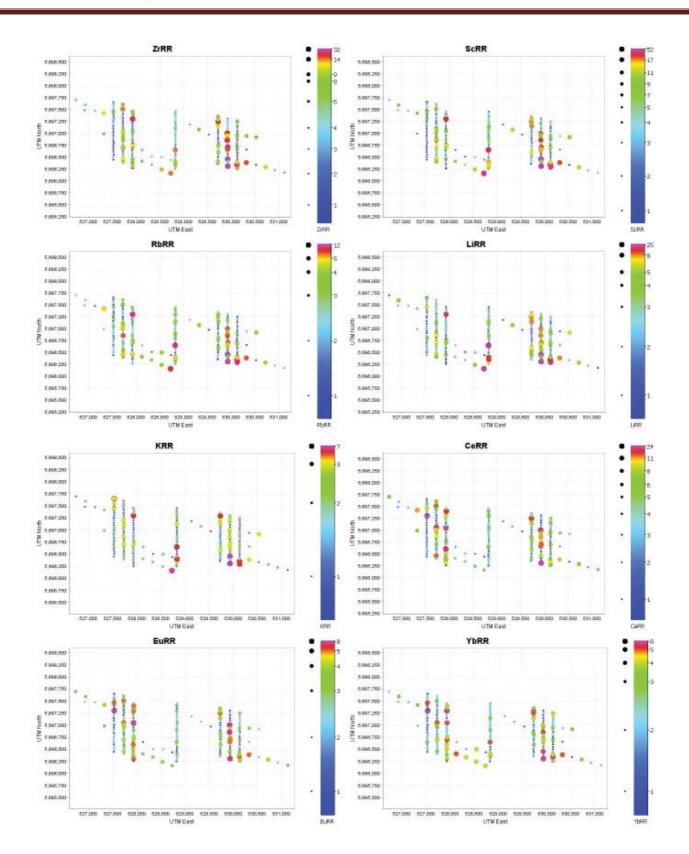


Figure 11: Commodity Elements-Grid A





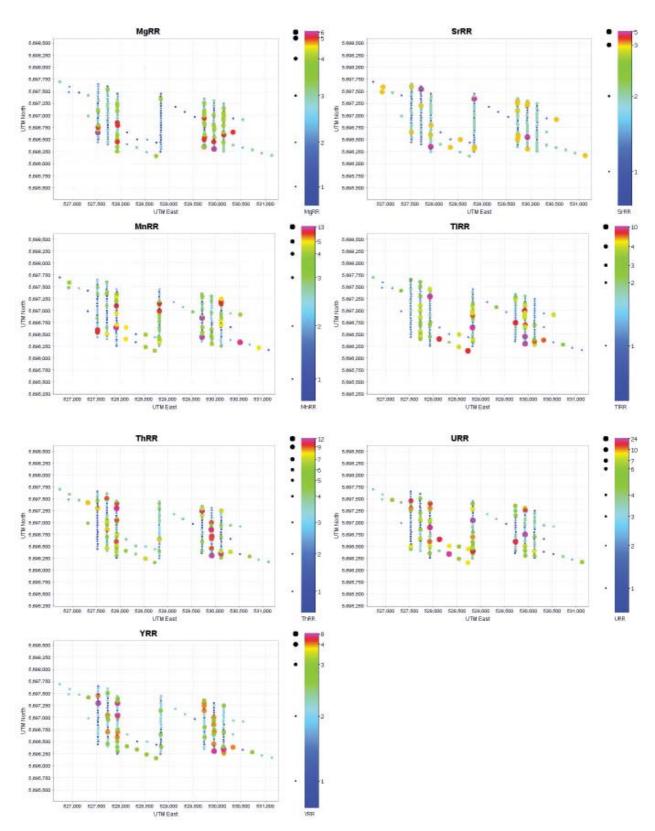


Figure 12: Lithologically-Sensitive Elements-Grid A

China Metallurgical Exploration Corporation Long Property 2014 MMI Surveys

#### **OBSERVATIONS**

# Commodity and Lithologic Element Responses – Grid A

A review of bubble plots in Figures 11 and 12 indicate a well-defined multi-element and multi-sample anomaly is present on Grid A. This anomaly is characterized by moderate- to low-contrast responses for Cu, Pb, Zn, Ni and Sb and its location is indicated in Figure 13. The anomaly may be open to the south and appears to be coincident with a linear two-component lithologic anomaly (Figure 14). The first of these two components consists of elevated Fe, Ti, Nb, Zr, Sc, Rb, Th, Mg, Ti, Ce, Eu and Yb, is not coincident with the commodity element anomaly occurring to the east. This anomaly is interpreted as an Fe-rich, magnetite-bearing mafic chemical sedimentary rock or iron formation. The second component overlaps with the first and comprises elevated Ba, Cs, Li and K and may be a variant of the first component. The second component anomaly envelops the commodity element anomaly.

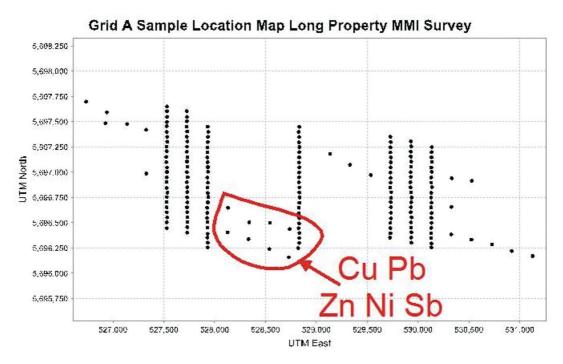


Figure 13. Summary of commodity element responses, Grid A.

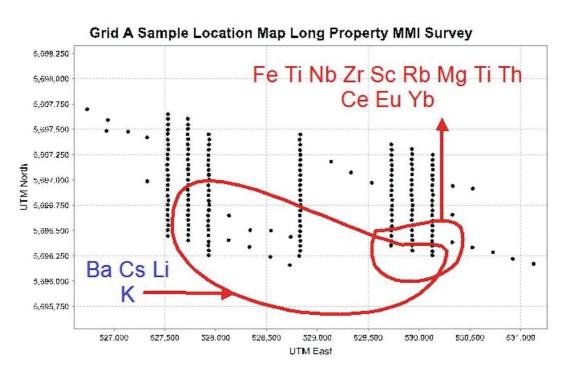
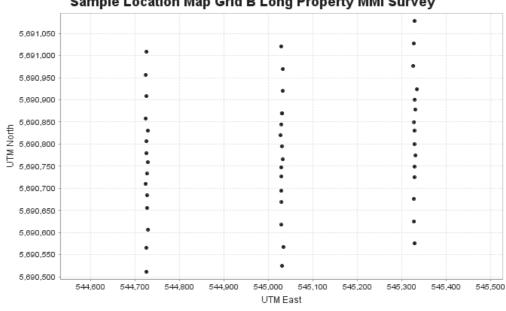


Figure 14. Summary of lithologically-sensitive element responses, Grid A.

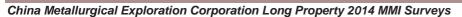
# GRID B (n=46; Figure 15)

The distribution of samples collected from Grid B is depicted in Figure 15. The pattern is one of three lines forming a grid. Bubble plots illustrating commodity element responses are given in Figure 16 and for lithology-related elements in Figure 17.

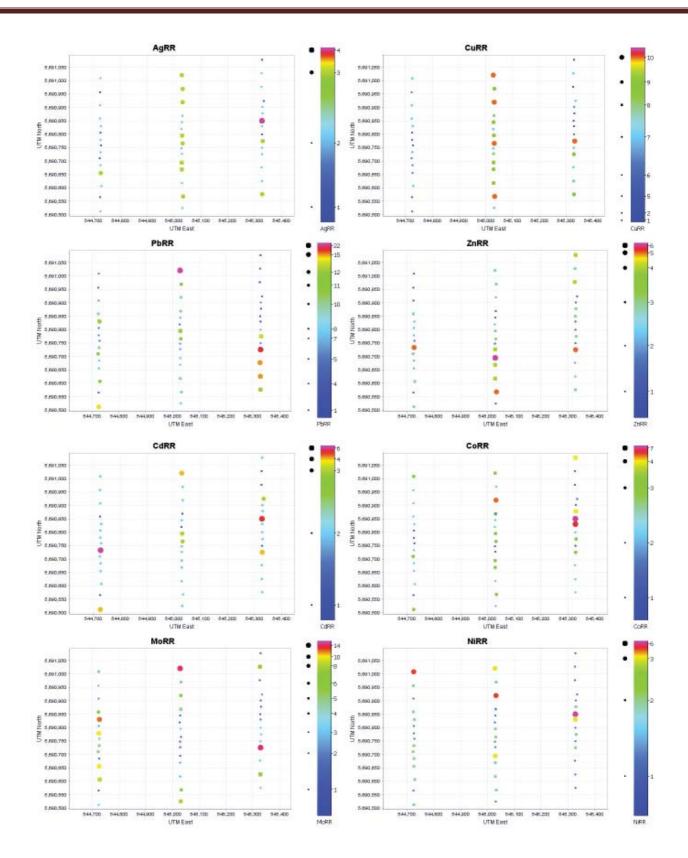


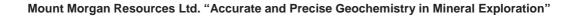


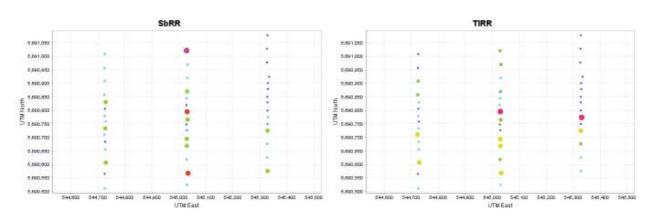


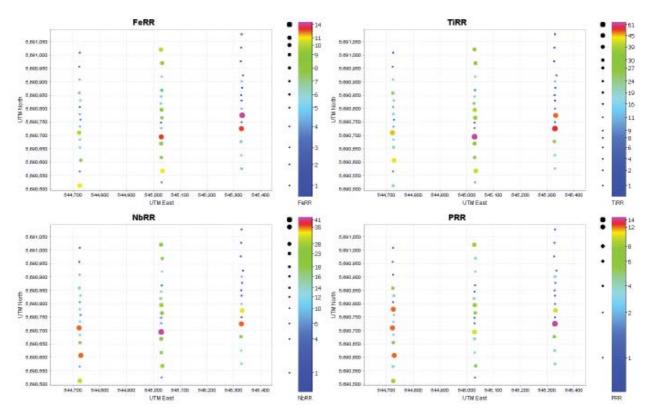












# Figure 16. Commodity Elements-Grid B



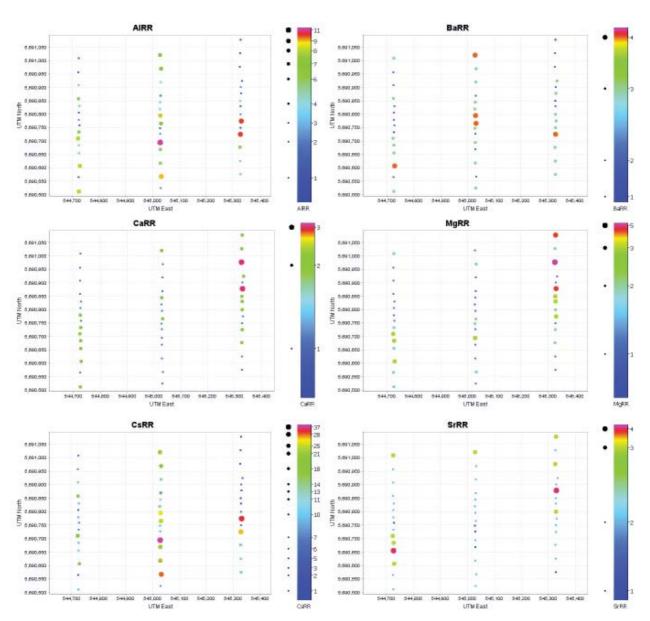


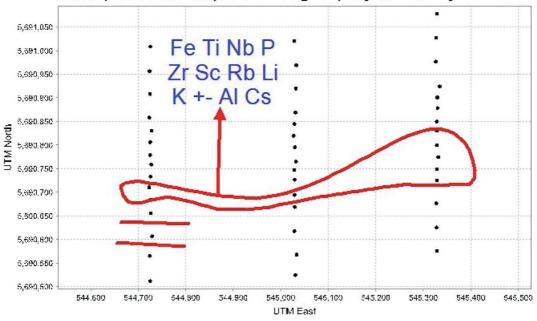
Figure 17: Lithologically-Sensitive Elements-Grid B

# Commodity and Lithologic Element Responses – Grid B

Unfortunately there were no significant commodity element responses observed on Grid B. Allcommodity element responses are very low-contrast with the exception of Pb which forms a single line anomaly consisting of three adjacent samples with maximium RR of 22 times background. There are no responses that might be interpreted as forming a **bona fide** anomaly or indicating a vector to mineralization.

Lithologically-sensitive element responses define a linear east-west-trending multi-element and multi-sample anomaly based on the element suite Fe, Ti, Nb, P, Zr, Sc, Rb, Li, K plus or minus Al and Cs. This anomaly is

interpreted to represent a magnetite-bearing chemical sedimentary lithology with an overall mafic bulk chemical composition. It may be interpreted as an oxide facies iron formation (Figure 18).



Sample Location Map Grid B Long Property MMI Survey

Figure 18. Summary of lithologically-sensitive element responses, Grid B.

### DISCUSSION

# Sample Collection in the Long Property MMI Survey

Soil samples collected from the Long property MMI survey targeted the 10-20 cm sample depth beneath the zero datum or the point at which soil formation is initiated. This sample location in the soil profile was collected from hand-dug pits. The depth of the sample location was consistently maintained and no organic soil samples were collected. This provided an excellent sample set for MMI-M partial extraction analysis.

# Data Quality

Simple linear regression, Tukey box plots coupled with a visual assessment of quality control data from analytical and field duplicates, replicate analyses of the analytical blank and MMI standard reference materials indicate the analytical data is both accurate and precise. There are some reproducibility problems with data at or near the lower limit of determination and possibly at high responses, however for most elements the partial MMI-M extraction releases sufficient concentrations of metals from the surfaces of soil particles to be easily measured with ICP-MS instrumentation. The variability of some elements suggests that anomalous concentrations of base metals are present in the MMI survey area.

# Anomalous Responses

Base and precious metal mineralization is the focus of exploration on the Long property and to this end MMI-M surveys were undertaken on Grids A and B. These surveys have been based on the collection of a soil sample between 10 and 20 cm below the zero datum. Based on this approach a multi-element and multisample commodity and lithologic anomaly has been defined on Grid A. There appears to be no significant responses on Grid B in terms of commodity elements however a lesser lithologic anomaly has been defined.

## CONCLUSIONS

The following conclusions are evident from the Long property MMI surveys:

- 1. There is a multi-sample, linear east-trending Cu, Pb, Zn, Ni and Sb commodity element anomaly present on Grid A. It is developed, in part, near the southern extremity of sampling and for this reason may be open to the south.
- 2. The nature and chemical makeup of the Grid A MMI anomaly suggests a zone of base metal mineralization with lesser precious metal (Au) content. The nature of the mineralization could be disseminated to massive.
- 3. The Grid A base metal anomaly is encapsulated by what appears to be a two-component lithology consisting of a very localized zone of Ba-Cs-Li-K enrichment that occurs at the east end of a much larger Fe-Ti-Nb-Zr-Sc-Rb-Mg-Ti-Th-Ce-Eu-Yb anomaly. The lithology that hosts the base metal anomaly is

interpreted to be an Fe-rich magnetite-bearing chemical sedimentary rock with an overall mafic bulk chemical composition. Depending on magnetite abundance it may be an oxide facies iron formation.

- 4. Grid B is marked by the absence of any significant base or precious metal anomalies. Single sample responses typify the grid at low-contrast response ratios.
- 5. A linear east-west-trending lithologic anomaly is present on Grid B. It consists of Fe, Ti, Nb, P, Zr, Sc, Rb, Li, K +- Al and Cs. These elements are very similar to those that characterize the Grid A anomaly and may be a continuation of the same lithologic unit. This unit is also interpreted to be an Fe-rich magnetite-bearing chemical sedimentary rock with an overall mafic bulk chemical composition.
- 6. The MMI-M partial extraction of representative unconsolidated sediment present in the Long property survey area is a viable exploration approach to base and precious metal exploration in the survey area.

#### RECOMMENDATIONS

The following recommendations are made with respect to this MMI-M survey at the Long property of CMEC:

- 1. An MMI anomaly does not indicate the depth to the source mineralization. Therefore it is important that the depth to the source mineralization be estimated by modeling any geophysical surveys that have been done on the grid.
- 2. The Grid A base metal anomaly should be further assessed by modeling the geophysical response to determine the potential dimensions of the causative conductive source. Maxwell modeling is one approach to assess the physical dimensions of the MMI and initial geophysical response.
- 3. Because the MMI responses for lithology on both Grid A and B is interpreted as near-iron formation or oxide facies iron formation a detailed review of magnetic survey results on the two grid areas should be undertaken.
- 4. Future MMI surveys in the Long property area should be based on sampling and analytical protocols established for the current survey.

#### **CERTIFICATE of AUTHOR**

I, Mark A.F. Fedikow, HB.Sc., M.Sc., Ph.D., P.Eng., P.Geo., C.P.G. do hereby certify that:

- I am currently a self-employed Consulting Geologist/Geochemist with a field office at: 50 Dobals Road North, Lac du Bonnet, Manitoba, Canada R0E 1A0.
- I graduated with a degree in Honors Geology (B.Sc.) from the University of Windsor (Windsor, Ont.) in 1975. In addition, I earned a M.Sc. in geophysics and geochemistry from the University of Windsor and a Doctor of Philosophy (Ph.D.) in exploration geochemistry from the School of Applied Geology, University of New South Wales (Sydney) in 1982.
- 3. I am a Member of the Association of Professional Engineers and Geoscientists of Manitoba. I am also a Fellow of the Association of Exploration (Applied) Geochemists, and a Member of the Prospectors and Developers Association of Canada. I am registered as a Professional Engineer (P.Eng.) and a Professional Geologist (P.Eng.) by the Association of Professional Engineers and Geoscientists of Manitoba (APEGM). I am registered as a Certified Professional Geologist (C.P.G.) by the American Association of Professional geologists (Westminster, Colorado, U.S.A.).
- 4. I have worked as a geologist for a total of thirty-nine years since my graduation from university; as a graduate student, as an employee of major and junior mining companies, the Manitoba Geological Survey and as an independent consultant.
- 5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
- 6. I am responsible for the preparation of the technical report titled "Results of Mobile Metal Ion (MMI-M) Soil Geochemical Surveys on the Long Property of China Metallurgical Exploration Corporation, Ontario".
- 7. I have not had prior involvement with the property that is the subject of the Technical Report.
- 8. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.
- 9. I consent to the filing of the Technical Report with any stock exchanges or other regulatory authority and any publication by them, including electronic publication in the public company files on the web-sites accessible by the public, of the Technical Report.

Dated this 2nd Day of January, 2015.

Original Signed by Mark Fedikow

Mark A.F. Fedikow, HB.Sc., M.Sc., Ph.D., P. Eng. P.Geo. Consulting Geologist and Geochemist Mount Morgan Resources Ltd. 50 Dobals Road North Lac du Bonnet, Manitoba R0E 1A0 Tel/Fax: 204-284-6869 Cell: 204-998-0271 Email: <u>mfedikow@shaw.ca</u>