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**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 7694**

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Drainage Geochemistry Study,
southwest Mackenzie Mountains, Northwest Territories
GEM2 Mackenzie Project**

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Foreword

The Geo-mapping for Energy and Minerals (GEM) program is laying the foundation for sustainable economic development in the North. The Program provides modern public geoscience that will set the stage for long-term decision making related to investment in responsible resource development. Geoscience knowledge produced by GEM supports evidence-based exploration for new energy and mineral resources and enables northern communities to make informed decisions about their land, economy and society. Building upon the success of its first five-years, GEM has been renewed until 2020 to continue producing new, publically available, regional-scale geoscience knowledge in Canada's North.

During the summer 2014, GEM's new research program has been launched with 14 field activities that include geological, geochemical and geophysical surveying. These activities have been undertaken in collaboration with provincial and territorial governments, northerners and their institutions, academia and the private sector. GEM will continue to work with these key collaborators as the program advances.

Report of activities for the March Fault - Flat River Drainage Geochemistry Study, southwest Mackenzie Mountains, Northwest Territories; GEM 2 Mackenzie Project

Introduction

A drainage geochemical study was initiated under the auspices of the GEM2 *Mackenzie Project* in the vicinity, of the Northwest Territories portion, of the March Fault (Fig. 1). The fieldwork component of this study was carried out in July 2014, as part of a larger drainage sampling program managed by the Northwest Territories Geoscience Office (NTGO). Field activities were based out of the Cantung minesite in Tungsten, NT.

The NNW oriented March Fault, located in the western NWT in proximity to the Cantung Mine and Howard's Pass deposit, spans over 50 km of the study area. It has been hypothesised that this fault is a major deep-seated, long-lived structure that has played a significant role in numerous mineralizing events.

Numerous mineral occurrences representing several different deposit types are found within the study area. Sediment hosted Zn-Pb (Howard's Pass), Tungsten Skarn (Cantung, Lened), Rare-Earth Element (Little Nahanni Pegmatite Group) are all significant examples of substantial mineralisation located within the study area.

To date, however there have been no investigations using the mineralogy and chemistry data of indicator minerals derived from drainage sediments to determine if mineral enriched fluids have resulted in deposition of potentially economic mineral deposits in proximity to the March Fault.

The goal of this activity is to better understand the role of the March Fault, as a potential fluid conduit in mineralising events, by utilising drainage geochemistry –specifically, studying the mineralogy and chemistry of recovered Indicator Minerals (IM) from Heavy Mineral Concentrate (HMC) samples. This study aims to address the GEM2 Mackenzie Project scientific question no 8: *"What are the specific gaps to be addressed regarding the controls on fluid conduits, past and present to support exploration"*.

Methodology

In conjunction with a stream sediment and water survey conducted by NTGO, the fieldwork component of this study was carried out. Stream silt sediment, bulk sediment (for the HMC and IM fraction) and stream water samples were collected from 199 sites, resulting in 211, 120 and 211 samples respectively. Figure 2 illustrates the field equipment used and samples collected at a typical stream bulk sediment and water site.

Samples collected as part of this activity followed the GSC's former National Geochemical Reconnaissance (NGR) programme's standard set of sample collection and analytical techniques, in order to ensure consistent and reliable results regardless of the area, date of the survey or the analytical laboratory used (Friske and Hornbrook, 1991).

Results

At the time of publication, all samples collected during the 2014 fieldwork have been submitted for sample processing and subsequent mineralogical and geochemical analyses. Preliminary analytical and

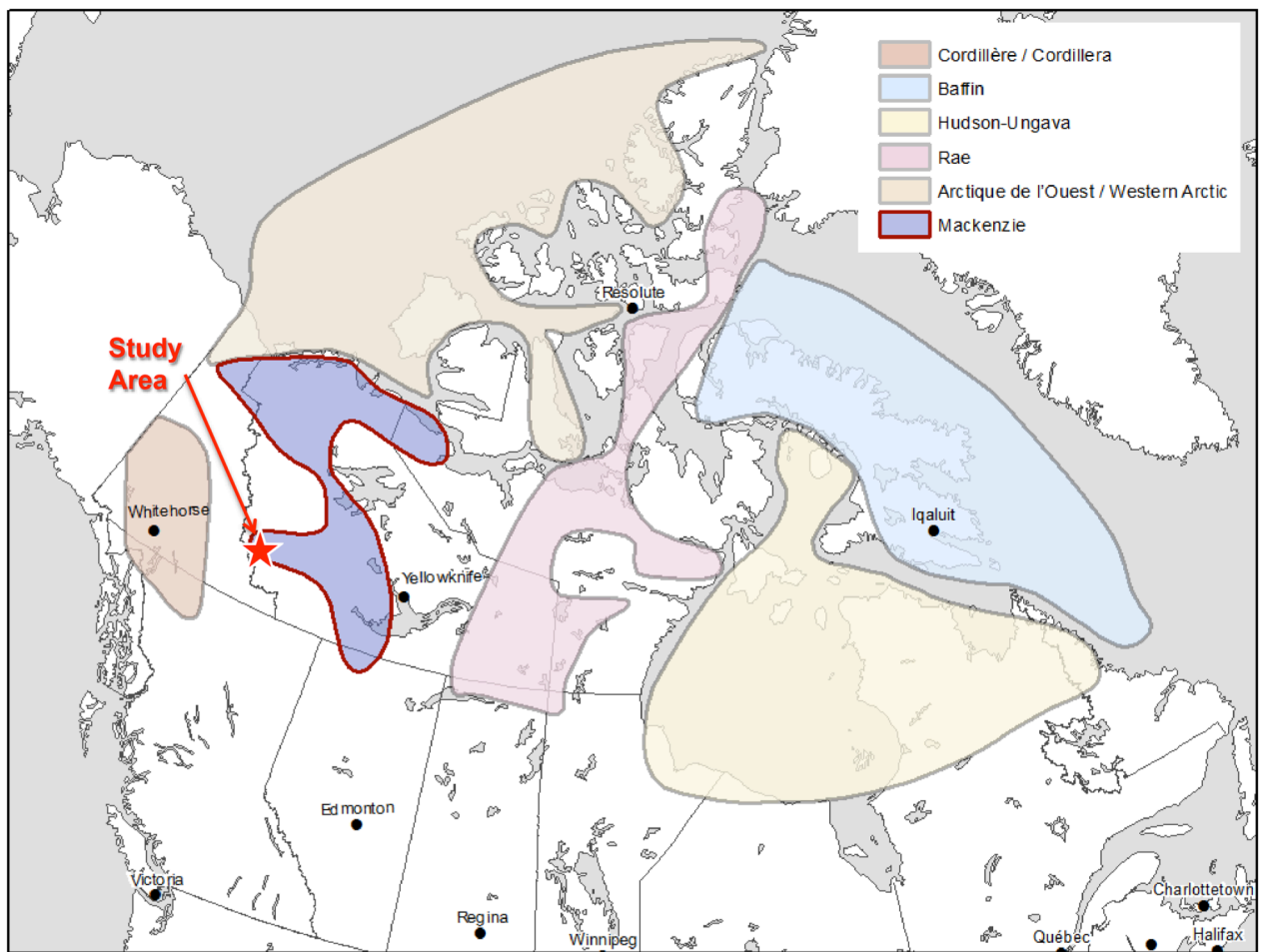


Figure 1. Map showing GEM2 Mackenzie Region, March Fault – Flat River Drainage Geochemical Study location marked with red star.

mineralogical data is not expected to begin arriving until late in 2014, with a complete dataset not expected until early 2015.



Figure 2: Field gear used and samples collected at a typical bulk stream sediment and water site.

1. two 60 ml water samples (filtered on site with 0.45 µm filter)
2. YSI Professional Plus multi-parameter water meter
3. silt-size stream sediment sample (~ 2kg wet)
4. #10 mesh (2mm) sieve
5. gold pan with weigh scale
6. steel shovel
7. bulk stream sediment (12+kg of ≤ 2 mm sediment)
8. #2 mesh (10mm) sieve
9. bucket with supplies (silt bags, bulk sediment bags, water bottles, ...)
10. bucket lined with pre-labeled sample bag (not yet stretched tightly about the bucket opening)

Conclusions

The field component of this study was successfully undertaken. Once the mineralogical and analytical data is complete, then data compilation, interrogation and interpretation will proceed.

Acknowledgments

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References

Friske, P.W.B. and Hornbrook, E.H.W., 1991. Canada's National Geochemical Reconnaissance programme: Transactions of the Institution of Mining and Metallurgy, London Section B; Volume 100, p. 47-56.