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TILL GEOCHEMISTRY DATA FOR THE CORMACK MAP AREA (NTS 12H/06), WESTERN NEWFOUNDLAND

S. Hashmi

Open File 012H/06/2332

**St. John's, Newfoundland
February, 2021**

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INTRODUCTION

A regional surficial geology mapping and till-sampling survey for the 2017 and 2018 field seasons (Figure 1) for the Cormack map area (NTS 12H/06) in western Newfoundland was completed. This data release presents the analytical results for till samples collected as well as summary notes on the samples. A total of 69 B-, C- and BC-horizon till samples were collected, primarily along roadcuts using truck, foot traverse, all-terrain vehicles (ATVs) and limited helicopter support; sampling spacing was 1 sample every 2 line-kilometres. Of these, 6 were follow up samples collected in 2018 in close proximity to samples that have elevated levels of Ni and U. Till samples were collected using a shovel and geological pick. Quality assurance measures in the field included thorough cleaning of sampling equipment between sample sites to reduce cross-contamination and written and photographic documentation at each site. A 2 to 3 kg till sample was collected for geochemical analyses, and field duplicates were collected every 12 to 15 sample sites. Larger till samples (10–15 kg) were also collected for heavy mineral separation; however, these samples have not, as yet, been analyzed.

METHODS

Till samples were submitted to the laboratory of the Geological Survey of Newfoundland and Labrador (GSNL) for preparation and analyses. The samples were dried and sieved to $-63\ \mu\text{m}$ (230 mesh) to recover the silt and clay fractions. Quality control in the lab consisted of insertion of lab duplicates to test analytical precision and the insertion of Canadian certified reference materials (CCRMs) to test analytical accuracy. The quality of the analyses has been verified prior to their release. Standard and duplicate data will be released with geochemical distribution maps at a later date.

Samples were submitted for the following analyses:

- 1) Four-acid (hydrochloric acid, hydrofluoric acid, nitric acid and perchloric acid) digestion followed by inductively coupled plasma-optical emission spectrometry (ICP-OES) to determine concentrations of 31 elements (Al, As, Ba, Be, Ca, Cd, Ce, Co, Cr, Cu, Dy, Fe, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Sc, Sr, Ti, V, Y, Zn and Zr). Additionally, S analysis was also performed on the samples collected in 2018. The 4-acid digestion is a near total leach that can dissolve oxides, sulphides and some silicates; however, the most resistant minerals (*e.g.*, zircon) may not be completely dissolved (C. Finch, personal communication, 2019).
- 2) Instrumental neutron activation analysis (INAA) to determine 26 elements (As, Au, Ba, Br, Ce, Co, Cr, Cs, Eu, Fe, Hf, La, Lu, Mo, Na, Rb, Sb, Sc, Se, Sm, Ta, Tb, Th, U, W and Yb).
- 3) Nitric acid digestion followed by ICP-OES to determine Ag concentration.
- 4) Alkaline fusion followed by ion-selective electrode (ISE) technique to determine fluoride ion (F⁻).
- 5) Loss on ignition (LOI) *via* gravimetry to determine percentage of organic matter.

Except for INAA, all analyses were completed at the GSNL laboratory in St. John's, NL: INAA was completed at Bureau Veritas, Mississauga, ON. A detailed description of each analytical procedure can be found in Finch *et al.* (2018). The detection limits, concentration units and range of data values for each analysis are reported in Table 1.

RESULTS

The following information is presented in a comma separated file (.csv) in Appendix A: sample number, year, location, elevation, horizon, depth, map unit, additional notes on location and till textures, and the elements analyzed. Major elements are reported in wt. %, whereas trace ele-

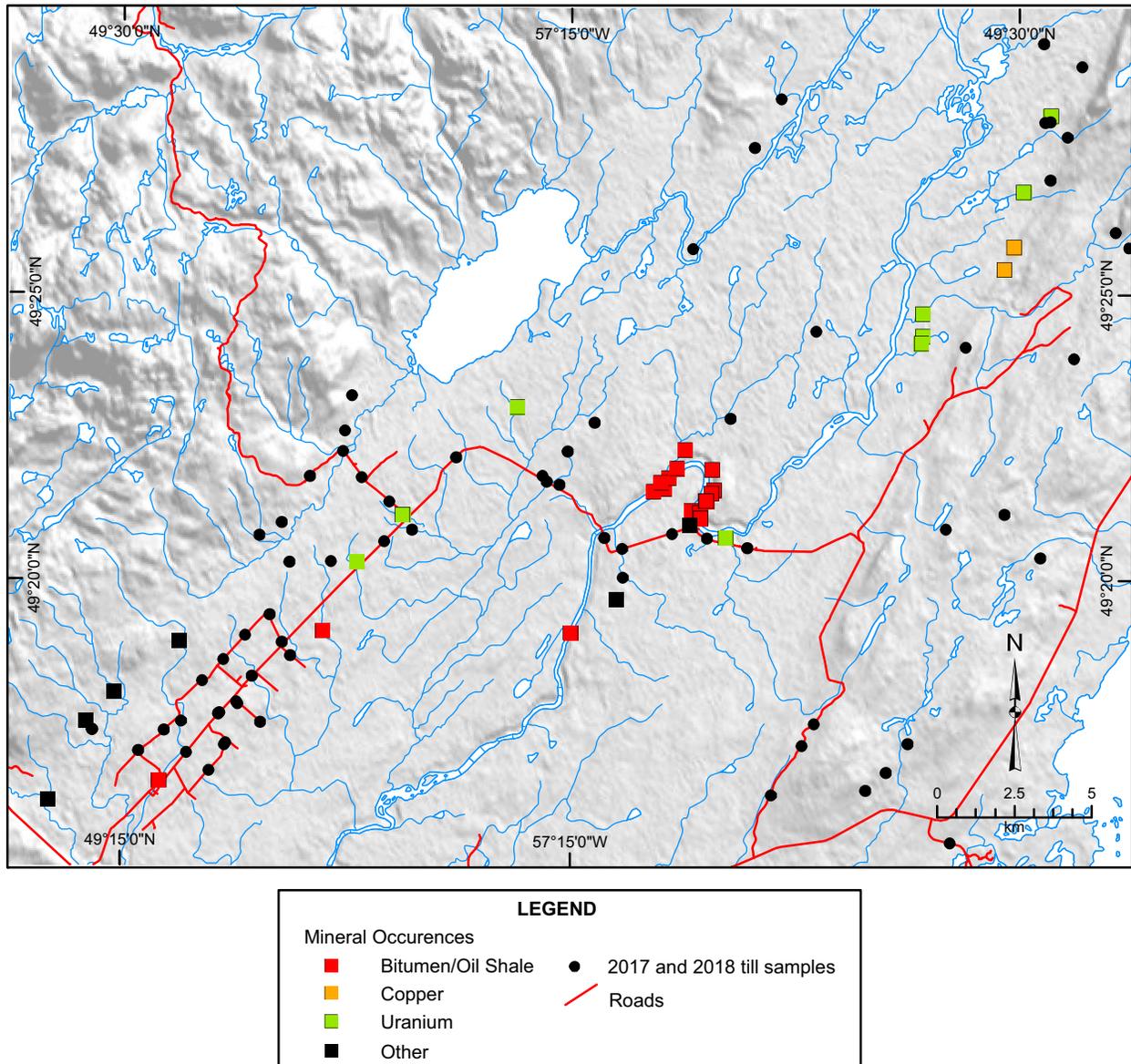


Figure 1. Till sample sites from the 2017 and 2018 field seasons in the Cormack map area (NTS 12H/06).

Table 1. Analytical data consisting of element, methods of analyses, measurement units, detection limit (DL), number of samples with concentration less than DL, and minimum and maximum concentrations

| Element | Method | Unit | DL | No. < DL | Minimum | Maximum |
|---------|------------|------|------|----------|---------|---------|
| Ag6 | ICP-OES | ppm | 0.1 | 69 | <0.1 | <0.1 |
| Al2 | ICP-OES | % | 0.01 | 0 | 5.53 | 9.70 |
| As1 | INAA | ppm | 0.5 | 0 | 0.6 | 70.0 |
| As2 | ICP-OES | ppm | 1 | 0 | 2 | 67 |
| Au1 | INAA | ppb | 1 | 51 | <1 | 20 |
| Ba1 | INAA | ppm | 50 | 0 | 310 | 1200 |
| Ba2 | ICP-OES | ppm | 1 | 0 | 311 | 1291 |
| Be2 | ICP-OES | ppm | 0.1 | 0 | 1.0 | 3.2 |
| Br1 | INAA | ppm | 1 | 2 | <1 | 60 |
| Ca2 | ICP-OES | % | 0.01 | 0 | 0.14 | 3.91 |
| Cd2 | ICP-OES | ppm | 0.1 | 12 | <0.1 | 0.3 |
| Ce1 | INAA | ppm | 3 | 0 | 48 | 301 |
| Ce2 | ICP-OES | ppm | 5 | 0 | 45 | 277 |
| Co1 | INAA | ppm | 2 | 0 | 7 | 33 |
| Co2 | ICP-OES | ppm | 1 | 0 | 9 | 33 |
| Cr1 | INAA | ppm | 1 | 0 | 56 | 820 |
| Cr2 | ICP-OES | ppm | 1 | 0 | 47 | 247 |
| Cs1 | INAA | ppm | 0.5 | 2 | <0.5 | 7.5 |
| Cu2 | ICP-OES | ppm | 1 | 0 | 7 | 50 |
| Dy2 | ICP-OES | ppm | 0.5 | 0 | 2.5 | 15.7 |
| Eu1 | INAA | ppm | 0.5 | 12 | <1.6 | 4.1 |
| F9 | ISE | ppm | 5 | 0 | 199 | 785 |
| Fe1 | INAA | % | 0.1 | 0 | 1.9 | 7.4 |
| Fe2 | ICP-OES | % | 0.01 | 0 | 1.92 | 7.26 |
| Hf1 | INAA | ppm | 1 | 0 | 5 | 42 |
| K2 | ICP-OES | % | 0.01 | 0 | 1.07 | 3.04 |
| La1 | INAA | ppm | 1 | 0 | 23 | 168 |
| La2 | ICP-OES | ppm | 1 | 0 | 21 | 161 |
| Li2 | ICP-OES | ppm | 0.1 | 0 | 5.5 | 83.8 |
| LOI | Gravimetry | % | 0.1 | 0 | 1.1 | 12.9 |
| Lu1 | INAA | ppm | 0.05 | 0 | 0.50 | 1.20 |
| Mg2 | ICP-OES | % | 0.01 | 0 | 0.51 | 3.52 |
| Mn2 | ICP-OES | ppm | 1 | 0 | 329 | 2591 |
| Mo1 | INAA | ppm | 1 | 47 | <1 | 16 |
| Mo2 | ICP-OES | ppm | 1 | 35 | <1 | 15 |
| Na1 | INAA | % | 0.05 | 0 | 0.69 | 2.40 |
| Na2 | ICP-OES | % | 0.01 | 0 | 0.65 | 2.46 |
| Nb2 | ICP-OES | ppm | 1 | 0 | 9 | 26 |

Table 1. Continued

| Element | Method | Unit | DL | No. < DL | Minimum | Maximum |
|----------------|---------------|-------------|-----------|--------------------|----------------|----------------|
| Ni2 | ICP-OES | ppm | 1 | 0 | 24 | 212 |
| P2 | ICP-OES | ppm | 1 | 0 | 296 | 2942 |
| Pb2 | ICP-OES | ppm | 1 | 0 | 2 | 64 |
| Rb1 | INAA | ppm | 5 | 0 | 24 | 120 |
| Rb2 | ICP-OES | ppm | 5 | 0 | 28 | 118 |
| S2 | ICP-OES | ppm | 5 | 0 | 47 | 97 |
| Sb1 | INAA | ppm | 0.1 | 2 | <0.1 | 2.2 |
| Sc1 | INAA | ppm | 0.1 | 0 | 7.3 | 41.2 |
| Sc2 | ICP-OES | ppm | 0.1 | 0 | 7.5 | 44.8 |
| Se1 | INAA | ppm | 1 | 69 | <1 | <1 |
| Sm1 | INAA | ppm | 0.1 | 0 | 3.7 | 22.1 |
| Sr2 | ICP-OES | ppm | 1 | 0 | 74 | 883 |
| Ta1 | INAA | ppm | 0.2 | 0 | 0.7 | 1.9 |
| Tb1 | INAA | ppm | 0.5 | 0 | 0.6 | 3.0 |
| Th1 | INAA | ppm | 0.5 | 0 | 4.2 | 33.5 |
| Ti2 | ICP-OES | ppm | 5 | 0 | 3617 | 11302 |
| U1 | INAA | ppm | 0.1 | 0 | 1.2 | 14.6 |
| V2 | ICP-OES | ppm | 1 | 0 | 52 | 230 |
| W1 | INAA | ppm | 1 | 28 | <1 | 6 |
| Y2 | ICP-OES | ppm | 1 | 0 | 12 | 91 |
| Yb1 | INAA | ppm | 0.5 | 0 | 1.2 | 8.9 |
| Zn2 | ICP-OES | ppm | 1 | 0 | 30 | 88 |
| Zr2 | ICP-OES | ppm | 1 | 0 | 47 | 182 |

Note: With the exception of S, for which only 6 samples were analyzed, the rest of the elements were analyzed for all 69 samples. Also, note that some elements showed a higher DL in some samples. In this case, the total number of samples under the variable detection limits is reported. For example, the DL for Eu *via* INAA is 0.5 ppm; however, the DL may be reported as 1.6 ppm in a sample due to low sample weight or matrix effect.

ments are reported in ppm except for gold, which is reported in ppb. Negative detection limit values represent analyses below the detection limit, and -9 represents samples that were not analyzed for that element. Different analytical procedures are indicated by numerical suffix after the element determined, whereby INAA is labelled as “1”, 4-acid digestion ICP-OES is “2”, nitric acid digestion ICP-OES is “6” and alkaline fusion, ion-selective electrode is “9”; *e.g.*, AU1_PPb stands for Au concentration in ppb, analyzed by INAA. All location data is projected in Universal Transverse Mercator (UTM) easting and northing and the datum used is NAD 27, Zone 21.

ACKNOWLEDGMENTS

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REFERENCE

Finch, C., Roldan, R., Walsh, L., Kelly, J. and Amor, S.
2018: Analytical methods for chemical analysis of geological materials. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File NFLD/3316, 67 pages.

APPENDIX

Appendix A is available as a digital comma-separated file (.csv) through this link.

Appendix A: Till Geochemistry Data