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GEOLOGICAL SURVEY OF CANADA
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P. Acosta-Góngora[1], C. Duffet[1], G.W. Sparkes[2], and E.G. Potter[1]

[1] Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8
[2] Geological Survey of Newfound land and Labrador, 50 Elizabeth Avenue, St. John's, Newfoundland and Labrador A1B 4J6

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Overview

The **C**entral **M**ineral **B**elt **U**ranium **G**eochemistry database (CMBUG) represents the compilation of several thousand Newfoundland and Labrador Geological Survey data files and drill core geochemical data extracted from mineral assessment reports submitted to the Newfoundland and Labrador Mineral Assessment Database (NLAD; Newfoundland and Labrador Department of Natural Resources Geofiles Database, 2017) for the period 2002 to 2011 for the Central Mineral Belt (CMB) region of Labrador (Figure 1). The primary purpose of this compilation is to produce a dataset from which further academic, government, and industrial research related to the various types of uranium mineralization may proceed.

The CMBUG is a Microsoft Excel® file accompanying this summary (Appendix 1), containing two sheets: geochemical data base and abbreviations.

During the process of compilation, the metadata associated with the database was standardized to assist with sorting, summarizing, and querying the dataset, and is described in detail in the following five sections: 1. Original Data Sources; 2. Geographic Distribution; 3. Sample Descriptions; 4. Analytical Laboratories; and 5. Analytical Results.

Original Data Sources

Mineral assessment reports submitted to the Newfoundland and Labrador Mineral Assessment Database (NLAD) are the primary sources of information contained within the CMBUG.

Column: REPORT_TID

- Identification number assigned in the CMBUG

Column: GEOFILE_NUMBER

- The specific identifier assigned to mineral assessment reports submitted to the NLAD.

Column: YEAR_FROM

- The year within which the work reported in the assessment report was started.

Column: YEAR_TO

- The year within which the work reported in the assessment report was completed.

Column: COMPANY

- The company primarily responsible for submitting the Assessment Report. A tabulation of the companies represented in the database is shown in Table 1.

Table 1: *Company representation within CMBUG Dataset.*

Column: COMPANY	**Sample Count (n)**	**Proportion of CMBUG Dataset (n = 42,154)**
ALTIUS RESOURCES INC	551	0.8
AURORA ENERGY RESOURCES	12609	30.5
BAYSWATER URANIUM CORP.	3150	7.5
CROSSHAIR EXPLORATION AND MINING CORP.	20460	48.5
MEGA URANIUM LTD	426	1.0
MONSTER COPPER RESOURCES INC.	540	1.3
SANTOY RESOURCES LTD	394	0.9
SILVER SPRUCE RESOURCES INC	4023	9.5

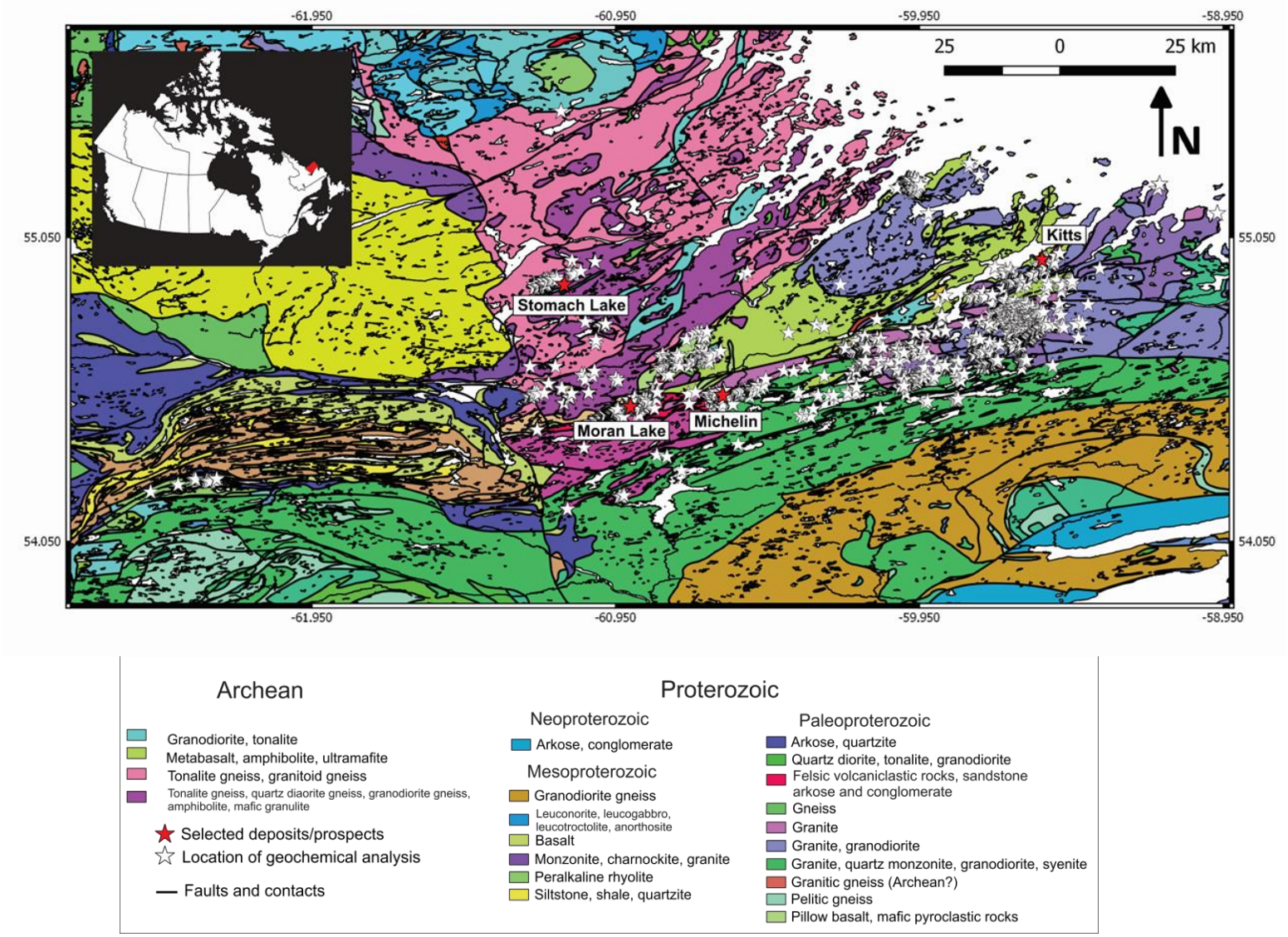

Figure 1. Central Mineral Belt geology after Wardle et al., (1997) and locations of the geochemistry samples and/or locations of the drill holes from which samples were obtained for analysis. Coordinates given in the WGS84 reference system.

Geographic Distribution

The geographic location of each sample is described in both absolute and relative terms within the CMBUG.

Absolute Geographic Distribution

The UTM coordinates of individual samples/drill holes were extracted from each assessment report or data file, and tabulated according to datum, zone, easting and northing. For spatial modelling these locations were compiled in both NAD83 and NAD27 datums. For simplicity, all data was converted into the WGS 84 coordinate reference system.

Column: LONGITUDE

- Longitude in decimal degrees (WGS 84)

Column: LATITUDE

- Latitude in decimal degrees (WGS 84)

Column: E_NAD27Z20

- UTM NAD27 Zone 20 Easting value.

Column: N_NAD27Z20

- UTM NAD27 Zone 20 Northing value.

Column: E_NAD27Z21

- UTM NAD27 Zone 21 Easting value.

Column: N_NAD27Z21

- UTM NAD27 Zone 21 Northing value.

Column: E_NAD83Z20

- UTM NAD83 Zone 20 Easting value.

Column: N_NAD83Z20

- UTM NAD83 Zone 20 Northing value.

Column: E_NAD83Z21

- UTM NAD83 Zone 21 Easting value

Column: N_NAD83Z21

- UTM NAD83 Zone 21 Northing value

Column: Sample_Elevation

- When available, the sample elevation was obtained from the mineral assessment reports.

Column: DDH_HOLE

- The original drill hole collar with which the record is associated.

Column: DDH_SAMPID

- The original sample label with which the record is associated. In some cases, the sample label was not clearly given the assessment reports, as such, we elaborated an artificial numbering to account for each individual sample and avoid duplicate labelling. Sample names with a * symbol correspond with those artificial labels.

Column: TYPE

- Nature of material sampled (if provided). For example: outcrop, boulder, channel, chip, etc. When no sample type was given in the geofile, it was labeled as "Not specified in the Geofile".

Column: DDH_FROM

- For samples collected from drill core, the depth within the drill hole at which the sample interval begins.

Column: DDH_TO

- For samples collected from drill core, the depth within the drill hole at which the sample interval ends.

Column: DDH_ELEV

- When available, the sample elevation was obtained from the mineral assessment reports.

Column: AZIMUTH

- The median compass orientation of the drill hole. For example, an azimuth of 90 degrees represent a drill hole plunging to the east (090°).

Column: DIP

- The median dip angle of the drill hole. A dip angle of 90 indicates vertical drilling whereas a dip angle of 0 refers to the horizontal plane.

Relative Geographic Distribution

Where possible, the spatial distribution of each sample from submitted Assessment Reports was also categorized according to their relative position within the Central Mineral Belt.

Column: GEN_AREA

- For all assessment report files, a general area of the Central Mineral Belt was identified either within the report or assigned later during this study (Table 2). The general area may include regional (e.g., CMB-E) to showing, prospect or deposit scale geographic associations (e.g., Jacques Lake).

Column: DEP_AREA

- For approximately half of the samples, a spatial association with the sampling completed and a known deposit area or area of interest was identified.

Table 2: *Distribution of samples per general area in the CMBUG*

Column: GEN_AREA	Sample Count (n)	Proportion of CMBUG Dataset (n = 42,154)
MORAN LAKE	18531	43.96
JACQUES LAKE	6532	15.50
MICHELIN	5759	13.66
SNEGAMOOK	5631	13.36
ANNA LAKE	1333	3.16
KITTS-POSTHILL BELT	1297	3.08
KANAIRIKTOK	756	1.79
CROTEAU LAKE	662	1.57
AILLIK	416	0.99
BRUCE RIVER	330	0.78
STIPEE RIVER ZONE	210	0.50
NE_STIPECRIVER_ISLAND POND	118	0.28
BOITEAU LAKE	93	0.22
STIPECRIVER_ISLAND POND	67	0.16
STOMACH LAKE	60	0.14
STORM	46	0.11
CMB-E	44	0.10
JEANS POND	39	0.09
NOSEMAN	32	0.08
NW MOSQUITO LAKE	23	0.05
CMB-NE	21	0.05
STOMACH LAKE	21	0.05
DOT_WEEK LAKE	19	0.05
LETITIA	19	0.05
CMB-NW	13	0.03
J & B SHOWING	13	0.03
MARVIN LAKE NO. 8	13	0.03
S TREASURE ISLAND_ACTIVE POND	13	0.03
GREEN POND	9	0.02
POMIADLUK PT	6	0.01
W MARVIN LAKE NO. 8	5	0.01
IRVING ZONE	4	0.01
CMB-SE	3	0.01
SE LASBY LAKE	3	0.01
NE CECIL LAKE	2	0.00

NW GAYLE ZONE	2	0.00
SW KANAIRIKTOK BAY	2	0.00
SW NYMAN'S SHOWING	2	0.00
OSCAR LAKE	1	0.00
RAINBOW DEPOSIT	1	0.00
SW RAINBOW DEPOSIT	1	0.00
SW SOUTH BROOK	1	0.00

Abbreviations: south west, SW; northwest, NW; northeast, NE; north, N; south, S; east, E; Central Mineral Belt, CMB.

Sample Descriptions

Sample descriptions within the CMBUG dataset range from very detailed to non-existent, often without any standard format or content between or even within the same report. Lithological descriptions in this report are given for a reduced batch of samples.

Column: LITHOLOGY_BASIC

- A few samples (976) have basic lithology descriptions within their source reports. Samples with no description are those for which a sample lithology label was not provided, or the labels provided were insufficient to accurately define the actual sample lithology.
- In some cases, samples collected for the purposes of monitoring quality of assurance and quality control (QAQC) were represented in original assessment report files. Although, they represented only a very small proportion of the original sample data population, we have included these data.

- **Column: GROUP**
  - Of a total of 42,154 rock samples, 21,850 were labeled with enough information to identify the likely stratigraphic group from which these samples were collected (Table 3).

- **Column: FORMATION**
  - Of a total of 42,154 rock samples, only 42 samples were labeled with enough information to identify the likely formation name, within the stratigraphic group from which these samples were collected.

***Table 3**: Column GROUP statistics*

Column: GROUP	**Sample Count (n)**	**Proportion of CMBUG Dataset (n = 42,154)**
NO DATA	20303	48.2
MORAN LAKE GROUP	14823	35.1
UPPER AILIK GROUP	5327	12.6
POST HILL GROUP	1245	3.0
BRUCE RIVER GROUP	435	1.0
BASEMENT GNEISSES	21	0.0

Analytical Laboratories

Column: ANALYTICAL_LABORATORY

- The analytical laboratories listed in the CMBUG dataset are summarized in Tables 4 and 5.
  - Activation Laboratories (ACTLABS) is the most common commercial laboratory used for the analysis of geochemical samples from the Central Mineral Belt.

Column: PARTIAL_DIGESTION

- Partial digestion attempts to focus dissolution on weakly bound elements of the more labile components of the sample, assumed to more likely represent the proportion of the sample associated with alteration and mineralization. Silicate and more resistate minerals like zircon, monazite, xenotime are not typically dissolved.
- The most common partial digestion analytical procedure employed in the Central Mineral Belt is the Activation Laboratories Aqua Regia partial digestion (3 HCl:1 HNO3) (Table 4). Final analysis of the digestion product is most commonly completed by ICP-OES techniques. ICP-MS techniques may also be used, providing lower detection limits.

Column: TOTAL_DIGESTION

- Total digestion attempts to fully dissolve samples, providing a relatively complete geochemical signature. Total digestion methods usually rely on a combination of three to four different acids, usually including hydrofluoric acid (HF). These techniques are typically effective, but incomplete digestion of the sample is still possible due to the presence of highly resistate minerals and are best considered "near-total" digestions. In addition, elements that may volatilize during total digestion may be under-represented in the dataset, including elements such as As, Se, Te and U. The most common total digest method employed in the Central Mineral Belt for uranium is the delayed neutron counting technique (DNC) for concentrations <1.0 wt.% U_3O_8, coupled with a four-acid digestion at Activation Laboratories (Table 5). Final analysis of the digestion product is most commonly completed by ICP-MS/AES techniques. Less often, samples were analyzed by a mixture of lithium metaborate/tetraborate fusion, instrumental neutron activation analysis (INAA, fluorimetry), and X-ray fluorescence (XRF). The combination of these techniques allow a better quantification of major and trace elements contained in resistive minerals (e.g., silicates, magnetite).

Table 4: *Analytical Laboratories represented in the CMBUG dataset for partial digestion.*

Analytical Laboratory	***Sample Count (n)**	**Proportion of CMBUG Dataset (n = 17,607)**	**Partial Digest**
Activation Laboratories (ACTLABS)	16,434	93.3	Aqua Regia/ICP-MS
ALS CHEMEX	514	2.9	Aqua Regia/ICP-MS
SRC Analytical laboratories	659	3.7	Aqua Regia/ICP-MS

Table 5: *Analytical Laboratories represented in the CMBUG dataset for total digestion.*

Analytical Laboratory	Sample Count (n)	Proportion of CMBUG Dataset (n = 35, 134)	Total Digest
Activation Laboratories (ACTLABS)	17,431	44.9	U by DNC± Fusion± INAA
Activation Laboratories	15,788	49.6	4 acid (ICP-MS)± Fusion±XRF±INAA± DNC
ALS CHEMEX	514	1.5	4 acid (ICP-MS/AES)
Loring Laboratories	130	0.4	No description
SGS Mineral Services, Vancouver (SGS)	1271	3.6	Fusion± Pyrosulphate fusion / XRF

Analytical Results

The analytical results for each sample are listed in individual columns using standardized labels indicating the element determined, the digest used, and the units used to measure the element. Data below detection have been handled in a variety of ways within the various assessment reports compiled, including preserving the original detection limit values (using "<" and "-" prefixes or "0" values), modification of the detection limit values, or deletion. Where identified in the original data, the absolute value of the original detection limit has been preserved in the CMBUG dataset, identified as the negative value of the absolute value.

Column: Element_Digest_Unit

- Element Labels:
  - Trace Elements (e.g. Ag through Zr)
  - Major Element Oxides (e.g. Al_2O_3 through TiO_2)
  - Major Elements (e.g. Al through Ti – not reported as Oxides)
- Digest Labels:
  - p = Partial Digest (laboratory specific)
  - t = Total Digest (laboratory specific)
- Unit Labels:
  - ppm = parts per million
  - ppb = parts per billion
  - pct = Percent.
- Sample Column Header Examples:
  - Ag_p_ppm = Silver by Partial Digest, reported in parts per million.
  - Al2O3_t_pct = Aluminum Oxide by Total Digest, reported in percent.

Acknowledgments

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Appendices

see of_8352_Appendix 1 data.xlsx