



Industry, Energy and Technology

Mines

RE-ANALYSIS OF THE TILL GEOCHEMISTRY OF THE DEAD WOLF POND MAP AREA (NTS 2D/10), EASTERN NEWFOUNDLAND

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Open File 002D/10/1020



St. John's, NL
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SUMMARY

This report presents the revised results of 64 samples of a till-geochemistry survey conducted in the Dead Wolf Pond map area (NTS 2D/10) of eastern Newfoundland in 2019 (Figure 1). The original results were examined internally using quality assurance and quality control protocols and were deemed unacceptable due to the magnitude of the spread between the results for Ce, La, Rb, Sr, Ti and Zr in duplicate samples. The results of the present re-analysis of the samples are appended to the analytical results for the <63 µm fraction of 118 till samples and six field duplicates originally released as Open File 002D/10/0954 (Organ and Amor, 2020) and re-released in this report as a complete dataset.

This release supports the Geological Survey of Newfoundland and Labrador's (GSNL) ongoing provincial till-geochemistry and surficial-mapping program. The objective of this program is to assist the mineral exploration industry in its efforts to delineate prospective areas using both till-geochemical anomalies and the regional ice-flow history.

Preliminary surficial mapping work and ice-flow history for the Dead Wolf Pond (NTS 2D/10) map area are summarized by Organ (2020). Field work completed by Organ (2020) was restricted to forestry-resource roads in the northern half of the study area using truck and ATV traverses. The southern part of the study area has been the focus of the 2024 field season. A detailed map of the surficial geology and landforms of NTS 2D/10 will be released at a later date, at a scale of 1:50 000.

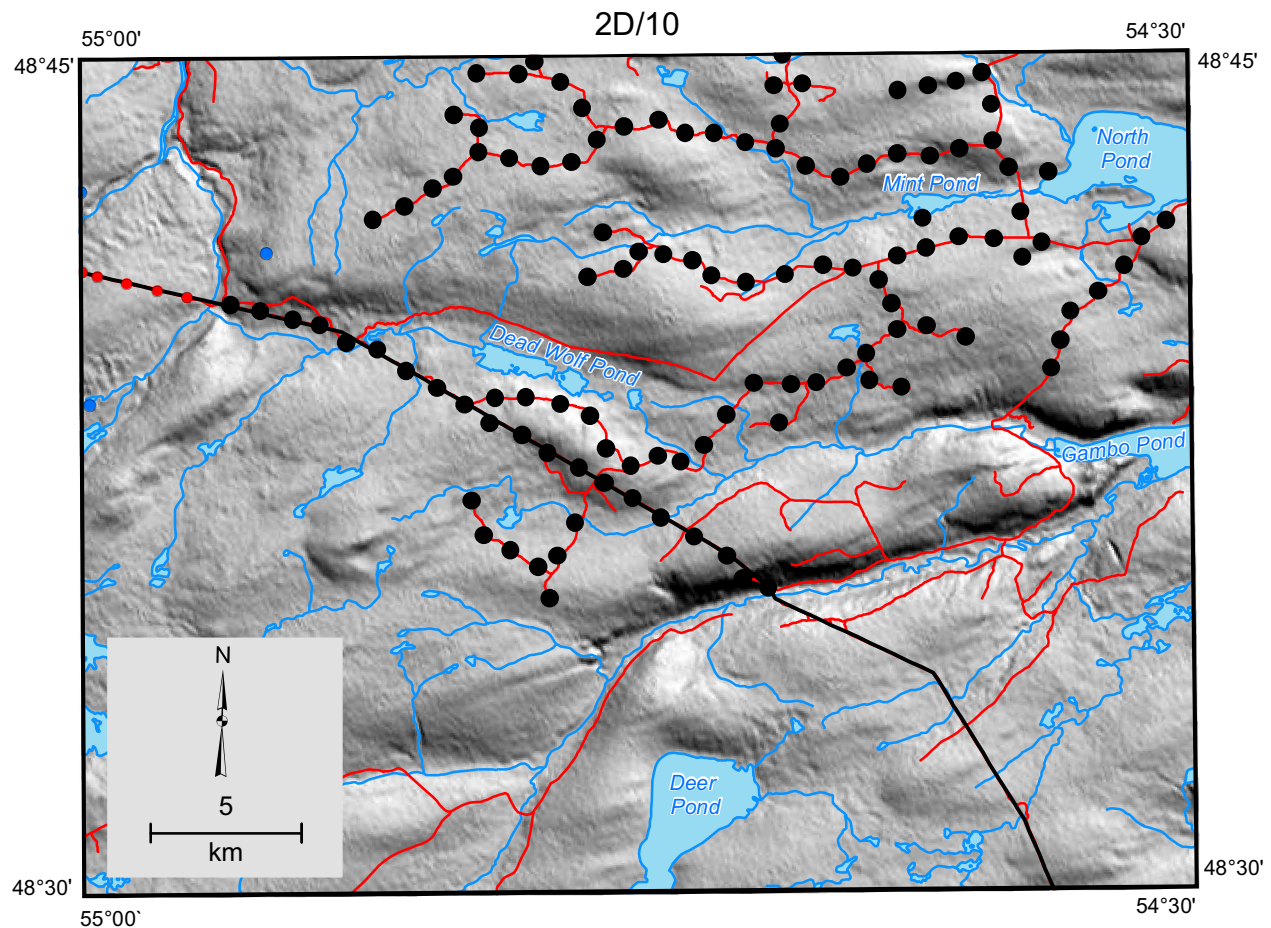
This open-file report comprises description of the sampling method, analytical methods for geochemistry, quality assurance protocols and notes on the content of the data files.

SAMPLING METHODS

The locations of till samples collected from the forest-access roads of the northern half of NTS 2D/10 are shown in Figure 1. Undisturbed till was collected from hand-dug pits, mudboils or exposed sediment faces in roadcuts or ditches. Approximately 1 kg of till from the C- or BC-soil horizons was placed in Kraft paper bags. Sample spacing was determined by access along existing roadways, and the availability of appropriate sample material. Along forest-access and other roads, the sample density was one sample every 1 linear kilometre. Field duplicates were collected at six sites, at an overall frequency of 1 in 19, to estimate the natural inhomogeneity of the sample medium. The results of the field-duplicate analyses are in appendices B, C and D.

DATABASE NOTES

The database includes analytical results for a total of 118 samples (Lab numbers 7834576–7834713) previously reported by Organ and Amor (2020), including the results for re-analysis of 64 samples (Lab numbers 7834651–7834713) by ICP-OES for samples collected from the Dead Wolf Pond map area (NTS 2D/10) in eastern Newfoundland. The <63 µm (silt and clay) fraction of the samples have been analyzed at the Geological Survey of Newfoundland and Labrador's (GSNL) geochemistry laboratory in St. John's, NL, by inductively coupled plasma-



LEGEND

2019 till sample locations

- This report

Previous till sample locations

- Brushett and Amor, 2016

- Campbell, 2019

— Transmission Line

— Forestry Resource Roads

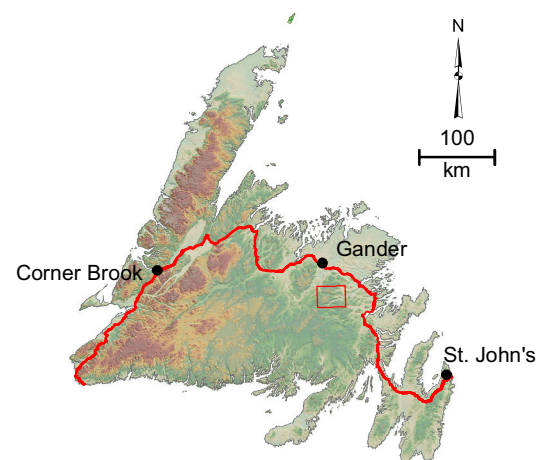


Figure 1. Figure showing location of 2019 till geochemical samples (black dots), 5 samples (red dots) released by Campbell (2019), and 3 samples (blue dots) released by Brushett and Amor (2016).

optical emission spectrometry (ICP-OES) after a 4-acid digestion ($\text{HCl-HNO}_3\text{-HClO}_4\text{-HF}$) for 32 elements including: aluminum, arsenic, barium, beryllium, cadmium, calcium, cerium, chromium, cobalt, copper, dysprosium, iron, lanthanum, lead, lithium, magnesium, manganese, molybdenum, nickel, niobium, phosphorus, potassium, rubidium, scandium, sodium, strontium, sulphur, titanium, vanadium, yttrium, zinc and zirconium. The GSNL laboratory also determined loss-on-ignition (LOI) gravimetrically, silver by ICP-OES after nitric acid digestion and fluoride which was analyzed by ion-selective electrode after alkaline fusion. In addition, 27 elements were submitted to Bureau Veritas in Mississauga, ON, for instrumental neutron activation analysis (INAA): antimony, arsenic, barium, bromine, cerium, cesium, chromium, cobalt, europium, gold, iron, hafnium, lanthanum, lutetium, molybdenum, rubidium, scandium, samarium, selenium, sodium, tantalum, terbium, thorium, tungsten, uranium, ytterbium and zirconium. A description of the sample preparation and analytical methods used can be found in Finch *et al.*, (2018). Within the database, elements are denoted by a combination of the elemental symbol followed by numeric suffix (*e.g.*, Pb2) identifying the analytical method:

1. Suffix 1 – Instrumental Neutron Activation Analysis (INAA),
2. Suffix 2 – Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) after multi-acid ($\text{HF/HCl/HNO}_3\text{/HClO}_4$) digestion,
3. Suffix 28 – ICP-OES after nitric acid digestion,
4. Suffix 9 – Ion-Selective Electrode (ISE) after alkaline fusion.

Further details regarding suffixes can be found in the Geoscience Atlas till geochemistry help file at https://geoatlas.gov.nl.ca/Custom/help/Till_geochem_help_tables/Table2_AnalyticalMethods.html. Table 1 provides a complete list of elements, analytical method, units, detection limit and range of values. A negative sign is assigned to any value below detection limit.

The location for each sample is given in Appendix A, as Universal Transverse Mercator (UTM) eastings and northings (Zone 21; NAD 27). Analytical data, along with a short description of each sample and site, are also included.

QUALITY ASSURANCE

Quality assurance was completed on a batch of samples from two different locations; those with Lab numbers 7834576–7834713 are related to this document and are from the Dead Wolf Pond map area (NTS 2D/10) while Lab numbers 7834714–7834776 are related to the Puddle Pond map area (Organ, 2024). Quality assurance data including field duplicates, laboratory duplicates and standards are provided in Appendix B for INAA, Appendix C for ICP-OES and Appendix D for F, Ag and LOI. Detection limits listed in Table 1 are reflective of the entire batch, while values below detection limit, minimum and maximum values are given for this open file only (Lab numbers 7834576–7834713).

The quality of the analyses has been checked for acceptable accuracy and precision. Quality assurance consisted of the analysis of one reference standard and one analytical duplicate in every sequence of 20 samples. For the ICP-OES analyses, the standards consisted of the CANMET standards TILL-1, TILL-2, TILL-3 (Lynch, 1996). For the samples submitted for INAA analysis, these

Table 1. Geochemical variables with analytical method, units, detection limit (DL), number of analyses below the detection limit (<DL) and range of data values. Detection limits below are reflective of the entire sample batch (Lab numbers 7834576–7834776), while values below detection limit, minimum and maximum values are given for this open file only (Lab numbers 7834576–784713)

Element	Method	Units	D.L.	<D.L.	Max	Min	Element	Method	Units	D.L.	<D.L.	Max	Min
Ag28	ICP-OES	ppm	0.1	117	0.1	<0.1	Mn2	ICP-OES	ppm	1	0	1542	638
Al2	ICP-OES	%	0.01	0	8.61	4.7	Mo1	INAA	ppm	1, 2	114	1	<2
As1	INAA	ppm	0.5	0	195	1.2	Mo2	ICP-OES	ppm	1	100	2	<1
As2	ICP-OES	ppm	1	0	175	2	Na1	INAA	%	0.05	0	2.3	1.1
Au1	INAA	ppb	1	45	24	<1	Na2	ICP-OES	%	0.01	0	2.1	1.09
Ba1	INAA	ppm	50	0	660	170	Nb2	ICP-OES	ppm	1	0	20	7
Ba2	ICP-OES	ppm	1	0	667	173	Ni2	ICP-OES	ppm	1	0	67	14
Be2	ICP-OES	ppm	0.1	0	10.4	1.9	P2	ICP-OES	ppm	1	0	1345	172
Br1	INAA	ppm	1	9	74	<1	Pb2	ICP-OES	ppm	1	4	54	8
Ca2	ICP-OES	%	0.01	0	1.24	0.4	Rb1	INAA	ppm	5	0	220	50
Cd2	ICP-OES	ppm	0.1	14	0.3	<0.1	Rb2	ICP-OES	ppm	5	0	221	54
Ce1	INAA	ppm	3	0	190	54	S2	ICP-OES	ppm	100	76	794	<100
Ce2	ICP-OES	ppm	5	0	137	44	Sb1	INAA	ppm	0.1	0	2.8	0.2
Co1	INAA	ppm	2	1	31	<2	Sc1	INAA	ppm	0.1	0	17.8	6.3
Co2	ICP-OES	ppm	1	0	39	7	Sc2	ICP-OES	ppm	0.1	0	19.2	5.5
Cr1	INAA	ppm	10	0	280	68	Se1	INAA	ppm	1, 2.6	118	<1	<1
Cr2	ICP-OES	ppm	1	0	114	34	Sm1	INAA	ppm	0.1	0	11.3	4.5
Cs1	INAA	ppm	0.5	0	25	3.2	Sr2	ICP-OES	ppm	1	0	147	71
Cu2	ICP-OES	ppm	1	0	80	10	Ta1	INAA	ppm	0.2	0	4.4	1
Dy2	ICP-OES	ppm	0.5	0	6.1	2.3	Tb1	INAA	ppm	0.5	0	1.6	0.6
Eu1	INAA	ppm	0.5	10	2.5	<0.5	Th1	INAA	ppm	0.1	0	27.2	8.4
F9	ISE	ppm	5	0	463	107	Ti2	ICP-OES	ppm	5	0	8187	3464
Fe1	INAA	%	0.1	0	4.2	1.8	U1	INAA	ppm	0.1	0	56.2	2.6
Fe2	ICP-OES	%	0.01	0	4.82	1.75	V2	ICP-OES	ppm	1	0	110	37
Hf1	INAA	ppm	1	0	22	7	W1	INAA	ppm	1	0	37	1
K2	ICP-OES	%	0.01	0	2.78	0.97	Y2	ICP-OES	ppm	1	0	30	9
La1	INAA	ppm	1	0	62	23	Yb1	INAA	ppm	0.5	0	4.3	1.3
La2	ICP-OES	ppm	1	0	68	19	Zn2	ICP-OES	ppm	1	0	121	24
Li2	ICP-OES	ppm	0.1	0	90.5	21.9	Zr1	INAA	ppm	100, 230	3	610	<100
LOI	Gravimetric	%	0.1	0	15.0	0.6	Zr2	ICP-OES	ppm	1	0	115	65
Lu1	INAA	ppm	0.05	0	0.73	0.24							
Mg2	ICP-OES	%	0.01	0	1.19	0.28							

Notes: INAA analyses for seven elements had multiple detection limits, due to low sample weight, and are listed separately in the detection limit column. The suffix “1” denotes INAA analysis; “2” denotes ICP-OES analysis after multi-acid digestion; “28” denotes ICP-OES after nitric acid digestion; and “9” denotes ISE after alkaline fusion

same standards were used until their supply was exhausted, at which point they were replaced by till standards OREAS-46 and OREAS-47 (www.ore.com.au). Comparison of known standards and duplicate analyses for INAA and ICP-OES as part of the quality control process were viewed as acceptable.

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APPENDICES

Appendices A–E are included in the OF_002D_10_1020 zip folder as Excel (.xlsx) files.

APPENDIX A: Formatted Site, Sample and Analytical Results for Till Collected in the Dead Wolf Pond Area in 2019

APPENDIX B: Raw Geochemical Data for Instrumental Neutron Activation Analysis (INAA).

APPENDIX C: Raw Geochemical Dataset for a Four Acid (HCl-HNO₃-HClO₄-HF) Digestion with Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) Finish for 32 Elements

APPENDIX D: Results of Fluoride Analysis Using Ion-Selective Electrode (ISE) after Alkaline Fusion, Silver Analysis Using ICP-OES after Nitric Acid Digestion and LOI was Determined Gravimetrically

APPENDIX E: Metadata for this Open File 002D/10/1020