



Industry, Energy and Technology

Mines

TILL GEOCHEMISTRY OF DEAD WOLF POND (NTS MAP AREA 2D/10) AND PARTS OF NTS MAP AREAS 11O/16, 11P/13 AND 12A/07, NEWFOUNDLAND

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Open File NFLD/3470



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CONTENTS

	Page
SUMMARY	1
SAMPLING METHODS	1
DATABASE NOTES	1
QUALITY ASSURANCE	3
REFERENCES	4
APPENDICES	6

FIGURE

Figure 1.	Map showing location of 2023 till geochemical samples (black dots) released with the current open file, along with 118 samples (green dots) released by Organ (2024), 5 samples (red dots) released by Campbell (2019) and 3 samples (blue dots) released by Brushett and Amor (2016). General geology (GSNL, 2025a) and mineral occurrences (GSNL, 2025b) are displayed and discussed in Organ (2020). Red dots and the red box on the map of the island indicate study areas of this report	2
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TABLE

Table 1.	Geochemical variables with analytical method, units, detection limit (D.L.), number of analyses below the detection limit (<D.L.) and range of data values.	4
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SUMMARY

This report provides the results of thirty-seven till-geochemistry samples taken from four NTS map areas across Newfoundland. Thirty-three of these samples were collected from the Dead Wolf Pond map area (NTS 2D/10), three samples from southwestern Newfoundland (NTS map areas 11O/16 and 11P/13) and one sample from central Newfoundland (NTS map area 12A/07) (Figure 1). All samples were collected from BC and C horizons as part of the ongoing till-geochemistry and surficial-mapping program across Newfoundland. The primary objective is to assist the mineral-exploration industry by delineating prospective areas using both till-geochemical anomalies and regional ice-flow history.

Most of the samples were taken from the Dead Wolf Pond area (NTS 2D/10). Previous surficial mapping and interpretation of ice-flow history for this area are summarized by Organ (2020).

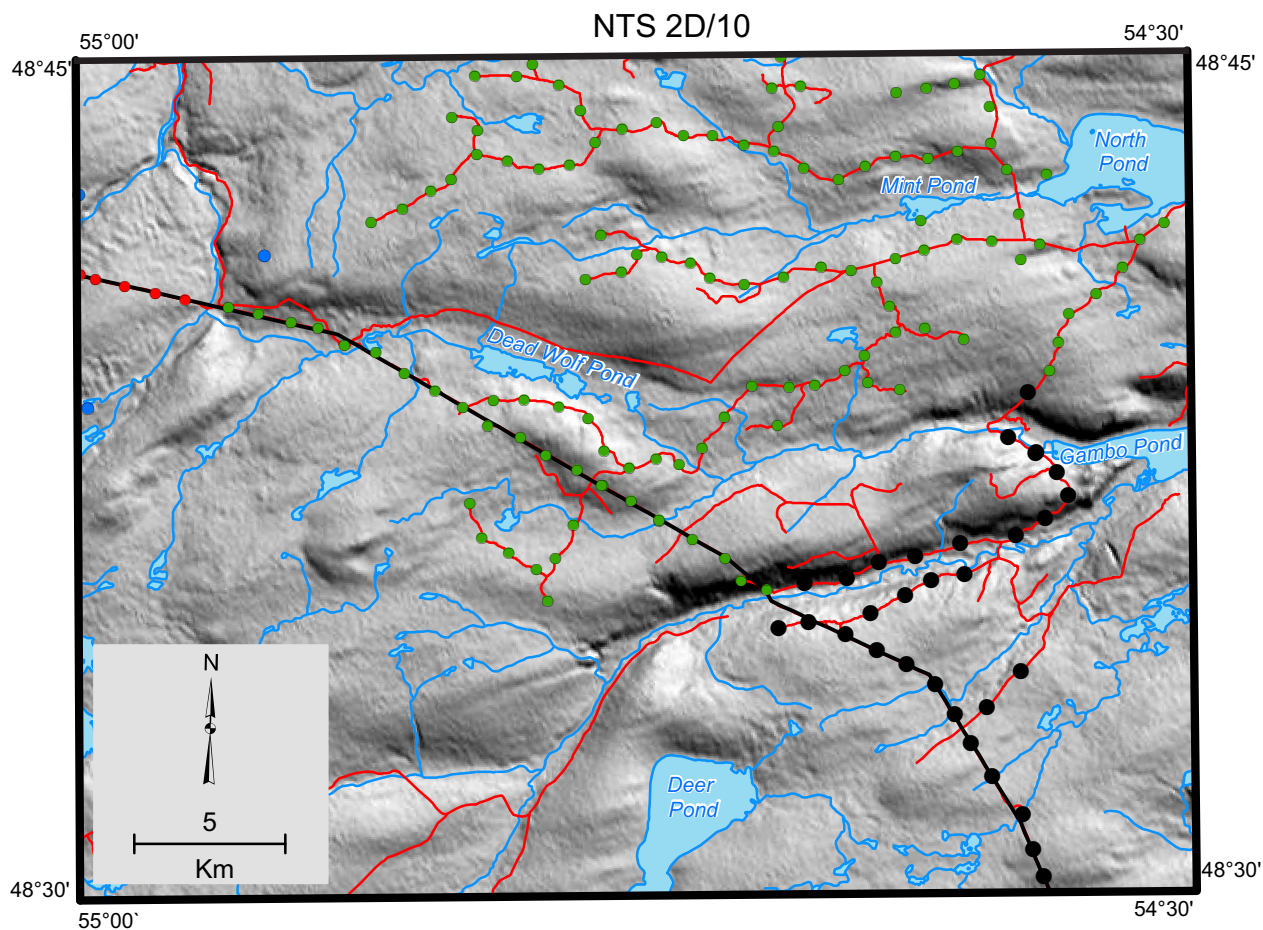
This report comprises descriptions of methods of sampling, followed by notes on the content of the database including analytical methods and quality assurance.

SAMPLING METHODS

The till sampling locations are shown in Figure 1. Approximately 1 kg of till was collected from the BC or C soil horizon exposed in hand-dug pits, trenches or exposed road-cuts and placed in a Kraft paper bag. Sample spacing in the Dead Wolf Pond area was completed on a 1 km linear grid. Other samples were taken during mineral exploration site visits. Field duplicates were collected at two sites, at an overall frequency of 1 in 21, to estimate the natural inhomogeneity of the sample medium. The results of the field-duplicate analyses are discussed briefly below and displayed in Appendices B–D. The field work was conducted using truck, ATV on forestry resource roads and helicopter to access remote areas.

DATABASE NOTES

This database includes analytical results of thirty-seven till samples (Lab numbers 7834969–7835015), and two field duplicates, from four areas across Newfoundland (NTS map areas 2D/10, 11O/16, 11P/13 and 12A/07; Appendix A). 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-optical emission spectrometry (ICP-OES) after a 4-acid digestion (HCl-HNO₃-HClO₄-HF) for 31 elements including: aluminum, arsenic, barium, beryllium, cadmium, calcium, 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 a nitric acid digestion and analyzed fluoride by ion-selective electrode after alkaline fusion. In addition, 27 elements were analyzed by Bureau Veritas in Mississauga, ON by instrumental neutron activation analysis (INAA), namely: antimony, arsenic, barium, bromine, cerium, cesium, chromium, cobalt, europium, gold, iron, hafnium, lanthanum, lutecium, molybdenum, rubidium, scandium, samarium, selenium, sodium, tantalum, terbium, thorium, tungsten,



LEGEND

2023 till sample locations

- Till samples (this open file)

Previous till sample locations

- Open File 002D/10/1020
- Open File NFLD/3273
- Open File NFLD/3358
- Transmission Line
- Forestry Resource Roads

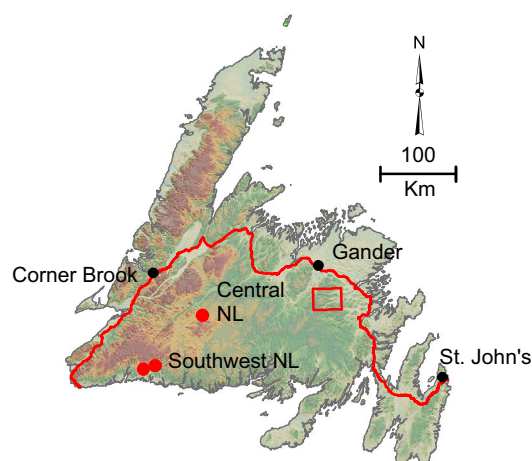


Figure 1. Map showing location of 2023 till geochemical samples (black dots) released with current open file, along with 118 samples (green dots) released by Organ (2024), 5 samples (red dots) released by Campbell (2019) and 3 samples (blue dots) released by Brushett and Amor (2016). General geology (GSNL, 2025a) and mineral occurrences (GSNL, 2025b) are displayed and discussed in Organ (2020). Red dots and the red box on the map of the island indicate study areas of this report.

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.*, Pb 2) 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 (4-acid) (HF/HCl/HNO₃/HClO₄) 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_Analytical-Methods.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 reported in Appendix A, as Universal Transverse Mercator (UTM) eastings and northings (zone 21; NAD 27 datum). Analytical data, along with a short description of each sample and site characteristics, are also included.

QUALITY ASSURANCE

In addition to the thirty-seven surface samples presented here, six sub-surface samples were analyzed. Data from these six samples (23JO5000, 23JO5001, 23JO5003, 23JO5005, 23JO5024 and 23JO5032) will be released at a later date. 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, minimum and maximum values are provided in Table 1.

The quality of the analyses has been checked for acceptable accuracy and precision. Quality assurance was determined by the insertion 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, and TILL-2 (Lynch, 1996). For the samples submitted for INAA analysis, TILL-1 and TILL-3 were used. Standard and duplicate analyses for INAA and ICP-OES were satisfactory.

Table 1. Geochemical variables with analytical method, units, detection limit (D.L.), number of analyses below the detection limit (<D.L.) and range of data values.

Element	Method	Units	D.L.	<D.L.	Max	Min	Element	Method	Units	D.L.	<D.L.	Max	Min
Ag28	AAS	ppm	0.1	35	<0.1	<0.1	Mg2	ICP-OES	%	0.01	0	1.04	0.21
Al2	ICP-OES	%	0.01	0	7.64	4.57	Mn2	ICP-OES	ppm	1	0	2645	559
As1	INAA	ppm	0.5	2	172	<0.5	Mo1	INAA	ppm	1	33	32	<1
As2	ICP-OES	ppm	1	0	137	2	Mo2	ICP-OES	ppm	1	23	29	<1
Au1	INAA	ppb	1	27	14	<1	Na1	INAA	%	0.05	0	2.18	0.81
Ba1	INAA	ppm	50	0	790	170	Na2	ICP-OES	%	0.01	0	2.1	0.89
Ba2	ICP-OES	ppm	1	0	712	172	Nb2	ICP-OES	ppm	1	0	22	10
Be2	ICP-OES	ppm	0.1	0	7.4	1.1	Ni2	ICP-OES	ppm	1	0	64	9
Br1	INAA	ppm	1	2	36	<1	P2	ICP-OES	ppm	1	0	1421	252
Ca2	ICP-OES	%	0.01	0	2.1	0.21	Pb2	ICP-OES	ppm	1	0	72	12
Cd2	ICP-OES	ppm	0.1	15	0.5	<0.1	Rb1	INAA	ppm	5	0	166	32
Ce1	INAA	ppm	0.5	0	283	53	Rb2	ICP-OES	ppm	5	0	139	35
Ce2	ICP-OES	ppm	5	0	347	57	S2	ICP-OES	ppm	100	23	274	<100
Co1	INAA	ppm	2	1	28	4	Sb1	INAA	ppm	0.1	0	2.8	<0.1
Co2	ICP-OES	ppm	1	0	35	5	Sc1	INAA	ppm	0.1	0	23.4	5.3
Cr1	INAA	ppm	10	2	210	30	Sc2	ICP-OES	ppm	0.1	0	26.2	4.8
Cr2	ICP-OES	ppm	1	0	174	25	Se1	INAA	ppm	1, 2, 3	35	<1	<1
Cs1	INAA	ppm	0.5	0	20	1.3	Sm1	INAA	ppm	0.1	0	15.7	4.7
Cu2	ICP-OES	ppm	1	0	92	3	Sr2	ICP-OES	ppm	1	0	281	64
Dy2	ICP-OES	ppm	0.5	0	10.5	2.7	Ta1	INAA	ppm	0.1, 0.2	0	3.4	0.9
Eu1	INAA	ppm	0.5, 1.5	0	3.3	1	Tb1	INAA	ppm	0.5	1	2.3	<0.5
F9	ISE	ppm	5	0	391	160	Th1	INAA	ppm	0.5	0	21.9	5.7
Fe1	INAA	%	n/a	0	5.5	1.3	Ti2	ICP-OES	ppm	5	0	7555	3802
Fe2	ICP-OES	%	0.01	0	5.48	1.33	U1	INAA	ppm	1	0	11	2.2
Hf1	INAA	ppm	0.5	0	26	5	V2	ICP-OES	ppm	1	0	157	31
K2	ICP-OES	%	0.01	0	3.13	0.91	W1	INAA	ppm	1	1	8	<1
La1	INAA	ppm	0.1	0	82	26	Y2	ICP-OES	ppm	1	0	44	12
La2	ICP-OES	ppm	1	0	81	27	Yb1	INAA	ppm	0.5	0	5.8	2.1
Li2	ICP-OES	ppm	0.1	0	84.5	4.6	Zn2	ICP-OES	ppm	1	0	129	22
LOI	Gravimetric	%	0.1	0	13.1	1.03	Zr1	INAA	ppm	100	1	800	<100
Lu1	INAA	ppm	0.10	0	0.86	0.37	Zr2	ICP-OES	ppm	1	0	191	83

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; “6” denotes ICP-OES after nitric acid digestion; and “9” denotes ISE after alkaline fusion

REFERENCES

Campbell, H.E.

2019: Till geochemistry of the Great Burnt Lake (NTS 12A/08), Burnt Hill (NTS 2D/05), Northern Cold Spring Pond (NTS 12A/01) and adjacent map areas. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, St. John's, Open File NFLD/3358, 53 pages.

Geological Survey of Newfoundland and Labrador (GSNL)

2025a: “Generalized Bedrock Geology.” Newfoundland and Labrador GeoScience Atlas OnLine. Last update: May 2023. <http://geoatlas.gov.nl.ca/>. [Downloaded January 2025].

2025b: “Mineral Occurrence Database System (MODS).” Newfoundland and Labrador GeoScience Atlas OnLine. Last update: Updated daily. <http://geoatlas.gov.nl.ca/>. [Downloaded January 2025].

Finch, C., Roldan, R., Walsh, L., Kelly, J. and Amor, S.D.

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.

Lynch, J.

1996: Provisional elemental values for four new geochemical soil and till reference materials, TILL-1, TILL-2, TILL-3 and TILL-4. *Geostandards Newsletter*, Volume 20, Number 2, pages 277-287.

Organ, J.S.

2020: Preliminary till-geochemical and surficial mapping investigations of the Dead Wolf Pond map area (NTS 2D/10). *In* Current Research. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Report 20-1, pages 87-102.

Thompson M. and Howarth, R.J.

1978: A new approach to the estimation of analytical precision. *Journal of Geochemical Exploration*, Volume 9(1), pages 23-30.

APPENDICES

Appendices A–E are included in the OF_NFLD_3470 zip folder as Excel (.xlsx) files.

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

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 Open File NFLD/3470