# BRITISH COLUMBIA TILL GEOCHEMICAL DATAFILE

Geofile 2008_13

**Ray Lett**

## *Introduction*

The BC Geological Survey (BCGS) and Geological Survey of Canada (GSC) have produced geochemical analyses of over 5000 drift samples collected across the province since 1991. Both agencies and Geoscience BC have release many of these data in digital form to the public. Ferbey (2008) has summarised the location and spatial coverage of BC Geological Survey drift prospecting surveys that have generated much the geochemical information. Jackaman (2007) compiled BCGS and GSC geochemical survey data, including the results of regional till survey sampling, for parts of the BC interior affected by the Mountain Pine Beetle infestation. Geofile 2008_13 complements information in both publications. It contains an MS Excel file combining BCGS and GSC drift geochemical data from much of central BC including results from surveys on Vancouver Island and additional, unpublished till data from the area around Mt Milligan (NTS 93). Figure 1 shows the distribution of drift samples analysed and survey boundaries based on the index map displayed in Geolfile 2008_12. While Geofile 2008_13 has instrumental neutron activation (INA), aqua regia digestion – inductively coupled plasma emission spectroscopy (AR-ICP), lithium metaborate fusion - inductively coupled plasma emission spectroscopy (LI) and Loss on Ignition (LOI) data not all of the samples have been analysed by these four techniques. Drift samples are classified by bedrock geology at the sample site based on published BCGS digital geology (Massey, 2005) and also by surficial sediment type (e.g. lodgement till, melt-out till, colluvial) from the descriptions in the source publication for the geochemical data. The MS Excel file structure is described in more detail in Table 1.

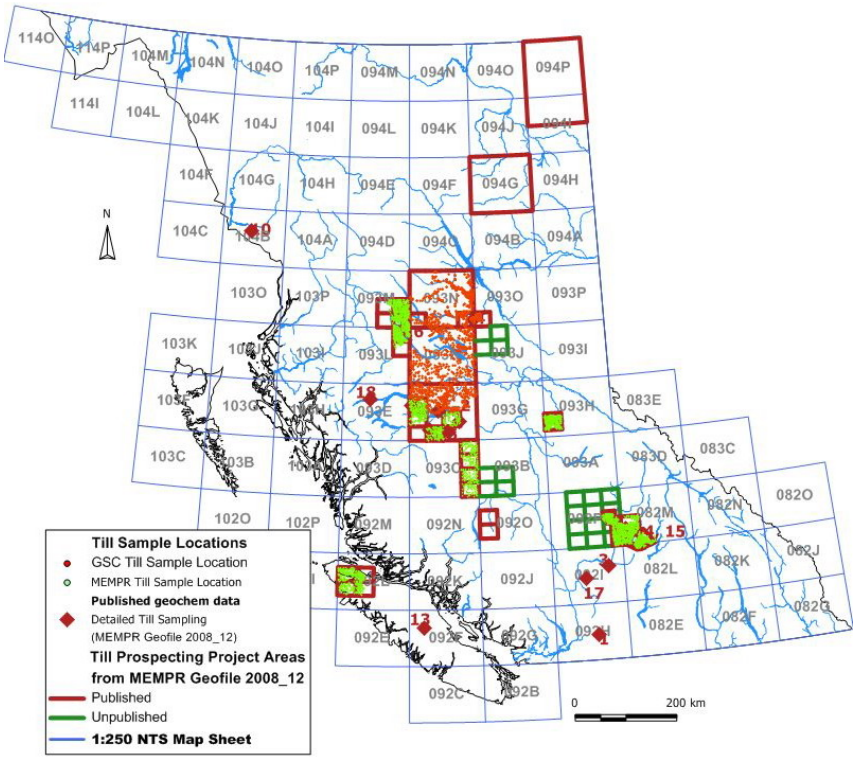


Figure 1

## *Till Geochemical File Structure*

| Column Title Primary Abbreviation | Translation | Column Title Secondary Abbreviation | Translation |
|---|---|---|---|
| MASTER_NUM | Unique samples identification – combines NTS Map Number, collection year & number. All samples are prefix TILL to distinguish from stream and lake sediments | | |
| UNIT | Glacial sediment type (codes from GSB and GSC reports) | Mu<br>Mb<br>Mv<br>Ma<br>Mr<br>Meb<br>Mgb<br>Cv<br>Ceb<br>Cgb<br>FG<br>LG<br>R<br>R<br>T<br>F<br>FG^Mb | Morainal (till) – type unspecified by likely to be till<br>Morainal – till blanket (> 3 m thick)<br>Morainal – till veneer (< 3 m thick)<br>Morainal – ablation till<br>Morainal – resedimented<br>Till mainly from Eagle Bay rocks<br>Till mainly from Baldy Batholith rocks<br>Colluvium – veneer<br>Colluvium mainly reworked Eagle Bay rocks<br>Colluvium mainly reworked Baldy intrusive rocks<br>Glaciofluvial<br>Glaciolacustrine<br>Bedrock<br>Resedimented<br>Terrace<br>Fan<br>Sequence (e.g. glaciofluvial on till) |
| MAP50 | NTS 1:50 000 scale map ID | | |
| MAP 20 | NTS 1:20 000 scale map ID (0 if no 1:20 000 sheet identified | | |
| YEAR | Year sample collected | | |
| SURVEY_NUM | Sample number in survey | | |
| STATUS | Quality control identifier | 00<br>10<br>20<br>30 | Routine sample<br>First field duplicate<br>Second field duplicate<br>Third field duplicate |
| UTMZ | UTM Zone | | |
| UTME83 | UTM East Sample Coordinate-NAD 83 | | |
| UTMN83 | UTM North Sample Coordinate-NAD 83 | | |
| LAT | Latitude – Decimal degrees | | |
| LONG | Longitude – Decimal degrees | | |

| | | | |
|---|---|---|---|
| STRAT | Bedrock Geology Code – STRAT 1 (from Massey et al, 2005) | | |
| STRAT_NAME | Strata name (from Massey et al, 2005) | | |
| ROCK_TYPE | Rock type summary description (from Massey et al, 2005) | | |
| ORIGIONAL_D | Rock type original description (from Massey et al, 2005) | | |
| REPORT | Source report for analytical data (See Ferbey, 2008, for complete listing of reports. | | |
| LAB_1 | First Laboratory responsible for analyses | | ACTIVATION – Activation Laboratories Ltd. Ancaster, Ontario<br>BECQUEREL – Becquerel Laboratories, Mississauga, Ontario. |
| METHOD_1 | Instrumental neutron activation analysis of the < 0.063 mm fraction. Note that ach method, laboratory and elements determined are identified by separate columns (see below). symbol, method ID and unit. For example gold by instrumental neutron activation in units of parts per billion will be Au_INA_ppb. If there were two, repeat determinations for and the element (e.g. Au) the column header may be designated 1 and 2 e.g. Au1_INA_ppb and Au2_INA_ppb. Also, note that Wt is the sample weight irradiated for INAA analysis. | | |
| As_INA_ppm | e.g. Arsenic by instrumental neutron activation in parts per million | | |
| LAB_2 | Second laboratory responsible for analyses | | ACME – Acme Analytical Ltd. Vancouver, BC<br>BONDAR – Bondar Clegg Ltd. Vancouver, BC (no longer in business).<br>CHEMEX ALS-Chemex Ltd, North Vancouver, BC. |
| METHOD_2 | Second method of analysing 0.063 mm fraction. Typically an aqua regia digestion of the < 0.063 mm fraction followed by inductively coupled plasma emission spectroscopy. | | |
| LAB_3 | Third laboratory responsible for analyses | | ACME – Acme Analytical Ltd. Vancouver, BC |
| METHOD_3 | Third method of analysing 0.063 mm fraction. Typically an lithium metaborate fusion of the < 0.063 mm fraction followed by inductively coupled plasma emission spectroscopy. | | |
| | | | |

Table 1: Data File structure

| | Mean | median | Quartile | SD | Max | Min | 50%ile | 60%ile | 70%ile | 80%ile | 90%ile | 95%ile | 98%ile | 99%ile | Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Au1_INA_ppb | 10.1 | 3.0 | 9.0 | 34.0 | 1210.0 | 0.5 | 3.0 | 5.0 | 7.0 | 11.0 | 20.0 | 37.0 | 66.0 | 107.4 | 5741 |
| Au2_INA_ppb | 10.6 | 5.5 | 10.8 | 14.8 | 67.0 | -2.0 | 5.5 | 7.0 | 8.5 | 15.0 | 30.5 | 43.5 | 52.7 | 57.9 | 66 |
| Ag_INA_ppm | 1.9 | 2.5 | 2.5 | 2.0 | 9.0 | -5.0 | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1605 |
| As_INA_ppm | 13.8 | 10.0 | 16.0 | 32.6 | 2100.0 | -5.0 | 10.0 | 12.0 | 14.0 | 17.2 | 23.8 | 33.0 | 50.1 | 69.5 | 5741 |
| Ba_INA_ppm | 833.1 | 810.0 | 990.0 | 314.3 | 4600.0 | -50.0 | 810.0 | 860.0 | 940.0 | 1000.0 | 1200.0 | 1400.0 | 1600.0 | 1800.0 | 5741 |
| Br_INA_ppm | 3.7 | 0.5 | 2.1 | 22.5 | 770.0 | -0.6 | 0.5 | 0.5 | 1.7 | 2.5 | 4.3 | 8.5 | 27.0 | 73.0 | 5741 |
| Ca_INA_ppm | 2.4 | 2.0 | 3.0 | 2.5 | 26.0 | -1.0 | 2.0 | 3.0 | 3.0 | 4.0 | 5.0 | 6.0 | 8.0 | 10.0 | 3873 |
| Cd_INA_ppm | 2.5 | 2.5 | 2.5 | 0.0 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 456 |
| Ce_INA_ppm | 55.9 | 47.0 | 62.0 | 29.3 | 310.0 | 2.0 | 47.0 | 51.0 | 57.0 | 70.0 | 92.0 | 115.0 | 149.0 | 168.8 | 5741 |
| Co_INA_ppm | 18.4 | 16.0 | 23.0 | 9.9 | 120.0 | -1.0 | 16.0 | 18.0 | 21.0 | 24.0 | 31.0 | 38.0 | 46.2 | 52.0 | 5741 |
| Cr_INA_ppm | 122.1 | 100.0 | 150.0 | 100.4 | 2630.0 | 0.0 | 100.0 | 120.0 | 140.0 | 160.0 | 200.0 | 250.0 | 341.8 | 450.0 | 5741 |
| Cs_INA_ppm | 3.6 | 2.0 | 4.0 | 6.1 | 77.0 | -1.0 | 2.0 | 3.0 | 3.0 | 4.0 | 5.2 | 8.0 | 29.0 | 37.0 | 5741 |
| Eu_INA_ppm | 1.5 | 1.5 | 1.7 | 0.5 | 7.3 | 0.1 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.3 | 2.8 | 3.1 | 5741 |
| Fe_INA_% | 4.9 | 4.6 | 5.6 | 1.5 | 17.9 | 0.9 | 4.6 | 5.0 | 5.3 | 5.9 | 6.8 | 7.6 | 8.6 | 9.5 | 5741 |
| Hf_INA_ppm | 5.7 | 5.0 | 7.0 | 2.1 | 23.0 | 0.5 | 5.0 | 6.0 | 6.0 | 7.0 | 8.0 | 10.0 | 11.0 | 13.0 | 5633 |
| Hg_INA_ppm | 0.6 | 0.5 | 0.5 | 3.1 | 48.0 | -1.0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 1149 |
| Ir_INA_ppb | 1.6 | 2.0 | 2.5 | 1.9 | 16.0 | -5.0 | 2.0 | 2.0 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 1605 |
| La_INA_ppm | 29.3 | 24.0 | 32.6 | 16.7 | 190.0 | 3.0 | 24.0 | 27.0 | 30.0 | 37.0 | 51.0 | 63.0 | 80.1 | 92.0 | 5741 |
| Lu_INA_ppm | 0.5 | 0.5 | 0.6 | 0.2 | 2.2 | 0.0 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.9 | 1.0 | 5741 |
| Mo_INA_ppm | 1.1 | 0.5 | 1.0 | 2.8 | 41.0 | -3.0 | 0.5 | 0.5 | 1.0 | 2.0 | 4.0 | 6.0 | 9.0 | 12.0 | 5741 |
| Na_INA_% | 1.9 | 1.9 | 2.2 | 0.6 | 4.5 | 0.0 | 1.9 | 2.1 | 2.2 | 2.3 | 2.5 | 2.7 | 2.9 | 3.1 | 5741 |
| Nd_INA_ppm | 21.6 | 20.0 | 27.0 | 12.0 | 108.0 | -5.0 | 20.0 | 22.0 | 25.0 | 29.0 | 37.0 | 44.0 | 53.0 | 59.0 | 5741 |
| Ni_INA_ppm | 42.4 | 10.0 | 61.0 | 96.1 | 1120.0 | -68.0 | 10.0 | 24.0 | 44.0 | 82.0 | 140.0 | 190.0 | 280.0 | 370.0 | 2131 |
| Rb_INA_ppm | 56.4 | 51.0 | 71.0 | 36.2 | 300.0 | -15.0 | 51.0 | 58.0 | 66.0 | 78.0 | 98.0 | 121.0 | 160.0 | 184.0 | 5741 |
| Sb_INA_ppm | 1.5 | 1.2 | 1.8 | 1.7 | 52.0 | -0.1 | 1.2 | 1.4 | 1.7 | 2.0 | 2.7 | 3.5 | 5.1 | 6.6 | 5741 |
| Sc_INA_ppm | 18.4 | 17.0 | 21.0 | 7.0 | 68.0 | 4.3 | 17.0 | 18.0 | 20.0 | 23.0 | 28.0 | 32.0 | 37.7 | 42.0 | 5633 |
| Se_INA_ppm | -0.3 | 0.0 | 2.0 | 2.5 | 31.0 | -5.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.5 | 2.5 | 2.5 | 2.5 | 3684 |
| Sm_INA_ppm | 5.1 | 4.7 | 6.0 | 1.9 | 22.0 | 1.2 | 4.7 | 5.1 | 5.7 | 6.4 | 7.5 | 8.7 | 10.0 | 11.2 | 5741 |
| Sn_INA_ppm | 12.0 | 0.0 | 50.0 | 28.4 | 50.0 | -100.0 | 0.0 | 0.0 | 0.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 5168 |
| Sr_INA_ppm | 45.2 | 0.0 | 0.0 | 137.8 | 1100.0 | -500.0 | 0.0 | 0.0 | 0.0 | 250.0 | 250.0 | 250.0 | 250.0 | 250.0 | 5168 |
| Ta_INA_ppm | 0.7 | 0.5 | 1.1 | 0.9 | 11.0 | -0.7 | 0.5 | 0.5 | 0.9 | 1.3 | 1.8 | 2.2 | 3.0 | 3.9 | 5633 |
| Tb_INA_ppm | 0.6 | 0.6 | 0.9 | 0.5 | 2.9 | -0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.1 | 1.3 | 1.5 | 1.6 | 5276 |
| Te_INA_ppm | 0.8 | 0.0 | 0.0 | 1.8 | 11.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 5.0 | 5.0 | 5.0 | 5.0 | 5127 |
| Th_INA_ppm | 7.6 | 5.3 | 7.8 | 7.6 | 120.0 | -0.2 | 5.3 | 5.8 | 6.9 | 9.6 | 15.0 | 19.6 | 26.8 | 45.0 | 5741 |
| U_INA_ppm | 2.5 | 2.2 | 2.9 | 1.9 | 27.0 | -0.5 | 2.2 | 2.5 | 2.8 | 3.2 | 4.1 | 5.1 | 7.3 | 9.9 | 5741 |
| W_INA_ppm | 0.6 | 1.0 | 1.0 | 1.4 | 20.0 | -1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | 5.0 | 6.0 | 5741 |
| Yb_INA_ppm | 3.1 | 3.0 | 3.5 | 1.0 | 15.0 | 0.1 | 3.0 | 3.2 | 3.4 | 3.7 | 4.1 | 4.7 | 5.6 | 6.5 | 5741 |
| Zn_INA_ppm | 107.7 | 113.0 | 146.8 | 124.9 | 5700.0 | -50.0 | 113.0 | 125.0 | 139.0 | 155.6 | 182.0 | 210.0 | 260.0 | 310.6 | 4838 |
| Zr_INA_ppm | 79.5 | 25.0 | 230.0 | 149.9 | 580.0 | -50.0 | 25.0 | 25.0 | 210.0 | 250.0 | 300.0 | 340.0 | 400.0 | 450.0 | 456 |

Table 2. Statistics for instrumental neutron activation determined elements

| | Mean | median | Quartile | SD | Max | Min | 50%ile | 60%ile | 70%ile | 80%ile | 90%ile | 95%ile | 98%ile | 99%ile | Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Au_ICP_ppb | 2.3 | 2.0 | 3.0 | 2.5 | 16.0 | 0.5 | 2.0 | 2.0 | 3.0 | 4.0 | 4.0 | 5.5 | 9.4 | 12.5 | 71 |
| Ag_ICP_ppm | 0.1 | 0.1 | 0.2 | 0.3 | 8.4 | -0.3 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.4 | 0.6 | 0.7 | 5786 |
| Al_ICP_% | 2.0 | 1.8 | 2.3 | 0.9 | 9.2 | 0.0 | 1.8 | 2.0 | 2.1 | 2.4 | 2.9 | 3.6 | 4.4 | 5.4 | 5786 |
| As_ICP_ppm | 10.5 | 7.0 | 13.0 | 30.9 | 2024.0 | -2.0 | 7.0 | 9.0 | 12.0 | 15.0 | 21.0 | 30.0 | 45.9 | 60.7 | 5786 |
| B_ICP_ppm | 2.8 | 3.0 | 4.0 | 6.4 | 110.0 | -3.0 | 3.0 | 3.0 | 3.0 | 5.0 | 10.0 | 13.0 | 16.0 | 19.0 | 1557 |
| Ba_ICP_ppm | 156.8 | 140.0 | 207.8 | 105.8 | 2138.4 | 0.0 | 140.0 | 162.0 | 190.0 | 225.0 | 279.5 | 332.0 | 420.0 | 474.0 | 5786 |
| Be_ICP_ppm | 0.2 | 0.3 | 0.3 | 0.2 | 2.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 | 0.5 | 1859 |
| Bi_ICP_ppm | 0.9 | 1.0 | 2.0 | 1.6 | 15.0 | -2.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 3.0 | 5.0 | 6.0 | 4683 |
| Ca_ICP_% | 1.1 | 0.7 | 1.1 | 1.6 | 28.6 | 0.0 | 0.7 | 0.8 | 1.0 | 1.3 | 2.4 | 3.7 | 6.3 | 8.3 | 5786 |
| Cd_ICP_ppm | 0.3 | 0.2 | 0.3 | 0.5 | 22.0 | -0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.6 | 1.0 | 1.6 | 2.1 | 5786 |
| Ce_ICP_ppm | 9.3 | 2.0 | 2.0 | 17.6 | 81.0 | 0.0 | 2.0 | 2.0 | 2.0 | 2.0 | 46.0 | 52.1 | 58.0 | 62.0 | 460 |
| Co_ICP_ppm | 15.5 | 14.0 | 19.0 | 9.4 | 120.0 | 0.0 | 14.0 | 16.0 | 18.0 | 21.0 | 26.0 | 33.0 | 42.0 | 51.0 | 5786 |
| Cr_ICP_ppm | 48.9 | 37.0 | 59.0 | 44.7 | 789.0 | 0.0 | 37.0 | 45.0 | 54.0 | 66.0 | 91.0 | 116.0 | 178.0 | 230.4 | 5786 |
| Cu_ICP_ppm | 62.2 | 45.0 | 68.5 | 91.2 | 3653.0 | 0.0 | 45.0 | 52.0 | 61.6 | 79.0 | 114.0 | 162.8 | 245.1 | 320.3 | 5786 |
| Fe_ICP_% | 3.7 | 3.6 | 4.3 | 1.3 | 14.9 | 0.0 | 3.6 | 3.9 | 4.2 | 4.5 | 5.2 | 6.1 | 7.2 | 8.0 | 5786 |
| Ga_ICP_ppm | 5.2 | 5.0 | 6.4 | 5.3 | 31.0 | 0.0 | 5.0 | 5.0 | 5.7 | 7.4 | 12.1 | 17.0 | 21.0 | 23.0 | 3450 |
| Hg_ICP_ppb | 49.0 | 28.0 | 67.0 | 76.2 | 2228.0 | -10.0 | 28.0 | 39.0 | 55.0 | 80.0 | 125.0 | 170.0 | 230.0 | 294.0 | 3621 |
| K_ICP_% | 0.1 | 0.1 | 0.2 | 0.1 | 2.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.5 | 0.7 | 5786 |
| La_ICP_ppm | 18.1 | 14.0 | 23.0 | 14.5 | 155.0 | 0.0 | 14.0 | 18.0 | 21.0 | 27.0 | 34.0 | 44.0 | 58.0 | 68.0 | 3300 |
| Li_ICP_ppm | 14.7 | 14.0 | 16.0 | 6.5 | 65.0 | 0.0 | 14.0 | 15.0 | 16.0 | 18.0 | 22.0 | 28.0 | 33.6 | 37.8 | 460 |
| Mg_ICP_% | 0.9 | 0.7 | 1.1 | 0.7 | 10.1 | 0.0 | 0.7 | 0.9 | 1.0 | 1.2 | 1.6 | 2.1 | 2.8 | 3.6 | 5786 |
| Mn_ICP_ppm | 720.7 | 650.0 | 875.0 | 413.2 | 6061.0 | 0.0 | 650.0 | 727.0 | 820.5 | 938.0 | 1162.5 | 1388.8 | 1824.9 | 2277.5 | 5786 |
| Mo_ICP_ppm | 1.4 | 1.0 | 1.1 | 2.4 | 61.0 | -1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.9 | 4.1 | 8.0 | 11.0 | 5786 |
| Na_ICP_% | 0.1 | 0.0 | 0.0 | 0.3 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 2.0 | 5786 |
| Nb_ICP_ppm | 5.3 | 5.0 | 6.0 | 1.2 | 9.0 | 0.0 | 5.0 | 6.0 | 6.0 | 6.0 | 7.0 | 7.0 | 8.0 | 8.0 | 461 |
| Ni_ICP_ppm | 43.9 | 32.0 | 51.0 | 56.3 | 1491.0 | 0.0 | 32.0 | 38.0 | 46.0 | 57.0 | 80.0 | 111.9 | 161.0 | 218.2 | 5786 |
| P_ICP_% | 0.1 | 0.1 | 0.1 | 0.0 | 0.5 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 5786 |
| Pb_ICP_ppm | 12.5 | 9.2 | 14.0 | 18.4 | 779.9 | -3.0 | 9.2 | 11.0 | 13.0 | 16.0 | 22.0 | 29.0 | 49.6 | 77.7 | 5786 |
| Rb_ICP_ppm | 36.0 | 25.0 | 57.5 | 30.2 | 109.0 | 10.0 | 25.0 | 34.0 | 48.0 | 67.0 | 81.0 | 94.5 | 102.4 | 106.9 | 71 |
| Sb_ICP_ppm | 1.1 | 0.7 | 2.0 | 2.8 | 47.0 | -2.0 | 0.7 | 1.0 | 1.1 | 2.0 | 2.3 | 4.0 | 8.0 | 13.0 | 3717 |
| Sc_ICP_ppm | 6.9 | 7.0 | 8.0 | 2.9 | 32.0 | 0.0 | 7.0 | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 13.0 | 14.4 | 1859 |
| Se_ICP_ppm | 0.2 | 0.0 | 0.3 | 0.5 | 7.8 | -0.3 | 0.0 | 0.2 | 0.3 | 0.4 | 0.6 | 0.9 | 1.6 | 2.1 | 1398 |
| Sn_ICP_ppm | 10.2 | 10.0 | 10.0 | 6.4 | 135.0 | 0.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 468 |
| Sr_ICP_ppm | 56.6 | 50.0 | 71.0 | 41.2 | 861.0 | 0.0 | 50.0 | 58.0 | 67.0 | 77.0 | 96.5 | 122.0 | 153.0 | 197.2 | 5786 |
| Ta_ICP_ppm | 1.0 | 0.0 | 0.0 | 2.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 2223 |
| Te_ICP_ppm | 0.7 | 0.0 | 0.0 | 1.7 | 13.2 | -0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 5.0 | 5.0 | 5.0 | 5.0 | 3347 |
| Th_ICP_ppm | 5.4 | 4.0 | 7.0 | 4.3 | 32.0 | -2.0 | 4.0 | 5.0 | 6.6 | 8.0 | 10.3 | 13.8 | 18.2 | 20.8 | 1245 |
| Ti_ICP_% | 0.1 | 0.1 | 0.2 | 0.1 | 0.9 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.5 | 5678 |
| Tl_ICP_ppm | 0.6 | 0.0 | 0.1 | 1.6 | 5.0 | -0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 5.0 | 5.0 | 5.0 | 5.0 | 3348 |
| U_ICP_ppm | 4.9 | 5.0 | 5.0 | 1.6 | 30.0 | 0.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 9.8 | 510 |
| V_ICP_ppm | 75.4 | 71.0 | 90.0 | 31.5 | 419.0 | 0.0 | 71.0 | 77.0 | 85.0 | 95.0 | 113.0 | 130.8 | 153.3 | 170.0 | 5786 |
| W_ICP_ppm | 2.4 | 5.0 | 5.0 | 3.3 | 21.0 | -2.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 10.0 | 1529 |
| Y_ICP_ppm | 10.6 | 10.0 | 11.0 | 3.0 | 25.0 | 0.0 | 10.0 | 10.0 | 11.0 | 12.0 | 15.0 | 17.0 | 18.0 | 21.4 | 460 |
| Zn_ICP_ppm | 85.4 | 75.0 | 99.0 | 98.4 | 5067.0 | 0.0 | 75.0 | 83.0 | 93.0 | 106.0 | 126.4 | 157.0 | 205.0 | 271.2 | 5786 |
| Zr_ICP_ppm | 12.2 | 11.0 | 14.0 | 6.4 | 44.0 | 0.0 | 11.0 | 12.0 | 13.0 | 15.0 | 19.0 | 25.0 | 30.8 | 36.2 | 460 |

Table 3. Statistics for aqua regia - ICPES determined elements

| | Mean | median | Quartile | SD | Max | Min | 50%ile | 60%ile | 70%ile | 80%ile | 90%ile | 95%ile | 98%ile | 99%ile | Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SiO2_LI_% | 57.0 | 60.7 | 65.2 | 15.5 | 78.0 | 0.0 | 60.7 | 62.5 | 64.3 | 66.1 | 68.3 | 70.5 | 72.4 | 73.5 | 3701 |
| Al2O3_LI_% | 13.6 | 14.2 | 15.5 | 3.9 | 23.5 | 0.0 | 14.2 | 14.7 | 15.2 | 15.9 | 16.9 | 17.8 | 19.5 | 20.6 | 3701 |
| Fe2O3_LI_% | 6.6 | 6.6 | 8.1 | 2.6 | 18.8 | 0.0 | 6.6 | 7.1 | 7.7 | 8.5 | 9.6 | 10.6 | 12.3 | 13.2 | 3701 |
| MgO_LI_% | 2.2 | 1.9 | 3.0 | 1.6 | 21.8 | 0.0 | 1.9 | 2.3 | 2.7 | 3.3 | 4.2 | 5.0 | 6.1 | 7.4 | 3701 |
| CaO_LI_% | 3.1 | 2.4 | 4.1 | 2.9 | 36.2 | 0.0 | 2.4 | 3.1 | 3.7 | 4.5 | 6.3 | 8.2 | 10.8 | 12.8 | 3701 |
| Na2O_LI_% | 2.3 | 2.4 | 2.9 | 1.0 | 30.3 | 0.0 | 2.4 | 2.6 | 2.8 | 3.1 | 3.4 | 3.6 | 3.9 | 4.1 | 3701 |
| K2O_LI_% | 1.7 | 1.5 | 2.1 | 1.0 | 6.4 | 0.0 | 1.5 | 1.7 | 2.0 | 2.3 | 3.0 | 3.7 | 4.5 | 5.0 | 3701 |
| TiO2_LI_% | 1.0 | 0.9 | 1.2 | 0.4 | 5.0 | 0.0 | 0.9 | 1.0 | 1.1 | 1.3 | 1.5 | 1.8 | 2.2 | 2.4 | 3701 |
| P2O5_LI_% | 0.2 | 0.2 | 0.3 | 0.1 | 1.1 | 0.0 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 3701 |
| MnO_LI_% | 0.1 | 0.1 | 0.1 | 0.1 | 0.8 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 3701 |
| Cr2O3_LI_% | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 3701 |
| Ba_LI_ppm | 848.8 | 783.0 | 936.0 | 720.3 | 31035.0 | 0.0 | 783.0 | 834.0 | 894.0 | 985.0 | 1164.5 | 1383.8 | 1715.3 | 2141.2 | 3116 |
| Ni_LI_ppm | 50.1 | 45.0 | 68.0 | 58.7 | 1322.0 | -20.0 | 45.0 | 53.0 | 62.0 | 74.0 | 97.0 | 127.3 | 174.7 | 221.6 | 3116 |
| Sr_LI_ppm | 266.3 | 253.0 | 334.0 | 125.8 | 1205.0 | 0.0 | 253.0 | 281.0 | 314.0 | 364.0 | 450.0 | 497.0 | 540.0 | 571.9 | 3116 |
| Zr_LI_ppm | 193.1 | 174.0 | 230.0 | 92.8 | 1390.0 | 0.0 | 174.0 | 195.0 | 217.0 | 246.0 | 292.0 | 349.5 | 438.7 | 526.9 | 3116 |
| Y_LI_ppm | 23.6 | 23.0 | 28.0 | 8.8 | 131.0 | -10.0 | 23.0 | 25.0 | 27.0 | 30.0 | 33.0 | 37.0 | 42.0 | 47.0 | 3116 |
| Nb_LI_ppm | -5.8 | 0.0 | 19.0 | 33.5 | 99.0 | -50.0 | 0.0 | 14.0 | 17.0 | 21.0 | 34.0 | 42.0 | 50.0 | 55.0 | 1993 |
| Sc_LI_ppm | 11.3 | 13.0 | 16.0 | 9.6 | 45.0 | -10.0 | 13.0 | 14.0 | 15.0 | 18.0 | 22.0 | 25.0 | 29.0 | 32.0 | 3116 |
| LOI_GRAV_% | 6.6 | 5.9 | 7.4 | 4.4 | 54.6 | 0.0 | 5.9 | 6.4 | 7.0 | 7.9 | 10.1 | 13.3 | 20.1 | 27.3 | 3580 |

Table 4. Statistics for lithium metaborate fusion-ICPES determined elements

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