# Report on the 2019 Kamiskotia area Geochronology, Stratigraphy and VMS Potential

By John Ayer, Ph.D., P.Geo, Ayer and Associates Consulting Geologists, Sudbury and Mike Hamilton, Ph.D., Jack Satterly Geochronology Laboratory, University of Toronto

## Introduction

Two geochronology samples were collected in the Kamiskotia area of Timmins, Ontario during the summer of 2019 for International Explorers and Prospectors Inc. (IEP). Identification of the best areas for sample collection was provided by 2 days of consultations by John Ayer and Ben Berger. Analysis and results on the geochronology samples was provided by Mike Hamilton of the Jack Satterly Geochronological Laboratory (JGSL) in 2019.

The Abitibi greenstone belt (AGB) is a difficult area to explore for Volcanogenic Massive Sulfide (VMS) deposits because of the structural complications related to multiple episodes of folding and faulting, metamorphism locally up to amphibolite facies and extensive overburden thickness of glacial till and lacustrine clay. Geophysics, as well as lithogeochemistry, alteration studies and an understanding of the stratigraphic location of favourable horizons for VMS deposition are thus valuable tools in the search for new deposits. In order to better understand the distribution of key base metal bearing stratigraphic assemblages to aid in future exploration for VMS deposits on IEP's claim holdings the geochronological samples were collected in strategic areas based on previous geochronological and lithogeochemical results including the IEP report from 2017. Two new samples of felsic volcanic rock were collected from outcrop and diamond drill core in Godfrey and Loveland townships respectively.

### Analytical Methods

U-Pb work was carried out at the Jack Satterly Geochronology Laboratory at the University of Toronto. New rock samples were crushed using a jaw crusher, and ground with a disk mill. Initial separation of heavy minerals was carried out via multiple passes on a Wilfley table to concentrate zircon. Subsequent work included density separation using methylene iodide, followed by magnetic separations with a Frantz isodynamic separator. Final sample selection was achieved by hand picking under a microscope, choosing the highest optical quality euhedral zircon grains (as inclusion-, crack-, alteration-free as possible). Grains with obvious cores were avoided.

Chemical abrasion (CA, Mattinson, 2005) pre-treatment methods were used to improve concordance of zircon analyzed subsequently by isotope dilution – thermal ionization mass spectrometry (ID-TIMS). Selected single grain zircon fractions were annealed in a quartz crucible at 900°C for a period of 48 hours. Crystals were then leached in hydrofluoric acid (HF) at 200°C in Teflon bombs (Krogh, 1973) for 4 hours.

Weights of zircon grains were estimated from photomicrographs and the density of zircon. Mineral grains were washed prior to loading for dissolution. Zircon was dissolved using concentrated HF in Teflon bombs at 200°C (Krogh, 1973), to which a $^{205}Pb$-$^{235}U$ spike was added. Samples were dried and subsequently re-dissolved in 3N HCl overnight to convert to a salt and promote equilibration with the spike. U and Pb were separated from the solutions using 50 microliter anion exchange columns (Krogh, 1973). Column washes were preserved for possible future use (e.g. Hf isotopic analysis). Mixed, purified U and Pb solutions were loaded directly onto Re filaments using silica gel and analyzed with a VG354 mass spectrometer in single (Daly) collector, pulse-counting mode. Deadtimes of the measuring system for Pb and U during this period were 15 ns. The mass discrimination correction for the Daly detector was constant at 0.07%/AMU. Daly characteristics were monitored using the SRM982 Pb standard. Thermal mass discrimination corrections were 0.10 ± 0.03% /AMU.

The new zircon chemical abrasion methods, combined with spike refinements and increased instrumental sensitivities, result in more accurate and more precise age determinations than initially possible during earlier studies of the volcanic stratigraphy in the AGB.

## Blake River Assemblage

The Kamiskotia Volcanic Complex (KVC) consists of an extensive bimodal sequence of tholeiitic basalts and high silica rhyolites located about 20 km northwest of Timmins in the Kamiskotia area of the Abitibi greenstone belt (AGB). The KVC is part of the Blake River assemblage, the youngest volcanic-dominated assemblage within the AGB with ages ranging from 2704 to 2697 Ma (Ayer et al., 2002, 2005). The KVC has a broad northerly strike, extending from a faulted contact with the Kidd Munro assemblage in northern Bristol Township to a faulted contact with the Kidd Munro assemblage in northern Robb and Jamieson townships (Fig. 1). Extending for over a strike length of 25 km, the KVC represents the second largest accumulation of rhyolites in the AGB, following the ~50 km strike length of felsic volcanics hosting the Matagami VMS camp in Quebec. To the west, the KVC is underlain by the Kamiskotia Gabbroic Complex (KGC), an extensive mafic intrusion with ages ranging from 2707 ± 2 to 2705 ± 2 Ma (Fig. 1). To the east, the KVC is truncated by the Mattagami River fault, a north striking Proterozoic-aged fault in which the older Archean rocks of the AGB are displaced with sinistral offset of 5 to 10 km.

### Previous Geochronology

U-Pb zircon geochronology by Barrie and Davis (1990) yielded an of age of 2707 ± 2 Ma for a pegmatitic quartz gabbro from the Middle Zone of KGC in southern Turnbull Township and 2705 ± 2 Ma for rhyolite in southwestern Godfrey Township (Fig. 1).

Subsequent higher precision U-Pb zircon geochronology (Hathway et. al., 2008) yielded an age of 2704.8 ± 1.4 Ma from a granophyric sample in the Upper Zone of the KGC in central Robb Township. The 4 new KVC rhyolite ages ranged from an age of 2703.1 ± 1.2 Ma in the lower part of the KVC in Turnbull Township to 3 rhyolite ages ranging from 2701.1 ± 1.4 to 2698.6 ± 1.3 Ma in the upper stratigraphic part, thus confirming that the KVC is part of the Blake River assemblage (2704–2697 Ma) (Ayer et al., 2005). The upper part of the KVC appears to be more favourable for VMS mineralization containing 5 known VMS deposits extending over 15 km from the Half Moon deposit in Robb Township to the Genex mine in Godfrey Township (Fig. 1).

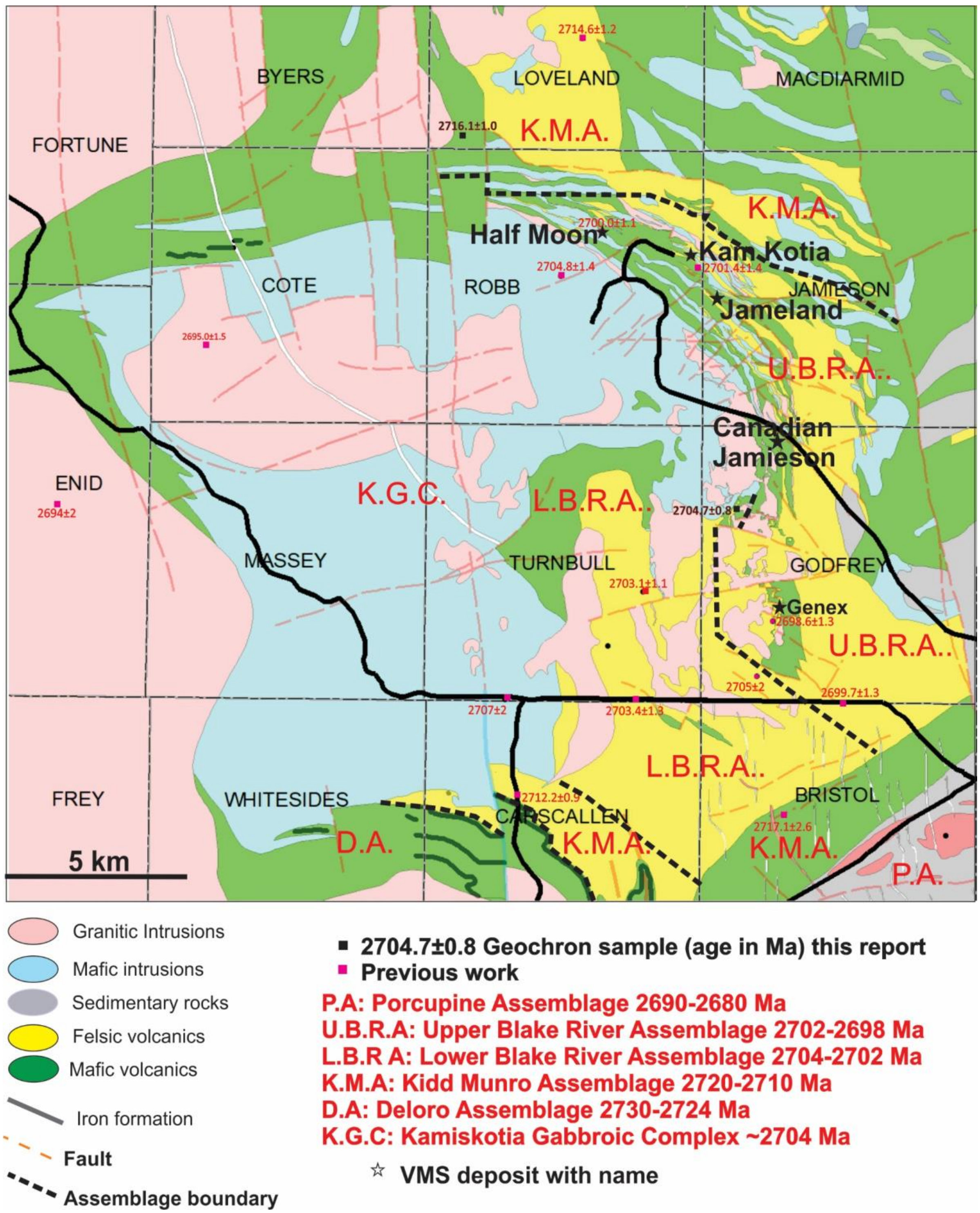


*Figure 1. Kamiskotia area general geology with U-Pb zircon ages in Ma, VMS deposit locations and assemblage boundaries.*

Based on the IEP geochronology report (Ayer and Hamilton, 2017), there is a good correlation between an age of 2703.1 ± 1.1 Ma in central Turnbull Township and the 2703.4 ± 0.9 Ma age in southern Turnbull Township and provides further stratigraphic evidence that the western Kamiskotia Volcanic complex in this area is the lower member of KVC (Lower Blake River assemblage) (Fig. 1). An age of 2699.3 ± 1.7 in northern Bristol Township correlates well with the age of 2698.6 ± 1.3 (Hathway et al., 2008) at the Genex mine, located about 4 km to the NNW. This age data indicates that in the south, the KVC is a thick, dominantly felsic volcanic sequence which strikes southeasterly and faces to the east. A conformable contact and an age of 2712.9 ± 0.9 in northern Carscallen Township suggests the lowermost contact of the KVC with the underlying Kidd-Munro assemblage represents a disconformity between the assemblages (see Thurston et al., 2008), in the southwest. However, the abrupt change from northeast-trending mafic volcanic rocks of the lower Kidd-Munro assemblage, with an age 2717.1 ± 2.6 Ma in an intercalated felsic volcanic unit, to lower KVC rhyolites with an age of 2699.3 ± 1.7 in northern Bristol Township Bristol indicates a fault contact between the assemblages. These upper KVC rhyolites in southern Godfrey and northern Bristol townships thus represent a good target area for discovery of VMS deposits, extending the favourable VMS stratigraphy of the upper KVC (i.e. 2700 ± 1 Ma) another 6 km south of Genex.

## Kidd-Munro Assemblage

The Kidd–Munro assemblage (2720–2710 Ma) is host to the Kidd Creek Mine, a giant volcanogenic massive sulfide (VMS) deposit that contains over 150 million tons of copper and zinc mineralization (Fig. 5). The assemblage extends continuously over 250 km from the Kamiskotia area into Quebec and also occurs in a number of isolated sequences throughout the Abitibi (Thurston et al., 2008). Berger et al., (2011) subdivided the Kidd–Munro assemblage into 4 distinct stratigraphic subdivisions as indicated below, based on mapping, geochemistry and an intensive campaign of high-precision U-Pb zircon geochronology. These stratigraphic subdivisions are 2720 to 2717 Ma, 2717 to 2715 Ma, 2715 to 2712 Ma and 2712 to 2710 Ma (Fig. 5). Each age is spatially restricted within the Kidd–Munro episode, has dominant rock types, volcanic morphologies, geochemical affinities and distinctive base metal prospectivity.

The 2717 to 2715 Ma age interval is characterized by a bimodal suite of tholeiitic mafic and high silica felsic metavolcanic flows with lesser pyroclastic deposits, a komatiitic suite composed of subvolcanic dikes, sills and thick cumulate-textured flows, and a transitional suite of mafic, intermediate and felsic metavolcanic rocks. These rocks occur as intercalated units throughout the Kidd–Munro volcanic episode with the greatest concentration in the area of the Kidd Creek base metal deposit. Rare calc-alkalic rocks occur as spatially restricted mafic flows that are intercalated with mafic and intermediate tholeiitic flows.

Tholeiitic felsic metavolcanic rocks of this age are widespread and are host to VMS mineralization such as the giant Kidd Creek deposit and several smaller occurrences. Mafic magma that was erupted synchronous with the komatiite locally hosts potentially economic copper-zinc VMS mineralization (such as the Potter Mine deposit) and account for over 5 million tons of ore. This style of mineralization is poorly understood and under explored given that over 80% of the Kidd–Munro episode is composed of mafic metavolcanic rocks. Kambaldastyle nickel-copper-(platinum group element) mineralization (over 500 000 tons) occurs in thick komatiite flows (sills) within footwall embayments produced by thermo-mechanical erosion and are spatially associated with peperitic komatiitic dikes and sills within this cycle. These prospective units appear to be under explored given the extent of komatiite magmatism of this age. The 2717 to 2715 Ma age bracket appears to be the most prospective for base metal mineralization in the Kidd–Munro episode (Berger et al. 2011).

**2019 IEP geochronological sampling**

This program was focused on understanding the broader extent of known VMS-bearing stratigraphy, and to better define the location of the assemblage boundaries in the Kamiskotia area (Fig. 1). The results of the 2019 dating are discussed below, with U-Pb isotopic data provided in Table 1, and presented graphically as concordia plots with paired zircon population images in Figure 2; The 2019 sample locations are shown as black squares in Figure 1.

Sample 97418 was collected from an outcrop in the Steep Lake area in NW Godfrey Township (Fig. 1). This area is in the vicinity of trenches of 1940s vintage in rhyolite with disseminated pyrite and chalcopyrite identified as the Phillips Oneill Group #1 occurrence (MDI42A12SE00057). Outcrops in this area consist of rhyolite fragmental and flow units. The geochronology sample (UTM: 457119E, 5373353N, NAD 83, Zone 17) is from a reddish-coloured, fine-grained massive rhyolite flow consisting of quartz and feldspar phenocrysts in a very-fine grained groundmass. A heavy mineral concentrate consisted of a small quantity of zircon amongst abundant pyrite. Zircon is present as mostly small, sharply faceted, clear to slightly cloudy prismatic euhedra or broken equivalents. Minor hematite staining is common. Four zircon grains were analyzed and yielded a magmatic age of 2704.7 ± 0.8 Ma (Fig. 2, Table 1). This new age indicates this unit is part of the Lower Blake River assemblage and suggests the contact between upper and lower Blake River assemblage is located further to the east than was previously suggested (Ayer and Hamilton, 2017, Hathway et al. 2008). This eastward modification of the boundary between lower and upper Blake River stratigraphy better explains the age of 2705 ± 0.8 Ma from a rhyolite unit 2.5 km SSW of the Genex deposit (Barrie and Davis 1990) and indicates several kms of dextral displacement of this boundary across a NW trending fault (Fig. 1). This also has implications for exploration focus on the now better delineated and more VMS-favourable Upper Blake River stratigraphy in Godfrey Township.

A second sample was collected from Noranda DDH FPL-89-1 (collar UTM: 447377E, 5386170N, NAD 83, Zone 17) located in SW Loveland Township (Fig. 1). The sample was collected from the 511-516’ interval consisting of fine-grained rhyolite tuffs with minor fine-grained quartz and feldspar crystals. The heavy mineral concentrate from this sample also yielded a very small quantity of zircon (<20 grains) amidst considerable pyrite. The zircon population is represented by a relatively uniform collection of small, pale yellow to pale brown, up to 3:1 euhedral prisms and broken grains. Rare grains show signs of minor pitting and rounding, suggesting that the rhyolite may have a volcaniclastic component. Four best-quality (non-pitted/rounded) zircons were analyzed and yielded a uniform magmatic age of 2716.1 ± 1.0 Ma (Fig. 2, Table 1), without obvious signs of inheritance or older clastic input.

The implication of this new age is that this particular dated volcanic interval coincides with the most highly prospective, yet brief, mineralized event identified just to the east within the VMS-favourable part of the Kidd-Munro assemblage hosting the Kidd Creek Mine (i.e. 2717-15 Ma;

Berger et al., 2011). This interval is now known to extend further west and south into NW Robb Township. A DDH drilled in 2001 by IEP (ERN-01-02) located approximately 400 m south of the above geochronology sample intersected 3.6 m of altered felsic tuff and graphitic argillite with sulfide stringers containing semi-massive sphalerite and pyrite with values of up to 3.4% zinc.

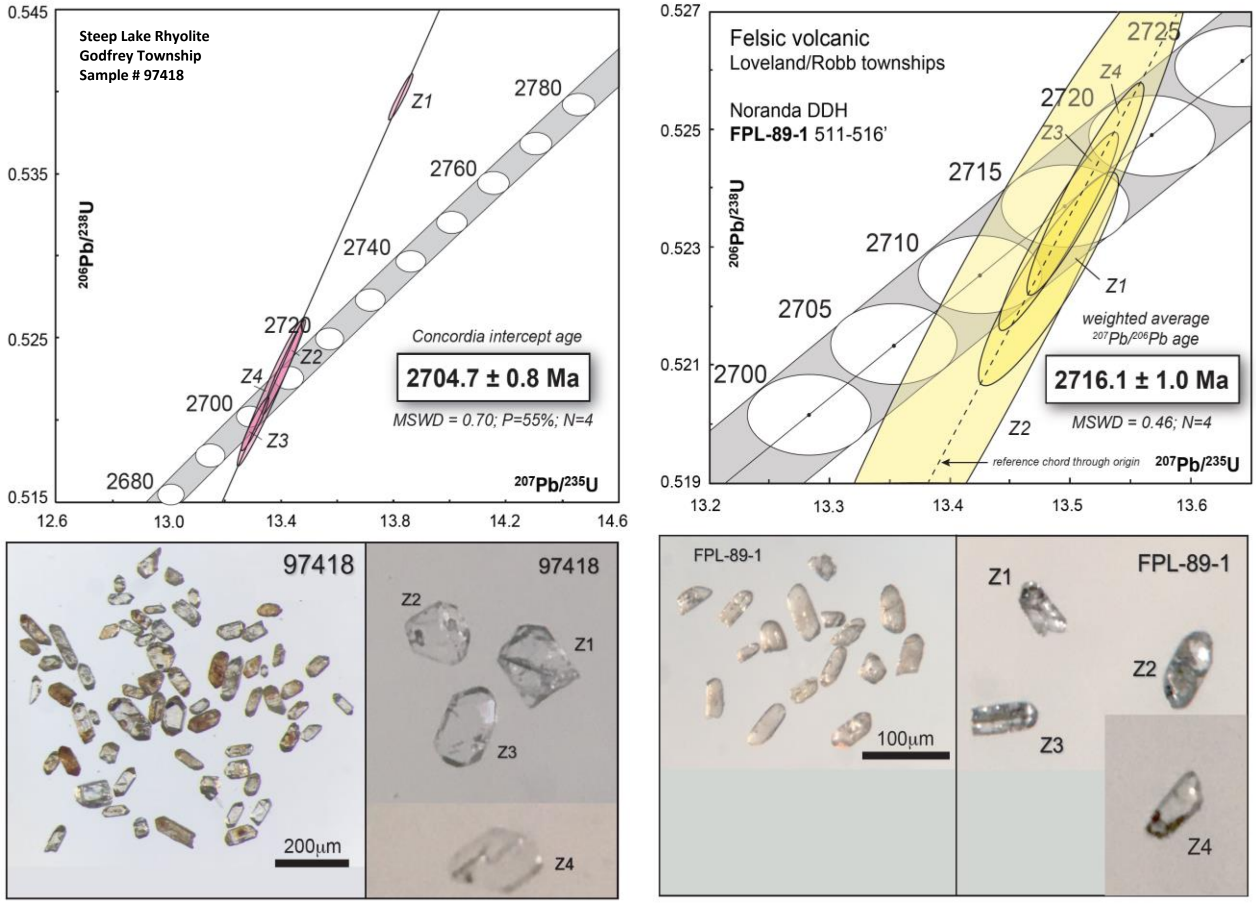


*Figure 2. Concordia plots and images of selected zircons from the Kamiskotia area (see text for details).*

## References


Ayer, J, Amelin, Y., Corfu, F., Kamo, S., Ketchum, J., Kwok, K. and Trowell, N., 2002. Evolution of the southern Abitibi greenstone belt based on U-Pb geochronology: Autochthonous volcanic construction followed by plutonism, regional deformation and sedimentation; Precambrian Research, v.115. p.63-95.

Ayer, J.A., Thurston, P.C., Bateman, R., Dubé, B., Gibson, H.L., Hamilton, M.A., Hathway, B., Hocker, S.M., Houlé, M.G., Hudac, G., Ispolatov, V.O., Lafrance, B., Lesher, C.M., MacDonald, P.J., Péloquin, A.S., Piercey, S.J., Reed, L.E. and Thompson, P.H. 2005. Overview of results of the Greenstone Architecture Project: Discover Abitibi Initiative; Ontario Geological Survey, Open File Report 6154, 146p.

Ayer, J.A., Hamilton, M., 2017. Reid Township and Kamiskotia areas Geochronology, Stratigraphy and VMS Potential, Unpublished report for International Explorers and Prospectors

Barrie and Davis, 1990. Timing of magmatism and deformation in the Kamiskotia-Kidd Creek area, western Abitibi Subprovince, Canada.: Precambrian Research v.46, p.214-240.

Berger, B,. Bleeker, W., van Breemen, O., Chapman, J.B., Peter, J.M., Layton-Matthews D., Gemmell J.B. 2011. Results from the Targeted Geoscience Initiative III Kidd–Munro Project. Ontario Geological Survey, Open File Report 6258, 142p.

Hathway, B., Hudac, G., Hamilton, M.A., 2008. Geologic Setting of Volcanic-Associated Massive Sulfide Deposits in the Kamiskotia Area, Abitibi Subprovince, Canada; *Economic Geology*, v. 103, pp. 1185–1202.

Jaffey, A.H., Flynn, K.F., Glendenin, L.E., Bentley, W.C. and Essling, A.M. 1971. Precision measurement of half-lives and specific activities of 235U and 238U. Physical Review 4, 1889-1906.

Krogh, T.E. 1973. A low contamination method for hydrothermal decomposition of zircon and extraction of U and Pb for isotopic age determinations. Geochimica et Cosmochimica Acta 37, 485-494.

Ludwig, K.R. 2003. User’s manual for Isoplot 3.00 a geochronological toolkit for Excel. Berkeley Geochronological Center Special Publication 4, 71 p.

Mattinson, J. 2005. Zircon U-Pb chemical abrasion (CA-TIMS) method: Combined annealing and multi-step partial dissolution analysis for improved precision and accuracy of zircon ages. Chem. Geol. 220, 47-66.

Thurston P.C., Ayer J.A., Goutier, J., Hamilton M.A., 2008. Depositional gaps in Abitibi greenstone belt stratigraphy: a key to exploration for syngenetic mineralization. Economic Geology, v. 103, pp. 1094-1137.

**Table 1.** Zircon U-Pb isotopic data for felsic volcanic rocks from the Kamiskotia area.

| Fraction | Description | Sample wt. (μg) | U (ppm) | $Pb^T$ (pg) | $Pb_C$ (pg) | Th/U | $^{206}Pb/^{204}Pb$ | $^{206}Pb/^{238}U$ | ± 2s | $^{207}Pb/^{235}U$ | ± 2s | $^{207}Pb/^{206}Pb$ | ± 2s | Ages (Ma) $^{206}Pb/^{238}U$ | ± 2s | $^{207}Pb/^{235}U$ | ± 2s | $^{207}Pb/^{206}Pb$ | ± 2s | Disc. (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***JAA-14-01 Felsic lapillistone, Turnbull Township. DDH ETC-07-5 (97.5-99.0m).*** | | | | | | | | | | | | | | | | | | | | |
| Z1 | 1 clr, cls sml brkn pr | 0.51 | 39 | 11.90 | 0.50 | 0.518 | 1354 | 0.532527 | 0.003016 | 13.69155 | 0.08901 | 0.186470 | 0.000472 | 2752.1 | 12.7 | 2728.6 | 6.1 | 2711.3 | 4.2 | -1.8 |
| Z2 | 1 clr, cls lrg 2:1 pr, incl | 1.10 | 58 | 34.68 | 2.05 | 0.513 | 968 | 0.521298 | 0.001496 | 13.33928 | 0.06974 | 0.185586 | 0.000639 | 2704.7 | 6.3 | 2704.0 | 4.9 | 2703.4 | 5.7 | -0.1 |
| Z3 | 1 clr, cls, el, sl flat | 0.49 | 55 | 16.60 | 1.96 | 0.527 | 492 | 0.526241 | 0.002385 | 13.44741 | 0.11308 | 0.185333 | 0.001050 | 2725.6 | 10.1 | 2711.6 | 8.0 | 2701.2 | 9.4 | -1.1 |
| Z4 | 1 clr, cls, el, sq, brkn | 0.82 | 56 | 28.29 | 0.78 | 0.799 | 1934 | 0.519887 | 0.001045 | 13.30156 | 0.03047 | 0.185560 | 0.000191 | 2698.7 | 4.4 | 2701.3 | 2.2 | 2703.2 | 1.7 | 0.2 |
| Z5 | 1 clr, cls, el rect, brkn | 0.63 | 50 | 18.35 | 0.84 | 0.624 | 1224 | 0.520655 | 0.001209 | 13.32412 | 0.03672 | 0.185605 | 0.000248 | 2702.0 | 5.1 | 2702.9 | 2.6 | 2703.6 | 2.2 | 0.1 |
| ***JAA-14-03 Felsic-intermediate, heterolithic lapilli tuff to breccia, Bristol Township. DH EB [illegible]-00-01 (23[illegible].7-238.2m).*** | | | | | | | | | | | | | | | | | | | | |
| Z1 | 1 clr, cls, lrg 2.5:1 shrp pr, incl | 0.95 | 122 | 75.05 | 0.66 | 0.685 | 6224 | 0.519552 | 0.001134 | 13.30875 | 0.03364 | 0.185783 | 0.000209 | 2697.3 | 4.8 | 2701.8 | 2.4 | 2705.2 | 1.9 | 0.4 |
| Z2 | 1 clr, cls, brkn shrt shrp pr, incl | 0.52 | 97 | 28.88 | 0.30 | 0.545 | 5326 | 0.520062 | 0.001457 | 13.27452 | 0.04183 | 0.185124 | 0.000181 | 2699.4 | 6.2 | 2699.4 | 3.0 | 2699.3 | 1.6 | 0.0 |
| Z3 | 1 clr, cls, sl flat, 2:1 shrp pr, incl | 1.03 | 75 | 44.36 | 0.51 | 0.548 | 4864 | 0.516022 | 0.001205 | 13.20084 | 0.03651 | 0.185538 | 0.000186 | 2682.3 | 5.1 | 2694.1 | 2.6 | 2703.0 | 1.7 | 0.9 |
| Z4 | 1 clr, cls, 4:1 shrp brkn, incl | 0.61 | 84 | 30.46 | 0.80 | 0.637 | 2113 | 0.515005 | 0.001432 | 13.13210 | 0.04559 | 0.184936 | 0.000284 | 2678.0 | 6.1 | 2689.2 | 3.3 | 2697.6 | 2.5 | 0.9 |
| ***JAA-14-04 Quartz porphyritic rhyolite breccia, NE Reid Township.*** | | | | | | | | | | | | | | | | | | | | |
| Z1 | 1 gemmy, crkd, 2.5:1 sq pr | 1.02 | 149 | 93.13 | 0.44 | 0.764 | 11321 | 0.519486 | 0.001030 | 13.27449 | 0.03156 | 0.185329 | 0.000164 | 2697.0 | 4.4 | 2699.4 | 2.2 | 2701.1 | 1.5 | 0.2 |
| Z2 | 1 gemmy, crkd, brkn sq pr frag | 0.98 | 105 | 62.71 | 1.32 | 0.554 | 2670 | 0.517392 | 0.001201 | 13.05411 | 0.03723 | 0.182989 | 0.000283 | 2688.1 | 5.1 | 2683.6 | 2.7 | 2680.2 | 2.6 | -0.4 |
| Z3 | 1 gemmy, crkd, 2:1 sq pr, incl | 0.59 | 140 | 50.40 | 0.46 | 0.592 | 6129 | 0.518520 | 0.001253 | 13.26009 | 0.03725 | 0.185472 | 0.000173 | 2692.9 | 5.3 | 2698.3 | 2.7 | 2702.4 | 1.5 | 0.4 |
| ***JAA-14-05 Quartz and feldspar phenocryst-bearing tuffaceous rhyolite, SE Reid Township.*** | | | | | | | | | | | | | | | | | | | | |
| Z1 | 1 clr, cls, 2:1 shrp pr, incl | 1.15 | 126 | 75.87 | 0.61 | 0.573 | 6900 | 0.521284 | 0.001038 | 13.31619 | 0.03227 | 0.185270 | 0.000173 | 2704.6 | 4.4 | 2702.3 | 2.3 | 2700.6 | 1.5 | -0.2 |
| Z2 | 1 clr, cls, shrt pr, incl | 0.85 | 114 | 34.55 | 0.57 | 0.608 | 3344 | 0.520546 | 0.001347 | 13.30108 | 0.04089 | 0.185322 | 0.000213 | 2701.5 | 5.7 | 2701.3 | 2.9 | 2701.1 | 1.9 | 0.0 |
| Z3 | 1 clr, cls, 2:1 brkn pr | 1.12 | 128 | 78.89 | 0.96 | 0.675 | 4468 | 0.520592 | 0.001067 | 13.30155 | 0.03398 | 0.185312 | 0.000187 | 2701.7 | 4.5 | 2701.3 | 2.4 | 2701.0 | 1.7 | 0.0 |
| Z4 | 1 clr, cls, short, sl flat, shrp pr | 1.05 | 180 | 113.69 | 0.48 | 0.823 | 12445 | 0.520488 | 0.000993 | 13.29576 | 0.03093 | 0.185268 | 0.000156 | 2701.3 | 4.2 | 2700.9 | 2.2 | 2700.6 | 1.4 | 0.0 |

*Notes:*

All analyzed fractions represent best optical quality (crack-, inclusion-, core-free), fresh (least altered) grains of zircon available. All zircons were chemically abraded.

Abbreviations: Z - zircon fraction; clr - clear; cls - colourless; fr - fragment; pr - prism/prismatic; el - elongate; sl - slightly; sml - small; lrg - large; sq - square x-section; shrp - sharp; brkn - broken; rect - rectangular; incl - inclusion-bearing.

$Pb^T$ is total amount (in picograms) of Pb.

$Pb_C$ is total measured common Pb (in picograms) assuming the isotopic composition of laboratory blank: 206/204 - 18.221; 207/204 - 15.612; 208/204 - 39.360 (errors of 2%). Pb/U atomic ratios are corrected for spike, fractionation, blank, and, where necessary, initial common Pb; 206Pb/204Pb is corrected for spike and fractionation.

Th/U is model value calculated from radiogenic 208Pb/206Pb ratio and 207Pb/206Pb age, assuming concordance. Disc. (%) - per cent discordance for the given 207Pb/206Pb age. Uranium decay constants are from Jaffey et al. (1971).