Instructions for Analysts

*** * IT IS EXTREMELY IMPORTANT TO FOLLOW THESE INSTRUCTIONS * ***

(1) Analysis of the Geo*PT* test sample

The analysis of the test sample must be conducted according to your **normal routine analytical procedures**. This proficiency test is designed to assess **routine laboratory performance**, *not* how good your performance *could be* when taking special precautions. The test is ***invalid*** if you treat the test sample in any special way other than using your routine analytical procedures.

However, whatever your routine procedure, ***before any measurements are made***, every portion of the test sample you use must be **dried at 105 ± 5°C for at least 2 hours**.

Note: Only **ONE set of results** per test material may be submitted for each registration fee paid. Data handling should follow as far as possible the routine procedures of the laboratory. When your **routine analytical protocol** involves making one determination, that result should be reported. **If your protocol** involves reporting the **average** of two or more determinations, that value should be reported.

Results for ***different* analytes** may be obtained by ***different* analytical procedures**.

(2) Reporting of results – online data submission

All reporting of results is now by the **online system**. See also **other Help pages** accessible from the online system.

a) Your Procedures

Before submitting your results you must record all of the procedures that you have used to analyse the test material – click **Your Procedures**. The summary page lists all the procedures you have already recorded (ignore the ID number). These remain available for continuing use and can be modified as and when necessary.

Click **New** to establish a new record for each procedure you have not already recorded. You may use ***any*** unique **Procedure name or identifier** of your choice for convenience of identification. The description of each **Procedure** comprises three essential parts:

1. The **Analytical Technique,** with **Additional Details** if needed,
2. The **Sample Preparation** method, with **Additional Details** if needed, and
3. The **Mass** of sample used for that procedure.

Lists of commonly used **Analytical Techniques and Sample Preparation** methods are available via drop-down menus for your convenience. Add any *essential* **Additional Details** where necessary in the space provided (be concise, but it is helpful to specify, for example, flux:sample ratios or digestion procedures). If the analytical technique or sample preparation method used is not listed you should select **Other** and provide the name of the technique or method, as well as details if necessary, as **Additional Details**.

You may subsequently edit a **Procedure** by clicking on it in the summary list to access the **Procedure Edit** screen (above) and making any necessary changes, but ***remember*** to **Save** any changes you make. You may indicate whether or not a procedure is **In Use** for the current round by checking/unchecking the tick box.

If you consider that a technique should be included in the coded lists and available as a drop-down menu item in future, please contact us by email through the link provided (**Email us**) and give full details. Likewise, if you uncertain about any of the categories already defined, email us for clarification.

b) Rounds

To submit your results, click the specific **Round** in the listing for which results are to be recorded. When a supplementary (additional) sample is provided for a round it will appear as though it is a separate round, and designated with the same number as the regular sample but followed by 'A'. ***Before*** submitting your results you need to have established a record of the **Procedure** you have used for every oxide/element analysed (many of these will employ the same procedure and they can be selected and defined together). **Procedures** already recorded for an oxide/element will remain as defaults from round to round. It is therefore important that you ensure that existing procedures remain valid in subsequent rounds and make any necessary changes *before* saving and submitting your data. All those **In Use** procedures that you have recorded will appear in pull-down menus for your convenience.

On the **Results** page **Procedures** employed for oxides/elements may be selected individually from the pull-down menus, or defined for a number of oxides/elements using the **QUICK SETUP** system by checking the relevant tick boxes at the side, selecting the **Procedure** from the pull-down menu and selecting the **Data Quality** (1) or (2) at the top of the

list, before clicking **APPLY**. Deselection of tick boxes can be done rapidly by clicking twice the **Select / Unselect All** tick box at the top.

Input your analytical results for every oxide/element for which you will be submitting data. You may input values individually or use a spreadsheet to input your results in bulk (see procedure below).

When inputting values individually, use the TAB key to navigate between input fields. Ensure that you use the units as specified. Select the **Quality** standard (pure geochemistry (1) or applied geochemistry (2): see explanation below) that is appropriate as your fitness-for-purpose criterion for each oxide/element, as this will be taken into account when your *z*-scores are calculated. For your convenience, **Qualities** can be set individually or when the **QUICK SETUP** procedure. You may **Save** the results that you have input at any stage.

It is **important** that you **Save** any results or other details that you have input ***before*** navigating away from the results page. **Save**d results can be accessed repeatedly to make additions or changes. **Remember** to **Save** each time that changes are made.

Only **Submit** your results when you are completely satisfied with your results input, but you **must Submit** your results to take part in the proficiency test. **Once submitted, results cannot be changed**.

When entering results:

- **(i)** Use only the **concentration units requested**, i.e. *g* $100g^{-1}$ (the same as % *m/m*) for the **major element oxides**, or *mg* kg^{-1} (the same as $\mu g\ g^{-1}$ or '*ppm*') for the **trace elements**. **Do NOT give results in other units OR give elemental concentrations for major elements.**
- **(ii)** For **major elements** quote concentrations appropriate for the **oxides** specified; for **trace elements** quote **elemental** concentrations.
- **(iii)** For the benefit of the statistical analysis, it is recommended that you **quote your results** to **at least one more digit** than you would normally judge to be significant.
- **(iv)** **Use** the **'full stop'** as the **decimal point** (not the 'comma').
- **(v)** **Do NOT report your results** as **not detected (nd)** or **less than** (**<**) or **use dots (…), dashes (–) or stars (*).**
- **(vi)** **Do NOT report ZEROS** or **detection limit values.** (Any zeros will normally be ignored.)
- **(vii)** **We recommend that you avoid reporting data *below*** your effective **limit of determination**, as such values will almost certainly produce unsatisfactory *z*-scores and degrade the dataset that we use to derive assigned values. We suggest that if you wish to monitor your performance at such concentrations, you withhold the data and subsequently calculate a *z*-score when the assigned value is made available.

Note that:

- **(viii)** **Fe_2O_3T** is **total** iron expressed as **Fe_2O_3**; **Fe(II)O** is the **actual** ferrous iron expressed as oxide;
- **(ix)** **H_2O^+** is **'structural' water**, that remaining after drying (normally at 105°C — see note **(1)** above);
- **(x)** **CO_2** represents **carbon present as CO_3^{2-}**, i.e. inorganic carbon, expressed as **CO_2**, **NOT** total carbon recalculated as CO_2 (as was the case in early rounds of Geo*PT*);
- **(xi)** **LOI** is the **loss on ignition** (please specify the temperature of ignition as **Additional details** in the **Procedure** definition, do not correct for oxidation of iron. Occasionally there may be a **gain on ignition** due to oxidation of Fe(II), in which case it is valid to report a negative LOI value);
- **(xii)** **$C_{(Org)}$** is **organic carbon** and **$C_{(Total)}$** is **total carbon**, both expressed in *mg* kg^{-1}. **NOTE:** These are ordered in **reverse** in the new input procedure. **Ordering of elements** is now fully **alphabetical.**

NOTE also:

Reporting errors in data or the use of **incorrect units cannot be corrected** by the organisers, the reporting of results is part of the proficiency test. P**lease** be sure to **check your data very carefully *before* you submit it.**

You may **Print** the results page for your records. The output from Google Chrome or Firefox browsers most closely reflects the screen page.

Using a spreadsheet to input results as a batch:

First select **Download** to obtain the Excel template provided and save it to a convenient location, then input the data (using cut and paste, or macros) that you wish to submit into the **Results** column of the template. You must not change the template and your data must be supplied in the order and units specified. Ensure that values are numeric and conform to the requirements indicated in **(i)** to **(xii)**, above, and **resave** the file both in **.XLS(X)** (Excel) format for your own reference and subsequent use, and in **.CSV** (Comma Separated Value) format for submission to the online system. Note that the .CSV file is a text file and cannot be read in Excel. It can be read in Word.

Submit your **.CSV** file by **Upload**ing it. The **.CSV** file will populate the results page, but the results will appear **only** when you **refresh** the page. Additional data may be added to the results page manually: errors may be edited manually. Be sure to **Save** any additions or changes that you make.

Only **Submit** your results when you are completely satisfied with your results input, but you **must Submit** your results to take part in the proficiency test. **Once submitted, results cannot be changed**.

Notes about Qualities:

Qualities are a means of setting an appropriate fitness for purpose criterion that can be used in calculating *z*-scores for your results:

> **Data quality 1** corresponds to ***'Geochemical research'*** relating to data expected to be appropriate for use in geochemical research laboratories, usually to investigate geochemical processes, when particular care is routinely taken to ensure such data are of high precision and accuracy.
>
> **Data quality 2** corresponds to ***'Applied geochemistry'*** relating to analytical results appropriate for use in geochemical mapping or mineral exploration. Although accuracy is important, precision may not need to be as high as for geochemical research applications, as the capability to process large numbers of samples economically is an important consideration.

(3) The Geo*PT* Report

When the report for the current round is available you will be notified by email. To download the file, log in to www.geopt.info with your usual login details. In **Rounds**, **select** the relevant round and on the **Results** page click on the button **Report**. The report in pdf format should appear in a new window. **Save** the file. You will find **your lab code** on the **Results** page (for the Round you select) in the header just above the **Report** button. You can download the **Report** file in this way whenever you need to.

Each report consists of 7 sections:

Text — Details about the sample; an account of Geo*PT* procedures; a summary of round characteristics; any special problems, a list of previous reports.

Table 1 — Full dataset of contributed data, listed according to randomised and anonymised laboratory codes. Your laboratory code is listed as the first item in the header on the Results page.

Table 2 — Assigned values and statistical summary.

Table 3 — *Z*-scores, listed according to randomised and anonymised laboratory codes, for oxides/elements for which assigned or provisional values are defined.

Figure 1 — Barcharts, showing data distributions for oxides/elements for which assigned or provisional values are defined.

Figure 2 — Barcharts for information only, showing data distributions for oxides/elements for which no assigned or provisional values could be defined.

Figure 3 — Multiple z-score charts summarising the performance for all participants indicating whether or not an elemental result complies with the $-2<z<+2$ criteria.

Self-assessment of performance

Laboratories are invited to assess their performance as follows:–

Z-score results in the range $-2<z<2$ may be considered to be 'satisfactory' (in the sense that no action is called for by the participant). When a *z*-score for any element falls outside this range, especially when it is outside the range $-3<z<3$, it would be advisable for the contributing laboratory to examine its procedures, and if necessary, take action to ensure that corresponding determinations are not subject to unsuspected analytical bias. Repeated analysis of the PT material would reveal whether a random error was responsible, such as might occur when a determination is made too close to the detection limit of the technique. A persistent deviation from the assigned value would indicate a systematic problem that should be investigated further.

Note that a *z*-score for an element/oxide that is given a provisional value is defined with a lower level of confidence. While action should still be considered, it would be necessary to undertake a more thorough review of performance for that analyte using a comparable test sample for which a value has been assigned.

Evaluation of laboratory performance through Geo*PT* should be just one part of a comprehensive QA programme.

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