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**The Geology of the Hypersthene Gabbro
of Ardnamurchan Point
and implications for its evolution
as an upper crustal
basic magma chamber**

VOLUME 3.

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**Thesis submitted for the degree of
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Appendix 1. ANALYTICAL METHODS.

A1.1. Bulk Rock Analysis Methods: Introduction.

NOTE: tables related to this appendix are collected together at its end, except for Table A1.5 and other small tables in the text.

Four main methods were employed for bulk rock analysis during the course of the present work: Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP - AES); X - Ray Fluorescence (XRF) on both fused glass discs and pressed powder pellets; Ammonium phosphomolybdate absorption colorimetry for phosphorous analyses; and Instrumental Neutron Activation Analysis (INAA) for Rare Earth Elements and certain other trace elements (principally Th, Ta, Hf, Sc, U and Cs). The last two techniques are specialised methods used to produce analyses for elements present at very low abundances. The use of ICP - AES and XRF methods for analysis of major, minor and trace elements in different samples was necessitated by the move from Imperial College to Durham part - way through the studentship during which the present work was carried out. Samples analysed by the two methods are distinguished as such in Appendix 2 but unfortunately it was only possible to analyse a relatively small number of samples by both methods. Two internal reference materials were analysed repeatedly by both methods: the two sets of results are discussed below. In addition a small number of unknown samples were analysed once by both methods to examine agreement between the two over a wider range of compositions, whilst testing of each method by analysis of international and other reference materials provided a means of testing their compatibility with the international reference material set and therefore with each other.

Interpretation and comparison of the two sets of data is made difficult by the fact that the XRF analytical methods used appear to be flawed, in a variety of ways. It is important to note that analytical work at Durham was carried out during a period when the XRF facility there was in a state of rapid change. The XRF data set presented here was something of an experimental 'guinea pig', used to test the success (or otherwise) of a variety of methods. It should not be regarded as relevant to the quality of earlier or later XRF analyses originating from Durham, except as noted in the text.



A1.2. Sample preparation.

Samples in the size range 1 - 10kg were collected during fieldwork; most were in the range 2 - 5kg. This was in general adequate to ensure that samples representative of the outcrops were collected (Le Maitre 1982), except in the following cases:

- Coarse - grained gabbro-norites. Samples of these rocks should have been in excess of 100kg in size, which is impracticably large. It should be noted that with the exception of the inference of bulk chemical changes during the formation of lamination (section 6.2) none of the discussion in Chapter 6 is particularly sensitive to the precise composition of individual samples, which could vary by 10 - 20% or more without affecting the arguments used.
- The heterogenous hybrid rocks of the MBG. These vary in composition on all scales from centimetres to many tens of metres, making the concept of a representative sample rather meaningless. The most important discussion of these rocks, that of the variation in felsic and mafic end - member components in section 4.4, depends on the **variation** in compositions rather than their mean composition, whilst the inference that they contain a high proportion of intermediate, high - Fe components depends upon the trends shown by a large number of samples rather than the composition of any individual sample..
- Bedded country rock sediments. Here again, 'representative samples' would be impracticably large and rather meaningless because of the multiple scales of variation.

As is the case in all the BTVP central complexes, alteration of the rocks is pervasive and has had to be allowed for in the text even when it is not itself of interest. Care was however taken to avoid samples affected by surficial weathering and contamination with everything from sheep carcasses to tar oil, either by selection in the field or by subsequently removing affected material with a rock splitter. With regard to hydrothermal alteration, material affected by early alteration (for example, rocks representative of altered material which could have been assimilated in that state) was included, whilst that affected by post - Hypersthene Gabbro hydrothermal veining was discarded: pervasively altered material had to be included, of course.

In the laboratory, samples were broken up using various rock splitters. Where possible, a lump was set aside at this stage for later sectioning: if it was necessary to analyse rocks which had been previously sectioned, the cut surfaces and those coated in rock powder were treated as weathered surfaces and discarded, in order to avoid contamination. The cubes of rock obtained were then crushed in rotary jaw crushers to chips 0.1 – 0.5cm across (mostly $\leq 0.3\text{cm}$). The chips were 'coned' and quartered by hand or by using a slotted sorting tray three to five times, to ensure random mixing of the sample. Hand picking of separate splits of some samples (notably the rheomorphic breccias and granitoid rocks containing small chilled basic inclusions) was carried out at this stage: analyses of such splits are noted as such in Appendix 2.

About 50g of the chips (rarely, as little as 20g in the case of some samples ground in agate swing mills, and as much as 100g in the case of a group of samples ground in agate ball mills: both groups of such powders were only analysed by INAA) were crushed to powder in agate or tungsten carbide 'Tema' swing mills. In all cases the samples contained at least a few hundred rock chips because those ground in agate were broken down into unusually small chips before quartering, so as to prevent damage to the mills. Nevertheless, some additional 'sampling error' may have been introduced into analyses of coarse - grained rocks at this stage. Grinding times were typically in the range 60 – 120s (tungsten carbide mills) or 5 – 10min (agate mills). Comparison of replicate samples ground in agate and tungsten carbide indicates that some 20 – 40ppm of contaminant cobalt is introduced into the samples during grinding in the latter: three samples analysed by INAA which had to be ground in tungsten carbide pots because they were too hard to be ground in agate were found to contain c.200ppm tungsten and a few ppm of Ta.

Extreme care was taken at all times to avoid significant amounts of cross - contamination between samples (and also contamination with trace element rich monzosyenites, nepheline syenites and carbonatites being prepared in the same laboratories at different times). Wherever possible, samples were ground in sequences containing rocks of similar compositions. Dummy runs using batches of material, of similar composition to subsequent samples, which were then discarded, were made at the beginning of each such sequence and whenever sample compositions changed sharply within sequences. All equipment, from rock splitters to the tema mills, was cleaned using brushes and/or by washing, as appropriate, after preparation of each sample.

A1.3. ICP - AES analysis

(major elements, Ba, Cr, Cu, La, Ni, Sr, V, Zn and Zr).

A1.3.1. Analytical Procedure.

a). **Moisture content and loss - on - ignition** were determined gravimetrically prior to ICP - AES analysis. Before October 1986 both were determined on a separate split of the same batch of powder. Thereafter, a small amount of the powder used for determining moisture content was removed, and later analysed by ICP - AES, before the reweighed remainder was ignited for LOI determination. The change in procedure had no noticeable effect. Moisture content was determined after drying overnight at 110°C, and LOI by overnight ignition in a muffle furnace at 950°C (typically about 14 hours including 4 hours heating).

b). **Flux - fusion.** 0.2500 ± 0.0001 grams of dried powder was weighed out into a glazed crucible and precisely three times the measured weight of flux (Johnson Matthey spectroflux 100B, a 4:1 $\text{LiBO}_2/\text{LiB}_4\text{O}_7$ mixture) was added. It was especially important to maintain the 3:1 flux:sample ratio after the Li in the flux was used as an internal spike, from summer 1986 onwards. The sample and flux were gently mixed in the glazed crucible and then carefully transferred to pre - ignited graphite crucibles. Batches of up to six samples were fused at 1000°C (heated from cold if LOI was more than 5%) for 20 minutes. Provided that the sample was completely dissolved, the precise heating time was found to be not particularly critical when a batch had to be left in the furnace for a total of three hours (as a result of a bomb scare !) and duplicate samples from this and adjacent batches were subsequently found to give identical results.

c). **Dissolution.** After 20min, the samples were removed from the furnace and the molten beads quenched and shattered by pouring into plastic beakers containing 25ml of specpure HNO_3 diluted to 2N concentration with distilled and deionised water, and 150ml distilled and deionised water. Any beads remaining in the crucibles were removed and added to the beakers once they had cooled. The contents of the beaker were agitated with magnetic stirrers for 30min at room temperature: this was sufficient to dissolve all the metaborate glass. Each solution, together with three successive washings from the beaker, was transferred to a clean 250ml volumetric flask and made up to precisely 250ml with distilled and deionised water: with practice, this could be done to within $\pm 0.5\text{ml}$. The

solution was shaken vigourously to ensure that it was homogenous and about 100ml transferred to a polyethene storage bottle via a filter. The bottle was then sealed with a piece of plastic film under the cap.

Solutions prepared in this way are stable for periods of 3 - 4 months or so. Although this means that the calibration standards and other reference solutions have to be re - prepared at intervals the preparation procedure described is highly reproducible: no systematic differences were found between runs using different batches of standards unless one of the latter was more than 4 months old. To ensure reproducibility in routine sample preparation, duplicate samples were prepared at intervals (10 - 20% of all unknowns were analysed in duplicate) and internal standards and in - house reference materials were also prepared and analysed with the unknowns.

d). Analysis. This was carried out on a Perkin - Elmer ICP - AES in the Applied Geochemistry section of the Royal School of Mines, Imperial College. Samples were analysed in batches in a fixed running order (see below). Small amounts of the sample solution were taken up in a capillary tube and injected through a nebuliser into a continuous flow of argon gas. This was passed into a radio - frequency heater coil and heated to temperatures of several thousand degrees. The optical spectrum emitted from the plasma produced in this way was monitored simultaneously at a number of preset frequencies for three periods of ten seconds each, which were averaged to obtain a mean emitted light intensity for the wavelength concerned. The system was flushed through between samples to prevent contamination of successive samples.

The practice of averaging the measured intensities over a period was adopted to help remove the effects of short - term instabilities in the plasma jet. These are due to variations in the rate of uptake of sample solution through the nebuliser and in the temperature of the plasma (which decreases with increased sample uptake rate, amongst other factors). Long - term variations in the system were monitored using drift and blank solutions analysed at intervals (every 7 samples) but shorter - term (over tens of seconds to minutes) instabilities were more of a problem, especially after summer 1986, when the machine was dismantled and reassembled because of building work. These short - term instabilities were partly corrected for by assuming that the samples were essentially Li - free and contributed a negligible amount of Li to the solution (this was found to be true for all

rocks analysed except Li - pegmatites and other exotic lithologies) and using the Li in the flux (whose concentration in the solution was precisely known) as an internal spike. The data was then normalised using the ratio of the strength of the Li emission in the sample solution to that in the drift solution used for normalisation of long - term drift (see below). This procedure worked well for those elements with low excitation potentials, whose apparent concentration was independent of the temperature of the plasma torch and only varied with sample uptake rate, but less well for elements such as Si and Al whose spectral intensity varies with torch temperature (note that this varies inversely with uptake rate).

The fixed run sequence is shown in Table A1.1. Half - runs with only the first 45 solutions in this sequence were sometimes carried out but were not always satisfactory because they were critically dependent upon the quality of the first twelve analyses made. Notable features of this run sequence are the large number of drift monitor and blank solution analyses and the use of three groups of calibration standards. Up to 5 in - house reference materials were analysed with each run which had been prepared with the unknown solutions, in order to ensure high - quality sample preparation. Since these were not analysed by other means they had no other function and are not considered further. Where possible, international standard solutions prepared with the unknowns were used instead: analyses of these are considered in section A1.3.2.

e). Data Reduction. With the exception of the very earliest analyses, which were processed using the program TROCK, all ICP - AES data reduction was carried out using the program ICP, written by Ian Kille. TROCK was essentially similar to ICP except in that it did not have a facility for correction using the Li spike. ICP is described fully by Kille (1987) and only its more important features are discussed here.

i). Spectral intensities for all samples and blanks are doubly normalised:

a) with respect to a suitable drift monitor analysis, element - by - element, by interpolating between the nearest drift monitor solutions to each sample.

b) with respect to the internal Li spike, by multiplying the intensities by the ratio of the intensity of the Li emission line in the sample concerned to that in the chosen drift

monitor sample.

Either step could be omitted if this improved the final results for the reference materials.

ii). Blank corrections, by interpolation between the blank solutions, and interference corrections on certain trace elements (Kille 1987) are made.

iii). Standards and unknowns are separated out and calibration lines constructed using one or more of the groups of standards analysed. This is an interactive procedure: the standard data points and a linear best - fit line are plotted on the computer screen and a correlation coefficient displayed. The operator is then able to remove spurious (especially poorly - determined) standards from the calibration set, although care had to be taken to leave at least 3 (and preferably at least 5) standards in the calibration line for any one element.

One of the best features of ICP - AES analysis is that the calibration lines are linear over the whole of the compositional ranges: the only exception is Mg, which shows slight deviation from linearity at high concentrations: the procedure adopted was to split the Mg calibration line into two parts at c.20% MgO rather than introduce the complexities of polynomial calibration lines. Correlation coefficients using linear curves were in general more than 0.9999 for major elements (anything less was cause for re - analysis or re - preparation of the solutions) and 0.999 for minor and trace elements.

iv). The unknowns are recalculated to weight percentages and parts - per - million as appropriate, using the calibration lines calculated in (iii). Loss on ignition values were typed in and totals calculated. These were not normalised and could be used as a final filter for flawed analyses. Totals of 98 - 102% were considered acceptable although for much of the time these were in the range 99 - 100.5% .

A1.3.2. Replicate analyses and analyses of international reference materials by ICP - AES.

Eight splits of two samples from Ardnamurchan, an Inner Series gabbro-norite (sample 35) and an

M2 felsite (sample 19E6) were separately ground (4 in agate pots, 4 in tungsten carbide). No differences were found between the WC - and agate - ground samples except with respect to Co (section A1.2). 6 of the splits of each rock were analysed by ICP - AES, with results presented in Table A1.2. The precision of major element determinations is in general acceptable for present purposes, except perhaps for Si (and also Al in sample 35). Minor and trace elements are less satisfactory, particularly with respect to La, Ni, V, Zn and Zr (also P at the very low abundances found in 35).

Table A1.3 contains analyses of international standards analysed as unknowns, mainly during later runs. Both NIM-G and AN-G are, unfortunately, in the calibration standard set (they were actually chosen because of their very low but fairly well - known P contents, as reference materials for phosphorous analysis (section A1.4)) but since the calibration lines are linear this is less of a disadvantage than it is with polynomial or iterative calibrations which may produce good fits for standards analysed as unknowns whilst producing poor analyses of true unknowns. With this caveat in mind, however, it is apparent that the degree of agreement between the ICP - AES data and the accepted compositions of these standards (Govindaraju 1984;1989) is good, except perhaps for Ca and elements present only in very low abundances. Generally accepted uncertainties in trace element concentrations determined with the ICP - AES at Imperial College (P. Watkins pers comm.) are as follows (values expressed in ppm):

Ba	±10	Be	±0.2	Cu	±15
Cr	±15	La	±10	Ni	±20
Sr	±10	V	±15	Zn	±15
Zr	±20	Co	±10		

Experience gained during the present work suggests that these values are somewhat pessimistic with respect to Ba and Sr, and optimistic with respect to La, Ni, V and Zr. Consistent results for Be were not obtained at the abundance levels encountered, although they were often up to 2 ppm, whilst most of the Co data gathered is meaningless because the samples were ground in tungsten carbide (see section A1.2).

A1.4. Spectrophotometric analysis of Phosphorous.

This method is dealt with here, before XRF methods are considered, because it uses the solutions prepared for ICP - AES analysis. The method is essentially that of Watkins (1979). This involves formation of a complex phosphomolybdate ion, stabilised by the presence of antimony, in a mildly reducing and strongly acidic solution (to suppress interference from the corresponding silicomolybdate ion, which forms under more alkaline conditions), and measurement of the absorbtion of light at 880nm by this molecule in a spectrophotometer (a Unicam SP600 was in use for this method at the Dept. of Geology, Imperial College). The relationship between absorbtion at this wavelength and P concentrations is calibrated by measuring the absorbtion due to known concentrations of P in synthetic standard solutions (equivalent to 0.1, 0.2, 0.3 and 0.4 wt% P_2O_5 in rock samples) added to the same batch of 'mixed reagent' (see Watkins 1979 for discussion of the preparation and properties of this reagent) as is used for reaction with the unknown solutions. The 'mixed reagent' and the phosphomolybdate solutions produced are both unstable and have a useful life of hours but the method was found to produce highly reproducible results over a period of more than 18 months and with different replicate batches of the solutions prepared for ICP - AES analysis. The internal reference material 35 was analysed 10 times over this period by the method and gave results of 0.020 ± 0.002 wt% (2σ) P_2O_5 throughout. The calibration line is linear, at least at P_2O_5 concentrations below 0.5wt%, and the method gives particularly precise results at concentrations below 0.1% . Reliable reference material analyses at these abundances are very rare, making it difficult to assess the accuracy of the method, although this is believed to be high because it depends on a simple linear calibration using synthetic solutions of precisely known compositions. 5 replicate analyses of AN-G and NIM-G yielded average determinations similar to thier accepted values (0.011 and 0.009 wt% respectively, compared to accepted values of 0.01 and 0.01) whilst analyses of W-1 and NIM-P gave values of 0.123 and 0.019 wt% respectively, compared to accepted values of 0.13 and 0.02. In contrast, analyses of AC-E (accepted value 0.014 wt%) yielded an average value of 0.009wt% (all accepted values taken from Govinderaju 1989).

Analyses of rocks from Ardnamurchan carried out during the course of the present work by this method are identified as such in Appendix 2. Some of these have extremely low abundances indeed (as low as 0.008wt%). At these levels contamination of the solutions is a major problem and all solutions were analysed in duplicate to provide a check on this. It was found necessary to

stand the glassware used (apart from the photometric cells, which were stored in 'decon' detergent solutions when not in use) in dilute specpure hydrochloric acid overnight before use, to remove adsorbed phosphorous on or in the glass. All glassware was also washed thoroughly in deionised water before and immediately after use and not used for any other purpose. The practice of standing the glassware in acid was found to improve the consistency of the results considerably over those reported by Watkins (1979) and also to reduce the totals slightly, indicating that contamination had previously been a persistent problem.

A1.5. XRF analysis.

XRF analysis was carried out using three methods and associated data reduction programs:

Major - element analysis using La - doped fused discs, with data processing by the simple polynomial curve - fitting program FINAL, written by B. Day.

Major - element analysis on pressed powder pellets, using a cubic curve fit and iterative mass absorption correction program, CBI, written by C. Watson and implemented for microcomputer use by D. Stevenson.

Trace element analysis on pressed powder pellets, using programs written by N.J.G. Pearce (Pearce 1988) and implemented for microcomputers by D. Stevenson.

Each of these methods is considered separately but it is first necessary to consider sample preparation and problems arising from it.

A1.5.1. Sample Preparation.

Pressed powder pellets were made by mixing 5 – 8g of sample powder with up to 10 drops of a PVA ('Mowiol') binder solution. This was pressed in a hydraulic press at a pressure of the order of $1000\text{kg}/\text{cm}^{-2}$ for about 30s to produce a flat disc. This was dried at 110°C before use.

Fused glass disc XRF analysis methods were re-introduced at Durham with the present work and a number of errors were made in sample preparation which probably affected the results and produced a number of the observed analytical errors.

Fused discs were prepared using about 0.45g of dried (but not ignited; the use of pre - ignited powders has been found to improve XRF analyses and is standard practice in a number of more experienced laboratories; G.Fitton pers comm. to R.G.Hardy) sample powder, weighed into platinum crucibles. Precisely 5 times as much lanthanum - doped lithium metaborate flux (Johnson Matthey Spectroflux 105) was added and the two were carefully mixed with a polyethene stirring rod. The crucibles were

then placed into a pre - heated electric muffle furnace and melted for 20 minutes at 1050°C. The few samples with LOI over 5% were heated from room temperature. After this period the crucibles were removed from the furnace and the molten fused beads poured into graphite dies and pressed into shape with an aluminium plunger in a steel collar. The discs should then have been stored in a dessicator (G. Fitton pers comm.) but weren't. The first set of standard discs used had been prepared some time previously and the same errors made in their preparation and storage. A second set was prepared in the same way in 1988 and also gave poor results (see below), and shows systematic disagreements with the first set.

A1.5.2. Analysis Conditions.

All analyses were carried out on a Phillips PW1400 wavelength dispersive X - ray spectrometer, with a rhodium tube. Accelerating potential was 80kV and the electron current was 35mA. Other operating conditions are given in Table A1.4.

The settings for the trace elements given in Table A1.4 are the same as previously used by N.J.G. Pearce for analysis of trace - element - rich syenitic, alkali doleritic and carbonatitic rocks. The use of these settings and the failure to correct for irregularities in the background spectra near certain peaks which are unimportant at the high abundances encountered by Pearce but become significant at lower abundances may also have contributed to the poor quality of the data (J.A. Pearce pers comm.). Nb, Y and Rb are particularly affected: analyses of the first two elements have not been used at all in the present work whilst Rb data has only been used in the investigation of the granitoid rocks, which have relatively high Rb contents (c. 100ppm). The settings for major element analyses of fused discs also appear to have been unsatisfactory, particularly with respect to Na: the K_{α} peak for this element is overlapped by La L lines and measurements of this peak are problematic.

Analytical runs consisted of up to 120 analyses, 25 - 30 of which were calibration standards and the rest of which were run as unknowns. Formal drift correction was not possible but analyses of replicate samples run at intervals in a number of runs suggest that machine drift could produce at most 0.5 - 1% relative error within a run. No in - house reference materials were available and it was not possible to prepare batches of international reference materials to check sample preparation as these were in short supply. The following reference materials were therefore used:

- The internal replicate samples 35 and 19E6, which had been analysed in multiple at Imperial College by ICP - AES.
- Fused discs remaining from an interlaboratory comparison exercise conducted by I. Meighan of Queen's University, Belfast (Meighan et al. 1988). Samples S1, S3, S4, S5, S7, S9 and S11 of Meighan et al. were routinely analysed.
- International standards also run as calibration materials. Use of standards in this way is not normally recommended when the data reduction procedure is a complex one as the calibration produced will inevitably tend to produce better results for the rocks used to construct it than for any other unknowns.

Neither of the latter two groups were prepared with the unknowns, with the result that knowledge of the precise errors introduced by fused disc sample preparation is limited. They are however of value in testing the data processing programs.

A1.5.3. XRF data processing.

The data was processed offline using the three main programs noted above. Prior to running these programs, the data was rewritten into a suitable format, backgrounds removed and standards and unknowns separated using programs written by D. Stevenson.

A1.5.3.1. FINAL.

FINAL is an interactive polynomial curve - fitting program which makes no attempt to carry out mass absorption corrections, treating each of the major elements entirely separately. It is therefore only suitable for processing data for La - doped fused discs, in which the intensity of X - ray absorption by the La is such that, as a first approximation, the mass absorption characteristics of the discs can be treated as constant (Potts 1987).

The program first plots count rate against standard composition for the element being processed for all the standards analysed and outputs the result to the computer screen. The operator enters

the order of polynomial curve to be fitted to the data and the program then calculates the best - fit curve through the data and the standard deviation of the data around this curve using a matrix decomposition method which limits the order of the polynomial to 5, because of memory - space constraints. The scatter of the data around the best - fit curve is calculated as a standard deviation or standard error, rather than as a correlation coefficient because it is easier to evaluate the effects of the former as the errors in the calibration (particularly those produced by standard preparation errors and the assumption of no variation in the mass absorbtion characteristics of the samples) propagate through the analyses.

The operator is then presented with a number of options, including the removal of outlying data points and recalculation of the curve using a lower - or higher - order polynomial. When the best possible calibration has been produced, the polynomial coefficients are written to memory and the operator proceeds to the next element to be calibrated. When all ten major elements have been processed, the calibrations are applied to the unknowns, LOI values typed in and totals calculated before output of the results.

The standard errors calculated by the program varied between runs, and changed markedly for certain elements when the later set of standard discs was introduced. A typical set of standard errors associated with the latter set of standards is shown in Table A1.5:

Table A1.5. Typical standard errors from FINAL processing of fused disc data.

	Std. Error wt% oxide	y - axis intercept (wt% oxide)
Si	1.06	5.49
Al	0.47	0.11
Fe	0.20	-.04
Mg	0.32	0.38
Ca	0.15	0.05
Na	0.55	-.90
K	0.07	-.08
Ti	0.03	-.06
Mn	0.02	-.03
P	0.04	-.39

It is instructive to compare these errors with the variation in replicate analyses of the internal reference materials (Table A1.6, below). Six elements, Si, Al, Fe, Mg, Ca and Ti, show standard errors around the calibration line of similar size to variations in replicate analyses of the internal reference materials carried out in a single run. This indicates that the standard errors about the calibration lines for these elements are largely due to sample preparation rather than to uncorrected mass absorption effects. The other elements analysed, Na, K, P and Mn, however, showed proportionately large standard errors and negative y - axis intercepts, indicating the presence of varying but often large spurious count rates at the wavelengths associated with these elements. These varied with the set of calibration standards used, indicating that the cause was sample preparation.

A1.5.3.2. CBI.

CBI was designed for use with pressed pellets and after initial experimentation its use with fused discs was dropped, FINAL being written instead. It attempts to correct for the effects of variation in the mass absorption properties of the samples by first constructing a cubic polynomial best fit curve through the calibration standard count - rate data, calculating a set of mass absorption coefficients (MACs), correcting the data, recalculating the best - fit curve, recalculating the MACs and re - correcting the data, and so on in an iterative procedure which continues until there is no further change either in the MACs or the calibration curve. These are then applied to the unknowns, whose mass absorption coefficients and compositions are themselves iteratively recalculated until a stable solution is reached.

This procedure has been criticised on the grounds that it requires normalisation of the data to total 100% at each recalculation of the mass absorption coefficients. A more serious problem became apparent from the comparison of accepted values for intermediate to basic reference materials (notably BR, DR-N, BE-N and S3 and S5 of Meighan et al. (1988)) and of ICP - AES data for rocks analysed by both methods with the CBI output. Whilst CBI produces consistent results for granitic rocks (e.g. England 1988a) it produces incorrect results for Mg, Al and, to a lesser extent, Si and Fe, in rocks of these compositions. Discrepancies of -2 to -3 wt% in MgO and +1 to +2 wt% in Al_2O_3 , SiO_2 and/or Fe_2O_3^T were found to be persistently present in most but not all analyses of rocks in these compositional ranges. The fact that not all samples were affected suggests that the cause of this phenomenon lies in the iterative procedure for calculating unknown compositions.

While this is stable in the mathematical sense it appears likely that it converges upon spurious solutions in the basaltic to intermediate compositional range.

A further problem with CBI is that it is highly unstable in regions outside the range of standards and cannot be used to extrapolate to compositions lying even a short way outside the compositional range of the standards used, or in gaps in the standard compositional range (e.g. between most standards and anorthosite AN-G with respect to Al).

A1.5.3.3. The nature of the XRF major - element data in Appendix 2.

Neither of the methods used gives satisfactory results for all the 'major' elements (although it should be noted that much of the problem, with phosphorous in particular, is that it is only present in trace amounts).

The combination of FINAL and data collected on fused discs was found to usually give better results for Si, Al, Fe, Mg and Ca than CBI and pressed - pellet data (see below) and these values were therefore used in the compilation of XRF data presented in Appendix 2. CBI data was generally used for Ti, except where the results for Ti were affected by spurious values of Fe, in rocks which lay outside the range of Fe contents in the standards. These invariably had very high Ti contents as well, which meant that they were unaffected by the spurious counts at the Ti K wavelength which affect low - abundance analyses for this element using fused discs. The poor quality of results for Na, K, Mn and P from the fused discs meant that CBI data had to be used throughout for these elements. The samples analysed all lie within the range of the calibration standards except for Fe - rich Inner Series rocks with $> 22\% \text{Fe}_2\text{O}_3^T$: the fused disc calibration curve for Fe itself is only slightly curved, suggesting that the extrapolation of this curve to these samples is probably valid, but the CBI data for these samples should be treated with caution.

The totals given for samples analysed by XRF in Appendix 2 are more - or - less valid because the bulk of the rocks is made up of elements processed using FINAL, which does not normalise the results to 100% . A number of samples were however found to give persistently low totals, probably due to loss of material during fused disc preparation. Since it was not possible to re - prepare the discs in the time available these samples were recalculated to give totals close to 100% (it was not

valid simply to sum to 100% because some of the elements in the analyses were determined by a method, CBI, in which such normalisation had already occurred; the correction was carried out by multiplying by a factor (100% - the sum of negative intercepts for Na, K, P, Mn and Ti for the calibration standards in the run in which the samples were analysed). These analyses are marked by a row of XXXX's after the sample name in Appendix 2 and should be regarded with due caution, although the normalisation procedure has not produced any startling discrepancies between these samples and those from similar adjacent outcrops.

The accuracy of the XRF data is considered further in section A1.5.3.5, in the context of its comparability with the ICP - AES data. Data for the two replicate samples analysed, which gives some measure of the precision of the data, is presented in Table A1.6.

A1.5.3.4. Trace - element analyses using the K - factor method.

Owing to the very wide range of sample compositions the TRATIO program used for much trace - element work at Durham was not used; instead, a set of programmes written by N.J.G. Pearce (described in detail in Pearce (1988)) and based on methods used by the Greenland Geological Survey (Bailey 1976) was used, in a form suitable for use on the microcomputer attached to the Durham XRF. The method requires prior major - element analyses for mass absorption corrections: ICP - AES and XRF analyses were used as available. This version was intended to be identical to that described by Pearce (1988), apart from having a more flexible structure to allow for changes to the data acquisition programme, but an error in file management led to a failure to make blank corrections. In addition, the XRF trace element measurement settings used were not changed from those used by Nick Pearce to analyse trace - element - rich rocks, resulting in errors due to faulty background corrections. The latter are perhaps more important as reprocessing of one batch of data following the discovery of the error in blank corrections (by R.G. Hardy and J.A. Pearce) showed that little improvement in the results occurred when proper blank corrections were made. It was not possible to re-analyse the samples in the time available and since a large part of the thesis had been written by the time the causes of the errors in the XRF trace element analyses had been identified, the data have been left as they were. It should be noted that the arguments used in this work have been chosen so as to avoid using suspect XRF data (identified as such on the grounds of anomalous chondrite - normalised values, discrepancies with respect to ICP - AES analyses for those elements

(principally Sr and Ba) which are reliably analysed by that method and discrepancies between accepted and measured abundances in reference materials) as much as possible. Much of the work on the causes of errors in the trace element processing programs has been carried out by R.G. Hardy and J.A. Pearce and for this reason and for brevity only the conclusions regarding the validity of the XRF data set in Appendix 2 are presented here.

Precision. As is indicated by the trace element data in Table A1.6, the precision of the data for most trace elements has not been affected by the errors in the programs, which produce systematic analytical errors.

Sr, Ni, V, Zn. These elements do not seem to have been greatly affected and give good agreements with the ICP - AES data over the range of compositions analysed.

REEs, Th. These elements give very poor results but would be expected to do so by XRF in any case at the low levels present in the rocks analysed.

Cr. This appears to give relatively good results at low abundances but shows poor agreement with the ICP - AES data for Cr in 35.

Ba, Zr. Ba both shows anomalously high values in rocks where it would be expected to have low abundances, by up to 100ppm, and shows poor precision at higher abundances. Zr is better at abundances of more than 200ppm but is also anomalously high at lower abundances, by up to 20ppm. Cu shows a similar pattern of errors to Zr, which in both cases is due to positive blanks and interfering peaks which have not been removed.

Rb, Y, Nb. These elements are those which are most strongly affected by the various errors and all consistently give anomalously high values. Only Rb has been used at all in the present work (section 4.2.2) and only in rocks with high Rb abundances where the errors are relatively small.

A1.5.3.5. Comparison of ICP - AES and XRF data.

A comparison of the results obtained for the two samples analysed in replicate by both methods (Tables A1.2 and A1.6) indicates that the two sets of data are, with a few exceptions, consistent except in the cases of elements only present at very low abundances and those trace elements known to have been analysed incorrectly by XRF (section A1.5.3.3). Systematic differences are however apparent in the data for Al and Na.

The Al_2O_3 content of 35, as determined by XRF analysis of fused discs, is lower than the value determined by ICP - AES by around 1.2wt% , or about 4 times the standard deviation of the XRF data. This discrepancy is not apparent in the data for 19E6, nor in comparisons of each data set with accepted abundances of international standards with alumina contents below 17.5 wt% . The lack of basic rock standards with alumina contents above 17.5wt% , except for the very much more Al - rich AN-G, makes it difficult to be sure which of the two data sets is incorrect. In the only cases where precise variations in Al contents are important (principally the examination of the effects of the formation of lamination in Chapter 6) the data was all obtained by XRF, or the XRF data set is large enough for it to be apparent that any discrepancy in Al contents is small compared to the actual differences.

Sodium. This also shows a discrepancy in the case of 35 but not in that of 19E6. There is no systematic difference between measured and recommended values in the case of international standards analysed as unknowns in the XRF data set, nor in the Queen's University Belfast reference materials of Meighan et al. (1988). In contrast, the ICP - AES analyses of international standards tend to be slightly higher than recommended, by up to 0.1wt% . This is, however, still only twice the standard deviation for Na by either method and is not large enough to have any effect on the plots used in the present work.

A1.6 Instrumental Neutron Activation Analysis.

(La, Ce, Nd, Sm, Eu, Tb, Yb, Lu, Ta, Hf, U, Th, Cr, Sc, Cs)

INAA analysis for the above elements was carried out by measuring the gamma - ray activities produced by irradiation of powder samples in a thermal and epithermal neutron flux. Counting was carried out after irradiation, using only relatively long - lived daughter radioisotopes derived from the above elements by reaction with neutrons. The theory of the procedure is described in Potts (1987); only those aspects relevant to the quality of the data are discussed here.

Sample preparation. Wherever possible (the exceptions being samples 177/1, 183D2 and 183D3, which were judged to be too hard to be ground in agate), the samples chosen for INAA were ground in agate tema pots to avoid introduction of W and Co (which activate very strongly and mask the gamma - ray activity of other elements) and contamination with Ta. About 0.25g (accurately weighed) of powdered sample, dried overnight at 110°C beforehand, was placed in a flat plastic capsule and sealed. This makes sample preparation very easy but introduces the problem that the powder may collect on one side of the capsule during loading into the reactor, causing variation in sample geometry during irradiation: since the capsule must not be opened after irradiation, it is also difficult to ensure uniform sample geometries during counting.

13 such capsules are loaded into an outer plastic tube, in which the capsules are loaded into the reactor. Some of these capsules contain calibration standards which are irradiated with the unknown samples, thus eliminating a number of problems in calibration due to temporal variation in the reactor flux. Owing to spatial variation in the reactor flux along the tube, it was found necessary to use 3 calibration standards, one at either end of the tube and one in the middle. A batch of samples for irradiation thus contained 10 sample powders (usually 9 unknowns and 1 reference material).

The calibration standards were synthetic, prepared by pipetting 0.1ml of a 1000ppm solution of all the elements to be analysed onto filter paper which was then inserted into capsules identical to those used for the rock samples, to ensure that samples and standards were of approximately the same geometry. Standard preparation and checking was carried out by the staff of the Imperial College reactor centre initially, and subsequently by P.T. Leat. The standards were assumed to be identical and typically had higher concentrations of the elements than the unknowns analysed during the

course of the present work. This is not, however, important as the calibration line is linear except at very high concentrations of strong neutron absorbers (e.g. Sm and Gd).

Irradiation and counting. Irradiation was carried out at the Imperial College Reactor Centre, Silwood Park, for nominal periods of 5 days. The samples were left in the reactor for 2 days, in order to allow very short - lived, highly active radioisotopes to decay, and then removed to a store for a further 1 - 2 days. The batches of samples were subsequently analysed a number of times in order to analyse for elements with different half - lives. Counting was carried out by placing the samples in sequence above an energy - dispersive solid - state germanium gamma - ray detector crystal. Two such crystals were used: early batches were analysed using a crystal with a detection range from 60MeV to 500MeV, and later ones with a larger crystal capable of detecting a significant prportion of gamma rays emitted with energies up to 1 GeV. The latter crystal was also rather more sensitive at lower energies.

The counting schedules used varied according to availability of detectors but was typically as follows:

a) The earlier batches were counted at about 5 days after the end of irradiation for periods of 1 hour or 1.5 hours per sample/standard, (giving the data used for La, Sm, U, and sometimes Lu, Yb and Th as well), then for the same periods 3 - 4 weeks and 2 - 3 months later (giving data for Th, Yb, Lu, Nd and sometimes Hf and for Ce, Eu, Tb, Ta and Hf respectively).

b) A similar procedure was followed for some of the later samples as well but samples 193/2, 3, 5, 35, 194A3, 42D2, 314, 286/1, 275/5, 316A, 318, 286/3, 279/3, 275/6, 279/5, 287C1, 279/2, 317B and 296 were counted for periods of 12 or 24 hours during later counts at around 2 weeks and 1 - 1.5 months after irradiation. This improved the sensitivity of the method markedly (important in these cases because of the very low abundances of most of the elements analysed) but does not seem to have produced much improvement in accuracy for reasons discussed below.

Data Processing.

Data was recorded simultaneously over the entire spectrum, in channels with widths equivalent to 0.25MeV, as counts per channel for each of the calibration standards and unknowns. Data

processing procedures are discussed by Potts (1987) and essentially involve construction of a element abundance - to - measured activity relationship for the particular batch being analysed using the calibration standards within the batch. Corrections to this are made for interelement interferences, detector dead time and the precise sample weight for each unknown sample. An additional correction, for spatial variation in neutron flux in the reactor, is made by linear interpolation between the calibration standard positions: analysis of batches with a number of reference materials suggests that this procedure is only valid if the total variation in flux, as measured by differences in the activities of the standards, is less than about 20% relative. Data for particular elements which showed larger variations between standards was discarded.

Errors in INAA.

The method of calibration used has the advantage that it is insensitive to temporal variations in neutron flux in the reactor and to a number of other errors related to the time of irradiation, but assumes that the sample geometries, and their positions relative to the detector during counting, do not vary. Inspection of the analyses of reference materials reveals errors greater than those due to counting statistics alone and these assumptions are the likely cause. Both will produce errors that are proportional to the abundance of the elements concerned in the samples, as will errors due to sample heterogeneity.

The magnitudes of these errors are not easily predicted and are best estimated using replicate analyses of reference materials: the IAEA standard SOIL - 5 (6 analyses) and andesite AGV - 1 (4 analyses) were used. Relative 2σ variations for these standards are as follows (values in parentheses are those for AGV-1, which for reasons unknown often gave more consistent REE results than SOIL-5, although abundances in the latter are generally higher and it has not previously been reported as being heterogenous):

La	15% (5)	Ce	11% (11)	Nd	10% (1)	Sm	3% (3)
Eu	10% (13)	Tb	20% (7)	Yb	20% (5)	Lu	12% (8)
Ta	9% (7)	Hf	15% (12)	U	14% (-)	Th	20% (34)
Sc	2.5%	Cr	30% (40)				

(note that Cr abundances in AGV-1 are close to the detection limit). These values are only a

rough guide as the accuracy of the results (as assessed by the smoothness of chondrite - normalised plots as well as by inspection of results for reference materials) appeared to vary between batches by as much as factors of two or three. Certain elements (notably La, Nd, Sm and Lu) analysed by INAA also show systematic anomalies, of the order of 10 - 30% relative difference, relative to adjacent REEs in chondrite - normalised REE plots which do not occur in analyses by other means.

Detection limits for the various elements are governed by peak to background ratios in the acquired spectra and are improved by increased counting times. The following list is of typical detection limits encountered during this work for counting times of the order of 1 hour. Values in parentheses are those for the best counts on the larger crystal: the improvement is mainly due to the use of 24 - hour counting periods of long - lived radioisotopes although the improvement in Sm, U and La indicates that the greater sensitivity of the detector also had a significant effect.

La	1.0(0.5)	Ce	2.0 (0.6)	Nd	10.0 (1)	Sm	0.04 (0.02)
Eu	0.01(0.004)	Tb	0.08(0.02)	Yb	0.4(0.15)	Lu	0.1(0.02)
Ta	0.02(0.01)	Hf	0.2(0.1)	U	0.1(0.05)	Th	2.0(0.2)
Sc	- (0.1)	Cr	20(2)				

A1.7. Electron Probe Microanalysis.

Electron probe microanalysis was mainly carried out at the University of Durham using a Cambridge Instruments Geoscan probe fitted with a Link 860 energy - dispersive detector system centred on a silicon solid - state detector. Si, Ti, Al, Mg, Fe, Ca, Na, K, Mn and Cr were all analysed simultaneously, using the K_{α} peak in all cases (Fe L_{α} was also measured but only for correction purposes). ZAF corrections were applied using Link - supplied software based on the method of Sweatman & Long (1969).

Operating conditions were 15kV accelerating potential, 3.5nA sample current on the Co standard used to correct drift (sample currents on minerals were 4.5nA to 5.5nA according to mineral species) and a beam spot of around 30 microns diameter (except where rastering was employed for analyses of exsolved pyroxenes and devitrified glasses: see Chapters 6 and 5 respectively), which did at least ensure that Na volatilisation was not a problem. Integration times for analysis were 100 seconds throughout, dead time being around 20% . Olivine, Wollastonite and Albite reference materials were analysed at the beginning of each session of analysis and after any interruptions in these sessions (e.g. for sample or filament changes). The primary standards used in calibration of the instrument were as follows: **Si** - synthetic quartz; **Al** - synthetic corundum; **Ti** - synthetic rutile; **Fe** - metal; **Mg** - synthetic periclase; **Mn** - metal; **Ca** - natural wollastonite ; **Na** - halite; **K** - natural orthoclase; **Cr** - metal.

All analyses of stoichiometric minerals showed consistent stoichiometry, with the exception of extremely calcic plagioclases in which there was less Al than was necessary to charge - balance the measured amount of Ca, by as much as a few percent. Otherwise all analyses were within 1 - 2% of charge balance for those minerals in which oxidation states could be assumed a priori. Totals for intermediate, Mg - and Fe - bearing olivines were in the range 101 - 102% , as is normally the case for EDS analyses.

Analyses of minerals in samples 4, 5 and 35 were carried out at Imperial College, using a Cambridge Instruments Microscan probe with a similar EDS system fitted and similar software and operating conditions.

Table A1.1. ICP - AES run sequence.

Solution type	No. of solutions
Blank	1
Drift monitor	1
Calibration standards	10
Blank	1
Drift monitor	1
Unknown samples	10
Spiked std. (2000ppm)	1
Drift monitor	1
Unknown samples	10
Blank	1
Drift monitor	1
Calibration standards	5
Blank	1
Drift monitor	1
Unknown samples	10
Blank	1
Drift monitor	1
Unknown samples	10
Blank	1
Drift monitor	1
Calibration standards	10
Blank	1
Drift monitor	1

The standards used are BR, GA, GH, NIM-N, SY-2 (those used in the middle group of 5 standards), UB-N, NIM-G, DTS-1, AN-G and MICA-MG (see Govinderaju (1984) for compositions used). The spiked standard is a solution of GH with 2000ppm of all trace elements except Be added.

Table A1.2. Replicate analyses of two samples

from Ardnamurchan by ICP - AES.

	35 $n = 6$			19E6 $n = 6$		
	x	σ_{n-1}	R.S.D.%	x	σ_{n-1}	R.S.D.%
SiO ₂	47.83	0.13	0.27	67.86	0.17	0.25
Al ₂ O ₃	18.74	0.21	1.10	13.04	0.052	0.40
Fe ₂ O ₃ ^T	8.25	0.13	1.63	6.16	0.059	0.96
MgO	9.59	0.12	1.20	0.90	0.048	9.0
CaO	12.58	0.18	1.40	2.86	0.14	4.8
Na ₂ O	2.13	0.052	2.42	3.87	0.046	1.2
K ₂ O	0.12	0.014	12	3.78	0.044	1.2
P ₂ O ₅	(0.03)	-	-	0.25	0.01	4
TiO ₂	0.375	0.021	5.5	0.972	0.004	0.42
MnO	0.12	-	-	0.13	-	-
Ba	52	8	15	987	4.1	0.41
Cr	359	36	10	17	9	53
Cu	98	5	5	12	4	35
La	-	-	-	45	3.6	8
Ni	171	12	7	-	-	-
Sr	279	4	1.4	178	2.0	1.1
V	135	21	15	35	9	27
Zn	28	6	21	84	10	11
Zr	27	4.5	16	382	6	1.5

**Table A1.3 International Reference Materials
analysed by ICP - AES.**

Samples NIM-N, NIM-P, NIM-S and W-1 were analysed once each, whilst samples AN-G and NIM-G were analysed 5 times in replicate. Averages and standard deviations are given for the latter. Values in wt% or ppm as appropriate. Recommended values from Govindaraju (1984,1989; see addenda to references, p.776).

	NIM-P	RECC.	NIM-N	RECC.
SiO ₂	51.20	51.10	52.40	52.64
Al ₂ O ₃	4.14	4.18	16.59	16.50
Fe ₂ O ₃ ^T	12.47	12.76	9.05	8.91
MgO	26.63	25.33	7.53	7.50
CaO	2.74	2.66	11.60	11.50
Na ₂ O	0.41	0.37	2.50	2.46
K ₂ O	0.10	0.09	0.26	0.25
P ₂ O ₅	0.02	0.02	0.03	0.03
TiO ₂	0.18	0.20	0.20	0.20
MnO	0.22	0.22	0.18	0.18
Ba	34	46	93	100
Be	0.28	0.4	0.3	1.0
Cr	17865	16400	37	30
Cu	23	18	12	14
La	-	-	-	-
Ni	574	560	118	120
Sr	39	32	261	260
V	241	230	204	220
Zn	135	100	48	68
Zr	14	30	30	23
Co	105	110	53	58

	W-1	RECC.	NIM-S	RECC.
SiO ₂	52.57	52.72	63.85	63.63
Al ₂ O ₃	14.86	15.02	17.38	17.34
Fe ₂ O ₃ ^T	11.17	11.11	1.44	1.40
MgO	6.62	6.63	0.46	0.46
CaO	11.17	10.98	0.68	0.68
Na ₂ O	2.28	2.15	0.45	0.43
K ₂ O	0.65	0.64	15.08	15.35
P ₂ O ₅	0.13	0.14	0.13	0.12
TiO ₂	1.05	1.07	0.05	0.04
MnO	0.18	0.17	0.01	0.01
Ba	164	160	2562	2400
Be	1.3	0.8	1.4	1.4
Cr	123	115	17	12
Cu	110	118	13	19
La	17	10	8	5
Ni	82	76	-	7
Sr	184	190	68	62
V	260	289	-	10
Zn	80	86	-	10
Zr	98	105	2	33
Co	43	47	4	3

	AN-G	σ_{n-1}	RECC.		NIM-G	σ_{n-1}	RECC.
SiO ₂	46.40	0.24	46.30		76.20	0.41	75.70
Al ₂ O ₃	29.70	0.17	29.80		12.13	0.04	12.08
Fe ₂ O ₃ ^T	3.33	0.03	3.35	2.02	0.02	2.02	
MgO	1.78	0.02		1.80	0.07	0.01	0.06
CaO	16.24	0.28	15.90		0.86	0.04	0.78
Na ₂ O	1.73	0.02	1.63		3.41	0.02	3.36
K ₂ O	0.17	0.01	0.13		4.93	0.04	4.99
P ₂ O ₅	0.02	-	0.01		0.02	-	0.01
TiO ₂	0.23	0.01	0.22		0.10	-	0.09
MnO	0.04	-	0.04		0.02	-	0.01
Ba	41	1.3	34		121	4	120
Be	-	-	-		7.2	0.1	7
Cr	52	3	50		15	2	12
Cu	20	2	19		12	2	12
La	-	-	-		108	6	105
Ni	35	8	35		-	-	8
Sr	79	1	76		16	2	10
V	80	5	70		-	-	-
Zn	-	-	-		41	5	50
Zr	27	6	15		309	10	300
Co	24	1	25		-	-	4

Table A1.4 XRF operating conditions.

The X - ray fluorescence spectral line used is the K_{α} line unless otherwise stated. Crystals used are: 1 - LiF_{220} ; 2 - LiF_{200} ; 3 - PE ; 4 - THAP ; 5 - Ge ; 6 - PX1. Angle refers to the 2θ angle at which the crystal is set for measurement of the line concerned. Positive and negative background angular offsets, where used, are given relative to the position of the peak angle. Count times are in seconds. Conditions for fused disc analysis are given for Si, Al, Mg, Fe, Ca; conditions for all other major and trace elements are those for analysis of pressed pellets.

Element	Line	Crystal	Angle	+ bkg	- bkg	Peak t	Bkg t
Si		6	16.765	4.20	1.80	40	20
Al		6	19.365	1.72	-	40	20
Fe		2	57.580	2.30	2.00	40	20
Mg		6	23.325	2.30	2.40	40	20
Ca		2	113.260	4.30	2.00	40	20
Na		4	55.00	2.40	-	100	40
K		2	136.885	3.00	-	40	20
Ti		2	86.28	5.00	-	40	20
Mn		1	95.415	4.60	-	40	20
P		5	141.025	4.00	-	80	40
Ba		1	15.61	1.38	0.78	40	20
Nb		1	30.495	0.60	0.60	80	20
Zr		1	32.155	0.90	-	80	20
Y		1	33.960	1.00	0.90	80	20
Sr		1	35.925	0.90	-	80	20
Rb		1	38.045	0.70	1.00	80	20
Zn		1	60.665	1.00	-	80	20
Cu		1	65.645	1.10	-	80	20
Ni		1	71.355	2.00	-	80	20
Pb		1	40.460	1.20	1.60	80	20
Th	L α	1	39.310	1.60	0.76	80	20
V		1	13.335	-	2.00	80	20
Cr		1	107.305	-	2.00	80	20
Nd	L α	1	112.820	1.40	-	80	20
Ga		1	56.27	0.90	0.40	80	20
La	L α	1	139.075	2.00	-	80	20
Ce	L β	1	111.84	2.60	1.50	80	20

Table A1.6. Replicate analyses of samples 35 and 19E6

analysed by XRF.

	35 $n = 7$			19E6 $n = 8$		
	x	σ_{n-1}	R.S.D.%	x	σ_{n-1}	R.S.D.%
SiO ₂	47.62	1.07	2.24	66.54	0.85	1.27
Al ₂ O ₃	17.59	0.33	1.85	13.00	0.11	0.85
Fe ₂ O ₃ ^T	7.94	0.15	1.85	5.91	0.067	1.14
MgO	9.72	0.32	3.25	0.83	0.046	5.5
CaO	12.63	0.38	3.00	2.70	0.035	1.3
Na ₂ O	1.90	0.041	2.17	3.91	0.034	0.87
K ₂ O	0.148	0.004	2.5	3.67	0.072	2.0
P ₂ O ₅	0.028	0.003	12	0.267	0.009	3.3.
TiO ₂	0.361	0.020	5.6	0.933	0.019	2.1
MnO	0.126	0.005	3.7	0.118	0.002	1.8
Ba	(164)	(11)	7	972	68	7
Ce	(7)	(6)	(80)	99	8	8
Cr	257	26	10	17	1	6
Cu	93	4	4	42	2	5
Ga	15	2	13	18	1.4	8
La	(12)	(6)	(50)	65	5	8
Nb	6	0.5	9	20	1	4
Nd	16	5	30	54	7	13
Ni	164	7	7	29	3	10
Pb	21	1	5	28	1	3
Rb	27	1	3	115	2	2
Sr	293	7	2.2	181	1.8	1.0
Th	9	1	12	-	-	-
V	104	7	7	49	5	10
Zn	44	2	4	80	2	2
Zr	31	1	3	389	6	1.5

APPENDIX 2. WHOLE - ROCK ANALYTICAL DATA.

The following data set is divided into four sections dealing with pre - Hypersthene Gabbro rocks, Marginal Border Group and associated rocks, Inner Series rocks and post - Hypersthene Gabbro rocks. Samples are identified by codes listed in each section. Full sample descriptions and sample localities are not presented here but are available on request from the author.

The methods of analysis of the samples are indicated by codes following the sample names (see also section A1.5.3.4):

ICP: major elements and Ba, Sr, Zn, Cr, Cu and Ni by ICP - AES. All other trace elements by XRF.

XRF: Si, Al, Fe, Mg and Ca from fused discs analysed by XRF and processed using FINAL; all other data from pressed pellets analysed by XRF and processed using CBI.

XXXX: XRF analyses in which it was necessary to normalise the fused disc data in order to obtain results which could be compared with the remainder of the XRF data.

Phosphorous analyses by spectrophotometry are distinguished in A2.3 and A2.4 by being given to three places of decimals and being given in heavy type. Analyses by the same method in other appendices are not distinguished in the same way. Fe is expressed as Fe_2O_3 .

A2.1. Pre - Hypersthene Gabbro Country Rocks.

SAMPLE CODES: 1 - Moinian rocks from eastern Ardnamurchan; 2 - Kilchoan Moines; 3 - Jurassic sediments; 4 - Basic to intermediate rocks of Plateau Basalt suite; 5 - Early Tertiary granitic rocks; 6 - Early Tertiary volcanoclastic rocks; 7 - Hornfused altered basalt (tholeiite ?); 10 - Early Ti - rich porphyroblastic dolerite.

	91 XRF	92A XRF	92B XRF	144/1 XRF	157/2 ICP	144/2 XRF
ROCK TYPE	2	2	2	1	1	1
SiO ₂	76.86	84.09	76.81	76.43	79.86	73.37
TiO ₂	0.45	0.15	0.55	0.46	0.09	0.61
Al ₂ O ₃	10.37	7.10	11.61	10.95	10.42	11.66
Fe ₂ O ₃	2.52	0.82	2.63	2.57	0.99	3.27
MgO	0.70	0.10	0.41	0.61	0.36	0.68
CaO	0.63	0.07	0.41	2.11	0.99	1.82
Na ₂ O	2.35	0.96	0.96	2.95	2.98	2.97
K ₂ O	3.75	4.38	5.90	3.41	3.78	3.52
MnO	0.04	0.01	0.02	0.07	0.03	0.06
P ₂ O ₅	0.02	0.02	0.04	0.03	0.03	0.04
L.O.I.	1.09	0.58	1.33	1.28	1.00	0.88
Total	98.74	98.24	100.62	100.82	100.50	98.82
Ba	735.	764.	1194.	702.	820.	923.
Ce	42.	21.	41.	42.	15.	65.
Cr	35.	22.	44.	35.	21.	44.
Cu	36.	39.	42.	38.	42.	38.
Ga	9.	6.	12.	11.	10.	11.
La	34.	23.	46.	30.	26.	49.
Nb	12.	8.	13.	12.	8.	14.

Nd	23.	14.	30.	29.	1.	30.
Ni	31.	24.	27.	37.	23.	28.
Pb	29.	27.	29.	30.	30.	30.
Rb	103.	101.	161.	83.	88.	86.
Sr	171.	123.	120.	286.	205.	240.
Th	12.	8.	12.	15.	9.	15.
V	46.	14.	53.	51.	13.	70.
Y	3.	0.	17.	13.	0.	20.
Zn	35.	16.	31.	29.	19.	38.
Zr	150.	107.	334.	137.	51.	208.

	145 XRF	146/1 XRF	146/2 XRF	147 XRF	157/1 ICP	158 ICP
ROCK TYPE	1	1	1	1	1	1
SiO ₂	84.53	83.79	84.69	83.78	84.67	73.11
TiO ₂	0.31	0.37	0.23	0.35	0.23	0.47
Al ₂ O ₃	7.59	7.31	7.44	7.41	7.38	13.16
Fe ₂ O ₃	1.16	2.08	1.33	1.30	1.73	3.28
MgO	0.04	0.15	0.02	0.10	0.28	0.75
CaO	0.05	0.04	0.07	0.20	1.78	0.66
Na ₂ O	0.16	1.17	0.83	1.15	1.67	2.37
K ₂ O	4.77	4.44	4.96	4.32	1.90	4.67
MnO	0.00	0.05	0.01	0.03	0.03	0.04
P ₂ O ₅	0.02	0.03	0.02	0.03	0.02	0.14
L.O.I.	0.63	0.32	0.35	0.42	0.58	1.27
Total	99.24	99.70	99.90	99.04	100.27	99.92
Ba	893.	943.	823.	763.	445.	1137.
Ce	20.	44.	19.	13.	30.	45.
Cr	24.	32.	27.	30.	14.	32.
Cu	41.	41.	41.	37.	0.	0.
Ga	6.	6.	6.	6.	9.	16.
La	25.	40.	28.	26.	31.	19.
Nb	9.	10.	8.	9.	9.	13.
Nd	12.	25.	22.	26.	19.	0.
Ni	26.	22.	26.	19.	0.	0.
Pb	29.	29.	27.	29.	30.	27.
Rb	100.	114.	117.	102.	58.	154.
Sr	126.	122.	121.	125.	399.	164.
Th	9.	11.	9.	12.	9.	11.

V	19.	30.	20.	26.	23.	58.
Y	0.	0.	0.	0.	0.	6.
Zn	16.	24.	16.	18.	0.	20.
Zr	150.	161.	108.	164.	162.	212.

	159/1 ICP	159/2 ICP	172 ICP	173/1 ICP	173/2 ICP	120F XRF
ROCK TYPE	1	1	2	2	2	3
SiO ₂	68.69	86.51	82.15	78.21	85.00	78.69
TiO ₂	0.64	0.21	0.27	0.60	0.15	0.45
Al ₂ O ₃	15.06	7.01	8.26	10.78	6.61	8.16
Fe ₂ O ₃	4.61	1.22	1.73	2.89	1.39	5.39
MgO	1.32	0.43	0.38	0.33	0.57	0.86
CaO	0.53	0.14	0.61	0.09	0.82	0.73
Na ₂ O	2.54	1.05	0.61	0.76	0.06	1.21
K ₂ O	5.41	2.89	4.04	4.64	3.40	1.76
MnO	0.05	0.02	0.01	0.01	0.05	0.04
P ₂ O ₅	0.06	0.02	0.04	0.04	0.04	0.08
L.O.I.	1.03	0.50	1.41	1.33	2.13	0.96
Total	99.94	100.00	99.51	99.68	100.22	98.28
Ba	1609.	742.	788.	970.	588.	534.
Ce	33.	9.	45.	58.	36.	67.
Cr	44.	15.	19.	25.	11.	71.
Cu	0.	8.	0.	3.	1.	44.
Ga	17.	7.	7.	10.	8.	9.
La	26.	20.	18.	47.	32.	47.
Nb	16.	11.	10.	16.	10.	13.
Nd	17.	16.	24.	39.	26.	41.
Ni	0.	0.	0.	0.	0.	47.
Pb	30.	31.	27.	29.	29.	35.
Rb	167.	78.	123.	146.	101.	55.
Sr	307.	123.	101.	112.	83.	133.
Th	13.	12.	12.	16.	14.	18.

V	95.	23.	33.	55.	18.	94.
Y	0.	0.	0.	21.	3.	8.
Zn	31.	12.	5.	12.	0.	46.
Zr	245.	85.	144.	420.	94.	256.

	89/2 XRF	185/2 XRF	47H XRF	47K XRF	47N1 XRF	47N2 XRF
ROCK TYPE	3	3	3	3	3	3
SiO ₂	56.31	59.84	66.43	78.68	64.75	69.87
TiO ₂	0.97	0.58	0.80	0.43	0.55	0.67
Al ₂ O ₃	21.75	10.76	14.73	8.49	9.83	12.56
Fe ₂ O ₃	7.50	4.45	6.99	2.90	4.11	5.13
MgO	2.25	1.10	1.73	0.98	0.86	1.55
CaO	2.75	16.42	2.95	3.83	14.66	4.09
Na ₂ O	0.96	1.01	1.77	2.43	1.46	2.19
K ₂ O	3.20	2.63	3.32	2.57	2.74	3.33
MnO	0.07	0.08	0.04	0.03	0.07	0.03
P ₂ O ₅	0.10	0.15	0.21	0.11	0.19	0.14
L.O.I.	2.10	0.36	1.26	0.56	1.09	0.96
Total	97.91	97.33	100.18	100.96	100.26	100.47
Ba	541.	504.	719.	399.	510.	489.
Ce	86.	58.	54.	48.	68.	50.
Cr	124.	87.	111.	73.	92.	111.
Cu	43.	43.	45.	37.	38.	46.
Ga	27.	13.	17.	9.	12.	12.
La	61.	53.	41.	28.	58.	34.
Nb	21.	14.	18.	12.	14.	17.
Nd	48.	32.	29.	27.	33.	41.
Ni	85.	47.	67.	45.	48.	54.
Pb	34.	25.	34.	28.	23.	34.
Rb	151.	98.	110.	77.	91.	89.
Sr	307.	375.	284.	211.	354.	256.
Th	22.	16.	18.	15.	18.	17.

V	174.	82.	126.	65.	64.	98.
Y	29.	17.	21.	4.	13.	9.
Zn	120.	82.	93.	44.	67.	65.
Zr	249.	293.	274.	343.	333.	312.

	47P1 XRF	243 XRF	245/1 XRF	246 XRF	276/3 XRF	199 ICP
ROCK TYPE	3	3	3	3	3	3
SiO ₂	78.48	93.59	68.54	90.13	81.44	51.48
TiO ₂	0.44	0.25	0.31	0.32	0.30	0.13
Al ₂ O ₃	7.92	2.82	14.12	4.55	7.38	2.81
Fe ₂ O ₃	2.62	1.44	4.80	1.48	5.12	2.95
MgO	0.59	0.09	1.23	0.10	0.64	0.89
CaO	3.35	2.56	2.70	2.34	0.58	40.07
Na ₂ O	3.04	0.03	0.37	0.11	1.23	0.92
K ₂ O	2.88	0.11	1.31	1.54	2.55	0.06
MnO	0.03	0.01	0.01	0.02	0.05	0.12
P ₂ O ₅	0.11	0.02	0.01	0.03	0.25	0.53
L.O.I.	0.04	0.32	0.33	0.83	0.49	-0.05
Total	99.45	101.19	93.70	101.40	99.99	99.91
Ba	470.	86.	294.	372.	418.	53.
Ce	65.	19.	26.	28.	73.	21.
Cr	78.	52.	51.	58.	66.	52.
Cu	41.	38.	37.	39.	45.	9.
Ga	6.	5.	1.	4.	8.	1.
La	43.	8.	15.	11.	52.	14.
Nb	12.	11.	11.	12.	9.	4.
Nd	31.	18.	4.	17.	44.	20.
Ni	42.	27.	27.	31.	54.	0.
Pb	29.	24.	24.	25.	34.	11.
Rb	74.	19.	43.	49.	76.	17.
Sr	228.	131.	86.	127.	139.	751.
Th	17.	10.	10.	14.	16.	8.

V	51.	45.	40.	53.	105.	117.
Y	5.	0.	0.	0.	17.	0.
Zn	35.	13.	20.	43.	44.	43.
Zr	436.	196.	276.	307.	115.	65.

	67/1 ICP	81/3 ICP	121/3 ICP	177/1 ICP	183D2 ICP	183D3 ICP
ROCK TYPE	3	3	3	3	3	3
SiO ₂	63.68	71.65	56.28	55.38	72.54	54.87
TiO ₂	0.76	1.05	1.10	0.97	0.71	0.97
Al ₂ O ₃	12.69	10.20	22.07	21.06	12.18	22.68
Fe ₂ O ₃	4.90	3.65	8.03	9.58	5.01	7.76
MgO	1.45	1.35	2.30	2.71	1.23	2.33
CaO	11.80	7.75	3.60	4.86	3.37	6.44
Na ₂ O	1.58	1.42	1.89	1.41	1.94	1.59
K ₂ O	2.39	2.77	3.40	3.17	3.09	2.18
MnO	0.03	0.02	0.07	0.89	0.04	0.07
P ₂ O ₅	0.50	0.08	0.17	0.20	0.13	0.06
L.O.I.	0.48	0.21	0.52	0.37	0.57	0.63
Total	100.26	100.15	99.43	100.60	100.81	99.58
Ba	400.	454.	587.	525.	755.	438.
Ce	85.	59.	95.	84.	92.	110.
Cr	112.	146.	124.	133.	93.	136.
Cu	11.	13.	15.	19.	11.	73.
Ga	14.	11.	27.	27.	15.	31.
La	66.	37.	64.	53.	52.	55.
Nb	16.	29.	20.	20.	17.	20.
Nd	55.	29.	45.	41.	51.	45.
Ni	30.	36.	45.	54.	43.	61.
Pb	25.	25.	31.	33.	33.	52.
Rb	89.	91.	127.	147.	85.	99.
Sr	615.	471.	301.	366.	237.	444.
Th	17.	17.	22.	20.	23.	21.

V	82.	125.	154.	178.	113.	235.
Y	58.	24.	37.	34.	17.	25.
Zn	64.	75.	120.	94.	44.	168.
Zr	365.	424.	213.	193.	436.	210.

	212/1 XRF	212/3 XRF	299 XRF	207 XRF	300/1 XRF	301/1 XRF
ROCK TYPE	4	5	5	5	5	6
SiO ₂	52.71	64.12	62.56	65.16	69.04	53.86
TiO ₂	2.42	0.70	0.99	0.79	0.80	1.39
Al ₂ O ₃	12.36	13.00	13.18	12.65	12.35	14.15
Fe ₂ O ₃	11.46	5.11	6.49	7.54	4.91	9.51
MgO	1.81	0.54	0.80	0.55	0.90	4.99
CaO	6.60	2.07	2.40	2.61	1.94	6.51
Na ₂ O	3.22	3.45	3.91	3.96	3.03	2.80
K ₂ O	1.40	4.15	3.62	3.47	3.70	1.60
MnO ₂	0.21	0.13	0.15	0.15	0.10	0.17
P ₂ O ₅	1.05	0.17	0.30	0.23	0.26	0.27
L.O.I.	5.77	4.96	4.44	0.97	0.84	3.18
Total	98.96	98.35	98.80	98.03	97.82	98.39
Ba	900.	1119.	1178.	1346.	1056.	716.
Ce	89.	86.	91.	77.	74.	70.
Cr	27.	39.	23.	17.	32.	189.
Cu	49.	39.	39.	46.	44.	72.
Ga	21.	21.	20.	21.	18.	22.
La	44.	65.	56.	60.	50.	44.
Nb	19.	22.	21.	22.	17.	19.
Nd	61.	65.	47.	58.	42.	49.
Ni	30.	24.	27.	31.	32.	128.
Pb	27.	28.	30.	30.	30.	26.
Rb	62.	117.	91.	98.	118.	62.
Sr	243.	139.	218.	168.	231.	369.
Th	10.	11.	13.	12.	13.	9.

V	206.	34.	55.	37.	71.	216.
Y	75.	71.	71.	107.	49.	52.
Zn	112.	84.	74.	109.	69.	98.
Zr	283.	411.	373.	453.	320.	309.

	202 ICP	83/2 ICP	120C ICP	190 ICP	48/1 XRF	56 XRF
ROCK TYPE	4	4	4	6	10	4
SiO ₂	45.83	48.72	51.67	64.05	45.15	46.45
TiO ₂	1.47	1.71	3.05	0.83	1.25	1.37
Al ₂ O ₃	14.54	15.36	12.73	13.75	12.71	12.85
Fe ₂ O ₃	13.38	13.03	17.06	5.31	12.69	11.90
MgO	12.67	8.38	3.70	3.10	14.67	12.70
CaO	10.27	9.75	7.65	3.21	9.65	11.20
Na ₂ O	2.01	2.62	3.05	2.91	2.06	1.58
K ₂ O	0.45	0.62	1.76	5.55	0.22	0.36
MnO	0.19	0.18	0.25	0.12	0.18	0.18
P ₂ O ₅	0.12	0.23	0.52	0.10	0.11	0.13
L.O.I.	-0.50	-0.34	-0.59	1.27	-0.46	-0.70
Total	100.43	100.26	100.85	100.20	98.18	97.95
Ba	101.	290.	620.	399.	235.	278.
Ce	6.	34.	66.	130.	26.	23.
Cr	815.	337.	14.	148.	944.	851.
Cu	138.	61.	66.	27.	79.	112.
Ga	20.	19.	23.	19.	16.	20.
La	23.	20.	35.	92.	4.	5.
Nb	8.	9.	15.	31.	7.	7.
Nd	3.	22.	47.	59.	21.	26.
Ni	432.	125.	0.	70.	405.	441.
Pb	23.	20.	24.	30.	21.	24.
Rb	36.	35.	70.	136.	26.	31.
Sr	192.	342.	266.	212.	202.	326.
Th	9.	7.	10.	8.	9.	7.

V	291.	329.	455.	95.	264.	311.
Y	25.	21.	77.	65.	0.	7.
Zn	85.	99.	146.	90.	77.	83.
Zr	96.	137.	224.	502.	54.	111.

	72/2 XRF	120A XRF	162B XRF	236 XRF	237 XRF	251 XRF
ROCK TYPE	7	4	4	4	4	4
SiO ₂	47.40	45.88	46.08	47.41	44.91	44.62
TiO ₂	0.74	2.53	1.30	1.33	1.35	1.50
Al ₂ O ₃	15.64	15.28	14.85	13.86	13.77	13.49
Fe ₂ O ₃	11.05	15.26	11.95	11.83	12.76	14.92
MgO	10.36	6.61	12.12	11.73	12.06	13.99
CaO	11.13	8.60	8.69	10.33	8.96	8.71
Na ₂ O	2.79	3.18	2.45	1.57	1.94	1.63
K ₂ O	0.13	1.09	0.91	0.34	0.27	0.55
MnO	0.16	0.18	0.16	0.17	0.17	0.20
P ₂ O ₅	0.02	0.34	0.20	0.12	0.16	0.14
L.O.I.	-0.15	-0.28	-0.48	-0.20	2.14	-0.57
Total	99.22	98.62	98.19	98.45	98.45	99.15
Ba	265.	315.	585.	261.	333.	230.
Ce	0.	33.	32.	24.	32.	38.
Cr	370.	60.	653.	718.	656.	209.
Cu	47.	78.	78.	102.	88.	116.
Ga	15.	19.	22.	17.	20.	17.
La	12.	5.	31.	7.	4.	4.
Nb	6.	8.	8.	8.	9.	9.
Nd	4.	43.	27.	30.	24.	33.
Ni	145.	86.	351.	387.	370.	368.
Pb	20.	21.	30.	25.	22.	20.
Rb	25.	56.	44.	33.	29.	37.
Sr	265.	495.	534.	331.	332.	280.
Th	10.	7.	9.	9.	8.	11.

V	246.	367.	278.	310.	260.	264.
Y	0.	29.	10.	6.	23.	12.
Zn	69.	98.	81.	82.	88.	89.
Zr	21.	176.	126.	95.	111.	100.

A2.2. Marginal Border Group Rocks.

SAMPLE CODES: 7 - M1 subalkaline microgranitoids; 8 - M2 subalkaline microgranitoids; 9 - Rheomorphic Breccias; 16 - Anomalous Microgranitoids; 17 - country rock xenoliths; 18 - Pseudo-screen rocks; 19 - MBG homogenous basic rocks; 20 - MBG homogenous intermediate rocks; 21 - M2 ferrogabbros; 11 - M2 cone sheets, cone sheets from beyond M1 aureole; 12 - M1 cone sheets; 15 - Heterogenous hybrid rocks; 22 - M2 porphyritic dolerites.

Several samples in the following lists are hand - picked separates from heterogenous rocks, or the corresponding whole rock samples, as follows:

- 266G, felsic component of heterogenous M1 cone sheet; 266WR, mafic host to the heterogenous inclusions which form 266G.

- 20/6WR, pillowed hybrid rock of heterogenous hybrid suite: contains chilled basic inclusions 20/6B in felsic host 20/6G.

- 248G, felsic groundmass of M2 microgranodiorite, Glebe Hill. Corresponding whole rock, which contains small basaltic inclusions, is 248WR.

- 20/1V, heterogenous hybrid vein cutting xenolith in xenolith swarm S.W. of Duin Bhain. Whole rock, mostly calc - quartzite xenolith material but with some vein rock, is 20/1WR.

- 47AW, whole rock rheomorphic breccia sample, Glendrian Bay. Composed of matrix 47AM and residual quartzite blocks 47AR.

	292 XRF	277 XRF	140/1 XRF	152 XRF	155 XRF	77 XRF
ROCK TYPE	22	11	19	22	22	11
SiO ₂	51.03	49.49	52.04	49.30	48.99	49.64
TiO ₂	1.68	1.40	1.85	1.40	0.92	2.06
Al ₂ O ₃	15.43	16.82	15.04	15.38	17.73	13.04
Fe ₂ O ₃	13.00	12.14	12.98	12.62	9.89	14.57
MgO	5.28	5.76	4.59	6.37	5.23	5.28
CaO	9.46	10.41	7.25	12.02	11.47	8.40
Na ₂ O	2.93	2.83	3.50	2.72	2.94	2.89
K ₂ O	0.81	0.47	1.53	0.27	0.54	1.16
MnO	0.20	0.17	0.19	0.17	0.15	0.19
P ₂ O ₅	0.24	0.13	0.45	0.03	0.10	0.43
L.O.I.	0.00	0.42	0.63	0.00	1.25	0.15
Total	100.01	100.01	100.01	100.26	99.16	97.77
Ba	407.	316.	668.	235.	288.	722.
Ce	35.	19.	58.	13.	19.	39.
Cr	106.	115.	64.	160.	146.	71.
Cu	91.	75.	93.	47.	100.	114.
Ga	21.	17.	21.	21.	22.	20.
La	25.	12.	37.	4.	16.	25.
Nb	10.	8.	15.	6.	6.	12.
Nd	31.	21.	33.	21.	20.	33.
Ni	60.	58.	57.	52.	67.	73.
Pb	24.	23.	24.	21.	19.	25.
Rb	46.	35.	56.	30.	35.	59.
Sr	280.	298.	304.	296.	445.	254.
Th	11.	8.	8.	8.	10.	10.

V	325.	343.	340.	455.	241.	388.
Y	42.	27.	59.	1.	15.	53.
Zn	91.	67.	115.	73.	52.	111.
Zr	125.	92.	233.	46.	75.	174.

	113/2 XRF	185/3 XRF	63 XRF	65/3 XRF	148 XRF	150/2 XRF
ROCK TYPE	11	11	19	19	19	19
SiO ₂	53.07	49.52	48.03	49.99	46.97	47.90
TiO ₂	1.96	2.36	0.95	1.47	2.87	1.85
Al ₂ O ₃	12.94	12.59	15.70	13.84	11.28	12.78
Fe ₂ O ₃	12.72	15.06	11.73	12.85	19.06	14.88
MgO	4.13	4.78	7.69	6.44	5.34	6.59
CaO	7.74	9.57	11.54	10.14	9.39	11.26
Na ₂ O	3.16	2.69	2.57	2.94	2.52	2.55
K ₂ O	1.38	1.28	0.24	0.54	0.73	0.35
MnO	0.19	0.20	0.17	0.19	0.22	0.22
P ₂ O ₅	0.42	0.35	0.06	0.21	0.19	0.06
L.O.I.	0.25	-0.29	0.06	-0.15	-0.34	-0.25
Total	97.91	98.09	98.71	98.42	98.19	98.14
Ba	724.	514.	232.	366.	362.	234.
Ce	62.	44.	6.	28.	33.	23.
Cr	71.	103.	231.	206.	48.	176.
Cu	81.	136.	127.	102.	78.	111.
Ga	23.	23.	19.	20.	21.	18.
La	38.	31.	14.	11.	4.	13.
Nb	14.	13.	6.	9.	9.	6.
Nd	45.	33.	13.	23.	26.	7.
Ni	49.	49.	116.	71.	48.	71.
Pb	27.	33.	21.	24.	22.	21.
Rb	54.	83.	31.	36.	44.	31.
Sr	250.	262.	287.	266.	235.	280.
Th	10.	9.	10.	10.	12.	7.

V	333.	473.	316.	327.	751.	471.
Y	64.	51.	6.	38.	37.	14.
Zn	96.	106.	63.	85.	106.	84.
Zr	217.	167.	45.	111.	107.	51.

	156 XRF	76/1 XRF	105 XRF	273 XRF	293B XRF	121/2 XRF
ROCK TYPE	19	19	20	20	19	19
SiO ₂	45.29	48.28	51.35	52.16	49.27	49.80
TiO ₂	2.28	1.00	2.19	2.57	1.67	1.97
Al ₂ O ₃	12.30	17.76	12.71	12.27	12.98	12.50
Fe ₂ O ₃	17.49	10.29	14.36	14.36	14.13	15.15
MgO	7.04	6.62	4.37	2.75	6.42	5.24
CaO	11.46	10.92	8.10	7.06	10.40	9.37
Na ₂ O	2.56	2.39	3.31	3.44	2.72	2.99
K ₂ O	0.17	0.40	1.15	1.17	0.57	0.93
MnO	0.21	0.15	0.20	0.26	0.20	0.21
P ₂ O ₅	0.02	0.13	0.47	0.99	0.18	0.26
L.O.I.	-0.35	0.53	0.23	-0.34	-0.05	0.15
Total	98.43	98.41	98.39	96.63	98.44	98.53
Ba	214.	327.	608.	583.	303.	432.
Ce	21.	15.	53.	60.	28.	28.
Cr	123.	119.	69.	19.	75.	59.
Cu	154.	74.	73.	49.	99.	105.
Ga	21.	19.	22.	26.	20.	21.
La	2.	9.	29.	26.	8.	8.
Nb	5.	7.	12.	14.	9.	8.
Nd	19.	28.	44.	50.	28.	32.
Ni	73.	96.	44.	33.	62.	57.
Pb	21.	20.	23.	21.	22.	22.
Rb	30.	29.	48.	50.	39.	45.
Sr	252.	379.	275.	288.	255.	272.
Th	7.	9.	10.	14.	10.	12.

V	801.	210.	412.	204.	409.	410.
Y	3.	6.	63.	131.	40.	50.
Zn	83.	63.	109.	135.	81.	107.
Zr	29.	72.	173.	171.	107.	123.

	272 XRF	140/2 XRF	143/3 XRF	20/6B XRF	167 XRF	75/2 XRF
ROCK TYPE	20	20	19	20	19	19
SiO ₂	51.75	50.97	51.91	50.98	47.35	48.14
TiO ₂	2.08	2.80	2.04	2.04	1.42	1.98
Al ₂ O ₃	12.95	12.27	13.46	12.34	13.72	17.77
Fe ₂ O ₃	14.78	16.51	13.78	14.89	13.31	10.25
MgO	3.97	3.27	3.80	4.09	7.84	6.58
CaO	7.59	7.10	7.66	8.37	11.95	10.97
Na ₂ O	3.26	3.00	2.86	3.23	2.37	2.90
K ₂ O	1.26	1.33	1.54	1.10	0.28	0.67
MnO	0.21	0.21	0.19	0.21	0.18	0.17
P ₂ O ₅	0.32	0.53	0.49	0.26	0.06	0.34
L.O.I.	-0.10	0.15	0.15	0.53	-0.05	0.29
Total	98.03	98.10	97.83	97.98	98.38	100.02
Ba	599.	569.	539.	501.	232.	433.
Ce	57.	37.	68.	31.	16.	15.
Cr	61.	28.	65.	47.	289.	77.
Cu	77.	57.	58.	102.	144.	206.
Ga	20.	25.	25.	21.	16.	22.
La	18.	12.	32.	22.	15.	4.
Nb	14.	12.	13.	11.	6.	8.
Nd	33.	37.	34.	29.	18.	23.
Ni	48.	38.	43.	33.	106.	62.
Pb	23.	21.	22.	22.	22.	24.
Rb	54.	54.	61.	53.	28.	34.
Sr	265.	259.	262.	259.	247.	295.
Th	14.	12.	11.	10.	10.	12.

V	401.	366.	326.	444.	455.	557.
Y	78.	84.	77.	52.	11.	30.
Zn	113.	123.	117.	128.	68.	71.
Zr	160.	199.	185.	153.	47.	100.

	75/4 XRF	200/1 XRF	182 XRF	111 XRF	181 XRF	149 XRF
ROCK TYPE	15	15	20	21	20	22
SiO ₂	51.07	55.86	53.33	49.93	51.47	48.24
TiO ₂	2.34	0.75	2.31	2.12	1.77	0.95
Al ₂ O ₃	12.39	11.24	11.24	12.23	12.95	15.91
Fe ₂ O ₃	15.41	8.47	15.40	15.82	13.36	10.71
MgO	4.03	4.19	3.38	4.87	5.18	7.78
CaO	7.01	13.53	7.64	8.84	9.06	11.53
Na ₂ O	3.73	2.48	3.30	3.11	2.80	2.41
K ₂ O	1.45	1.28	1.57	0.63	1.19	0.29
MnO	0.21	0.15	0.20	0.21	0.19	0.16
P ₂ O ₅	0.58	0.11	0.26	0.23	0.28	0.09
L.O.I.	0.28	0.41	0.00	0.13	0.09	0.16
Total	98.47	98.42	98.59	98.07	98.28	98.18
Ba	753.	411.	802.	395.	475.	222.
Ce	56.	38.	33.	32.	31.	15.
Cr	33.	90.	45.	42.	90.	244.
Cu	98.	55.	64.	65.	98.	102.
Ga	19.	16.	23.	22.	18.	16.
La	37.	28.	23.	9.	22.	3.
Nb	13.	11.	12.	9.	10.	6.
Nd	64.	29.	29.	30.	35.	15.
Ni	52.	40.	35.	38.	48.	115.
Pb	22.	23.	20.	19.	24.	21.
Rb	45.	59.	56.	37.	50.	27.
Sr	263.	341.	251.	261.	268.	266.
Th	11.	11.	11.	13.	11.	8.

V	415.	176.	570.	429.	327.	248.
Y	83.	33.	80.	62.	44.	16.
Zn	114.	74.	99.	99.	94.	60.
Zr	218.	196.	244.	150.	138.	56.

	264/2XXX	265XXX	266GXXX	266WRXXX	267/1 XRF	20/6WRXXX
ROCK TYPE	12	12	12	12	9	15
SiO ₂	54.68	50.92	60.97	59.88	89.20	58.44
TiO ₂	1.89	1.52	1.58	1.48	0.76	1.78
Al ₂ O ₃	13.09	13.88	13.19	13.51	3.43	13.36
Fe ₂ O ₃	13.88	12.66	11.16	11.16	1.13	11.36
MgO	3.93	6.64	2.33	2.69	0.05	2.88
CaO	7.77	11.39	5.02	5.56	1.19	5.52
Na ₂ O	2.20	2.67	3.04	3.07	3.87	3.33
K ₂ O	1.85	0.55	2.34	2.49	3.73	2.29
MnO	0.20	0.19	0.18	0.18	0.08	0.16
P ₂ O ₅	0.35	0.18	0.41	0.43	0.19	0.39
L.O.I.	0.58	0.25	0.31	0.22	2.68	0.53
Total	100.37	100.81	100.47	100.63	106.27	100.01
Ba	582.	299.	703.	742.	765.	780
Ce	39.	34.	73.	51.	55.	42
Cr	50.	210.	39.	48.	28.	26
Cu	61.	115.	59.	61.	43.	78.
Ga	21.	20.	21.	23.	13.	20.
La	29.	9.	40.	41.	45.	28.
Nb	11.	8.	15.	14.	16.	13
Nd	40.	26.	48.	45.	43.	35
Ni	38.	68.	47.	46.	22.	35
Pb	23.	23.	26.	25.	27.	22
Rb	67.	33.	83.	84.	126.	85
Sr	252.	261.	219.	235.	131.	253
Th	14.	10.	15.	14.	17.	8

V	319.	352.	173.	167.	91.	269.
Y	76.	33.	97.	92.	40.	58.
Zn	95.	78.	99.	101.	54.	99.
Zr	197.	86.	290.	270.	247.	227.

	20/6GXXX	186/3XXX	248GXXX	248WRXXX	250/1XXX	19D1 XRF
ROCK TYPE	15	19	8	15	8	8
SiO ₂	57.66	49.34	64.77	64.63	71.60	69.27
TiO ₂	1.76	0.89	1.20	1.27	0.64	0.92
Al ₂ O ₃	12.91	15.16	13.28	13.24	12.82	13.31
Fe ₂ O ₃	12.73	10.26	8.62	8.92	5.00	6.16
MgO	2.76	7.43	1.37	1.42	0.32	0.88
CaO	6.03	12.30	3.75	3.91	1.82	2.81
Na ₂ O	3.34	2.56	4.16	4.12	3.67	4.04
K ₂ O	2.26	0.22	2.78	2.78	4.25	3.68
MnO	0.16	0.16	0.15	0.16	0.11	0.12
P ₂ O ₅	0.41	0.09	0.37	0.38	0.13	0.26
L.O.I.	0.47	0.42	0.04	-0.06	0.00	-0.85
Total	100.44	98.81	100.44	100.72	100.31	100.56
Ba	792.	219.	927.	852.	1281.	1003.
Ce	42.	11.	79.	71.	100.	82.
Cr	30.	200.	20.	26.	18.	19.
Cu	79.	113.	49.	50.	40.	39.
Ga	17.	18.	19.	21.	19.	19.
La	26.	12.	31.	50.	66.	59.
Nb	13.	6.	18.	17.	21.	19.
Nd	48.	10.	59.	62.	55.	54.
Ni	37.	82.	32.	30.	31.	35.
Pb	25.	25.	27.	25.	30.	25.
Rb	84.	27.	96.	93.	133.	116.
Sr	258.	275.	197.	196.	142.	177.
Th	14.	11.	17.	15.	18.	13.

V	273.	219.	95.	112.	27.	52.
Y	59.	12.	94.	97.	94.	86.
Zn	98.	55.	82.	82.	68.	74.
Zr	222.	47.	350.	333.	451.	377.

	43EXXX	43FXXX	43HXXX	43K1XXX	43MXXX	43NXXX
ROCK TYPE	8	8	8	8	8	8
SiO ₂	67.19	66.73	66.99	67.04	67.70	67.87
TiO ₂	0.99	1.02	0.94	1.23	1.00	1.07
Al ₂ O ₃	13.05	12.96	12.96	13.34	13.25	13.31
Fe ₂ O ₃	6.34	6.46	6.04	6.99	6.31	6.55
MgO	0.83	1.07	0.77	1.02	0.89	0.87
CaO	2.89	2.77	2.65	3.15	2.65	2.94
Na ₂ O	3.72	3.64	3.66	3.80	3.89	4.07
K ₂ O	3.59	3.59	3.81	3.47	3.70	3.61
MnO	0.13	0.15	0.14	0.16	0.12	0.13
P ₂ O ₅	0.33	0.36	0.28	0.34	0.30	0.33
L.O.I.	1.04	2.16	1.89	-0.06	0.33	-0.02
Total	100.07	100.89	100.09	100.44	100.11	100.68
Ba	1032.	1118.	1072.	1038.	1052.	1040.
Ce	90.	87.	92.	93.	92.	75.
Cr	17.	17.	16.	20.	21.	19.
Cu	38.	42.	41.	42.	39.	42.
Ga	17.	19.	19.	21.	17.	21.
La	53.	48.	53.	51.	54.	55.
Nb	20.	20.	21.	21.	20.	20.
Nd	57.	49.	47.	63.	58.	55.
Ni	28.	35.	28.	27.	21.	28.
Pb	26.	28.	25.	28.	28.	28.
Rb	111.	115.	118.	106.	116.	111.
Sr	187.	187.	176.	199.	184.	188.
Th	17.	15.	18.	14.	15.	16.

V	50.	56.	55.	59.	50.	53.
Y	93.	92.	91.	97.	86.	91.
Zn	81.	81.	85.	93.	70.	72.
Zr	378.	378.	398.	403.	398.	386.

	289 XRF	19D2XXX	140/3XXX	150/1 XRF	274/1XXX	267/3XXX
ROCK TYPE	8	8	18	18	18	16
SiO ₂	66.82	66.85	55.20	73.85	52.07	75.26
TiO ₂	0.94	0.90	0.89	0.75	0.59	0.70
Al ₂ O ₃	12.78	12.93	21.68	9.34	22.60	11.42
Fe ₂ O ₃	6.01	5.92	7.85	8.06	7.61	5.17
MgO	0.82	0.74	2.54	1.52	2.47	1.03
CaO	2.77	2.73	5.22	0.48	9.07	1.23
Na ₂ O	3.69	4.10	1.79	1.07	3.94	1.09
K ₂ O	3.48	3.62	1.89	1.63	0.60	2.67
MnO	0.13	0.12	0.06	0.03	0.22	0.03
P ₂ O ₅	0.27	0.28	0.18	0.04	0.14	0.06
L.O.I.	2.59	0.06	2.24	1.53	0.90	1.68
Total	100.26	98.20	99.49	98.26	100.18	100.30
Ba	944.	974.	556.	417.	335.	603.
Ce	95.	93.	108.	48.	26.	67.
Cr	17.	22.	131.	106.	167.	85.
Cu	40.	42.	51.	42.	50.	44.
Ga	16.	18.	27.	13.	30.	13.
La	51.	51.	54.	28.	29.	44.
Nb	20.	19.	16.	11.	9.	16.
Nd	50.	45.	44.	25.	29.	41.
Ni	30.	28.	90.	57.	88.	47.
Pb	25.	25.	33.	28.	28.	34.
Rb	112.	114.	74.	52.	33.	96.
Sr	161.	180.	370.	79.	501.	169.
Th	15.	13.	25.	12.	14.	18.

V	60.	57.	182.	117.	152.	94.
Y	90.	83.	28.	0.	2.	15.
Zn	78.	71.	85.	40.	52.	56.
Zr	384.	371.	205.	323.	91.	375.

	47U XRF	42D3 XRF	19E4 XRF	102/3 ICP	9 ICP	11 ICP
ROCK TYPE	9	17	12	22	19	19
SiO ₂	69.70	72.35	51.43	49.74	50.57	50.50
TiO ₂	0.92	0.54	2.70	2.05	1.43	1.40
Al ₂ O ₃	11.95	9.11	12.64	14.39	14.39	14.67
Fe ₂ O ₃	4.96	3.68	16.07	14.83	13.05	11.71
MgO	1.22	0.99	2.92	5.04	6.35	6.69
CaO	2.62	4.13	7.17	10.22	10.89	10.70
Na ₂ O	2.82	2.70	3.13	2.98	2.80	2.84
K ₂ O	3.91	2.88	1.77	0.60	0.55	0.58
MnO	0.10	0.06	0.23	0.23	0.20	0.19
P ₂ O ₅	0.19	0.16	0.59	0.18	0.13	0.15
L.O.I.	0.13	2.69	-0.69	0.00	0.00	0.47
Total	98.48	99.24	97.91	100.26	100.36	99.90
Ba	1191.	563.	789.	228.	189.	186.
Ce	53.	48.	67.	24.	15.	5.
Cr	37.	58.	24.	103.	165.	257.
Cu	56.	40.	71.	61.	114.	119.
Ga	14.	8.	20.	17.	20.	20.
La	48.	40.	46.	3.	11.	18.
Nb	13.	14.	17.	9.	9.	8.
Nd	24.	28.	51.	17.	29.	26.
Ni	34.	40.	30.	25.	43.	61.
Pb	29.	23.	24.	24.	23.	22.
Rb	101.	89.	67.	42.	39.	38.
Sr	225.	213.	271.	286.	264.	244.
Th	16.	13.	9.	13.	8.	9.

V	102.	77.	306.	436.	425.	373.
Y	26.	15.	91.	48.	34.	35.
Zn	51.	51.	138.	126.	80.	82.
Zr	235.	392.	280.	98.	89.	90.

	18 ICP	32 ICP	29 ICP	30 ICP	33A1 ICP	33B1 ICP
ROCK TYPE	15	19	15	19	15	15
SiO ₂	50.39	51.63	52.83	49.97	50.58	50.14
TiO ₂	1.47	0.92	1.63	1.27	1.08	1.19
Al ₂ O ₃	13.91	14.31	13.62	14.80	18.24	14.14
Fe ₂ O ₃	13.35	10.68	13.66	12.02	9.65	11.69
MgO	6.00	7.11	4.82	6.98	5.17	6.75
CaO	10.38	11.40	8.02	10.54	11.86	11.07
Na ₂ O	2.65	2.45	3.28	2.83	2.78	2.65
K ₂ O	0.73	0.39	1.20	0.55	0.57	0.42
MnO	0.20	0.19	0.20	0.18	0.15	0.19
P ₂ O ₅	0.12	0.06	0.25	0.14	0.13	0.12
L.O.I.	0.38	0.10	0.42	0.87	0.55	0.49
Total	99.58	99.24	99.93	100.15	100.76	98.85
Ba	219.	131.	369.	207.	210.	161.
Ce	26.	24.	47.	8.	4.	22.
Cr	118.	114.	45.	180.	152.	256.
Cu	155.	50.	82.	120.	109.	133.
Ga	18.	15.	22.	17.	16.	14.
La	12.	13.	11.	29.	4.	5.
Nb	8.	8.	11.	9.	8.	10.
Nd	24.	18.	18.	21.	32.	18.
Ni	32.	44.	31.	73.	49.	52.
Pb	23.	22.	23.	21.	22.	23.
Rb	43.	33.	47.	38.	37.	35.
Sr	255.	262.	261.	248.	296.	239.
Th	9.	8.	7.	7.	9.	13.

V	555.	322.	435.	390.	319.	382.
Y	21.	12.	55.	26.	21.	29.
Zn	102.	88.	119.	74.	61.	0.
Zr	92.	67.	147.	91.	88.	94.

	33B2 ICP	39B ICP	42D2 ICP	193/1 ICP	193/2 ICP	194A2 ICP
ROCK TYPE	15	15	19	21	19	15
SiO ₂	51.86	52.40	49.31	50.29	48.91	53.21
TiO ₂	0.86	1.95	1.48	3.24	0.71	1.22
Al ₂ O ₃	14.79	13.68	13.92	11.55	16.11	14.14
Fe ₂ O ₃	9.51	13.10	13.96	18.48	9.93	10.87
MgO	6.97	5.24	6.55	4.11	8.07	5.53
CaO	10.93	7.79	10.88	8.11	13.09	10.40
Na ₂ O	2.68	2.97	2.55	3.96	2.46	2.99
K ₂ O	0.71	1.56	0.33	0.23	0.17	0.59
MnO.	0.17	0.20	0.22	0.30	0.16	0.19
P ₂ O ₅	0.13	0.25	0.13	0.28	0.05	0.21
L.O.I.	0.89	0.88	0.48	0.08	0.66	0.63
Total	99.50	100.02	99.81	100.63	100.32	99.98
Ba	191.	434.	134.	209.	83.	275.
Ce	23.	51.	5.	25.	9.	31.
Cr	219.	48.	181.	17.	385.	84.
Cu	96.	62.	123.	48.	120.	71.
Ga	16.	18.	18.	28.	18.	18.
La	27.	18.	8.	9.	9.	19.
Nb	10.	12.	9.	12.	7.	11.
Nd	30.	29.	24.	37.	1.	29.
Ni	72.	20.	49.	0.	67.	20.
Pb	22.	23.	23.	20.	22.	24.
Rb	41.	64.	34.	31.	28.	39.
Sr	259.	248.	230.	232.	262.	267.
Th	12.	10.	10.	11.	11.	15.

V	262.	492.	432.	630.	218.	274.
Y	15.	39.	38.	107.	3.	44.
Zn	80.	113.	92.	154.	37.	81.
Zr	88.	141.	85.	177.	41.	131.

	194A3 ICP	100/1 ICP	100/2 ICP	102/1 ICP	102/2 ICP	121/1 ICP
ROCK TYPE	19	21	19	21	19	15
SiO ₂	49.26	49.10	50.26	47.37	48.95	52.92
TiO ₂	1.25	2.97	1.29	3.17	1.15	2.05
Al ₂ O ₃	14.11	11.23	14.59	11.28	15.52	13.53
Fe ₂ O ₃	13.05	18.52	12.81	20.47	11.89	13.53
MgO	7.18	4.86	7.05	5.25	7.80	3.77
CaO	11.58	8.51	10.95	9.17	11.11	7.52
Na ₂ O	2.61	3.00	2.83	2.69	2.80	3.63
K ₂ O	0.29	1.01	0.33	0.55	0.27	1.31
MnO	0.20	0.26	0.21	0.27	0.18	0.24
P ₂ O ₅	0.10	0.27	0.08	0.21	0.09	0.31
L.O.I.	0.19	0.02	0.00	0.00	0.12	0.51
Total	99.82	99.75	100.40	100.43	99.88	99.32
Ba	123.	294.	151.	249.	134.	467.
Ce	15.	32.	23.	33.	28.	65.
Cr	240.	55.	261.	12.	239.	17.
Cu	146.	91.	113.	80.	102.	104.
Ga	19.	23.	16.	18.	21.	24.
La	13.	2.	6.	13.	5.	26.
Nb	8.	11.	8.	9.	8.	14.
Nd	24.	27.	17.	20.	20.	38.
Ni	49.	40.	57.	0.	86.	0.
Pb	23.	21.	22.	22.	21.	25.
Rb	33.	56.	33.	40.	30.	54.
Sr	235.	253.	271.	231.	262.	265.
Th	11.	7.	9.	10.	10.	10.

V	380.	550.	333.	877.	333.	421.
Y	28.	66.	26.	54.	26.	74.
Zn	87.	128.	91.	148.	77.	111.
Zr	73.	170.	60.	127.	70.	203.

	161/1 ICP	161/2 ICP	183A ICP	183B1 ICP	20/1V ICP	20/1WR ICP
ROCK TYPE	15	19	20	20	15	18
SiO ₂	59.47	49.70	56.19	52.48	61.37	80.26
TiO ₂	1.80	1.45	2.14	2.94	1.18	0.54
Al ₂ O ₃	12.61	14.08	12.44	12.79	9.58	5.49
Fe ₂ O ₃	11.57	13.64	13.97	15.81	7.83	2.86
MgO	2.46	6.91	3.06	3.33	2.77	1.29
CaO	4.89	11.10	6.87	6.99	7.34	4.02
Na ₂ O	2.93	2.69	2.82	2.85	2.61	2.08
K ₂ O	2.33	0.40	1.84	1.72	1.85	1.16
MnO	0.20	0.21	0.24	0.25	0.15	0.07
P ₂ O ₅	0.49	0.12	0.37	0.54	0.21	0.12
L.O.I.	0.86	0.00	0.26	0.00	4.85	2.15
Total	99.61	100.30	100.20	99.70	99.74	100.00
Ba	766.	172.	589.	685.	550.	355.
Ce	67.	23.	54.	71.	52.	35.
Cr	16.	218.	24.	11.	47.	61.
Cu	39.	129.	40.	19.	20.	41.
Ga	22.	18.	21.	23.	17.	5.
La	31.	28.	23.	16.	36.	23.
Nb	14.	8.	13.	14.	14.	14.
Nd	42.	18.	35.	44.	39.	28.
Ni	0.	56.	0.	0.	0.	31.
Pb	25.	23.	26.	20.	27.	22.
Rb	76.	34.	70.	75.	67.	46.
Sr	261.	251.	256.	272.	172.	97.
Th	9.	7.	12.	13.	13.	16.

V	204.	402.	350.	320.	203.	57.
Y	94.	33.	89.	73.	48.	14.
Zn	402.	97.	176.	132.	55.	24.
Zr	249.	83.	240.	229.	308.	515.

	19C1 ICP	19C2 ICP	186/1 ICP	186/2 ICP	24/3 ICP	33C1 ICP
ROCK TYPE	15	15	15	7	15	15
SiO ₂	50.90	57.00	54.65	66.85	52.91	57.59
TiO ₂	2.41	1.78	2.15	0.97	2.13	1.90
Al ₂ O ₃	13.02	13.24	13.10	12.78	13.51	13.18
Fe ₂ O ₃	16.65	12.35	13.36	6.55	14.44	12.12
MgO	4.34	2.82	3.40	1.22	3.74	2.72
CaO	7.94	5.59	6.67	3.17	7.35	5.67
Na ₂ O	3.02	3.64	4.04	3.75	3.21	3.73
K ₂ O	1.06	2.19	1.69	3.59	1.70	2.16
MnO ₂	0.23	0.19	0.20	0.12	0.20	0.20
P ₂ O ₅	0.16	0.32	0.35	0.29	0.36	0.39
L.O.I.	0.30	0.45	0.48	0.36	0.48	0.61
Total	100.03	99.57	100.09	99.65	100.03	100.27
Ba	326.	617.	631.	688.	503.	615.
Ce	38.	57.	59.	103.	50.	49.
Cr	12.	0.	9.	27.	0.	7.
Cu	75.	25.	31.	16.	95.	19.
Ga	21.	22.	24.	22.	21.	22.
La	21.	29.	32.	56.	18.	34.
Nb	13.	14.	15.	23.	14.	16.
Nd	31.	27.	33.	64.	42.	51.
Ni	0.	0.	0.	0.	0.	0.
Pb	22.	22.	23.	29.	23.	24.
Rb	50.	77.	64.	104.	62.	77.
Sr	255.	252.	268.	191.	263.	245.
Th	14.	11.	12.	14.	12.	15.

V	479.	241.	358.	77.	385.	242.
Y	40.	74.	60.	103.	51.	73.
Zn	97.	90.	104.	132.	130.	109.
Zr	151.	232.	230.	463.	192.	245.

	42A2 ICP	42B ICP	42A4 ICP	42D1 ICP	39A2 ICP	39A1 ICP
ROCK TYPE	15	15	16	16	15	15
SiO ₂	57.35	53.17	80.54	75.16	63.86	64.69
TiO ₂	0.91	1.96	0.34	0.47	1.25	1.16
Al ₂ O ₃	13.85	12.55	5.64	8.50	13.67	13.37
Fe ₂ O ₃	8.51	15.21	2.63	3.34	7.54	7.18
MgO	4.38	4.37	0.73	0.65	1.41	1.56
CaO	8.96	8.04	4.33	4.06	3.54	3.43
Na ₂ O	3.26	3.07	1.75	1.95	3.87	3.82
K ₂ O	1.59	1.03	1.18	2.85	3.57	3.66
MnO	0.16	0.23	0.04	0.03	0.12	0.12
P ₂ O ₅	0.14	0.20	0.07	0.40	0.32	0.28
L.O.I.	0.58	0.43	2.87	2.97	0.48	0.48
Total	99.69	100.26	100.12	100.38	99.63	99.75
Ba	386.	324.	279.	466.	1095.	952.
Ce	49.	28.	32.	54.	72.	92.
Cr	69.	31.	50.	58.	0.	15.
Cu	76.	78.	0.	0.	20.	23.
Ga	16.	22.	7.	13.	20.	17.
La	30.	18.	23.	38.	37.	47.
Nb	11.	11.	15.	13.	20.	19.
Nd	29.	26.	27.	43.	46.	35.
Ni	22.	0.	0.	0.	0.	15.
Pb	23.	23.	24.	24.	25.	25.
Rb	62.	47.	50.	96.	94.	106.
Sr	267.	224.	132.	174.	238.	220.
Th	10.	8.	17.	18.	12.	12.

V	158.	401.	52.	68.	112.	112.
Y	39.	61.	10.	23.	83.	78.
Zn	65.	121.	29.	28.	40.	78.
Zr	175.	155.	433.	409.	371.	303.

	194B ICP	42C ICP	43D ICP	19E1 ICP	19E6 ICP	33C2 ICP
ROCK TYPE	7	8	8	8	8	8
SiO ₂	63.61	68.07	67.36	67.14	67.86	64.16
TiO ₂	1.27	1.04	1.08	0.99	0.98	1.08
Al ₂ O ₃	13.18	13.05	13.01	13.20	13.04	13.66
Fe ₂ O ₃	8.17	6.42	6.56	6.09	6.16	8.53
MgO	1.62	0.98	1.03	0.79	0.90	1.07
CaO	3.86	2.76	2.54	2.70	2.86	2.93
Na ₂ O	3.20	3.77	3.84	3.91	3.87	3.97
K ₂ O	3.82	3.69	3.89	3.80	3.78	3.61
MnO	0.14	0.14	0.15	0.12	0.13	0.16
P ₂ O ₅	0.30	0.27	0.29	0.25	0.25	0.33
L.O.I.	0.46	0.11	0.47	0.04	0.07	0.33
Total	99.63	100.30	100.22	99.03	99.90	99.83
Ba	718.	1015.	1016.	990.	987.	1348.
Ce	97.	78.	57.	104.	102.	94.
Cr	27.	8.	0.	0.	17.	11.
Cu	39.	6.	10.	11.	12.	18.
Ga	15.	17.	19.	18.	19.	20.
La	33.	57.	64.	61.	62.	60.
Nb	19.	22.	21.	21.	21.	22.
Nd	59.	46.	53.	58.	58.	51.
Ni	0.	0.	0.	0.	0.	19.
Pb	28.	28.	28.	27.	28.	27.
Rb	110.	114.	120.	115.	116.	100.
Sr	236.	191.	186.	174.	178.	231.
Th	12.	17.	14.	15.	12.	11.

V	115.	57.	45.	50.	52.	48.
Y	91.	104.	100.	99.	95.	95.
Zn	96.	88.	83.	70.	84.	98.
Zr	343.	431.	399.	407.	401.	405.

	93 ICP	94 ICP	95A ICP	96 ICP	42A3 ICP	47AW ICP
ROCK TYPE	11	11	11	11	17	9
SiO ₂	50.45	52.08	48.98	50.21	69.35	72.17
TiO ₂	2.71	2.54	2.48	2.71	0.14	0.83
Al ₂ O ₃	12.64	12.85	12.56	12.64	4.29	10.87
Fe ₂ O ₃	16.37	14.76	16.92	16.47	1.83	5.04
MgO	3.94	3.45	4.96	3.83	0.54	1.12
CaO	8.13	7.14	8.83	7.34	19.97	2.69
Na ₂ O	2.85	3.22	2.67	3.33	1.40	2.57
K ₂ O	1.28	1.89	1.20	1.76	1.46	3.27
MnO	0.23	0.24	0.25	0.24	0.07	0.08
P ₂ O ₅	0.43	0.65	0.26	0.39	0.04	0.17
L.O.I.	0.96	1.27	1.09	0.79	0.69	0.29
Total	99.99	100.09	100.20	99.71	99.78	99.10
Ba	569.	686.	367.	632.	290.	975.
Ce	71.	85.	39.	63.	36.	50.
Cr	8.	33.	62.	11.	40.	20.
Cu	117.	34.	98.	116.	0.	26.
Ga	25.	20.	23.	22.	4.	10.
La	19.	38.	18.	27.	32.	30.
Nb	16.	15.	11.	13.	8.	12.
Nd	30.	37.	19.	46.	26.	20.
Ni	0.	0.	13.	0.	0.	0.
Pb	26.	23.	22.	22.	22.	29.
Rb	63.	73.	65.	67.	57.	93.
Sr	259.	276.	260.	276.	269.	213.
Th	9.	12.	8.	9.	11.	13.

V	526.	270.	485.	460.	30.	88.
Y	66.	68.	62.	66.	0.	26.
Zn	136.	126.	125.	131.	12.	42.
Zr	217.	215.	160.	206.	142.	217.

	47AM ICP	47AR ICP	24/2XXX	126 XRF	128 XRF	143/2 XRF
ROCK TYPE	9	9	19	19	19	19
SiO ₂	68.70	82.58	50.86	50.26	48.16	49.11
TiO ₂	1.09	0.25	1.22	1.91	2.71	0.87
Al ₂ O ₃	11.96	8.39	13.85	12.65	11.87	16.33
Fe ₂ O ₃	6.36	1.33	13.67	15.31	18.01	10.34
MgO	1.42	0.32	6.45	5.54	5.72	8.42
CaO	3.19	1.39	10.53	9.66	10.26	11.57
Na ₂ O	2.82	2.13	3.50	3.10	2.62	2.30
K ₂ O	3.71	2.48	0.46	0.56	0.51	0.42
MnO ₂	0.11	0.02	0.19	0.22	0.23	0.15
P ₂ O ₅	0.22	0.02	0.15	0.22	0.17	0.09
L.O.I.	0.21	0.23	0.58	0.03	-0.19	0.26
Total	99.79	99.14	101.42	99.40	100.01	99.82
Ba	1051.	721.	335.	324.	290.	198.
Ce	69.	30.	33.	19.	34.	0.
Cr	19.	5.	193.	73.	61.	220.
Cu	35.	6.	119.	78.	83.	97.
Ga	17.	7.	19.	19.	18.	14.
La	46.	30.	15.	17.	11.	0.
Nb	15.	11.	9.	10.	8.	8.
Nd	23.	20.	25.	18.	18.	6.
Ni	0.	0.	56.	60.	47.	132.
Pb	27.	27.	20.	21.	19.	20.
Rb	103.	84.	34.	38.	39.	32.
Sr	222.	197.	261.	252.	245.	260.
Th	12.	11.	6.	12.	7.	7.

V	116.	25.	324.	442.	576.	235.
Y	37.	0.	27.	58.	49.	16.
Zn	73.	10.	89.	98.	119.	62.
Zr	254.	127.	92.	116.	101.	57.

183D1 ICP

ROCK TYPE 16

SiO ₂	66.21
TiO ₂	1.06
Al ₂ O ₃	13.26
Fe ₂ O ₃	7.29
MgO	1.14
CaO	2.82
Na ₂ O	3.03
K ₂ O	3.32
MnO ₂	0.11
P ₂ O ₅	0.23
L.O.I.	0.67
Total	99.14

Ba	862.
Ce	80.
Cr	28.
Cu	31.
Ga	22.
La	40.
Nb	17.
Nd	34.
Ni	28.
Pb	32.
Rb	88.
Sr	229.
Th	8.

V	77.
Y	95.
Zn	89.
Zr	355.

A2.3. Inner Series rocks.

SAMPLE TYPES: 24 – Coarse Inner Series Gabbronorite; 25 – Fine - grained Inner Series Gabbronorite; 26 – Pre - gabbronorite granular rocks; 27 – Pre - gabbronorite Laminated Gabbro; 28 – Pre - gabbronorite Anorthosite; 29 – Metasomatic Pyroxenite; 30 – Inner Series Ferrogabbro; 31 – Porphyroblastic granular dolerite.

	275/5 XRF	275/7 XRF	170 XRF	279/2 XRF	279/5 XRF	281/1 XRF
ROCK TYPE	27	30	27	26	27	26
SiO ₂	49.12	47.05	50.66	35.40	41.25	38.31
TiO ₂	1.59	3.48	0.51	4.45	2.91	3.67
Al ₂ O ₃	13.40	11.77	14.95	10.57	11.88	13.47
Fe ₂ O ₃	13.10	19.07	8.18	31.60	21.12	24.95
MgO	6.98	5.29	9.11	5.35	6.64	4.79
CaO	12.26	9.30	13.89	10.32	10.96	10.13
Na ₂ O	2.59	2.85	2.24	2.76	2.33	2.59
K ₂ O	0.23	0.59	0.16	0.27	0.16	0.24
MnO	0.21	0.25	0.15	0.26	0.22	0.19
P ₂ O ₅	0.10	0.17	0.02	0.03	0.02	0.02
L.O.I.	0.04	0.12	0.16	-0.92	-0.50	-0.56
Total	99.57	99.88	99.99	100.05	96.96	97.77
Ba	247.	338.	201.	118.	175.	220.
Ce	8.	17.	0.	0.	5.	0.
Cr	138.	43.	277.	91.	50.	101.
Cu	142.	91.	66.	29.	334.	49.
Ga	17.	21.	15.	13.	20.	20.
La	6.	0.	14.	0.	0.	2.
Nb	8.	9.	6.	3.	6.	5.

Nd	25.	23.	21.	13.	21.	11.
Ni	90.	46.	95.	30.	114.	67.
Pb	21.	21.	21.	9.	20.	18.
Rb	30.	45.	27.	18.	29.	30.
Sr	272.	249.	257.	118.	219.	269.
Th	13.	8.	9.	6.	8.	4.
V	404.	695.	183.	1343.	1125.	960.
Y	26.	49.	0.	0.	0.	0.
Zn	78.	137.	47.	72.	76.	85.
Zr	59.	109.	29.	16.	26.	26.

	281/2 XRF	286/3 XRF	287B1 XRF	287C1 XRF	314 XRF	316A XRF
ROCK TYPE	24	27	28	28	27	29
SiO ₂	46.19	46.60	49.56	49.74	49.96	42.66
TiO ₂	2.80	1.90	0.29	0.22	0.56	0.40
Al ₂ O ₃	12.94	12.39	21.54	26.61	15.03	5.54
Fe ₂ O ₃	16.91	15.51	3.38	2.21	7.42	19.40
MgO	5.35	7.32	3.98	1.03	8.00	21.36
CaO	9.92	11.35	13.88	12.49	13.75	7.11
Na ₂ O	2.89	2.49	2.95	3.49	2.64	0.51
K ₂ O	0.63	0.34	0.29	0.43	0.17	0.19
MnO	0.25	0.22	0.08	0.03	0.14	0.30
P ₂ O ₅	0.24	0.12	0.04	0.03	0.03	0.04
L.O.I.	-0.03	0.24	0.82	0.76	0.06	0.88
Total	98.05	98.43	96.74	97.00	97.73	98.35
Ba	407.	262.	224.	218.	195.	144.
Ce	15.	22.	3.	0.	2.	19.
Cr	36.	180.	214.	31.	148.	353.
Cu	107.	155.	81.	80.	130.	400.
Ga	21.	19.	18.	21.	18.	8.
La	13.	1.	12.	14.	14.	9.
Nb	10.	7.	6.	7.	7.	6.
Nd	32.	15.	3.	11.	3.	24.
Ni	36.	80.	64.	45.	74.	302.
Pb	20.	21.	23.	23.	19.	19.
Rb	36.	30.	25.	28.	26.	31.
Sr	299.	243.	421.	482.	282.	85.
Th	10.	8.	11.	9.	10.	4.

V	529.	632.	90.	39.	192.	134.
Y	31.	14.	0.	0.	1.	0.
Zn	97.	67.	27.	25.	43.	93.
Zr	111.	53.	42.	50.	32.	16.

	318 XRF	97/1 XRF	97/5 XRF	34 XRF	97/3 XRF	97/4 XRF
ROCK TYPE	27	27	26	24	24	24
SiO ₂	49.63	46.11	46.59	47.15	49.54	46.25
TiO ₂	0.48	0.20	0.60	0.37	0.53	0.26
Al ₂ O ₃	14.87	16.87	14.23	15.20	16.89	16.50
Fe ₂ O ₃	8.47	10.09	7.67	9.89	5.42	8.34
MgO	8.40	11.09	6.72	10.50	6.19	9.68
CaO	13.54	9.69	19.76	10.96	15.20	12.72
Na ₂ O	2.34	1.88	1.04	2.32	2.13	1.65
K ₂ O	0.19	0.22	0.19	0.18	0.35	0.15
MnO	0.17	0.13	0.09	0.16	0.10	0.13
P ₂ O ₅	0.04	0.01	0.04	0.04	0.03	0.02
L.O.I.	0.01	0.90	0.69	0.09	0.32	0.25
Total	98.08	97.16	97.58	96.81	96.66	95.91
Ba	181.	172.	200.	186.	260.	180.
Ce	6.	0.	0.	16.	0.	7.
Cr	362.	187.	233.	248.	329.	394.
Cu	124.	98.	68.	131.	68.	132.
Ga	14.	18.	17.	16.	17.	16.
La	10.	5.	23.	12.	16.	10.
Nb	5.	5.	7.	6.	7.	5.
Nd	8.	8.	18.	32.	11.	6.
Ni	128.	218.	65.	125.	91.	180.
Pb	23.	21.	22.	23.	23.	23.
Rb	28.	27.	29.	27.	27.	27.
Sr	260.	418.	423.	282.	407.	314.
Th	9.	8.	8.	11.	11.	10.

V	173.	80.	193.	118.	158.	102.
Y	0.	0.	0.	0.	3.	0.
Zn	52.	55.	49.	63.	41.	46.
Zr	30.	32.	69.	31.	52.	28.

	287B2 XRF	315A XRF	315C XRF	317B XRF	195	196 XRF
ROCK TYPE	24	24	24	24	22	24
SiO ₂	47.93	49.03	50.13	48.95	49.42	48.57
TiO ₂	0.23	0.73	0.34	0.53	0.89	0.53
Al ₂ O ₃	18.37	16.93	15.90	17.05	18.84	17.25
Fe ₂ O ₃	8.25	9.49	8.17	9.44	9.16	9.02
MgO	9.70	7.82	9.39	7.97	5.26	9.44
CaO	10.93	12.17	13.09	12.48	13.08	11.90
Na ₂ O	2.02	2.32	2.42	2.27	2.53	2.41
K ₂ O	0.28	0.23	0.14	0.22	0.24	0.20
MnO	0.13	0.16	0.16	0.16	0.14	0.14
P ₂ O ₅	0.05	0.07	0.04	0.06	0.01	0.04
L.O.I.	0.44	0.25	0.11	0.29	-0.20	0.63
Total	98.29	99.16	99.85	99.36	99.32	100.09
Ba	184.	203.	179.	204.	200.	204.
Ce	8.	12.	1.	0.	0.	13.
Cr	114.	240.	432.	251.	162.	300.
Cu	95.	106.	114.	97.	44.	102.
Ga	15.	16.	15.	16.	19.	17.
La	27.	11.	5.	9.	0.	11.
Nb	6.	6.	6.	6.	6.	7.
Nd	7.	14.	9.	18.	9.	7.
Ni	175.	112.	141.	119.	43.	139.
Pb	22.	19.	22.	22.	22.	23.
Rb	30.	30.	28.	30.	28.	27.
Sr	316.	387.	333.	304.	332.	295.
Th	8.	11.	6.	10.	8.	10.

V	49.	209.	134.	160.	269.	158.
Y	0.	3.	0.	0.	0.	0.
Zn	41.	55.	43.	52.	49.	52.
Zr	34.	49.	32.	37.	31.	33.

	197/1 XRF	198 XRF	279/3 XRF	280/1 XRF	286/1 XRF	286/4 XRF
ROCK TYPE	24	24	31	24	31	24
SiO ₂	49.66	50.03	48.76	47.02	48.41	50.88
TiO ₂	0.69	0.80	1.10	1.51	0.90	0.96
Al ₂ O ₃	15.36	19.57	14.74	16.13	15.33	16.14
Fe ₂ O ₃	9.63	7.47	11.82	13.66	11.57	9.24
MgO	8.69	4.58	8.05	8.37	8.56	6.39
CaO	13.04	12.44	11.62	10.32	12.18	12.21
Na ₂ O	2.25	2.86	2.40	2.38	2.31	2.79
K ₂ O	0.22	0.33	0.29	0.31	0.21	0.32
MnO	0.15	0.10	0.17	0.18	0.17	0.16
P ₂ O ₅	0.04	0.07	0.09	0.10	0.02	0.07
L.O.I.	0.19	0.42	-0.01	0.05	0.03	0.27
Total	99.87	98.63	98.99	100.00	99.65	99.38
Ba	209.	224.	252.	250.	225.	275.
Ce	5.	6.	21.	17.	4.	26.
Cr	340.	98.	245.	157.	263.	190.
Cu	120.	103.	125.	145.	116.	98.
Ga	15.	21.	16.	14.	15.	18.
La	1.	2.	4.	10.	4.	10.
Nb	6.	7.	7.	7.	6.	6.
Nd	9.	18.	21.	7.	23.	23.
Ni	100.	59.	107.	99.	114.	68.
Pb	23.	22.	22.	22.	21.	22.
Rb	29.	28.	30.	31.	28.	29.
Sr	264.	356.	261.	259.	266.	305.
Th	10.	9.	5.	11.	11.	7.

V	236.	271.	310.	455.	287.	280.
Y	2.	0.	11.	7.	2.	9.
Zn	54.	41.	67.	73.	63.	58.
Zr	40.	48.	53.	59.	32.	55.

	197/2 XRF	275/1 XRF	275/2 XRF	275/6 XRF	293A XRF	296 XRF
ROCK TYPE	31	25	24	31	24	25
SiO ₂	48.73	48.94	47.44	48.93	49.14	47.30
TiO ₂	0.52	0.71	0.85	1.47	0.84	0.63
Al ₂ O ₃	15.63	16.35	16.05	13.96	16.17	15.38
Fe ₂ O ₃	9.37	10.69	12.26	13.03	10.51	10.40
MgO	9.45	8.84	8.84	7.81	8.30	13.01
CaO	12.91	12.06	11.12	11.00	11.71	10.84
Na ₂ O	2.10	2.34	2.05	2.57	2.22	1.84
K ₂ O	0.15	0.22	0.27	0.31	0.31	0.17
MnO ₁	0.15	0.17	0.18	0.19	0.16	0.16
P ₂ O ₅	0.01	0.04	0.07	0.16	0.06	0.03
L.O.I.	0.21	0.06	0.28	0.21	0.26	-0.10
Total	99.19	100.37	99.35	99.60	99.64	99.63
Ba	190.	206.	233.	258.	238.	204.
Ce	3.	10.	3.	28.	7.	8.
Cr	330.	270.	202.	202.	220.	264.
Cu	137.	125.	105.	109.	105.	119.
Ga	15.	16.	16.	18.	17.	13.
La	15.	8.	20.	5.	0.	0.
Nb	5.	5.	7.	7.	7.	7.
Nd	16.	24.	12.	32.	10.	24.
Ni	113.	113.	142.	120.	119.	265.
Pb	23.	22.	23.	21.	21.	24.
Rb	24.	29.	31.	28.	28.	27.
Sr	252.	298.	282.	257.	279.	256.
Th	7.	7.	7.	8.	11.	10.

V	174.	210.	258.	356.	214.	116.
Y	0.	0.	3.	31.	1.	0.
Zn	52.	60.	69.	81.	56.	64.
Zr	23.	36.	50.	65.	45.	36.

	297 XRF	133/1 XRF	26 ICP	X1 ICP	4 ICP	137/1 ICP
ROCK TYPE	25	31	24	26	28	28
SiO ₂	47.85	46.39	49.00	47.69	50.60	49.40
TiO ₂	0.62	2.59	1.00	0.28	0.40	0.42
Al ₂ O ₃	16.48	12.46	17.63	21.29	27.24	20.44
Fe ₂ O ₃	10.45	17.36	9.49	5.44	3.12	7.19
MgO	9.65	5.71	6.26	4.23	0.91	6.65
CaO	11.54	10.52	12.55	18.03	12.38	12.14
Na ₂ O	2.06	2.89	2.72	1.70	3.93	2.94
K ₂ O	0.23	0.32	0.23	0.15	0.54	0.25
MnO ₂	0.16	0.22	0.15	0.06	0.04	0.11
P ₂ O ₅	0.06	0.22	0.10	0.02	0.053	0.056
L.O.I.	0.08	-0.17	0.35	0.62	0.64	0.19
Total	99.13	98.47	99.46	99.51	99.86	99.79
Ba	224.	280.	235.	87.	223.	108.
Ce	22.	28.	31.	17.	21.	12.
Cr	253.	72.	430.	238.	0.	248.
Cu	117.	100.	97.	51.	38.	74.
Ga	14.	21.	17.	21.	20.	21.
La	12.	2.	6.	27.	13.	17.
Nb	7.	8.	6.	6.	8.	7.
Nd	7.	18.	15.	13.	6.	3.
Ni	188.	48.	85.	44.	0.	93.
Pb	21.	19.	20.	21.	21.	20.
Rb	29.	30.	27.	24.	29.	25.
Sr	280.	266.	287.	495.	493.	344.
Th	9.	14.	11.	8.	11.	11.

V	162.	618.	258.	89.	94.	114.
Y	1.	36.	13.	0.	0.	0.
Zn	61.	95.	53.	31.	24.	28.
Zr	44.	64.	63.	52.	63.	42.

	3 ICP	5 ICP	7 ICP	21 ICP	25 ICP	35 ICP
ROCK TYPE	24	24	24	24	24	24
SiO ₂	48.02	48.56	48.28	46.85	45.60	47.90
TiO ₂	0.21	0.46	0.56	0.53	0.58	0.35
Al ₂ O ₃	19.10	17.45	17.13	18.27	16.31	18.90
Fe ₂ O ₃	7.51	8.82	9.94	10.05	13.07	8.23
MgO	9.46	8.33	9.09	9.57	12.20	9.65
CaO	12.67	12.54	12.25	11.24	9.68	12.17
Na ₂ O	2.13	2.44	2.08	2.15	1.82	2.10
K ₂ O	0.10	0.15	0.08	0.17	0.16	0.14
MnO ₂	0.11	0.14	0.15	0.15	0.19	0.12
P ₂ O ₅	0.019	0.016	0.028	0.044	0.043	0.020
L.O.I.	0.29	0.32	0.49	0.32	0.03	0.29
Total	99.62	99.23	100.08	99.35	99.69	99.87
Ba	44.	69.	38.	46.	55.	36.
Ce	13.	0.	5.	17.	1.	3.
Cr	338.	380.	246.	236.	68.	305.
Cu	98.	117.	84.	174.	285.	97.
Ga	12.	17.	15.	15.	11.	13.
La	13.	15.	8.	14.	0.	0.
Nb	6.	6.	7.	7.	6.	6.
Nd	2.	13.	9.	26.	18.	13.
Ni	150.	116.	143.	188.	261.	178.
Pb	21.	20.	20.	21.	21.	18.
Rb	25.	26.	27.	28.	29.	26.
Sr	302.	293.	252.	259.	241.	281.
Th	14.	10.	10.	10.	9.	9.

V	103.	193.	209.	169.	209.	132.
Y	0.	0.	0.	0.	3.	0.
Zn	42.	55.	66.	54.	87.	47.
Zr	22.	29.	36.	39.	48.	27.

	129 ICP	133/2 ICP	134 ICP	136 ICP	137/2 ICP	164 ICP
ROCK TYPE	24	24	24	24	24	24
SiO ₂	48.58	51.32	47.80	48.22	49.66	48.14
TiO ₂	0.85	1.38	0.98	1.03	0.32	0.52
Al ₂ O ₃	15.57	14.20	15.53	15.83	18.49	19.89
Fe ₂ O ₃	12.02	11.32	12.22	11.73	7.10	8.21
MgO	8.54	6.46	8.73	8.49	7.91	7.41
CaO	11.44	12.51	12.03	11.68	13.20	12.48
Na ₂ O	2.44	2.89	2.43	2.56	2.68	2.38
K ₂ O	0.23	0.38	0.18	0.24	0.14	0.14
MnO ₂	0.19	0.19	0.18	0.18	0.12	0.12
P ₂ O ₅	0.032	0.11	0.037	0.044	0.008	0.042
L.O.I.	0.14	0.16	0.10	0.05	0.10	0.38
Total	100.04	100.92	100.22	100.06	99.73	99.72
Ba	100.	177.	91.	93.	64.	70.
Ce	13.	8.	11.	14.	3.	0.
Cr	276.	254.	300.	271.	464.	263.
Cu	102.	104.	137.	133.	50.	124.
Ga	16.	15.	17.	18.	21.	20.
La	6.	17.	13.	13.	14.	14.
Nb	7.	8.	5.	6.	6.	6.
Nd	17.	25.	15.	21.	8.	12.
Ni	112.	46.	125.	113.	92.	134.
Pb	23.	21.	20.	20.	21.	20.
Rb	27.	30.	27.	26.	24.	26.
Sr	274.	254.	266.	259.	306.	304.
Th	11.	11.	7.	7.	9.	9.

V	265.	390.	334.	298.	132.	180.
Y	0.	40.	1.	12.	0.	0.
Zn	58.	79.	62.	61.	29.	30.
Zr	33.	77.	37.	42.	26.	38.

	165 ICP	168 ICP	169 ICP	203 ICP	204 ICP	205 ICP
ROCK TYPE	24	24	24	24	24	24
SiO ₂	47.88	48.43	48.01	50.12	48.42	48.40
TiO ₂	0.37	0.54	0.53	1.34	0.78	0.40
Al ₂ O ₃	21.11	19.36	21.09	15.71	16.06	21.12
Fe ₂ O ₃	7.15	7.77	8.62	11.47	11.60	7.24
MgO	6.89	7.48	6.95	6.03	8.98	6.23
CaO	13.33	13.53	12.03	11.71	11.32	13.25
Na ₂ O	2.19	2.21	2.41	2.98	2.35	2.30
K ₂ O	0.10	0.16	0.22	0.31	0.20	0.16
MnO	0.11	0.12	0.13	0.18	0.18	0.10
P ₂ O ₅	0.010	0.033	0.029	0.079	0.038	0.021
L.O.I.	0.22	0.36	0.03	0.00	0.26	0.46
Total	99.36	99.99	100.05	99.94	100.19	99.69
Ba	53.	64.	86.	169.	107.	73.
Ce	16.	8.	0.	2.	12.	7.
Cr	249.	328.	117.	112.	337.	238.
Cu	40.	104.	90.	160.	161.	124.
Ga	14.	14.	16.	18.	17.	17.
La	9.	4.	12.	3.	5.	14.
Nb	6.	7.	7.	8.	6.	7.
Nd	12.	7.	7.	17.	8.	6.
Ni	104.	93.	106.	66.	144.	92.
Pb	22.	22.	22.	21.	21.	22.
Rb	24.	26.	28.	29.	27.	25.
Sr	317.	293.	310.	295.	268.	310.
Th	6.	10.	9.	7.	10.	9.

V	140.	185.	131.	474.	260.	127.
Y	0.	0.	0.	25.	0.	0.
Zn	10.	28.	38.	111.	65.	21.
Zr	27.	40.	36.	64.	41.	31.

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ROCK TYPE	24	25
SiO ₂	47.84	47.90
TiO ₂	0.80	0.47
Al ₂ O ₃	20.18	16.99
Fe ₂ O ₃	8.96	9.19
MgO	5.38	9.78
CaO	13.14	12.23
Na ₂ O	2.67	2.19
K ₂ O	0.19	0.13
MnO ₂	0.13	0.14
P ₂ O ₅	0.037	0.017
L.O.I.	0.29	0.27
Total	99.62	99.31

Ba	85.	72.
Ce	2.	7.
Cr	152.	340.
Cu	121.	139.
Ga	20.	16.
La	2.	24.
Nb	6.	6.
Nd	15.	12.
Ni	63.	145.
Pb	22.	23.
Rb	27.	28.
Sr	320.	263.
Th	3.	5.

V	297.	168.
Y	0.	0.
Zn	35.	34.
Zr	39.	32.

A2.4. Post - Hypersthene Gabbro Rocks.

SAMPLE TYPES: 13 – Group 3 dolerites; 23 – Glebe Hill gabbros; 32 – Late Inner Series dolerites;
 33 – Post - Inner Series dolerites and microgranite; 34 – Post - Hypersthene Gabbro Quartz Gabbros
 ; Post - Hypersthene Gabbro Olivine Gabbro

	253/3 XRF	234C1 XRF	89/1 ICP	54 XRF	261 XRF	263 XRF
ROCK TYPE	13	13	13	23	23	35
SiO ₂	49.50	49.27	48.85	48.01	50.33	47.17
TiO ₂	1.19	1.21	1.10	2.68	0.87	0.64
Al ₂ O ₃	17.53	15.29	18.78	11.84	21.99	20.98
Fe ₂ O ₃	10.39	11.40	10.47	18.05	6.19	8.09
MgO	5.37	5.64	5.05	4.69	2.98	6.34
CaO	12.27	11.91	11.78	8.90	11.24	11.44
Na ₂ O	2.78	3.01	3.04	2.81	3.40	2.25
K ₂ O	0.36	0.52	0.34	0.86	0.91	0.38
MnO ₂	0.16	0.16	0.15	0.20	0.09	0.12
P ₂ O ₅	0.11	0.15	0.100	0.20	0.18	0.11
L.O.I.	0.00	0.92	0.76	0.00	0.41	0.39
Total	99.62	99.45	100.42	98.19	98.54	97.86
Ba	251.	359.	183.	451.	422.	300.
Ce	4.	11.	30.	24.	16.	0.
Cr	139.	158.	144.	30.	110.	111.
Cu	76.	101.	105.	61.	62.	74.
Ga	19.	18.	18.	22.	20.	16.
La	0.	2.	12.	22.	21.	24.
Nb	8.	7.	8.	11.	8.	7.
Nd	19.	19.	12.	27.	21.	11.

Ni	49.	56.	38.	39.	54.	113.
Pb	21.	20.	21.	22.	20.	21.
Rb	31.	35.	31.	45.	34.	28.
Sr	312.	367.	347.	242.	460.	411.
Th	9.	8.	10.	10.	9.	12.
V	279.	296.	285.	666.	176.	145.
Y	18.	25.	16.	32.	20.	6.
Zn	64.	70.	71.	110.	43.	55.
Zr	81.	94.	71.	126.	114.	70.

	276/1 XRF	279/1 XRF	280/2 XRF	308 XRF	319 XRF	326 XRF
ROCK TYPE	33	33	33	32	32	32
SiO ₂	65.81	48.39	48.39	48.37	51.54	54.26
TiO ₂	0.25	1.15	1.07	0.86	0.69	1.20
Al ₂ O ₃	15.29	17.20	18.19	19.40	19.39	16.46
Fe ₂ O ₃	5.57	11.00	10.15	9.32	6.70	9.67
MgO	0.00	5.44	5.06	5.44	4.57	3.02
CaO	0.45	11.65	12.10	11.95	10.85	7.68
Na ₂ O	6.59	3.07	2.78	2.51	2.80	3.61
K ₂ O	4.04	0.32	0.33	0.31	0.75	1.69
MnO ₂	0.13	0.16	0.15	0.13	0.12	0.16
P ₂ O ₅	0.02	0.12	0.11	0.13	0.27	0.51
L.O.I.	-0.06	-0.09	0.16	0.47	0.83	0.80
Total	98.05	98.35	98.43	98.84	98.47	99.02
Ba	142.	280.	262.	260.	378.	601.
Ce	141.	36.	10.	23.	25.	55.
Cr	18.	156.	156.	125.	180.	61.
Cu	31.	104.	93.	101.	71.	69.
Ga	39.	20.	15.	19.	17.	19.
La	72.	15.	9.	12.	20.	19.
Nb	52.	7.	7.	7.	10.	12.
Nd	91.	26.	25.	10.	26.	42.
Ni	35.	68.	51.	72.	58.	36.
Pb	20.	23.	21.	21.	22.	22.
Rb	98.	29.	29.	28.	39.	60.
Sr	33.	329.	324.	353.	318.	292.
Th	18.	12.	13.	13.	14.	11.

V	5.	276.	273.	213.	100.	164.
Y	130.	18.	18.	10.	27.	61.
Zn	112.	65.	60.	53.	57.	74.
Zr	1463.	70.	69.	61.	130.	204.

328 XRF 339 XRF 340 XRF

ROCK TYPE	34	34	34
SiO ₂	49.48	49.23	52.00
TiO ₂	0.55	1.22	1.77
Al ₂ O ₃	15.75	17.38	12.63
Fe ₂ O ₃	9.24	10.85	12.63
MgO	8.64	5.02	4.46
CaO	11.62	11.17	7.88
Na ₂ O	2.37	2.95	3.84
K ₂ O	0.27	0.41	1.38
MnO	0.15	0.16	0.19
P ₂ O ₅	0.06	0.17	0.32
L.O.I.	0.52	0.41	-0.34
Total	98.61	98.92	96.71

Ba	263.	308.	591.
Ce	22.	22.	54.
Cr	216.	146.	44.
Cu	63.	99.	90.
Ga	19.	19.	20.
La	7.	13.	23.
Nb	7.	8.	11.
Nd	10.	14.	25.
Ni	101.	61.	36.
Pb	21.	22.	24.
Rb	28.	33.	54.
Sr	331.	309.	252.
Th	12.	9.	11.

V	150.	297.	389.
Y	0.	23.	52.
Zn	56.	69.	87.
Zr	51.	88.	174.

APPENDIX 2.5

INSTRUMENTAL NEUTRON ACTIVATION

ANALYSIS DATA

NOTE :

- 1) Bracketed values are anomalous or are considered to be inaccurate on the basis of discrepancies between successive gamma-ray counting runs
- 2) n.d. = element not determined
- 3) b.d. = element below detection limit

All data are expressed as p.p.m.

The data are presented to the precision implied by the calculated counting errors presented in the output from the data processing programmes. The true accuracy of the data is likely to be much lower, as a result of other errors (see Appendix 1).

A2.5.1 INAA Analyses of Pre-Hypersthene Gabbro Rocks.

A2.5.1.1 Moinian Rocks

Sample no. Elmnt	157/1	157/2	158	159/1	173/1	173/2
La	21.6	8.4	8.7	15.5	36.9	17.4
Ce	46.7	23.3	(56.7)	39.0	83	35.6
Nd	19.0	(10)	(13)	16.6	37.7	14.8
Sm	2.56	(1.2)	(2.0)	2.78	5.8	2.09
Eu	0.64	0.55	0.51	0.64	1.28	0.543
Tb	0.29	0.28	0.38	0.25	0.77	0.35
Yb	(0.9)	(0.6)	(2)	0.81	(1.9)	1.04
Lu	0.139	0.09	0.34	0.20	0.36	0.16
Ta	0.311	0.114	(0.6)	0.74	0.75	0.26
Hf	3.46	0.97	7.5	6.13	13.9	3.03
U	0.87	b.d.	(1.3)	0.86	1.19	0.43
Th	3.9	2.0	8.1	5.25	12.0	3.54
Cr	13.4	b.d.	31	40.2	1.5	15.4
Sc	2.26	2.26	9.2	7.72	6.0	1.47

A2.5.1.2 Jurassic Rocks

Sample no. Elmnt	67/1	121/3	177/1	183D2	183D3	199
La	49	46	47	41	48	19.4
Ce	112	105	96	102	110	49
Nd	61	51	49	47	49	22.1
Sm	9.82	8.36	8.01	7.51	7.93	3.35
Eu	2.14	1.69	1.56	1.36	1.56	0.68
Tb	1.36	1.05	1.03	0.80	0.96	0.45
Yb	3.17	3.07	3.07	2.54	3.12	(1.2)
Lu	0.53	0.47	0.49	0.37	0.43	0.13
Ta	1.04	1.13	n.d.	0.80	n.d.	0.14
Hf	10.8	6.4	5.6	12.6	6.0	2.1
U	3.96	2.98	2.75	2.23	4.15	1.25
Th	11.4	14.4	16.3	14.0	16.2	(6)
Cr	114	122	134	96	137	3.4
Sc	13.5	20.5	20.3	11.8	21.8	b.d.

A2.5.1.3 Pre-Hypersthene Gabbro Tertiary Rocks

Sample no. Elmnt	83/2	120C	190	202	212/1	300/1
La	14.3	33.4	79	5.4	44.9	41.7
Ce	35	71	176	17.0	98.1	103.4
Nd	(26)	47	81	(12)	51	61
Sm	5.49	9.61	12.4	3.82	8.41	11.60
Eu	1.86	2.98	1.94	1.44	1.80	2.85
Tb	0.89	1.79	1.44	0.86	1.62	2.19
Yb	(2)	(6)	(4)	(2)	3.6	(4.9)
Lu	0.29	0.80	0.67	0.34	(0.6)	0.67
Ta	0.21	0.70	1.41	0.19	0.840	0.901
Hf	3.7	6.9	13.2	3.0	8.8	7.9
U	0.15	0.89	1.45	0.19	(2.1)	(0.6)
Th	n.d.	3.7	5.4	n.d.	9.5	4.4
Cr	(340)	n.d.	136	(840)	14	b.d.
Sc	33.8	47.2	13.2	39.9	13.40	27.73

A2.5.2 Marginal Border Group Rocks

A2.5.2.1 Marginal Border Group Subalkaline Granitoids and Anatectic Rocks

Sample no. Element	19E1	42A3	42A4	43D	47AM
La	51	11.1	17.3	52	35
Ce	110	26.8	40	121	67
Nd	54	13.3	21	60	26
Sm	11.5	2.20	3.49	11.5	6.64
Eu	2.67	0.48	0.62	2.79	1.64
Tb	2.0	0.30	0.48	2.1	1.05
Yb	(6)	0.67	0.93	7.3	(3)
Lu	0.9	0.1	0.21	0.92	0.37
Ta	1.09	0.17	0.43	1.21	0.53
Hf	11.8	3.51	8.5	11.4	6.7
U	2.0	0.55	0.94	1.6	1.4
Th	n.d.	3.5	4.5	12.9	4.6
Cr	b.d.	41	55	n.d.	b.d.
Sc	13.7	2.85	5.5	n.d.	n.d.



A2.5.2.1 Marginal Border Group Subalkaline Granitoids and Anatectic Rocks (continued)

Sample no. Element	47AW	183D1	186/2	194B
La	29	44	59	44
Ce	62	96	150	98
Nd	29	54	78	53
Sm	5.34	10.29	13.0	10.46
Eu	1.41	2.43	(2.5)	2.42
Tb	0.83	1.67	2.0	1.76
Yb	(2.3)	6.6	(6)	5.6
Lu	0.29	0.93	0.98	0.84
Ta	0.53	0.97	1.23	0.96
Hf	5.8	11.0	(5.0)	9.0
U	1.3	1.5	1.5	1.67
Th	4.1	8.3	8.6	6.4
Cr	b.d.	29	b.d.	n.d.
Sc	n.d.	16.6	17.1	n.d.

A2.5.2.2 Marginal Border Group M1 Homogenous Microgabbros and Microdiorites, Cone Sheet Rocks and M2 Ferrogabbros

Sample no. Element	11	30	32	42D2	100/1
La	7.8	11.0	6.1	6.2	4.4
Ce	19	23.2	12	19.1	11.4
Nd	(21)	14.2	b.d.	13.2	9.2
Sm	4.27	3.64	2.57	3.96	3.04
Eu	1.50	1.21	1.01	1.43	1.43
Tb	1.03	0.81	1.59	1.20	0.78
Yb	(3)	(2.7)	(3.8)	3.2	(2.8)
Lu	0.31	0.38	0.50	0.56	0.40
Ta	0.14	0.25	0.37	0.17	0.09
Hf	2.8	2.5	4.0	2.73	1.7
U	b.d.	0.40	0.61	b.d.	b.d.
Th	b.d.	1.30	b.d.	0.57	b.d.
Cr	261	192	38	203	245
Sc	n.d.	42.3	n.d.	52.54	44.5

A2.5.2.2 Marginal Border Group M1 Homogenous Microgabbros and Microdiorites, Cone Sheet Rocks and M2 Ferrogabbros (continued)

Sample no. Element	102/2	183A	183B1	193/2	194A3	94*
La	3.6	25	33	n.d.	5.7	34
Ce	12.6	62	83	7	12	n.d.
Nd	(9)	37	46	5.2	11.3	46
Sm	2.63	8.20	9.36	1.36	3.3	9.06
Eu	1.11	2.73	3.08	0.75	1.17	2.79
Tb	0.67	1.72	1.81	(0.7)	0.78	1.59
Yb	(2.6)	(5.8)	5.5	1.55	2.9	5.2
Lu	0.35	0.85	0.78	0.22	0.43	0.71
Ta	0.11	0.60	0.68	0.049	0.09	0.63
Hf	1.9	7.6	7.4	0.91	1.9	5.3
U	b.d.	0.83	0.73	b.d.	b.d.	0.73
Th	b.d.	4.6	3.2	b.d.	(0.5)	n.d.
Cr	218	b.d.	b.d.	388	(11)	n.d.
Sc	40.2	36.8	40.8	60.2	n.d.	n.d.

* - from cone sheet (see App.2.6)

A2.5.2.2 Marginal Border Group M1 Homogenous Microgabbros and Microdiorites, Cone Sheet Rocks and M2 Ferrogabbros (continued)

Sample no. Element	95A*	96*	100/1**	193/1**
La	15	30.1	14.0	13
Ce	44	61	34.2	37
Nd	(26)	40	(25)	23
Sm	(6.1)	8.34	6.34	7.1
Eu	2.06	2.63	1.92	(2.4)
Tb	1.91	1.57	1.47	1.9
Yb	(5)	(4.8)	(4.8)	(6.5)
Lu	0.68	0.71	0.67	1.00
Ta	0.25	0.58	0.40	0.24
Hf	3.7	5.8	5.0	5.1
U	b.d.	0.83	0.52	b.d.
Th	2.3	2.4	2.2	0.9
Cr	48	b.d.	46	b.d.
Sc	61.7	48.1	52.3	56.8

* - cone sheet rock
 ** - M2 MBG ferrogabbro

A2.5.2.3 Marginal Border Group : Heterogeneous Hybrid Rocks

Sample no. Element	18	24/3	29	33B1	33B2
La	11.0	26	17.7	9.1	11.9
Ce	27	61	41	22	26
Nd	16	34	26	14	(12)
Sm	3.62	7.29	6.02	3.77	3.47
Eu	1.17	2.24	1.90	1.29	1.17
Tb	0.69	1.45	1.38	0.81	0.73
Yb	2.2	4.2	(3.8)	(2.6)	(2.0)
Lu	0.30	(0.5)	0.49	0.35	0.24
Ta	0.25	0.57	0.37	0.18	0.22
Hf	2.4	5.6	4.1	3.0	2.6
Lu	0.46	0.8	0.61	0.39	b.d.
Th	b.d.	n.d.	b.d.	b.d.	b.d.
Cr	116	b.d.	38	260	217
Sc	n.d.	35.9	n.d.	n.d.	n.d.

A2.5.2.3 Marginal Border Group : Heterogeneous Hybrid Rocks
(continued)

Sample no. Element	42A2	42B	42D1	194A2
La	17.1	14.6	29.8	14.9
Ce	42	38.2	76	37
Nd	23.1	25.0	38.4	25
Sm	5.02	6.09	6.46	5.33
Eu	1.53	2.08	1.23	1.88
Tb	0.98	1.42	0.84	1.24
Yb	3.43	4.7	1.61	(3.7)
Lu	0.46	0.65	0.27	0.50
Ta	0.38	0.40	0.58	0.33
Hf	4.9	5.0	10.4	3.5
U	0.58	0.71	1.8	0.51
Th	2.8	(1.2)	7.3	b.d.
Cr	74	25	58	84
Sc	36.8	43.0	7.5	n.d.

A2.5.3.1 Pregabbronorite Suite Rocks

Sample no. Element	X1	4	137/1	275/5	279/2
La	3.1	5.8	b.d.	5.1	2.0
Ce	9.4	12.7	(2.5)	11.7	6
Nd	b.d.	8	2.3	8.8	4.0
Sm	1.03	1.78	0.72	2.83	1.544
Eu	0.373	0.832	0.54	1.212	0.642
Tb	0.29	0.39	0.38	1.20	0.53
Yb	0.29	(0.9)	0.8	2.9	1.1
Lu	b.d.	0.12	0.09	0.41	0.17
Ta	0.030	0.19	b.d.	0.088	0.045
Hf	0.88	1.1	0.30	1.40	0.96
U	b.d.	b.d.	b.d.	n.d.	b.d.
Th	n.d.	b.d.	b.d.	0.24	n.d.
Cr	253	b.d.	477	128	34
Sc	21.8	n.d.	30.8	56.3	65.0

A2.5.3.1 Pregabbronorite Suite Rocks (continued)

Sample no. Element	279/5	286/3	287C1	318
La	1.5	n.d.	(4.4)	n.d.
Ce	(2.7)	15	5.3	(3.6)
Nd	b.d.	8.9	3.3	3.8
Sm	1.30	2.80	0.717	1.20
Eu	0.628	0.926	0.421	0.511
Tb	0.69	1.18	0.26	0.62
Yb	1.2	2.1	0.46	1.0
Lu	0.19	0.31	0.06	0.17
Ta	0.030	0.104	0.040	0.024
Hf	0.8	1.7	0.49	0.61
U	b.d.	b.d.	0.07	b.d.
Th	(3.6)	b.d.	b.d.	(2.3)
Cr	b.d.	186	8.3	411
Sc	58.9	59.7	5.23	52.9

A2.5.3.2 Gabbronorites and Later Rocks

Sample no. Element	3	5	7	25	26	35
La	b.d.	b.d.	b.d.	2.1	3.8	b.d.
Ce	(0.9)	2.7	b.d.	6.7	11	2.6
Nd	b.d.	2.1	b.d.	b.d.	b.d.	1.7
Sm	0.47	0.85	1.185	1.382	2.47	0.73
Eu	0.34	0.51	0.612	0.605	1.026	0.430
Tb	(0.28)	(0.54)	0.39	0.40	0.81	(0.35)
Yb	0.44	(b.d.)	1.34	1.44	2.6	0.71
Lu	0.05	0.18	n.d.	n.d.	n.d.	0.12
Ta	b.d.	b.d.	b.d.	0.023	0.080	0.023
Hf	0.28	0.45	0.67	0.92	1.6	0.47
U	b.d.	b.d.	b.d.	b.d.	b.d.	b.d.
Th	b.d.	b.d.	b.d.	b.d.	b.d.	b.d.
Cr	(335)	(370)	(269)	(83)	(528)	(317)
Sc	(39)	50.6	(38)	(24)	(41)	36.8

A2.5.3.2 Gabbrongrites and Later Rocks (continued)

Sample no. Element	129	136	164	165	169	171
La	(3.0)	(1.3)	2.0	(0.94)	(2.3)	1.3
Ce	4.9	6.2	6.3	(2.0)	4.2	5.0
Nd	3.3	5.3	4.5	(2.1)	2.3	3.2
Sm	1.154	2.057	1.138	0.656	0.862	1.044
Eu	0.81	0.95	0.63	0.52	0.61	0.57
Tb	(0.39)	(0.63)	0.36	0.19	0.30	0.35
Yb	1.25	2.2	1.2	0.8	0.9	1.0
Lu	0.17	0.31	0.16	0.12	0.14	0.14
Ta	b.d.	b.d.	b.d.	b.d.	b.d.	b.d.
Hf	0.81	1.1	0.88	0.23	0.57	0.53
U	b.d.	b.d.	b.d.	b.d.	b.d.	b.d.
Th	b.d.	b.d.	b.d.	b.d.	b.d.	b.d.
Cr	244	283	284	264	119	377
Sc	37.3	41.5	27.9	24.8	19.6	33.7

A2.5.3.2 Gabbro-norites and Later Rocks (continued)

Sample no. Element	205	296	317B	275/6*
La	1.6	2.4	2.7	5.9
Ce	3.5	5.3	5.1	13
Nd	2.1	(2.8)	4.2	9.0
Sm	0.841	1.223	1.261	3.51
Eu	0.51	0.552	0.523	1.241
Tb	0.28	0.57	0.59	1.27
Yb	2.5	1.3	1.2	3.1
Lu	0.32	0.18	0.19	0.40
Ta	0.09	0.051	0.028	0.093
Hf	1.9	1.02	0.66	1.83
U	b.d.	b.d.	(0.07)	b.d.
Th	b.d.	b.d.	b.d.	(0.64)
Cr	129	266	290	198
Sc	33.9	30.0	34.4	46.9

* = granular dolerites and microgabbros from intrusive sheets

A2.5.3.2 Gabbro-norites and Later Rocks (continued)

Sample no. Element	279/3*	286/1*	316A\$	89/1**
La	5.3	2.5	b.d.	5.4
Ce	12	5.0	3.2	12.1
Nd	7.0	4.7	2.4	9.7
Sm	2.44	1.58	0.96	2.80
Eu	0.905	0.705	0.324	1.10
Tb	1.07	0.65	0.40	0.62
Yb	2.1	1.3	0.89	2.5
Lu	0.29	0.19	(0.17)	0.32
Ta	0.073	0.029	0.021	0.09
Hf	1.21	0.56	0.42	1.6
U	b.d.	b.d.	b.d.	b.d.
Th	b.d.	b.d.	(0.35)	b.d.
Cr	248	271	363	129
Sc	46.0	44.19	41.13	33.9

* = granular dolerites and microgabbros from intrusive sheets

\$ = pyroxenite

** = porphyritic dolerite from Group 3 cone sheet

APPENDIX 2.6
LOCATIONS AND DESCRIPTIONS OF SAMPLES
ANALYSED BY XRF AND ICP METHODS.

Note: Page numbers referred to are those in appendices 2.1 - 2.4, on which analyses are given. "G.R." indicates National Grid Reference.

A2.6.1 ANALYSED MOINIAN ROCKS

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
91	G.R. 486647 (Western end of Glas Bheinn). Contact metamorphosed psammite with pelitic laminae.	810
92A	G.R. 49156286 (Immediately NW of Mingary pier). Psammite with micaceous laminae.	810
92B	G.R. 49166283 (NW of Mingary pier). Semipelite, flaggy and micaceous with thin quartzose laminae.	810
144/1	G.R. 556713 (Ockle - NE of Ardnamurchan central complex). Psammite with biotite rich wispy laminae.	810
144/2	G.R. 556713 (Intertidal outcrops at Ockle). Semipelite with thin quartzofeldspathic bands.	810
145	G.R. 547649 (S of Loch Mudle - road cutting). Micaceous quartzose psammite.	812
146/1	G.R. 577617 (Coastal outcrops at Camas Fearna). Coarse quartzose psammite with micaceous laminae.	812
146/2	G.R. 557617 (Shore outcrops at Camas Fearna). Coarse pebbly meta-sandstone.	812
147	G.R. 575618 (Roadside outcrops at NW side of Camas Fearna). Quartzose psammite.	812
157/1	G.R. 556616 (W shore of Camas nan Geall). Micaceous pebbly psammite.	812
157/2	G.R. 556616 (W shore of Camas nan Geall). Pink micaceous psammite.	810
158	G.R. 555615 (W side of Camas nan Geall). Mica rich semipelite from lens in trough cross-bedded meta-sandstones.	812
159/1	G.R. 548617 (Coastal outcrops SE of Beinn Hiant). Well foliated semipelitic mica schist.	814

A2.6.1 ANALYSED MOINIAN ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
159/2	G.R. 548617 (Coastal outcrops SE of Beinn Hiant). Micaceous meta-sandstone with mica rich laminae.	814
172	G.R. 514631 (Coastal outcrops SE of Beinn Hiant). Well bedded pebbly micaceous psammite with mica-rich laminae.	814
173/1	G.R. 519630 (Coastal outcrops SW of Beinn Hiant). Micaceous flaggy semi-pelite.	814
173/2	G.R. 519630 (Coastal outcrop SW of Beinn Hiant). Coarse pebbly psammite.	814

A2.6.2 ANALYSED JURASSIC ROCKS

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
47H	G.R. 46037033 (SE side of Glendrian Bay). Upper Pabba Beds semipelitic hornfels.	816
47K	G.R. 46057035 (SE side of Glendrian Bay). Mottled yellowish quartzose hornfels with dark spots. Scalpa sandstone ?.	816
47N1	G.R. 46077037 (SE side of Glendrian Bay). Calc - semi-pelitic hornfels (nodular bodies in semi-pelitic hornfels) Upper Pabba Beds.	816
47N2	G.R. 46077037 (SE side of Glendrian Bay). Semipelitic hornfels - Upper Pabba Beds ?.	816
47P1	G.R. 46097039 (SE side of Glendrian Bay). Calc - silicate - quartzite hornfels. Scalpa sandstone.	818
67/1	G.R. 46256360 (N side of Druim na Gearr Leacainn). Diopside - rich calcsilicate hornfels. Middle Jurassic ?.	820
81/3	G.R. 45946350 (N side of Druim na Gearr Leacainn). Calcsilicate bearing quartzitic hornfels (Middle Jurassic ?).	820
89/2	G.R. 45586316 (SW end of Druim na Gearr Leacainn). Middle Pabba Beds pelitic hornfels.	816
120F	G.R. 45436323 (E side of Dubh Chreag gorge). Lower Pabba Beds cordierite - orthopyroxene quartzite hornfels.	814
121/3	G.R. 45326332 (Floor of Dubh Chreag gorge, adjacent to outer contact of MBG). Middle Pabba Beds pelitic hornfels.	820
177/1	G.R. 44206328 (Beinn nan Codhan, just S of summit). Banded Middle Pabba Beds pelitic hornfels.	820
183D2	G.R. 44926325 (In down - faulted block on S side of Hill 210). Semi - pelitic, partly fused hornfels (Upper Pabba Beds).	820

A2.6.2 ANALYSED JURASSIC ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
183D3	G.R. 44936325 (In foot of wall of down - faulted block on S side of Hill 210). Middle Pabba Beds pelitic hornfels.	820
185/2	G.R. 46137017 (W side of Hill 90). Calc - semi - pelitic hornfels (Upper Pabba Beds ?).	816

A2.6.3 ANALYSED PRE-HYPERSTHENE GABBRO TERTIARY ROCKS

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
48/1	G.R. 47706447 (W side of Glebe hill). Intensely hornfelsesd porphyritic alkali meta-basic rock.	824
56	G.R. 46586382 (Druim na Gearr Leacainn). Alkali picrobasalt hornfels.	824
72/2	G.R. 48066478 (Spinel hornfels locality, N of Glebe hill). Orthopyroxene - rich metabasic hornfels.	826
83/2	G.R. 45656344 (NW end of Druim na Gearr Leacainn). Amygdaloidal basalt of plateau basalt suite.	824
120A	G.R. 45446318 (E side of Dubh Chreag gorge). Alkali ferrodolerite sill in Middle Pabba Beds .	826
120C	G.R. 45446318 (as for 120A). .	824
162B	G.R. 44946328 (Hill 210). Hornfelsesd amygdaloidal picrobasalt.	826
190	G.R. 46157053 (S of Rubha Carrach). Tuffaceous sandstone in Centre 1 agglomerate.	824
202	G.R. 46686374 (E end of Druim na Gearr Leacainn). Alkali picrodolerite of plateau basalt suite.	824
207	G.R. 470627 (Coastal outcrops E of Cuingleum). Feldsparphyric felsite of M0 age.	822
212/1	G.R. 46456230 (In downfaulted block on W side of Cuingleum intrusion). Porphyritic trachyandesitic lava.	822
212/3	G.R. 46466230 (W side of Cuingleum intrusion). Early M0 porphyritic felsite.	822
236	G.R. 46686372 (E end of Druim na Gearr Leacainn). Alkali picrodolerite of plateau basalt suite.	826
237	G.R. 46646363 (E end of Druim na Gearr Leacainn). Amygdaloidal alkali basalt of plateau basalt suite.	826

A2.6.3 ANALYSED PRE-HYPERSTHENE GABBRO TERTIARY ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
251	G.R. 48026459 (N summit of Glebe hill). Alkali picrodolerite of plateau basalt suite.	826
299	G.R. 488711 (W of Faskadale). Centre 1 altered and hornfelsed felsite.	822
300/1	G.R. 49687100 (Coastal outcrops on W side of Faskadale bay). Centre 1 xenolithic microgranite.	822
301/1	G.R. 49707095 (W side of Faskadale bay). Matrix of Centre 1 tuffaceous agglomerate.	822

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
292	G.R. 43176357 (NW side of An Acairsed). Coarse dolerite with sparse small plagioclase phenocrysts, from irregular sheet intruding MBG microgabbros.	829
277	G.R. 43016382 (S end of Druim na Cloise). Coarse feldsparphyric dolerite from early M2 cone sheet.	829
140/1	G.R. 41476588 (N end of Gharblach Mhor). Sparsely feldsparphyric MBG microgabbro.	829
152	G.R. 42286528 (NE of Druim na Cloise, W of An Acairseid - Briaghlan fault). Sparsely feldsparphyric coarse dolerite from sheet intruded into MBG microgabbros.	829
155	G.R. 42106529 (N end of Druim na Cloise). Feldsparphyric coarse dolerite, from sheet intruded into MBG microgabbros.	829
77	G.R. 46476354 (Druim na Gearr Leacainn). Very sparsely feldsparphyric dolerite from group 2 (M2) cone sheet.	829
113/2	G.R. 45616305 (SW side of Druim na Gearr Leacainn). Sparsely feldsparphyric dolerite from group 2 (M2) cone sheet.	831
185/3	G.R. 46137017 (W side of Hill 90). Hornfused dolerite from cone sheet, of probable M2 age.	831
63	G.R. 46396392 (Valley S of Beinn na Seilg). Homogenous, rather granular MBG microgabbro.	831
65/3	G.R. 46246375 (Valley S of Beinn na Seilg). Homogenous, sparsely feldsparphyric MBG microgabbro.	831
148	G.R. 41916514 (Gharblach Mhor). Homogenous MBG microgabbro.	831
150/2	G.R. 41966520 (E side of Gharblach Mhor). Homogenous MBG microgabbro - host rock to xenolith 150/1.	831
156	G.R. 42436527 (N of Druim na Cloise, W of An Acairseid - Briaghlan fault). Granular - textured homogenous MBG microgabbro.	833

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
76/1	G.R. 48096487 (In Abhainn chro Bheinn). Altered homogenous MBG microgabbro.	833
105	G.R. 41566752 (Ardnamurchan Point). Homogenous MBG microdiorite.	833
273	G.R. 43566315 (SE side of An Acairseid). Homogenous microdiorite : basic component of contact zone hybrid rocks.	833
293B	G.R. 43326356 (NW side of An Acairseid). Aphyric MBG microgabbro.	833
121/2	G.R. 45326332 (Floor of Dubh Chreag gorge). Homogenous MBG microgabbro.	833
272	G.R. 43586313 (SE side of An Acairseid). Homogenous MBG microdiorite.	835
140/2	G.R. 41476588 (N end of Gharblach Mhor). Coarse MBG ferrogabbro.	835
143/3	G.R. 416655 (W side of Gharblach Mhor). Homogenous MBG microgabbro.	835
20/6B	G.R. 44597071 (Coastal outcrops W of Duin Bhain). Fine grained mafic pillow in MBG contact zone hybrid rock.	835
167	G.R. 45446342 (NE of Dubh Chreag). Homogenous MBG microgabbro.	835
75/2	G.R. 48106492 (In Abhainn chro Bheinn NE of Glebe hill). Slightly heterogeneous MBG microgabbro.	835
75/4	G.R. 48106492 (In Abhainn chro Bheinn NE of Glebe hill). Heterogeneous hybrid rock from MBG contact zone.	837
200/1	G.R. 46786384 (E end of Druim na Gearr Leacainn). Heterogeneous hybrid pyroxenite - pyroxene diorite.	837
182	G.R. 44856313 (SW of Hill 210). MBG microdiorite.	837

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
111	G.R. 41436612 (Corrachadh Mhor). Coarse ferrogabbro from irregular vein in MBG microgabbros.	837
181	G.R. 43976330 (SW of Hill 210). MBG microdiorite.	837
149	G.R. 41856518 (Gharblach Mhor). Sparsely feldsparphyric microgabbro, from sheet intruding MBG microgabbros.	837
264/2	G.R. 43846325 (SW side of Beinn nan Codhan). Heterogeneous microdiorite in M1 cone sheet.	839
265	G.R. 43846315 (SW side of Beinn nan Codhan). Heterogeneous quartz diorite from M1 cone sheet.	839
266: 266G 266WR	G.R. 43846315 (SW side of Beinn nan Codhan). Coarse heterogeneous quartz diorite (266WR) with coarse granitoid inclusions (266G) from M1 cone sheet.	839 839
267/1	G.R. 43626302 (SE side of An Acairseid). Intensely altered rheomorphic breccia.	839
20/6WR	G.R. 44597031 (Coastal outcrops W of Duin Bhain). Heterogeneous MBG contact zone hybrid rock.	839
20/6G	G.R. 44597031 (Coastal outcrops W of Duin Bhain). Felsic component of MBG heterogeneous hybrid rock (20/6WR).	841
186/3	G.R. 46017027 (S side of Glendrian bay). Homogenous MBG microgabbro.	841
248	G.R. 47976442 (W side of Glebe hill). Hornfelses porphyritic M2 microgranodiorite with mafic inclusions - G: handpicked separate, WR: whole rock with mafic inclusions.	841 841
250/1	G.R. 48086448 (Glebe hill). M2 porphyritic felsite.	841

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
19D1	G.R. 44687030 (Coastal outcrops W of Duin Bhain). M2 porphyritic microgranophyre.	841
43E	G.R. 45017034 (S of Duin Bhain). Sparsely feldsparphyric M2 microgranophyre.	843
43F	G.R. 45017033 (S of Duin Bhain). Feldsparphyric M2 felsite.	843
43H	G.R. 45017032 (S of Duin Bhain). Sparsely feldsparphyric M2 microgranophyre.	843
43K1	G.R. 45017029 (S of Duin Bhain). Very fine grained feldsparphyric M2 felsite.	843
43M	G.R. 45017028 (S of Duin Bhain). Feldsparphyric M2 felsite.	843
43N	G.R. 45017027 (S of Duin Bhain). Feldsparphyric M2 microgranophyre.	843
289	G.R. 44847023 (SW of Duin Bhain). Sparsely feldsparphyric M2 microgranophyre.	845
19D2	G.R. 446703 (Coastal outcrops W of Duin Bhain). Very fine grained M2 felsite.	845
140/3	G.R. 41476588 (N end of Gharblach Mhor). Pelitic xenolith in MBG hybrid rocks.	845
150/1	G.R. 41966520 (E side of Gharblach Mhor). Quartzite xenolith in MBG hybrid rocks.	845
274/1	G.R. 43556319 (SE side of Gharblach Mhor). Banded pelitic xenolith in MBG contact zone suite rocks.	845
267/3	G.R. 43626299 (SE side of An Acairseid). Heterogeneous microgranite with granular xenoliths from irregular M1 sheet intrusion.	845
47U	G.R. 46007032 (SE side of Glendrian bay). Rheomorphic breccia.	847
42D3	G.R. 45007025 (S of Duin Bhain in pseudoscreen). Diopside microgranite.	847
19E4	G.R. 446703 (Coastal outcrops W of Duin Bhain). Hornfelsesd M1 cone sheet dolerite.	847

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
102/3	G.R. 415672 (Ardnamurchan Point). Feldsparphyric dolerite sheet in MBG microgabbros.	847
9	G.R. 44037039 (Coastal outcrops E of Sanna Point). Homogenous MBG microgabbro.	847
11	G.R. 44097034 (Coastal outcrops E of Sanna Point). Homogenous MBG microgabbro.	847
18	G.R. 44227042 (Coastal outcrops E of Sanna Point). Heterogeneous MBG hybrid rock.	849
32	G.R. 44377018 (ESE of Sanna Point). Homogenous MBG microgabbro with rare plagioclase phenocrysts.	849
29	G.R. 44407035 (Coastal outcrops E of Sanna point). Mottled heterogeneous hybrid rock.	849
30	G.R. 44377035 (Coastal outcrops E of Sanna point). Fine grained MBG microgabbro adjacent to contact with contact zone hybrid rocks.	849
33A1	G.R. 443704 (Coastal outcrops E of Sanna point). Sparsely feldsparphyric heterogeneous hybrid rock.	849
33B1	G.R. 443704 (Coastal outcrops E of Sanna point). Strongly mottled heterogeneous hybrid rock.	849
33B2	G.R. 443704 (Coastal outcrops E of Sanna point). Strongly mottled (on decimetre scale) heterogeneous hybrid rock.	851
39B	G.R. 441704 (Coastal outcrops E of Sanna point). Mottled heterogeneous hybrid rock.	851
42D2	G.R. 44997025 (S of Duin Bhain). Homogenous dolerite from pillow in heterogeneous hybrid rock.	851
193/1	G.R. 45777023 (S side of Glendrian bay). Coarse ferrodiorite with quench textures from inclusion in MBG microgabbros.	851
193/2	G.R. 45777023 (S side of Glendrian bay). Host MBG microgabbro to ferrodiorite 193/1.	851

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
194A2	G.R. 458703 (S side of Glendrian bay). Heterogeneous hybrid rock with faintly developed mottling.	851
194A3	G.R. 458703 (S side of Glendrian bay). Fine grained microgabbro from close to contact between homogenous microgabbros and contact zone hybrid rocks.	853
100/1	G.R. 41616717 (S side of Ardnamurchan point). Ferrogabbroic rock from vein in homogenous microgabbro.	853
100/2	G.R. 41616717 (S side of Ardnamurchan point). Homogenous MBG microgabbro.	853
102/1	G.R. 415672 (Ardnamurchan point : S end of main N-S ridge). Heterogeneous ferrodiorite from large sheet cutting contact zone rocks.	853
102/2	G.R. 415672 (Ardnamurchan point : S end of W facing rock slabs). Homogenous granular mafic component of contact zone rocks.	853
121/1	G.R. 45326332 (Floor of Dubh Chreag gorge at N end adjacent to contact). Faintly mottled heterogeneous hybrid microdiorite.	853
161/1	G.R. 44996330 (SE side of Hill 210 adjacent to the main contact of the MBG). Dioritic component of decimetre scale mottled heterogeneous hybrid rock.	855
161/2	G.R. 44996330 (SE side of Hill 210 adjacent to the main contact of the MBG). Sparsely feldsparphyric dolerite occurring with 161/1.	855
183A	G.R. 449632 (SW side of Hill 210). Faintly heterogeneous M1 microdiorite.	855
183B1	G.R. 449632 (SW side of Hill 210). M1 ferrodioritic rock (contains lobate granitoid inclusions : these excluded from sampled material).	855
20/1V	G.R. 446703 (Coastal outcrops E of Sanna point). High calcium and silicon hybrid dioritic veins cutting xenoliths in quartzitic xenolith swarm.	855

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
20/1WR	G.R. 446703 (Coastal outcrops E of Sanna point). Calc-silicate quartzite xenolith, cut by hybrid veins, from xenolith swarm in hybrid rocks.	855
19C1	G.R. 446703 (Coastal outcrops W of Duin Bhain). Mafic component of heterogeneous hybrid rock, occurring in mottled heterogeneous pillows.	857
19C2	G.R. 446703 (Coastal outcrops W of Duin Bhain). Coarser and more felsic component of heterogeneous hybrid rocks : forms matrix to heterogeneous mottled pillows (19C1).	857
186/1	G.R. 46017027 (Coastal outcrops on the SE side of Glendrian bay). Mottled heterogeneous hybrid rock with gradational pillowed contact against M1 microdiorite 186/1.	857
186/2	G.R. 46017027 (Coastal outcrops on SE side of Glendrian bay). M1 microdiorite with gradational pillowed contact against heterogeneous hybrid rock.	857
24/3	G.R. 45897030 (Intertidal outcrops on S side of Glendrian bay). Heterogeneous hybrid rock with decimetre scale mottling at outcrop.	857
33C1	G.R. 443704 (Coastal outcrops E of Sanna point close to low tide mark). Relatively fine grained , faintly heterogeneous hybrid rock.	857
42A2	G.R. 44967023 (S of Duin Bhain on S side of pseudoscreen). Coarse mottled heterogeneous hybrid rock.	859
42B	G.R. 44987025 (S of Duin Bhain on N side of pseudoscreen). Heterogeneous hybrid rock with centimetre scale mottling.	859
42A4	G.R. 44987024 (Within pseudoscreen S of Duin Bhain). Rheomorphic breccia composed of residual quartzite bodies in a diopside microgranite matrix.	859

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
42D1	G.R. 45007024 (Within pseudoscreen S of Duin Bhain). Diopside microgranite.	859
39A2	G.R. 441704 (Coastal outcrops E of Sanna point). Fine grained component of heterogeneous unchilled sheet cutting hybrid rocks.	859
39A1	G.R. 441704 (Coastal outcrops E of Sanna point). Coarse grained component of heterogeneous unchilled sheet cutting hybrid rocks.	859
194B	G.R. 458703 (Intertidal outcrops on the S side of Glendrian bay). Faintly heterogeneous M1 microgranodiorite.	861
42C	G.R. 45007026 (S of Duin Bhain). M2 porphyritic felsite.	861
43D	G.R. 45027033 (S of Duin Bhain). Fine grained M2 porphyritic granophyre.	861
19E1	G.R. 446703 (Coastal outcrops W of Duin Bhain). M2 felsite with weak cataclastic deformation.	861
19E6	G.R. 446703 (Coastal outcrops W of Duin Bhain). M2 felsite.	861
33C2	G.R. 443704 (Coastal outcrops E of Sanna point). M2 microgranophyric felsite with abundant plagioclase porphyrocrysts.	861
93	G.R. 49136289 (Coastal outcrops NW of Mingary pier). Fine grained aphyric basaltic rock from aphophysis to cone sheet.	863
94	G.R. 49036298 (Coastal outcrops NW of Mingary pier). Aphyric microdiorite from cone sheet.	863
95A	G.R. 49136287 (Coastal outcrops NW of Mingary pier). Sparsely plagioclase-phyric dolerite from cone sheet.	863
96	G.R. 49166278 (Coastal outcrops NW of Mingary pier). Aphyric dolerite from cone sheet.	863

A2.6.4 ANALYSED MARGINAL BORDER GROUP ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
42A3	G.R. 44987024 (In Duin Bhain pseudoscreen). Calc-silicate quartzite from nodular body in partially fused Scalpa sstn hornfels.	863
47AW	G.R. 45957028 (Intertidal outcrops on SE side of Glendrian bay). Rheomorphic breccia (47AR restitic quartzite clasts; 47AM matrix material).	863 865 865
24/2	G.R. 45897030 (Intertidal outcrops on S side of Glendrian bay). Dolerite from rooted dyke cutting outer contact of MBG.	865
126	G.R. 41766732 (E of Ardnamurchan point). Homogenous microgabbro (outcrop contains very rare granular basic inclusions).	865
128	G.R. 41746719 (E of Ardnamurchan point). Granular MBG microgabbro.	865
143/2	G.R. 416655 (W side of Gharblach Mhor). MBG microgabbro with abundant plagioclase phenocrysts.	865
183D1	G.R. 449632 (SW side of Hill 210). Porphyritic orthopyroxene - cordierite microgranodiorite.	867
195	G.R. 42366597 (N of Druim na Cloise). Coarse dolerite with abundant plagioclase porphyrocrysts.	875

A2.6.5 ANALYSED INNER SERIES ROCKS

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
275/5	G.R. 43536333 (S side of An Acairseid). Pre-gabbronorite laminated (but homogenous) gabbro.	869
275/7	G.R. 43536333 (S side of An Acairseid). Isotropic ferrogabbro (xenolith in porphyritic dolerite sheet).	869
170	G.R. 45776396 (S side of Beinn na Seilg). Laminated pre-gabbronorite olivine microgabbro.	869
279/2	G.R. 45636418 (S side of summit ridge, Beinn na Seilg). Granular fine grained magnetite-gabbro with faint wispy banding.	869
279/5	G.R. 45696417 (Summit ridge of Beinn na Seilg). Laminated fine grained magnetite-gabbro (pre-gabbronorite).	869
281/1	G.R. 45736418 (Summit ridge of Beinn na Seilg). Granular fine grained magnetite-gabbro xenolith in isotropic magnetite gabbro.	869
281/2	G.R. 45736418 (Summit ridge of Beinn na Seilg). Isotopic gabbronorite.	871
286/3	G.R. 456641 (W end of Beinn na Seilg summit ridge). Aphyric fine grained laminated gabbro (pre-gabbronorite).	871
287B1	G.R. 441697 (N side of Sanna bay). Gabbroic anorthosite from lobate sheet intruded by gabbronorite.	871
287C1	G.R. 441697 (N side of Sanna bay). Laminated anorthosite from sheet intruded by gabbronorite.	871
314	G.R. 44037002 (Coastal outcrops N of Sanna bay). Laminated aphyric gabbro (with troctolitic bands) : pre-gabbronorite.	871

A2.6.5 ANALYSED INNER SERIES ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
316A	G.R. 44017002 (Coastal outcrops N of Sanna bay). Metasomatic pyroxenite from upper main Pyroxenite band. Sample originates from the upper part of the band.	871
318	G.R. 44076998 (Coastal outcrops N of Sanna). Pre-gabbronorite laminated gabbro.	873
97/1	G.R. 441694 (Intertidal outcrops, Sanna bay). Laminated olivine microgabbronorite (pre-dates gabbronorite suite rocks) : host to banded anorthite-gabbro xenoliths.	873
97/5	G.R. 441694 (Intertidal outcrops, Sanna bay). Augite-anorthite gabbro from banded xenoliths within pre-gabbronorite laminated microgabbronorite xenolith / screen.	873
34	G.R. 44556985 (Inland outcrops NW of water tower, Sanna). Olivine rich gabbronorite.	873
97/3	G.R. 441694 (Coastal outcrops Sanna bay). Altered gabbronorite.	873
97/4	G.R. 441694 (Intertidal outcrops Sanna bay). Porphyritic-textured coarse gabbronorite.	873
287B2	G.R. 441697 (Outcrops on N side of Sanna bay). Sparsely plagioclase-phyric gabbronorite (host to gabbroic anorthosite, 287B1).	875
315A	G.R. 44057000 (Coastal outcrops N of Sanna bay). Near-isotropic gabbronorite with sparse plagioclase porphyrocrysts.	875
315C	G.R. 44057000 (Coastal outcrops N of Sanna bay). Laminated fine grained gabbronorite from laminated band within near isotropic gabbronorite.	875
317B	G.R. 44056999 (Coastal outcrops N of Sanna bay). Near isotropic gabbronorite with prominent plagioclase porphyrocrysts.	875

A2.6.5 ANALYSED INNER SERIES ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
196	G.R. 42666523 (N end of Drium Reidh-Dhalach). Near isotropic gabbronorite.	875
197/1	G.R. 42676543 (N end of Drium Reidh-Dhalach). Near isotropic gabbronorite : host to granular dolerite 197/2.	877
198	G.R. 42936550 (N end of Drium Reidh-Dhalach). Plagioclase porphyrocryst-rich near isotropic gabbronorite.	877
279/3	G.R. 45636418 (Beinn na Seilg summit ridge). Granular dolerite, from back-veined sheet cutting gabbronorite.	877
280/1	G.R. 45816420 (E end of Beinn na Seilg summit ridge). Coarse gabbronorite with prominent poikilitic magnetite grains.	877
286/1	G.R. 456641 (W end of Beinn na Seilg summit ridge). Plagioclase-phyric fine grained gabbronorite or dolerite from sheet intruded into, and backveined by gabbronorite.	877
286/4	G.R. 456641 (W end of Beinn na Seilg summit ridge). Coarse gabbronorite.	877
197/2	G.R. 42646548 (N end of Drium Reidh-Dhalach). Granular sparsely plagioclase-phyric dolerite from back-veined sheet intruded into gabbronorite.	879
275/1	G.R. 43536333 (S side of An Acairseid). Plagioclase-phyric and xenolithic fine grained gabbronorite from close to contact with older laminated rocks.	879
275/2	G.R. 43536333 (S side of An Acairseid). Coarse near isotropic gabbronorite with indistinct planar contact against underlying fine grained gabbronorite 275/1.	879
275/6	G.R. 43536333 (S side of An Acairseid). Granular plagioclase-phyric fine grained dolerite, intruded into laminated rocks.	879

A2.6.5 ANALYSED INNER SERIES ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
293A	G.R. 43356355 (NW side of An Acairseid). Coarse grained gabbronorite with prominent plagioclase porphyrocrysts.	879
296	G.R. 42226436 (N of Port Choinnich). Near isotropic plagioclase-phyric dolerite gabbronorite with abundant olivine oikocrysts.	879
297	G.R. 42246440 (N of Port Choinnich). Plagioclase-phyric gabbronorite.	879
133/1	G.R. 41826734 (E of Ardnamurchan point). Plagioclase-phyric granular dolerite from sheet cutting gabbronorite.	881
26	G.R. 45777020 (S side of Glendrian bay). Coarse near isotropic gabbronorite.	881
X1	G.R. 441694 (Sanna bay area). Banded augite-anorthite gabbro, from xenoliths within laminated olivine gabbronorite xenolith or screen.	881
4	G.R. 43976982 (N side of Sanna bay on promontory opposite Sanna island). Pre-gabbronorite augite-anorthosite.	881
137/1	G.R. 42606680 (SE of Grigadale bay). Poikilitic olivine-augite anorthosite.	881
3	G.R. 43956961 (Sanna bay). Strongly plagioclase-phyric gabbronorite.	883
5	G.R. 44026997 (Coastal outcrops N of Sanna bay). Coarse gabbronorite.	883
7	G.R. 43927010 (Coastal outcrops N of Sanna bay). Coarse porphyrocryst-poor gabbronorite.	883
21	G.R. 45187008 (SW side of Glendrian bay N of Plocaig). Coarse ophitic gabbronorite.	883
25	G.R. 45687013 (S side of Glendrian bay). Olivine rich coarse gabbronorite.	883
35	G.R. 45286974 (N side of Sanna bay). Coarse gabbronorite with prominent and abundant plagioclase porphyrocrysts.	883

A2.6.5 ANALYSED INNER SERIES ROCKS
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
129	G.R. 41826700 (Just N of mouth of Allt Briaghlann). Aphyric coarse gabbonorite.	885
133/2	G.R. 41826734 (E of Ardnamurchan point). Coarse gabbonorite.	885
134	G.R. 42196695 (E of Ardnamurchan point). Granular near isotropic gabbonorite.	885
136	G.R. 42316707 (Due S of Grigadale bay). Granular gabbonorite.	885
137/2	G.R. 42606680 (SE of Grigadale bay). Laminated gabbonorite.	885
164	G.R. 45406370 (SW of Beinn na Seilg). Coarse plagioclase rich gabbonorite.	885
165	G.R. 45416360 (SW of Beinn na Seilg). Plagioclase rich, near-isotropic coarse gabbonorite.	887
168	G.R. 45386382 (SW of Beinn na Seilg). Coarse near-isotropic gabbonorite.	887
169	G.R. 45456388 (SW of Beinn na Seilg). Coarse plagioclase rich gabbonorite.	887
203	G.R. 46586403 (S of Stacan Dubha). Near-isotropic gabbonorite.	887
204	G.R. 46576416 (S side of Stacan Dubha). Near-isotropic gabbonorite.	887
205	G.R. 46506422 (Near summit of Stacan Dubha). Plagioclase rich, coarse isotropic gabbonorite.	887
154	G.R. 42486691 (S of Grigadale bay). Granular coarse gabbonorite.	889
171	G.R. 45826388 (S of Beinn na Seilg). Micro-gabbonorite with plagioclase porphyrocrysts.	889

A2.6.6 ANALYSED POST-HYPERSTHENE GABBRO
ROCKS OF THE TERTIARY IGNEOUS COMPLEX

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
253/3	G.R. 48116446 (NE end of Glebe hill). Weakly hornfelsed dolerite with abundant plagioclase phenocrysts and anorthositic microxenoliths.	891
234C1	G.R. 468638 (Tom na Moine). Ultra-plagioclase-phyric coarse dolerite (from Group 3 cone sheet).	891
89/1	G.R. 45586316 (SW end of Druim na Gearr Leacainn). Almost unhornfelsed plagioclase-phyric coarse dolerite.	891
54	G.R. 47965442 (W side of Glebe hill). Largely unmetamorphosed aphyric ferrogabbro.	891
261	G.R. 47976482 (N of Glebe hill, in bed of Abhainn Chro Bheinn). Abhainn Chro Bheinn quartz gabbro. Coarse grained plagioclase rich.	891
263	G.R. 45676434 (Col N of Beinn na Seilg). Plagioclase rich olivine gabbro ("Beinn nan Ord eucrite").	891
276/1	G.R. 43076382 (S end of Druim na Cloise). Aegirine-hedenbergite quartz microsyenite.	893
279/1	G.R. 45636418 (S side of Beinn na Seilg summit ridge). Fine grained feldspar-phyric dolerite (basaltic chilled margins).	893
280/2	G.R. 45836418 (E end of Beinn na Seilg summit ridge). Coarse dolerite with abundant phenocrysts from cone of dyke with chilled margins.	893
308	G.R. 45476392 (Gully W of Beinn na Seilg). Plagioclase rich coarse unhornfelsed dolerite.	893
319	G.R. 45356406 (W of Beinn na Seilg). Porphyritic dolerite component of Sgurr nam Meann hybrid dolerite / granophyre.	893

A2.6.6 ANALYSED POST-HYPERSTHENE GABBRO
ROCKS OF THE TERTIARY IGNEOUS COMPLEX
(continued)

SAMPLE	LOCATION AND DESCRIPTION	PAGE NO.
326	G.R. 45646400 (S side of Beinn na Seilg). Porphyritic coarse dolerite with patchy development of granophyre in ground mass.	893
328	G.R. 45996427 (E side of col N of Beinn na Seilg). Centre 2 or centre 3 gabbro.	895
339	G.R. 43476512 (NW side of Reidh-Dhail). Porphyritic dolerite with very abundant plagioclase phenocrysts (part of Sgurr nan Meann hybrid intrusion).	895
340	G.R. 43146588 (N of Loch Caorach). Fine grained quartz gabbro (from Loch Caorach gabbro).	895

APPENDIX 3. ELECTRON MICROPROBE DATA.

Sample description data is presented here in a condensed form which makes use of the following codes:

MINERAL: 11 - PLAGIOCLASE; 12 - K - FELDSPAR; 13 - OLIVINE; 14 - ORTHOPYROXENE; 15 - CLINOPYROXENE; 16 - HORNBLLENDE; 17 - BIOTITE; 18 - MAGNETITE; 19 - ILMENITE; 20 - EPIDOTE; 21 - OVERGROWTH ON FELDSPARS IN M2 FELSITES; 22 - OPAQUE - RICH SIEVE - TEXTURED FELDSPARS IN M2 FELSITES; 23 - CORDIERITE; 24 - TALC; 25 - SPHENE; 26 - ZEOLITE(?); 27 - CORUNDUM; 28 - HERCYNITE.

ROCK TYPE: this uses the same codes as for the bulk - rock analyses.

GRAIN TYPE: 11 - PLAGIOCLASE PORPHYROCRYST; 12 - GROUNDMASS PLAGIOCLASE; 34 - HYDROTHERMAL VEIN FELDSPARS; 13 - MAGMATIC ORTHOPYROXENES; 14 - RIMS AROUND OLIVINES; 15 - SYMPLECTITIC ORTHOPYROXENES; 16 - HYDROTHERMAL VEIN ORTHOPYROXENES; 17 - MAGMATIC CLINOPYROXENES; 18 - HYDROTHERMAL VEIN CLINOPYROXENES; 19 - DISCRETE MAGNETITE GRAINS; 20 - MAGNETITES IN SYMPLECTITIC INTERGROWTHS; 21 - MAGNETITE WITHIN LAMELLAE IN ILMENITES; 22 - DISCRETE ILMENITE GRAINS; 23 - SYMPLECTITIC ILMENITES; 24 - ILMENITE EXSOLUTION LAMELLAE; 25 - K - FELDSPAR; 26 - METAMORPHIC HORNBLLENDE; 27 - PARGASITIC HORNBLLENDE; 30 - VEIN HORNBLLENDES; 28 - OLIVINE; 29 - EPIDOTE; 31 - FELDSPAR OVERGROWTHS IN M2 FELSITES; 32 - FINE - GRAINED SIEVE - TEXTURED FELDSPARS; 33 - BIOTITE; 35 - TALC; 36 - SPHENE; 37 - ZEOLITE(?); 38 - CORDIERITE; 39 - CORUNDUM; 40 - HERCYNITE.

ZONE: SET TO 1 THROUGHOUT EXCEPT IN ZONED MINERALS (A) FELDSPARS, WHERE: 1 - CORE; 2 - MANTLE OR OUTER CORE; 3 - RIM (B) 1 - INNER SERIES CLINOPYROXENES WITH EXSOLUTION LAMELLAE; 2 - I.S. CPX'S WITH GRANULAR OPAQUE INCLUSIONS.

Individual analyses are identified by a two - part code: that in front of the decimal point refers to

the rock and the numbers to the right identify the analysis number within the sample. Individual sample codes are listed with each section of this appendix.

A3.1. Marginal Border Group Minerals.

Samples and sample codes are as follows: 11 - 184 (Rheomorphic breccia); 12 - 183D1 (Anomalous granitoid); 13 - 19C1 (Intermediate heterogenous hybrid rock); 14 - 19C2 (as 19C1); 15 - 42F2, 16 - 43K1, 17 - 250/1 (all M2 felsities); 18 - ferrogabbro from pod within MBG basic rocks; 19 - MBG ferrogabbro; 20 - 102/1, 21 - 193/2, 22 - 194A3, 23 - 42D2 (all MBG basic rocks).

	23.11	23.12	23.13	23.14	23.15	23.16
MINERAL	11	11	11	11	15	15
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	12	12	12	17	17
ZONE	3	1	3	3	1	1
SiO ₂	53.345	52.002	51.982	54.801	51.216	50.428
TiO ₂	0.080	0.003	0.076	0.036	0.589	0.677
Al ₂ O ₃	28.868	29.089	28.904	27.419	3.261	3.514
FeO	0.798	0.729	1.256	0.613	9.710	12.073
MnO	0.007	0.210	0.079	0.018	0.308	0.335
MgO	0.349	0.217	0.455	0.299	16.043	14.275
CaO	12.545	13.240	12.937	10.851	18.874	18.908
Na ₂ O	4.430	3.791	4.300	5.246	0.539	0.445
K ₂ O	0.141	0.149	0.150	0.343	0.0	0.0
Cr ₂ O ₃	0.014	0.0	0.0	0.156	0.454	0.420
TOTAL	99.779	98.701	98.883	99.169	91.28	89.002
OXYGENS	8.000	8.000	8.000	8.000	6.000	6.000
Si	2.413	2.384	2.375	2.488	1.889	1.880
Ti	0.003	0.000	0.003	0.001	0.016	0.019
AL	1.539	1.572	1.556	1.467	0.142	0.154
Fe	0.030	0.028	0.048	0.023	0.300	0.376
Mn	0.000	0.008	0.003	0.001	0.010	0.011
Mg	0.024	0.015	0.031	0.020	0.882	0.793
Ca	0.608	0.650	0.633	0.528	0.746	0.755
Na	0.388	0.337	0.381	0.462	0.039	0.032
K	0.008	0.009	0.009	0.020	0.0	0.0
Cr	0.001	0.0	0.0	0.006	0.013	0.012
total	5.013	5.003	5.039	5.015	4.036	4.033

	23.17	23.18	23.19	23.20	23.21	23.22
MINERAL	15	15	15	18	15	18
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	17	17	17	19	17	19
ZONE	1	1	1	1	1	1
SiO ₂	50.113	49.834	52.290	1.107	50.136	0.263
TiO ₂	0.914	0.890	0.301	10.877	0.740	7.994
Al ₂ O ₃	2.815	2.868	0.898	2.092	3.690	1.032
FeO	13.491	14.462	11.377	84.050	10.210	87.580
MnO	0.413	0.588	0.324	0.408	0.141	0.116
MgO	13.573	13.493	13.744	0.540	14.563	0.275
CaO	18.882	17.921	20.534	0.068	19.658	0.0
Na ₂ O	0.568	0.759	0.428	0.112	0.640	0.245
K ₂ O	0.0	0.051	0.064	0.219	0.0	0.017
Cr ₂ O ₃	0.059	0.031	0.036	0.283	0.748	0.140
TOTAL	87.337	86.435	88.619	15.706	90.32	10.082
OXYGENS	6.000	6.000	6.000	4.000	6.000	4.000
Si	1.888	1.883	1.968	0.047	1.870	0.012
Ti	0.026	0.025	0.009	0.347	0.021	0.272
AL	0.125	0.128	0.040	0.105	0.162	0.055
Fe	0.425	0.457	0.358	2.979	0.318	3.309
Mn	0.013	0.019	0.010	0.015	0.004	0.004
Mg	0.762	0.760	0.771	0.034	0.810	0.019
Ca	0.762	0.726	0.828	0.003	0.786	0.0
Na	0.041	0.056	0.031	0.009	0.046	0.021
K	0.0	0.002	0.003	0.012	0.0	0.001
Cr	0.002	0.001	0.001	0.009	0.022	0.005
total	4.044	4.056	4.020	3.560	4.040	3.698

	23.23	18.01	18.02	18.03	18.04	18.05
MINERAL	18	18	18	18	18	11
ROCK TYPE	19	21	21	21	21	21
GRAINTYPE	19	21	21	21	21	12
ZONE	1	1	1	1	1	1
SiO ₂	0.541	0.338	0.217	0.130	0.191	56.333
TiO ₂	10.408	6.293	5.325	6.238	5.290	0.0
Al ₂ O ₃	1.297	1.179	1.191	1.288	1.200	25.824
FeO	84.470	87.918	89.573	88.072	89.126	0.494
MnO	0.492	0.418	0.185	0.376	0.264	0.095
MgO	0.289	0.153	0.269	0.307	0.303	0.127
CaO	0.007	0.0	0.0	0.0	0.0	9.488
Na ₂ O	0.184	0.140	0.183	0.0	0.162	5.836
K ₂ O	0.047	0.086	0.065	0.024	0.033	0.342
Cr ₂ O ₃	0.096	0.185	0.097	0.104	0.333	0.042
TOTAL	13.361	8.792	7.532	8.467	7.78	98.087
OXYGENS	4.000	4.000	4.000	4.000	4.000	8.000
Si	0.024	0.016	0.010	0.006	0.009	2.574
Ti	0.345	0.218	0.186	0.217	0.185	0.0
AL	0.067	0.064	0.065	0.070	0.066	1.391
Fe	3.110	3.390	3.470	3.406	3.457	0.019
Mn	0.018	0.016	0.007	0.015	0.010	0.004
Mg	0.019	0.011	0.019	0.021	0.021	0.009
Ca	0.000	0.0	0.0	0.0	0.0	0.464
Na	0.016	0.013	0.016	0.0	0.015	0.517
K	0.003	0.005	0.004	0.001	0.002	0.020
Cr	0.003	0.007	0.004	0.004	0.012	0.002
total	3.605	3.740	3.780	3.741	3.776	4.999

	18.06	18.07	18.08	18.09	18.10	18.11
MINERAL	11	11	11	11	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	12	12	12	12	12	11
ZONE	1	1	3	1	3	1
SiO ₂	56.434	56.734	57.942	55.292	57.259	56.671
TiO ₂	0.156	0.084	0.042	0.155	0.095	0.161
Al ₂ O ₃	26.149	26.301	25.311	24.988	26.011	26.430
FeO	0.387	0.427	0.561	0.386	0.527	0.406
MnO	0.139	0.013	0.087	0.0	0.188	0.0
MgO	0.215	0.166	0.0	0.070	0.230	0.237
CaO	10.010	9.313	8.316	9.099	9.141	9.931
Na ₂ O	5.698	5.846	6.395	5.802	5.836	5.639
K ₂ O	0.373	0.414	0.534	0.456	0.410	0.410
Cr ₂ O ₃	0.0	0.0	0.221	0.103	0.0	0.019
TOTAL	99.174	98.871	98.848	95.965	99.17	99.498
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.557	2.570	2.620	2.584	2.584	2.556
Ti	0.005	0.003	0.001	0.005	0.003	0.005
AL	1.396	1.404	1.349	1.376	1.383	1.405
Fe	0.015	0.016	0.021	0.015	0.020	0.015
Mn	0.005	0.000	0.003	0.0	0.007	0.0
Mg	0.015	0.011	0.0	0.005	0.015	0.016
Ca	0.486	0.452	0.403	0.456	0.442	0.480
Na	0.500	0.513	0.561	0.526	0.511	0.493
K	0.022	0.024	0.031	0.027	0.024	0.024
Cr	0.0	0.0	0.008	0.004	0.0	0.001
total	5.001	4.994	4.996	4.997	4.989	4.994

	18.12	18.13	18.14	18.15	18.16	18.17
MINERAL	11	11	11	11	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	11	11	11	11	11	12
ZONE	1	1	1	3	1	3
SiO ₂	56.567	57.008	57.758	57.756	55.102	59.831
TiO ₂	0.111	0.0	0.107	0.064	0.048	0.043
Al ₂ O ₃	26.684	27.449	26.308	25.608	26.238	25.167
FeO	0.543	0.576	0.482	0.545	0.530	0.547
MnO	0.166	0.085	0.006	0.056	0.021	0.0
MgO	0.200	0.234	0.049	0.0	0.037	0.152
CaO	9.925	10.331	9.125	8.911	10.244	7.519
Na ₂ O	5.745	5.524	6.180	5.947	5.520	6.783
K ₂ O	0.349	0.346	0.405	0.529	0.235	0.465
Cr ₂ O ₃	0.0	0.0	0.0	0.070	0.161	0.0
TOTAL	99.747	100.977	99.938	98.941	97.61	99.960
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.545	2.532	2.586	2.609	2.536	2.662
Ti	0.004	0.0	0.004	0.002	0.002	0.001
AL	1.415	1.437	1.388	1.363	1.423	1.319
Fe	0.020	0.021	0.018	0.021	0.020	0.020
Mn	0.006	0.003	0.000	0.002	0.001	0.0
Mg	0.013	0.015	0.003	0.0	0.003	0.010
Ca	0.478	0.492	0.438	0.431	0.505	0.358
Na	0.501	0.476	0.536	0.521	0.492	0.585
K	0.020	0.020	0.023	0.030	0.014	0.026
Cr	0.0	0.0	0.0	0.002	0.006	0.0
total	5.004	4.997	4.996	4.982	5.001	4.983

	18.18	18.19	18.20	18.21	18.22	18.23
MINERAL	11	11	11	12	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	12	12	12	25	12	12
ZONE	1	3	3	1	3	3
SiO ₂	58.664	57.852	58.557	63.087	68.707	57.515
TiO ₂	0.041	0.139	0.0	0.574	1.195	0.099
Al ₂ O ₃	24.849	25.854	24.600	19.522	17.030	27.096
FeO	0.535	0.346	0.268	0.109	1.783	0.402
MnO	0.033	0.125	0.087	0.104	0.009	0.093
MgO	0.021	0.046	0.013	0.0	0.285	0.147
CaO	7.875	9.223	7.803	1.442	1.688	9.832
Na ₂ O	6.453	5.931	6.793	3.717	8.015	5.730
K ₂ O	0.539	0.424	0.437	9.408	1.067	0.400
Cr ₂ O ₃	0.0	0.0	0.107	0.093	0.0	0.0
TOTAL	98.475	99.594	98.397	97.947	98.00	100.912
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.654	2.600	2.658	2.918	3.028	2.555
Ti	0.001	0.005	0.0	0.020	0.040	0.003
AL	1.325	1.370	1.316	1.064	0.885	1.419
Fe	0.020	0.013	0.010	0.004	0.066	0.015
Mn	0.001	0.005	0.003	0.004	0.000	0.003
Mg	0.001	0.003	0.001	0.0	0.019	0.010
Ca	0.382	0.444	0.379	0.071	0.080	0.468
Na	0.566	0.517	0.598	0.333	0.685	0.494
K	0.031	0.024	0.025	0.555	0.060	0.023
Cr	0.0	0.0	0.004	0.003	0.0	0.0
total	4.981	4.981	4.994	4.973	4.862	4.990

	18.24	18.25	18.26	18.27	18.28	18.29
MINERAL	12	11	15	15	15	15
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	25	12	17	17	17	17
ZONE	1	3	1	1	1	1
SiO ₂	63.315	66.097	51.486	50.802	51.177	50.815
TiO ₂	0.227	0.205	0.217	0.755	0.536	0.392
Al ₂ O ₃	19.174	19.702	0.782	1.786	0.994	1.222
FeO	0.103	0.274	16.645	14.770	15.591	15.653
MnO	0.072	0.129	0.570	0.492	0.481	0.543
MgO	0.0	0.145	11.629	13.593	12.015	11.849
CaO	1.362	1.074	19.815	17.825	19.123	19.785
Na ₂ O	5.857	9.454	0.374	0.346	0.430	0.439
K ₂ O	6.163	1.639	0.0	0.020	0.034	0.014
Cr ₂ O ₃	0.0	0.0	0.113	0.234	0.0	0.0
TOTAL	96.170	98.445	84.986	85.853	84.79	85.059
OXYGENS	8.000	8.000	6.000	6.000	6.000	6.000
Si	2.944	2.950	1.953	1.921	1.953	1.939
Ti	0.008	0.007	0.006	0.021	0.015	0.011
AL	1.051	1.036	0.035	0.080	0.045	0.055
Fe	0.004	0.010	0.528	0.467	0.498	0.500
Mn	0.003	0.005	0.018	0.016	0.016	0.018
Mg	0.0	0.010	0.657	0.766	0.683	0.674
Ca	0.068	0.051	0.805	0.722	0.782	0.809
Na	0.528	0.818	0.028	0.025	0.032	0.032
K	0.365	0.093	0.0	0.001	0.002	0.001
Cr	0.0	0.0	0.003	0.007	0.0	0.0
total	4.970	4.981	4.035	4.027	4.026	4.039

	19.01	19.02	19.03	19.04	19.05	19.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	11	11	11	11	11	11
ZONE	3	1	1	1	1	1
SiO ₂	56.543	56.123	57.270	56.762	55.880	56.930
TiO ₂	0.177	0.096	0.025	0.054	0.127	0.193
Al ₂ O ₃	26.280	26.437	26.271	26.235	25.906	25.960
FeO	0.532	0.820	0.694	0.505	0.762	0.723
MnO	0.228	0.051	0.134	0.120	0.071	0.025
MgO	0.246	0.232	0.246	0.254	0.0	0.180
CaO	9.560	9.867	9.708	9.778	9.608	9.307
Na ₂ O	5.657	5.533	5.812	5.762	5.550	5.825
K ₂ O	0.412	0.267	0.416	0.331	0.382	0.327
Cr ₂ O ₃	0.0	0.009	0.019	0.0	0.115	0.016
TOTAL	99.103	98.615	99.901	99.296	97.64	98.763
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.558	2.547	2.568	2.563	2.562	2.576
Ti	0.006	0.003	0.001	0.002	0.004	0.007
AL	1.401	1.414	1.388	1.396	1.400	1.384
Fe	0.020	0.031	0.026	0.019	0.029	0.027
Mn	0.009	0.002	0.005	0.005	0.003	0.001
Mg	0.017	0.016	0.016	0.017	0.0	0.012
Ca	0.463	0.480	0.466	0.473	0.472	0.451
Na	0.496	0.487	0.505	0.504	0.493	0.511
K	0.024	0.015	0.024	0.019	0.022	0.019
Cr	0.0	0.000	0.001	0.0	0.004	0.001
total	4.995	4.994	5.001	4.999	4.990	4.990

	19.07	19.08	19.09	19.10	19.11	19.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	11	11	11	11	11	11
ZONE	1	1	3	3	1	1
SiO ₂	56.972	55.574	56.224	57.843	56.540	56.210
TiO ₂	0.0	0.094	0.090	0.046	0.070	0.132
Al ₂ O ₃	25.982	26.504	26.430	25.802	26.226	26.396
FeO	0.696	0.614	0.643	0.478	0.606	0.511
MnO	0.0	0.150	0.039	0.190	0.118	0.092
MgO	0.242	0.158	0.193	0.312	0.144	0.265
CaO	9.254	10.318	9.924	8.556	9.970	10.083
Na ₂ O	5.896	5.482	5.469	6.109	5.731	5.567
K ₂ O	0.410	0.341	0.267	0.444	0.310	0.352
Cr ₂ O ₃	0.079	0.043	0.0	0.0	0.0	0.093
TOTAL	98.835	98.664	98.636	99.302	99.11	99.190
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.578	2.531	2.552	2.603	2.558	2.545
Ti	0.0	0.003	0.003	0.002	0.002	0.004
AL	1.386	1.423	1.414	1.368	1.399	1.408
Fe	0.026	0.023	0.024	0.018	0.023	0.019
Mn	0.0	0.006	0.001	0.007	0.005	0.004
Mg	0.016	0.011	0.013	0.021	0.010	0.018
Ca	0.449	0.503	0.483	0.413	0.483	0.489
Na	0.517	0.484	0.481	0.533	0.503	0.489
K	0.024	0.020	0.015	0.025	0.018	0.020
Cr	0.003	0.002	0.0	0.0	0.0	0.003
total	4.998	5.006	4.987	4.990	5.000	4.999

	19.13	19.14	19.15	19.16	19.17	19.18
MINERAL	11	11	11	11	11	11
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	11	11	11	11	11	11
ZONE	1	1	1	1	1	1
SiO ₂	56.109	56.722	57.099	56.712	56.207	56.603
TiO ₂	0.119	0.076	0.161	0.103	0.054	0.140
Al ₂ O ₃	26.097	26.511	26.253	26.489	26.802	26.777
FeO	0.571	0.786	0.551	0.376	0.680	0.607
MnO	0.0	0.149	0.131	0.162	0.0	0.019
MgO	0.048	0.200	0.154	0.242	0.122	0.289
CaO	9.743	9.579	9.768	9.700	10.381	10.162
Na ₂ O	5.740	5.560	5.715	5.801	5.434	5.627
K ₂ O	0.271	0.416	0.357	0.371	0.281	0.270
Cr ₂ O ₃	0.016	0.027	0.008	0.106	0.069	0.0
TOTAL	98.143	99.240	99.646	99.686	99.35	99.887
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.561	2.557	2.568	2.555	2.536	2.541
Ti	0.004	0.003	0.005	0.003	0.002	0.005
AL	1.404	1.409	1.391	1.406	1.425	1.417
Fe	0.022	0.030	0.021	0.014	0.026	0.023
Mn	0.0	0.006	0.005	0.006	0.0	0.001
Mg	0.003	0.013	0.010	0.016	0.008	0.019
Ca	0.476	0.463	0.471	0.468	0.502	0.489
Na	0.508	0.486	0.498	0.507	0.475	0.490
K	0.016	0.024	0.020	0.021	0.016	0.015
Cr	0.001	0.001	0.000	0.004	0.002	0.0
total	4.995	4.990	4.990	5.001	4.994	4.999

	19.19	19.20	19.21	19.22	19.23	19.24
MINERAL	11	11	11	11	11	15
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	11	12	11	11	12	17
ZONE	3	1	1	3	1	1
SiO ₂	57.197	67.075	56.903	58.746	67.002	50.848
TiO ₂	0.0	0.0	0.108	0.0	0.0	0.773
Al ₂ O ₃	25.645	20.613	26.199	25.660	19.879	1.316
FeO	0.632	0.203	0.632	0.526	0.130	14.703
MnO	0.0	0.022	0.0	0.044	0.0	0.854
MgO	0.111	0.230	0.208	0.098	0.219	11.077
CaO	9.164	1.727	9.754	8.455	0.945	20.943
Na ₂ O	5.913	10.208	5.703	6.422	10.372	0.489
K ₂ O	0.437	0.173	0.317	0.431	0.157	0.023
Cr ₂ O ₃	0.0	0.0	0.015	0.0	0.075	0.0
TOTAL	98.467	100.048	99.207	99.856	98.65	86.323
OXYGENS	8.000	8.000	8.000	8.000	8.000	6.000
Si	2.596	2.933	2.567	2.625	2.964	1.935
Ti	0.0	0.0	0.004	0.0	0.0	0.022
AL	1.372	1.062	1.393	1.351	1.036	0.059
Fe	0.024	0.007	0.024	0.020	0.005	0.468
Mn	0.0	0.001	0.0	0.002	0.0	0.028
Mg	0.008	0.015	0.014	0.007	0.014	0.628
Ca	0.446	0.081	0.471	0.405	0.045	0.854
Na	0.520	0.865	0.499	0.556	0.890	0.036
K	0.025	0.010	0.018	0.025	0.009	0.001
Cr	0.0	0.0	0.001	0.0	0.003	0.0
total	4.991	4.974	4.991	4.990	4.966	4.032

	19.25	19.26	19.27	20.01	20.02	20.03
MINERAL	16	16	16	18	19	19
ROCK TYPE	21	21	21	19	19	19
GRAINTYPE	27	26	26	21	24	24
ZONE	1	1	1	1	1	1
SiO ₂	46.790	51.880	51.956	0.459	1.335	0.402
TiO ₂	1.377	0.161	0.230	3.751	48.533	50.013
Al ₂ O ₃	6.040	2.008	1.823	1.295	0.367	0.213
FeO	19.147	21.937	20.533	90.513	49.592	51.790
MnO	0.325	0.352	0.610	0.382	1.845	1.555
MgO	11.954	10.873	11.741	0.112	0.597	0.210
CaO	11.156	11.600	11.405	0.084	0.043	0.027
Na ₂ O	1.990	0.446	0.466	0.134	0.175	0.108
K ₂ O	0.820	0.037	0.115	0.081	0.003	0.006
Cr ₂ O ₃	0.123	0.111	0.011	0.158	0.0	0.003
TOTAL	80.575	77.468	78.357	6.456	52.90	52.537
OXYGENS	23.000	23.000	23.000	4.000	3.000	3.000
Si	6.944	7.678	7.689	0.021	0.033	0.010
Ti	0.154	0.018	0.026	0.132	0.909	0.929
AL	1.056	0.350	0.318	0.071	0.011	0.006
Fe	2.376	2.715	2.541	3.542	1.033	1.070
Mn	0.041	0.044	0.076	0.015	0.039	0.033
Mg	2.644	2.398	2.589	0.008	0.022	0.008
Ca	1.774	1.839	1.808	0.004	0.001	0.001
Na	0.573	0.128	0.134	0.012	0.008	0.005
K	0.155	0.007	0.022	0.005	0.000	0.000
Cr	0.014	0.013	0.001	0.006	0.0	0.000
total	15.731	15.190	15.204	3.816	2.057	2.061

	20.04	20.05	20.06	20.07	20.08	20.09
MINERAL	19	18	18	18	19	15
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	24	21	21	21	24	17
ZONE	1	1	1	1	1	1
SiO ₂	1.623	0.288	0.582	0.354	0.380	50.641
TiO ₂	48.432	3.462	3.195	3.257	48.373	0.682
Al ₂ O ₃	0.061	0.964	0.944	1.039	0.170	1.610
FeO	50.420	91.543	90.883	90.050	51.151	15.271
MnO	1.814	0.218	0.388	0.274	1.792	0.824
MgO	0.833	0.093	0.236	0.0	0.109	13.007
CaO	0.088	0.0	0.019	0.086	0.0	17.408
Na ₂ O	0.092	0.0	0.262	0.0	0.227	0.344
K ₂ O	0.0	0.024	0.0	0.052	0.009	0.0
Cr ₂ O ₃	0.119	0.255	0.255	0.264	0.036	0.039
TOTAL	53.062	5.304	5.881	5.326	51.10	84.555
OXYGENS	3.000	4.000	4.000	4.000	3.000	6.000
Si	0.040	0.014	0.027	0.017	0.010	1.935
Ti	0.900	0.123	0.113	0.117	0.921	0.020
AL	0.002	0.054	0.052	0.059	0.005	0.072
Fe	1.041	3.616	3.581	3.611	1.083	0.488
Mn	0.038	0.009	0.015	0.011	0.038	0.027
Mg	0.031	0.007	0.017	0.0	0.004	0.741
Ca	0.002	0.0	0.001	0.004	0.0	0.713
Na	0.004	0.0	0.024	0.0	0.011	0.025
K	0.0	0.001	0.0	0.003	0.000	0.0
Cr	0.002	0.010	0.009	0.010	0.001	0.001
total	2.061	3.833	3.840	3.833	2.073	4.021

	20.10	20.11	20.12	20.13	20.14	20.15
MINERAL	15	15	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	17	17	12	12	12	12
ZONE	1	1	1	1	1	3
SiO ₂	50.691	50.752	55.968	55.525	55.391	55.185
TiO ₂	0.671	0.566	0.060	0.014	0.212	0.090
Al ₂ O ₃	1.323	0.897	26.534	26.506	26.306	25.725
FeO	14.129	15.008	0.708	0.552	0.356	0.492
MnO	0.879	0.652	0.140	0.244	0.224	0.418
MgO	12.795	12.778	0.243	0.218	0.287	0.179
CaO	18.887	19.085	9.932	9.765	9.890	9.317
Na ₂ O	0.402	0.418	5.706	5.703	5.538	5.644
K ₂ O	0.0	0.049	0.333	0.318	0.366	0.293
Cr ₂ O ₃	0.0	0.0	0.204	0.029	0.022	0.011
TOTAL	85.648	85.197	99.120	98.322	98.24	96.862
OXYGENS	6.000	6.000	8.000	8.000	8.000	8.000
Si	1.938	1.940	2.535	2.536	2.536	2.557
Ti	0.019	0.016	0.002	0.000	0.007	0.003
AL	0.060	0.040	1.416	1.427	1.419	1.405
Fe	0.452	0.480	0.027	0.021	0.014	0.019
Mn	0.028	0.021	0.005	0.009	0.009	0.016
Mg	0.729	0.728	0.016	0.015	0.020	0.012
Ca	0.773	0.782	0.482	0.478	0.485	0.462
Na	0.030	0.031	0.501	0.505	0.492	0.507
K	0.0	0.002	0.019	0.019	0.021	0.017
Cr	0.0	0.0	0.007	0.001	0.001	0.000
total	4.028	4.040	5.011	5.011	5.003	5.000

	20.16	20.17	20.18	20.19	20.20	20.21
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	1	1	3
SiO ₂	56.739	57.194	55.746	55.893	55.440	57.101
TiO ₂	0.144	0.0	0.186	0.174	0.041	0.112
Al ₂ O ₃	26.007	24.669	25.940	26.472	26.714	24.767
FeO	0.145	0.805	0.554	0.353	0.499	0.625
MnO	0.089	0.113	0.181	0.158	0.072	0.083
MgO	0.310	0.149	0.124	0.310	0.203	0.130
CaO	9.227	8.299	9.570	9.928	10.049	7.891
Na ₂ O	6.062	6.371	5.676	5.696	5.379	6.531
K ₂ O	0.371	0.457	0.324	0.367	0.328	0.482
Cr ₂ O ₃	0.0	0.038	0.125	0.0	0.0	0.077
TOTAL	98.949	97.290	97.872	98.998	98.23	97.174
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.574	2.624	2.555	2.539	2.532	2.623
Ti	0.005	0.0	0.006	0.006	0.001	0.004
AL	1.391	1.334	1.401	1.417	1.438	1.341
Fe	0.006	0.031	0.021	0.013	0.019	0.024
Mn	0.003	0.004	0.007	0.006	0.003	0.003
Mg	0.021	0.010	0.008	0.021	0.014	0.009
Ca	0.448	0.408	0.470	0.483	0.492	0.388
Na	0.533	0.567	0.504	0.502	0.476	0.582
K	0.021	0.027	0.019	0.021	0.019	0.028
Cr	0.0	0.001	0.005	0.0	0.0	0.003
total	5.003	5.005	4.997	5.008	4.995	5.006

	20.22	20.23	20.24	20.25	21.01	21.02
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	12	12	12	11	11
ZONE	1	3	3	1	1	1
SiO ₂	54.976	57.217	55.946	58.279	47.218	46.658
TiO ₂	0.047	0.630	0.083	0.0	0.0	0.116
Al ₂ O ₃	26.168	25.382	26.716	25.030	32.463	32.339
FeO	0.488	0.334	0.487	0.578	0.814	0.725
MnO	0.250	0.189	0.194	0.178	0.095	0.0
MgO	0.158	0.080	0.242	0.123	0.250	0.172
CaO	9.709	8.415	10.273	8.114	16.997	17.107
Na ₂ O	5.244	6.220	5.489	6.375	1.845	1.817
K ₂ O	0.405	0.419	0.316	0.534	0.009	0.038
Cr ₂ O ₃	0.0	0.121	0.109	0.163	0.196	0.028
TOTAL	96.957	98.673	99.368	98.796	99.07	98.275
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.544	2.597	2.531	2.634	2.181	2.174
Ti	0.002	0.022	0.003	0.0	0.0	0.004
AL	1.427	1.358	1.424	1.333	1.767	1.776
Fe	0.019	0.013	0.018	0.022	0.031	0.028
Mn	0.010	0.007	0.007	0.007	0.004	0.0
Mg	0.011	0.005	0.016	0.008	0.017	0.012
Ca	0.481	0.409	0.498	0.393	0.841	0.854
Na	0.470	0.547	0.481	0.559	0.165	0.164
K	0.024	0.024	0.018	0.031	0.001	0.002
Cr	0.0	0.004	0.004	0.006	0.007	0.001
total	4.988	4.986	5.002	4.992	5.015	5.016

	21.03	21.04	21.05	21.06	21.07	21.08
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	11	11	11	11	12	12
ZONE	2	2	3	3	1	3
SiO ₂	49.529	50.031	53.552	52.777	52.946	54.386
TiO ₂	0.060	0.0	0.007	0.0	0.0	0.0
Al ₂ O ₃	30.766	30.995	28.389	28.887	28.885	28.659
FeO	0.968	0.711	0.880	0.555	0.733	0.810
MnO	0.053	0.156	0.0	0.0	0.0	0.011
MgO	0.233	0.152	0.298	0.466	0.275	0.340
CaO	15.206	15.018	11.739	12.551	12.282	11.589
Na ₂ O	2.845	2.898	4.565	4.262	4.407	4.726
K ₂ O	0.049	0.168	0.215	0.186	0.213	0.234
Cr ₂ O ₃	0.0	0.060	0.096	0.100	0.028	0.0
TOTAL	98.741	99.478	98.861	99.229	99.04	99.945
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.280	2.289	2.438	2.405	2.412	2.447
Ti	0.002	0.0	0.000	0.0	0.0	0.0
AL	1.669	1.671	1.523	1.551	1.551	1.520
Fe	0.037	0.027	0.033	0.021	0.028	0.030
Mn	0.002	0.006	0.0	0.0	0.0	0.000
Mg	0.016	0.010	0.020	0.032	0.019	0.023
Ca	0.750	0.736	0.573	0.613	0.600	0.559
Na	0.254	0.257	0.403	0.376	0.389	0.412
K	0.003	0.010	0.012	0.011	0.012	0.013
Cr	0.0	0.002	0.003	0.004	0.001	0.0
total	5.012	5.008	5.006	5.012	5.012	5.005

	21.09	21.10	21.11	21.12	13.01	13.02
MINERAL	11	15	15	13	11	11
ROCK TYPE	19	19	19	19	15	15
GRAINTYPE	12	17	17	28	12	12
ZONE	3	1	1	1	1	1
SiO ₂	49.519	51.516	51.342	36.207	56.544	54.858
TiO ₂	0.073	0.711	0.552	0.090	0.123	0.0
Al ₂ O ₃	30.769	1.863	2.566	0.0	27.340	26.346
FeO	0.685	12.052	10.860	34.537	1.098	0.974
MnO	0.0	0.436	0.272	0.564	0.0	0.071
MgO	0.209	14.977	14.650	29.209	0.214	0.0
CaO	14.599	17.194	19.402	0.169	10.884	10.340
Na ₂ O	3.072	0.463	0.628	0.250	5.294	5.400
K ₂ O	0.165	0.0	0.0	0.0	0.260	0.390
Cr ₂ O ₃	0.088	0.0	0.095	0.062	0.0	0.0
TOTAL	98.494	87.160	89.507	66.551	100.66	97.405
OXYGENS	8.000	6.000	6.000	4.000	8.000	8.000
Si	2.287	1.944	1.917	0.992	2.516	2.526
Ti	0.003	0.020	0.015	0.002	0.004	0.0
AL	1.674	0.083	0.113	0.0	1.434	1.430
Fe	0.026	0.380	0.339	0.792	0.041	0.038
Mn	0.0	0.014	0.009	0.013	0.0	0.003
Mg	0.014	0.842	0.815	1.193	0.014	0.0
Ca	0.722	0.695	0.776	0.005	0.519	0.510
Na	0.275	0.034	0.045	0.013	0.457	0.482
K	0.010	0.0	0.0	0.0	0.015	0.023
Cr	0.003	0.0	0.003	0.001	0.0	0.0
total	5.014	4.012	4.032	3.012	4.999	5.011

	13.03	13.04	13.05	13.06	13.07	13.08
MINERAL	11	11	12	12	11	11
ROCK TYPE	15	15	15	15	15	15
GRAINTYPE	12	12	25	25	12	12
ZONE	1	1	1	1	1	1
SiO ₂	59.513	57.426	65.346	66.402	57.072	61.240
TiO ₂	0.117	0.042	0.157	0.141	0.200	0.030
Al ₂ O ₃	24.445	25.982	17.900	19.370	25.430	23.930
FeO	0.501	0.723	0.140	0.0	0.769	0.695
MnO	0.0	0.0	0.005	0.042	0.0	0.0
MgO	0.0	0.091	0.019	0.035	0.023	0.165
CaO	7.369	9.489	0.0	0.686	9.391	6.294
Na ₂ O	6.990	5.879	0.253	5.285	5.953	7.813
K ₂ O	0.419	0.305	16.903	8.977	0.457	0.244
Cr ₂ O ₃	0.138	0.0	0.0	0.046	0.051	0.0
TOTAL	98.991	99.214	100.583	100.984	98.58	99.716
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.676	2.586	3.009	2.968	2.590	2.720
Ti	0.004	0.001	0.005	0.005	0.007	0.001
AL	1.295	1.379	0.971	1.020	1.360	1.253
Fe	0.019	0.027	0.005	0.0	0.029	0.026
Mn	0.0	0.0	0.000	0.002	0.0	0.0
Mg	0.0	0.006	0.001	0.002	0.002	0.011
Ca	0.355	0.458	0.0	0.033	0.457	0.299
Na	0.609	0.513	0.023	0.458	0.524	0.673
K	0.024	0.018	0.993	0.512	0.026	0.014
Cr	0.005	0.0	0.0	0.002	0.002	0.0
total	4.987	4.988	5.008	5.001	4.997	4.996

	13.09	13.10	13.11	13.12	13.13	13.14
MINERAL	11	11	11	11	11	15
ROCK TYPE	15	15	15	15	15	15
GRAINTYPE	12	12	12	12	12	17
ZONE	1	1	1	1	1	1
SiO ₂	55.153	55.387	55.821	59.998	54.891	51.259
TiO ₂	0.0	0.134	0.162	0.0	0.190	0.646
Al ₂ O ₃	27.232	27.694	27.139	25.305	26.846	2.030
FeO	0.812	0.872	1.081	0.720	0.983	13.446
MnO	0.0	0.044	0.020	0.014	0.0	0.307
MgO	0.0	0.114	0.050	0.195	0.049	14.459
CaO	10.985	11.264	10.927	7.765	10.737	18.793
Na ₂ O	5.078	5.130	5.073	7.083	5.133	0.448
K ₂ O	0.236	0.249	0.288	0.455	0.163	0.048
Cr ₂ O ₃	0.053	0.092	0.0	0.0	0.0	0.033
TOTAL	98.737	100.108	99.480	100.815	98.01	88.023
OXYGENS	8.000	8.000	8.000	8.000	8.000	6.000
Si	2.507	2.487	2.514	2.650	2.509	1.913
Ti	0.0	0.005	0.005	0.0	0.007	0.018
AL	1.459	1.465	1.440	1.317	1.446	0.089
Fe	0.031	0.033	0.041	0.027	0.038	0.420
Mn	0.0	0.002	0.001	0.001	0.0	0.010
Mg	0.0	0.008	0.003	0.013	0.003	0.804
Ca	0.535	0.542	0.527	0.367	0.526	0.751
Na	0.447	0.447	0.443	0.607	0.455	0.032
K	0.014	0.014	0.017	0.026	0.010	0.002
Cr	0.002	0.003	0.0	0.0	0.0	0.001
total	4.994	5.005	4.991	5.007	4.993	4.041

	13.15	14.01	14.02	14.03	14.04	14.05
MINERAL	15	11	11	11	11	11
ROCK TYPE	15	15	15	15	15	15
GRAINTYPE	17	12	12	12	12	12
ZONE	1	1	3	1	1	3
SiO ₂	1.964	54.711	54.919	55.842	54.709	62.697
TiO ₂	0.004	0.062	0.054	0.008	0.064	0.159
Al ₂ O ₃	0.031	27.718	27.883	26.756	27.259	22.987
FeO	0.402	0.914	0.937	0.792	0.692	0.394
MnO	0.013	0.0	0.038	0.075	0.0	0.022
MgO	0.719	0.285	0.358	0.169	0.258	0.236
CaO	0.868	10.957	10.717	9.759	10.409	4.723
Na ₂ O	0.027	5.229	5.171	5.572	5.207	8.719
K ₂ O	0.003	0.261	0.112	0.168	0.246	0.653
Cr ₂ O ₃	0.001	0.0	0.079	0.0	0.021	0.045
TOTAL	3.630	99.223	99.331	98.349	98.17	100.241
OXYGENS	6.000	8.000	8.000	8.000	8.000	8.000
Si	1.851	2.477	2.479	2.539	2.500	2.772
Ti	0.003	0.002	0.002	0.000	0.002	0.005
AL	0.034	1.479	1.483	1.434	1.468	1.198
Fe	0.317	0.035	0.035	0.030	0.026	0.015
Mn	0.010	0.0	0.001	0.003	0.0	0.001
Mg	1.010	0.019	0.024	0.011	0.018	0.016
Ca	0.876	0.532	0.518	0.475	0.510	0.224
Na	0.049	0.459	0.453	0.491	0.461	0.747
K	0.004	0.015	0.006	0.010	0.014	0.037
Cr	0.001	0.0	0.003	0.0	0.001	0.002
total	4.155	5.018	5.005	4.994	5.001	5.015

	14.06	14.07	14.08	14.09	14.10	14.11
MINERAL	11	11	11	11	11	11
ROCK TYPE	15	15	15	15	15	15
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	3	3	1
SiO ₂	54.633	54.716	54.299	54.985	54.490	53.833
TiO ₂	0.0	0.128	0.089	0.105	0.143	0.0
Al ₂ O ₃	28.210	27.519	27.457	28.109	27.099	27.249
FeO	0.973	0.772	0.820	0.624	0.953	0.712
MnO	0.0	0.046	0.053	0.049	0.0	0.020
MgO	0.339	0.330	0.236	0.353	0.189	0.186
CaO	10.981	11.041	10.920	10.928	10.601	10.891
Na ₂ O	5.042	5.374	4.970	5.558	5.299	5.064
K ₂ O	0.293	0.157	0.152	0.275	0.222	0.217
Cr ₂ O ₃	0.032	0.0	0.0	0.060	0.041	0.099
TOTAL	99.530	99.311	98.176	100.422	98.08	97.559
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.465	2.479	2.483	2.468	2.493	2.481
Ti	0.0	0.004	0.003	0.004	0.005	0.0
AL	1.500	1.469	1.480	1.487	1.461	1.480
Fe	0.037	0.029	0.031	0.023	0.036	0.027
Mn	0.0	0.002	0.002	0.002	0.0	0.001
Mg	0.023	0.022	0.016	0.024	0.013	0.013
Ca	0.531	0.536	0.535	0.525	0.520	0.538
Na	0.441	0.472	0.441	0.484	0.470	0.453
K	0.017	0.009	0.009	0.016	0.013	0.013
Cr	0.001	0.0	0.0	0.002	0.001	0.004
total	5.014	5.023	4.999	5.034	5.012	5.009

	14.12	14.13	14.14	14.15	14.16	14.17
MINERAL	11	15	15	15	15	15
ROCK TYPE	15	15	15	15	15	15
GRAINTYPE	12	17	17	17	17	17
ZONE	3	1	1	1	1	1
SiO ₂	53.833	51.283	51.058	51.874	50.962	51.625
TiO ₂	0.0	0.524	0.737	0.749	0.539	0.830
Al ₂ O ₃	27.249	1.359	1.999	2.413	1.683	2.332
FeO	0.712	14.879	13.289	11.905	14.850	0.0
MnO	0.020	0.604	0.234	0.409	0.430	11.901
MgO	0.186	12.811	13.939	14.660	13.206	0.373
CaO	10.891	17.795	17.876	17.752	17.472	14.505
Na ₂ O	5.064	0.360	0.378	0.446	0.496	18.173
K ₂ O	0.217	0.013	0.0	0.0	0.0	0.528
Cr ₂ O ₃	0.099	0.0	0.072	0.108	0.037	0.0
TOTAL	97.559	84.749	86.293	88.411	84.82	100.267
OXYGENS	8.000	6.000	6.000	6.000	6.000	6.000
Si	2.481	1.957	1.934	1.935	1.942	2.028
Ti	0.0	0.015	0.021	0.021	0.015	0.025
AL	1.480	0.061	0.089	0.106	0.076	0.108
Fe	0.027	0.475	0.421	0.371	0.473	0.0
Mn	0.001	0.020	0.008	0.013	0.014	0.396
Mg	0.013	0.729	0.787	0.815	0.750	0.022
Ca	0.538	0.728	0.725	0.709	0.713	0.610
Na	0.453	0.027	0.028	0.032	0.037	1.384
K	0.013	0.001	0.0	0.0	0.0	0.026
Cr	0.004	0.0	0.002	0.003	0.001	0.0
total	5.009	4.011	4.014	4.006	4.022	4.599

	17.01	17.02	17.03	17.04	17.05	17.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	30	30	30	30	30	30
ZONE	3	3	1	1	1	3
SiO ₂	58.001	58.245	59.627	58.092	58.114	57.699
TiO ₂	0.028	0.157	0.016	0.054	0.063	0.088
Al ₂ O ₃	25.659	25.573	25.446	26.311	26.223	25.331
FeO	0.280	0.520	0.402	0.285	0.343	0.462
MnO	0.011	0.0	0.0	0.170	0.0	0.007
MgO	0.114	0.127	0.257	0.173	0.356	0.173
CaO	8.541	0.834	7.672	8.740	8.692	8.357
Na ₂ O	6.049	0.629	6.818	6.213	6.381	6.406
K ₂ O	0.658	0.669	0.453	0.517	0.336	0.643
Cr ₂ O ₃	0.079	0.0	0.0	0.010	0.021	0.0
TOTAL	99.140	86.234	100.289	100.280	100.19	98.704
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.616	2.833	2.649	2.594	2.594	2.615
Ti	0.001	0.006	0.001	0.002	0.002	0.003
AL	1.364	1.466	1.332	1.385	1.379	1.353
Fe	0.011	0.021	0.015	0.011	0.013	0.018
Mn	0.000	0.0	0.0	0.006	0.0	0.000
Mg	0.008	0.009	0.017	0.012	0.024	0.012
Ca	0.413	0.043	0.365	0.418	0.416	0.406
Na	0.529	0.059	0.587	0.538	0.552	0.563
K	0.038	0.042	0.026	0.029	0.019	0.037
Cr	0.003	0.0	0.0	0.000	0.001	0.0
total	4.983	4.479	4.991	4.995	5.000	5.006

	17.07	17.08	17.09	17.10	17.11	17.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	30	30	30	11	11	29
ZONE	3	1	1	1	1	1
SiO ₂	59.165	57.937	59.562	58.512	57.367	59.138
TiO ₂	0.0	0.029	0.092	0.078	0.177	0.0
Al ₂ O ₃	24.772	25.679	24.455	25.188	25.879	24.497
FeO	0.302	0.536	0.685	0.583	0.681	0.450
MnO	0.133	0.0	0.0	0.0	0.0	0.0
MgO	0.095	0.122	0.223	0.098	0.003	0.144
CaO	7.409	8.636	7.081	7.758	8.687	7.793
Na ₂ O	6.608	6.201	6.719	6.399	6.026	6.514
K ₂ O	0.723	0.604	0.914	0.759	0.652	0.839
Cr ₂ O ₃	0.003	0.017	0.094	0.0	0.0	0.043
TOTAL	98.908	99.225	99.140	98.792	98.79	98.968
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.668	2.610	2.674	2.640	2.595	2.667
Ti	0.0	0.001	0.003	0.003	0.006	0.0
AL	1.316	1.363	1.294	1.339	1.379	1.302
Fe	0.011	0.020	0.026	0.022	0.026	0.017
Mn	0.005	0.0	0.0	0.0	0.0	0.0
Mg	0.006	0.008	0.015	0.007	0.000	0.010
Ca	0.358	0.417	0.341	0.375	0.421	0.376
Na	0.578	0.541	0.585	0.560	0.528	0.569
K	0.042	0.035	0.052	0.044	0.038	0.048
Cr	0.000	0.001	0.003	0.0	0.0	0.002
total	4.984	4.996	4.993	4.989	4.993	4.991

	17.13	17.14	17.15	17.16	17.17	17.18
MINERAL	11	15	15	15	15	15
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	29	17	17	17	17	17
ZONE	1	1	1	1	1	1
SiO ₂	57.947	53.281	50.134	51.041	54.138	51.688
TiO ₂	0.147	0.364	0.335	0.780	0.193	0.356
Al ₂ O ₃	25.669	1.090	1.354	1.169	1.166	1.216
FeO	0.469	16.961	18.904	18.186	14.510	15.030
MnO	0.015	1.275	1.560	1.216	1.302	1.264
MgO	0.176	9.190	10.413	9.437	9.678	9.964
CaO	8.593	17.982	17.166	17.756	18.689	19.708
Na ₂ O	6.243	0.577	0.630	0.638	0.827	0.718
K ₂ O	0.705	0.070	0.066	0.074	0.065	0.197
Cr ₂ O ₃	0.0	0.090	0.006	0.063	0.035	0.0
TOTAL	99.495	83.919	81.664	82.174	86.09	85.111
OXYGENS	8.000	6.000	6.000	6.000	6.000	6.000
Si	2.606	2.024	1.942	1.971	2.040	1.982
Ti	0.005	0.010	0.010	0.023	0.005	0.010
AL	1.361	0.049	0.062	0.053	0.052	0.055
Fe	0.018	0.539	0.612	0.587	0.457	0.482
Mn	0.001	0.041	0.051	0.040	0.042	0.041
Mg	0.012	0.520	0.601	0.543	0.544	0.569
Ca	0.414	0.732	0.713	0.735	0.755	0.810
Na	0.544	0.042	0.047	0.048	0.060	0.053
K	0.040	0.003	0.003	0.004	0.003	0.010
Cr	0.0	0.003	0.000	0.002	0.001	0.0
total	5.001	3.963	4.042	4.005	3.959	4.012

	17.19	17.20	17.21	16.01	16.02	16.03
MINERAL	18	19	18	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	19	22	21	11	11	11
ZONE	1	1	1	3	3	3
SiO ₂	0.514	0.701	0.555	57.943	57.243	57.064
TiO ₂	12.839	46.325	13.321	0.036	0.165	0.153
Al ₂ O ₃	0.766	0.239	0.894	25.099	25.657	25.263
FeO	80.960	49.703	78.729	0.510	0.835	0.459
MnO	1.519	3.519	1.591	0.181	0.058	0.031
MgO	0.269	0.035	0.263	0.256	0.248	0.139
CaO	0.135	0.202	0.0	7.793	8.742	8.380
Na ₂ O	0.561	0.148	0.209	6.688	6.290	6.315
K ₂ O	0.028	0.040	0.079	0.305	0.394	0.364
Cr ₂ O ₃	0.021	0.079	0.0	0.018	0.0	0.143
TOTAL	16.652	51.288	16.912	98.319	98.80	97.852
OXYGENS	4.000	3.000	4.000	8.000	8.000	8.000
Si	0.022	0.018	0.025	2.629	2.588	2.607
Ti	0.421	0.897	0.442	0.001	0.006	0.005
AL	0.039	0.007	0.047	1.342	1.367	1.360
Fe	2.950	1.070	2.908	0.019	0.032	0.018
Mn	0.056	0.077	0.060	0.007	0.002	0.001
Mg	0.017	0.001	0.017	0.017	0.017	0.009
Ca	0.006	0.006	0.0	0.379	0.423	0.410
Na	0.047	0.007	0.018	0.588	0.551	0.559
K	0.002	0.001	0.004	0.018	0.023	0.021
Cr	0.001	0.002	0.0	0.001	0.0	0.005
total	3.561	2.085	3.521	5.001	5.009	4.996

	16.04	16.05	16.06	16.07	16.08	16.09
MINERAL	11	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	11	11	11	11	11	11
ZONE	1	1	1	1	1	1
SiO ₂	58.093	57.441	57.244	58.321	56.849	57.295
TiO ₂	0.094	0.112	0.080	0.205	0.103	0.121
Al ₂ O ₃	24.687	25.650	25.113	25.478	25.212	25.108
FeO	0.505	0.631	0.469	1.114	0.594	0.410
MnO	0.034	0.024	0.086	0.0	0.152	0.060
MgO	0.156	0.311	0.196	0.376	0.113	0.153
CaO	7.627	8.343	8.098	7.879	8.358	7.945
Na ₂ O	6.415	6.314	6.371	6.168	6.191	6.433
K ₂ O	0.494	0.469	0.403	0.747	0.382	0.296
Cr ₂ O ₃	0.051	0.086	0.0	0.0	0.0	0.0
TOTAL	97.651	98.750	97.591	99.174	97.36	97.411
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.649	2.598	2.619	2.616	2.608	2.623
Ti	0.003	0.004	0.003	0.007	0.004	0.004
AL	1.327	1.367	1.354	1.347	1.363	1.355
Fe	0.019	0.024	0.018	0.042	0.023	0.016
Mn	0.001	0.001	0.003	0.0	0.006	0.002
Mg	0.011	0.021	0.013	0.025	0.008	0.010
Ca	0.373	0.404	0.397	0.379	0.411	0.390
Na	0.567	0.554	0.565	0.536	0.551	0.571
K	0.029	0.027	0.024	0.043	0.022	0.017
Cr	0.002	0.003	0.0	0.0	0.0	0.0
total	4.981	5.003	4.996	4.994	4.994	4.989

	16.10	16.11	16.12	16.13	16.14	16.15
MINERAL	11	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	11	11	11	11	11	11
ZONE	1	3	3	1	1	3
SiO ₂	57.276	58.876	57.616	56.884	57.120	57.911
TiO ₂	0.163	0.034	0.144	0.041	0.086	0.087
Al ₂ O ₃	25.727	25.605	25.304	25.695	25.665	24.628
FeO	0.651	0.414	0.610	0.554	0.453	0.406
MnO	0.033	0.140	0.0	0.0	0.039	0.091
MgO	0.195	0.260	0.163	0.034	0.213	0.084
CaO	8.865	8.005	8.366	8.830	8.564	7.923
Na ₂ O	6.056	6.690	6.355	6.178	6.150	6.588
K ₂ O	0.357	0.317	0.301	0.322	0.300	0.276
Cr ₂ O ₃	0.030	0.073	0.171	0.034	0.0	0.0
TOTAL	98.702	100.000	98.420	98.018	98.14	97.588
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.592	2.627	2.612	2.594	2.599	2.646
Ti	0.006	0.001	0.005	0.001	0.003	0.003
AL	1.372	1.347	1.352	1.381	1.376	1.326
Fe	0.025	0.015	0.023	0.021	0.017	0.016
Mn	0.001	0.005	0.0	0.0	0.002	0.004
Mg	0.013	0.017	0.011	0.002	0.014	0.006
Ca	0.430	0.383	0.406	0.431	0.418	0.388
Na	0.531	0.579	0.559	0.546	0.543	0.584
K	0.021	0.018	0.017	0.019	0.017	0.016
Cr	0.001	0.003	0.006	0.001	0.0	0.0
total	4.992	4.995	4.992	4.996	4.989	4.988

	16.16	16.17	16.18	16.19	16.20	16.21
MINERAL	11	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	11	11	11	11	11	11
ZONE	1	3	3	1	3	3
SiO ₂	57.120	56.982	57.964	57.473	57.264	57.392
TiO ₂	0.111	0.026	0.125	0.064	0.104	0.143
Al ₂ O ₃	25.703	26.118	25.808	25.626	26.469	25.870
FeO	0.668	0.858	0.805	0.643	0.800	0.747
MnO	0.147	0.030	0.0	0.0	0.200	0.0
MgO	0.049	0.081	0.323	0.099	0.266	0.121
CaO	8.860	9.102	8.682	8.829	9.008	8.822
Na ₂ O	6.255	6.068	6.341	5.999	6.137	6.220
K ₂ O	0.284	0.268	0.398	0.354	0.236	0.278
Cr ₂ O ₃	0.0	0.081	0.073	0.068	0.0	0.118
TOTAL	98.529	98.756	99.714	98.512	99.68	98.964
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.591	2.576	2.595	2.603	2.567	2.589
Ti	0.004	0.001	0.004	0.002	0.004	0.005
AL	1.374	1.392	1.362	1.368	1.398	1.375
Fe	0.025	0.032	0.030	0.024	0.030	0.028
Mn	0.006	0.001	0.0	0.0	0.008	0.0
Mg	0.003	0.005	0.022	0.007	0.018	0.008
Ca	0.431	0.441	0.416	0.428	0.433	0.426
Na	0.550	0.532	0.550	0.527	0.533	0.544
K	0.016	0.015	0.023	0.020	0.013	0.016
Cr	0.0	0.003	0.003	0.002	0.0	0.004
total	5.001	4.999	5.005	4.983	5.004	4.996

	16.22	16.23	16.24	16.25	16.26	16.27
MINERAL	11	11	11	15	15	15
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	11	11	11	17	17	17
ZONE	1	1	3	1	1	1
SiO ₂	57.126	57.310	57.889	50.637	51.145	51.660
TiO ₂	0.107	0.068	0.0	0.604	0.700	0.754
Al ₂ O ₃	25.725	25.973	25.991	1.205	1.347	1.365
FeO	0.542	0.645	0.635	17.945	15.921	16.841
MnO	0.0	0.040	0.0	0.794	0.713	0.794
MgO	0.083	0.226	0.163	12.021	12.970	12.542
CaO	8.764	8.610	8.546	17.080	17.188	17.290
Na ₂ O	6.108	6.008	6.414	0.427	0.283	0.480
K ₂ O	0.337	0.372	0.232	0.048	0.029	0.034
Cr ₂ O ₃	0.0	0.035	0.049	0.0	0.038	0.023
TOTAL	98.250	98.642	99.284	82.816	84.41	84.942
OXYGENS	8.000	8.000	8.000	6.000	6.000	6.000
Si	2.597	2.592	2.601	1.940	1.946	1.945
Ti	0.004	0.002	0.0	0.017	0.020	0.021
AL	1.378	1.384	1.376	0.054	0.060	0.061
Fe	0.021	0.024	0.024	0.575	0.506	0.530
Mn	0.0	0.002	0.0	0.026	0.023	0.025
Mg	0.006	0.015	0.011	0.686	0.735	0.704
Ca	0.427	0.417	0.411	0.701	0.701	0.697
Na	0.538	0.527	0.559	0.032	0.021	0.035
K	0.020	0.021	0.013	0.002	0.001	0.002
Cr	0.0	0.001	0.002	0.0	0.001	0.001
total	4.989	4.987	4.996	4.033	4.015	4.021

	16.28	16.29	16.30	16.30	16.31	16.32
MINERAL	15	15	19	19	18	19
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	17	17	22	22	19	22
ZONE	1	1	1	1	1	1
SiO ₂	51.390	51.665	0.672	0.843	0.695	0.502
TiO ₂	0.551	0.479	50.514	49.418	4.791	49.606
Al ₂ O ₃	0.208	1.163	0.093	0.233	1.130	0.206
FeO	16.849	17.208	46.835	47.271	83.480	45.964
MnO	0.706	0.839	2.486	2.658	0.323	3.639
MgO	12.297	12.586	0.206	0.457	0.287	0.229
CaO	17.198	17.369	0.139	0.102	0.293	0.103
Na ₂ O	0.435	0.230	0.003	0.005	0.199	0.068
K ₂ O	0.048	0.082	0.056	0.128	0.024	0.085
Cr ₂ O ₃	0.017	0.0	0.087	0.023	0.084	0.0
TOTAL	82.850	84.413	54.256	53.867	7.83	54.438
OXYGENS	6.000	6.000	3.000	3.000	4.000	3.000
Si	1.978	1.952	0.017	0.021	0.034	0.013
Ti	0.016	0.014	0.955	0.936	0.176	0.948
AL	0.009	0.052	0.003	0.007	0.065	0.006
Fe	0.542	0.544	0.984	0.996	3.417	0.977
Mn	0.023	0.027	0.053	0.057	0.013	0.078
Mg	0.705	0.708	0.008	0.017	0.021	0.009
Ca	0.709	0.703	0.004	0.003	0.015	0.003
Na	0.032	0.017	0.000	0.000	0.019	0.003
K	0.002	0.004	0.002	0.004	0.001	0.003
Cr	0.001	0.0	0.002	0.000	0.003	0.0
total	4.018	4.019	2.027	2.041	3.766	2.039

	16.33	23.01	23.02	23.03	23.04	23.05
MINERAL	18	11	11	11	11	11
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	19	11	11	11	11	11
ZONE	1	1	1	1	3	3
SiO ₂	0.735	57.071	57.532	58.515	58.569	59.585
TiO ₂	5.045	0.006	0.019	0.010	0.088	0.227
Al ₂ O ₃	1.285	25.490	25.793	26.103	25.102	24.636
FeO	86.952	0.614	0.596	0.548	0.456	0.444
MnO	0.461	0.005	0.024	0.019	0.084	0.0
MgO	0.236	0.160	0.136	0.320	0.149	0.215
CaO	0.096	8.097	8.476	8.337	7.634	6.706
Na ₂ O	0.096	6.433	6.423	6.522	7.036	7.141
K ₂ O	0.008	0.321	0.346	0.312	0.324	0.287
Cr ₂ O ₃	0.092	0.0	0.0	0.070	0.071	0.0
TOTAL	8.054	97.583	98.749	100.208	99.06	98.797
OXYGENS	4.000	8.000	8.000	8.000	8.000	8.000
Si	0.035	2.608	2.601	2.605	2.638	2.677
Ti	0.178	0.000	0.001	0.000	0.003	0.008
AL	0.071	1.373	1.374	1.370	1.332	1.305
Fe	3.418	0.023	0.023	0.020	0.017	0.017
Mn	0.018	0.000	0.001	0.001	0.003	0.0
Mg	0.017	0.011	0.009	0.021	0.010	0.014
Ca	0.005	0.396	0.411	0.398	0.368	0.323
Na	0.009	0.570	0.563	0.563	0.614	0.622
K	0.000	0.019	0.020	0.018	0.019	0.016
Cr	0.003	0.0	0.0	0.002	0.003	0.0
total	3.754	5.000	5.002	4.999	5.008	4.982

	23.06	23.07	23.08	23.09	23.10	23.11
MINERAL	11	11	11	11	11	21
ROCK TYPE	8	8	8	8	8	8
GRAINTYPE	11	11	11	11	11	31
ZONE	1	3	3	1	3	1
SiO ₂	59.483	58.390	58.942	57.002	57.149	68.213
TiO ₂	0.001	0.148	0.030	0.107	0.199	0.265
Al ₂ O ₃	24.734	24.786	25.039	26.430	25.905	19.411
FeO	0.457	0.608	0.375	0.603	0.599	0.316
MnO	0.0	0.170	0.037	0.016	0.102	0.012
MgO	0.256	0.128	0.150	0.254	0.174	0.136
CaO	7.363	7.776	7.648	8.875	8.587	3.425
Na ₂ O	7.131	6.727	6.985	6.066	6.303	7.621
K ₂ O	0.453	0.352	0.357	0.292	0.244	0.927
Cr ₂ O ₃	0.032	0.0	0.001	0.144	0.0	0.055
TOTAL	99.453	98.477	99.189	99.186	98.66	100.065
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.665	2.643	2.650	2.569	2.587	2.977
Ti	0.000	0.005	0.001	0.004	0.007	0.009
AL	1.306	1.322	1.327	1.404	1.382	0.998
Fe	0.017	0.023	0.014	0.023	0.023	0.012
Mn	0.0	0.007	0.001	0.001	0.004	0.000
Mg	0.017	0.009	0.010	0.017	0.012	0.009
Ca	0.353	0.377	0.368	0.428	0.416	0.160
Na	0.619	0.590	0.609	0.530	0.553	0.645
K	0.026	0.020	0.020	0.017	0.014	0.052
Cr	0.001	0.0	0.000	0.005	0.0	0.002
total	5.004	4.996	5.001	4.997	4.998	4.863

	23.12	23.13	23.14	23.15	23.16	11.01
MINERAL	11	11	11	21	22	11
ROCK TYPE	8	8	8	8	8	9
GRAINTYPE	11	11	11	31	32	12
ZONE	1	1	1	1	1	3
SiO ₂	56.642	56.657	58.646	66.513	70.947	59.533
TiO ₂	0.049	0.091	0.123	0.419	0.675	0.031
Al ₂ O ₃	25.487	25.411	24.861	19.284	15.456	24.269
FeO	0.649	2.066	0.687	0.419	0.910	0.490
MnO	0.054	0.0	0.016	0.106	0.0	0.130
MgO	0.074	0.237	0.290	0.254	0.188	0.129
CaO	8.530	8.209	7.722	2.852	2.539	6.949
Na ₂ O	6.014	6.389	6.900	6.786	5.733	6.941
K ₂ O	0.318	0.354	0.332	2.842	2.563	0.583
Cr ₂ O ₃	0.079	0.0	0.045	0.0	0.0	0.0
TOTAL	97.247	97.348	98.935	99.056	98.10	98.565
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.599	2.580	2.641	2.956	3.133	2.687
Ti	0.002	0.003	0.004	0.014	0.022	0.001
AL	1.378	1.364	1.319	1.010	0.804	1.291
Fe	0.025	0.079	0.026	0.016	0.034	0.018
Mn	0.002	0.0	0.001	0.004	0.0	0.005
Mg	0.005	0.016	0.019	0.017	0.012	0.009
Ca	0.419	0.401	0.372	0.136	0.120	0.336
Na	0.535	0.564	0.602	0.585	0.491	0.607
K	0.019	0.021	0.019	0.161	0.144	0.034
Cr	0.003	0.0	0.002	0.0	0.0	0.0
total	4.986	5.027	5.005	4.898	4.760	4.987

	11.02	11.03	11.04	11.05	11.06	11.07
MINERAL	11	11	11	11	11	14
ROCK TYPE	9	9	9	9	9	9
GRAINTYPE	12	12	12	12	12	13
ZONE	1	3	1	3	1	1
SiO ₂	52.653	52.146	52.747	58.285	52.982	52.075
TiO ₂	0.116	0.081	0.0	0.155	0.058	0.320
Al ₂ O ₃	28.445	28.180	28.589	25.164	28.781	2.780
FeO	1.029	0.421	0.973	0.314	0.400	20.129
MnO	0.240	0.431	0.200	0.299	0.227	0.925
MgO	0.104	0.050	0.144	0.141	0.011	23.845
CaO	11.627	12.272	12.284	8.000	12.064	0.868
Na ₂ O	4.378	4.345	4.494	6.436	4.491	0.235
K ₂ O	0.305	0.185	0.215	0.399	0.100	0.116
Cr ₂ O ₃	0.031	0.097	0.0	0.0	0.071	0.0
TOTAL	97.899	97.787	98.673	98.879	98.78	81.164
OXYGENS	8.000	8.000	8.000	8.000	8.000	6.000
Si	2.422	2.417	2.413	2.633	2.423	1.906
Ti	0.004	0.003	0.0	0.005	0.002	0.009
AL	1.542	1.539	1.541	1.340	1.551	0.120
Fe	0.040	0.016	0.037	0.012	0.015	0.616
Mn	0.009	0.017	0.008	0.011	0.009	0.029
Mg	0.007	0.003	0.010	0.009	0.001	1.301
Ca	0.573	0.609	0.602	0.387	0.591	0.034
Na	0.390	0.390	0.399	0.564	0.398	0.017
K	0.018	0.011	0.013	0.023	0.006	0.005
Cr	0.001	0.004	0.0	0.0	0.003	0.0
total	5.007	5.010	5.022	4.985	5.000	4.036

	11.08	11.09	11.10	11.11	11.12	11.13
MINERAL	14	14	14	14	14	18
ROCK TYPE	9	9	9	9	9	9
GRAINTYPE	13	13	13	13	13	19
ZONE	1	1	1	1	1	1
SiO ₂	52.260	50.860	51.756	51.271	50.449	0.472
TiO ₂	0.223	0.259	0.359	0.304	0.314	6.817
Al ₂ O ₃	1.075	1.905	0.907	1.401	1.871	1.213
FeO	23.582	25.427	25.657	25.153	24.077	86.124
MnO	1.220	1.061	1.111	1.198	1.245	1.103
MgO	20.774	20.240	19.526	20.159	19.287	0.076
CaO	1.031	0.806	1.215	0.977	1.181	0.080
Na ₂ O	0.0	0.221	0.210	0.122	0.149	0.183
K ₂ O	0.102	0.0	0.075	0.0	0.045	0.0
Cr ₂ O ₃	0.062	0.181	0.120	0.006	0.085	0.497
TOTAL	76.747	75.533	75.279	75.438	74.63	10.441
OXYGENS	6.000	6.000	6.000	6.000	6.000	4.000
Si	1.963	1.918	1.955	1.938	1.939	0.022
Ti	0.006	0.007	0.010	0.009	0.009	0.235
AL	0.048	0.085	0.040	0.062	0.085	0.066
Fe	0.741	0.802	0.810	0.795	0.774	3.301
Mn	0.039	0.034	0.036	0.038	0.041	0.043
Mg	1.163	1.137	1.099	1.135	1.104	0.005
Ca	0.041	0.033	0.049	0.040	0.049	0.004
Na	0.0	0.016	0.015	0.009	0.011	0.016
K	0.005	0.0	0.004	0.0	0.002	0.0
Cr	0.002	0.005	0.004	0.000	0.003	0.018
total	4.008	4.038	4.022	4.027	4.015	3.710

	11.14	11.15	11.16	11.17	11.18	12.01
MINERAL	18	11	11	11	11	14
ROCK TYPE	9	9	9	9	9	16
GRAINTYPE	19	12	12	12	12	13
ZONE	1	1	3	1	3	1
SiO ₂	0.618	52.002	53.482	50.987	58.679	49.035
TiO ₂	6.294	0.0	0.076	0.036	0.108	0.426
Al ₂ O ₃	1.319	28.447	27.703	27.809	25.680	2.512
FeO	86.739	0.563	0.632	0.693	0.343	31.965
MnO	0.864	0.086	0.168	0.319	0.205	0.565
MgO	0.0	0.070	0.163	0.136	0.132	15.645
CaO	0.144	12.384	11.194	11.934	8.263	0.541
Na ₂ O	0.190	4.183	4.870	3.962	6.123	0.312
K ₂ O	0.053	0.201	0.251	0.134	0.987	0.0
Cr ₂ O ₃	0.431	0.224	0.116	0.004	0.009	0.018
TOTAL	9.913	97.597	98.023	95.321	100.19	69.054
OXYGENS	4.000	8.000	8.000	8.000	8.000	6.000
Si	0.028	2.410	2.459	2.414	2.623	1.903
Ti	0.217	0.0	0.003	0.001	0.004	0.012
AL	0.071	1.553	1.501	1.552	1.353	0.115
Fe	3.328	0.022	0.024	0.027	0.013	1.038
Mn	0.034	0.003	0.007	0.013	0.008	0.019
Mg	0.0	0.005	0.011	0.010	0.009	0.905
Ca	0.007	0.615	0.551	0.605	0.396	0.022
Na	0.017	0.376	0.434	0.364	0.531	0.023
K	0.003	0.012	0.015	0.008	0.056	0.0
Cr	0.016	0.008	0.004	0.000	0.000	0.001
total	3.721	5.004	5.010	4.994	4.991	4.038

	12.02	12.03	12.04	12.05	12.06	12.07
MINERAL	14	14	14	11	12	12
ROCK TYPE	16	16	16	16	16	16
GRAINTYPE	13	13	13	12	25	25
ZONE	1	1	1	1	1	1
SiO ₂	49.069	49.489	49.130	57.169	64.046	63.832
TiO ₂	0.391	0.312	0.206	0.010	0.107	0.114
Al ₂ O ₃	2.851	2.233	1.995	25.579	18.389	18.115
FeO	31.987	31.915	34.470	0.022	0.012	0.103
MnO	0.604	0.642	1.396	0.0	0.0	0.0
MgO	15.743	15.471	13.402	0.175	0.069	0.081
CaO	0.400	0.499	0.246	8.897	0.132	0.111
Na ₂ O	0.165	0.085	0.169	6.242	2.458	1.821
K ₂ O	0.011	0.008	0.0	0.141	12.743	13.724
Cr ₂ O ₃	0.021	0.0	0.0	0.013	0.0	0.0
TOTAL	69.255	68.739	66.544	98.226	97.94	97.798
OXYGENS	6.000	6.000	6.000	8.000	8.000	8.000
Si	1.898	1.924	1.933	2.605	2.987	2.992
Ti	0.011	0.009	0.006	0.000	0.004	0.004
AL	0.130	0.102	0.093	1.374	1.011	1.001
Fe	1.035	1.038	1.134	0.001	0.000	0.004
Mn	0.020	0.021	0.047	0.0	0.0	0.0
Mg	0.907	0.896	0.786	0.012	0.005	0.006
Ca	0.017	0.021	0.010	0.434	0.007	0.006
Na	0.012	0.006	0.013	0.552	0.222	0.165
K	0.001	0.000	0.0	0.008	0.758	0.820
Cr	0.001	0.0	0.0	0.000	0.0	0.0
total	4.032	4.019	4.021	4.987	4.994	4.997

	12.08	12.09	12.10	12.11	12.12	19.28
MINERAL	11	17	17	12	12	15
ROCK TYPE	16	16	16	16	16	21
GRAINTYPE	12	33	33	25	25	17
ZONE	1	1	1	1	1	1
SiO ₂	49.530	38.899	39.136	64.194	63.955	52.553
TiO ₂	0.0	1.122	1.629	0.167	0.061	0.159
Al ₂ O ₃	30.608	12.786	13.240	18.355	17.982	1.024
FeO	0.171	15.176	15.474	0.069	0.226	22.466
MnO	0.038	0.202	0.340	0.092	0.0	0.732
MgO	0.058	16.867	16.463	0.098	0.085	11.692
CaO	14.788	0.0	0.167	0.337	0.176	10.072
Na ₂ O	3.114	0.540	0.415	2.638	2.381	0.396
K ₂ O	0.098	9.406	9.280	12.720	12.715	0.096
Cr ₂ O ₃	0.147	0.0	0.056	0.003	0.045	0.083
TOTAL	98.381	79.822	80.726	98.604	97.40	76.807
OXYGENS	8.000	22.000	22.000	8.000	8.000	6.000
Si	2.297	5.837	5.800	2.979	2.996	2.030
Ti	0.0	0.127	0.182	0.006	0.002	0.005
AL	1.673	2.261	2.312	1.004	0.993	0.047
Fe	0.007	1.904	1.918	0.003	0.009	0.726
Mn	0.001	0.026	0.043	0.004	0.0	0.024
Mg	0.004	3.772	3.635	0.007	0.006	0.673
Ca	0.735	0.0	0.027	0.017	0.009	0.417
Na	0.280	0.157	0.119	0.237	0.216	0.030
K	0.006	1.800	1.754	0.753	0.760	0.005
Cr	0.005	0.0	0.007	0.000	0.002	0.003
total	5.007	15.884	15.796	5.009	4.992	3.958

	19.29	19.30	19.31	19.32	19.33	19.34
MINERAL	18	19	19	19	19	18
ROCK TYPE	21	21	21	21	21	21
GRAINTYPE	21	24	24	24	24	21
ZONE	1	1	1	1	1	1
SiO ₂	0.415	0.341	1.709	0.187	0.264	0.291
TiO ₂	3.701	46.510	50.679	50.843	52.442	4.129
Al ₂ O ₃	1.054	0.371	0.473	0.139	0.034	1.417
FeO	91.702	55.167	49.788	50.931	51.405	92.051
MnO	0.351	1.581	1.827	1.573	1.603	0.069
MgO	0.075	0.321	0.504	0.383	0.394	0.094
CaO	0.044	0.039	0.114	0.057	0.0	0.0
Na ₂ O	0.129	0.113	0.150	0.114	0.261	0.090
K ₂ O	0.016	0.0	0.140	0.021	0.041	0.0
Cr ₂ O ₃	0.356	0.0	0.540	0.0	0.173	0.159
TOTAL	6.141	49.276	56.136	53.317	55.21	6.249
OXYGENS	4.000	3.000	3.000	3.000	3.000	4.000
Si	0.019	0.009	0.041	0.005	0.006	0.013
Ti	0.130	0.879	0.912	0.942	0.947	0.143
AL	0.058	0.011	0.013	0.004	0.001	0.077
Fe	3.568	1.159	0.996	1.049	1.033	3.549
Mn	0.014	0.034	0.037	0.033	0.033	0.003
Mg	0.005	0.012	0.018	0.014	0.014	0.006
Ca	0.002	0.001	0.003	0.002	0.0	0.0
Na	0.012	0.006	0.007	0.005	0.012	0.008
K	0.001	0.0	0.004	0.001	0.001	0.0
Cr	0.013	0.0	0.010	0.0	0.003	0.006
total	3.822	2.110	2.041	2.054	2.051	3.806

	22.01	22.02	22.03	22.04	22.05	22.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	12	12	12	12	12
ZONE	3	3	3	1	3	1
SiO ₂	61.351	57.280	59.874	51.371	57.792	51.683
TiO ₂	0.099	0.0	0.112	0.080	0.0	0.0
Al ₂ O ₃	22.652	23.953	24.498	29.008	25.527	29.495
FeO	0.405	0.867	0.559	0.632	0.587	0.495
MnO	0.238	0.338	0.173	0.230	0.293	0.284
MgO	0.226	0.180	0.237	0.105	0.204	0.313
CaO	4.845	7.460	6.915	12.927	8.539	12.852
Na ₂ O	7.763	6.305	7.026	4.041	6.355	4.051
K ₂ O	0.731	0.405	0.407	0.165	0.297	0.147
Cr ₂ O ₃	0.0	0.068	0.0	0.116	0.013	0.110
TOTAL	97.905	95.989	99.242	98.043	99.02	98.935
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.774	2.655	2.681	2.375	2.608	2.369
Ti	0.003	0.0	0.004	0.003	0.0	0.0
AL	1.207	1.308	1.293	1.581	1.358	1.593
Fe	0.015	0.034	0.021	0.024	0.022	0.019
Mn	0.009	0.013	0.007	0.009	0.011	0.011
Mg	0.015	0.012	0.016	0.007	0.014	0.021
Ca	0.235	0.370	0.332	0.640	0.413	0.631
Na	0.680	0.566	0.610	0.362	0.556	0.360
K	0.042	0.024	0.023	0.010	0.017	0.009
Cr	0.0	0.002	0.0	0.004	0.000	0.004
total	4.981	4.985	4.986	5.016	4.999	5.017

	22.07	22.08	22.09	22.10	22.11	22.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	12	12	12	12	12
ZONE	1	3	3	3	3	1
SiO ₂	53.318	51.779	52.770	51.818	52.610	52.959
TiO ₂	0.229	0.115	0.049	0.102	0.307	0.117
Al ₂ O ₃	28.589	29.306	28.870	29.425	30.076	29.782
FeO	0.757	0.643	0.513	0.714	0.711	0.715
MnO	0.163	0.259	0.331	0.258	0.170	0.163
MgO	0.228	0.167	0.089	0.301	0.445	0.167
CaO	11.837	12.865	12.352	13.050	13.346	12.966
Na ₂ O	4.591	4.045	4.192	3.777	4.148	3.952
K ₂ O	0.145	0.087	0.166	0.136	0.127	0.153
Cr ₂ O ₃	0.069	0.064	0.024	0.072	0.0	0.052
TOTAL	99.169	98.687	98.843	98.939	101.23	100.311
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.424	2.375	2.413	2.370	2.356	2.385
Ti	0.008	0.004	0.002	0.004	0.010	0.004
AL	1.532	1.584	1.556	1.586	1.587	1.581
Fe	0.029	0.025	0.020	0.027	0.027	0.027
Mn	0.006	0.010	0.013	0.010	0.006	0.006
Mg	0.015	0.011	0.006	0.021	0.030	0.011
Ca	0.577	0.632	0.605	0.640	0.640	0.626
Na	0.405	0.360	0.372	0.335	0.360	0.345
K	0.008	0.005	0.010	0.008	0.007	0.009
Cr	0.002	0.002	0.001	0.003	0.0	0.002
total	5.007	5.010	4.997	5.003	5.024	4.996

	22.13	22.14	22.15	22.16	22.17	22.18
MINERAL	11	15	15	15	15	15
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	12	17	17	17	17	17
ZONE	1	1	1	1	1	1
SiO ₂	51.426	51.094	51.909	51.021	50.060	51.769
TiO ₂	0.0	0.675	0.688	0.686	0.748	0.097
Al ₂ O ₃	29.631	2.580	2.585	2.688	3.193	0.529
FeO	0.733	10.890	12.024	10.697	11.570	13.956
MnO	0.291	0.563	0.426	0.625	0.588	0.555
MgO	0.412	14.400	14.502	14.592	14.374	11.556
CaO	13.269	19.621	19.797	19.860	18.659	20.704
Na ₂ O	4.195	0.471	0.545	0.478	0.471	0.558
K ₂ O	0.217	0.0	0.0	0.0	0.062	0.0
Cr ₂ O ₃	0.062	0.248	0.0	0.249	0.041	0.044
TOTAL	99.503	89.652	90.452	90.199	88.20	85.812
OXYGENS	8.000	6.000	6.000	6.000	6.000	6.000
Si	2.348	1.909	1.909	1.900	1.889	1.982
Ti	0.0	0.019	0.019	0.019	0.021	0.003
AL	1.595	0.114	0.112	0.118	0.142	0.024
Fe	0.028	0.340	0.370	0.333	0.365	0.447
Mn	0.011	0.018	0.013	0.020	0.019	0.018
Mg	0.028	0.802	0.795	0.810	0.808	0.659
Ca	0.649	0.785	0.780	0.793	0.754	0.849
Na	0.371	0.034	0.039	0.035	0.034	0.041
K	0.013	0.0	0.0	0.0	0.003	0.0
Cr	0.002	0.007	0.0	0.007	0.001	0.001
total	5.045	4.028	4.036	4.035	4.037	4.024

	22.19	22.20	22.21	22.22	22.23	22.24
MINERAL	18	19	19	19	19	19
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	21	24	24	24	24	24
ZONE	1	1	1	1	1	1
SiO ₂	0.244	0.297	1.377	0.209	0.244	0.185
TiO ₂	7.418	50.368	49.384	50.828	50.703	51.234
Al ₂ O ₃	1.882	0.037	0.645	0.084	0.170	0.144
FeO	83.367	48.904	47.438	48.508	48.438	48.719
MnO	0.688	2.477	2.754	2.401	2.418	2.032
MgO	0.738	0.163	0.105	0.308	0.095	0.393
CaO	0.020	0.109	0.320	0.0	0.093	0.0
Na ₂ O	0.121	0.162	0.306	0.152	0.037	0.194
K ₂ O	0.051	0.026	0.052	0.045	0.003	0.019
Cr ₂ O ₃	0.280	0.0	0.156	0.150	0.085	0.148
TOTAL	11.442	53.639	55.099	54.177	53.85	54.349
OXYGENS	4.000	3.000	3.000	3.000	3.000	3.000
Si	0.011	0.007	0.034	0.005	0.006	0.005
Ti	0.257	0.947	0.919	0.952	0.953	0.954
AL	0.102	0.001	0.019	0.002	0.005	0.004
Fe	3.210	1.023	0.982	1.011	1.013	1.009
Mn	0.027	0.052	0.058	0.051	0.051	0.043
Mg	0.051	0.006	0.004	0.011	0.004	0.015
Ca	0.001	0.003	0.008	0.0	0.002	0.0
Na	0.011	0.008	0.015	0.007	0.002	0.009
K	0.003	0.001	0.002	0.001	0.000	0.001
Cr	0.010	0.0	0.003	0.003	0.002	0.003
total	3.683	2.049	2.044	2.044	2.038	2.042

	22.25	22.26	23.01	23.02	23.03	23.04
MINERAL	18	18	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	21	21	11	11	11	11
ZONE	1	1	1	3	1	3
SiO ₂	0.133	0.205	48.293	56.783	54.843	47.019
TiO ₂	7.286	6.930	0.149	0.243	0.012	0.0
Al ₂ O ₃	2.393	1.305	30.829	26.847	27.471	31.967
FeO	84.064	85.199	0.727	0.766	0.734	0.881
MnO	0.455	0.553	0.161	0.101	0.032	0.156
MgO	0.987	0.321	0.197	0.292	0.309	0.175
CaO	0.035	0.086	15.536	9.817	10.708	16.734
Na ₂ O	0.053	0.238	2.331	5.938	5.414	1.922
K ₂ O	0.0	0.0	0.112	0.362	0.220	0.059
Cr ₂ O ₃	0.262	0.320	0.0	0.0	0.150	0.0
TOTAL	11.604	9.958	97.608	100.383	99.16	98.032
OXYGENS	4.000	4.000	8.000	8.000	8.000	8.000
Si	0.006	0.010	2.255	2.537	2.487	2.193
Ti	0.249	0.242	0.005	0.008	0.000	0.0
AL	0.128	0.072	1.697	1.414	1.468	1.757
Fe	3.195	3.312	0.028	0.029	0.028	0.034
Mn	0.018	0.022	0.006	0.004	0.001	0.006
Mg	0.067	0.022	0.014	0.019	0.021	0.012
Ca	0.002	0.004	0.777	0.470	0.520	0.836
Na	0.005	0.021	0.211	0.514	0.476	0.174
K	0.0	0.0	0.007	0.021	0.013	0.004
Cr	0.009	0.012	0.0	0.0	0.005	0.0
total	3.678	3.717	5.000	5.016	5.020	5.017

	23.05	23.06	23.07	23.08	23.09	23.10
MINERAL	11	11	11	11	11	11
ROCK TYPE	19	19	19	19	19	19
GRAINTYPE	11	11	11	12	12	12
ZONE	3	1	3	1	1	3
SiO ₂	52.035	47.111	51.323	56.915	52.011	52.955
TiO ₂	0.080	0.0	0.079	0.148	0.084	0.129
Al ₂ O ₃	29.249	31.978	29.980	26.316	28.847	27.616
FeO	0.616	0.558	0.754	0.966	0.730	1.264
MnO	0.074	0.014	0.179	0.019	0.0	0.140
MgO	0.236	0.272	0.226	0.402	0.218	0.537
CaO	13.198	17.125	13.615	9.058	12.824	11.708
Na ₂ O	3.918	2.009	3.438	5.788	4.116	4.403
K ₂ O	0.188	0.063	0.055	0.294	0.292	0.163
Cr ₂ O ₃	0.206	0.210	0.050	0.0	0.031	0.061
TOTAL	99.184	98.782	98.945	98.940	98.42	97.712
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.377	2.188	2.348	2.565	2.391	2.436
Ti	0.003	0.0	0.003	0.005	0.003	0.004
AL	1.575	1.751	1.616	1.398	1.563	1.497
Fe	0.024	0.022	0.029	0.036	0.028	0.049
Mn	0.003	0.001	0.007	0.001	0.0	0.005
Mg	0.016	0.019	0.015	0.027	0.015	0.037
Ca	0.646	0.852	0.667	0.437	0.632	0.577
Na	0.347	0.181	0.305	0.506	0.367	0.393
K	0.011	0.004	0.003	0.017	0.017	0.010
Cr	0.007	0.008	0.002	0.0	0.001	0.002
total	5.008	5.025	4.995	4.992	5.016	5.011

A3.2. Minerals from Inner Series rocks.

Sample codes and samples are: 24 - 275/1 (fine - grained gabbronorite containing anorthositic xenolith); 25 - 275/6 (granular dolerite); 26 - 315C (laminated gabbronorite); 27 - 25 (coarse gabbronorite); 28 - 296 (fine grained olivine - rich gabbronorite); 29 - 2 (coarse gabbronorite); 30 - 315D1 (gabbronorite partially replaced by pyroxenite); 31 - 284 (granular magnetite - rich layered rock); 32 - 166A2 (as 284); 33 - 97/1 (pre - gabbronorite laminated rock); 34 - 108 (banded granular troctolite); 35 - 287C1 (pre - gabbronorite anorthosite); 36 - 286/5 (granular dolerite); 37 - 279/5 (opaque - rich laminated gabbro); 38 - 318, 39 - 314 (laminated gabbros); 40 - 316A (from top of Upper Main pyroxenite, Sanna); 41 - 6A (from top of UMP where it cuts gabbronorites, Sanna); 42 - 312B3 (anorthite - augite granular banded rock, Sanna); 43 - 36/2 (Apatite - bearing granular rock, Sanna); 44 - 97/5 (banded granular rock from southern xenolith locality, Sanna); 45 - 4 (anorthosite); 46 - 5 (coarse gabbronorite); 47 - 35 (coarse gabbronorite).

	24.01	24.02	24.03	24.04	24.05	24.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	1	1	1	1	1	3
SiO ₂	47.795	47.547	48.076	48.818	48.464	52.827
TiO ₂	0.0	0.091	0.159	0.006	0.039	0.157
Al ₂ O ₃	32.282	31.841	31.209	31.862	31.622	28.976
FeO	0.633	0.389	0.802	0.724	0.637	0.704
MnO	0.041	0.0	0.036	0.0	0.062	0.018
MgO	0.171	0.126	0.071	0.303	0.156	0.212
CaO	16.465	16.593	16.048	16.136	16.543	12.912
Na ₂ O	2.139	2.111	2.509	2.378	2.347	4.185
K ₂ O	0.049	0.086	0.130	0.091	0.108	0.319
Cr ₂ O ₃	0.003	0.0	0.022	0.150	0.0	0.179
TOTAL	98.945	98.395	98.260	99.744	99.34	99.785
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.207	2.213	2.235	2.234	2.231	2.397
Ti	0.0	0.003	0.006	0.000	0.001	0.005
AL	1.757	1.746	1.710	1.718	1.716	1.549
Fe	0.024	0.015	0.031	0.028	0.025	0.027
Mn	0.002	0.0	0.001	0.0	0.002	0.001
Mg	0.012	0.009	0.005	0.021	0.011	0.014
Ca	0.815	0.827	0.799	0.791	0.816	0.628
Na	0.192	0.190	0.226	0.211	0.209	0.368
K	0.003	0.005	0.008	0.005	0.006	0.018
Cr	0.000	0.0	0.001	0.005	0.0	0.006
total	5.011	5.009	5.021	5.013	5.018	5.013

	24.07	24.08	24.09	24.10	24.11	24.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	12	12	11	11
ZONE	3	3	1	1	1	1
SiO ₂	52.592	50.868	52.838	52.173	48.308	48.374
TiO ₂	0.181	0.073	0.104	0.059	0.027	0.004
Al ₂ O ₃	29.181	30.033	28.478	28.186	31.470	31.191
FeO	0.490	0.339	0.336	0.850	0.604	0.671
MnO	0.044	0.0	0.140	0.071	0.040	0.0
MgO	0.315	0.204	0.238	0.565	0.127	0.171
CaO	12.818	14.043	12.323	12.365	16.452	16.092
Na ₂ O	4.174	3.394	4.402	4.076	2.373	2.437
K ₂ O	0.248	0.255	0.357	0.187	0.100	0.088
Cr ₂ O ₃	0.0	0.0	0.0	0.088	0.032	0.0
TOTAL	99.553	98.870	98.880	97.770	98.93	98.357
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.392	2.338	2.421	2.409	2.233	2.245
Ti	0.006	0.003	0.004	0.002	0.001	0.000
AL	1.564	1.627	1.538	1.533	1.715	1.706
Fe	0.019	0.013	0.013	0.033	0.023	0.026
Mn	0.002	0.0	0.005	0.003	0.002	0.0
Mg	0.021	0.014	0.016	0.039	0.009	0.012
Ca	0.625	0.692	0.605	0.612	0.815	0.800
Na	0.368	0.302	0.391	0.365	0.213	0.219
K	0.014	0.015	0.021	0.011	0.006	0.005
Cr	0.0	0.0	0.0	0.003	0.001	0.0
total	5.011	5.004	5.013	5.009	5.017	5.014

	24.13	24.14	24.15	24.16	24.17	24.18
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	12
ZONE	1	1	3	1	3	1
SiO ₂	48.275	46.924	52.749	47.083	52.374	51.348
TiO ₂	0.0	0.0	0.027	0.115	0.060	0.0
Al ₂ O ₃	31.588	32.617	28.490	31.990	28.895	29.336
FeO	0.621	0.650	0.649	0.796	0.493	0.370
MnO	0.039	0.049	0.0	0.112	0.002	0.129
MgO	0.227	0.132	0.184	0.320	0.126	0.114
CaO	16.366	17.342	12.802	17.052	12.930	13.389
Na ₂ O	2.383	1.941	4.325	1.799	4.103	3.848
K ₂ O	0.115	0.047	0.325	0.033	0.218	0.226
Cr ₂ O ₃	0.091	0.043	0.036	0.0	0.051	0.0
TOTAL	99.084	99.095	98.938	98.504	98.76	98.390
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.228	2.172	2.413	2.188	2.400	2.370
Ti	0.0	0.0	0.001	0.004	0.002	0.0
AL	1.718	1.779	1.536	1.752	1.561	1.595
Fe	0.024	0.025	0.025	0.031	0.019	0.014
Mn	0.002	0.002	0.0	0.004	0.000	0.005
Mg	0.016	0.009	0.013	0.022	0.009	0.008
Ca	0.809	0.860	0.627	0.849	0.635	0.662
Na	0.213	0.174	0.384	0.162	0.365	0.344
K	0.007	0.003	0.019	0.002	0.013	0.013
Cr	0.003	0.002	0.001	0.0	0.002	0.0
total	5.021	5.026	5.019	5.014	5.005	5.012

	24.19	24.20	24.21	24.22	24.23	24.24
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	26	26	26	27
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	51.987	53.545	54.348	54.029	54.855	51.562
TiO ₂	0.035	0.172	0.025	0.015	0.027	0.044
Al ₂ O ₃	29.677	29.257	27.651	27.316	28.306	29.307
FeO	0.604	0.803	0.601	0.451	0.532	0.812
MnO	0.0	0.134	0.0	0.010	0.077	0.0
MgO	0.320	0.250	0.160	0.320	0.284	0.123
CaO	13.446	12.357	10.987	11.253	11.582	13.213
Na ₂ O	3.970	4.187	5.010	4.816	4.892	3.994
K ₂ O	0.215	0.295	0.374	0.341	0.385	0.371
Cr ₂ O ₃	0.010	0.057	0.050	0.144	0.046	0.0
TOTAL	99.660	100.254	98.605	98.244	100.45	98.614
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.365	2.410	2.481	2.479	2.463	2.369
Ti	0.001	0.006	0.001	0.001	0.001	0.002
AL	1.591	1.552	1.487	1.477	1.498	1.587
Fe	0.023	0.030	0.023	0.017	0.020	0.031
Mn	0.0	0.005	0.0	0.000	0.003	0.0
Mg	0.022	0.017	0.011	0.022	0.019	0.008
Ca	0.655	0.596	0.537	0.553	0.557	0.650
Na	0.350	0.365	0.443	0.428	0.426	0.356
K	0.012	0.017	0.022	0.020	0.022	0.022
Cr	0.000	0.002	0.002	0.005	0.002	0.0
total	5.020	4.999	5.007	5.003	5.010	5.025

	24.25	24.26	24.27	24.28	24.29	24.30
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	54.611	53.840	54.704	52.748	53.270	53.695
TiO ₂	0.182	0.055	0.0	0.125	0.057	0.105
Al ₂ O ₃	27.605	57.469	27.421	29.199	29.193	28.820
FeO	0.439	0.454	0.596	0.438	0.654	0.452
MnO	0.017	0.0	0.0	0.004	0.0	0.062
MgO	0.234	0.304	0.202	0.218	0.288	0.398
CaO	11.235	11.153	11.159	13.086	12.665	12.525
Na ₂ O	5.163	5.005	4.803	4.111	4.048	4.595
K ₂ O	0.322	0.321	0.434	0.250	0.164	0.254
Cr ₂ O ₃	0.0	0.0	0.013	0.0	0.0	0.030
TOTAL	99.369	128.147	98.736	99.741	99.68	100.484
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.479	1.896	2.492	2.395	2.410	2.419
Ti	0.006	0.001	0.0	0.004	0.002	0.004
AL	1.476	2.385	1.472	1.563	1.557	1.530
Fe	0.017	0.013	0.023	0.017	0.025	0.017
Mn	0.001	0.0	0.0	0.000	0.0	0.002
Mg	0.016	0.016	0.014	0.015	0.019	0.027
Ca	0.546	0.421	0.545	0.637	0.614	0.604
Na	0.454	0.342	0.424	0.362	0.355	0.401
K	0.019	0.014	0.025	0.014	0.009	0.015
Cr	0.0	0.0	0.000	0.0	0.0	0.001
total	5.014	5.088	4.996	5.007	4.992	5.020

	24.31	24.32	24.33	24.34	24.35	24.36
MINERAL	11	15	15	15	15	14
ROCK TYPE	27	27	27	27	25	25
GRAINTYPE	12	17	17	17	17	14
ZONE	1	2	2	2	1	1
SiO ₂	53.188	49.475	50.672	50.741	51.095	52.746
TiO ₂	0.128	0.933	0.578	0.978	0.913	0.554
Al ₂ O ₃	28.222	2.738	3.889	2.551	2.008	0.925
FeO	1.007	11.747	10.621	11.569	12.475	20.710
MnO	0.0	0.383	0.222	0.453	0.289	0.390
MgO	0.134	13.030	12.675	13.089	15.567	23.178
CaO	12.265	19.778	19.895	20.282	18.036	1.809
Na ₂ O	4.399	0.635	0.728	0.587	0.434	0.190
K ₂ O	0.280	0.066	0.002	0.0	0.006	0.016
Cr ₂ O ₃	0.0	0.074	0.054	0.063	0.149	0.098
TOTAL	98.616	87.112	88.715	88.744	88.50	79.906
OXYGENS	8.000	6.000	6.000	6.000	6.000	6.000
Si	2.430	1.895	1.911	1.910	1.905	1.949
Ti	0.004	0.027	0.016	0.028	0.026	0.015
AL	1.520	0.124	0.173	0.113	0.088	0.040
Fe	0.038	0.376	0.335	0.364	0.389	0.640
Mn	0.0	0.012	0.007	0.014	0.009	0.012
Mg	0.009	0.743	0.712	0.734	0.865	1.276
Ca	0.600	0.811	0.804	0.818	0.721	0.072
Na	0.390	0.047	0.053	0.043	0.031	0.014
K	0.016	0.003	0.000	0.0	0.000	0.001
Cr	0.0	0.002	0.002	0.002	0.004	0.003
total	5.008	4.041	4.012	4.026	4.039	4.021

	24.37	24.38	24.39	24.40	24.41	24.42
MINERAL	15	14	15	15	15	15
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	17	13	17	17	17	17
ZONE	1	2	1	1	2	2
SiO ₂	50.854	52.763	50.693	50.791	50.942	50.985
TiO ₂	0.795	0.0	0.877	0.685	0.753	0.694
Al ₂ O ₃	2.170	1.342	2.111	2.574	2.235	4.018
FeO	12.221	21.267	11.625	11.321	10.278	9.324
MnO	0.289	0.572	0.262	0.431	0.346	0.405
MgO	15.365	23.517	15.082	14.587	14.135	13.409
CaO	17.420	0.682	18.079	18.691	20.033	19.723
Na ₂ O	0.340	0.409	0.332	0.358	0.392	0.832
K ₂ O	0.0	0.0	0.023	0.0	0.0	0.051
Cr ₂ O ₃	0.085	0.0	0.007	0.052	0.115	0.014
TOTAL	87.318	79.285	87.466	88.169	88.95	90.131
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.917	1.950	1.918	1.915	1.924	1.909
Ti	0.023	0.0	0.025	0.019	0.021	0.020
AL	0.096	0.058	0.094	0.114	0.099	0.177
Fe	0.385	0.657	0.368	0.357	0.325	0.292
Mn	0.009	0.018	0.008	0.014	0.011	0.013
Mg	0.863	1.295	0.850	0.819	0.795	0.748
Ca	0.703	0.027	0.733	0.755	0.810	0.791
Na	0.025	0.029	0.024	0.026	0.029	0.060
K	0.0	0.0	0.001	0.0	0.0	0.002
Cr	0.003	0.0	0.000	0.002	0.003	0.000
total	4.024	4.035	4.022	4.021	4.018	4.014

	24.43	24.44	24.45	24.46	24.47	24.48
MINERAL	15	15	13	13	13	13
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	17	17	28	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	50.634	51.204	36.469	36.547	36.194	36.197
TiO ₂	0.904	0.816	0.0	0.101	0.125	0.0
Al ₂ O ₃	2.143	2.099	0.175	0.237	0.159	0.144
FeO	11.645	10.955	35.269	34.032	34.632	33.836
MnO	0.358	0.493	0.560	0.545	0.453	0.432
MgO	15.026	14.787	29.653	29.750	29.845	29.871
CaO	18.162	19.501	0.100	0.144	0.081	0.127
Na ₂ O	0.396	0.397	0.265	0.359	0.095	0.221
K ₂ O	0.0	0.0	0.004	0.032	0.014	0.0
Cr ₂ O ₃	0.120	0.009	0.030	0.0	0.0	0.050
TOTAL	87.743	89.306	67.256	67.715	66.97	67.042
OXYGENS	6.000	6.000	4.000	4.000	4.000	4.000
Si	1.913	1.917	0.987	0.992	0.986	0.990
Ti	0.026	0.023	0.0	0.002	0.003	0.0
AL	0.095	0.093	0.006	0.008	0.005	0.005
Fe	0.368	0.343	0.798	0.772	0.789	0.774
Mn	0.011	0.016	0.013	0.013	0.010	0.010
Mg	0.846	0.825	1.196	1.203	1.211	1.218
Ca	0.735	0.782	0.003	0.004	0.002	0.004
Na	0.029	0.029	0.014	0.019	0.005	0.012
K	0.0	0.0	0.000	0.001	0.000	0.0
Cr	0.004	0.000	0.001	0.0	0.0	0.001
total	4.027	4.028	3.017	3.013	3.012	3.013

	24.49	24.50	24.51	24.52	24.53	24.54
MINERAL	17	17	16	17	20	18
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	33	33	26	33	29	21
ZONE	1	1	1	1	1	1
SiO ₂	38.021	38.747	43.666	38.129	38.321	0.416
TiO ₂	5.789	5.045	0.115	5.489	0.141	3.131
Al ₂ O ₃	13.100	12.804	11.048	13.286	24.199	2.691
FeO	11.630	11.154	19.337	11.724	11.618	90.793
MnO	0.130	0.165	0.604	0.078	0.372	0.144
MgO	17.184	17.613	9.190	16.931	0.345	0.545
CaO	0.238	0.059	12.211	0.077	23.613	0.0
Na ₂ O	0.532	0.582	2.052	0.528	0.225	0.198
K ₂ O	9.546	9.353	0.153	9.684	0.0	0.013
Cr ₂ O ₃	0.094	0.075	0.0	0.0	0.099	0.422
TOTAL	84.634	84.443	79.039	84.202	87.31	7.560
OXYGENS	22.000	22.000	23.000	22.000	13.000	4.000
Si	5.565	5.679	6.582	5.597	3.197	0.019
Ti	0.637	0.556	0.013	0.606	0.009	0.107
AL	2.260	2.212	1.963	2.298	2.379	0.144
Fe	1.423	1.367	2.437	1.439	0.811	3.457
Mn	0.016	0.020	0.077	0.010	0.026	0.006
Mg	3.748	3.846	2.064	3.703	0.043	0.037
Ca	0.037	0.009	1.972	0.012	2.111	0.0
Na	0.151	0.165	0.600	0.150	0.036	0.017
K	1.782	1.749	0.029	1.813	0.0	0.001
Cr	0.011	0.009	0.0	0.0	0.007	0.015
total	15.630	15.612	15.738	15.629	8.619	3.803

	24.55	25.01	25.02	25.03	25.04	25.05
MINERAL	18	13	18	18	18	13
ROCK TYPE	25	31	31	31	31	31
GRAINTYPE	21	28	19	19	19	28
ZONE	1	1	1	1	1	1
SiO ₂	0.329	36.557	0.332	0.462	0.326	35.605
TiO ₂	2.958	0.022	12.874	22.188	3.688	0.084
Al ₂ O ₃	2.644	0.0	1.328	1.660	3.078	0.102
FeO	90.628	32.033	79.018	70.157	87.173	37.540
MnO	0.027	0.537	0.571	0.702	0.001	0.693
MgO	0.523	30.824	0.036	0.243	0.549	27.327
CaO	0.026	0.121	0.056	0.212	0.055	0.024
Na ₂ O	0.127	0.110	0.101	0.230	0.146	0.403
K ₂ O	0.005	0.0	0.0	0.0	0.0	0.0
Cr ₂ O ₃	0.429	0.078	0.554	0.291	0.305	0.0
TOTAL	7.068	68.249	15.852	25.988	8.15	64.238
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	0.015	0.997	0.015	0.019	0.015	0.985
Ti	0.102	0.000	0.431	0.683	0.129	0.002
AL	0.143	0.0	0.070	0.080	0.169	0.003
Fe	3.483	0.731	2.943	2.403	3.394	0.868
Mn	0.001	0.012	0.022	0.024	0.000	0.016
Mg	0.036	1.253	0.002	0.015	0.038	1.126
Ca	0.001	0.004	0.003	0.009	0.003	0.001
Na	0.011	0.006	0.009	0.018	0.013	0.022
K	0.000	0.0	0.0	0.0	0.0	0.0
Cr	0.016	0.002	0.020	0.009	0.011	0.0
total	3.809	3.004	3.514	3.262	3.772	3.023

	25.06	25.07	25.08	25.09	25.10	25.11
MINERAL	18	14	15	14	15	15
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	19	13	17	13	17	17
ZONE	1	1	2	1	2	1
SiO ₂	0.296	52.049	50.679	52.646	51.111	50.855
TiO ₂	11.354	0.309	0.590	0.398	0.608	0.902
Al ₂ O ₃	1.317	0.575	1.810	0.794	1.531	1.673
FeO	82.326	22.743	11.472	21.929	11.004	13.354
MnO	0.591	0.655	0.312	0.525	0.366	0.175
MgO	0.072	20.963	13.617	21.869	13.813	13.575
CaO	0.078	1.717	20.086	1.616	20.139	18.281
Na ₂ O	0.160	0.124	0.396	0.214	0.407	0.411
K ₂ O	0.0	0.015	0.0	0.0	0.035	0.0
Cr ₂ O ₃	0.297	0.0	0.0	0.027	0.044	0.083
TOTAL	14.165	76.407	87.490	78.089	88.05	85.955
OXYGENS	4.000	6.000	6.000	6.000	6.000	6.000
Si	0.013	1.972	1.931	1.966	1.941	1.936
Ti	0.379	0.009	0.017	0.011	0.017	0.026
AL	0.069	0.026	0.081	0.035	0.069	0.075
Fe	3.058	0.721	0.365	0.685	0.349	0.425
Mn	0.022	0.021	0.010	0.017	0.012	0.006
Mg	0.005	1.184	0.773	1.217	0.782	0.770
Ca	0.004	0.070	0.820	0.065	0.819	0.745
Na	0.014	0.009	0.029	0.015	0.030	0.030
K	0.0	0.001	0.0	0.0	0.002	0.0
Cr	0.010	0.0	0.0	0.001	0.001	0.002
total	3.575	4.011	4.026	4.012	4.022	4.015

	25.12	25.13	25.14	25.15	25.16	25.17
MINERAL	15	15	14	14	15	11
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	17	17	13	13	17	11
ZONE	1	2	1	1	2	1
SiO ₂	50.902	51.188	51.852	52.660	51.011	49.639
TiO ₂	0.692	0.666	0.477	0.305	0.539	0.055
Al ₂ O ₃	1.700	1.718	0.791	0.780	1.404	30.671
FeO	13.894	10.787	22.246	21.873	10.909	0.373
MnO	0.534	0.246	0.421	0.707	0.435	0.028
MgO	14.565	13.722	21.251	21.926	14.080	0.302
CaO	17.413	19.890	1.981	1.632	20.211	14.789
Na ₂ O	0.522	0.487	0.156	0.317	0.462	3.033
K ₂ O	0.0	0.0	0.023	0.067	0.007	0.114
Cr ₂ O ₃	0.050	0.017	0.039	0.106	0.0	0.0
TOTAL	86.378	87.934	76.991	78.500	88.15	98.631
OXYGENS	6.000	6.000	6.000	6.000	6.000	8.000
Si	1.923	1.945	1.959	1.963	1.938	2.293
Ti	0.020	0.019	0.014	0.009	0.015	0.002
AL	0.076	0.077	0.035	0.034	0.063	1.669
Fe	0.439	0.343	0.703	0.682	0.347	0.014
Mn	0.017	0.008	0.013	0.022	0.014	0.001
Mg	0.820	0.777	1.197	1.218	0.797	0.021
Ca	0.705	0.810	0.080	0.065	0.823	0.732
Na	0.038	0.036	0.011	0.023	0.034	0.272
K	0.0	0.0	0.001	0.003	0.000	0.007
Cr	0.001	0.001	0.001	0.003	0.0	0.0
total	4.038	4.015	4.015	4.023	4.032	5.010

	25.18	25.19	25.20	25.21	25.22	25.23
MINERAL	11	11	11	11	11	11
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	11	11	11	11	11	11
ZONE	2	1	3	1	2	2
SiO ₂	48.736	49.932	50.383	49.437	50.478	49.565
TiO ₂	0.125	0.0	0.001	0.0	0.0	0.0
Al ₂ O ₃	31.318	30.390	30.368	31.113	30.818	31.566
FeO	0.745	0.340	0.812	0.366	0.497	0.568
MnO	0.0	0.107	0.046	0.034	0.0	0.054
MgO	0.552	0.155	0.285	0.198	0.179	0.255
CaO	15.314	14.197	14.110	15.171	14.725	15.609
Na ₂ O	2.611	3.279	3.400	2.966	3.311	2.736
K ₂ O	0.099	0.161	0.077	0.133	0.205	0.073
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.087	0.010
TOTAL	98.755	98.221	98.670	99.052	99.80	99.868
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.248	2.313	2.316	2.277	2.303	2.262
Ti	0.004	0.0	0.000	0.0	0.0	0.0
AL	1.702	1.659	1.645	1.689	1.657	1.698
Fe	0.029	0.013	0.031	0.014	0.019	0.022
Mn	0.0	0.004	0.002	0.001	0.0	0.002
Mg	0.038	0.011	0.020	0.014	0.012	0.017
Ca	0.757	0.705	0.695	0.748	0.720	0.763
Na	0.233	0.295	0.303	0.265	0.293	0.242
K	0.006	0.010	0.005	0.008	0.012	0.004
Cr	0.0	0.0	0.0	0.0	0.003	0.000
total	5.017	5.009	5.015	5.015	5.019	5.012

	25.24	25.25	25.26	25.27	25.28	25.29
MINERAL	11	11	11	11	11	11
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	12	12	12	12	12	12
ZONE	1	3	1	3	1	3
SiO ₂	54.883	54.655	52.393	56.363	54.245	56.230
TiO ₂	0.023	0.130	0.094	0.143	0.0	0.165
Al ₂ O ₃	28.207	26.814	28.338	27.170	28.267	27.139
FeO	0.287	0.303	0.632	0.381	0.461	0.495
MnO	0.078	0.015	0.0	0.0	0.0	0.0
MgO	0.323	0.143	0.102	0.261	0.200	0.245
CaO	10.847	10.467	12.239	10.026	11.603	9.995
Na ₂ O	5.203	5.316	4.375	5.587	4.681	5.689
K ₂ O	0.253	0.354	0.250	0.464	0.278	0.358
Cr ₂ O ₃	0.063	0.0	0.0	0.0	0.0	0.128
TOTAL	99.880	97.894	97.791	100.014	99.27	99.949
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.476	2.513	2.420	2.531	2.462	2.526
Ti	0.001	0.004	0.003	0.005	0.0	0.006
AL	1.499	1.453	1.542	1.438	1.512	1.437
Fe	0.011	0.012	0.024	0.014	0.017	0.019
Mn	0.003	0.001	0.0	0.0	0.0	0.0
Mg	0.022	0.010	0.007	0.017	0.014	0.016
Ca	0.524	0.516	0.606	0.482	0.564	0.481
Na	0.455	0.474	0.392	0.486	0.412	0.496
K	0.015	0.021	0.015	0.027	0.016	0.021
Cr	0.002	0.0	0.0	0.0	0.0	0.005
total	5.007	5.003	5.009	5.001	4.996	5.005

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	25.30	25.31	25.32	25.33	26.01	26.02
MINERAL	11	11	11	11	11	11
ROCK TYPE	31	31	31	31	24	24
GRAINTYPE	12	12	12	12	11	11
ZONE	1	3	1	3	1	1
SiO ₂	53.443	55.862	56.064	56.621	47.781	46.901
TiO ₂	0.208	0.175	0.133	0.055	0.094	0.052
Al ₂ O ₃	28.932	26.955	26.220	25.859	31.675	32.036
FeO	0.534	0.588	0.470	0.409	0.514	0.523
MnO	0.004	0.0	0.0	0.0	0.0	0.025
MgO	0.224	0.304	0.161	0.189	0.143	0.103
CaO	12.202	10.128	9.432	9.064	16.130	17.037
Na ₂ O	4.323	5.613	5.576	5.954	2.295	1.899
K ₂ O	0.289	0.398	0.426	0.402	0.026	0.057
Cr ₂ O ₃	0.023	0.0	0.170	0.0	0.0	0.079
TOTAL	99.648	99.435	98.182	98.144	98.14	98.189
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.421	2.523	2.559	2.583	2.224	2.190
Ti	0.007	0.006	0.005	0.002	0.003	0.002
AL	1.545	1.435	1.410	1.390	1.738	1.763
Fe	0.020	0.022	0.018	0.016	0.020	0.020
Mn	0.000	0.0	0.0	0.0	0.0	0.001
Mg	0.015	0.020	0.011	0.013	0.010	0.007
Ca	0.592	0.490	0.461	0.443	0.804	0.852
Na	0.380	0.491	0.493	0.526	0.207	0.172
K	0.017	0.023	0.025	0.023	0.002	0.003
Cr	0.001	0.0	0.006	0.0	0.0	0.003
total	4.997	5.011	4.988	4.996	5.008	5.013

	26.03	26.04	26.05	26.06	26.07	26.08
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	12
ZONE	1	2	3	2	3	1
SiO ₂	46.637	51.223	52.769	51.159	52.395	52.073
TiO ₂	0.039	0.106	0.090	0.038	0.0	0.109
Al ₂ O ₃	32.324	30.523	28.834	29.850	28.580	29.523
FeO	0.494	0.526	0.407	0.537	0.456	0.537
MnO	0.060	0.0	0.021	0.024	0.056	0.010
MgO	0.097	0.216	0.296	0.251	0.140	0.0
CaO	17.140	14.110	12.009	13.874	12.725	13.286
Na ₂ O	1.970	3.334	4.475	3.583	4.239	3.566
K ₂ O	0.007	0.138	0.199	0.084	0.125	0.201
Cr ₂ O ₃	0.0	0.062	0.053	0.0	0.100	0.0
TOTAL	98.274	99.712	98.746	98.863	98.36	98.768
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.177	2.331	2.415	2.347	2.410	2.384
Ti	0.001	0.004	0.003	0.001	0.0	0.004
AL	1.778	1.637	1.555	1.614	1.550	1.593
Fe	0.019	0.020	0.016	0.021	0.018	0.021
Mn	0.002	0.0	0.001	0.001	0.002	0.000
Mg	0.007	0.015	0.020	0.017	0.010	0.0
Ca	0.857	0.688	0.589	0.682	0.627	0.652
Na	0.178	0.294	0.397	0.319	0.378	0.316
K	0.000	0.008	0.012	0.005	0.007	0.012
Cr	0.0	0.002	0.002	0.0	0.004	0.0
total	5.021	4.997	5.008	5.006	5.006	4.981

	26.09	26.10	26.11	26.12	26.13	26.14
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	27
GRAINTYPE	12	12	12	12	12	12
ZONE	3	1	3	1	3	1
SiO ₂	52.123	50.953	53.404	52.348	52.728	53.837
TiO ₂	0.114	0.089	0.063	0.124	0.0	0.074
Al ₂ O ₃	28.609	31.087	28.160	29.547	28.979	28.588
FeO	0.818	0.584	0.788	0.368	0.508	0.401
MnO	0.028	0.0	0.0	0.0	0.0	0.0
MgO	0.328	0.258	0.269	0.212	0.255	0.201
CaO	12.322	14.684	11.671	13.121	12.415	11.941
Na ₂ O	4.100	3.268	5.008	4.141	4.324	4.732
K ₂ O	0.157	0.048	0.115	0.136	0.139	0.204
Cr ₂ O ₃	0.056	0.048	0.011	0.057	0.024	0.208
TOTAL	97.837	100.435	98.701	99.686	98.86	99.785
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.403	2.305	2.439	2.380	2.409	2.437
Ti	0.004	0.003	0.002	0.004	0.0	0.003
AL	1.554	1.657	1.515	1.583	1.560	1.525
Fe	0.032	0.022	0.030	0.014	0.019	0.015
Mn	0.001	0.0	0.0	0.0	0.0	0.0
Mg	0.023	0.017	0.018	0.014	0.017	0.014
Ca	0.609	0.712	0.571	0.639	0.608	0.579
Na	0.366	0.287	0.443	0.365	0.383	0.415
K	0.009	0.003	0.007	0.008	0.008	0.012
Cr	0.002	0.002	0.000	0.002	0.001	0.007
total	5.003	5.007	5.026	5.010	5.006	5.007

	26.15	26.16	26.17	26.18	26.19	26.20
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	12	12	12	12	12
ZONE	3	1	3	1	3	1
SiO ₂	53.312	52.686	53.208	52.961	53.409	52.790
TiO ₂	0.072	0.122	0.085	0.011	0.067	0.0
Al ₂ O ₃	28.399	29.563	28.679	28.373	29.203	29.576
FeO	0.607	0.384	0.583	0.394	0.416	0.422
MnO	0.0	0.026	0.254	0.0	0.080	0.0
MgO	0.190	0.266	0.199	0.074	0.223	0.255
CaO	12.174	13.156	12.255	11.895	12.367	12.738
Na ₂ O	4.460	4.207	4.681	4.545	4.337	4.230
K ₂ O	0.093	0.267	0.165	0.127	0.159	0.118
Cr ₂ O ₃	0.024	0.0	0.0	0.003	0.009	0.093
TOTAL	98.724	100.293	99.526	97.989	99.85	99.800
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.435	2.383	2.418	2.438	2.416	2.392
Ti	0.002	0.004	0.003	0.000	0.002	0.0
AL	1.528	1.576	1.536	1.539	1.557	1.580
Fe	0.023	0.015	0.022	0.015	0.016	0.016
Mn	0.0	0.001	0.010	0.0	0.003	0.0
Mg	0.013	0.018	0.013	0.005	0.015	0.017
Ca	0.596	0.637	0.597	0.587	0.599	0.618
Na	0.395	0.369	0.412	0.406	0.380	0.372
K	0.005	0.015	0.010	0.007	0.009	0.007
Cr	0.001	0.0	0.0	0.000	0.000	0.003
total	4.998	5.018	5.022	4.998	4.998	5.005

	26.21	26.22	26.23	26.24	26.25	26.26
MINERAL	11	11	11	15	15	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	12	12	17	17	17
ZONE	3	1	3	2	2	2
SiO ₂	53.407	53.365	52.362	50.378	50.482	50.500
TiO ₂	0.070	0.048	0.103	0.719	0.780	0.559
Al ₂ O ₃	28.596	28.922	29.189	2.038	1.877	2.015
FeO	1.045	0.560	0.492	9.237	9.270	9.551
MnO	0.022	0.0	0.035	0.238	0.298	0.209
MgO	0.148	0.178	0.103	14.278	14.264	14.464
CaO	11.882	12.259	12.807	20.597	20.418	20.007
Na ₂ O	4.661	4.547	4.032	0.366	0.435	0.522
K ₂ O	0.132	0.121	0.071	0.0	0.051	0.0
Cr ₂ O ₃	0.0	0.009	0.051	0.225	0.313	0.301
TOTAL	98.918	99.449	98.753	88.839	88.92	88.577
OXYGENS	8.000	8.000	8.000	6.000	6.000	6.000
Si	2.429	2.422	2.396	1.921	1.924	1.925
Ti	0.002	0.002	0.004	0.021	0.022	0.016
AL	1.533	1.547	1.574	0.092	0.084	0.091
Fe	0.040	0.021	0.019	0.295	0.295	0.304
Mn	0.001	0.0	0.001	0.008	0.010	0.007
Mg	0.010	0.012	0.007	0.811	0.810	0.821
Ca	0.579	0.596	0.628	0.842	0.834	0.817
Na	0.411	0.400	0.358	0.027	0.032	0.039
K	0.008	0.007	0.004	0.0	0.002	0.0
Cr	0.0	0.000	0.002	0.007	0.009	0.009
total	5.012	5.007	4.993	4.022	4.024	4.029

	26.27	26.28	26.29	26.30	26.31	26.32
MINERAL	15	14	14	14	15	15
ROCK TYPE	27	27	24	24	24	24
GRAINTYPE	17	14	13	13	17	17
ZONE	2	1	1	1	1	2
SiO ₂	51.556	53.116	52.230	52.942	50.390	50.668
TiO ₂	0.598	0.203	0.480	0.399	0.668	0.620
Al ₂ O ₃	1.873	0.879	1.063	1.312	2.145	1.893
FeO	9.155	18.375	18.648	19.421	10.142	9.101
MnO	0.141	0.694	0.465	0.577	0.277	0.443
MgO	14.617	24.789	23.641	23.777	14.620	14.494
CaO	20.734	1.295	1.942	1.750	18.916	20.916
Na ₂ O	0.400	0.170	0.236	0.0	0.434	0.333
K ₂ O	0.016	0.0	0.031	0.050	0.041	0.0
Cr ₂ O ₃	0.148	0.065	0.0	0.143	0.379	0.173
TOTAL	90.083	81.211	80.088	80.950	87.87	89.540
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.937	1.960	1.951	1.948	1.923	1.922
Ti	0.017	0.006	0.013	0.011	0.019	0.018
AL	0.083	0.038	0.047	0.057	0.096	0.085
Fe	0.288	0.567	0.583	0.598	0.324	0.289
Mn	0.004	0.022	0.015	0.018	0.009	0.014
Mg	0.818	1.363	1.316	1.304	0.831	0.819
Ca	0.835	0.051	0.078	0.069	0.773	0.850
Na	0.029	0.012	0.017	0.0	0.032	0.024
K	0.001	0.0	0.001	0.002	0.002	0.0
Cr	0.004	0.002	0.0	0.004	0.011	0.005
total	4.017	4.021	4.021	4.011	4.021	4.027

	26.33	26.34	26.35	26.36	26.37	26.38
MINERAL	15	15	13	13	18	18
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	17	17	28	28	21	21
ZONE	1	1	1	1	1	1
SiO ₂	51.131	51.369	36.755	36.483	0.399	0.172
TiO ₂	0.578	0.578	0.003	0.024	4.611	3.945
Al ₂ O ₃	2.179	2.247	-0.010	0.0	3.421	3.918
FeO	9.807	10.811	30.502	30.210	85.650	84.081
MnO	0.424	0.318	0.395	0.506	0.327	0.312
MgO	15.048	15.622	32.079	32.198	0.836	0.813
CaO	18.833	17.921	0.085	0.054	0.068	0.028
Na ₂ O	0.282	0.418	0.184	0.185	0.152	0.276
K ₂ O	0.022	0.017	0.033	0.031	0.033	0.001
Cr ₂ O ₃	0.348	0.500	0.167	0.0	1.635	1.411
TOTAL	88.845	88.990	69.711	69.481	11.48	10.876
OXYGENS	6.000	6.000	4.000	4.000	4.000	4.000
Si	1.931	1.922	0.996	0.993	0.018	0.008
Ti	0.016	0.016	0.000	0.000	0.156	0.136
AL	0.097	0.099	0.000	0.0	0.181	0.212
Fe	0.310	0.338	0.691	0.688	3.215	3.234
Mn	0.014	0.010	0.009	0.012	0.012	0.012
Mg	0.847	0.871	1.295	1.306	0.056	0.056
Ca	0.762	0.718	0.002	0.002	0.003	0.001
Na	0.021	0.030	0.010	0.010	0.013	0.025
K	0.001	0.001	0.001	0.001	0.002	0.000
Cr	0.010	0.015	0.004	0.0	0.058	0.051
total	4.009	4.021	3.008	3.012	3.714	3.736

	26.39	26.40	26.41	26.42	26.43	26.44
MINERAL	13	18	18	13	13	19
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	28	19	19	28	28	22
ZONE	1	1	1	1	1	1
SiO ₂	36.664	0.653	0.308	36.835	37.211	0.271
TiO ₂	0.101	11.978	13.758	0.055	0.0	51.075
Al ₂ O ₃	0.0	2.235	3.029	0.126	0.219	0.078
FeO	31.259	77.283	76.638	31.309	31.091	46.862
MnO	0.783	0.390	0.367	0.531	0.468	0.906
MgO	32.564	0.641	1.103	32.818	32.936	1.770
CaO	0.0	0.290	0.013	0.061	0.047	0.068
Na ₂ O	0.134	0.058	0.079	0.118	0.330	0.010
K ₂ O	0.017	0.0	0.031	0.0	0.049	0.051
Cr ₂ O ₃	0.0	2.335	2.758	0.0	0.060	0.0
TOTAL	70.263	18.580	21.446	70.544	71.32	54.229
OXYGENS	4.000	4.000	4.000	4.000	4.000	3.000
Si	0.985	0.028	0.013	0.984	0.987	0.007
Ti	0.002	0.390	0.431	0.001	0.0	0.959
AL	0.0	0.114	0.149	0.004	0.007	0.002
Fe	0.702	2.800	2.668	0.700	0.690	0.978
Mn	0.018	0.014	0.013	0.012	0.011	0.019
Mg	1.303	0.041	0.068	1.307	1.302	0.066
Ca	0.0	0.013	0.001	0.002	0.001	0.002
Na	0.007	0.005	0.006	0.006	0.017	0.000
K	0.001	0.0	0.002	0.0	0.002	0.002
Cr	0.0	0.080	0.091	0.0	0.001	0.0
total	3.017	3.487	3.441	3.016	3.018	2.035

	27.01	27.02	27.03	27.04	27.05	27.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	11
ZONE	1	1	1	1	1	1
SiO ₂	46.578	47.733	47.237	47.944	47.541	47.251
TiO ₂	0.0	0.040	0.0	0.0	0.0	0.102
Al ₂ O ₃	32.370	33.096	32.228	32.555	33.824	32.884
FeO	2.934	0.551	0.601	0.566	0.740	0.454
MnO	0.096	0.0	0.0	0.0	0.0	0.0
MgO	0.175	0.059	0.228	0.240	0.304	0.285
CaO	16.361	16.877	16.282	16.491	17.382	16.918
Na ₂ O	1.931	1.905	2.018	2.109	1.600	1.928
K ₂ O	0.030	0.051	0.036	0.105	0.0	0.083
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	97.541	99.761	98.029	99.444	100.65	99.451
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.159	2.188	2.201	2.204	2.159	2.177
Ti	0.0	0.001	0.0	0.0	0.0	0.004
AL	1.768	1.788	1.770	1.763	1.811	1.786
Fe	0.114	0.021	0.023	0.022	0.028	0.017
Mn	0.004	0.0	0.0	0.0	0.0	0.0
Mg	0.012	0.004	0.016	0.016	0.021	0.020
Ca	0.812	0.829	0.813	0.812	0.846	0.835
Na	0.174	0.169	0.182	0.188	0.141	0.172
K	0.002	0.003	0.002	0.006	0.0	0.005
Cr	0.0	0.0	0.0	0.0	0.0	0.0
total	5.045	5.003	5.007	5.012	5.006	5.015

	27.07	27.08	27.09	27.10	27.11	27.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	11
ZONE	3	2	3	3	2	1
SiO ₂	52.698	48.775	51.171	47.000	48.821	47.991
TiO ₂	0.031	0.093	0.027	0.0	0.0	0.0
Al ₂ O ₃	29.279	29.938	28.806	31.169	32.231	33.274
FeO	0.659	0.713	1.305	0.903	0.461	0.728
MnO	0.165	0.0	0.0	0.046	0.080	0.128
MgO	0.478	0.096	0.855	0.628	0.164	0.259
CaO	12.001	14.207	12.214	13.109	15.914	16.824
Na ₂ O	4.575	3.016	4.308	2.272	2.325	2.276
K ₂ O	0.197	0.130	0.307	1.020	0.145	0.056
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.424	96.255	97.688	95.244	99.68	100.808
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.395	2.301	2.365	2.242	2.236	2.179
Ti	0.001	0.003	0.001	0.0	0.0	0.0
AL	1.568	1.664	1.569	1.752	1.739	1.781
Fe	0.025	0.028	0.050	0.036	0.018	0.028
Mn	0.006	0.0	0.0	0.002	0.003	0.005
Mg	0.032	0.007	0.059	0.045	0.011	0.018
Ca	0.584	0.718	0.605	0.670	0.781	0.818
Na	0.403	0.276	0.386	0.210	0.206	0.200
K	0.011	0.008	0.018	0.062	0.008	0.003
Cr	0.0	0.0	0.0	0.0	0.0	0.0
total	5.027	5.005	5.052	5.018	5.002	5.032

	27.13	27.14	27.15	27.16	27.17	27.18
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	12
ZONE	2	2	3	1	3	3
SiO ₂	48.867	50.408	54.156	48.697	53.669	55.301
TiO ₂	0.0	0.015	0.046	0.0	0.004	0.083
Al ₂ O ₃	32.824	31.294	28.791	33.081	29.333	27.607
FeO	0.685	0.634	0.605	0.530	0.709	0.795
MnO	0.0	0.0	0.0	0.115	0.009	0.093
MgO	0.305	0.245	0.240	0.409	0.201	0.550
CaO	16.137	14.722	11.380	16.192	12.091	10.289
Na ₂ O	2.363	3.143	4.895	2.483	4.719	5.467
K ₂ O	0.060	0.077	0.204	0.054	0.096	0.263
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.556	99.904	99.712	101.031	100.12	99.653
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.216	2.292	2.445	2.203	2.416	2.491
Ti	0.0	0.001	0.002	0.0	0.000	0.003
AL	1.754	1.677	1.532	1.764	1.556	1.466
Fe	0.026	0.024	0.023	0.020	0.027	0.030
Mn	0.0	0.0	0.0	0.004	0.000	0.004
Mg	0.021	0.017	0.016	0.028	0.013	0.037
Ca	0.784	0.717	0.550	0.785	0.583	0.497
Na	0.208	0.277	0.428	0.218	0.412	0.477
K	0.003	0.004	0.012	0.003	0.006	0.015
Cr	0.0	0.0	0.0	0.0	0.0	0.0
total	5.012	5.009	5.008	5.025	5.014	5.019

	27.19	27.20	27.21	27.22	27.23	27.24
MINERAL	11	11	13	13	13	14
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	12	12	28	28	28	13
ZONE	1	1	1	1	1	1
SiO ₂	49.656	51.129	37.291	38.173	37.204	52.569
TiO ₂	0.075	0.0	0.063	0.0	0.015	0.514
Al ₂ O ₃	30.756	31.380	0.0	0.242	0.0	1.062
FeO	0.342	0.430	29.769	26.821	29.384	14.971
MnO	0.0	0.0	0.448	0.470	0.427	0.335
MgO	0.126	0.281	32.912	33.706	32.854	21.795
CaO	14.166	14.100	0.129	0.0	0.055	6.747
Na ₂ O	3.066	3.406	0.444	0.423	0.225	0.235
K ₂ O	0.129	0.055	0.038	0.025	0.0	0.0
Cr ₂ O ₃	0.0	0.0	0.051	0.103	0.0	0.0
TOTAL	97.974	100.351	71.376	73.142	70.78	83.257
OXYGENS	8.000	8.000	4.000	4.000	4.000	6.000
Si	2.303	2.312	0.997	1.015	1.001	1.965
Ti	0.003	0.0	0.001	0.0	0.000	0.014
AL	1.681	1.672	0.0	0.008	0.0	0.047
Fe	0.013	0.016	0.665	0.597	0.661	0.468
Mn	0.0	0.0	0.010	0.011	0.010	0.011
Mg	0.009	0.019	1.311	1.336	1.318	1.214
Ca	0.704	0.683	0.004	0.0	0.002	0.270
Na	0.276	0.299	0.023	0.022	0.012	0.017
K	0.008	0.003	0.001	0.001	0.0	0.0
Cr	0.0	0.0	0.001	0.002	0.0	0.0
total	4.996	5.003	3.014	2.991	3.004	4.006

	28.01	28.02	28.03	28.04	28.05	28.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	1	3	1	1	2	3
SiO ₂	47.812	51.839	47.587	47.365	48.780	52.358
TiO ₂	0.0	0.0	0.0	0.063	0.001	0.014
Al ₂ O ₃	32.650	29.552	32.666	32.765	31.722	29.339
FeO	0.560	0.680	0.613	0.685	0.493	0.484
MnO	0.0	0.0	0.030	0.0	0.0	0.061
MgO	0.192	0.321	0.281	0.125	0.042	0.164
CaO	16.734	13.425	16.885	16.731	15.798	12.967
Na ₂ O	1.905	3.789	2.012	1.796	2.544	4.138
K ₂ O	0.113	0.231	0.050	0.072	0.057	0.155
Cr ₂ O ₃	0.0	0.073	0.065	0.156	0.112	0.009
TOTAL	99.406	99.230	99.576	99.073	99.06	99.205
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.199	2.366	2.188	2.185	2.247	2.389
Ti	0.0	0.0	0.0	0.002	0.000	0.000
AL	1.770	1.590	1.770	1.781	1.722	1.578
Fe	0.022	0.026	0.024	0.026	0.019	0.018
Mn	0.0	0.0	0.001	0.0	0.0	0.002
Mg	0.013	0.022	0.019	0.009	0.003	0.011
Ca	0.825	0.657	0.832	0.827	0.780	0.634
Na	0.170	0.335	0.179	0.161	0.227	0.366
K	0.007	0.013	0.003	0.004	0.003	0.009
Cr	0.0	0.003	0.002	0.006	0.004	0.000
total	5.004	5.012	5.017	5.001	5.005	5.009

	28.07	28.08	28.09	28.10	28.11	28.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	3	2	2	3	1	1
SiO ₂	52.281	48.935	49.152	51.994	47.627	48.097
TiO ₂	0.0	0.0	0.0	0.132	0.016	0.026
Al ₂ O ₃	29.404	31.555	31.577	29.429	32.853	32.481
FeO	0.714	0.568	0.723	0.629	0.347	0.653
MnO	0.080	0.0	0.0	0.0	0.114	0.042
MgO	0.173	0.109	0.088	0.195	0.130	0.0
CaO	13.167	15.544	15.867	13.128	17.188	16.792
Na ₂ O	3.983	2.622	2.449	3.941	1.958	1.859
K ₂ O	0.168	0.122	0.154	0.302	0.059	0.084
Cr ₂ O ₃	0.090	0.060	0.0	0.0	0.008	0.005
TOTAL	99.346	98.947	99.287	99.121	99.95	99.386
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.381	2.255	2.256	2.375	2.186	2.210
Ti	0.0	0.0	0.0	0.005	0.001	0.001
AL	1.578	1.713	1.708	1.585	1.777	1.759
Fe	0.027	0.022	0.028	0.024	0.013	0.025
Mn	0.003	0.0	0.0	0.0	0.004	0.002
Mg	0.012	0.007	0.006	0.013	0.009	0.0
Ca	0.642	0.767	0.780	0.643	0.845	0.827
Na	0.352	0.234	0.218	0.349	0.174	0.166
K	0.010	0.007	0.009	0.018	0.003	0.005
Cr	0.003	0.002	0.0	0.0	0.000	0.000
total	5.009	5.008	5.004	5.011	5.014	4.994

	28.13	28.14	28.15	28.16	28.17	28.18
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	1	3	1	2	3	3
SiO ₂	46.980	51.731	47.679	48.368	53.748	52.959
TiO ₂	0.102	0.054	0.043	0.101	0.189	0.086
Al ₂ O ₃	32.590	28.278	32.446	31.422	29.166	28.667
FeO	0.435	0.977	0.667	0.612	0.565	0.731
MnO	0.088	0.004	0.0	0.0	0.0	0.0
MgO	0.094	1.435	0.069	0.057	0.232	0.050
CaO	16.858	12.422	17.071	15.945	12.322	12.664
Na ₂ O	1.857	3.764	1.955	2.515	4.563	3.961
K ₂ O	0.052	0.167	0.087	0.133	0.301	0.311
Cr ₂ O ₃	0.0	0.106	0.0	0.020	0.0	0.005
TOTAL	98.621	97.961	99.350	98.561	100.52	98.703
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.183	2.383	2.196	2.241	2.416	2.421
Ti	0.004	0.002	0.001	0.004	0.006	0.003
AL	1.784	1.535	1.761	1.716	1.545	1.544
Fe	0.017	0.038	0.026	0.024	0.021	0.028
Mn	0.003	0.000	0.0	0.0	0.0	0.0
Mg	0.007	0.098	0.005	0.004	0.016	0.003
Ca	0.839	0.613	0.842	0.791	0.593	0.620
Na	0.167	0.336	0.175	0.226	0.398	0.351
K	0.003	0.010	0.005	0.008	0.017	0.018
Cr	0.0	0.004	0.0	0.001	0.0	0.000
total	5.007	5.019	5.012	5.014	5.013	4.989

	28.19	28.20	28.21	28.22	28.23	28.24
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	2	1	1	1	1	2
SiO ₂	49.004	47.807	46.994	47.557	47.557	49.478
TiO ₂	0.013	0.153	0.0	0.0	0.0	0.135
Al ₂ O ₃	31.686	32.431	32.708	32.855	33.031	31.935
FeO	0.499	0.576	0.675	0.632	0.750	0.559
MnO	0.091	0.071	0.190	0.036	0.0	0.0
MgO	0.214	0.255	0.0	0.183	0.116	0.151
CaO	15.904	16.998	16.880	17.176	17.186	15.913
Na ₂ O	2.700	2.001	1.732	1.805	1.855	2.603
K ₂ O	0.166	0.097	0.103	0.003	0.090	0.146
Cr ₂ O ₃	0.208	0.0	0.0	0.045	0.081	0.122
TOTAL	99.986	99.813	98.607	99.660	99.92	100.483
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.242	2.194	2.181	2.184	2.178	2.248
Ti	0.000	0.005	0.0	0.0	0.0	0.005
AL	1.708	1.754	1.789	1.778	1.783	1.710
Fe	0.019	0.022	0.026	0.024	0.029	0.021
Mn	0.004	0.003	0.007	0.001	0.0	0.0
Mg	0.015	0.017	0.0	0.013	0.008	0.010
Ca	0.780	0.836	0.839	0.845	0.843	0.774
Na	0.239	0.178	0.156	0.161	0.165	0.229
K	0.010	0.006	0.006	0.000	0.005	0.008
Cr	0.008	0.0	0.0	0.002	0.003	0.004
total	5.024	5.015	5.005	5.007	5.014	5.010

	28.25	28.26	28.27	28.28	28.29	28.30
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	3	3	2	3	3	3
SiO ₂	52.451	52.727	48.796	52.346	53.307	54.234
TiO ₂	0.102	0.074	0.130	0.036	0.092	0.182
Al ₂ O ₃	29.608	28.980	31.932	29.563	29.114	28.901
FeO	0.420	0.540	0.683	0.529	0.415	0.550
MnO	0.044	0.0	0.042	0.0	0.098	0.0
MgO	0.228	0.155	0.051	0.140	0.145	0.144
CaO	13.226	12.633	15.905	12.842	12.490	12.004
Na ₂ O	4.048	4.222	2.458	3.967	4.362	4.617
K ₂ O	0.251	0.256	0.208	0.252	0.417	0.370
Cr ₂ O ₃	0.103	0.007	0.0	0.088	0.004	0.0
TOTAL	100.061	99.054	99.522	99.234	100.03	100.452
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.377	2.407	2.237	2.386	2.413	2.436
Ti	0.003	0.003	0.004	0.001	0.003	0.006
AL	1.582	1.559	1.726	1.588	1.553	1.530
Fe	0.016	0.021	0.026	0.020	0.016	0.021
Mn	0.002	0.0	0.002	0.0	0.004	0.0
Mg	0.015	0.011	0.003	0.010	0.010	0.010
Ca	0.642	0.618	0.781	0.627	0.606	0.578
Na	0.356	0.374	0.219	0.351	0.383	0.402
K	0.015	0.015	0.012	0.015	0.024	0.021
Cr	0.004	0.000	0.0	0.003	0.000	0.0
total	5.012	5.006	5.011	5.000	5.011	5.004

	28.31	28.32	28.33	28.34	28.35	28.36
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	11	11
ZONE	3	1	3	3	1	1
SiO ₂	47.310	47.637	52.111	53.293	47.520	46.829
TiO ₂	0.154	0.0	0.049	0.097	0.0	0.0
Al ₂ O ₃	31.902	32.738	29.424	28.862	32.850	32.295
FeO	0.674	0.701	0.593	0.582	0.595	0.401
MnO	0.056	0.039	0.018	0.069	0.088	0.034
MgO	0.071	0.162	0.120	0.207	0.201	0.087
CaO	16.595	17.078	12.956	12.209	16.811	16.976
Na ₂ O	2.127	2.032	3.993	4.486	1.941	1.813
K ₂ O	0.024	0.005	0.264	0.216	0.024	0.033
Cr ₂ O ₃	0.067	0.070	0.0	0.081	0.091	0.048
TOTAL	98.306	99.761	98.935	99.520	99.53	98.115
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.202	2.186	2.383	2.419	2.185	2.187
Ti	0.005	0.0	0.002	0.003	0.0	0.0
AL	1.750	1.770	1.586	1.544	1.780	1.778
Fe	0.026	0.027	0.023	0.022	0.023	0.016
Mn	0.002	0.002	0.001	0.003	0.003	0.001
Mg	0.005	0.011	0.008	0.014	0.014	0.006
Ca	0.827	0.839	0.635	0.594	0.828	0.850
Na	0.192	0.181	0.354	0.395	0.173	0.164
K	0.001	0.000	0.015	0.013	0.001	0.002
Cr	0.002	0.003	0.0	0.003	0.003	0.002
total	5.013	5.018	5.007	5.008	5.011	5.006

	28.37	28.38	28.39	28.40	28.41	28.42
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	11	11	11	12	12
ZONE	2	3	2	2	1	3
SiO ₂	48.281	52.497	48.331	48.559	48.359	52.719
TiO ₂	0.065	0.112	0.031	0.034	0.072	0.068
Al ₂ O ₃	32.159	29.056	31.441	32.265	30.818	29.313
FeO	0.531	0.480	0.739	0.656	0.376	0.578
MnO	0.0	0.077	0.095	0.082	0.048	0.065
MgO	0.114	0.046	0.190	0.155	0.314	0.323
CaO	15.988	12.901	15.752	16.071	15.457	12.626
Na ₂ O	2.371	3.794	2.498	2.499	2.845	4.331
K ₂ O	0.160	0.286	0.066	0.073	0.145	0.270
Cr ₂ O ₃	0.0	0.018	0.140	0.008	0.0	0.0
TOTAL	99.138	98.787	98.544	99.746	98.06	99.715
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.224	2.403	2.238	2.223	2.255	2.393
Ti	0.002	0.004	0.001	0.001	0.003	0.002
AL	1.746	1.567	1.716	1.741	1.694	1.568
Fe	0.020	0.018	0.029	0.025	0.015	0.022
Mn	0.0	0.003	0.004	0.003	0.002	0.002
Mg	0.008	0.003	0.013	0.011	0.022	0.022
Ca	0.789	0.633	0.781	0.788	0.772	0.614
Na	0.212	0.337	0.224	0.222	0.257	0.381
K	0.009	0.017	0.004	0.004	0.009	0.016
Cr	0.0	0.001	0.005	0.000	0.0	0.0
total	5.011	4.986	5.015	5.018	5.028	5.020

	28.43	28.44	28.45	28.46	28.47	28.48
MINERAL	11	11	11	11	11	11
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	12	12	12	12	12	12
ZONE	1	3	3	1	1	3
SiO ₂	48.743	53.394	51.998	48.034	49.002	51.517
TiO ₂	0.030	0.073	0.068	0.127	0.056	0.029
Al ₂ O ₃	31.897	29.085	29.231	31.886	31.722	29.222
FeO	0.458	0.568	0.848	0.609	0.543	0.603
MnO	0.088	0.029	0.142	0.126	0.0	0.044
MgO	0.232	0.147	0.228	0.257	0.374	0.040
CaO	16.128	12.353	12.939	16.186	15.741	13.504
Na ₂ O	2.356	4.226	4.057	2.253	2.796	3.737
K ₂ O	0.133	0.320	0.340	0.095	0.108	0.130
Cr ₂ O ₃	0.174	0.009	0.068	0.021	0.112	0.044
TOTAL	99.781	99.636	99.071	98.985	99.91	98.267
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.234	2.419	2.377	2.218	2.241	2.375
Ti	0.001	0.002	0.002	0.004	0.002	0.001
AL	1.723	1.553	1.575	1.735	1.709	1.587
Fe	0.018	0.022	0.032	0.024	0.021	0.023
Mn	0.003	0.001	0.005	0.005	0.0	0.002
Mg	0.016	0.010	0.016	0.018	0.025	0.003
Ca	0.792	0.600	0.634	0.801	0.771	0.667
Na	0.209	0.371	0.359	0.202	0.248	0.334
K	0.008	0.018	0.020	0.006	0.006	0.008
Cr	0.006	0.000	0.002	0.001	0.004	0.002
total	5.009	4.997	5.022	5.013	5.028	5.001

	28.49	28.50	28.51	28.52	28.53	28.54
MINERAL	11	11	11	15	15	14
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	12	12	12	17	17	13
ZONE	1	3	3	1	2	1
SiO ₂	51.078	53.093	51.739	51.248	51.063	53.273
TiO ₂	0.0	0.024	0.0	1.016	0.983	0.809
Al ₂ O ₃	29.694	28.617	29.708	2.511	2.728	1.447
FeO	0.575	0.478	0.778	8.682	8.344	16.289
MnO	0.128	0.0	0.0	0.451	0.304	0.538
MgO	0.220	0.136	0.276	16.083	15.064	25.656
CaO	13.613	12.363	13.427	19.237	20.594	2.110
Na ₂ O	3.756	4.345	3.817	0.569	0.544	0.324
K ₂ O	0.102	0.265	0.168	0.014	0.0	0.011
Cr ₂ O ₃	0.0	0.0	0.087	0.019	0.0	0.033
TOTAL	98.591	98.843	99.222	91.148	91.28	84.201
OXYGENS	8.000	8.000	8.000	6.000	6.000	6.000
Si	2.350	2.427	2.360	1.907	1.907	1.934
Ti	0.0	0.001	0.0	0.028	0.028	0.022
AL	1.610	1.541	1.597	0.110	0.120	0.062
Fe	0.022	0.018	0.030	0.270	0.261	0.495
Mn	0.005	0.0	0.0	0.014	0.010	0.017
Mg	0.015	0.009	0.019	0.892	0.838	1.388
Ca	0.671	0.605	0.656	0.767	0.824	0.082
Na	0.335	0.385	0.338	0.041	0.039	0.023
K	0.006	0.015	0.010	0.001	0.0	0.001
Cr	0.0	0.0	0.003	0.001	0.0	0.001
total	5.015	5.002	5.013	4.030	4.026	4.024

	28.55	28.56	28.57	28.58	28.59	28.60
MINERAL	14	15	15	15	14	14
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	13	17	17	17	13	14
ZONE	1	2	2	2	1	1
SiO ₂	53.850	51.154	51.389	51.217	53.421	53.686
TiO ₂	0.687	0.628	0.625	0.574	0.643	0.452
Al ₂ O ₃	1.268	2.738	2.827	3.246	1.159	0.717
FeO	16.616	7.884	8.008	7.415	17.004	16.208
MnO	0.348	0.145	0.221	0.167	0.451	0.445
MgO	25.464	15.573	15.437	15.742	25.552	25.469
CaO	1.935	19.957	20.093	20.403	1.898	1.902
Na ₂ O	0.233	0.490	0.321	0.501	0.226	0.172
K ₂ O	0.041	0.0	0.001	0.020	0.0	0.0
Cr ₂ O ₃	0.0	0.305	0.636	0.647	0.103	0.008
TOTAL	83.826	90.990	91.550	92.517	83.45	82.851
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.953	1.916	1.913	1.897	1.944	1.971
Ti	0.019	0.018	0.017	0.016	0.018	0.012
AL	0.054	0.121	0.124	0.142	0.050	0.031
Fe	0.504	0.247	0.249	0.230	0.517	0.498
Mn	0.011	0.005	0.007	0.005	0.014	0.014
Mg	1.376	0.869	0.856	0.869	1.385	1.393
Ca	0.075	0.801	0.801	0.810	0.074	0.075
Na	0.016	0.036	0.023	0.036	0.016	0.012
K	0.002	0.0	0.000	0.001	0.0	0.0
Cr	0.0	0.009	0.019	0.019	0.003	0.000
total	4.010	4.020	4.010	4.025	4.020	4.007

	28.61	28.62	28.63	28.64	28.65	29.01
MINERAL	13	13	13	18	18	11
ROCK TYPE	25	25	25	25	25	24
GRAINTYPE	28	28	28	19	19	11
ZONE	1	1	1	1	1	1
SiO ₂	38.101	38.610	37.939	0.905	0.402	46.014
TiO ₂	0.0	0.0	0.0	10.885	6.270	0.022
Al ₂ O ₃	0.080	0.087	0.083	3.544	3.868	32.513
FeO	27.357	25.864	28.095	77.315	82.392	0.854
MnO	0.516	0.347	0.398	0.160	0.073	0.134
MgO	35.669	36.916	35.340	1.835	1.105	0.0
CaO	0.139	0.125	0.175	0.076	0.012	16.821
Na ₂ O	0.138	0.209	0.146	0.353	0.134	1.550
K ₂ O	0.079	0.064	0.0	0.0	0.0	0.138
Cr ₂ O ₃	0.0	0.0	0.004	0.462	0.328	0.0
TOTAL	74.722	76.358	74.085	18.220	12.19	97.192
OXYGENS	4.000	4.000	4.000	4.000	4.000	8.000
Si	0.995	0.998	0.993	0.039	0.018	2.166
Ti	0.0	0.0	0.0	0.352	0.214	0.001
AL	0.002	0.003	0.003	0.180	0.207	1.803
Fe	0.598	0.559	0.615	2.783	3.124	0.034
Mn	0.011	0.008	0.009	0.006	0.003	0.005
Mg	1.388	1.422	1.378	0.118	0.075	0.0
Ca	0.004	0.003	0.005	0.004	0.001	0.848
Na	0.007	0.010	0.007	0.029	0.012	0.141
K	0.003	0.002	0.0	0.0	0.0	0.008
Cr	0.0	0.0	0.000	0.016	0.012	0.0
total	3.008	3.007	3.010	3.526	3.665	5.007

	29.02	29.03	29.04	29.05	29.06	29.07
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	11
ZONE	1	2	1	1	1	2
SiO ₂	46.713	47.224	45.979	46.486	46.932	47.781
TiO ₂	0.0	0.0	0.111	0.141	0.0	0.034
Al ₂ O ₃	32.761	32.235	32.124	31.752	32.448	31.111
FeO	0.729	0.725	0.708	0.787	0.762	0.700
MnO	0.104	0.0	0.128	0.0	0.130	0.018
MgO	0.156	0.191	0.225	0.070	0.073	0.225
CaO	16.871	16.578	16.516	16.409	16.719	15.197
Na ₂ O	1.681	1.917	1.825	1.806	1.852	2.634
K ₂ O	0.057	0.067	0.008	0.126	0.108	0.085
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	98.343	98.212	96.916	96.790	98.26	97.085
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.173	2.197	2.171	2.194	2.185	2.243
Ti	0.0	0.0	0.004	0.005	0.0	0.001
AL	1.796	1.767	1.788	1.766	1.780	1.721
Fe	0.028	0.028	0.028	0.031	0.030	0.027
Mn	0.004	0.0	0.005	0.0	0.005	0.001
Mg	0.011	0.013	0.016	0.005	0.005	0.016
Ca	0.841	0.826	0.836	0.830	0.834	0.764
Na	0.152	0.173	0.167	0.165	0.167	0.240
K	0.003	0.004	0.000	0.008	0.006	0.005
Cr	0.0	0.0	0.0	0.0	0.0	0.0
total	5.007	5.008	5.015	5.004	5.012	5.018

	29.08	29.09	29.10	29.11	29.12	29.13
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	12	11	11	11	11	11
ZONE	1	2	1	1	2	2
SiO ₂	50.268	47.830	46.598	46.608	47.621	47.578
TiO ₂	0.067	0.147	0.0	0.094	0.0	0.077
Al ₂ O ₃	30.699	31.931	33.136	32.667	31.171	31.149
FeO	0.664	0.701	0.578	0.638	0.749	895.000
MnO	0.028	0.047	0.0	0.0	0.006	0.0
MgO	0.276	0.104	0.116	0.146	0.135	0.180
CaO	14.295	15.991	17.304	16.525	15.542	15.270
Na ₂ O	3.351	2.282	1.466	1.758	2.213	2.415
K ₂ O	0.248	0.201	0.004	0.132	0.137	0.191
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.232	98.533	98.624	97.930	96.82	96.860
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.303	2.217	2.162	2.176	2.240	0.415
Ti	0.002	0.005	0.0	0.003	0.0	0.001
AL	1.658	1.744	1.812	1.797	1.728	0.320
Fe	0.025	0.027	0.022	0.025	0.029	6.523
Mn	0.001	0.002	0.0	0.0	0.000	0.0
Mg	0.019	0.007	0.008	0.010	0.009	0.002
Ca	0.702	0.794	0.860	0.827	0.783	0.143
Na	0.298	0.205	0.132	0.159	0.202	0.041
K	0.014	0.012	0.000	0.008	0.008	0.002
Cr	0.0	0.0	0.0	0.0	0.0	0.0
total	5.022	5.014	4.998	5.005	5.001	7.446

	29.14	29.15	29.16	29.17	29.18	30.01
MINERAL	11	15	15	15	15	11
ROCK TYPE	24	24	24	24	24	25
GRAINTYPE	11	17	17	17	17	12
ZONE	3	2	2	2	2	1
SiO ₂	47.578	50.709	50.301	49.201	49.677	52.050
TiO ₂	0.077	0.733	1.182	0.965	0.549	0.185
Al ₂ O ₃	31.149	2.895	2.640	3.800	3.040	28.385
FeO	0.895	9.873	10.164	10.295	9.145	0.608
MnO	0.0	0.057	0.139	0.265	0.005	0.0
MgO	0.180	12.682	12.348	12.334	12.798	0.102
CaO	15.270	22.561	22.279	22.259	22.326	12.023
Na ₂ O	2.415	0.546	0.413	0.471	0.623	4.101
K ₂ O	0.191	0.015	0.0	0.0	0.075	0.212
Cr ₂ O ₃	0.0	0.160	0.100	0.040	0.110	0.012
TOTAL	96.860	90.358	89.402	89.335	89.20	97.070
OXYGENS	8.000	6.000	6.000	6.000	6.000	8.000
Si	2.237	1.905	1.905	1.867	1.899	2.418
Ti	0.003	0.021	0.034	0.028	0.016	0.006
AL	1.726	0.128	0.118	0.170	0.137	1.554
Fe	0.035	0.310	0.322	0.327	0.292	0.024
Mn	0.0	0.002	0.004	0.009	0.000	0.0
Mg	0.013	0.710	0.697	0.697	0.729	0.007
Ca	0.769	0.908	0.904	0.905	0.914	0.598
Na	0.220	0.040	0.030	0.035	0.046	0.369
K	0.011	0.001	0.0	0.0	0.004	0.013
Cr	0.0	0.005	0.003	0.001	0.003	0.000
total	5.014	4.028	4.016	4.037	4.040	4.989

	30.02	30.03	30.04	30.05	30.06	30.07
MINERAL	11	11	11	14	15	15
ROCK TYPE	25	25	25	25	25	25
GRAINTYPE	11	12	12	13	17	17
ZONE	1	1	1	1	1	1
SiO₂	51.918	52.719	54.049	52.098	50.806	51.031
TiO₂	0.087	0.131	0.105	0.589	0.523	0.625
Al₂O₃	29.171	28.161	28.418	1.098	1.842	1.766
FeO	0.430	0.422	0.398	18.605	9.673	11.027
MnO	0.113	0.149	0.172	0.466	0.280	0.266
MgO	0.122	0.279	0.050	23.552	14.640	15.427
CaO	13.031	11.889	11.925	2.077	19.422	17.449
Na₂O	3.824	4.479	4.477	0.203	0.447	0.322
K₂O	0.223	0.328	0.328	0.0	0.0	0.004
Cr₂O₃	0.012	0.030	0.011	0.033	0.215	0.144
TOTAL	98.501	98.165	99.535	80.116	88.17	87.034
OXYGENS	8.000	8.000	8.000	6.000	6.000	6.000
Si	2.387	2.429	2.451	1.947	1.938	1.941
Ti	0.003	0.005	0.004	0.017	0.015	0.018
AL	1.581	1.529	1.519	0.048	0.083	0.079
Fe	0.017	0.016	0.015	0.581	0.309	0.351
Mn	0.004	0.006	0.007	0.015	0.009	0.009
Mg	0.008	0.019	0.003	1.312	0.832	0.874
Ca	0.642	0.587	0.579	0.083	0.794	0.711
Na	0.341	0.400	0.394	0.015	0.033	0.024
K	0.013	0.019	0.019	0.0	0.0	0.000
Cr	0.000	0.001	0.000	0.001	0.006	0.004
total	4.996	5.011	4.992	4.019	4.019	4.011

	30.08	30.09	30.10	30.11	30.12	30.13
MINERAL	18	18	13	13	14	11
ROCK TYPE	25	25	25	25	25	29
GRAINTYPE	21	21	28	28	13	11
ZONE	1	1	1	1	1	3
SiO ₂	0.298	0.259	36.614	36.017	52.043	53.351
TiO ₂	4.529	15.965	0.097	0.0	0.464	0.100
Al ₂ O ₃	3.790	2.472	0.286	0.0	1.110	28.141
FeO	81.836	72.617	31.082	31.202	18.315	0.500
MnO	0.189	0.324	0.417	0.533	0.402	0.0
MgO	0.783	0.840	31.247	31.086	23.576	0.217
CaO	0.022	0.095	0.0	0.082	2.028	11.641
Na ₂ O	0.0	0.0	0.206	0.0	0.176	4.709
K ₂ O	0.0	0.060	0.0	0.027	0.036	0.296
Cr ₂ O ₃	1.360	1.167	0.100	0.066	0.039	0.0
TOTAL	10.971	21.182	68.967	67.811	79.87	98.455
OXYGENS	4.000	4.000	4.000	4.000	6.000	8.000
Si	0.014	0.011	0.996	0.993	1.952	2.445
Ti	0.159	0.518	0.002	0.0	0.013	0.003
AL	0.209	0.126	0.009	0.0	0.049	1.520
Fe	3.201	2.621	0.707	0.719	0.575	0.019
Mn	0.007	0.012	0.010	0.012	0.013	0.0
Mg	0.055	0.054	1.266	1.277	1.318	0.015
Ca	0.001	0.004	0.0	0.002	0.082	0.572
Na	0.0	0.0	0.011	0.0	0.013	0.418
K	0.0	0.003	0.0	0.001	0.002	0.017
Cr	0.050	0.040	0.002	0.001	0.001	0.0
total	3.697	3.390	3.002	3.007	4.017	5.009

	30.14	30.15	30.16	30.17	30.18	30.19
MINERAL	11	11	11	11	11	15
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	11	12	11	11	11	17
ZONE	1	1	3	3	1	1
SiO ₂	45.919	52.306	52.376	52.022	46.860	51.134
TiO ₂	0.013	0.176	0.051	0.053	0.0	0.659
Al ₂ O ₃	32.086	28.102	27.962	28.785	32.603	2.292
FeO	0.590	0.449	0.317	0.330	0.445	9.096
MnO	0.056	0.0	0.006	0.125	0.099	0.383
MgO	0.109	0.0	0.039	0.131	0.097	14.953
CaO	17.094	11.733	11.874	12.484	16.887	19.328
Na ₂ O	1.791	4.452	4.308	4.223	1.847	0.185
K ₂ O	0.132	0.281	0.269	0.210	0.081	0.023
Cr ₂ O ₃	0.0	0.143	0.131	0.0	0.0	0.139
TOTAL	97.200	97.193	97.016	98.033	98.47	89.096
OXYGENS	8.000	8.000	8.000	8.000	8.000	6.000
Si	2.168	2.431	2.439	2.403	2.181	1.935
Ti	0.000	0.006	0.002	0.002	0.0	0.019
AL	1.786	1.539	1.534	1.567	1.788	0.102
Fe	0.023	0.017	0.012	0.013	0.017	0.288
Mn	0.002	0.0	0.000	0.005	0.004	0.012
Mg	0.008	0.0	0.003	0.009	0.007	0.843
Ca	0.865	0.584	0.592	0.618	0.842	0.783
Na	0.164	0.401	0.389	0.378	0.167	0.014
K	0.008	0.017	0.016	0.012	0.005	0.001
Cr	0.0	0.005	0.005	0.0	0.0	0.004
total	5.024	5.000	4.992	5.007	5.011	4.001

	30.20	30.21	30.22	30.23	30.24	30.25
MINERAL	15	15	11	11	13	13
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	17	17	11	11	28	28
ZONE	1	1	2	1	1	1
SiO ₂	51.398	50.686	50.358	46.935	37.050	35.774
TiO ₂	0.626	0.877	0.006	0.0	0.015	0.006
Al ₂ O ₃	2.332	1.844	30.999	32.263	0.119	0.0
FeO	10.246	10.068	0.524	0.456	32.661	32.029
MnO	0.183	0.412	0.038	0.151	0.639	0.681
MgO	15.572	15.161	0.236	0.060	32.059	30.801
CaO	18.288	18.892	15.411	17.155	0.041	0.066
Na ₂ O	0.449	0.274	2.956	1.964	0.194	0.0
K ₂ O	0.0	0.004	0.107	0.090	0.071	0.063
Cr ₂ O ₃	0.291	0.051	0.024	0.006	0.093	0.0
TOTAL	89.139	88.201	100.135	98.624	70.28	67.391
OXYGENS	6.000	6.000	8.000	8.000	4.000	4.000
Si	1.926	1.926	2.291	2.185	0.986	0.987
Ti	0.018	0.025	0.000	0.0	0.000	0.000
AL	0.103	0.083	1.662	1.770	0.004	0.0
Fe	0.321	0.320	0.020	0.018	0.727	0.739
Mn	0.006	0.013	0.001	0.006	0.014	0.016
Mg	0.869	0.859	0.016	0.004	1.271	1.267
Ca	0.734	0.769	0.751	0.856	0.001	0.002
Na	0.033	0.020	0.261	0.177	0.010	0.0
K	0.0	0.000	0.006	0.005	0.002	0.002
Cr	0.009	0.002	0.001	0.000	0.002	0.0
total	4.017	4.017	5.010	5.021	3.017	3.014

	30.26	30.27	30.28	30.29	30.30	31.01
MINERAL	13	13	18	18	14	14
ROCK TYPE	29	29	29	29	29	26
GRAINTYPE	28	28	21	21	13	16
ZONE	1	1	1	1	1	1
SiO ₂	36.007	35.988	0.235	0.263	52.389	53.867
TiO ₂	0.082	0.036	14.506	4.699	0.338	0.227
Al ₂ O ₃	0.0	0.0	2.840	3.379	0.853	0.829
FeO	31.525	31.274	75.873	82.070	18.412	17.383
MnO	0.551	0.567	0.215	0.079	0.658	0.462
MgO	31.589	31.499	1.066	0.696	24.232	26.166
CaO	0.015	0.099	0.032	0.0	1.299	0.610
Na ₂ O	0.017	0.027	0.045	0.0	0.121	0.423
K ₂ O	0.0	0.043	0.085	0.0	0.0	0.0
Cr ₂ O ₃	0.0	0.061	1.709	1.855	0.0	0.092
TOTAL	68.261	68.320	20.733	10.971	79.89	82.676
OXYGENS	4.000	4.000	4.000	4.000	6.000	6.000
Si	0.986	0.987	0.010	0.012	1.960	1.963
Ti	0.002	0.001	0.461	0.165	0.010	0.006
AL	0.0	0.0	0.141	0.186	0.038	0.036
Fe	0.722	0.717	2.680	3.211	0.576	0.530
Mn	0.013	0.013	0.008	0.003	0.021	0.014
Mg	1.289	1.287	0.067	0.049	1.351	1.421
Ca	0.000	0.003	0.001	0.0	0.052	0.024
Na	0.001	0.001	0.004	0.0	0.009	0.030
K	0.0	0.002	0.005	0.0	0.0	0.0
Cr	0.0	0.001	0.057	0.069	0.0	0.003
total	3.013	3.013	3.434	3.695	4.016	4.026

	31.02	31.03	31.04	31.05	31.06	31.07
MINERAL	14	14	14	15	15	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	16	16	16	17	17	17
ZONE	1	1	1	2	1	1
SiO ₂	54.452	53.237	52.836	51.115	50.370	51.147
TiO ₂	0.241	0.256	0.272	0.424	0.702	0.537
Al ₂ O ₃	0.739	1.282	1.569	2.254	2.773	2.397
FeO	17.131	17.499	17.180	10.656	11.021	11.350
MnO	0.397	0.552	0.355	0.297	0.516	0.226
MgO	26.312	24.737	25.660	13.608	13.835	14.562
CaO	0.750	1.110	1.365	20.581	19.749	19.147
Na ₂ O	0.238	0.542	0.332	0.449	0.576	0.362
K ₂ O	0.093	0.017	0.073	0.047	0.0	0.046
Cr ₂ O ₃	0.0	0.004	0.0	0.0	0.0	0.003
TOTAL	83.222	81.737	82.462	88.775	88.52	88.427
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.974	1.962	1.938	1.931	1.905	1.923
Ti	0.007	0.007	0.008	0.012	0.020	0.015
AL	0.032	0.056	0.068	0.100	0.124	0.106
Fe	0.519	0.539	0.527	0.337	0.348	0.357
Mn	0.012	0.017	0.011	0.010	0.017	0.007
Mg	1.421	1.358	1.402	0.766	0.779	0.816
Ca	0.029	0.044	0.054	0.833	0.800	0.771
Na	0.017	0.039	0.024	0.033	0.042	0.026
K	0.004	0.001	0.003	0.002	0.0	0.002
Cr	0.0	0.000	0.0	0.0	0.0	0.000
total	4.014	4.023	4.034	4.024	4.035	4.023

	31.08	31.09	31.10	31.11	31.12	31.13
MINERAL	15	11	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	12	12	12	12	12
ZONE	1	1	3	1	3	1
SiO ₂	51.130	52.992	54.372	53.188	53.710	53.265
TiO ₂	0.658	0.045	0.061	0.051	0.005	0.045
Al ₂ O ₃	2.625	29.031	28.440	28.334	28.833	28.859
FeO	11.035	0.409	0.581	0.603	0.650	0.469
MnO	0.401	0.0	0.0	0.043	0.0	0.095
MgO	14.319	0.193	0.215	0.189	0.125	0.209
CaO	19.188	12.499	11.389	12.133	12.211	12.658
Na ₂ O	0.400	4.247	4.741	4.226	4.478	4.274
K ₂ O	0.0	0.125	0.350	0.261	0.162	0.229
Cr ₂ O ₃	0.164	0.003	0.0	0.035	0.075	0.0
TOTAL	88.885	99.135	99.568	98.460	99.60	99.634
OXYGENS	6.000	8.000	8.000	8.000	8.000	8.000
Si	1.918	2.414	2.458	2.436	2.431	2.418
Ti	0.019	0.002	0.002	0.002	0.000	0.002
AL	0.116	1.559	1.515	1.529	1.538	1.544
Fe	0.346	0.016	0.022	0.023	0.025	0.018
Mn	0.013	0.0	0.0	0.002	0.0	0.004
Mg	0.800	0.013	0.014	0.013	0.008	0.014
Ca	0.771	0.610	0.552	0.595	0.592	0.616
Na	0.029	0.375	0.416	0.375	0.393	0.376
K	0.0	0.007	0.020	0.015	0.009	0.013
Cr	0.005	0.000	0.0	0.001	0.003	0.0
total	4.017	4.996	5.000	4.992	5.000	5.004

	31.14	31.15	31.16	31.17	31.18	31.19
MINERAL	11	11	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	34	12	12
ZONE	1	1	1	1	1	1
SiO ₂	53.403	53.070	53.603	57.350	53.353	52.003
TiO ₂	0.108	0.072	0.098	0.093	0.151	0.0
Al ₂ O ₃	28.348	28.457	28.375	25.431	28.537	29.698
FeO	1.050	0.671	0.868	0.728	0.725	0.490
MnO	0.006	0.0	0.0	0.0	0.076	0.0
MgO	0.090	0.099	0.109	0.334	0.253	0.146
CaO	11.959	11.992	11.586	7.884	11.839	13.140
Na ₂ O	4.442	4.574	4.582	6.612	4.441	3.874
K ₂ O	0.334	0.296	0.322	0.292	0.403	0.376
Cr ₂ O ₃	0.183	0.0	0.079	0.0	0.0	0.059
TOTAL	98.873	98.560	98.754	97.996	99.05	99.296
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.432	2.430	2.443	2.608	2.430	2.374
Ti	0.004	0.002	0.003	0.003	0.005	0.0
AL	1.522	1.535	1.524	1.363	1.532	1.597
Fe	0.040	0.026	0.033	0.028	0.028	0.019
Mn	0.000	0.0	0.0	0.0	0.003	0.0
Mg	0.006	0.007	0.007	0.023	0.017	0.010
Ca	0.584	0.588	0.566	0.384	0.578	0.643
Na	0.392	0.406	0.405	0.583	0.392	0.343
K	0.019	0.017	0.019	0.017	0.023	0.022
Cr	0.007	0.0	0.003	0.0	0.0	0.002
total	5.006	5.012	5.002	5.008	5.007	5.009

	31.20	31.21	31.22	31.23	31.24	31.25
MINERAL	11	11	11	18	18	18
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	19	19	19
ZONE	1	1	1	1	1	1
SiO ₂	53.601	52.756	53.604	0.227	0.339	0.421
TiO ₂	0.128	0.002	0.108	8.542	8.643	8.779
Al ₂ O ₃	28.651	28.841	28.430	4.200	3.762	4.265
FeO	0.700	0.835	0.762	80.150	79.293	81.004
MnO	0.0	0.0	0.117	0.184	0.231	0.250
MgO	0.293	0.137	0.157	2.147	1.757	0.819
CaO	11.889	11.887	11.865	0.020	0.0	0.0
Na ₂ O	4.579	4.387	4.543	0.212	0.016	0.0
K ₂ O	0.226	0.201	0.225	0.0	0.0	0.0
Cr ₂ O ₃	0.126	0.058	0.0	0.319	0.327	0.186
TOTAL	99.493	98.269	99.049	15.851	15.07	14.720
OXYGENS	8.000	8.000	8.000	4.000	4.000	4.000
Si	2.429	2.417	2.439	0.010	0.015	0.019
Ti	0.004	0.000	0.004	0.280	0.289	0.290
AL	1.530	1.557	1.524	0.216	0.197	0.221
Fe	0.027	0.032	0.029	2.923	2.952	2.978
Mn	0.0	0.0	0.005	0.007	0.009	0.009
Mg	0.020	0.009	0.011	0.140	0.117	0.054
Ca	0.577	0.584	0.578	0.001	0.0	0.0
Na	0.402	0.390	0.401	0.018	0.001	0.0
K	0.013	0.012	0.013	0.0	0.0	0.0
Cr	0.005	0.002	0.0	0.011	0.012	0.006
total	5.007	5.003	5.003	3.605	3.592	3.577

	31.26	31.27	31.28	31.29	31.30	31.31
MINERAL	18	13	14	18	14	13
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	19	28	15	19	15	28
ZONE	1	1	1	1	1	1
SiO ₂	0.437	38.731	51.329	0.323	55.401	41.469
TiO ₂	7.589	0.0	0.849	8.008	0.292	0.050
Al ₂ O ₃	3.946	0.0	1.357	3.854	1.371	0.396
FeO	80.592	24.433	21.244	81.910	16.040	22.646
MnO	0.292	0.772	0.400	0.166	0.502	0.453
MgO	0.548	37.676	26.720	1.776	28.370	37.008
CaO	0.198	0.227	0.723	0.063	0.574	0.179
Na ₂ O	0.226	0.060	0.121	0.031	0.127	0.263
K ₂ O	0.0	0.0	0.043	0.0	0.0	0.0
Cr ₂ O ₃	0.217	0.0	0.006	0.101	0.0	0.033
TOTAL	13.453	77.466	81.548	14.322	86.64	79.851
OXYGENS	4.000	4.000	6.000	4.000	6.000	4.000
Si	0.020	1.000	1.865	0.014	1.949	1.045
Ti	0.258	0.0	0.023	0.265	0.008	0.001
AL	0.210	0.0	0.058	0.200	0.057	0.012
Fe	3.049	0.527	0.645	3.011	0.472	0.477
Mn	0.011	0.017	0.012	0.006	0.015	0.010
Mg	0.037	1.449	1.446	0.116	1.488	1.390
Ca	0.010	0.006	0.028	0.003	0.022	0.005
Na	0.020	0.003	0.009	0.003	0.009	0.013
K	0.0	0.0	0.002	0.0	0.0	0.0
Cr	0.008	0.0	0.000	0.004	0.0	0.001
total	3.623	3.002	4.088	3.621	4.019	2.954

	31.32	31.33	32.01	32.02	32.03	32.04
MINERAL	13	18	14	14	14	14
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	28	19	16	16	16	16
ZONE	1	1	1	1	1	1
SiO ₂	38.829	0.338	52.220	53.181	52.868	53.006
TiO ₂	0.028	8.690	0.271	0.163	0.052	0.217
Al ₂ O ₃	0.0	3.613	0.943	0.953	0.829	1.241
FeO	24.497	80.125	20.836	19.627	21.766	20.416
MnO	0.590	0.187	0.469	0.509	0.509	0.547
MgO	37.273	2.042	23.518	23.547	23.323	23.922
CaO	0.149	0.0	0.708	1.289	0.836	0.501
Na ₂ O	0.197	0.035	0.113	0.253	0.252	0.146
K ₂ O	0.002	0.056	0.0	0.030	0.011	0.050
Cr ₂ O ₃	0.0	0.064	0.091	0.0	0.026	0.0
TOTAL	77.068	15.025	78.333	79.925	78.71	79.630
OXYGENS	4.000	4.000	6.000	6.000	6.000	6.000
Si	1.005	0.015	1.954	1.971	1.960	1.958
Ti	0.001	0.289	0.008	0.005	0.001	0.006
AL	0.0	0.188	0.042	0.042	0.036	0.054
Fe	0.530	2.962	0.652	0.608	0.675	0.631
Mn	0.013	0.007	0.015	0.016	0.016	0.017
Mg	1.437	0.135	1.311	1.301	1.288	1.317
Ca	0.004	0.0	0.028	0.051	0.033	0.020
Na	0.010	0.003	0.008	0.018	0.018	0.010
K	0.000	0.003	0.0	0.001	0.001	0.002
Cr	0.0	0.002	0.003	0.0	0.001	0.0
total	3.000	3.604	4.020	4.013	4.029	4.015

	32.05	32.06	32.07	32.08	32.09	32.10
MINERAL	14	14	14	14	14	14
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	16	16	16	16	16	16
ZONE	1	1	1	1	1	1
SiO ₂	52.634	52.973	52.947	53.249	53.378	53.530
TiO ₂	0.055	0.166	0.209	0.013	0.243	0.145
Al ₂ O ₃	1.108	1.208	0.801	0.936	1.746	0.641
FeO	19.870	19.465	19.462	19.406	16.869	20.112
MnO	0.354	0.465	0.690	0.516	0.284	0.288
MgO	22.475	24.539	24.782	23.964	26.032	24.040
CaO	1.861	0.513	0.560	1.023	0.998	0.701
Na ₂ O	0.167	0.031	0.167	0.159	0.122	0.099
K ₂ O	0.026	0.0	0.066	0.0	0.012	0.025
Cr ₂ O ₃	0.025	0.0	0.0	0.0	0.0	0.071
TOTAL	78.705	79.895	80.222	79.860	82.81	79.540
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.975	1.960	1.958	1.975	1.946	1.980
Ti	0.002	0.005	0.006	0.000	0.007	0.004
AL	0.049	0.053	0.035	0.041	0.075	0.028
Fe	0.623	0.602	0.602	0.602	0.514	0.622
Mn	0.011	0.015	0.022	0.016	0.009	0.009
Mg	1.257	1.353	1.366	1.324	1.414	1.325
Ca	0.075	0.020	0.022	0.041	0.039	0.028
Na	0.012	0.002	0.012	0.011	0.009	0.007
K	0.001	0.0	0.003	0.0	0.001	0.001
Cr	0.001	0.0	0.0	0.0	0.0	0.002
total	4.005	4.010	4.026	4.010	4.014	4.005

	32.11	32.12	32.13	32.14	32.15	32.16
MINERAL	14	14	15	16	16	16
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	16	16	18	30	30	30
ZONE	1	1	1	1	1	1
SiO ₂	53.521	53.401	52.884	48.612	46.820	50.392
TiO ₂	0.267	0.209	0.123	0.127	0.065	0.225
Al ₂ O ₃	0.858	0.521	0.410	5.006	5.987	4.361
FeO	20.126	20.117	10.636	17.224	24.671	14.687
MnO	0.486	0.454	0.351	0.201	0.310	0.549
MgO	23.980	24.302	13.496	14.461	7.670	14.956
CaO	0.851	0.771	21.584	9.765	11.694	10.349
Na ₂ O	0.126	0.189	0.492	0.597	0.967	0.765
K ₂ O	0.0	0.0	0.045	0.058	0.148	0.034
Cr ₂ O ₃	0.0	0.034	0.095	0.0	0.077	0.0
TOTAL	80.089	79.881	89.480	78.827	73.74	81.631
OXYGENS	6.000	6.000	6.000	23.000	23.000	23.000
Si	1.970	1.972	1.987	7.286	7.165	7.443
Ti	0.007	0.006	0.003	0.014	0.007	0.025
AL	0.037	0.023	0.018	0.884	1.080	0.759
Fe	0.620	0.621	0.334	2.159	3.157	1.814
Mn	0.015	0.014	0.011	0.026	0.040	0.069
Mg	1.316	1.337	0.755	3.229	1.749	3.292
Ca	0.034	0.030	0.869	1.568	1.917	1.638
Na	0.009	0.014	0.036	0.173	0.287	0.219
K	0.0	0.0	0.002	0.011	0.029	0.006
Cr	0.0	0.001	0.003	0.0	0.009	0.0
total	4.008	4.017	4.018	15.350	15.441	15.265

	32.17	32.18	32.19	32.20	32.21	32.22
MINERAL	17	17	17	17	17	17
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	33	33	33	33	33	33
ZONE	1	1	1	1	1	1
SiO ₂	37.276	37.287	37.640	37.662	37.191	37.792
TiO ₂	5.390	5.310	4.759	4.968	4.974	4.444
Al ₂ O ₃	14.394	14.721	15.258	15.138	14.977	14.802
FeO	9.018	10.718	8.734	9.522	9.504	9.157
MnO	0.004	0.0	0.0	0.045	0.023	0.0
MgO	17.508	17.472	18.908	18.002	18.052	18.891
CaO	0.249	0.142	0.220	0.040	0.035	0.044
Na ₂ O	0.783	0.946	0.895	0.707	0.601	0.684
K ₂ O	8.821	8.986	8.420	9.099	9.079	9.023
Cr ₂ O ₃	0.018	0.0	0.0	0.0	0.096	0.060
TOTAL	84.443	84.864	86.100	85.661	85.03	85.740
OXYGENS	22.000	22.000	22.000	22.000	22.000	22.000
Si	5.526	5.455	5.471	5.490	5.465	5.514
Ti	0.601	0.584	0.520	0.545	0.550	0.488
AL	2.515	2.538	2.614	2.601	2.593	2.545
Fe	1.118	1.311	1.062	1.161	1.168	1.117
Mn	0.001	0.0	0.0	0.006	0.003	0.0
Mg	3.867	3.809	4.095	3.910	3.952	4.107
Ca	0.040	0.022	0.034	0.006	0.006	0.007
Na	0.225	0.268	0.252	0.200	0.171	0.193
K	1.668	1.677	1.561	1.692	1.702	1.679
Cr	0.002	0.0	0.0	0.0	0.011	0.007
total	15.562	15.665	15.609	15.611	15.620	15.658

	32.23	32.24	32.25	32.26	32.27	32.28
MINERAL	15	15	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	17	17	11	11	11	11
ZONE	2	1	1	1	3	1
SiO ₂	52.127	51.623	48.206	47.440	51.979	47.423
TiO ₂	0.541	0.575	0.047	0.0	0.063	0.130
Al ₂ O ₃	2.160	2.260	32.777	32.465	29.133	32.177
FeO	9.945	10.761	0.827	0.722	0.598	0.713
MnO	0.229	0.359	0.100	0.034	0.0	0.0
MgO	15.090	15.229	0.141	0.114	0.196	0.019
CaO	20.204	18.660	16.887	16.769	12.760	16.778
Na ₂ O	0.321	0.325	2.064	1.837	4.029	1.942
K ₂ O	0.0	0.020	0.116	0.070	0.281	0.075
Cr ₂ O ₃	0.022	0.0	0.0	0.0	0.0	0.038
TOTAL	90.694	89.051	100.338	98.729	98.44	98.582
OXYGENS	6.000	6.000	8.000	8.000	8.000	8.000
Si	1.932	1.931	2.196	2.195	2.388	2.199
Ti	0.015	0.016	0.002	0.0	0.002	0.005
AL	0.094	0.100	1.760	1.771	1.578	1.759
Fe	0.308	0.337	0.032	0.028	0.023	0.028
Mn	0.007	0.011	0.004	0.001	0.0	0.0
Mg	0.833	0.849	0.010	0.008	0.013	0.001
Ca	0.802	0.748	0.824	0.831	0.628	0.834
Na	0.023	0.024	0.182	0.165	0.359	0.175
K	0.0	0.001	0.007	0.004	0.016	0.004
Cr	0.001	0.0	0.0	0.0	0.0	0.001
total	4.017	4.015	5.016	5.004	5.008	5.006

	32.29	32.30	32.31	32.32	32.33	32.34
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	26	26	26
GRAINTYPE	11	11	11	34	34	12
ZONE	1	2	3	1	1	1
SiO ₂	46.959	50.479	51.835	58.434	60.800	52.198
TiO ₂	0.041	0.121	0.060	0.123	0.087	0.013
Al ₂ O ₃	32.128	30.808	28.997	24.044	23.619	29.203
FeO	0.732	0.646	0.549	1.211	0.457	0.663
MnO	0.062	0.0	0.044	0.049	0.016	0.018
MgO	0.044	0.227	0.150	0.535	0.282	0.058
CaO	16.723	14.825	12.828	7.122	5.611	13.086
Na ₂ O	1.997	3.160	4.040	7.038	8.185	4.072
K ₂ O	0.092	0.134	0.212	0.129	0.152	0.243
Cr ₂ O ₃	0.015	0.0	0.114	0.002	0.060	0.027
TOTAL	98.061	99.754	98.280	97.476	98.81	98.918
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.191	2.301	2.388	2.657	2.726	2.388
Ti	0.001	0.004	0.002	0.004	0.003	0.000
AL	1.767	1.655	1.574	1.288	1.248	1.575
Fe	0.029	0.025	0.021	0.046	0.017	0.025
Mn	0.002	0.0	0.002	0.002	0.001	0.001
Mg	0.003	0.015	0.010	0.036	0.019	0.004
Ca	0.836	0.724	0.633	0.347	0.270	0.641
Na	0.181	0.279	0.361	0.620	0.712	0.361
K	0.005	0.008	0.012	0.007	0.009	0.014
Cr	0.001	0.0	0.004	0.000	0.002	0.001
total	5.017	5.011	5.008	5.009	5.006	5.011

	32.35	32.36	32.37	32.38	32.39	32.40
MINERAL	11	11	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	11	12	12
ZONE	1	1	1	1	1	1
SiO ₂	52.361	52.867	52.727	52.326	52.872	52.197
TiO ₂	0.0	0.102	0.0	0.148	0.167	0.107
Al ₂ O ₃	29.182	29.644	29.299	29.316	29.674	29.176
FeO	0.824	0.477	0.520	0.415	0.425	0.703
MnO	0.008	0.021	0.039	0.0	0.007	0.070
MgO	0.097	0.235	0.217	0.255	0.301	0.263
CaO	12.503	12.591	12.346	12.698	12.737	12.789
Na ₂ O	4.197	4.390	4.400	4.077	4.351	4.157
K ₂ O	0.146	0.105	0.142	0.202	0.158	0.150
Cr ₂ O ₃	0.021	0.007	0.0	0.114	0.045	0.036
TOTAL	98.515	99.962	99.170	99.136	100.31	98.945
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.397	2.391	2.402	2.389	2.386	2.386
Ti	0.0	0.003	0.0	0.005	0.006	0.004
AL	1.575	1.580	1.573	1.577	1.578	1.571
Fe	0.032	0.018	0.020	0.016	0.016	0.027
Mn	0.000	0.001	0.002	0.0	0.000	0.003
Mg	0.007	0.016	0.015	0.017	0.020	0.018
Ca	0.613	0.610	0.603	0.621	0.616	0.626
Na	0.373	0.385	0.389	0.361	0.381	0.368
K	0.009	0.006	0.008	0.012	0.009	0.009
Cr	0.001	0.000	0.0	0.004	0.002	0.001
total	5.006	5.011	5.010	5.002	5.013	5.013

	32.41	32.42	32.43	32.44	33.01	33.02
MINERAL	18	18	18	18	14	14
ROCK TYPE	26	26	26	26	27	27
GRAINTYPE	19	19	19	19	16	16
ZONE	1	1	1	1	1	1
SiO ₂	0.323	0.279	0.285	0.228	53.973	54.850
TiO ₂	7.593	7.593	8.175	7.913	0.387	0.513
Al ₂ O ₃	4.644	4.667	4.447	4.610	1.477	1.142
FeO	80.847	80.299	79.564	80.020	16.268	17.154
MnO	0.275	0.353	0.273	0.205	0.487	0.495
MgO	2.044	2.055	1.404	1.328	25.518	25.706
CaO	0.065	0.054	0.096	0.048	1.824	1.894
Na ₂ O	0.140	0.198	0.342	0.183	0.239	0.143
K ₂ O	0.0	0.070	0.108	0.0	0.0	0.070
Cr ₂ O ₃	0.099	0.122	0.202	0.116	0.003	0.0
TOTAL	15.183	15.391	15.332	14.631	83.91	84.813
OXYGENS	4.000	4.000	4.000	4.000	6.000	6.000
Si	0.014	0.012	0.013	0.010	1.958	1.962
Ti	0.250	0.250	0.272	0.265	0.011	0.014
AL	0.239	0.241	0.232	0.242	0.063	0.048
Fe	2.956	2.946	2.946	2.976	0.494	0.513
Mn	0.010	0.013	0.010	0.008	0.015	0.015
Mg	0.133	0.134	0.093	0.088	1.380	1.370
Ca	0.003	0.003	0.005	0.002	0.071	0.073
Na	0.012	0.017	0.029	0.016	0.017	0.010
K	0.0	0.004	0.006	0.0	0.0	0.003
Cr	0.003	0.004	0.007	0.004	0.000	0.0
total	3.621	3.625	3.613	3.610	4.008	4.007

	33.03	33.04	33.05	33.06	33.07	33.08
MINERAL	14	14	14	15	14	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	16	16	13	17	13	17
ZONE	1	1	1	2	1	1
SiO ₂	54.474	54.848	53.524	52.486	53.921	50.809
TiO ₂	0.254	0.328	0.101	0.527	0.283	0.956
Al ₂ O ₃	1.205	1.425	4.053	1.326	1.145	2.509
FeO	16.595	16.702	14.939	6.751	16.420	9.004
MnO	0.443	0.316	0.279	0.138	0.468	0.302
MgO	26.285	26.158	23.199	15.468	26.119	15.061
CaO	1.392	1.617	2.792	22.577	1.764	20.252
Na ₂ O	0.132	0.132	0.045	0.271	0.305	0.439
K ₂ O	0.0	0.057	0.0	0.032	0.0	0.0
Cr ₂ O ₃	0.0	0.022	0.077	0.216	0.077	0.194
TOTAL	84.185	84.903	84.070	93.041	84.08	90.522
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.963	1.961	1.949	1.948	1.953	1.905
Ti	0.007	0.009	0.003	0.015	0.008	0.027
AL	0.051	0.060	0.174	0.058	0.049	0.111
Fe	0.500	0.499	0.455	0.210	0.497	0.282
Mn	0.014	0.010	0.009	0.004	0.014	0.010
Mg	1.411	1.393	1.259	0.856	1.410	0.841
Ca	0.054	0.062	0.109	0.898	0.068	0.813
Na	0.009	0.009	0.003	0.020	0.021	0.032
K	0.0	0.003	0.0	0.002	0.0	0.0
Cr	0.0	0.001	0.002	0.006	0.002	0.006
total	4.009	4.006	3.962	4.015	4.024	4.026

	33.09	33.10	33.11	33.12	33.13	33.14
MINERAL	15	14	14	14	14	14
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	14	13	14	16	16
ZONE	2	1	1	1	1	1
SiO ₂	52.578	54.596	54.662	54.263	54.545	54.134
TiO ₂	0.580	0.256	0.268	0.439	0.329	0.440
Al ₂ O ₃	1.765	1.103	1.327	0.836	1.190	1.033
FeO	7.320	16.523	16.526	16.561	16.954	17.794
MnO	0.259	0.536	0.406	0.222	0.367	0.382
MgO	15.317	26.315	26.037	26.113	25.581	25.364
CaO	21.653	1.825	1.800	1.936	2.017	1.722
Na ₂ O	0.354	0.310	0.047	0.182	0.246	0.085
K ₂ O	0.0	0.0	0.0	0.0	0.0	0.054
Cr ₂ O ₃	0.0	0.137	0.071	0.0	0.0	0.047
TOTAL	92.506	85.078	84.618	83.991	84.27	83.261
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.949	1.957	1.963	1.963	1.963	1.959
Ti	0.016	0.007	0.007	0.012	0.009	0.012
AL	0.077	0.047	0.056	0.036	0.050	0.044
Fe	0.227	0.495	0.496	0.501	0.510	0.539
Mn	0.008	0.016	0.012	0.007	0.011	0.012
Mg	0.846	1.405	1.393	1.408	1.372	1.368
Ca	0.860	0.070	0.069	0.075	0.078	0.067
Na	0.025	0.022	0.003	0.013	0.017	0.006
K	0.0	0.0	0.0	0.0	0.0	0.002
Cr	0.0	0.004	0.002	0.0	0.0	0.001
total	4.009	4.022	4.002	4.014	4.011	4.010

	33.15	33.16	33.17	33.18	33.19	33.20
MINERAL	15	14	15	15	14	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	18	16	18	18	16	34
ZONE	2	1	2	2	1	1
SiO ₂	52.542	53.495	52.841	52.851	53.908	52.547
TiO ₂	0.654	0.482	0.407	0.478	0.247	0.0
Al ₂ O ₃	1.509	1.208	1.026	1.484	0.945	28.556
FeO	8.824	16.710	8.308	8.769	17.212	0.790
MnO	0.196	0.298	0.213	0.200	0.378	0.007
MgO	15.344	25.635	15.667	15.713	25.180	0.093
CaO	20.888	1.658	20.556	20.738	1.916	12.254
Na ₂ O	0.349	0.082	0.307	0.361	0.093	4.126
K ₂ O	0.001	0.009	0.037	0.022	0.027	0.262
Cr ₂ O ₃	0.159	0.0	0.174	0.040	0.0	0.031
TOTAL	91.642	82.867	91.228	91.887	82.69	97.876
OXYGENS	6.000	6.000	6.000	6.000	6.000	8.000
Si	1.945	1.956	1.968	1.950	1.969	2.420
Ti	0.018	0.013	0.011	0.013	0.007	0.0
AL	0.066	0.052	0.045	0.065	0.041	1.550
Fe	0.273	0.511	0.259	0.271	0.526	0.030
Mn	0.006	0.009	0.007	0.006	0.012	0.000
Mg	0.847	1.396	0.869	0.864	1.371	0.006
Ca	0.829	0.065	0.820	0.820	0.075	0.605
Na	0.025	0.006	0.022	0.026	0.007	0.368
K	0.000	0.000	0.002	0.001	0.001	0.015
Cr	0.005	0.0	0.005	0.001	0.0	0.001
total	4.014	4.008	4.008	4.017	4.008	4.996

	33.21	33.22	33.23	33.24	33.25	33.26
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	34	34	34	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	53.018	52.817	53.588	52.244	52.947	51.876
TiO ₂	0.154	0.074	0.129	0.0	0.064	0.053
Al ₂ O ₃	29.004	28.976	28.632	29.023	29.087	28.938
FeO	0.772	0.587	0.595	0.602	0.631	0.572
MnO	0.034	0.010	0.0	0.0	0.044	0.0
MgO	0.558	0.450	0.365	0.261	0.313	0.333
CaO	12.134	12.007	12.027	12.688	12.210	12.572
Na ₂ O	4.244	4.167	4.624	4.165	4.365	4.127
K ₂ O	0.381	0.231	0.321	0.272	0.273	0.152
Cr ₂ O ₃	0.076	0.012	0.0	0.088	0.056	0.0
TOTAL	99.603	98.744	99.686	98.741	99.36	98.051
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.403	2.412	2.428	2.394	2.407	2.392
Ti	0.005	0.003	0.004	0.0	0.002	0.002
AL	1.549	1.559	1.529	1.567	1.558	1.572
Fe	0.029	0.022	0.023	0.023	0.024	0.022
Mn	0.001	0.000	0.0	0.0	0.002	0.0
Mg	0.038	0.031	0.025	0.018	0.021	0.023
Ca	0.589	0.587	0.584	0.623	0.595	0.621
Na	0.373	0.369	0.406	0.370	0.385	0.369
K	0.022	0.013	0.019	0.016	0.016	0.009
Cr	0.003	0.000	0.0	0.003	0.002	0.0
total	5.013	4.997	5.016	5.014	5.011	5.009

	33.27	33.28	33.29	33.30	33.31	34.01
MINERAL	11	11	11	13	13	13
ROCK TYPE	27	27	27	27	27	26
GRAINTYPE	12	34	34	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	51.978	51.900	51.410	38.102	38.056	37.575
TiO ₂	0.043	0.034	0.0	0.068	0.034	0.019
Al ₂ O ₃	29.598	29.263	29.971	0.159	0.170	0.166
FeO	0.498	0.825	0.606	26.829	26.587	27.563
MnO	0.009	0.199	0.008	0.502	0.467	0.539
MgO	0.229	0.211	0.198	35.466	35.465	35.076
CaO	12.653	12.452	13.739	0.050	0.069	0.039
Na ₂ O	3.937	4.144	3.701	0.405	0.381	0.239
K ₂ O	0.158	0.137	0.093	0.045	0.0	0.007
Cr ₂ O ₃	0.031	0.0	0.177	0.0	0.0	0.065
TOTAL	98.636	98.340	99.297	74.797	74.64	73.725
OXYGENS	8.000	8.000	8.000	4.000	4.000	4.000
Si	2.381	2.383	2.348	0.998	0.999	0.991
Ti	0.001	0.001	0.0	0.001	0.001	0.000
AL	1.598	1.584	1.613	0.005	0.005	0.005
Fe	0.019	0.032	0.023	0.587	0.584	0.608
Mn	0.000	0.008	0.000	0.011	0.010	0.012
Mg	0.016	0.014	0.013	1.384	1.387	1.379
Ca	0.621	0.613	0.672	0.001	0.002	0.001
Na	0.350	0.369	0.328	0.021	0.019	0.012
K	0.009	0.008	0.005	0.002	0.0	0.000
Cr	0.001	0.0	0.006	0.0	0.0	0.001
total	4.997	5.012	5.009	3.010	3.007	3.011

	34.02	34.03	34.04	34.05	34.06	34.07
MINERAL	13	13	13	13	13	13
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	28	28	28	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	38.263	37.778	37.864	38.314	37.449	37.729
TiO ₂	0.101	0.022	0.006	0.041	0.030	0.0
Al ₂ O ₃	0.112	0.082	-0.144	0.144	0.085	0.049
FeO	27.501	27.457	27.713	27.655	27.706	27.035
MnO	0.572	0.579	0.499	0.526	0.319	0.619
MgO	35.202	34.813	35.394	34.871	34.896	34.823
CaO	0.174	0.103	0.125	0.092	0.0	0.099
Na ₂ O	0.176	0.202	0.403	0.181	0.156	0.261
K ₂ O	0.0	0.0	0.0	0.0	0.0	0.0
Cr ₂ O ₃	0.0	0.0	0.028	0.0	0.0	0.0
TOTAL	74.600	73.579	74.463	74.169	72.93	73.580
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	0.999	0.998	0.991	1.003	0.994	1.000
Ti	0.002	0.000	0.000	0.001	0.001	0.0
AL	0.003	0.003	0.004	0.004	0.003	0.002
Fe	0.601	0.607	0.606	0.606	0.615	0.599
Mn	0.013	0.013	0.011	0.012	0.007	0.014
Mg	1.370	1.371	1.380	1.361	1.380	1.375
Ca	0.005	0.003	0.004	0.003	0.0	0.003
Na	0.009	0.010	0.020	0.009	0.008	0.013
K	0.0	0.0	0.0	0.0	0.0	0.0
Cr	0.0	0.0	0.001	0.0	0.0	0.0
total	3.001	3.005	3.017	2.998	3.008	3.006

	34.08	34.09	34.10	34.11	34.12	34.13
MINERAL	14	14	14	14	14	14
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	14	14	14	14	14	14
ZONE	1	1	1	1	1	1
SiO ₂	50.723	51.054	54.007	53.328	51.929	51.923
TiO ₂	0.094	0.100	0.158	0.262	0.004	0.179
Al ₂ O ₃	5.611	5.152	1.958	1.478	4.008	4.518
FeO	17.779	18.191	16.650	16.516	17.110	17.488
MnO	0.413	0.371	0.409	0.373	0.235	0.381
MgO	24.032	24.480	26.334	25.820	24.304	25.002
CaO	0.088	0.192	0.890	0.977	1.799	0.218
Na ₂ O	0.064	0.273	0.341	0.142	0.417	0.174
K ₂ O	0.0	0.0	0.005	0.035	0.021	0.0
Cr ₂ O ₃	0.0	0.047	0.0	0.0	0.0	0.154
TOTAL	81.025	81.669	84.102	82.415	82.72	82.549
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.871	1.869	1.946	1.957	1.900	1.889
Ti	0.003	0.003	0.004	0.007	0.000	0.005
AL	0.244	0.222	0.083	0.064	0.173	0.194
Fe	0.548	0.557	0.502	0.507	0.523	0.532
Mn	0.013	0.012	0.012	0.012	0.007	0.012
Mg	1.321	1.335	1.414	1.412	1.325	1.356
Ca	0.003	0.008	0.034	0.038	0.071	0.008
Na	0.005	0.019	0.024	0.010	0.030	0.012
K	0.0	0.0	0.000	0.002	0.001	0.0
Cr	0.0	0.001	0.0	0.0	0.0	0.004
total	4.007	4.026	4.020	4.009	4.029	4.013

	34.14	34.15	34.16	34.17	34.18	34.19
MINERAL	24	24	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	35	35	11	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	59.439	60.060	53.503	54.132	54.243	52.689
TiO ₂	0.007	0.006	0.266	0.100	0.026	0.114
Al ₂ O ₃	1.667	0.489	28.515	28.306	27.998	29.085
FeO	4.425	2.829	0.440	0.414	0.576	0.339
MnO	0.0	0.064	0.0	0.023	0.031	0.0
MgO	27.641	29.114	0.318	0.356	0.368	0.267
CaO	0.134	0.044	12.067	11.234	11.066	12.810
Na ₂ O	0.599	0.360	4.480	4.985	4.909	4.200
K ₂ O	0.143	0.041	0.306	0.335	0.331	0.215
Cr ₂ O ₃	0.005	0.0	0.0	0.011	0.049	0.0
TOTAL	89.635	90.178	99.455	99.482	99.02	99.380
OXYGENS	22.000	22.000	8.000	8.000	8.000	8.000
Si	7.805	7.902	2.430	2.454	2.466	2.401
Ti	0.001	0.001	0.009	0.003	0.001	0.004
AL	0.258	0.076	1.526	1.512	1.500	1.562
Fe	0.486	0.311	0.017	0.016	0.022	0.013
Mn	0.0	0.007	0.0	0.001	0.001	0.0
Mg	5.408	5.708	0.022	0.024	0.025	0.018
Ca	0.019	0.006	0.587	0.546	0.539	0.625
Na	0.152	0.092	0.395	0.438	0.433	0.371
K	0.024	0.007	0.018	0.019	0.019	0.012
Cr	0.001	0.0	0.0	0.000	0.002	0.0
total	14.153	14.109	5.004	5.015	5.008	5.006

	34.20	34.21	34.22	34.23	34.24	34.25
MINERAL	18	19	18	19	18	19
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	19	22	19	22	19	22
ZONE	1	1	1	1	1	1
SiO ₂	0.372	0.450	0.346	0.345	0.369	0.435
TiO ₂	7.449	50.461	7.458	50.249	7.321	49.591
Al ₂ O ₃	6.351	0.295	6.374	0.310	5.941	0.199
FeO	78.085	47.559	78.353	48.158	77.866	46.936
MnO	0.371	1.111	0.318	1.160	0.478	2.556
MgO	1.445	0.513	0.748	0.417	0.975	0.277
CaO	0.047	0.080	0.071	0.0	0.050	0.111
Na ₂ O	0.293	0.0	0.052	0.145	0.234	0.0
K ₂ O	0.0	0.0	0.051	0.0	0.0	0.0
Cr ₂ O ₃	1.254	0.0	1.351	0.123	2.383	0.0
TOTAL	17.582	52.910	16.769	52.749	17.75	53.169
OXYGENS	4.000	3.000	4.000	3.000	4.000	3.000
Si	0.016	0.011	0.015	0.009	0.016	0.011
Ti	0.242	0.958	0.244	0.953	0.239	0.950
AL	0.323	0.009	0.327	0.009	0.303	0.006
Fe	2.816	1.004	2.854	1.015	2.821	1.000
Mn	0.014	0.024	0.012	0.025	0.018	0.055
Mg	0.093	0.019	0.049	0.016	0.063	0.011
Ca	0.002	0.002	0.003	0.0	0.002	0.003
Na	0.024	0.0	0.004	0.007	0.020	0.0
K	0.0	0.0	0.003	0.0	0.0	0.0
Cr	0.043	0.0	0.047	0.002	0.082	0.0
total	3.572	2.027	3.557	2.036	3.563	2.036

	35.01	35.02	35.03	35.04	35.05	35.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	11	11	11	11	11
ZONE	1	3	1	1	3	1
SiO ₂	52.963	55.281	51.406	51.952	53.729	52.154
TiO ₂	0.151	0.079	0.0	0.0	0.095	0.0
Al ₂ O ₃	29.092	28.444	29.959	29.015	28.560	29.855
FeO	0.637	0.489	0.772	0.568	0.735	0.769
MnO	0.028	0.091	0.0	0.078	0.0	0.0
MgO	0.267	0.349	0.156	0.179	0.109	0.155
CaO	13.141	11.652	13.988	13.010	12.320	13.755
Na ₂ O	4.096	4.878	3.576	3.915	4.319	3.640
K ₂ O	0.336	0.428	0.199	0.345	0.396	0.260
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.006	0.116
TOTAL	100.074	101.202	99.284	98.494	99.53	99.935
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.397	2.464	2.347	2.389	2.435	2.364
Ti	0.005	0.003	0.0	0.0	0.003	0.0
AL	1.551	1.494	1.612	1.573	1.525	1.595
Fe	0.024	0.018	0.029	0.022	0.028	0.029
Mn	0.001	0.003	0.0	0.003	0.0	0.0
Mg	0.018	0.023	0.011	0.012	0.007	0.010
Ca	0.637	0.556	0.684	0.641	0.598	0.668
Na	0.359	0.422	0.317	0.349	0.380	0.320
K	0.019	0.024	0.012	0.020	0.023	0.015
Cr	0.0	0.0	0.0	0.0	0.000	0.004
total	5.012	5.009	5.011	5.009	5.000	5.005

	35.07	35.08	35.09	35.10	35.11	35.12
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	11	11	34	11	11
ZONE	1	3	1	1	3	1
SiO ₂	52.329	54.012	52.113	56.422	53.674	48.579
TiO ₂	0.0	0.045	0.069	0.043	0.030	0.129
Al ₂ O ₃	29.565	28.910	29.201	26.384	28.731	32.161
FeO	0.614	0.606	0.412	0.384	0.347	0.814
MnO	0.183	0.0	0.0	0.050	0.070	0.0
MgO	0.290	0.085	0.249	0.123	0.129	0.021
CaO	13.703	12.111	13.155	9.730	12.185	16.407
Na ₂ O	3.742	4.350	3.907	5.620	4.213	2.358
K ₂ O	0.267	0.331	0.327	0.468	0.299	0.176
Cr ₂ O ₃	0.0	0.098	0.050	0.0	0.0	0.0
TOTAL	100.079	99.942	99.071	98.840	99.33	99.831
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.372	2.436	2.385	2.561	2.439	2.222
Ti	0.0	0.002	0.002	0.001	0.001	0.004
AL	1.579	1.537	1.575	1.411	1.539	1.734
Fe	0.023	0.023	0.016	0.015	0.013	0.031
Mn	0.007	0.0	0.0	0.002	0.003	0.0
Mg	0.020	0.006	0.017	0.008	0.009	0.001
Ca	0.665	0.585	0.645	0.473	0.593	0.804
Na	0.329	0.380	0.347	0.495	0.371	0.209
K	0.015	0.019	0.019	0.027	0.017	0.010
Cr	0.0	0.003	0.002	0.0	0.0	0.0
total	5.011	4.992	5.007	4.993	4.985	5.016

	35.13	35.14	35.15	35.16	35.17	35.18
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	11	11	11	11	11
ZONE	2	2	1	3	1	1
SiO ₂	52.470	52.017	49.386	53.925	52.430	52.399
TiO ₂	0.072	0.007	0.025	0.140	0.057	0.049
Al ₂ O ₃	29.656	29.945	32.659	29.677	29.651	30.193
FeO	0.455	0.366	0.576	0.615	0.532	0.757
MnO	0.085	0.026	0.060	0.045	0.046	0.0
MgO	0.241	0.191	0.249	0.172	0.073	0.078
CaO	13.409	13.510	16.066	13.011	13.559	13.950
Na ₂ O	3.732	3.800	2.444	4.110	3.498	3.559
K ₂ O	0.338	0.343	0.091	0.355	0.239	0.192
Cr ₂ O ₃	0.122	0.023	0.0	0.0	0.077	0.0
TOTAL	100.125	99.862	100.980	101.435	99.63	100.420
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.377	2.364	2.231	2.404	2.382	2.361
Ti	0.002	0.000	0.001	0.005	0.002	0.002
AL	1.583	1.604	1.739	1.559	1.587	1.604
Fe	0.017	0.014	0.022	0.023	0.020	0.029
Mn	0.003	0.001	0.002	0.002	0.002	0.0
Mg	0.016	0.013	0.017	0.011	0.005	0.005
Ca	0.651	0.658	0.778	0.621	0.660	0.674
Na	0.328	0.335	0.214	0.355	0.308	0.311
K	0.020	0.020	0.005	0.020	0.014	0.011
Cr	0.004	0.001	0.0	0.0	0.003	0.0
total	5.001	5.010	5.008	5.000	4.982	4.996

	35.19	35.20	35.21	35.22	35.23	35.24
MINERAL	11	11	11	14	14	15
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	12	11	13	13	17
ZONE	1	1	3	1	1	1
SiO ₂	54.219	52.346	54.155	53.909	53.438	52.039
TiO ₂	0.098	0.060	0.074	0.676	0.504	0.653
Al ₂ O ₃	28.817	29.979	29.039	1.126	1.052	2.566
FeO	0.658	0.545	0.782	20.216	19.755	11.589
MnO	0.097	0.0	0.021	0.588	0.624	0.434
MgO	0.283	0.037	0.167	23.499	23.841	15.645
CaO	12.512	13.671	12.318	1.917	1.692	18.122
Na ₂ O	4.468	3.858	4.535	0.121	0.084	0.376
K ₂ O	0.413	0.227	0.255	0.0	0.033	0.0
Cr ₂ O ₃	0.083	0.0	0.054	0.075	0.0	0.0
TOTAL	100.990	100.178	100.618	81.911	81.27	89.835
OXYGENS	8.000	8.000	8.000	6.000	6.000	6.000
Si	2.428	2.368	2.427	1.954	1.955	1.919
Ti	0.003	0.002	0.002	0.018	0.014	0.018
AL	1.521	1.598	1.534	0.048	0.045	0.111
Fe	0.025	0.021	0.029	0.613	0.604	0.357
Mn	0.004	0.0	0.001	0.018	0.019	0.014
Mg	0.019	0.002	0.011	1.269	1.300	0.859
Ca	0.600	0.663	0.591	0.074	0.066	0.716
Na	0.388	0.338	0.394	0.009	0.006	0.027
K	0.024	0.013	0.015	0.0	0.002	0.0
Cr	0.003	0.0	0.002	0.002	0.0	0.0
total	5.013	5.006	5.007	4.006	4.012	4.021

	35.25	35.26	35.27	35.28	35.29	35.30
MINERAL	14	15	15	15	15	15
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	13	17	17	17	17	17
ZONE	1	2	1	1	1	2
SiO ₂	53.245	52.286	51.534	52.332	51.660	52.328
TiO ₂	0.432	0.658	0.829	0.970	1.039	0.607
Al ₂ O ₃	1.189	1.514	1.821	1.942	2.265	1.415
FeO	20.097	9.243	10.759	10.597	10.012	10.361
MnO	0.434	0.357	0.232	0.392	0.318	0.408
MgO	23.178	14.511	14.183	14.647	14.078	13.521
CaO	2.073	21.306	20.167	20.304	21.021	21.658
Na ₂ O	0.204	0.256	0.314	0.605	0.443	0.396
K ₂ O	0.0	0.0	0.071	0.006	0.072	0.0
Cr ₂ O ₃	0.151	0.007	0.101	0.001	0.0	0.0
TOTAL	80.906	90.895	89.252	91.199	90.90	90.333
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.953	1.949	1.933	1.927	1.919	1.952
Ti	0.012	0.018	0.023	0.027	0.029	0.017
AL	0.051	0.067	0.081	0.084	0.099	0.062
Fe	0.617	0.288	0.338	0.326	0.311	0.323
Mn	0.013	0.011	0.007	0.012	0.010	0.013
Mg	1.267	0.806	0.793	0.804	0.779	0.752
Ca	0.081	0.851	0.811	0.801	0.837	0.866
Na	0.015	0.018	0.023	0.043	0.032	0.029
K	0.0	0.0	0.003	0.000	0.003	0.0
Cr	0.004	0.000	0.003	0.000	0.0	0.0
total	4.014	4.009	4.015	4.025	4.020	4.014

	35.31	35.32	35.33	36.01	36.02	36.03
MINERAL	18	19	18	13	13	13
ROCK TYPE	28	28	28	31	31	31
GRAINTYPE	21	22	21	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	0.310	1.438	0.145	38.997	38.558	39.312
TiO ₂	5.301	50.203	5.377	0.046	0.0	0.041
Al ₂ O ₃	1.511	0.514	1.972	0.175	0.086	0.194
FeO	86.568	47.365	86.565	24.215	24.389	24.374
MnO	0.150	1.695	0.200	0.664	0.571	0.525
MgO	0.187	0.581	0.506	37.973	37.062	37.912
CaO	0.0	0.311	0.113	0.112	0.062	0.165
Na ₂ O	0.200	0.0	0.0	0.273	0.131	0.392
K ₂ O	0.0	0.0	0.023	0.045	0.0	0.020
Cr ₂ O ₃	0.081	0.009	0.114	0.103	0.036	0.030
TOTAL	7.740	54.751	8.450	78.388	76.51	78.591
OXYGENS	4.000	3.000	4.000	4.000	4.000	4.000
Si	0.015	0.035	0.007	0.998	1.004	1.002
Ti	0.189	0.932	0.189	0.001	0.0	0.001
AL	0.084	0.015	0.109	0.005	0.003	0.006
Fe	3.433	0.978	3.389	0.518	0.531	0.519
Mn	0.006	0.035	0.008	0.014	0.013	0.011
Mg	0.013	0.021	0.035	1.448	1.438	1.440
Ca	0.0	0.008	0.006	0.003	0.002	0.005
Na	0.018	0.0	0.0	0.014	0.007	0.019
K	0.0	0.0	0.001	0.001	0.0	0.001
Cr	0.003	0.000	0.004	0.002	0.001	0.001
total	3.762	2.025	3.748	3.005	2.998	3.004

	36.04	36.05	36.06	36.07	36.08	36.09
MINERAL	13	13	14	14	14	15
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	28	28	13	15	15	17
ZONE	1	1	1	1	1	1
SiO ₂	38.729	39.091	53.369	54.582	53.695	51.032
TiO ₂	0.031	0.005	0.445	0.457	0.227	0.940
Al ₂ O ₃	0.071	0.071	.0856	0.971	1.090	2.907
FeO	23.903	23.761	18.699	15.525	15.932	9.707
MnO	0.479	0.527	0.333	0.578	0.301	0.337
MgO	37.822	38.210	24.265	27.493	26.506	14.771
CaO	0.074	0.139	1.848	1.321	1.447	19.452
Na ₂ O	0.168	0.267	0.288	0.328	0.234	0.629
K ₂ O	0.057	0.0	0.022	0.0	0.118	0.0
Cr ₂ O ₃	0.0	0.0	0.113	0.0	0.0	0.182
TOTAL	77.431	78.310	81.539	85.730	83.62	90.250
OXYGENS	4.000	4.000	6.000	6.000	6.000	6.000
Si	1.002	1.003	1.960	1.952	1.957	1.905
Ti	0.001	0.000	0.012	0.012	0.006	0.026
AL	0.002	0.002	0.037	0.041	0.047	0.128
Fe	0.517	0.510	0.574	0.464	0.486	0.303
Mn	0.010	0.011	0.010	0.018	0.009	0.011
Mg	1.458	1.460	1.328	1.465	1.440	0.822
Ca	0.002	0.004	0.073	0.051	0.057	0.778
Na	0.008	0.013	0.021	0.023	0.017	0.046
K	0.002	0.0	0.001	0.0	0.005	0.0
Cr	0.0	0.0	0.003	0.0	0.0	0.005
total	3.002	3.003	4.019	4.026	4.024	4.024

	36.10	36.11	36.12	36.13	36.14	36.15
MINERAL	15	15	15	15	15	15
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	17	17	17	17	17	17
ZONE	1	1	1	2	1	1
SiO ₂	51.329	50.960	51.426	50.720	51.800	49.971
TiO ₂	0.873	0.916	0.749	1.070	0.680	0.933
Al ₂ O ₃	2.486	2.498	2.767	2.922	2.241	3.101
FeO	9.790	9.647	9.703	9.839	9.926	10.031
MnO	0.428	0.418	0.236	0.349	0.274	0.276
MgO	14.878	14.873	14.928	14.562	15.173	14.152
CaO	19.194	19.345	19.388	19.794	19.261	19.829
Na ₂ O	0.708	0.574	0.636	0.654	0.614	0.658
K ₂ O	0.0	0.0	0.0	0.0	0.0	0.0
Cr ₂ O ₃	0.013	0.0	0.045	0.089	0.317	0.235
TOTAL	89.909	89.584	90.175	90.160	90.36	89.155
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.921	1.916	1.918	1.897	1.926	1.889
Ti	0.025	0.026	0.021	0.030	0.019	0.027
AL	0.110	0.111	0.122	0.129	0.098	0.138
Fe	0.306	0.303	0.303	0.308	0.309	0.317
Mn	0.014	0.013	0.007	0.011	0.009	0.009
Mg	0.830	0.833	0.830	0.812	0.841	0.797
Ca	0.769	0.779	0.775	0.793	0.767	0.803
Na	0.051	0.042	0.046	0.047	0.044	0.048
K	0.0	0.0	0.0	0.0	0.0	0.0
Cr	0.000	0.0	0.001	0.003	0.009	0.007
total	4.025	4.024	4.022	4.030	4.023	4.036

	36.16	36.17	36.18	36.19	36.20	36.21
MINERAL	14	14	15	14	15	16
ROCK TYPE	31	31	31	31	31	31
GRAINTYPE	13	13	17	15	18	30
ZONE	1	1	1	1	1	1
SiO ₂	53.637	53.177	50.464	51.828	50.871	49.520
TiO ₂	0.421	0.565	1.105	0.473	0.751	0.363
Al ₂ O ₃	1.143	1.174	2.908	2.236	2.123	13.192
FeO	17.559	18.559	8.975	17.235	7.715	6.662
MnO	0.355	0.644	0.311	0.322	0.165	0.131
MgO	24.849	24.106	14.189	25.030	15.082	10.826
CaO	2.014	2.168	19.943	1.876	21.289	15.430
Na ₂ O	0.459	0.338	0.628	0.197	0.544	1.383
K ₂ O	0.054	0.008	0.0	0.069	0.0	33.000
Cr ₂ O ₃	0.057	0.0	0.333	0.031	0.257	0.016
TOTAL	82.989	82.180	89.881	82.062	91.08	123.861
OXYGENS	6.000	6.000	6.000	6.000	6.000	23.000
Si	1.955	1.946	1.904	1.913	1.916	6.202
Ti	0.012	0.016	0.031	0.013	0.021	0.034
AL	0.049	0.051	0.129	0.097	0.094	1.947
Fe	0.535	0.568	0.283	0.532	0.243	0.698
Mn	0.011	0.020	0.010	0.010	0.005	0.014
Mg	1.349	1.315	0.798	1.376	0.846	2.020
Ca	0.079	0.085	0.806	0.074	0.859	2.070
Na	0.032	0.024	0.046	0.014	0.040	0.336
K	0.003	0.000	0.0	0.003	0.0	5.272
Cr	0.002	0.0	0.010	0.001	0.008	0.002
total	4.026	4.025	4.018	4.034	4.032	18.594

	36.22	36.23	36.24	36.25	37.01	37.02
MINERAL	11	11	11	11	11	11
ROCK TYPE	31	31	31	31	27	27
GRAINTYPE	11	11	12	12	12	12
ZONE	1	3	1	1	1	3
SiO ₂	51.144	54.139	52.883	52.948	53.703	55.216
TiO ₂	0.112	0.0	0.075	0.033	0.072	0.047
Al ₂ O ₃	30.537	28.331	28.668	29.690	27.229	28.133
FeO	0.421	0.463	0.489	0.675	0.660	0.760
MnO	0.112	0.012	0.0	0.092	0.0	0.0
MgO	0.243	0.282	0.053	0.310	0.129	0.250
CaO	14.283	11.932	12.389	12.669	11.491	11.476
Na ₂ O	3.653	5.009	4.279	4.269	4.679	4.987
K ₂ O	0.176	0.150	0.176	0.189	0.282	0.290
Cr ₂ O ₃	0.032	0.020	0.075	0.0	0.0	0.026
TOTAL	100.292	99.875	98.598	100.200	97.58	100.425
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.322	2.448	2.422	2.388	2.477	2.473
Ti	0.004	0.0	0.003	0.001	0.002	0.002
AL	1.634	1.510	1.547	1.578	1.480	1.485
Fe	0.016	0.018	0.019	0.025	0.025	0.028
Mn	0.004	0.000	0.0	0.004	0.0	0.0
Mg	0.016	0.019	0.004	0.021	0.009	0.017
Ca	0.695	0.578	0.608	0.612	0.568	0.551
Na	0.321	0.439	0.380	0.373	0.418	0.433
K	0.010	0.009	0.010	0.011	0.017	0.017
Cr	0.001	0.001	0.003	0.0	0.0	0.001
total	5.023	5.021	4.995	5.014	4.997	5.007

	37.03	37.04	37.05	37.06	37.07	37.08
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	12	12	12	12	11
ZONE	1	3	1	1	3	1
SiO ₂	54.742	54.166	55.210	54.530	54.565	53.877
TiO ₂	0.076	0.068	0.140	0.025	0.031	0.0
Al ₂ O ₃	27.794	27.927	27.532	27.529	27.328	27.332
FeO	0.537	0.867	0.723	0.683	0.621	0.656
MnO	0.062	0.068	0.016	0.042	0.081	0.0
MgO	0.233	0.273	0.161	0.231	0.268	0.112
CaO	11.440	11.554	10.965	11.442	11.054	11.379
Na ₂ O	4.789	4.715	4.919	4.688	4.935	4.608
K ₂ O	0.276	0.279	0.278	0.304	0.348	0.250
Cr ₂ O ₃	0.058	0.095	0.087	0.039	0.068	0.015
TOTAL	99.470	99.145	99.308	98.830	98.68	97.573
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.478	2.459	2.496	2.482	2.489	2.483
Ti	0.003	0.002	0.005	0.001	0.001	0.0
AL	1.483	1.494	1.467	1.477	1.469	1.484
Fe	0.020	0.033	0.027	0.026	0.024	0.025
Mn	0.002	0.003	0.001	0.002	0.003	0.0
Mg	0.016	0.018	0.011	0.016	0.018	0.008
Ca	0.555	0.562	0.531	0.558	0.540	0.562
Na	0.420	0.415	0.431	0.414	0.436	0.412
K	0.016	0.016	0.016	0.018	0.020	0.015
Cr	0.002	0.003	0.003	0.001	0.002	0.001
total	4.995	5.006	4.988	4.994	5.003	4.988

	37.09	37.10	37.11	37.12	37.13	37.14
MINERAL	11	14	14	15	15	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	11	13	13	17	17	17
ZONE	3	1	1	2	1	1
SiO ₂	54.727	52.415	53.139	52.021	51.061	50.858
TiO ₂	0.065	0.541	0.488	0.826	0.969	0.860
Al ₂ O ₃	27.612	1.107	1.133	2.143	2.307	2.404
FeO	0.569	20.043	20.025	9.943	12.074	11.642
MnO	0.023	0.476	0.495	0.471	0.403	0.427
MgO	0.140	22.694	23.416	15.093	14.769	14.716
CaO	11.479	2.151	2.297	20.038	18.119	18.116
Na ₂ O	4.752	0.0	0.280	0.523	0.501	0.420
K ₂ O	0.254	0.0	0.041	0.0	0.0	0.006
Cr ₂ O ₃	0.0	0.115	0.001	0.162	0.055	0.0
TOTAL	99.052	79.499	81.290	91.277	88.18	87.807
OXYGENS	8.000	6.000	6.000	6.000	6.000	6.000
Si	2.486	1.953	1.946	1.921	1.914	1.918
Ti	0.002	0.015	0.013	0.023	0.027	0.024
AL	1.478	0.049	0.049	0.093	0.102	0.107
Fe	0.022	0.625	0.613	0.307	0.378	0.367
Mn	0.001	0.015	0.015	0.015	0.013	0.014
Mg	0.009	1.260	1.278	0.831	0.825	0.827
Ca	0.559	0.086	0.090	0.793	0.728	0.732
Na	0.418	0.0	0.020	0.037	0.036	0.031
K	0.015	0.0	0.002	0.0	0.0	0.000
Cr	0.0	0.003	0.000	0.005	0.002	0.0
total	4.990	4.006	4.027	4.025	4.025	4.020

	37.15	37.16	37.17	37.18	37.19	37.20
MINERAL	15	15	15	14	14	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	17	17	13	13	17
ZONE	1	1	2	1	1	1
SiO ₂	50.940	51.699	52.571	52.810	53.210	51.608
TiO ₂	0.894	0.677	0.335	0.459	0.499	0.750
Al ₂ O ₃	2.347	1.926	1.381	1.023	1.042	1.900
Fe0	12.157	11.210	8.928	19.826	19.928	11.462
MnO	0.310	0.572	0.373	0.469	0.543	0.455
MgO	14.890	15.370	15.137	22.799	23.363	14.887
CaO	17.883	18.362	20.520	2.119	2.214	19.056
Na ₂ O	0.376	0.456	0.524	0.191	0.253	0.467
K ₂ O	0.011	0.035	0.0	0.0	0.018	0.026
Cr ₂ O ₃	0.010	0.0	0.0	0.051	0.0	0.0
TOTAL	87.661	89.097	90.841	79.921	81.14	89.149
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.916	1.930	1.960	1.961	1.952	1.926
Ti	0.025	0.019	0.009	0.013	0.014	0.021
AL	0.104	0.085	0.061	0.045	0.045	0.084
Fe	0.382	0.350	0.278	0.616	0.611	0.358
Mn	0.010	0.018	0.012	0.015	0.017	0.014
Mg	0.834	0.855	0.841	1.261	1.277	0.828
Ca	0.721	0.734	0.820	0.084	0.087	0.762
Na	0.027	0.033	0.038	0.014	0.018	0.034
K	0.001	0.002	0.0	0.0	0.001	0.001
Cr	0.000	0.0	0.0	0.001	0.0	0.0
total	4.021	4.026	4.019	4.010	4.021	4.028

	37.21	37.22	37.23	37.24	37.25	38.01
MINERAL	15	18	18	18	18	13
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	19	19	19	19	28
ZONE	2	1	1	1	1	1
SiO ₂	51.476	0.930	0.479	0.360	0.245	36.656
TiO ₂	0.710	3.954	6.594	4.594	6.199	0.048
Al ₂ O ₃	2.170	1.148	1.923	2.096	2.205	0.092
FeO	10.443	85.893	84.541	84.747	83.885	31.670
MnO	0.402	0.0	0.109	0.037	0.227	0.620
MgO	14.555	0.574	0.435	0.547	0.964	31.203
CaO	20.072	0.215	0.0	0.024	0.025	0.085
Na ₂ O	0.534	0.005	0.210	0.062	0.0	0.031
K ₂ O	0.0	0.038	0.039	0.078	0.053	0.001
Cr ₂ O ₃	0.0	0.137	0.180	0.233	0.180	0.0
TOTAL	89.919	7.001	9.969	8.031	10.10	68.736
OXYGENS	6.000	4.000	4.000	4.000	4.000	4.000
Si	1.923	0.045	0.022	0.017	0.011	0.996
Ti	0.020	0.143	0.230	0.166	0.217	0.001
AL	0.096	0.065	0.105	0.118	0.121	0.003
Fe	0.326	3.464	3.282	3.396	3.272	0.720
Mn	0.013	0.0	0.004	0.002	0.009	0.014
Mg	0.810	0.041	0.030	0.039	0.067	1.264
Ca	0.803	0.011	0.0	0.001	0.001	0.002
Na	0.039	0.000	0.019	0.006	0.0	0.002
K	0.0	0.002	0.002	0.005	0.003	0.000
Cr	0.0	0.005	0.007	0.009	0.007	0.0
total	4.029	3.778	3.702	3.759	3.709	3.002

	38.02	38.03	38.04	38.05	38.06	38.07
MINERAL	13	13	13	13	13	13
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	28	28	28	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	36.659	36.634	36.684	36.896	37.382	36.366
TiO ₂	0.0	0.0	0.0	0.097	0.183	0.0
Al ₂ O ₃	0.0	0.101	0.0	0.025	0.177	0.152
FeO	30.691	31.084	31.495	32.041	29.815	30.754
MnO	0.593	0.571	0.397	0.476	0.546	0.549
MgO	30.241	31.804	31.552	31.580	30.855	31.684
CaO	0.105	0.084	0.096	0.141	0.109	0.060
Na ₂ O	0.054	0.142	0.143	0.465	0.0	0.109
K ₂ O	0.017	0.0	0.032	0.009	0.045	0.013
Cr ₂ O ₃	0.0	0.111	0.036	0.0	0.126	0.0
TOTAL	67.669	69.447	68.940	69.689	69.42	68.933
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	1.013	0.992	0.996	0.992	1.017	0.992
Ti	0.0	0.0	0.0	0.002	0.004	0.0
AL	0.0	0.003	0.0	0.001	0.006	0.005
Fe	0.709	0.704	0.715	0.720	0.678	0.702
Mn	0.014	0.013	0.009	0.011	0.013	0.013
Mg	1.245	1.284	1.276	1.265	1.251	1.288
Ca	0.003	0.002	0.003	0.004	0.003	0.002
Na	0.003	0.007	0.008	0.024	0.0	0.006
K	0.001	0.0	0.001	0.000	0.002	0.000
Cr	0.0	0.002	0.001	0.0	0.003	0.0
total	2.989	3.009	3.008	3.018	2.976	3.008

	38.08	38.09	38.10	38.11	38.12	38.13
MINERAL	13	13	13	13	13	13
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	28	28	28	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	36.362	36.505	40.165	37.137	36.273	36.361
TiO ₂	0.136	0.108	0.0	0.0	0.078	0.020
Al ₂ O ₃	0.0	0.151	0.075	0.267	0.187	0.0
FeO	32.192	31.958	28.200	31.610	31.677	31.596
MnO	0.495	0.482	0.447	0.502	0.602	0.508
MgO	31.139	31.662	29.502	31.978	30.734	30.413
CaO	0.015	0.041	0.042	0.140	0.035	0.174
Na ₂ O	0.0	0.306	0.106	0.273	0.442	0.344
K ₂ O	0.004	0.0	0.024	0.024	0.047	0.0
Cr ₂ O ₃	0.0	0.0	0.148	0.0	0.0	0.011
TOTAL	68.151	69.255	70.509	70.321	68.40	67.831
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	0.992	0.986	1.080	0.992	0.992	1.000
Ti	0.003	0.002	0.0	0.0	0.002	0.000
AL	0.0	0.005	0.002	0.008	0.006	0.0
Fe	0.734	0.722	0.634	0.706	0.724	0.727
Mn	0.011	0.011	0.010	0.011	0.014	0.012
Mg	1.265	1.274	1.182	1.273	1.252	1.246
Ca	0.000	0.001	0.001	0.004	0.001	0.005
Na	0.0	0.016	0.006	0.014	0.023	0.018
K	0.000	0.0	0.001	0.001	0.002	0.0
Cr	0.0	0.0	0.003	0.0	0.0	0.000
total	3.006	3.017	2.920	3.011	3.016	3.009

	38.14	38.15	38.16	38.17	38.18	38.19
MINERAL	13	13	13	13	13	13
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	28	28	28	28	28	28
ZONE	1	1	1	1	1	1
SiO ₂	36.214	36.768	36.662	37.151	36.747	36.076
TiO ₂	0.106	0.034	0.0	0.028	0.006	0.061
Al ₂ O ₃	0.050	0.121	-0.023	0.120	0.030	0.037
FeO	32.055	31.959	32.091	31.145	31.898	32.306
MnO	0.639	0.540	0.432	0.705	0.509	0.726
MgO	31.117	29.749	31.295	31.132	31.495	30.893
CaO	0.098	0.165	0.091	0.058	0.012	0.078
Na ₂ O	0.039	0.240	0.256	0.026	0.222	0.303
K ₂ O	0.0	0.010	0.0	0.010	0.021	0.0
Cr ₂ O ₃	0.013	0.070	0.040	0.0	0.0	0.0
TOTAL	68.276	67.697	68.799	69.230	69.04	68.174
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	0.988	1.009	0.994	1.006	0.994	0.986
Ti	0.002	0.001	0.0	0.001	0.000	0.001
AL	0.002	0.004	0.001	0.004	0.001	0.001
Fe	0.732	0.733	0.727	0.705	0.722	0.738
Mn	0.015	0.013	0.010	0.016	0.012	0.017
Mg	1.266	1.216	1.264	1.256	1.270	1.258
Ca	0.003	0.005	0.003	0.002	0.000	0.002
Na	0.002	0.013	0.013	0.001	0.012	0.016
K	0.0	0.000	0.0	0.000	0.001	0.0
Cr	0.000	0.002	0.001	0.0	0.0	0.0
total	3.009	2.994	3.012	2.992	3.011	3.020

	38.20	38.21	38.22	38.23	38.24	38.25
MINERAL	13	19	18	18	18	19
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	28	23	21	21	20	23
ZONE	1	1	1	1	1	1
SiO ₂	36.260	1.065	0.390	1.185	0.772	4.952
TiO ₂	0.097	48.424	10.497	8.982	7.608	45.042
Al ₂ O ₃	0.0	0.232	4.059	3.571	3.172	0.224
FeO	31.369	45.235	78.192	79.061	81.318	45.117
MnO	0.320	0.988	0.096	0.229	0.337	1.529
MgO	31.074	2.063	1.032	1.295	0.913	2.799
CaO	0.164	0.013	0.049	0.075	0.018	0.138
Na ₂ O	0.219	0.170	0.067	0.0	0.061	0.024
K ₂ O	0.0	0.053	0.060	0.070	0.047	0.0
Cr ₂ O ₃	0.0	0.0	0.440	0.578	0.628	0.152
TOTAL	68.134	53.008	16.690	15.985	13.56	54.860
OXYGENS	4.000	3.000	4.000	4.000	4.000	3.000
Si	0.994	0.027	0.017	0.052	0.035	0.122
Ti	0.002	0.931	0.345	0.296	0.257	0.836
AL	0.0	0.007	0.209	0.185	0.168	0.007
Fe	0.719	0.967	2.861	2.898	3.053	0.931
Mn	0.007	0.021	0.004	0.009	0.013	0.032
Mg	1.270	0.079	0.067	0.085	0.061	0.103
Ca	0.005	0.000	0.002	0.004	0.001	0.004
Na	0.012	0.008	0.006	0.0	0.005	0.001
K	0.0	0.002	0.003	0.004	0.003	0.0
Cr	0.0	0.0	0.015	0.020	0.022	0.003
total	3.009	2.043	3.530	3.552	3.617	2.038

	38.26	38.27	38.28	38.29	38.30	38.31
MINERAL	18	18	18	18	18	14
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	21	21	21	21	21	15
ZONE	1	1	1	1	1	1
SiO ₂	0.557	0.509	0.461	0.655	1.616	52.270
TiO ₂	8.435	10.258	5.670	8.698	10.077	0.311
Al ₂ O ₃	3.277	3.003	3.228	2.509	3.151	1.047
FeO	80.194	79.781	81.889	78.924	75.877	20.098
MnO	0.247	0.281	0.336	0.568	0.425	0.452
MgO	0.700	0.830	0.591	0.446	1.270	25.012
CaO	0.118	0.146	0.132	0.140	0.096	0.683
Na ₂ O	0.088	0.123	0.125	0.225	0.037	0.290
K ₂ O	0.014	0.034	0.059	0.0	0.0	0.0
Cr ₂ O ₃	0.678	1.353	1.496	1.653	1.313	0.012
TOTAL	14.114	16.537	12.098	14.894	17.98	80.077
OXYGENS	4.000	4.000	4.000	4.000	4.000	6.000
Si	0.025	0.022	0.021	0.030	0.071	1.932
Ti	0.285	0.336	0.196	0.296	0.332	0.009
AL	0.174	0.154	0.175	0.134	0.163	0.046
Fe	3.016	2.906	3.153	2.990	2.778	0.621
Mn	0.009	0.010	0.013	0.022	0.016	0.014
Mg	0.047	0.054	0.041	0.030	0.083	1.377
Ca	0.006	0.007	0.007	0.007	0.005	0.027
Na	0.008	0.010	0.011	0.020	0.003	0.021
K	0.001	0.002	0.003	0.0	0.0	0.0
Cr	0.024	0.047	0.054	0.059	0.045	0.000
total	3.595	3.548	3.675	3.587	3.495	4.047

	38.32	38.33	38.34	38.35	38.36	38.37
MINERAL	14	14	14	14	14	14
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	14	14	15	15	15	15
ZONE	1	1	1	1	1	1
SiO ₂	52.763	52.191	52.876	52.571	53.262	53.377
TiO ₂	0.243	0.313	0.305	0.549	0.352	0.379
Al ₂ O ₃	1.235	1.298	0.812	1.421	1.149	0.798
FeO	18.831	18.508	18.688	18.689	18.948	18.337
MnO	0.452	0.496	0.497	0.710	0.546	0.507
MgO	24.377	23.867	24.217	22.849	25.063	24.420
CaO	1.215	1.506	1.397	3.330	1.067	1.075
Na ₂ O	0.298	0.377	0.195	0.334	0.287	0.189
K ₂ O	0.058	0.047	0.0	0.0	0.0	0.027
Cr ₂ O ₃	0.035	0.003	0.012	0.0	0.044	0.048
TOTAL	80.676	80.098	80.311	81.764	81.77	80.820
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.952	1.950	1.965	1.939	1.946	1.973
Ti	0.007	0.009	0.009	0.015	0.010	0.011
AL	0.054	0.057	0.036	0.062	0.049	0.035
Fe	0.582	0.578	0.581	0.576	0.579	0.567
Mn	0.014	0.016	0.016	0.022	0.017	0.016
Mg	1.344	1.328	1.341	1.256	1.365	1.345
Ca	0.048	0.060	0.056	0.132	0.042	0.043
Na	0.021	0.027	0.014	0.024	0.020	0.014
K	0.003	0.002	0.0	0.0	0.0	0.001
Cr	0.001	0.000	0.000	0.0	0.001	0.001
total	4.026	4.028	4.016	4.026	4.029	4.005

	38.38	38.39	38.40	38.41	38.42	38.43
MINERAL	14	14	14	14	15	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	15	15	15	15	17	17
ZONE	1	1	1	1	1	1
SiO ₂	52.142	52.963	51.798	52.421	50.448	50.103
TiO ₂	0.287	0.242	0.482	0.236	0.576	0.653
Al ₂ O ₃	1.017	1.039	0.957	0.997	2.336	2.226
FeO	19.203	19.194	19.414	18.969	11.303	10.760
MnO	0.497	0.428	0.442	0.461	0.312	0.273
MgO	24.051	24.204	24.065	23.865	14.651	14.262
CaO	1.024	0.826	1.372	1.345	18.356	18.948
Na ₂ O	0.130	0.059	0.093	0.023	0.224	0.427
K ₂ O	0.0	0.014	0.0	0.0	0.059	0.0
Cr ₂ O ₃	0.017	0.202	0.044	0.075	0.141	0.156
TOTAL	79.165	79.977	79.253	79.423	87.10	87.048
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.954	1.964	1.941	1.962	1.922	1.921
Ti	0.008	0.007	0.014	0.007	0.016	0.019
AL	0.045	0.045	0.042	0.044	0.105	0.101
Fe	0.602	0.595	0.608	0.594	0.360	0.345
Mn	0.016	0.013	0.014	0.015	0.010	0.009
Mg	1.343	1.337	1.344	1.331	0.832	0.815
Ca	0.041	0.033	0.055	0.054	0.749	0.778
Na	0.009	0.004	0.007	0.002	0.017	0.032
K	0.0	0.001	0.0	0.0	0.003	0.0
Cr	0.001	0.006	0.001	0.002	0.004	0.005
total	4.019	4.006	4.027	4.009	4.017	4.024

	38.44	38.45	38.46	38.47	38.48	38.49
MINERAL	15	15	15	15	15	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	17	17	17	17	17
ZONE	2	2	1	2	2	1
SiO ₂	50.671	50.066	50.811	51.091	50.974	50.715
TiO ₂	0.720	0.776	0.685	0.564	0.636	0.560
Al ₂ O ₃	2.028	1.937	2.142	1.443	2.168	2.148
FeO	10.126	10.347	11.066	9.074	9.082	11.771
MnO	0.355	0.353	0.146	0.363	0.198	0.308
MgO	14.091	14.156	14.710	13.922	14.172	15.100
CaO	20.770	20.113	18.972	21.382	21.547	17.837
Na ₂ O	0.353	0.477	0.450	0.166	0.391	0.460
K ₂ O	0.035	0.031	0.004	0.063	0.0	0.042
Cr ₂ O ₃	0.230	0.112	0.360	0.0	0.284	0.185
TOTAL	89.253	88.021	88.280	88.994	90.37	87.355
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.916	1.914	1.918	1.948	1.919	1.920
Ti	0.020	0.022	0.019	0.016	0.018	0.016
AL	0.090	0.087	0.095	0.065	0.096	0.096
Fe	0.320	0.331	0.349	0.289	0.286	0.373
Mn	0.011	0.011	0.005	0.012	0.006	0.010
Mg	0.794	0.806	0.828	0.791	0.795	0.852
Ca	0.841	0.824	0.767	0.874	0.869	0.723
Na	0.026	0.035	0.033	0.012	0.029	0.034
K	0.002	0.002	0.000	0.003	0.0	0.002
Cr	0.007	0.003	0.011	0.0	0.008	0.006
total	4.029	4.037	4.026	4.011	4.025	4.031

	38.50	38.51	38.52	38.53	38.54	38.55
MINERAL	15	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	12	12	12	12	12
ZONE	2	1	1	1	1	1
SiO ₂	51.487	53.566	54.284	53.950	53.079	53.062
TiO ₂	0.364	0.046	0.118	0.079	0.001	0.053
Al ₂ O ₃	1.404	27.684	27.858	28.325	28.285	28.524
FeO	9.162	0.545	0.476	0.428	0.315	0.605
MnO	0.165	0.068	0.048	0.070	0.049	0.017
MgO	14.139	0.134	0.317	0.249	0.162	0.139
CaO	21.633	11.646	11.588	11.986	12.469	12.655
Na ₂ O	0.499	4.765	5.045	4.380	4.372	4.123
K ₂ O	0.075	0.310	0.262	0.301	0.161	0.163
Cr ₂ O ₃	0.142	0.0	0.012	0.0	0.0	0.0
TOTAL	89.908	98.219	99.532	99.340	98.58	98.736
OXYGENS	6.000	8.000	8.000	8.000	8.000	8.000
Si	1.946	2.461	2.462	2.450	2.435	2.426
Ti	0.010	0.002	0.004	0.003	0.000	0.002
AL	0.063	1.499	1.489	1.516	1.529	1.537
Fe	0.290	0.021	0.018	0.016	0.012	0.023
Mn	0.005	0.003	0.002	0.003	0.002	0.001
Mg	0.796	0.009	0.021	0.017	0.011	0.009
Ca	0.876	0.573	0.563	0.583	0.613	0.620
Na	0.037	0.424	0.444	0.386	0.389	0.365
K	0.004	0.018	0.015	0.017	0.009	0.010
Cr	0.004	0.0	0.000	0.0	0.0	0.0
total	4.030	5.010	5.019	4.991	5.000	4.992

	38.56	39.01	39.02	39.03	39.04	39.05
MINERAL	11	13	13	13	19	18
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	28	28	28	22	19
ZONE	1	1	1	1	1	1
SiO ₂	53.281	36.578	36.195	36.112	0.548	0.611
TiO ₂	0.019	0.0	0.025	0.044	49.792	6.079
Al ₂ O ₃	28.254	0.0	0.0	0.120	0.211	2.342
FeO	0.579	29.745	31.736	32.191	48.747	83.496
MnO	0.0	0.636	0.454	0.542	1.075	0.284
MgO	0.116	32.313	31.749	31.541	1.228	0.627
CaO	12.053	0.165	0.181	0.072	0.063	0.235
Na ₂ O	4.393	0.078	0.090	0.213	0.097	0.371
K ₂ O	0.204	0.043	0.0	0.070	0.0	0.0
Cr ₂ O ₃	0.195	0.0	0.065	0.0	0.0	0.710
TOTAL	98.515	69.813	68.759	68.714	53.01	11.259
OXYGENS	8.000	4.000	4.000	4.000	3.000	4.000
Si	2.440	0.995	0.985	0.981	0.014	0.028
Ti	0.001	0.0	0.001	0.001	0.936	0.210
AL	1.525	0.0	0.0	0.004	0.006	0.127
Fe	0.022	0.677	0.722	0.731	1.019	3.212
Mn	0.0	0.015	0.010	0.012	0.023	0.011
Mg	0.008	1.310	1.287	1.277	0.046	0.043
Ca	0.591	0.005	0.005	0.002	0.002	0.012
Na	0.390	0.004	0.005	0.011	0.005	0.033
K	0.012	0.001	0.0	0.002	0.0	0.0
Cr	0.007	0.0	0.001	0.0	0.0	0.026
total	4.995	3.007	3.016	3.023	2.050	3.702

	39.06	39.07	39.08	39.09	39.10	39.11
MINERAL	19	18	18	18	18	18
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	22	19	21	19	21	21
ZONE	1	1	1	1	1	1
SiO ₂	0.296	0.759	0.415	1.400	0.315	0.346
TiO ₂	50.586	8.118	7.421	6.349	5.442	4.391
Al ₂ O ₃	0.144	2.786	3.406	2.440	1.216	1.221
FeO	48.447	81.887	82.771	81.688	86.936	88.174
MnO	0.616	0.235	0.009	0.195	0.149	0.012
MgO	1.871	0.762	0.875	1.147	0.211	0.182
CaO	0.0	0.214	0.0	0.081	0.015	0.063
Na ₂ O	0.135	0.135	0.220	0.191	0.0	0.0
K ₂ O	0.0	0.0	0.006	0.022	0.020	0.088
Cr ₂ O ₃	0.076	0.651	0.317	0.130	0.196	0.217
TOTAL	53.724	13.660	12.669	11.955	7.56	6.520
OXYGENS	3.000	4.000	4.000	4.000	4.000	4.000
Si	0.007	0.034	0.019	0.064	0.015	0.017
Ti	0.943	0.273	0.250	0.219	0.194	0.158
AL	0.004	0.147	0.180	0.132	0.068	0.069
Fe	1.005	3.057	3.106	3.130	3.447	3.517
Mn	0.013	0.009	0.000	0.008	0.006	0.000
Mg	0.069	0.051	0.059	0.078	0.015	0.013
Ca	0.0	0.010	0.0	0.004	0.001	0.003
Na	0.006	0.012	0.019	0.017	0.0	0.0
K	0.0	0.0	0.000	0.001	0.001	0.005
Cr	0.001	0.023	0.011	0.005	0.007	0.008
total	2.050	3.615	3.645	3.658	3.754	3.790

	39.12	39.13	39.14	39.15	39.16	39.17
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	34	34	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	54.317	56.549	53.177	53.086	52.932	53.197
TiO ₂	0.004	0.097	0.0	0.0	0.146	0.072
Al ₂ O ₃	26.836	25.642	28.375	27.995	28.917	28.551
FeO	0.596	0.687	0.570	0.596	0.669	0.467
MnO	0.0	0.0	0.0	0.0	0.0	0.0
MgO	0.069	0.187	0.288	0.187	0.272	0.199
CaO	10.737	9.311	12.545	12.239	12.516	12.009
Na ₂ O	5.037	5.875	4.297	4.308	4.462	4.437
K ₂ O	0.406	0.565	0.320	0.242	0.259	0.228
Cr ₂ O ₃	0.009	0.039	0.067	0.0	0.0	0.0
TOTAL	97.415	98.265	99.069	98.057	99.50	98.693
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.507	2.578	2.427	2.442	2.405	2.432
Ti	0.000	0.003	0.0	0.0	0.005	0.002
AL	1.460	1.377	1.526	1.518	1.548	1.538
Fe	0.023	0.026	0.022	0.023	0.025	0.018
Mn	0.0	0.0	0.0	0.0	0.0	0.0
Mg	0.005	0.013	0.020	0.013	0.018	0.014
Ca	0.531	0.455	0.613	0.603	0.609	0.588
Na	0.451	0.519	0.380	0.384	0.393	0.393
K	0.024	0.033	0.019	0.014	0.015	0.013
Cr	0.000	0.001	0.002	0.0	0.0	0.0
total	5.000	5.006	5.009	4.998	5.020	4.999

	39.18	39.19	39.20	39.21	39.22	39.23
MINERAL	11	11	15	15	15	15
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	12	18	18	18	18
ZONE	1	1	1	2	2	2
SiO ₂	52.565	52.948	50.809	52.014	51.688	52.464
TiO ₂	0.127	0.0	0.860	0.333	0.241	0.180
Al ₂ O ₃	27.833	28.479	-1.808	0.811	1.265	1.128
FeO	0.440	0.463	12.166	10.362	10.333	10.060
MnO	0.029	0.070	0.322	0.330	0.213	0.488
MgO	0.144	0.162	14.544	13.745	12.809	13.761
CaO	12.174	12.144	18.974	21.565	22.183	22.069
Na ₂ O	4.349	4.308	0.358	0.240	0.307	0.361
K ₂ O	0.220	0.334	0.004	0.001	0.039	0.012
Cr ₂ O ₃	0.0	0.025	0.191	0.065	0.031	0.0
TOTAL	97.441	98.470	87.870	89.104	88.78	90.463
OXYGENS	8.000	8.000	6.000	6.000	6.000	6.000
Si	2.437	2.429	1.916	1.965	1.963	1.961
Ti	0.004	0.0	0.024	0.009	0.007	0.005
AL	1.521	1.540	0.080	0.036	0.057	0.050
Fe	0.017	0.018	0.384	0.327	0.328	0.314
Mn	0.001	0.003	0.010	0.011	0.007	0.015
Mg	0.010	0.011	0.817	0.774	0.725	0.766
Ca	0.605	0.597	0.766	0.873	0.902	0.884
Na	0.391	0.383	0.026	0.018	0.023	0.026
K	0.013	0.020	0.000	0.000	0.002	0.001
Cr	0.0	0.001	0.006	0.002	0.001	0.0
total	5.000	5.002	4.030	4.015	4.014	4.022

	39.24	39.25	39.26	39.27	39.28	39.29
MINERAL	15	15	14	14	14	14
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	17	17	14	14	14	15
ZONE	2	1	1	1	1	1
SiO ₂	51.184	50.921	53.191	52.991	53.965	53.067
TiO ₂	0.756	0.771	0.186	0.506	0.377	0.239
Al ₂ O ₃	1.797	2.024	0.830	0.984	0.693	0.587
FeO	11.184	11.708	19.474	18.904	17.831	18.574
MnO	0.337	0.458	0.481	0.425	0.335	0.553
MgO	13.316	14.208	24.375	24.705	25.749	25.310
CaO	20.749	19.055	1.227	1.377	0.932	0.858
Na ₂ O	0.484	0.424	0.117	0.060	0.212	0.044
K ₂ O	0.0	0.035	0.0	0.058	0.021	0.0
Cr ₂ O ₃	0.0	0.128	0.0	0.001	0.0	0.0
TOTAL	88.623	88.024	80.407	81.107	82.28	80.658
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.933	1.922	1.963	1.950	1.968	1.963
Ti	0.021	0.022	0.005	0.014	0.010	0.007
AL	0.080	0.090	0.036	0.043	0.030	0.026
Fe	0.353	0.370	0.601	0.582	0.544	0.575
Mn	0.011	0.015	0.015	0.013	0.010	0.017
Mg	0.749	0.799	1.341	1.355	1.399	1.395
Ca	0.840	0.771	0.049	0.054	0.036	0.034
Na	0.035	0.031	0.008	0.004	0.015	0.003
K	0.0	0.002	0.0	0.003	0.001	0.0
Cr	0.0	0.004	0.0	0.000	0.0	0.0
total	4.023	4.025	4.018	4.018	4.014	4.019

	39.30	39.31	39.32	39.33	39.34	39.35
MINERAL	14	14	15	15	15	14
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	15	15	17	17	17	14
ZONE	1	1	1	2	1	1
SiO ₂	53.322	52.718	51.216	52.611	51.134	52.405
TiO ₂	0.336	0.434	0.841	0.219	0.644	0.315
Al ₂ O ₃	0.799	0.976	1.918	0.637	2.182	1.038
FeO	18.719	19.361	11.441	9.784	9.850	19.236
MnO	0.517	0.528	0.378	0.297	0.494	0.624
MgO	25.686	23.608	13.888	13.473	15.265	23.807
CaO	0.845	1.711	19.465	21.851	19.558	1.408
Na ₂ O	0.228	0.092	0.303	0.352	0.468	0.040
K ₂ O	0.0	0.020	0.019	0.0	0.010	0.0
Cr ₂ O ₃	0.0	0.0	0.130	0.046	0.058	0.096
TOTAL	81.733	80.087	88.158	89.486	89.81	79.733
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.950	1.958	1.933	1.985	1.918	1.955
Ti	0.009	0.012	0.024	0.006	0.018	0.009
AL	0.034	0.043	0.085	0.028	0.096	0.046
Fe	0.572	0.601	0.361	0.309	0.309	0.600
Mn	0.016	0.017	0.012	0.009	0.016	0.020
Mg	1.400	1.306	0.781	0.758	0.853	1.323
Ca	0.033	0.068	0.787	0.883	0.786	0.056
Na	0.016	0.007	0.022	0.026	0.034	0.003
K	0.0	0.001	0.001	0.0	0.000	0.0
Cr	0.0	0.0	0.004	0.001	0.002	0.003
total	4.031	4.013	4.010	4.006	4.032	4.014

	39.36	39.37	39.38	40.01	40.02	40.03
MINERAL	15	15	15	14	14	14
ROCK TYPE	27	27	27	29	29	29
GRAINTYPE	17	17	17	13	13	14
ZONE	1	1	1	1	1	1
SiO ₂	50.486	50.724	50.506	53.410	52.683	53.934
TiO ₂	0.679	0.859	0.620	0.554	0.450	0.137
Al ₂ O ₃	2.091	1.812	2.181	1.128	1.061	0.900
FeO	10.920	10.336	10.940	17.449	17.862	17.779
MnO	0.333	0.254	0.200	0.429	0.429	0.512
MgO	14.477	14.492	14.421	24.652	24.508	25.594
CaO	19.690	20.283	19.233	2.432	1.888	0.876
Na ₂ O	0.597	0.456	0.330	0.175	0.162	0.130
K ₂ O	0.0	0.007	0.009	0.0	0.0	0.0
Cr ₂ O ₃	0.0	0.166	0.174	0.130	0.082	0.0
TOTAL	88.353	89.053	87.674	82.910	81.26	82.083
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.913	1.917	1.921	1.951	1.951	1.971
Ti	0.019	0.024	0.018	0.015	0.013	0.004
AL	0.093	0.081	0.098	0.049	0.046	0.039
Fe	0.346	0.327	0.348	0.533	0.553	0.543
Mn	0.011	0.008	0.006	0.013	0.013	0.016
Mg	0.817	0.816	0.817	1.342	1.352	1.394
Ca	0.799	0.821	0.784	0.095	0.075	0.034
Na	0.044	0.033	0.024	0.012	0.012	0.009
K	0.0	0.000	0.000	0.0	0.0	0.0
Cr	0.0	0.005	0.005	0.004	0.002	0.0
total	4.043	4.033	4.022	4.014	4.018	4.010

	40.04	40.05	40.06	40.07	40.08	40.09
MINERAL	15	15	15	15	14	15
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	17	17	17	17	13	17
ZONE	2	2	2	2	1	2
SiO ₂	50.677	50.690	52.679	51.583	54.018	51.956
TiO ₂	0.645	0.579	0.464	0.660	0.593	0.835
Al ₂ O ₃	2.200	2.345	2.136	2.379	1.096	2.050
FeO	9.232	8.147	8.578	9.279	18.259	9.180
MnO	0.176	0.224	0.378	0.220	0.369	0.088
MgO	14.514	14.347	15.205	15.219	24.564	14.946
CaO	20.601	20.707	20.989	19.938	2.220	20.603
Na ₂ O	0.459	0.417	0.672	0.486	0.213	0.508
K ₂ O	0.0	0.022	0.021	0.046	0.0	0.0
Cr ₂ O ₃	0.270	0.385	0.195	0.247	0.013	0.206
TOTAL	89.542	89.716	92.739	90.778	83.09	91.192
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.918	1.927	1.935	1.921	1.957	1.929
Ti	0.018	0.017	0.013	0.018	0.016	0.023
AL	0.098	0.105	0.092	0.104	0.047	0.090
Fe	0.292	0.259	0.263	0.289	0.553	0.285
Mn	0.006	0.007	0.012	0.007	0.011	0.003
Mg	0.818	0.813	0.832	0.844	1.326	0.827
Ca	0.835	0.843	0.826	0.795	0.086	0.819
Na	0.034	0.031	0.048	0.035	0.015	0.037
K	0.0	0.001	0.001	0.002	0.0	0.0
Cr	0.008	0.012	0.006	0.007	0.000	0.006
total	4.028	4.014	4.028	4.024	4.011	4.018

	40.10	40.11	40.12	40.13	40.14	40.15
MINERAL	14	15	15	15	15	15
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	13	17	17	17	17	17
ZONE	1	2	2	2	2	2
SiO ₂	53.217	51.148	52.077	51.477	52.253	51.882
TiO ₂	0.596	0.618	0.613	0.701	0.524	0.505
Al ₂ O ₃	1.209	2.359	2.293	2.539	2.509	2.544
FeO	18.574	8.727	9.859	9.601	9.386	10.557
MnO	0.376	0.145	0.111	0.343	0.269	0.344
MgO	24.401	15.266	15.523	15.548	15.317	15.944
CaO	1.987	19.982	19.481	19.066	20.538	18.752
Na ₂ O	0.176	0.522	0.414	0.441	0.476	0.506
K ₂ O	0.038	0.007	0.0	0.055	0.012	0.0
Cr ₂ O ₃	0.111	0.251	0.272	0.364	0.309	0.326
TOTAL	82.111	90.298	90.784	90.534	92.21	90.803
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.945	1.921	1.926	1.915	1.918	1.911
Ti	0.016	0.017	0.017	0.020	0.014	0.014
AL	0.052	0.104	0.100	0.111	0.109	0.110
Fe	0.568	0.274	0.305	0.299	0.288	0.325
Mn	0.012	0.005	0.003	0.011	0.008	0.011
Mg	1.329	0.854	0.856	0.862	0.838	0.875
Ca	0.078	0.804	0.772	0.760	0.808	0.740
Na	0.012	0.038	0.030	0.032	0.034	0.036
K	0.002	0.000	0.0	0.003	0.001	0.0
Cr	0.003	0.007	0.008	0.011	0.009	0.009
total	4.018	4.025	4.017	4.022	4.026	4.033

	40.16	40.17	40.18	40.19	40.20	40.21
MINERAL	15	15	15	15	15	11
ROCK TYPE	29	27	27	27	27	29
GRAINTYPE	17	17	17	17	17	12
ZONE	2	2	2	2	2	1
SiO ₂	51.324	51.485	51.489	51.789	51.419	52.336
TiO ₂	0.862	0.763	0.583	0.648	0.427	0.0
Al ₂ O ₃	2.469	2.664	2.602	2.473	2.574	28.453
FeO	9.422	10.233	9.780	10.139	9.492	0.376
MnO	0.274	0.173	0.188	0.138	0.292	0.083
MgO	14.652	14.468	15.119	15.489	15.081	0.058
CaO	20.867	20.480	19.924	19.095	20.074	12.192
Na ₂ O	0.453	0.389	0.616	0.494	0.518	4.171
K ₂ O	0.0	0.029	0.0	0.0	0.0	0.322
Cr ₂ O ₃	0.334	0.432	0.350	0.287	0.380	0.041
TOTAL	91.235	90.883	90.871	90.413	90.76	97.656
OXYGENS	6.000	6.000	6.000	6.000	6.000	8.000
Si	1.907	1.908	1.911	1.920	1.915	2.423
Ti	0.024	0.021	0.016	0.018	0.012	0.0
AL	0.108	0.116	0.114	0.108	0.113	1.552
Fe	0.293	0.317	0.303	0.314	0.296	0.015
Mn	0.009	0.005	0.006	0.004	0.009	0.003
Mg	0.811	0.799	0.836	0.855	0.837	0.004
Ca	0.831	0.813	0.792	0.758	0.801	0.605
Na	0.033	0.028	0.044	0.035	0.037	0.374
K	0.0	0.001	0.0	0.0	0.0	0.019
Cr	0.010	0.013	0.010	0.008	0.011	0.002
total	4.026	4.021	4.033	4.022	4.030	4.997

	40.22	40.23	40.24	40.25	40.26	40.27
MINERAL	11	11	11	11	11	11
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	3	3	1
SiO ₂	54.296	52.297	53.034	54.602	54.006	55.289
TiO ₂	0.062	0.066	0.048	0.214	0.120	0.131
Al ₂ O ₃	27.438	28.224	28.678	27.913	27.970	26.958
FeO	0.676	0.427	0.432	0.636	0.500	0.178
MnO	0.0	0.0	0.110	0.167	0.132	0.125
MgO	0.0	0.101	0.191	0.219	0.103	0.048
CaO	10.987	12.552	12.200	11.440	11.535	10.592
Na ₂ O	4.730	4.184	4.539	4.792	4.572	5.111
K ₂ O	0.397	0.303	0.315	0.460	0.394	0.458
Cr ₂ O ₃	0.0	0.015	0.049	0.037	0.0	0.039
TOTAL	97.910	97.742	99.164	99.844	98.83	98.751
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.491	2.421	2.420	2.466	2.464	2.522
Ti	0.002	0.002	0.002	0.007	0.004	0.004
AL	1.484	1.540	1.542	1.486	1.504	1.449
Fe	0.026	0.017	0.016	0.024	0.019	0.007
Mn	0.0	0.0	0.004	0.006	0.005	0.005
Mg	0.0	0.007	0.013	0.015	0.007	0.003
Ca	0.540	0.623	0.596	0.554	0.564	0.518
Na	0.421	0.376	0.402	0.420	0.404	0.452
K	0.023	0.018	0.018	0.027	0.023	0.027
Cr	0.0	0.001	0.002	0.001	0.0	0.001
total	4.987	5.003	5.016	5.006	4.994	4.988

	40.28	40.29	40.30	40.31	40.32	40.33
MINERAL	11	11	11	11	11	11
ROCK TYPE	29	29	29	29	29	27
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	55.826	54.042	52.719	53.236	52.835	53.464
TiO ₂	0.083	0.078	0.026	0.065	0.0	0.016
Al ₂ O ₃	27.648	27.372	29.079	29.137	29.044	29.046
FeO	0.399	0.453	0.470	0.613	0.624	0.675
MnO	0.107	0.0	0.033	0.076	0.143	0.118
MgO	0.139	0.019	0.135	0.226	0.107	0.339
CaO	11.144	11.093	13.206	12.910	12.716	12.369
Na ₂ O	5.145	4.953	4.209	4.145	4.254	4.323
K ₂ O	0.470	0.495	0.275	0.263	0.333	0.142
Cr ₂ O ₃	0.0	0.017	0.057	0.0	0.0	0.107
TOTAL	100.562	98.069	99.739	100.058	99.43	99.924
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.502	2.484	2.397	2.406	2.405	2.415
Ti	0.003	0.003	0.001	0.002	0.0	0.001
AL	1.460	1.483	1.558	1.552	1.558	1.546
Fe	0.015	0.017	0.018	0.023	0.024	0.025
Mn	0.004	0.0	0.001	0.003	0.006	0.005
Mg	0.009	0.001	0.009	0.015	0.007	0.023
Ca	0.535	0.546	0.643	0.625	0.620	0.598
Na	0.447	0.441	0.371	0.363	0.375	0.379
K	0.027	0.029	0.016	0.015	0.019	0.008
Cr	0.0	0.001	0.002	0.0	0.0	0.004
total	5.002	5.006	5.016	5.005	5.014	5.003

	40.34	40.35	40.36	40.37	40.38	40.39
MINERAL	11	11	11	11	11	11
ROCK TYPE	27	27	27	27	27	27
GRAINTYPE	12	11	11	11	11	11
ZONE	1	1	1	3	1	3
SiO ₂	53.338	53.037	52.757	54.569	52.709	53.015
TiO ₂	0.095	0.065	0.114	0.063	0.106	0.144
Al ₂ O ₃	28.870	28.862	28.737	28.046	28.931	29.198
FeO	0.606	0.481	0.376	0.545	0.582	0.686
MnO	0.152	0.0	0.003	0.0	0.043	0.0
MgO	0.163	0.198	0.045	0.118	0.043	0.194
CaO	12.384	12.340	12.866	11.686	12.723	12.693
Na ₂ O	4.235	4.538	3.949	4.965	4.232	3.998
K ₂ O	0.277	0.220	0.197	0.320	0.193	0.185
Cr ₂ O ₃	0.0	0.046	0.082	0.073	0.0	0.074
TOTAL	99.514	99.306	98.750	99.840	98.98	99.501
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.421	2.415	2.416	2.465	2.407	2.404
Ti	0.003	0.002	0.004	0.002	0.004	0.005
AL	1.544	1.549	1.551	1.493	1.557	1.561
Fe	0.023	0.018	0.014	0.021	0.022	0.026
Mn	0.006	0.0	0.000	0.0	0.002	0.0
Mg	0.011	0.013	0.003	0.008	0.003	0.013
Ca	0.602	0.602	0.631	0.566	0.623	0.617
Na	0.373	0.401	0.351	0.435	0.375	0.352
K	0.016	0.013	0.012	0.018	0.011	0.011
Cr	0.0	0.002	0.003	0.003	0.0	0.003
total	4.998	5.014	4.984	5.011	5.003	4.990

	40.40	40.41	40.42	40.43	40.44	40.45
MINERAL	11	11	11	13	13	13
ROCK TYPE	27	27	27	29	29	29
GRAINTYPE	11	11	11	28	28	28
ZONE	1	1	3	1	1	1
SiO ₂	53.495	53.389	54.044	36.977	36.868	37.216
TiO ₂	0.122	0.054	0.119	0.089	0.023	0.135
Al ₂ O ₃	28.244	28.288	28.246	0.0	0.0	0.0
FeO	0.499	0.607	0.362	29.364	29.631	30.652
MnO	0.0	0.0	0.0	0.535	0.479	0.446
MgO	0.185	0.118	0.251	33.365	33.140	33.630
CaO	11.969	12.151	11.786	0.069	0.130	0.046
Na ₂ O	4.420	4.456	4.684	0.162	0.119	0.318
K ₂ O	0.279	0.230	0.401	0.0	0.0	0.020
Cr ₂ O ₃	0.009	0.0	0.0	0.030	0.093	0.0
TOTAL	98.723	98.686	99.531	71.227	70.85	71.811
OXYGENS	8.000	8.000	8.000	4.000	4.000	4.000
Si	2.444	2.440	2.452	0.992	0.992	0.985
Ti	0.004	0.002	0.004	0.002	0.000	0.003
AL	1.521	1.524	1.511	0.0	0.0	0.0
Fe	0.019	0.023	0.014	0.659	0.666	0.678
Mn	0.0	0.0	0.0	0.012	0.011	0.010
Mg	0.013	0.008	0.017	1.334	1.328	1.326
Ca	0.586	0.595	0.573	0.002	0.004	0.001
Na	0.392	0.395	0.412	0.008	0.006	0.016
K	0.016	0.013	0.023	0.0	0.0	0.001
Cr	0.000	0.0	0.0	0.001	0.002	0.0
total	4.995	5.000	5.006	3.010	3.010	3.021

	40.46	40.47	40.48	40.49	40.50	40.51
MINERAL	13	18	18	18	18	18
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	28	19	19	19	19	19
ZONE	1	1	1	1	1	1
SiO ₂	37.145	0.283	0.345	0.327	0.242	0.272
TiO ₂	0.216	6.124	10.100	7.271	9.071	4.780
Al ₂ O ₃	0.027	2.687	2.625	2.221	2.266	2.862
FeO	29.359	83.510	80.384	83.433	80.919	84.690
MnO	0.488	0.346	0.216	0.111	0.133	0.034
MgO	33.182	0.855	0.842	0.770	0.539	0.678
CaO	0.113	0.111	0.033	0.066	0.068	0.025
Na ₂ O	0.0	0.113	0.150	0.108	0.240	0.264
K ₂ O	0.0	0.0	0.0	0.0	0.0	0.0
Cr ₂ O ₃	0.0	1.715	1.757	1.854	2.131	1.269
TOTAL	71.171	12.234	16.068	12.728	14.69	10.184
OXYGENS	4.000	4.000	4.000	4.000	4.000	4.000
Si	0.996	0.013	0.015	0.015	0.011	0.013
Ti	0.004	0.209	0.332	0.246	0.305	0.166
AL	0.001	0.144	0.135	0.118	0.119	0.156
Fe	0.658	3.167	2.940	3.139	3.023	3.277
Mn	0.011	0.013	0.008	0.004	0.005	0.001
Mg	1.326	0.058	0.055	0.052	0.036	0.047
Ca	0.003	0.005	0.002	0.003	0.003	0.001
Na	0.0	0.010	0.013	0.009	0.021	0.024
K	0.0	0.0	0.0	0.0	0.0	0.0
Cr	0.0	0.061	0.061	0.066	0.075	0.046
total	2.999	3.681	3.561	3.652	3.598	3.732

	41.01	41.02	41.03	41.04	41.05	41.06
MINERAL	14	14	14	14	14	14
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	13	13	13	13	13	13
ZONE	1	1	1	1	1	1
SiO ₂	52.740	52.110	52.526	52.428	52.534	52.693
TiO ₂	0.380	0.438	0.309	0.409	0.298	0.178
Al ₂ O ₃	1.175	1.178	1.150	1.164	1.132	1.180
FeO	18.535	18.333	18.033	18.696	17.723	18.664
MnO	0.543	0.357	0.476	0.566	0.543	0.463
MgO	24.421	23.693	24.039	23.376	24.370	23.863
CaO	2.091	2.209	2.271	2.295	2.145	2.224
Na ₂ O	0.189	0.036	0.211	0.033	0.260	0.198
K ₂ O	0.0	0.0	0.024	0.031	0.001	0.0
Cr ₂ O ₃	0.246	0.154	0.004	0.131	0.168	0.036
TOTAL	81.785	80.175	81.010	80.433	81.45	80.835
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.939	1.948	1.951	1.952	1.947	1.953
Ti	0.011	0.012	0.009	0.011	0.008	0.005
AL	0.051	0.052	0.050	0.051	0.049	0.052
Fe	0.570	0.573	0.560	0.582	0.549	0.578
Mn	0.017	0.011	0.015	0.018	0.017	0.015
Mg	1.338	1.320	1.331	1.297	1.346	1.318
Ca	0.082	0.088	0.090	0.092	0.085	0.088
Na	0.013	0.003	0.015	0.002	0.019	0.014
K	0.0	0.0	0.001	0.001	0.000	0.0
Cr	0.007	0.005	0.000	0.004	0.005	0.001
total	4.028	4.013	4.023	4.011	4.026	4.023

	41.07	41.08	41.09	41.10	41.11	41.12
MINERAL	14	11	11	11	11	11
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	13	12	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	51.947	53.469	53.529	53.680	52.887	54.870
TiO ₂	0.349	0.141	0.172	0.079	0.022	0.126
Al ₂ O ₃	0.942	27.553	28.130	27.788	28.660	27.018
FeO	18.550	0.739	0.289	0.526	0.489	0.518
MnO	0.575	0.033	0.209	0.032	0.265	0.058
MgO	23.871	0.281	0.231	0.227	0.224	0.165
CaO	2.163	11.619	11.939	11.682	12.555	10.882
Na ₂ O	0.0	4.872	4.376	4.589	4.180	5.139
K ₂ O	0.038	0.434	0.356	0.283	0.341	0.399
Cr ₂ O ₃	0.048	0.095	0.113	0.075	0.051	0.078
TOTAL	79.933	98.497	99.055	98.435	99.18	98.735
OXYGENS	6.000	8.000	8.000	8.000	8.000	8.000
Si	1.947	2.452	2.444	2.459	2.415	2.503
Ti	0.010	0.005	0.006	0.003	0.001	0.004
AL	0.042	1.489	1.514	1.500	1.542	1.452
Fe	0.581	0.028	0.011	0.020	0.019	0.020
Mn	0.018	0.001	0.008	0.001	0.010	0.002
Mg	1.333	0.019	0.016	0.015	0.015	0.011
Ca	0.087	0.571	0.584	0.573	0.614	0.532
Na	0.0	0.433	0.387	0.408	0.370	0.454
K	0.002	0.025	0.021	0.017	0.020	0.023
Cr	0.001	0.003	0.004	0.003	0.002	0.003
total	4.022	5.027	4.995	4.999	5.008	5.004

	41.13	41.14	41.15	41.16	41.17	41.18
MINERAL	13	13	18	15	18	11
ROCK TYPE	29	29	29	29	29	29
GRAINTYPE	28	28	19	17	19	12
ZONE	1	1	1	1	1	1
SiO ₂	36.586	37.482	0.411	51.010	0.174	51.276
TiO ₂	0.037	0.0	7.877	0.710	7.468	0.0
Al ₂ O ₃	0.0	0.121	3.126	2.244	3.174	29.469
FeO	30.734	30.100	84.269	10.781	84.035	0.360
MnO	0.611	0.618	0.419	0.497	0.239	0.148
MgO	32.938	32.913	1.249	15.061	1.296	0.235
CaO	0.024	0.120	0.038	18.898	0.041	13.638
Na ₂ O	0.100	0.189	0.160	0.381	0.294	3.749
K ₂ O	0.044	0.015	0.076	0.010	0.017	0.232
Cr ₂ O ₃	0.0	0.198	0.640	0.265	0.933	0.099
TOTAL	70.340	71.656	13.996	89.076	13.64	98.846
OXYGENS	4.000	4.000	4.000	6.000	4.000	8.000
Si	0.984	0.996	0.018	1.914	0.008	2.358
Ti	0.001	0.0	0.258	0.020	0.247	0.0
AL	0.0	0.004	0.160	0.099	0.164	1.597
Fe	0.691	0.669	3.068	0.338	3.087	0.014
Mn	0.014	0.014	0.015	0.016	0.009	0.006
Mg	1.320	1.304	0.081	0.842	0.085	0.016
Ca	0.001	0.003	0.002	0.760	0.002	0.672
Na	0.005	0.010	0.014	0.028	0.025	0.334
K	0.002	0.001	0.004	0.000	0.001	0.014
Cr	0.0	0.004	0.022	0.008	0.032	0.004
total	3.018	3.005	3.642	4.026	3.660	5.015

	41.19	41.20	41.21	41.22	41.23	41.24
MINERAL	11	11	11	11	14	15
ROCK TYPE	29	25	25	25	25	25
GRAINTYPE	12	12	12	12	13	17
ZONE	1	1	1	1	1	2
SiO ₂	51.418	52.366	53.705	52.413	52.867	51.105
TiO ₂	0.132	0.0	0.098	0.0	0.577	0.714
Al ₂ O ₃	29.448	29.052	27.928	28.761	1.365	1.975
FeO	0.446	0.568	0.449	0.496	18.943	10.002
MnO	0.096	0.062	0.125	0.101	0.499	0.197
MgO	0.187	0.342	0.196	0.129	23.707	14.672
CaO	13.913	12.875	11.541	12.682	2.048	20.928
Na ₂ O	3.853	4.324	4.666	4.293	0.159	0.440
K ₂ O	0.203	0.125	0.230	0.152	0.0	0.010
Cr ₂ O ₃	0.0	0.081	0.105	0.113	0.202	0.267
TOTAL	99.250	99.227	98.594	98.644	81.42	90.308
OXYGENS	8.000	8.000	8.000	8.000	6.000	6.000
Si	2.356	2.390	2.457	2.405	1.944	1.912
Ti	0.005	0.0	0.003	0.0	0.016	0.020
AL	1.590	1.563	1.506	1.555	0.059	0.087
Fe	0.017	0.022	0.017	0.019	0.582	0.313
Mn	0.004	0.002	0.005	0.004	0.016	0.006
Mg	0.013	0.023	0.013	0.009	1.299	0.818
Ca	0.683	0.630	0.566	0.623	0.081	0.839
Na	0.342	0.383	0.414	0.382	0.011	0.032
K	0.012	0.007	0.013	0.009	0.0	0.000
Cr	0.0	0.003	0.004	0.004	0.006	0.008
total	5.021	5.022	4.998	5.011	4.013	4.036

	41.25	41.26	41.27	41.28	42.01	42.02
MINERAL	15	13	13	18	15	15
ROCK TYPE	25	25	25	25	26	26
GRAINTYPE	17	28	28	19	17	17
ZONE	2	1	1	1	2	2
SiO ₂	51.578	37.270	37.183	1.122	48.808	47.273
TiO ₂	0.504	0.191	0.054	7.425	0.329	0.636
Al ₂ O ₃	1.977	0.0	0.0	3.211	4.177	5.168
FeO	9.393	30.782	31.189	82.176	11.353	11.827
MnO	0.486	0.631	0.676	0.268	0.0	0.241
MgO	14.222	33.468	33.139	0.926	10.794	10.288
CaO	21.310	0.008	0.124	0.580	24.095	24.160
Na ₂ O	0.352	0.103	0.0	0.133	0.233	0.123
K ₂ O	0.014	0.0	0.0	0.021	0.025	0.007
Cr ₂ O ₃	0.350	0.159	0.0	2.118	0.033	0.099
TOTAL	90.793	71.830	71.176	15.804	88.49	87.995
OXYGENS	6.000	4.000	4.000	4.000	6.000	6.000
Si	1.929	0.986	0.988	0.048	1.863	1.816
Ti	0.014	0.004	0.001	0.241	0.009	0.018
AL	0.087	0.0	0.0	0.163	0.188	0.234
Fe	0.294	0.681	0.693	2.966	0.362	0.380
Mn	0.015	0.014	0.015	0.010	0.0	0.008
Mg	0.792	1.319	1.311	0.060	0.614	0.589
Ca	0.854	0.000	0.004	0.027	0.985	0.994
Na	0.026	0.005	0.0	0.011	0.017	0.009
K	0.001	0.0	0.0	0.001	0.001	0.000
Cr	0.010	0.003	0.0	0.072	0.001	0.003
total	4.022	3.012	3.011	3.599	4.042	4.052

	42.03	42.04	42.05	42.06	42.07	42.08
MINERAL	15	15	15	15	15	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	17	17	17	17	17
ZONE	2	2	2	2	2	2
SiO ₂	48.347	47.880	46.488	47.718	47.041	48.293
TiO ₂	0.514	0.461	0.500	0.344	0.687	0.441
Al ₂ O ₃	5.019	4.747	5.378	4.961	5.250	5.118
FeO	11.641	11.240	12.296	12.002	12.315	12.101
MnO	0.099	0.047	0.192	0.039	0.063	0.122
MgO	10.821	10.761	10.457	10.809	10.011	10.299
CaO	24.266	24.130	24.003	24.197	23.848	23.983
Na ₂ O	0.277	0.264	0.319	0.217	0.248	0.384
K ₂ O	0.094	0.0	0.0	0.0	0.031	0.0
Cr ₂ O ₃	0.091	0.158	0.158	0.0	0.026	0.067
TOTAL	89.528	88.448	87.495	88.285	87.20	88.707
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.828	1.834	1.794	1.823	1.815	1.834
Ti	0.015	0.013	0.015	0.010	0.020	0.013
AL	0.224	0.214	0.245	0.223	0.239	0.229
Fe	0.368	0.360	0.397	0.383	0.397	0.384
Mn	0.003	0.002	0.006	0.001	0.002	0.004
Mg	0.610	0.614	0.601	0.615	0.576	0.583
Ca	0.983	0.990	0.992	0.990	0.986	0.976
Na	0.020	0.020	0.024	0.016	0.019	0.028
K	0.005	0.0	0.0	0.0	0.002	0.0
Cr	0.003	0.005	0.005	0.0	0.001	0.002
total	4.057	4.053	4.079	4.063	4.055	4.052

	42.09	42.10	42.11	42.12	42.13	42.14
MINERAL	15	15	15	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	17	17	12	12	12
ZONE	2	2	2	1	1	1
SiO ₂	47.240	47.015	47.530	44.576	44.628	44.483
TiO ₂	0.461	0.493	0.188	0.042	0.113	0.005
Al ₂ O ₃	5.313	5.160	5.278	33.738	33.446	33.909
FeO	12.156	11.917	11.925	0.966	1.097	0.870
MnO	0.143	0.089	0.120	0.155	0.092	0.058
MgO	10.471	10.124	10.325	0.083	0.214	0.211
CaO	24.067	23.857	24.104	18.780	18.744	18.801
Na ₂ O	0.149	0.121	0.348	0.641	0.730	0.804
K ₂ O	0.017	0.014	0.001	0.117	0.110	0.174
Cr ₂ O ₃	0.183	0.188	0.122	0.0	0.0	0.0
TOTAL	88.044	87.061	88.016	98.132	98.08	98.445
OXYGENS	6.000	6.000	6.000	8.000	8.000	8.000
Si	1.810	1.821	1.823	2.089	2.091	2.081
Ti	0.013	0.014	0.005	0.001	0.004	0.000
AL	0.240	0.236	0.239	1.863	1.847	1.869
Fe	0.389	0.386	0.382	0.038	0.043	0.034
Mn	0.005	0.003	0.004	0.006	0.004	0.002
Mg	0.598	0.584	0.590	0.006	0.015	0.015
Ca	0.988	0.990	0.990	0.943	0.941	0.942
Na	0.011	0.009	0.026	0.058	0.066	0.073
K	0.001	0.001	0.000	0.007	0.007	0.010
Cr	0.006	0.006	0.004	0.0	0.0	0.0
total	4.060	4.049	4.063	5.011	5.018	5.026

	42.15	42.16	42.17	43.01	43.02	43.03
MINERAL	11	11	11	15	11	18
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	17	12	19
ZONE	1	1	1	2	1	1
SiO ₂	44.970	44.494	44.728	49.272	46.484	0.258
TiO ₂	0.007	0.114	0.098	1.067	0.089	11.555
Al ₂ O ₃	33.444	33.677	33.933	4.025	34.282	2.514
FeO	1.230	1.357	1.203	10.061	0.485	74.817
MnO	0.007	0.0	0.0	0.255	0.058	0.390
MgO	0.184	0.304	0.260	12.344	0.143	0.251
CaO	18.436	18.953	18.639	21.236	17.662	0.0
Na ₂ O	0.968	0.741	0.792	0.450	1.364	0.079
K ₂ O	0.201	0.183	0.116	0.0	0.040	0.005
Cr ₂ O ₃	0.124	0.0	0.053	0.517	0.0	1.628
TOTAL	98.341	98.466	98.619	89.166	100.12	16.680
OXYGENS	8.000	8.000	8.000	6.000	8.000	4.000
Si	2.100	2.076	2.082	1.870	2.129	0.012
Ti	0.000	0.004	0.003	0.030	0.003	0.397
AL	1.840	1.852	1.862	0.180	1.851	0.135
Fe	0.048	0.053	0.047	0.319	0.019	2.856
Mn	0.000	0.0	0.0	0.008	0.002	0.015
Mg	0.013	0.021	0.018	0.698	0.010	0.017
Ca	0.922	0.948	0.930	0.863	0.867	0.0
Na	0.088	0.067	0.071	0.033	0.121	0.007
K	0.012	0.011	0.007	0.0	0.002	0.000
Cr	0.005	0.0	0.002	0.016	0.0	0.059
total	5.028	5.032	5.022	4.018	5.004	3.498

	43.04	43.05	43.06	43.07	43.08	43.09
MINERAL	15	11	11	11	11	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	12	12	12	12	17
ZONE	2	1	1	1	1	2
SiO ₂	48.913	45.202	45.354	45.249	49.502	47.815
TiO ₂	0.958	0.210	0.103	0.143	0.959	0.880
Al ₂ O ₃	5.425	33.268	33.509	33.599	4.460	5.763
FeO	9.951	0.731	0.564	0.642	9.903	9.789
MnO	0.319	0.132	0.017	0.0	0.184	0.127
MgO	12.205	0.135	0.127	0.156	12.511	11.735
CaO	21.780	17.577	17.836	18.158	21.845	21.870
Na ₂ O	0.589	1.360	1.199	1.175	0.580	0.623
K ₂ O	0.0	0.030	0.047	0.0	0.0	0.0
Cr ₂ O ₃	0.272	0.0	0.0	0.0	0.448	0.415
TOTAL	90.461	97.914	98.192	98.480	90.49	89.228
OXYGENS	6.000	8.000	8.000	8.000	8.000	6.000
Si	1.836	2.119	2.121	2.111	2.477	1.822
Ti	0.027	0.007	0.004	0.005	0.036	0.025
AL	0.240	1.838	1.847	1.847	0.263	0.259
Fe	0.312	0.029	0.022	0.025	0.414	0.312
Mn	0.010	0.005	0.001	0.0	0.008	0.004
Mg	0.683	0.009	0.009	0.011	0.933	0.666
Ca	0.876	0.883	0.894	0.908	1.171	0.893
Na	0.043	0.124	0.109	0.106	0.056	0.046
K	0.0	0.002	0.003	0.0	0.0	0.0
Cr	0.008	0.0	0.0	0.0	0.018	0.013
total	4.035	5.017	5.008	5.013	5.375	4.040

	43.10	43.11	43.12	44.01	44.02	44.03
MINERAL	18	19	18	11	11	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	19	24	21	12	12	17
ZONE	1	1	1	1	1	2
SiO ₂	0.274	2.012	0.175	45.849	45.342	49.206
TiO ₂	7.280	41.930	8.279	0.0	0.0	0.594
Al ₂ O ₃	2.878	1.187	3.097	32.948	32.569	2.764
FeO	77.537	46.640	75.191	0.977	0.949	12.093
MnO	0.427	1.588	0.308	0.0	0.0	0.398
MgO	0.277	0.487	0.678	0.176	0.080	10.180
CaO	0.0	0.913	0.031	17.693	18.089	23.611
Na ₂ O	0.031	0.014	0.063	1.458	1.332	0.410
K ₂ O	0.0	0.091	0.005	0.242	0.085	0.021
Cr ₂ O ₃	1.317	0.685	2.221	0.033	0.100	0.238
TOTAL	12.484	48.907	14.857	98.399	97.60	87.422
OXYGENS	4.000	3.000	4.000	8.000	8.000	6.000
Si	0.013	0.054	0.008	2.138	2.134	1.895
Ti	0.261	0.844	0.292	0.0	0.0	0.017
AL	0.162	0.037	0.171	1.810	1.806	0.125
Fe	3.095	1.044	2.954	0.038	0.037	0.389
Mn	0.017	0.036	0.012	0.0	0.0	0.013
Mg	0.020	0.019	0.047	0.012	0.006	0.584
Ca	0.0	0.026	0.002	0.884	0.912	0.974
Na	0.003	0.001	0.006	0.132	0.122	0.031
K	0.0	0.003	0.000	0.014	0.005	0.001
Cr	0.050	0.014	0.082	0.001	0.004	0.007
total	3.621	2.078	3.575	5.030	5.025	4.037

	44.04	44.05	44.06	44.07	44.08	44.09
MINERAL	15	15	15	15	15	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	17	17	17	17	17
ZONE	4	3	3	4	3	3
SiO ₂	50.779	49.030	50.002	50.468	50.151	47.469
TiO ₂	0.541	0.778	0.506	0.622	0.795	1.251
Al ₂ O ₃	1.822	3.127	1.757	1.677	2.501	3.632
FeO	10.055	12.439	11.170	11.755	12.313	12.459
MnO	0.180	0.181	0.118	0.214	0.084	0.306
MgO	11.309	10.095	10.769	10.975	10.459	9.617
CaO	24.052	23.808	23.974	23.975	24.330	23.617
Na ₂ O	0.306	0.403	0.429	0.363	0.433	0.415
K ₂ O	0.0	0.0	0.0	0.0	0.022	0.0
Cr ₂ O ₃	0.355	0.231	0.218	0.030	0.245	0.154
TOTAL	89.344	87.653	87.773	88.324	89.02	86.461
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.935	1.879	1.927	1.925	1.897	1.848
Ti	0.015	0.022	0.015	0.018	0.023	0.037
AL	0.082	0.141	0.080	0.075	0.111	0.167
Fe	0.320	0.399	0.360	0.375	0.389	0.406
Mn	0.006	0.006	0.004	0.007	0.003	0.010
Mg	0.642	0.577	0.618	0.624	0.589	0.558
Ca	0.982	0.978	0.990	0.980	0.986	0.985
Na	0.023	0.030	0.032	0.027	0.032	0.031
K	0.0	0.0	0.0	0.0	0.001	0.0
Cr	0.011	0.007	0.007	0.001	0.007	0.005
total	4.015	4.039	4.031	4.032	4.038	4.046

	44.10	44.11	44.12	44.13	44.14	44.15
MINERAL	15	15	15	15	15	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	17	17	17	17	17
ZONE	4	3	4	3	4	3
SiO ₂	48.098	50.180	47.759	50.887	49.117	49.027
TiO ₂	0.900	0.719	0.998	0.636	0.648	0.337
Al ₂ O ₃	2.679	2.459	3.813	2.488	2.471	2.256
FeO	14.685	10.398	11.970	8.815	13.667	14.841
MnO	0.209	0.126	0.232	0.191	0.125	0.261
MgO	8.843	11.546	9.773	12.768	9.460	8.957
CaO	23.503	24.619	23.545	24.870	24.063	24.248
Na ₂ O	0.428	0.378	0.511	0.426	0.339	0.284
K ₂ O	0.002	0.077	0.0	0.010	0.022	0.018
Cr ₂ O ₃	0.075	0.265	0.186	0.152	0.360	0.142
TOTAL	84.737	90.369	86.817	92.428	86.60	85.530
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.879	1.895	1.855	1.897	1.892	1.898
Ti	0.026	0.020	0.029	0.018	0.019	0.010
AL	0.123	0.109	0.175	0.109	0.112	0.103
Fe	0.480	0.328	0.389	0.275	0.440	0.481
Mn	0.007	0.004	0.008	0.006	0.004	0.009
Mg	0.515	0.650	0.566	0.709	0.543	0.517
Ca	0.984	0.996	0.980	0.993	0.993	1.006
Na	0.032	0.028	0.038	0.031	0.025	0.021
K	0.000	0.004	0.0	0.000	0.001	0.001
Cr	0.002	0.008	0.006	0.004	0.011	0.004
total	4.048	4.042	4.045	4.044	4.041	4.049

	44.16	44.17	44.18	44.19	44.20	44.21
MINERAL	15	25	25	25	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	17	36	36	36	12	12
ZONE	4	1	1	1	1	1
SiO ₂	47.876	29.939	29.526	29.351	47.128	46.356
TiO ₂	0.593	40.079	39.748	38.566	0.024	0.0
Al ₂ O ₃	2.523	0.614	0.741	0.708	32.060	32.739
FeO	17.015	0.744	0.504	1.374	0.663	0.982
MnO	0.414	0.038	0.0	0.0	0.0	0.027
MgO	7.588	0.004	0.156	0.0	0.354	0.090
CaO	23.532	28.961	28.667	27.956	16.874	17.636
Na ₂ O	0.459	0.135	0.158	0.070	1.536	1.587
K ₂ O	0.014	0.0	0.0	0.057	0.079	0.136
Cr ₂ O ₃	0.079	0.120	0.152	0.0	0.105	0.0
TOTAL	83.078	99.890	99.148	96.708	98.16	98.571
OXYGENS	6.000	20.000	20.000	20.000	8.000	8.000
Si	1.881	3.909	3.889	3.936	2.195	2.155
Ti	0.018	3.934	3.937	3.888	0.001	0.0
AL	0.117	0.094	0.115	0.112	1.759	1.794
Fe	0.559	0.081	0.056	0.154	0.026	0.038
Mn	0.014	0.004	0.0	0.0	0.0	0.001
Mg	0.444	0.001	0.031	0.0	0.025	0.006
Ca	0.990	4.051	4.045	4.016	0.842	0.878
Na	0.035	0.034	0.040	0.018	0.139	0.143
K	0.001	0.0	0.0	0.010	0.005	0.008
Cr	0.002	0.012	0.016	0.0	0.004	0.0
total	4.060	12.121	12.129	12.134	4.994	5.024

	44.22	44.23	44.24	44.25	44.26	44.27
MINERAL	11	11	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	12	12	12
ZONE	1	1	1	1	1	1
SiO ₂	47.999	47.963	47.482	46.477	48.280	47.593
TiO ₂	0.073	0.0	0.0	0.0	0.0	0.083
Al ₂ O ₃	31.682	31.702	32.478	32.890	32.376	32.918
FeO	0.869	0.941	0.896	0.864	0.972	1.010
MnO	0.008	0.023	0.035	0.004	0.0	0.0
MgO	0.161	0.149	0.214	0.174	0.179	0.154
CaO	16.718	16.246	17.223	17.723	16.500	17.275
Na ₂ O	2.157	2.047	1.782	1.376	2.034	1.768
K ₂ O	0.136	0.176	0.182	0.058	0.218	0.147
Cr ₂ O ₃	0.0	0.0	0.006	0.070	0.0	0.074
TOTAL	98.934	98.306	99.402	98.772	99.59	100.012
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.217	2.224	2.186	2.155	2.211	2.176
Ti	0.003	0.0	0.0	0.0	0.0	0.003
AL	1.725	1.733	1.762	1.797	1.748	1.774
Fe	0.034	0.036	0.034	0.034	0.037	0.039
Mn	0.000	0.001	0.001	0.000	0.0	0.0
Mg	0.011	0.010	0.015	0.012	0.012	0.010
Ca	0.827	0.807	0.849	0.880	0.810	0.846
Na	0.193	0.184	0.159	0.124	0.181	0.157
K	0.008	0.010	0.011	0.003	0.013	0.009
Cr	0.0	0.0	0.000	0.003	0.0	0.003
total	5.018	5.006	5.018	5.008	5.011	5.016

	44.28	44.29	44.30	45.01	45.02	45.03
MINERAL	11	11	11	11	11	11
ROCK TYPE	26	26	26	28	28	28
GRAINTYPE	12	12	12	11	11	11
ZONE	1	1	1	1	1	3
SiO ₂	48.656	45.417	45.882	48.317	47.621	54.130
TiO ₂	0.093	0.0	0.0	0.042	0.0	0.087
Al ₂ O ₃	31.472	33.496	34.056	33.213	32.635	28.102
FeO	0.906	0.592	0.842	0.682	0.693	0.458
MnO	0.051	0.061	0.0	0.132	0.174	0.0
MgO	0.251	0.0	0.154	0.283	0.0	0.0
CaO	16.291	18.491	18.664	17.539	17.179	11.916
Na ₂ O	2.185	1.122	0.938	1.751	1.997	4.492
K ₂ O	0.198	0.033	0.057	0.068	0.078	0.358
Cr ₂ O ₃	0.0	0.0	0.0	0.0	0.037	0.0
TOTAL	99.197	98.620	99.751	101.345	99.72	99.085
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.238	2.118	2.111	2.183	2.188	2.463
Ti	0.003	0.0	0.0	0.001	0.0	0.003
AL	1.706	1.841	1.847	1.769	1.767	1.507
Fe	0.035	0.023	0.032	0.026	0.027	0.017
Mn	0.002	0.002	0.0	0.005	0.007	0.0
Mg	0.017	0.0	0.011	0.019	0.0	0.0
Ca	0.803	0.924	0.920	0.849	0.846	0.581
Na	0.195	0.101	0.084	0.153	0.178	0.396
K	0.012	0.002	0.003	0.004	0.005	0.021
Cr	0.0	0.0	0.0	0.0	0.001	0.0
total	5.010	5.013	5.009	5.010	5.019	4.989

	45.04	45.05	45.06	45.07	45.08	45.09
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	11	11	11	11	11
ZONE	3	3	3	2	3	3
SiO ₂	52.771	52.173	51.838	48.187	53.010	51.195
TiO ₂	0.117	0.0	0.170	0.0	0.071	0.0
Al ₂ O ₃	29.291	28.361	28.715	32.389	29.454	29.120
FeO	0.669	0.588	0.446	0.534	0.350	0.694
MnO	0.0	0.063	0.125	0.0	0.008	0.011
MgO	0.016	0.0	0.179	0.0	0.065	0.0
CaO	13.276	13.481	13.472	16.478	13.005	13.147
Na ₂ O	4.200	3.867	4.037	2.287	4.129	3.929
K ₂ O	0.200	0.288	0.251	0.103	0.302	0.268
Cr ₂ O ₃	0.0	0.016	0.0	0.0	0.106	0.0
TOTAL	99.871	98.249	98.787	99.444	100.15	97.670
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.392	2.407	2.384	2.215	2.398	2.374
Ti	0.004	0.0	0.006	0.0	0.002	0.0
AL	1.565	1.542	1.556	1.755	1.570	1.591
Fe	0.025	0.023	0.017	0.021	0.013	0.027
Mn	0.0	0.002	0.005	0.0	0.000	0.000
Mg	0.001	0.0	0.012	0.0	0.004	0.0
Ca	0.645	0.666	0.664	0.812	0.630	0.653
Na	0.369	0.346	0.360	0.204	0.362	0.353
K	0.012	0.017	0.015	0.006	0.017	0.016
Cr	0.0	0.001	0.0	0.0	0.004	0.0
total	5.012	5.003	5.019	5.012	5.002	5.015

	45.10	45.11	45.12	45.13	45.14	45.15
MINERAL	11	11	11	11	11	11
ROCK TYPE	28	28	28	28	28	28
GRAINTYPE	11	11	11	11	11	11
ZONE	3	3	3	3	2	2
SiO ₂	51.784	53.577	53.866	52.772	52.479	49.502
TiO ₂	0.066	0.028	0.130	0.057	0.144	0.0
Al ₂ O ₃	28.998	27.944	28.235	28.863	29.968	31.644
FeO	0.656	0.376	0.533	0.364	0.630	0.467
MnO	0.056	0.014	0.027	0.0	0.165	0.0
MgO	0.084	0.0	0.0	0.0	0.0	0.0
CaO	12.955	11.887	12.040	12.608	13.579	15.922
Na ₂ O	3.762	4.631	4.374	4.341	3.834	2.740
K ₂ O	0.329	0.314	0.344	0.146	0.219	0.114
Cr ₂ O ₃	0.0	0.039	0.0	0.0	0.026	0.073
TOTAL	98.034	98.434	99.016	98.787	100.41	99.995
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.389	2.458	2.453	2.416	2.369	2.260
Ti	0.002	0.001	0.004	0.002	0.005	0.0
AL	1.577	1.511	1.515	1.557	1.594	1.703
Fe	0.025	0.014	0.020	0.014	0.024	0.018
Mn	0.002	0.001	0.001	0.0	0.006	0.0
Mg	0.006	0.0	0.0	0.0	0.0	0.0
Ca	0.640	0.584	0.587	0.618	0.657	0.779
Na	0.337	0.412	0.386	0.385	0.335	0.243
K	0.019	0.018	0.020	0.009	0.013	0.007
Cr	0.0	0.001	0.0	0.0	0.001	0.003
total	4.998	5.000	4.988	5.001	5.003	5.012

	45.16	45.17	45.18	45.19	46.01	46.02
MINERAL	15	15	15	18	11	11
ROCK TYPE	28	28	28	28	24	24
GRAINTYPE	17	17	17	21	11	11
ZONE	2	2	2	1	3	1
SiO ₂	49.265	51.153	51.035	0.456	52.880	47.095
TiO ₂	2.509	0.698	0.821	4.509	0.0	0.0
Al ₂ O ₃	2.635	2.482	2.474	1.816	29.266	32.737
FeO	11.757	10.409	10.216	86.928	0.544	0.489
MnO	0.266	0.389	0.386	0.234	0.0	0.0
MgO	12.909	13.368	13.042	0.432	0.063	0.088
CaO	20.351	21.843	21.457	0.137	13.126	17.066
Na ₂ O	0.608	0.465	0.383	0.113	4.324	1.561
K ₂ O	0.125	0.074	0.019	0.033	0.169	0.097
Cr ₂ O ₃	0.155	0.026	0.056	0.155	0.019	0.046
TOTAL	88.823	90.498	89.673	7.885	99.85	98.690
OXYGENS	6.000	6.000	6.000	4.000	8.000	8.000
Si	1.860	1.911	1.921	0.021	2.398	2.184
Ti	0.071	0.020	0.023	0.160	0.0	0.0
AL	0.117	0.109	0.110	0.101	1.564	1.789
Fe	0.371	0.325	0.322	3.425	0.021	0.019
Mn	0.009	0.012	0.012	0.009	0.0	0.0
Mg	0.726	0.744	0.731	0.030	0.004	0.006
Ca	0.823	0.874	0.865	0.007	0.638	0.848
Na	0.045	0.034	0.028	0.010	0.380	0.140
K	0.006	0.004	0.001	0.002	0.010	0.006
Cr	0.005	0.001	0.002	0.006	0.001	0.002
total	4.033	4.033	4.015	3.772	5.015	4.994

	46.03	46.04	46.05	46.06	46.07	46.08
MINERAL	11	11	11	11	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	11	11	11	11	11	11
ZONE	3	1	3	3	1	3
SiO ₂	53.489	47.494	52.085	53.416	48.306	53.195
TiO ₂	0.134	0.0	0.047	0.124	0.068	0.154
Al ₂ O ₃	29.660	33.152	29.216	29.275	32.697	29.178
FeO	0.500	0.578	0.550	0.480	0.343	0.514
MnO	0.039	0.115	0.059	0.144	0.0	0.0
MgO	0.314	0.098	0.094	0.0	0.057	0.0
CaO	12.898	17.376	12.953	12.835	17.009	12.689
Na ₂ O	4.544	1.535	4.077	4.127	2.137	4.269
K ₂ O	0.152	0.057	0.092	0.200	0.003	0.237
Cr ₂ O ₃	0.038	0.0	0.0	0.0	0.111	0.008
TOTAL	101.268	99.827	98.623	100.121	100.39	99.730
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.392	2.178	2.389	2.412	2.204	2.411
Ti	0.005	0.0	0.002	0.004	0.002	0.005
AL	1.563	1.792	1.579	1.558	1.758	1.558
Fe	0.019	0.022	0.021	0.018	0.013	0.019
Mn	0.001	0.004	0.002	0.006	0.0	0.0
Mg	0.021	0.007	0.006	0.0	0.004	0.0
Ca	0.618	0.854	0.636	0.621	0.832	0.616
Na	0.394	0.136	0.363	0.361	0.189	0.375
K	0.009	0.003	0.005	0.012	0.000	0.014
Cr	0.001	0.0	0.0	0.0	0.004	0.000
total	5.023	4.996	5.004	4.991	5.007	4.999

	46.09	46.10	46.11	46.12	46.13	46.14
MINERAL	11	11	15	15	15	15
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	12	12	17	17	17	17
ZONE	1	1	1	1	2	1
SiO ₂	53.085	52.503	51.591	51.958	52.310	51.766
TiO ₂	0.173	0.0	0.588	0.538	0.581	0.394
Al ₂ O ₃	29.486	29.291	2.654	2.511	2.466	2.124
FeO	0.331	0.358	9.959	9.002	9.098	9.991
MnO	0.0	0.0	0.318	0.242	0.317	0.301
MgO	0.043	0.0	15.499	14.750	15.347	15.522
CaO	12.849	12.958	19.417	20.716	20.820	18.667
Na ₂ O	4.462	4.226	0.561	0.709	0.450	0.512
K ₂ O	0.217	0.192	0.0	0.034	0.0	0.0
Cr ₂ O ₃	0.0	0.015	0.188	0.176	0.306	0.385
TOTAL	100.315	99.185	90.816	91.634	92.60	89.671
OXYGENS	8.000	8.000	6.000	6.000	6.000	6.000
Si	2.398	2.397	1.911	1.925	1.917	1.934
Ti	0.006	0.0	0.016	0.015	0.016	0.011
AL	1.569	1.576	0.116	0.110	0.107	0.094
Fe	0.013	0.014	0.308	0.279	0.279	0.312
Mn	0.0	0.0	0.010	0.008	0.010	0.010
Mg	0.003	0.0	0.855	0.814	0.838	0.864
Ca	0.622	0.634	0.770	0.822	0.818	0.747
Na	0.391	0.374	0.040	0.051	0.032	0.037
K	0.013	0.011	0.0	0.002	0.0	0.0
Cr	0.0	0.001	0.006	0.005	0.009	0.011
total	5.013	5.007	4.033	4.029	4.025	4.021

	46.15	46.16	47.01	47.02	47.03	47.04
MINERAL	18	15	15	15	15	15
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	19	17	17	17	17	17
ZONE	1	1	2	2	2	2
SiO ₂	0.130	50.948	52.202	52.422	51.653	50.771
TiO ₂	9.424	0.572	0.397	0.664	0.720	0.672
Al ₂ O ₃	2.869	2.492	2.683	2.644	2.479	2.292
FeO	78.705	9.187	7.375	8.003	8.279	7.218
MnO	0.221	0.320	0.168	0.100	0.205	0.109
MgO	0.784	14.995	16.230	16.100	15.825	15.337
CaO	0.110	19.783	20.622	20.464	20.116	21.674
Na ₂ O	0.189	0.645	0.691	0.583	0.498	0.374
K ₂ O	0.038	0.091	0.017	0.004	0.023	0.007
Cr ₂ O ₃	0.850	0.214	0.252	0.014	0.066	0.093
TOTAL	14.615	90.060	93.262	92.995	91.58	91.329
OXYGENS	4.000	6.000	6.000	6.000	6.000	6.000
Si	0.006	1.915	1.918	1.920	1.918	1.912
Ti	0.322	0.016	0.011	0.018	0.020	0.019
AL	0.154	0.110	0.116	0.114	0.108	0.102
Fe	2.991	0.289	0.227	0.245	0.257	0.227
Mn	0.009	0.010	0.005	0.003	0.006	0.003
Mg	0.053	0.840	0.889	0.879	0.876	0.861
Ca	0.005	0.797	0.812	0.803	0.800	0.875
Na	0.017	0.047	0.049	0.041	0.036	0.027
K	0.002	0.004	0.001	0.000	0.001	0.000
Cr	0.031	0.006	0.007	0.000	0.002	0.003
total	3.589	4.036	4.034	4.025	4.025	4.030

	47.05	47.06	47.07	47.08	47.09	47.10
MINERAL	15	15	15	15	15	15
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	17	17	17	17	17	17
ZONE	2	2	1	1	1	1
SiO ₂	52.096	51.758	50.357	50.594	51.122	51.508
TiO ₂	0.417	0.558	0.691	0.671	0.863	0.952
Al ₂ O ₃	2.488	2.234	2.514	2.745	2.880	2.874
FeO	7.221	7.552	8.206	8.233	7.870	8.522
MnO	0.137	0.192	0.121	0.272	0.227	0.253
MgO	16.388	15.882	15.077	15.153	15.350	15.614
CaO	20.580	20.563	19.845	20.501	20.775	20.040
Na ₂ O	0.693	0.436	0.718	0.740	0.730	0.707
K ₂ O	0.0	0.008	0.0	0.0	0.011	0.0
Cr ₂ O ₃	0.379	0.243	0.062	0.157	0.055	0.117
TOTAL	93.178	91.874	89.385	90.833	92.01	92.065
OXYGENS	6.000	6.000	6.000	6.000	6.000	6.000
Si	1.918	1.927	1.916	1.902	1.901	1.903
Ti	0.012	0.016	0.020	0.019	0.024	0.026
AL	0.108	0.098	0.113	0.122	0.126	0.125
Fe	0.222	0.235	0.261	0.259	0.245	0.263
Mn	0.004	0.006	0.004	0.009	0.007	0.008
Mg	0.899	0.881	0.855	0.849	0.851	0.859
Ca	0.812	0.820	0.809	0.826	0.828	0.793
Na	0.049	0.031	0.053	0.054	0.053	0.051
K	0.0	0.000	0.0	0.0	0.001	0.0
Cr	0.011	0.007	0.002	0.005	0.002	0.003
total	4.036	4.021	4.033	4.043	4.037	4.032

	47.11	47.12	47.13	47.14	47.15	47.16
MINERAL	13	13	11	11	14	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	28	28	11	12	13	12
ZONE	1	1	2	1	1	1
SiO ₂	38.528	38.219	49.771	51.072	53.913	51.178
TiO ₂	0.0	0.0	0.190	0.146	0.385	0.0
Al ₂ O ₃	0.036	0.0	31.426	29.940	1.244	30.912
FeO	26.204	25.623	0.363	0.334	16.456	0.743
MnO	0.276	0.454	0.091	0.0	0.352	0.0
MgO	37.195	36.778	0.0	0.040	26.370	0.055
CaO	0.106	0.026	15.588	14.071	1.724	14.009
Na ₂ O	0.489	0.391	2.923	3.598	0.505	3.495
K ₂ O	0.011	0.100	0.110	0.187	0.0	0.134
Cr ₂ O ₃	0.126	0.0	0.047	0.058	0.0	0.0
TOTAL	76.767	75.968	100.146	99.112	84.49	99.783
OXYGENS	4.000	4.000	8.000	8.000	6.000	8.000
Si	0.992	0.996	2.270	2.343	1.945	2.324
Ti	0.0	0.0	0.007	0.005	0.010	0.0
AL	0.001	0.0	1.689	1.619	0.053	1.654
Fe	0.564	0.558	0.014	0.013	0.496	0.028
Mn	0.006	0.010	0.004	0.0	0.011	0.0
Mg	1.426	1.428	0.0	0.003	1.418	0.004
Ca	0.003	0.001	0.762	0.692	0.067	0.681
Na	0.024	0.020	0.258	0.320	0.035	0.308
K	0.000	0.003	0.006	0.011	0.0	0.008
Cr	0.003	0.0	0.002	0.002	0.0	0.0
total	3.019	3.016	5.011	5.007	4.036	5.007

	47.17	47.18	47.19	47.20	47.21	47.22
MINERAL	15	15	15	15	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	17	17	17	17	12	12
ZONE	2	1	1	1	1	1
SiO ₂	51.729	51.445	50.968	51.452	50.888	50.732
TiO ₂	0.487	0.653	1.046	0.956	0.184	0.0
Al ₂ O ₃	2.526	2.568	-2.822	2.708	30.177	29.931
FeO	7.244	7.964	9.445	8.135	0.400	0.623
MnO	0.166	0.217	0.255	0.093	0.070	0.0
MgO	15.862	16.426	15.516	15.175	0.054	0.0
CaO	20.765	19.756	19.516	21.190	14.149	13.645
Na ₂ O	0.452	0.603	0.695	0.382	3.309	3.645
K ₂ O	0.002	0.0	0.022	0.030	0.219	0.104
Cr ₂ O ₃	0.350	0.173	0.024	0.037	0.0	0.0
TOTAL	92.339	91.841	90.864	92.023	99.05	98.057
OXYGENS	6.000	6.000	6.000	6.000	8.000	8.000
Si	1.921	1.909	1.895	1.908	2.335	2.344
Ti	0.014	0.018	0.029	0.027	0.006	0.0
AL	0.111	0.112	0.124	0.118	1.632	1.630
Fe	0.225	0.247	0.294	0.252	0.015	0.024
Mn	0.005	0.007	0.008	0.003	0.003	0.0
Mg	0.878	0.908	0.860	0.839	0.004	0.0
Ca	0.826	0.785	0.777	0.842	0.695	0.676
Na	0.033	0.043	0.050	0.027	0.294	0.327
K	0.000	0.0	0.001	0.001	0.013	0.006
Cr	0.010	0.005	0.001	0.001	0.0	0.0
total	4.022	4.036	4.039	4.020	4.997	5.007

	47.23	47.24	47.24	47.25	47.26	47.27
MINERAL	11	13	13	13	11	11
ROCK TYPE	24	24	24	24	24	24
GRAINTYPE	12	28	28	28	11	11
ZONE	1	1	1	1	1	3
SiO ₂	51.482	38.584	38.584	38.314	48.088	51.660
TiO ₂	0.043	0.092	0.092	0.092	0.064	0.159
Al ₂ O ₃	29.564	0.059	0.059	0.0	32.445	29.745
FeO	0.498	26.384	26.384	25.752	0.489	0.774
MnO	0.0	0.401	0.401	0.444	0.0	0.033
MgO	0.0	35.815	35.815	36.262	0.0	0.149
CaO	13.570	0.004	0.004	0.116	16.659	13.517
Na ₂ O	3.635	0.673	0.673	0.563	2.143	3.654
K ₂ O	0.188	0.0	0.0	0.003	0.050	0.188
Cr ₂ O ₃	0.0	0.109	0.109	0.079	0.129	0.0
TOTAL	98.482	75.737	75.737	75.873	99.58	99.105
OXYGENS	8.000	4.000	4.000	4.000	8.000	8.000
Si	2.369	1.002	1.002	0.999	2.209	2.359
Ti	0.001	0.002	0.002	0.002	0.002	0.005
AL	1.603	0.002	0.002	0.0	1.757	1.601
Fe	0.019	0.573	0.573	0.561	0.019	0.030
Mn	0.0	0.009	0.009	0.010	0.0	0.001
Mg	0.0	1.386	1.386	1.408	0.0	0.010
Ca	0.669	0.000	0.000	0.003	0.820	0.661
Na	0.324	0.034	0.034	0.028	0.191	0.324
K	0.011	0.0	0.0	0.000	0.003	0.011
Cr	0.0	0.002	0.002	0.002	0.005	0.0
total	4.996	3.011	3.011	3.013	5.005	5.002

	47.28	47.29	47.30
MINERAL	11	11	11
ROCK TYPE	24	24	24
GRAINTYPE	11	11	11
ZONE	3	3	3
SiO ₂	50.458	51.242	50.340
TiO ₂	0.0	0.080	0.027
Al ₂ O ₃	30.751	29.537	30.151
FeO	0.719	0.527	0.641
MnO	0.019	0.010	0.016
MgO	0.133	0.026	0.0
CaO	14.306	13.480	14.386
Na ₂ O	3.401	3.637	3.308
K ₂ O	0.172	0.174	0.155
Cr ₂ O ₃	0.0	0.002	0.0
TOTAL	99.240	98.188	98.383

OXYGENS	8.000	8.000	8.000
Si	2.309	2.364	2.324
Ti	0.0	0.003	0.001
Al	1.658	1.606	1.640
Fe	0.028	0.020	0.025
Mn	0.001	0.000	0.001
Mg	0.009	0.002	0.0
Ca	0.701	0.666	0.712
Na	0.302	0.325	0.296
K	0.010	0.010	0.009
Cr	0.0	0.000	0.0
total	5.018	4.998	5.007

A3.3. Miscellaneous rocks.

Sample codes and samples: 48 - 70/2 (granular xenolith in Glebe Hill gabbros); 49 - 276/1 (very late alkali granite); 50 - 234B (Pelite containing late - M2 vein assemblage); 51 - 121/3 (Middle Pabba Beds pelite with well - developed M2 mineral assemblage); 52 - 202 (Plateau basalt suite picrodoleritic rock); 53 - 72/3 (hercynite - corundum hornfels, Glebe Hill)

	48.01	48.02	48.03	48.04	48.05	48.06
MINERAL	11	11	11	11	11	11
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	12	12	12
ZONE	1	3	3	3	3	3
SiO ₂	52.767	52.940	52.756	52.750	53.766	53.883
TiO ₂	0.0	0.167	0.118	0.170	0.001	0.027
Al ₂ O ₃	28.838	28.982	29.115	29.119	29.117	28.816
FeO	1.133	1.272	0.855	0.821	0.861	0.921
MnO	0.0	0.0	0.157	0.140	0.0	0.0
MgO	0.595	0.514	0.218	0.259	0.498	0.302
CaO	12.690	12.945	13.122	12.726	12.197	12.484
Na ₂ O	4.207	4.248	4.145	4.260	4.441	4.397
K ₂ O	0.228	0.132	0.147	0.128	0.248	0.227
Cr ₂ O ₃	0.114	0.096	0.036	0.0	0.103	0.060
TOTAL	99.439	100.024	99.814	99.552	100.37	100.196
OXYGENS	8.000	8.000	8.000	8.000	8.000	8.000
Si	2.394	2.388	2.391	2.394	2.415	2.424
Ti	0.0	0.006	0.004	0.006	0.000	0.001
AL	1.542	1.540	1.555	1.557	1.541	1.528
Fe	0.043	0.048	0.032	0.031	0.032	0.035
Mn	0.0	0.0	0.006	0.005	0.0	0.0
Mg	0.040	0.035	0.015	0.018	0.033	0.020
Ca	0.617	0.625	0.637	0.619	0.587	0.602
Na	0.370	0.371	0.364	0.375	0.387	0.384
K	0.013	0.008	0.008	0.007	0.014	0.013
Cr	0.004	0.003	0.001	0.0	0.004	0.002
total	5.024	5.024	5.014	5.012	5.013	5.008

	48.07	48.08	48.09	48.10	48.11	48.12
MINERAL	11	11	11	11	11	15
ROCK TYPE	26	26	26	26	26	26
GRAINTYPE	12	12	12	12	12	17
ZONE	3	3	1	1	1	1
SiO ₂	53.938	53.474	53.533	52.398	52.882	50.288
TiO ₂	0.033	0.063	0.022	0.088	0.104	0.801
Al ₂ O ₃	28.922	29.595	28.711	29.103	29.295	2.877
FeO	0.840	0.812	0.820	1.006	0.840	9.570
MnO	0.008	0.082	0.0	0.0	0.020	0.258
MgO	0.401	0.291	0.276	0.240	0.212	14.731
CaO	12.304	13.072	12.360	13.055	12.839	19.625
Na ₂ O	4.583	4.226	4.612	4.079	4.019	0.348
K ₂ O	0.189	0.077	0.183	0.170	0.124	0.045
Cr ₂ O ₃	0.0	0.019	0.0	0.0	0.070	0.073
TOTAL	100.378	100.899	99.697	99.133	99.56	89.046
OXYGENS	8.000	8.000	8.000	8.000	8.000	6.000
Si	2.423	2.394	2.423	2.387	2.396	1.903
Ti	0.001	0.002	0.001	0.003	0.004	0.023
AL	1.531	1.561	1.531	1.562	1.564	0.128
Fe	0.032	0.030	0.031	0.038	0.032	0.303
Mn	0.000	0.003	0.0	0.0	0.001	0.008
Mg	0.027	0.019	0.019	0.016	0.014	0.831
Ca	0.592	0.627	0.599	0.637	0.623	0.796
Na	0.399	0.367	0.405	0.360	0.353	0.026
K	0.011	0.004	0.011	0.010	0.007	0.002
Cr	0.0	0.001	0.0	0.0	0.003	0.002
total	5.016	5.009	5.019	5.014	4.997	4.022

	48.13	48.14	48.15	48.16	48.17	49.01
MINERAL	15	15	13	13	13	12
ROCK TYPE	26	26	26	26	26	33
GRAINTYPE	17	17	28	28	28	25
ZONE	1	1	1	1	1	1
SiO ₂	50.380	51.373	37.559	38.528	38.378	66.008
TiO ₂	0.866	0.782	0.0	0.003	0.011	0.0
Al ₂ O ₃	3.871	3.023	0.0	0.118	0.0	17.909
FeO	9.344	9.783	26.864	27.794	26.941	1.138
MnO	0.445	0.303	0.388	0.435	0.551	0.107
MgO	14.266	15.106	35.006	35.803	36.258	0.289
CaO	20.125	20.000	0.106	0.120	0.012	0.092
Na ₂ O	0.578	0.487	0.281	0.459	0.192	7.577
K ₂ O	0.033	0.014	0.032	0.008	0.027	5.167
Cr ₂ O ₃	0.050	0.112	0.010	0.0	0.0	0.053
TOTAL	90.614	91.200	73.382	75.474	75.43	97.202
OXYGENS	6.000	6.000	4.000	4.000	4.000	8.000
Si	1.883	1.900	0.998	0.996	0.997	3.001
Ti	0.024	0.022	0.0	0.000	0.000	0.0
AL	0.170	0.132	0.0	0.004	0.0	0.960
Fe	0.292	0.303	0.597	0.601	0.585	0.043
Mn	0.014	0.009	0.009	0.010	0.012	0.004
Mg	0.794	0.832	1.386	1.378	1.403	0.020
Ca	0.806	0.792	0.003	0.003	0.000	0.004
Na	0.042	0.035	0.014	0.023	0.010	0.668
K	0.002	0.001	0.001	0.000	0.001	0.300
Cr	0.001	0.003	0.000	0.0	0.0	0.002
total	4.029	4.029	3.009	3.014	3.008	5.002

	49.02	49.03	49.04	49.05	49.06	49.07
MINERAL	12	12	15	15	15	15
ROCK TYPE	33	33	33	33	33	33
GRAINTYPE	25	25	17	17	17	17
ZONE	1	1	1	1	1	1
SiO ₂	67.011	66.108	47.182	47.829	47.118	48.422
TiO ₂	0.0	0.033	0.207	0.189	0.192	0.0
Al ₂ O ₃	18.000	17.564	0.465	0.488	0.490	0.043
FeO	0.191	0.805	27.331	25.755	26.366	25.885
MnO	0.0	0.0	4.144	4.184	3.917	4.601
MgO	0.119	0.144	1.764	2.254	1.659	1.271
CaO	0.650	0.347	18.378	19.008	18.997	20.730
Na ₂ O	10.409	8.779	1.340	1.290	1.157	0.754
K ₂ O	0.431	2.563	0.045	0.031	0.0	0.001
Cr ₂ O ₃	0.0	0.003	0.091	0.040	0.029	0.201
TOTAL	96.620	95.541	73.616	75.313	73.56	76.023
OXYGENS	8.000	8.000	6.000	6.000	6.000	6.000
Si	3.025	3.027	1.944	1.953	1.953	1.969
Ti	0.0	0.001	0.006	0.006	0.006	0.0
AL	0.957	0.948	0.023	0.023	0.024	0.002
Fe	0.007	0.031	0.942	0.879	0.914	0.880
Mn	0.0	0.0	0.145	0.145	0.138	0.158
Mg	0.008	0.010	0.108	0.137	0.102	0.077
Ca	0.031	0.017	0.811	0.832	0.844	0.903
Na	0.911	0.779	0.107	0.102	0.093	0.059
K	0.025	0.150	0.002	0.002	0.0	0.000
Cr	0.0	0.000	0.003	0.001	0.001	0.006
total	4.964	4.963	4.091	4.080	4.075	4.056

	49.08	50.01	50.02	50.03	50.04	50.05
MINERAL	18	15	20	20	20	26
ROCK TYPE	33	3	3	3	3	3
GRAINTYPE	129	17	29	29	29	37
ZONE	1	1	1	1	1	1
SiO ₂	0.475	48.379	37.808	37.459	37.374	56.365
TiO ₂	4.641	0.203	0.141	0.208	0.0	0.005
Al ₂ O ₃	0.225	1.133	26.001	23.891	24.838	16.054
FeO	89.868	22.185	8.495	10.648	9.696	0.077
MnO	1.708	0.069	0.144	0.062	0.0	0.0
MgO	0.033	5.311	0.201	0.035	0.134	0.112
CaO	0.015	22.354	24.259	23.990	24.077	8.590
Na ₂ O	0.364	0.285	0.213	0.0	0.119	0.615
K ₂ O	0.0	0.098	0.102	0.005	0.032	0.361
Cr ₂ O ₃	0.0	0.080	0.094	0.104	0.0	0.034
TOTAL	7.461	77.912	88.963	85.754	86.57	82.136
OXYGENS	4.000	6.000	13.000	13.000	13.000	10.000
Si	0.022	1.936	3.157	3.197	3.178	3.722
Ti	0.164	0.006	0.009	0.013	0.0	0.000
AL	0.012	0.053	2.559	2.403	2.489	1.250
Fe	3.522	0.742	0.593	0.760	0.689	0.004
Mn	0.068	0.002	0.010	0.004	0.0	0.0
Mg	0.002	0.317	0.025	0.004	0.017	0.011
Ca	0.001	0.958	2.170	2.194	2.193	0.608
Na	0.033	0.022	0.034	0.0	0.020	0.079
K	0.0	0.005	0.011	0.001	0.003	0.030
Cr	0.0	0.003	0.006	0.007	0.0	0.002
total	3.824	4.044	8.574	8.584	8.589	5.706

	50.06	50.07	51.01	51.02	51.03	51.04
MINERAL	26	26	17	17	17	17
ROCK TYPE	3	3	3	3	3	3
GRAINTYPE	37	37	33	33	33	33
ZONE	1	1	1	1	1	1
SiO ₂	57.378	56.646	36.521	35.611	36.652	35.956
TiO ₂	0.0	0.062	4.409	4.421	4.231	4.585
Al ₂ O ₃	16.110	16.050	13.436	13.642	13.789	13.652
FeO	0.0	0.048	21.117	21.580	21.441	21.716
MnO	0.0	0.0	0.215	0.007	0.0	0.0
MgO	0.148	0.071	11.186	9.718	10.738	10.433
CaO	8.593	8.874	0.068	0.104	0.186	0.125
Na ₂ O	0.744	0.467	0.346	0.129	0.256	0.287
K ₂ O	0.205	0.0	9.600	9.350	9.503	9.593
Cr ₂ O ₃	0.037	0.0	0.019	0.054	0.078	0.050
TOTAL	83.215	82.170	75.800	73.036	75.43	74.681
OXYGENS	10.000	10.000	22.000	22.000	22.000	22.000
Si	3.737	3.730	5.561	5.565	5.577	5.523
Ti	0.0	0.003	0.505	0.519	0.484	0.530
AL	1.236	1.246	2.411	2.512	2.473	2.471
Fe	0.0	0.003	2.689	2.820	2.728	2.789
Mn	0.0	0.0	0.028	0.001	0.0	0.0
Mg	0.014	0.007	2.538	2.263	2.435	2.388
Ca	0.600	0.626	0.011	0.017	0.030	0.021
Na	0.094	0.060	0.102	0.039	0.076	0.085
K	0.017	0.0	1.865	1.864	1.845	1.879
Cr	0.002	0.0	0.002	0.007	0.009	0.006
total	5.700	5.674	15.711	15.607	15.657	15.692

	51.05	51.07	51.08	51.09	51.10	51.11
MINERAL	11	11	12	11	11	23
ROCK TYPE	3	3	3	3	3	3
GRAINTYPE	12	12	25	12	12	38
ZONE	1	1	1	1	1	1
SiO ₂	56.261	52.894	63.899	51.958	53.932	49.184
TiO ₂	0.0	0.071	0.164	0.0	0.024	0.057
Al ₂ O ₃	27.289	28.707	18.175	29.399	27.454	30.939
FeO	0.215	0.381	0.160	0.317	0.347	10.866
MnO	0.051	0.167	0.086	0.0	0.006	0.109
MgO	0.093	0.080	0.009	0.130	0.099	6.691
CaO	9.925	12.149	0.218	12.985	10.677	0.126
Na ₂ O	5.687	4.016	1.552	4.032	4.640	0.242
K ₂ O	0.147	0.138	14.529	0.091	0.785	0.005
Cr ₂ O ₃	0.0	0.045	0.031	0.194	0.115	0.088
TOTAL	99.453	98.267	98.663	98.789	97.73	87.441
OXYGENS	8.000	8.000	8.000	8.000	8.000	18.000
Si	2.538	2.428	2.982	2.383	2.488	5.124
Ti	0.0	0.002	0.006	0.0	0.001	0.004
AL	1.451	1.553	1.000	1.589	1.492	3.799
Fe	0.008	0.015	0.006	0.012	0.013	0.947
Mn	0.002	0.006	0.003	0.0	0.000	0.010
Mg	0.006	0.005	0.001	0.009	0.007	1.039
Ca	0.480	0.597	0.011	0.638	0.528	0.014
Na	0.497	0.357	0.140	0.358	0.415	0.049
K	0.008	0.008	0.865	0.005	0.046	0.001
Cr	0.0	0.002	0.001	0.007	0.004	0.007
total	4.990	4.975	5.015	5.001	4.994	10.993

	51.12	51.13	51.14	51.15	51.16	51.17
MINERAL	11	23	11	18	19	18
ROCK TYPE	3	3	3	3	3	3
GRAINTYPE	12	38	12	19	22	19
ZONE	1	1	1	1	1	1
SiO ₂	54.302	45.078	54.029	0.363	2.587	0.895
TiO ₂	0.035	0.019	0.138	4.572	48.613	14.996
Al ₂ O ₃	28.184	29.704	27.294	3.949	1.087	3.009
FeO	0.198	11.706	0.409	86.344	48.304	77.139
MnO	0.0	0.271	0.011	0.0	0.379	0.343
MgO	0.235	6.055	0.178	0.080	1.014	0.330
CaO	11.417	0.220	10.544	0.0	0.058	0.037
Na ₂ O	4.870	0.186	4.480	0.109	0.101	0.196
K ₂ O	0.146	0.080	1.455	0.016	0.590	0.003
Cr ₂ O ₃	0.0	0.0	0.005	0.671	0.0	0.877
TOTAL	99.189	81.613	98.134	9.760	54.43	20.686
OXYGENS	8.000	18.000	8.000	4.000	3.000	4.000
Si	2.468	5.002	2.488	0.017	0.063	0.037
Ti	0.001	0.002	0.005	0.157	0.892	0.469
AL	1.509	3.885	1.481	0.212	0.031	0.147
Fe	0.008	1.086	0.016	3.289	0.985	2.682
Mn	0.0	0.025	0.000	0.0	0.008	0.012
Mg	0.016	1.001	0.012	0.005	0.037	0.020
Ca	0.556	0.026	0.520	0.0	0.002	0.002
Na	0.429	0.040	0.400	0.010	0.005	0.016
K	0.008	0.011	0.085	0.001	0.018	0.000
Cr	0.0	0.0	0.000	0.024	0.0	0.029
total	4.995	11.079	5.009	3.714	2.041	3.414

	51.18	51.19	51.20	51.21
MINERAL	18	18	18	18
ROCK TYPE	3	3	3	3
GRAINTYPE	19	19	19	19
ZONE	1	1	1	1
SiO ₂	0.706	0.542	1.623	0.290
TiO ₂	18.324	4.398	10.597	5.179
Al ₂ O ₃	3.011	2.284	2.794	3.456
FeO	75.952	88.456	79.147	87.422
MnO	0.393	0.130	0.213	0.149
MgO	0.244	0.103	0.336	0.221
CaO	0.085	0.086	0.008	0.055
Na ₂ O	0.0	0.131	0.054	0.369
K ₂ O	0.0	0.061	0.079	0.011
Cr ₂ O ₃	0.581	0.679	0.610	0.605
TOTAL	23.344	8.414	16.314	10.335
OXYGENS	4.000	4.000	4.000	4.000
Si	0.028	0.025	0.071	0.013
Ti	0.555	0.152	0.347	0.175
Al	0.143	0.124	0.143	0.183
Fe	2.559	3.400	2.883	3.279
Mn	0.013	0.005	0.008	0.006
Mg	0.015	0.007	0.022	0.015
Ca	0.004	0.004	0.000	0.003
Na	0.0	0.012	0.005	0.032
K	0.0	0.004	0.004	0.001
Cr	0.019	0.025	0.021	0.021
total	3.336	3.757	3.504	3.727



MAP 4: An Acairseid: Faulted and intrusive contacts between Inner Series and Marginal Border Group rocks.



KEY

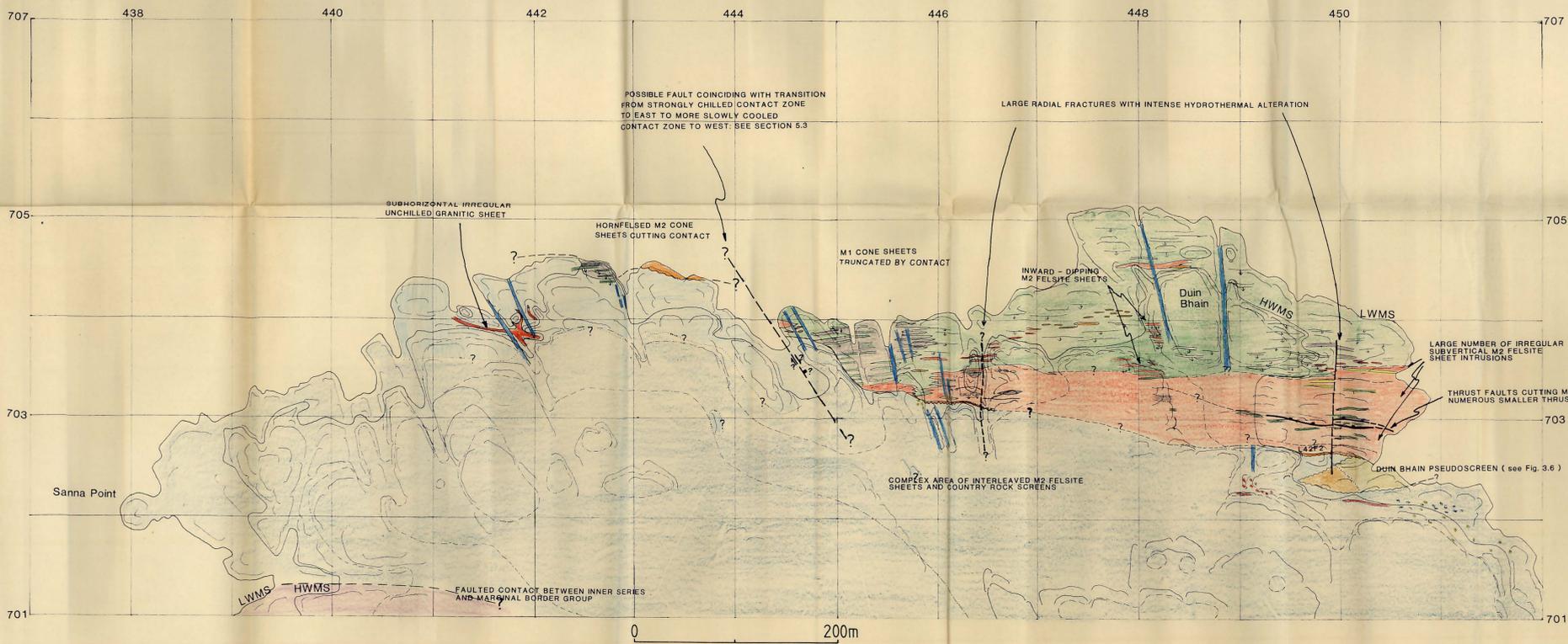
- Late picritic dyke
- Late felsic and hybrid intrusions
- Late porphyritic dolerite cone sheets

- Inner Series:**
- Porphyritic orthopyroxene - rich dolerites and other unchilled intrusions
- Pegmatoid gabbro pods
- Porphyritic gabbronorites
- Pre - gabbronorite laminated and layered rocks

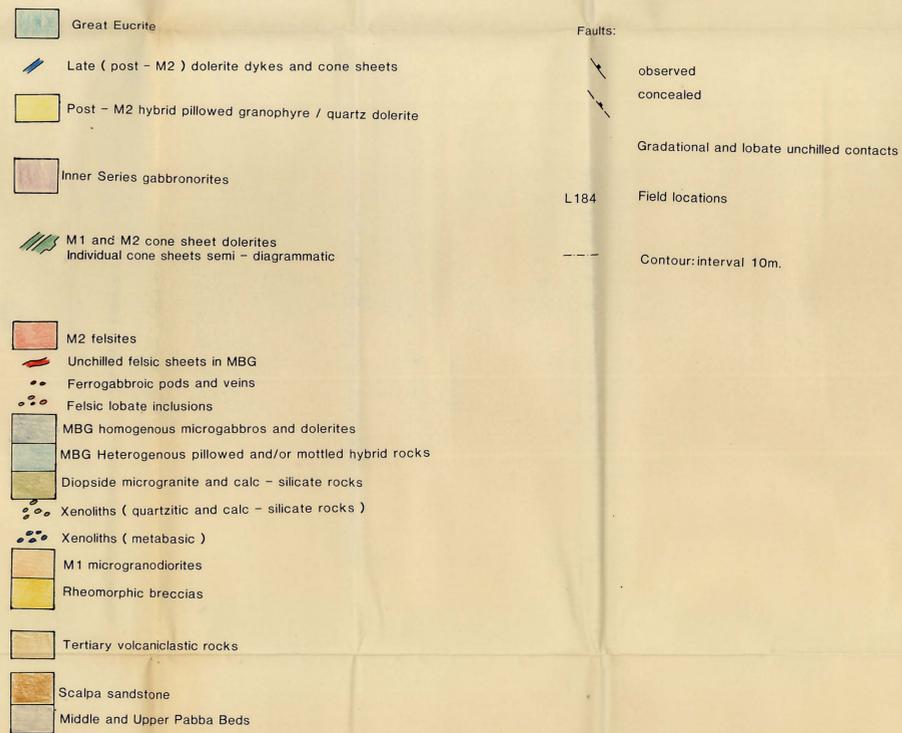
- Marginal Border Group:**
- Mottled heterogenous rocks
- Homogenous microgabbro
- Granitic rock with doleritic pillows
- Lobate inclusions
- Xenoliths
- Basic hornfelsed cone sheets (M2)
- Basic hornfelsed cone sheets (M1 ?)
- M1 felsic/hybrid cone sheets
- Rheomorphic breccia
- Middle Pabba Beds
- Lower Pabba Beds

- Fault:**
- observed
- concealed
- Fault inferred from geometrical constraints
- Granular annealed shear zones with dip (vertical)
- Gradational boundary
- Dip of intrusive contacts
- Dip of bedding in country rocks or of lamination in igneous rocks

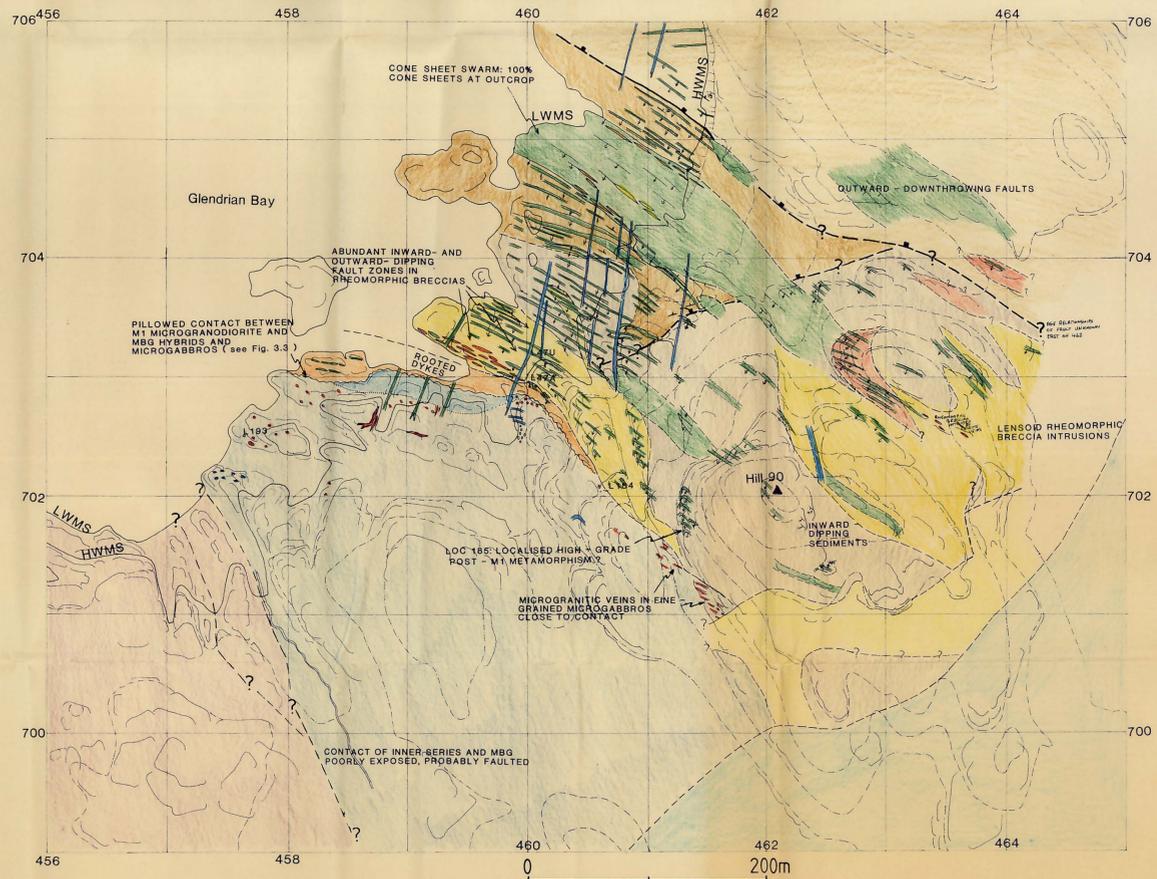
MAP 3: Duin Bhain to Sanna Point: Marginal Border Group contact zone rocks.



KEY, MAPS 2 & 3.



MAP 2. Glendrian Bay: Marginal Border Group contact zone rocks and Rheomorphic Breccia intrusions in the country rocks



MAP 1.

GENERAL MAP OF THE HYPERSTHENE GABBRO

0 1 2 km

