THE EVOLUTION OF THE PEACH SPRING TUFF MAGMATIC SYSTEM AS REVEALED BY ACCESSORY MINERAL TEXTURES AND COMPOSITIONS

By

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To Supereruptions

Without you this project would never have been done. No joke.

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CHAPTER I

THE PEACH SPRING TUFF

Introduction

An eruption is deemed a “supereruption” if it is one that deposits a large volume of material (Sparks et al. 2005, Self 2006) over a relatively short time interval. The tuffs that result from these eruptions are of great interest to the field of Earth Science, as their existence is striking evidence that large magma reservoirs exist within the Earth’s crust. Studying these tuffs can provide important insight into the evolution of such large magma bodies, which is fundamental to understanding the stability and longevity of such systems, as well as the mechanism(s) that do (or do not) trigger a supereruption. In addition, they may hold meaningful information about processes that form and alter the continental crust.

On a broader scale, studying these tuffs is essential for understanding how and why supereruptions are (or are not) comparable to eruptions of lesser volume, and to what extent these giant systems are similar to those that form large batholiths. We can relatively easily monitor and study small ongoing volcanic systems, but we are not able to do this for rare and short supereruptions. Consequently, by finding and understanding similarities between small and giant systems we will be better able to prepare for future supereruptions. Volcanic eruptions of all sizes impact life and society, but supereruptions have the ability to wreak havoc at much larger scales than smaller eruptions. Thus, despite the fact that such large eruptions are rare, they do deserve study.

The Peach Spring Tuff (PST) is an example of an enormous pyroclastic deposit formed by a supereruption (e.g. (Smith & Bailey 1966, Christiansen & Blank 1972, Bailey et al. 1976). Relative to other known tuffs that are products of super eruptions, such as Oranui or the Bishop Tuff (Wilson 2001, Wilson & Hildreth 1997), the PST is unusual in its abundance of accessory minerals like sphene, zircon, and allanite. These minerals are major reservoirs for trace elements, particularly U, Th, and REE, and can serve as useful geochronometers, geothermometers and monitors of magmatic evolution trends. Study of these minerals can place useful constraints on the conditions in the magma chamber, and their ability to record important compositional stages of the melt (e.g. via compositional zoning) can be used to understand the development of the PST system over time.

This primary aim of this study was to assess the history and evolution of the PST system by using textures and compositions of accessory minerals (sphene, zircon, allanite, chevkinite) and glasses in pumice clasts and fiamme from various regions of the PST outflow and intracaldera deposits. This study complements work done by Carley (2010), who used MELTS modeling and bulk compositions of the same set of pumice clasts and fiamme to investigate the mechanisms involved in bringing the PST system to an eruptive state.

Geologic Background

The Peach Spring Tuff is a large Miocene ignimbrite located in the southwestern United States. It was first recognized by Young & Brennan (1974), who described it in the western Colorado Plateau. Glazner et al. (1986) broadened its known extent to the Mojave Desert, where field observations and phenocryst assemblages were used to correlate tuff outcrops with the PST. It has since been found discontinuously in outcrops over a radius of ~360 km (Buesch 1992) around the triple junction of Arizona, Nevada, and California (figure 1). Based upon outflow exposures known at the time, Buesch (1992) estimated that the PST covered an area of at least 32,000 km^2 and had a volume ≥ 640 km^3.

The PST represents a geologically instantaneous eruptive event that occurred within a period of significant regional extension. This, in addition to having an expansive presence throughout the region, makes the PST an important stratigraphic horizon in a region that generally lacks similarly useful marker beds.

Originally, the PST was thought to record a single cooling unit (e.g. Young & Brennan, 1976; Glazner et al, 1986); however, recently it has been proposed that two cooling units may exist (Varga et al. 2004). Sanidine crystals in the PST dated by Ar/Ar have been reported to have an age of 18.5±0.2 Ma (Nielson et al. 1990, Miller & 1998), but a revised age of 18.66±0.03 Ma (using the most recent accepted Fish Canyon sanidine standard age) has recently been obtained for the PST (Ferguson & McIntosh in prep.).

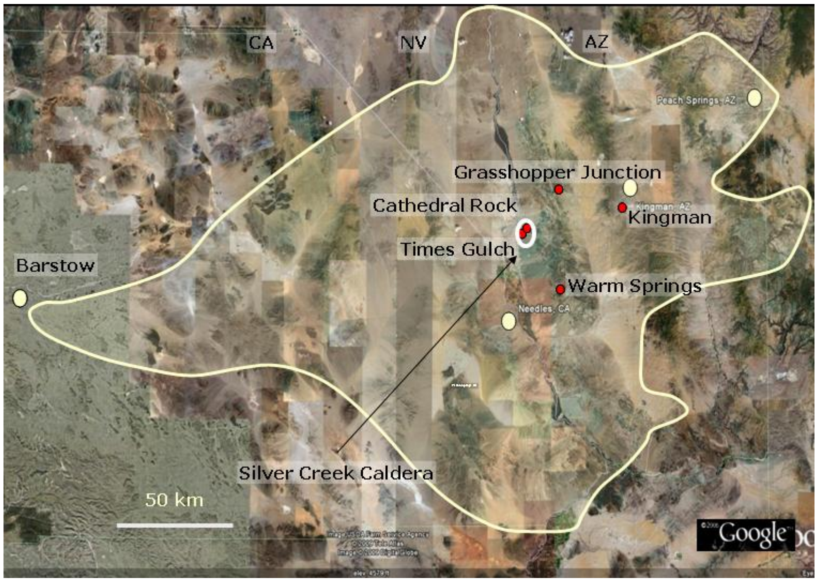


Figure 1. Areal extent of the Peach Spring Tuff. Red dots indicate sample locations. White circle indicates the approximate location of the source caldera (Silver Creek Caldera).

The PST is typically strongly welded and varies in thickness (Glazner et al. 1986) from 10-15 m in distal portions (e.g. Barstow, CA) to 60-130 m in more proximal localities (e.g. Kingman, AZ; Piute Mountains, CA). Young & Brennan (1974) were first to describe the rock and deemed it a trachyte; however, recent work indicates that the PST outflow is rhyolitic in composition (Gaudio et al. 2003, Carley 2010). Previous workers have characterized the PST as containing 4-20% phenocrysts (Young & Brennan 1974) of primarily feldspar (sanidine and plagioclase), biotite more abundant than hornblende and pyroxene, and rare quartz. Large sanidine is the predominant feldspar (Glazner et al. 1986)..Accessory minerals include relatively abundant sphene, zircon and allanite, as well as some possible monazite and chevkinite.

Given the volume of the PST, it is expected that a sizeable caldera (15-20 km diameter) (Smith 1979) would have been produced from eruption; however, the precise location of the PST source has been an issue of contention. Various studies have considered the problem, and the Black (AZ) or Newberry (NV) Mountains have generally been thought to be the best candidates to contain the caldera: Young & Brennan (1974) suggested that outcrop thinning in locations distal from Black Mountains were evidence of a source in the Black Mountains. Glazner et al (1986) supported this idea based on similar thickness patterns between distal outcrops in the Mojave Desert and locations more proximal to the Black Mountains. In contrast, Hillhouse & Wells (1991) showed that the intersection of magnetic lineations and patterns of magnetic imbrications suggested a source region in the Newberry Mountains.

Until recently, a source caldera was never located in either of these areas, but it was thought that this was due to regional extension and younger deposits disjointing and burying the vent (Buesch 1992). New detailed mapping of the area around Oatman, AZ (southern Black Mountains) by Pearthree et al. (2008) has, however, revealed a portion of a caldera. Ferguson (2008) investigated the ash-flow tuff found within this remnant and noted it was characterized by a nearly identical phenocryst assemblage to the PST and was of the same age (Ferguson and McIntosh in prep.). Known as the Silver Creek caldera (Ferguson 2008), this is now thought to be the source of the PST.

CHAPTER II

METHODS

The primary goal of this work was to study the history and evolution of the PST magmatic system as recorded by the relatively abundant accessory mineral phases present. To achieve this, geochemical data from glasses and accessory minerals were combined with data garnered on textural features of these minerals.

Textures and trace element compositions of accessory minerals and glasses in outflow and intracaldera pumice clasts and fiamme were characterized using a number of methods: Textures were quantitatively and qualitatively analyzed using differential absorption x-ray tomography, optical and electron microscopy of thin sections and handpicked crystal separates. Trace element compositions of glasses were analyzed by Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICPMS), and trace element compositions of zircon and sphene crystals were analyzed by Reverse Geometry Sensitive High Resolution Ion Microprobe (SHRIMP-RG). SHRIMP-RG results were also used to calculate temperatures recorded in zircon and sphene crystals, using the re-calibrated Ti-in-zircon thermometer (Ferry & Watson 2007) and Zr-in-sphene thermobarometer (Hayden et al, 2008.

Additional information was collected on whole rock geochemistry, bulk densities, and phenocryst assemblages of the samples. Whole rock determinations were conducted by ACTLABS (Ontario, Canada). Bulk densities of samples were measured using an immersion method described by Gualda (2007). Phenocryst assemblages were determined by optical microscopy and, where possible, by x-ray tomography and electron microscopy.

Four accessory mineral phases were the main focus of this work: zircon ($ZrSiO_4$), sphene ($[Ca, MREE, Ce]_4TiSiO_5$), allanite ($[Ca, LREE]_2[Al,Fe]_3[SiO_4]_3[OH]$), and chevkinite ($[Ca, LREE]_2[Ti, Fe]_3Ti_2Si_4O_{22}$), where MREE and LREE are middle and light rare earth elements, respectively. Both allanite and chevkinite have been positively identified in these samples; however, they are generally difficult or, in the case of x-ray tomography, impossible to distinguish and have thus been characterized together as allanite+chevkinite. No attempt was made to distinguish between chevkinite and perrierite, which can only be done by x-ray diffraction (Macdonald & Belkin 2002), and we refer to it as chevkinite for convenience. Textures and crystal size distributions for magnetite were also studied by x-ray tomography.

Samples

Samples studied in this work were collected on three separate occasions from locations representing different facies of the PST. Table 1 provides GPS locations and descriptions of samples collected and studied. The map in Figure 1 depicts the known extents of the PST with sample locations noted.

Eleven samples were selected for detailed study: 8 pumice clasts from different localities in the outflow sheet (KPST01A-E, WSW2A-B, WSW3A), 2 intracaldera fiamme (PSTG01C, CRW) and a mafic enclave (WSW1). Qualitative observations were also made on five additional samples (WSW4B,D, GJ1A-C, PTB). Glass analyses were also conducted on these samples; however, results showed large intrasample variation and glass in thin section appeared to be substantially altered. Thus, glass results from these samples were not included in the primary dataset. Glass analyses from WSW2A, WSW2B, and PSTG01C were similarly problematic and are also not included. All glass data collected can be found in Appendix B.

For the most part, samples were large enough to cut thin sections, create mounts of small (~1 cm^3) chips, cut multiple small cylinders (largest diameter 1 cm) for tomographic analysis, and obtain whole rock geochemistry. In the case of WSW3A, however, the sample was too small to permit tomographic analysis and whole rock geochemistry.

Given restrictions on time, tomography was only performed on nine of the eleven samples: KPST01A-E, WSW2A-B, PSTG01C, and CRW. Similarly, SHRIMP-RG analysis was only conducted for zircon and sphene crystals from KPST01A, WSW2A-B, PSTG01C, and CRW.

Table 1. Sample locations, descriptions, analyses performed, and year collected.

Sample Name	Map Location Name	Easting	Northing	Location within tuff	Sample Description	Analyses Performed	Year Collected
KPST01A	Kingman	0769890	3897793	do	pc	x, t, i, s	2007
KPST01B	Kingman	0769890	3897793	do	pc	x, t, i, s	2007
KPST01C	Kingman	0769890	3897793	do	pc	x, t, i, s	2007
KPST01D	Kingman	0769890	3897793	do	pc	x, t, i, s	2007
KPST01E	Kingman	0769890	3897793	do	pc	x, t, i, s	2007
GJ1A	Grasshopper Junction	0739361	3902329	do	pc	t, i	2009
GJ1B	Grasshopper Junction	0739361	3902329	do	pc	t, i	2009
GJ1C	Grasshopper Junction	0739361	3902329	do	pc	t	2009
PT1B	Piute Mountains	0670678	3848191	do	f	t	2009
WSW1	Warm Springs West	0740155	3864385	po	me	t, i	2009
WSW2A	Warm Springs West	0740155	3864007	po	pc	x, t, i, s	2009
WSW2B	Warm Springs West	0740155	3864007	po	pc	x, i, s	2009
WSW2D	Warm Springs West	0740155	3864007	po	pc	t, i	2009
WSW2F	Warm Springs West	0740155	3864007	po	pc	i	2009
WSW2G	Warm Springs West	0740155	3864007	po	pc	t	2009
WSW3A	Warm Springs West	0740405	3863908	po	pc	t	2009
WSW4B	Warm Springs West	0740173	3864203	po	f	t, i	2009
WSW4D	Warm Springs West	0740173	3864203	po	f	t, i	2009
CRW	Cathedral Rock	0731653	3882577	ic	f	x, t, i, s	2009
PSTG01C	Times Gulch	0730332	3881149	ic	f	x, t, i, s	2008

All Waypoints are UTM zone 11S, NAD 27 unless otherwise indicated

x: x-ray tomography
t: thin section analysis
i: LA-ICPMS
s: SHRIMP-RG

do: distal outflow
po: proximal outflow
ic: intracaldera

pc: pumice clast
f: fiamme
me: mafic enclave

Analytical Methods

Bulk Density Determinations, Thin Section Documentation and Crystal Separation

Bulk densities were determined using an immersion technique based on Archimedes' Principle appropriate for porous samples, described in detail by Gualda (2007). Bulk densities were obtained for all samples in the primary sample set, except WSW1 and WSW3A.

Polished thin sections were prepared by Idaho Petrographics and were examined under a Zeiss petrographic microscope equipped with a digital camera for photomicrography. Phenocryst assemblages and textural features of crystals were documented and photographed.

Zircon and sphene crystals were separated from pumice and fiamme by a modified version of the physical separation technique outlined and used by Gualda et al. (2004) and Gualda (2007), which consists of lightly crushing pumice, sieving, and separating glass-rich from crystal-rich material by winnowing in water. In this work, winnowing sieved separates in water was unsuccessful, due to the fact that the density of the glass-rich particles is closer to that of feldspar phenocrysts than in the Bishop pumice studied by Gualda (2007). Despite the fact that zircon and sphene are much denser than feldspar, the crystal population in these rocks is dominated by feldspar and it is difficult to winnow feldspar+glass without risking significant loss of other crystals, particularly in the small size fractions. Therefore, heavy liquid separation was performed instead, using methylene iodide (MEI) to separate zircon and sphene crystals ≤800 μm in size from the sieved fractions. Magnetite was removed from the heavy separate fraction with a strong magnet.

Zircon and sphene crystals were picked under the petrographic microscope in 1.54 refractive index oil and photographed.

Differential Absorption X-ray Tomography (DAT) and Crystal Size Distributions (CSD)

X-ray tomography has been shown to be a useful technique to study pumice, particularly because it provides 3D images of samples, with which crystals can be characterized *in situ* and textural features (e.g. fragmentation, clustering, shapes) can be documented (e.g. Gualda & Rivers 2006, Song et al, 2001). Differential absorption x-ray tomography (Gualda et al., in press) has been introduced as a more refined method for studying minerals rich in high-Z elements, particularly Zr and rare earth elements (REE). Unlike conventional x-ray tomography, in which all phases appear and need to be distinguished based on differences in linear attenuation coefficients, this method results in elemental maps such that only phases rich in a given element appear. As such, DAT is suitable for studying zircon (Zr), sphene (Ce), and allanite+chevkinite (Ce) in PST pumice and fiamme.

All tomographic imaging was performed on the bending magnet beamline of the GeoSoilEnvironCARS at the Advanced Photon Source (APS) at Argonne National Laboratory (Chicago, IL) (Rivers et al. 1999, Sutton et al. 2002, Gualda & Rivers 2006). Samples were prepared in the manner described by Pamukcu & Gualda (in press). Three cylinders of systematically varying size were cut from each sample (10 mm, 4.5 mm, 2 mm). Each cylinder was imaged at five different energies: above and below the Zr absorption edge (17.9, 18.1 KeV), above and below the Ce absorption edge (40.34, 40.54 KeV), and at an ideal energy (20-30 KeV, dependent on sample density). A total of 720 frames (692 x 520 pixels each) were collected for runs using above and below edge energies, and 900 frames (1392 x 1040 pixels each) were collected for runs performed at ideal energy. As a result, voxel (volume element) size in above and below edge tomograms is twice that of a tomogram taken at ideal energy in each linear dimension.

Each run was given a letter to designate cylinder size and image resolution. A, B, and C were given to above and below edge analyses of cylinders of different sizes. X, Y, and Z were given to ideal energy analyses of cylinders of different sizes. See table 2 for run letters and corresponding cylinder size and image resolution.

Table 2. Tomographic run letters with corresponding sample size and image resolution.

Run Letter	Cylinder Size (mm)	Resolution (µm/voxel)
Run A	10	17.58
Run X	10	8.79
Run B	4.5	8.74
Run Y	4.5	4.37
Run C	2	4.70
Run Z	2	2.35

Image processing was performed using Blob3D (Ketcham 2005) and vol_tools (Rivers & Gualda 2009), as outlined by Gualda & Rivers (2006) and Gualda et al. (in press). Typically, crystals in pumice clasts are independent of each other (not touching) and can be measured automatically by Blob3D. Accessory minerals in the PST, however, have a tendency to cluster together and automatic measurement of these clusters can skew resultant size distributions. This problem can be avoided during image processing using tools available in Blob3D that allow for manual separation of touching crystals such that they can be measured individually. In samples where such clustering was prevalent, this manual separation technique was used.

A total of four minerals have been analyzed by x-ray tomography: zircon, sphene, allanite+chevkinite, and magnetite. Zircon and allanite+chevkinite results were obtained from Zr- and Ce-maps, respectively. Even though important qualitative information can be retrieved on sphene from Ce maps, Ce contents in PST sphene crystals were low enough that sphene crystals could not be quantitatively measured using Ce-maps, and ideal energy tomograms were used instead, Magnetite results were also determined from ideal energy tomograms. Unfortunately, this latter approach requires significantly more time for processing (Gualda & Rivers 2006), and due to time restrictions, sphene and magnetite data were obtained for only two of the five Kingman samples. The decision to use two samples as representative was supported by the fact that Kingman samples are quite similar to each other in various respects, including zircon and allanite+chevkinite size distributions and geochemistry. Finally, it should also be noted that the density of the highly compressed fiamma PSTG01C was too high to be successfully imaged at the lowest resolution used (A Run), but zircon data were garnered from the low resolution ideal energy tomograms (X Run) of this sample.

Scanning Electron Microscope (SEM)

Small rock chips were mounted in epoxy and carbon coated for use in the SEM, as well as for LA-ICPMS (see below). The Hitachi S-4200 Scanning Electron Microscope with an energy dispersive system (EDS) from Oxford Instruments, located in the Electron Optics Laboratory of the Vanderbilt Institute of Nanoscale Science and Engineering, was used to observe and characterize phenocrysts and examine locations of ICPMS laser spots. Back-Scattered Electron (BSE) images were used to select areas for standard-less quantitative analysis of minerals and glasses, which were performed using the INCA software and EDS detector. See table 3 for detailed operating conditions.

Table 3. SEM Operating Conditions

SEM Operating Conditions	
Accelerating Voltage	15-20 kV
Objective Aperture	#2
Emissions	6-10 uA
Working Distance	15 mm
Condenser Lens	#10

Laser Ablation Inductively Coupled Plasma Mass Spectrometer (LA-ICPMS)

The New Wave 213 Laser Ablation system connected to a Perkin-Elmer Sciex ELAN 6100 DRCII ICPMS at Vanderbilt University was used to measure trace element compositions of glasses in mounted rock chips on two separate occasions. In 2008, Dr. Calvin Miller and Tim Peters analyzed KPST01B,D. In 2009, all remaining samples were analyzed. Table 4 outlines operating conditions.

Approximately 10 spots were analyzed on each sample and were bracketed on both ends by analyses of NIST610 (primary) and NIST612 (secondary) standards. An example set is as follows: 3 analyses of NIST610, 2 analyses of NIST612, 10 analyses of unknown, 2 analyses of

NIST612, 3 analyses of NIST610. Attempts were made to choose spot locations at a distance from other spots to avoid analysis of material sputtered previously.

The GLITTER data reduction package (GEMOC, Australia) was used for data processing (Griffin et al. 2008). Each block of analyses (10 standards and 10 unknowns) was processed independently, using Si as an internal standard and linear interpolation of standards.

Measurements of NIST612 show that measured values are within 10% of the expected values of Pearce et al. (1997) for most elements, between 10% and 15% for Sc, Fe, Nb, Cs, near 25% for P, Ti, Cr, Ta, and close to 50% for Mg. For elements of most interest here, namely Rb, Sr, Ba, Zr, Hf, REE, reproducibility is typically close to or better than 5%.

Table 4. LA-ICPMS operating conditions (modified from Colombini 2009)

LA-ICPMS Operating Conditions	
Perkin-Elmer Sciex ELAN 6100 DRCII Inductively Coupled Plasma Mass Spectrometer	
Forward power	1350-1400 W
Gas flow rate	
Nebulizer	0.75 L/min
Auxiliary	0.65-1.00 L/min
Plasma	~ 15.0 L/min
Lens voltage	10.5 V
Auto lens	OFF
New Wave 213 Laser Ablation System	
Wavelength	213 nm
Fluence (26-30 kV, 10 Hz)	~ 6 J/cm²
Laser frequency	10 Hz
Laser output	80%
Spot size	60 µm
He-Carrier gas flow	0.85 L/min
Pulse duration	20 ns
Data Acquisition	
Data acquisition protocol	Time resolved analysis
Scanning mode	Peak hopping, 1 pt/peak
Background (blank) acquisition time	~ 60 s
Analysis (ablation) time	60 s
Flush time	~ 60 s
Dwell time per reading	20 ms for Ti, 10 ms for all others
Replicates	1

Reverse Geometry Senstive High Resolution Ion Microprobe (SHRIMP-RG)

Trace element compositions of zircon and sphene crystals were analyzed at the USGS-Stanford SHRIMP-RG at Stanford University. Zircon and sphene crystals were picked from crystal separates using the method described above and sent to the SHRIMP-RG laboratory. Crystals were mounted, polished, and gold coated by Lily Claiborne, Danny Flanagan, and Dr. Joe Wooden. Cathodoluminescence (CL) images of mounted zircon and sphene crystals were obtained on the Stanford JEOL 5600LV SEM equipped with a custom-built panchromatic CL detector. CL images were used to select locations for analytical spots. The sample was analyzed using a focused 3-6 nA primary beam of $^{16}O_2^-$ (Grimes et al, 2009) and an ~15 µm spot size. The basic operating parameters and trace element routines described by Claiborne et al.(2010) and Mazdab et al.(2007) were employed for this work. Standards R33 and BLR were included in zircon and sphene mounts, respectively, and used as secondary standards. Typical errors are 10%, but significantly higher for LREE (except for Ce) in zircon. La values in zircon, in particular, can be strongly affected by analysis of volumes containing small inclusions of LREE-rich minerals.

Zircon and sphene crystals of KPST01A, WSW2A, WSW2B, and PSTG01C were analyzed for this work. Sphene crystals could not be found in CRW separates, thus only zircon was analyzed for CRW. Lindy Colombini performed analyses on zircon and sphene from PSTG01C in June 2008 and on sphene from the Kingman locality in January 2009, and the remaining samples were analyzed in December 2009. Efforts were made to analyze cores and edges of crystals, as well as sector zones and zones of conspicuously different brightness in CL. However, some of the zoning includes features that are smaller than the beam size used, such that analyses average out the properties of these regions. CL images with spots locations noted can be found in Appendices C and D.

Ti-in-Zircon and Zr-in-Sphene Thermometry

Temperature histories recorded in zircon and sphene crystals can be estimated using the re-calibrated Ti-in-zircon thermometer (Ferry & Watson 2007) and the Zr-in-sphene thermobarometer (Hayden et al. 2008):

$$T_{zircon}(^{\circ}C) = \frac{-4800 \pm 86}{\log Ti(ppm) + \log a_{SiO_2} - \log a_{TiO_2} - (5.711 \pm 0.072)} - 273$$

$$T_{sphene}(^{\circ}C) = \frac{7708 + 960P(GPa)}{10.52 - \log a_{TiO_2} - \log a_{SiO_2} - \log Zr(ppm)} - 273$$

An important caveat to applying these thermometers to real systems is that activity values of TiO_2, SiO_2 and, in the case of sphene, $ZrSiO_4$ must be constrained. The reader is referred to Claiborne et al. (2010) for an in-depth discussion of the complications in determining a_{TiO_2} and a_{SiO_2} for the Ti-in-zircon thermometer and the errors due to over- or under-estimating these activities. Additional discussions of a_{TiO_2} values in magmatic systems that are rutile-undersaturated but do contain a titaniferous phase can be found in Watson et al. (2006), Hayden & Watson (2007), and Ferry & Watson (2007). In the case of sphene, as Hayden et al. (2008) explain, $a_{Zr\,SiO_4}$ can generally be taken as 1, given that natural zircon is typically nearly pure.

In the case of the PST, which is rutile-undersaturated but does contain sphene, a value of $a_{TiO_2} = 0.7$ was assumed. In terms of quartz, it is unknown if and when the system was quartz-saturated and if zircon and sphene were in equilibrium with the host melt at the time, but a value of $a_{SiO_2} = 1$ has been used in this work. Finally, the sphene thermobarometer includes a pressure component. Best estimates of crystallization pressures are in the range 200-250 MPa for PST samples (see Carley, 2010), and thus P = 0.25 GPa was used in the temperature calculations here. Importantly, changing a_{TiO_2} or a_{SiO_2} by ±0.1 leads to differences in temperature of ~10-15 ºC. In the case of sphene, a ±0.05 GPa change in pressure results in a temperature difference of ~5-10 ºC. These differences are small relative to the range of temperatures recorded on zircon and sphene.

Despite these complexities, it is important to note that the qualitative relationships that are found on plots of Ti and Zr contents do not change with changing activity values. These relative relationships are the primary focus here. Plots do contain reference temperature lines using the above values; however, it must be stressed that these should be taken as *estimated* temperatures rather than measured temperatures, and the specific choice of activities does not significantly change any of our conclusions.

Whole Rock Geochemistry

Whole rock geochemistry determinations were performed by ACTLABS. Pieces of pumice and fiamme of ~5-20 g were sent for analysis. Analytical methods used by ACTLABS include ICPMS and Instrumental Neutron Activation Analysis (INAA).

CHAPTER III

RESULTS

Bulk Density Determinations

Bulk densities of pumice clasts (average = 1.37 g/cm^3) and intracaldera fiamme (average = 2.55 g/cm^3) differ significantly. Among the seven pumice clasts alone, bulk densities vary considerably, from 1.14 to 1.59 g/cm^3 (see table 5 for specific samples). Bulk densities of Kingman pumice clasts (KPST01A-E) cover a relatively wide range (1.14-1.41 g/cm^3), but are somewhat lower than WSW2A and WSW2B, which are similar to each other (1.49 and 1.59 g/cm^3 respectively). Intracaldera fiamme, PSTG01C and CRW, have much higher densities (2.53 g/cm^3 and 2.57 g/cm^3, respectively). This trend may reflect varying degrees of welding of the samples, and the high densities (>1 g/cm^3) of pumice clasts suggest they were welded but to a lesser extent than the fiamme.

Table 5. Measured bulk densities of pumice clasts and intracaldera fiamme.

Sample name	Sample Density (g/cm^3)
KPST01A	1.41
KPST01B	1.41
KPST01C	1.23
KPST01D	1.35
KPST01E	1.14
WSW2A	1.49
WSW2B	1.59
CRWPST	2.53
PSTG01C	2.57

Whole Rock Geochemistry

Pumice clasts and fiamme range considerably in whole rock composition, from high-silica rhyolite to trachyte (Carley, 2010). Kingman samples are high silica rhyolite (75 wt. % SiO_2) and display little compositional variability (e.g. 12-13 wt. % Al_2O_3, 1 wt. % Fe_2O_3). WSW2A is similar to Kingman (75 wt. % SiO_2, 13 wt. % Al_2O_3, 1 wt. % Fe_2O_3), but WSW2B is considerably more mafic (71 wt. % SiO_2, 15 wt. % Al_2O_3, 2 wt. % Fe_2O_3). Intracaldera fiamme (PSTG01C and CRW) are both trachytes (66-68 wt. % SiO_2. 16-17 wt. % Al_2O_3, 2-3 wt. % Fe_2O_3). The enclave, WSW1, is distinctly more mafic (57 wt. % SiO_2, 17 wt. % Al_2O_3, 7 wt. % Fe_2O_3). For the full suite of major element compositional data, see Appendix A.

Phenocryst Assemblages

Phenocryst assemblages were determined by optical microscopy and complemented by information from x-ray tomography and electron microscopy. Quantitative abundances of phenocrysts have not been determined from thin sections, but feldspar is much more abundant than other mineral phases, and sanidine is predominant over plagioclase. A summary of phenocryst assemblages for each sample can be found in table 6.

Most outflow pumice and fiamme samples contain feldspar (alkali feldspar>>plagioclase), zircon, sphene, magnetite and biotite. Amphibole is found in all pumice clasts, and in the mafic enclave, but it is not readily found in thin sections of most fiamme. Amphibole is absent in thin sections of some pumice clasts, but is found in tomograms of all analyzed samples. Allanite+chevkinite is found sparingly in thin sections of both pumice and fiamme, but has been identified in tomography of all analyzed pumice clasts. Abundant clinopyroxene and sparse orthopyroxene are present in the mafic enclave (WSW1). Clinopyroxene has also been identified in the WSW3A pumice clast and as a large (~500 μm) singe crystal in the WSW4B fiamme. Single grains of quartz (~250-400 μm) were found in WSW2D and GJ1B thin sections.

The intracaldera fiamme contain alkali feldspar, zircon, sphene, allanite+chevkinite, magnetite and biotite. Amphibole is found in both samples, but it is typically present as small fragments in thin section. Some euhedral to subhedral grains of amphibole can be identified in tomographic images. Biotite in both intracaldera samples is commonly rimmed by or entirely altered to chlorite. CRW is distinct from all other samples in that it contains a population of abundant apatite, which has not been found in other samples.

Table 6. Phenocryst assemblages of PST samples.

Sample Name	Alkali Feldspar	Plagioclase	Quartz	Zircon	Sphene	Allanite + Chevkinite	Amphibole	Biotite	Orthopyroxene	Clinopyroxene	Apatite
KPST01A	o			o	o	o	o				
KPST01B	o	o		x	o	o	o	x			
KPST01C	o	o		o	o	x	o	o			
KPST01D	o	o		x	o	x	x	o			
KPST01E	o	o		o	o	x	o	o			
GJ1A	o	o		o	o			o			
GJ1B	o		o	o	o			o			
GJ1C											
PT1B				o	o			o			
WSW1		o					o		x	o	
WSW2A	o	o		o	o	o	o	o			
WSW2D	o	o	o	o	o	o	o	o			
WSW2G	o	o		o	o		o	o			
WSW3A	o	o		o	o	o	o	o		o	
WSW4B	o	o		o	o	o	o	o		o	
WSW4D	o	o		o	o	o		o			
CRW	o	o		o	x	o	x	o			o
PSTG01C	o			o	o	o	o	o			

x: x-ray tomography only
o: thin section analysis + x-ray tomography and/or SEM

Trace Element Compositions

Glass and Whole Rock Compositions and Trends

Glass and whole rock geochemistry results are provided in figures 2 and 3 for Kingman (outflow), CRW (intracaldera), and WSW1 (mafic enclave). Glasses in all other outflow samples were significantly altered and/or overwhelmed by microlites, and results for these samples were deemed unreasonable. Intrasample variability of elemental concentrations and shapes of REE patterns (e.g. positive Eu anomalies indicative of feldspar analysis) were used to distinguish acceptable and unacceptable analyses. Additionally, some analyses resulted in disjointed REE patterns and were thus discarded.

The focus of this work is on trace element data, but in figure 2, a plot of Sr v. SiO_2 has been provided to show how these trends relate to changes in the major element composition of the samples. All plots are relative to Sr, which acts as an indicator of fractionation in this feldspar-rich system. Ba, Hf, Gd, La, Nb, and Yb are considered here as they readily enter into the structures of feldspar, zircon, sphene, allanite, and chevkinite, and can elucidate crystallization and fractionation trends. Additionally, Hf, Gd, La, Nb, and Yb will also be utilized as indicators of differentiation in zircon and sphene.

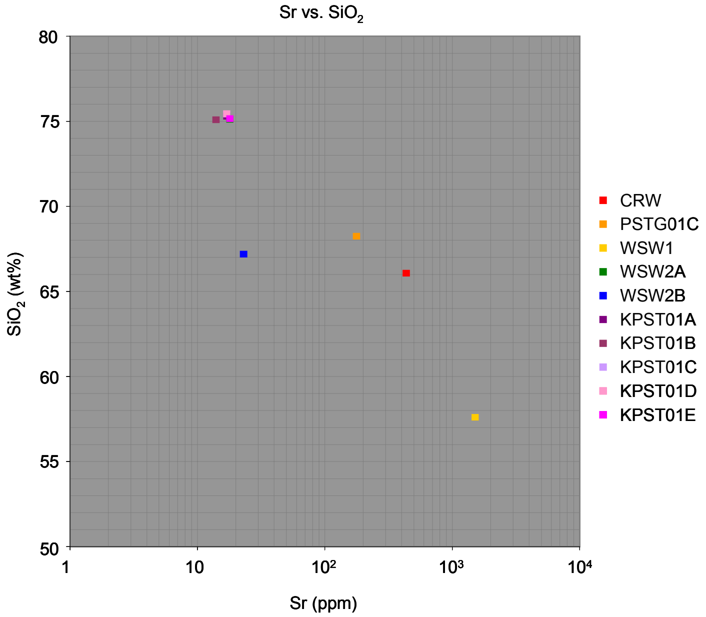


Figure 2. SiO_2 vs. Sr in CRW, PSTG01C, WSW1, WSW2A, WSW2B and Kingman. SiO_2 increases with decreasing Sr. Kingman and WSW2A are high-silica rhyolites, and WSW2B is a low-silica rhyolites. CRW and PSTG01C are trachytes. WSW1 is notably more mafic in composition.

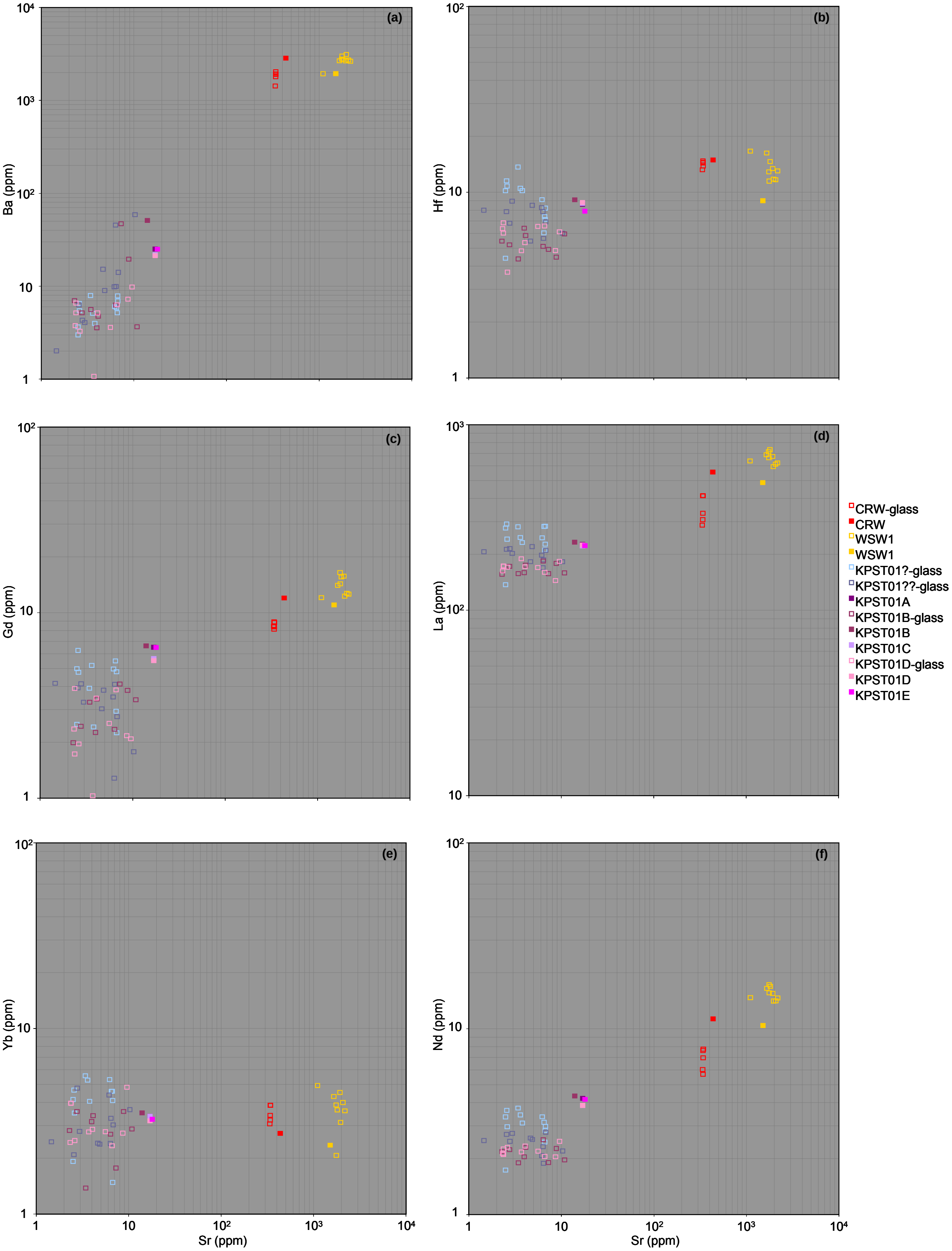


Figure 3. Whole rock and glass compositions for Kingman (outflow pumice), CRW (intracaldera fiamma), and WSW1 (mafic enclave). Filled symbols are whole rock analyses, open symbols are glass analyses. Sr is positively correlated with Ba (a), Hf (b), Gd (c), La (d), and Nd (f), showing fractionation of the system by crystallization of feldspar (Ba, Sr), zircon (Hf), sphene (Gd) and allanite+chevkinite (La, Nd). Yb (e) remains relatively constant.

Outflow and intracaldera samples show similar trends in the trace elements considered here. Ba, Hf, Gd, La, and Nd contents in both glasses and whole rock of outflow and intracaldera samples are positively correlated with Sr, such that Kingman samples appear to be the most evolved. Yb contents of glasses in both samples show no correlation with Sr, but Yb contents of whole rocks are negatively correlated, such that CRW is most depleted in Yb.

Glasses in the mafic enclave (WSW1) are also enriched in Sr, Ba, Hf, Gd, La, and Nd, relative to other samples, but show no difference in Yb contents. Whole rock Ba, Hf, Gd, La, Nd, and Yb are nearly all depleted relative to glass—one glass analysis is more depleted in Yb relative to whole rock. Whole rock Ba, Hf, Gd, La, Nd, and Sr in WSW1 are enriched relative to Kingman, but depleted relative to CRW. Yb in WSW1 is lower than in both Kingman and CRW.

Zircon and Sphene Compositions

Rare Earth Elements

Rare earth element plots for zircon and sphene, in which cores, interiors, and edges of crystals have been distinguished, are shown in figures 5 and 6. REE plots are typically displayed as chondrite-normalized; however, this significantly reduces the ability to see subtle differences between analyses. REE plots shown and discussed here are normalized to a zircon or sphene from the PST, which enhances these differences. Single zircon and sphene analyses used for this normalization were chosen from analyses of KPST01A grains because Kingman samples are similar to each other and likely represent the bulk of the PST. Furthermore, as discussed below, geochemical data indicate that Kingman samples follow a simple fractionation history and represent some of the most evolved magmas in the system. Thus these samples include some of the most evolved zircon and sphene grains in the PST.

The compositions of the selected grains are in table 7, and chondrite-normalized plots of these crystals are included in figure 4. As usually the case in zircon, the grain selected shows enrichment in HREEs relative to other REEs. Ce is a notable exception, resulting in a considerable positive Ce-anomaly. Notice that La concentration is very low, in sub-ppm levels.

The sphene grain selected displays depletion in HREE relative to MREE and LREE, with much higher REE concentrations than zircon, particularly for MREE and LREE. A moderate negative Eu-anomaly is apparent.

Table 7. REE compositions of zircon and sphene crystals used for normalization.

	La	**Ce**	**Pr**	**Nd**	**Pm**	**Sm**	**Eu**	**Gd**	**Ho**	**Tb**	**Dy**	**Er**	**Tm**	**Yb**	**Lu**	**Hf**
Zircon	0.016	71.7		1.3		3.6	1.0	31.9	40.5	10.1	111.6	165.9	33.8	255.5	43.4	9914.8
Sphene	4824.6	171235	2416.1	10689.5		2160	181.9	1852.3	248.1	1395.9	271.8	720.8	92.1	489.7	57.9	

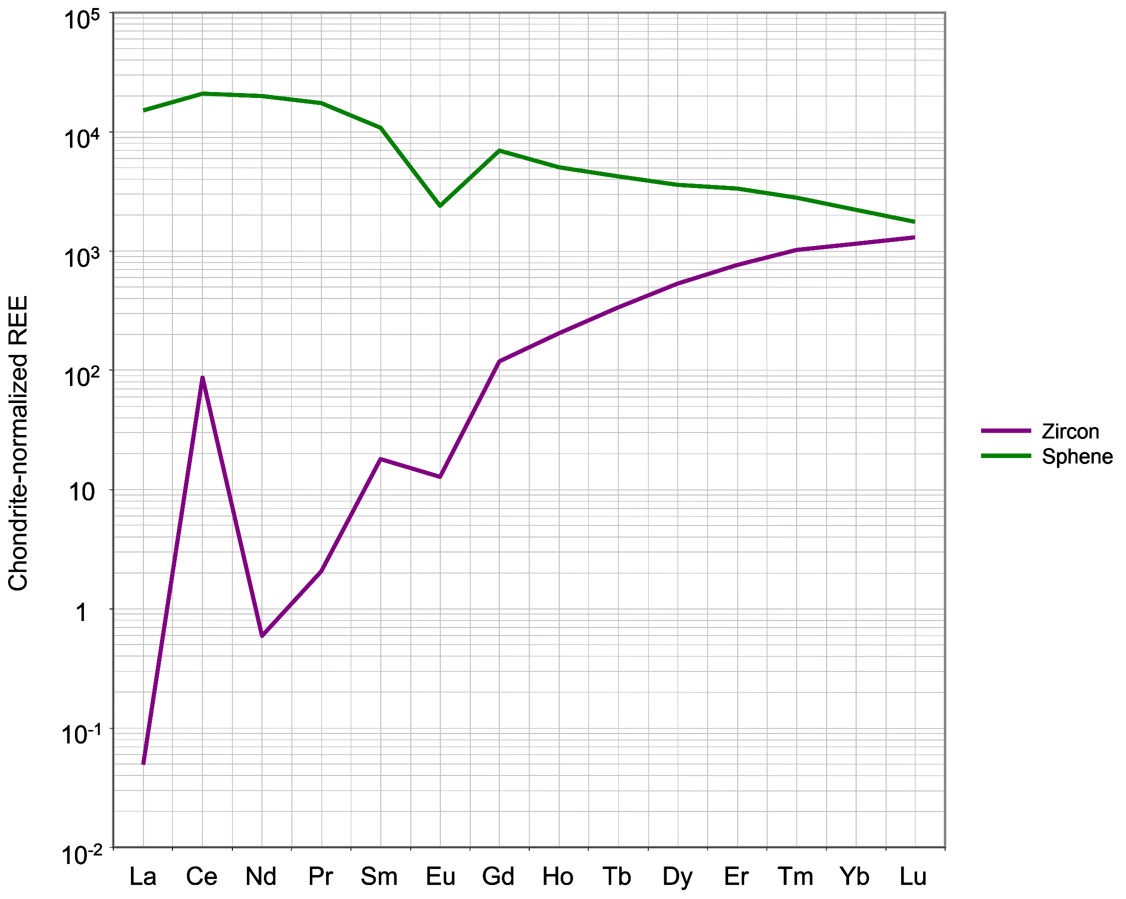


Figure 4. Chondrite-normalized REE plots of zircon and sphene grains used for zircon- and sphene-normalized REE plots.

Zircon

Zircon REEs (fig. 5) of outflow pumice follow two different sets of patterns. In general, edges of KPST01A and WSW2A zircon crystals are depleted in MREE relative to the normalizing zircon, and WSW2A cores are enriched in LREE (except for Ce). In contrast, WSW2B REEs are similar to the normalizing zircon, but show core-to-edge reduction in total REE concentration.

Intracaldera samples display patterns similar to those of WSW2B in that they resemble the normalizing zircon. However, both PSTG01C and CRW are enriched in LREE (except Ce). PSTG01C also shows a core-to-edge reduction in total REE contents, but CRW does not.

Sphene

Sphene REEs for outflow pumice clasts can also be split into two sets of patterns. KPST01A and WSW2A cores are generally enriched in MREE relative to the normalizing sphene, while edges are similar to it. Cores and interiors of WSW2B grains are similar to the normalizing sphene, though some cores show a significant enrichment in MREE. Edges, however, are considerably more enriched in MREE than cores. PSTG01C REE patterns are similar to those of WSW2B.

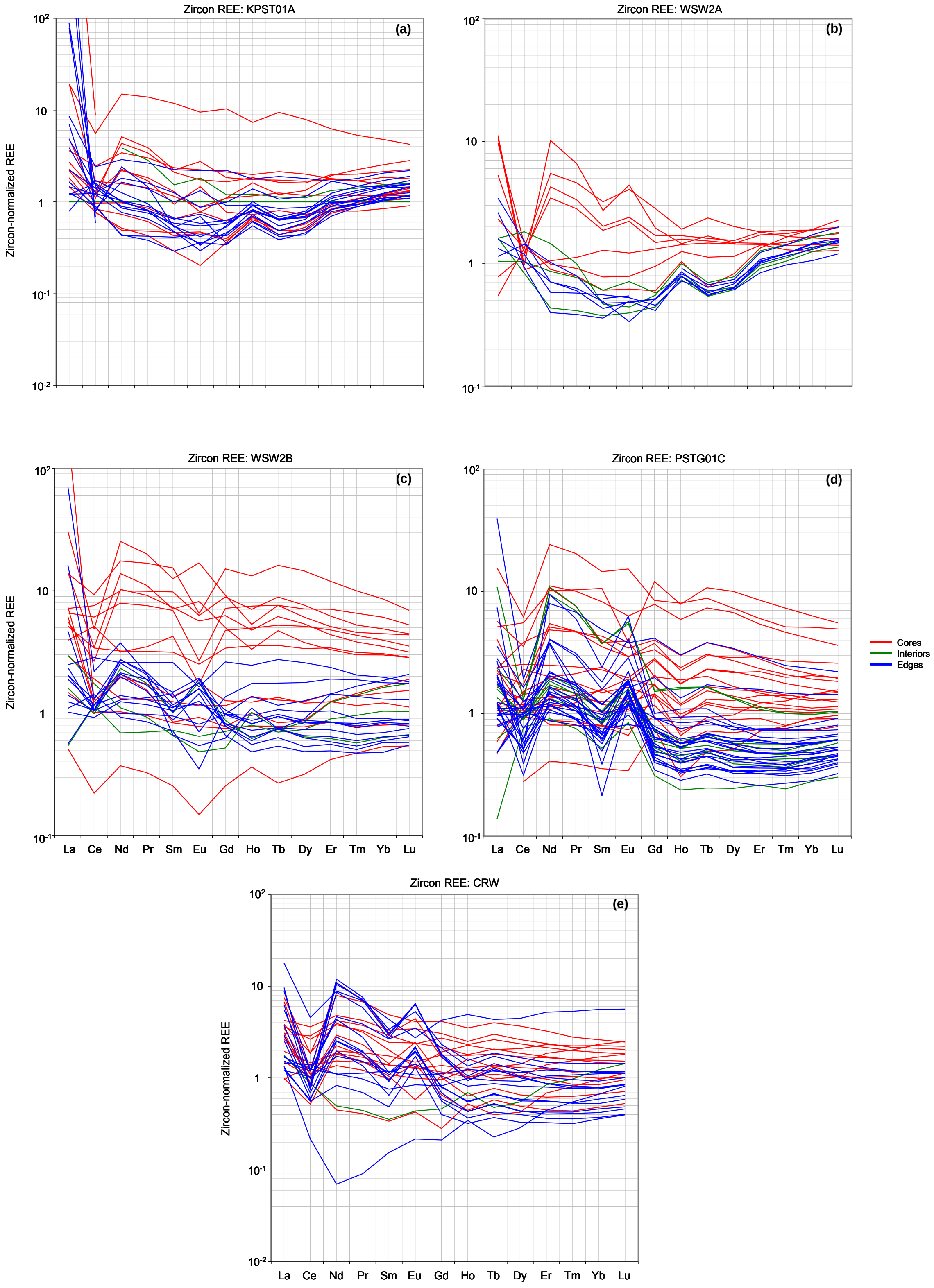


Figure 5. Zircon-normalized rare earth elements in zircon. REEs in all samples except CRW show core-to-edge depletion of REEs, indicative of fractionation. KPST01A (a) and WSW2A (b) are depleted in MREE relative to the normalizing zircon, while WSW2B (c), PSTG01C (d), and CRW (e) resemble the normalizing zircon.

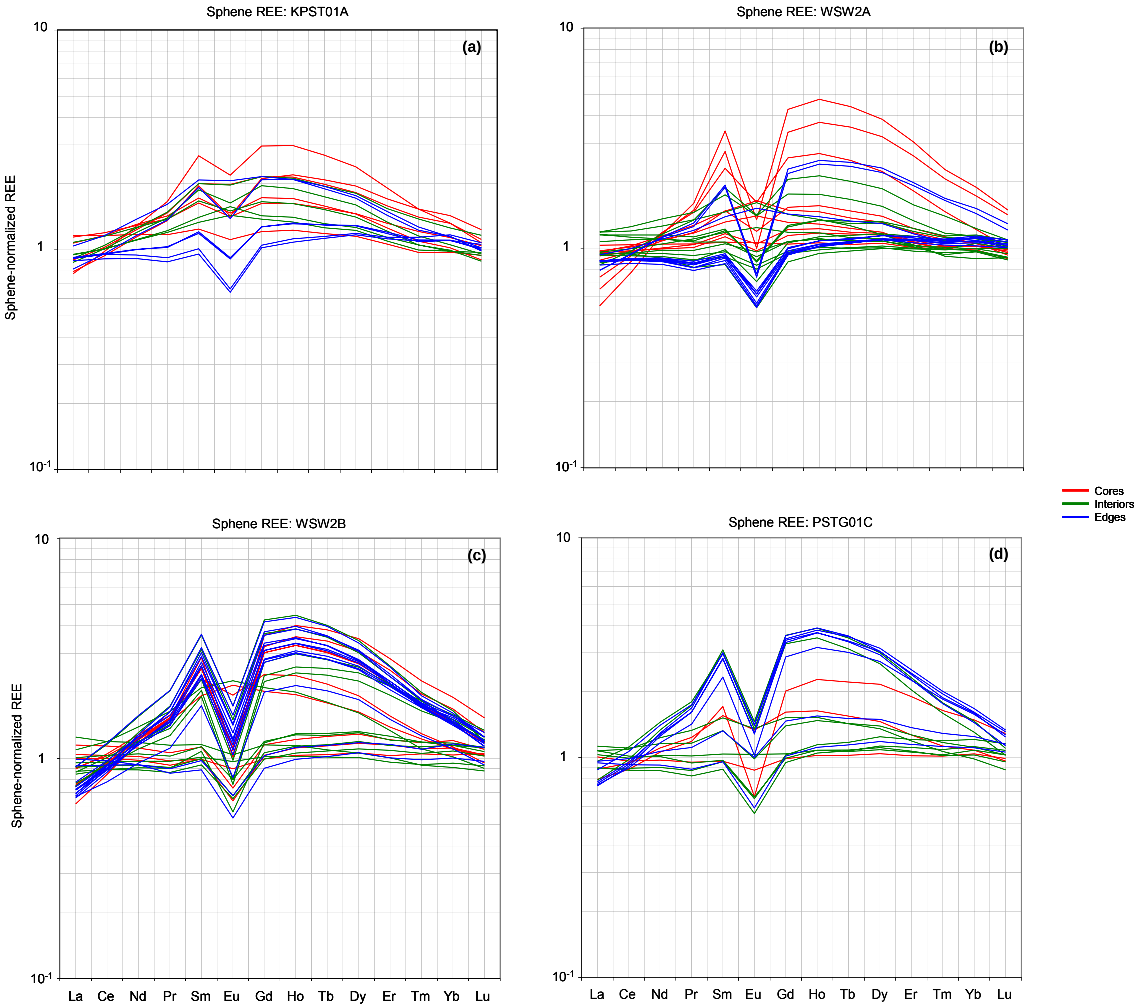


Figure 6. Sphene-normalized rare earth elements in sphene. KPST01A (a) and WSW2A (b) show depletion in REE from core to edge, indicative of fractionation. WSW2B (c) and PSTG01C (d) show this depletion as well, from core to interior, but show a significant enrichment in MREE in edges. This may reflect a heating event that caused resorption of sphene.

Trace element variations

Representative trace element concentrations in zircon and sphene have also been plotted (figs. 7, 8, 9, 10, 11), displaying core, interior, and edge compositions. Hf and Gd are used for zircon and sphene, respectively, as indicators of fractionation. Yb, Gd and Nd were also chosen for variation diagrams as each is readily taken into the structures of zircon, sphene, and allanite+chevkinite, respectively.

Zircon

Similar to REE plots, trace element variation plots (figs. 7, 8, 9) display two sets of trends in outflow pumice clasts. KPST01A and WSW2A both show the same patterns: Gd and Nd are negatively correlated with Hf; Gd and Nd are enriched in cores relative to edges, while Hf is depleted in cores relative to edges. There is no substantial difference in Yb contents between cores and edges. WSW2B shows a considerably different pattern. Gd, Nd, and Yb all decrease from core to edge. However, Hf is depleted in some edges relative to cores, but is enriched in other edges relative to cores. Intracaldera samples display patterns that are comparatively reversed from those of KPST01A and WSW2A. For the most part, intracaldera edges are depleted in Hf, Gd and Yb relative to cores.

Sphene

Trace element trends in sphene crystals (figs. 10, 11) are similar to those seen in zircon. KPST01A and WSW2A both display a core-to-edge trend of decreasing Yb with decreasing Gd. A similar trend is seen for Nd in WSW2A. KPST01A shows a decrease in Nd contents from core to edge, but this is not associated with a trend in Gd contents. WSW2B displays a reversed pattern, such that Yb, Nd, and Gd all increase from core to edge, though some cores and interiors are considerably enriched in these elements. The intracaldera sample, PSTG01C, also displays this reversed pattern, but cores and edges are separated into more discrete groups than in WSW2B, making the pattern more distinct in this sample.

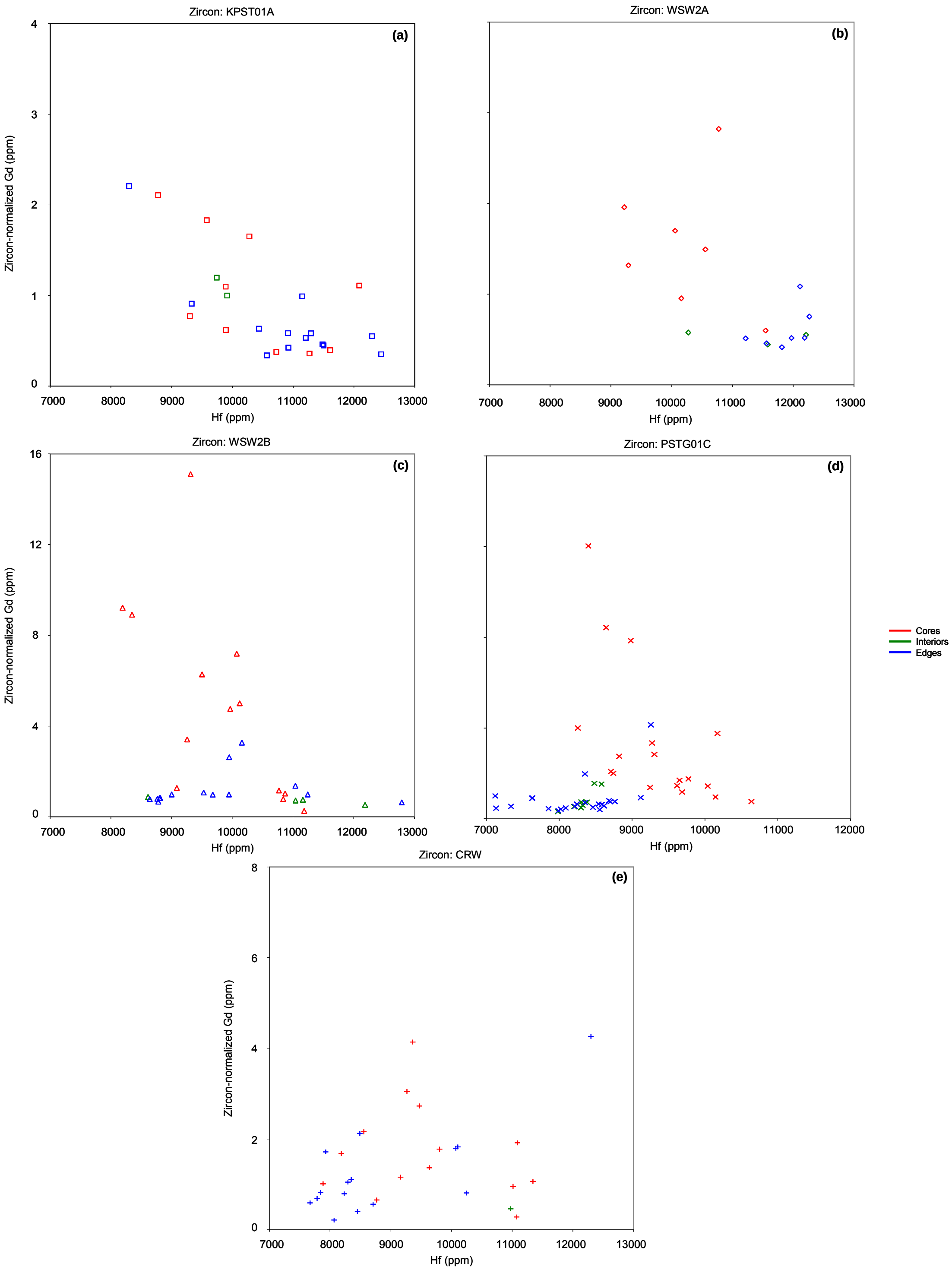


Figure 7. Zircon-normalized Gd vs. Hf in zircon crystals for (a) KPST01A, (b) WSW2A, (c) WSW2B, (d) PSTG01C and (e) CRW. Gd and Hf are negatively correlated in (a) and (b), suggestive of fractionation of sphene and zircon. Higher Gd contents in zircon cores of these samples suggests that zircon growth may have begun prior to sphene. Intracaldera samples (d, e) show reverse trends, indicating that some event, likely a heating and resorption event, occurred between the time of core and edge crystallization. WSW2B shows a decrease in Gd from core to edge, but Hf stays the same.

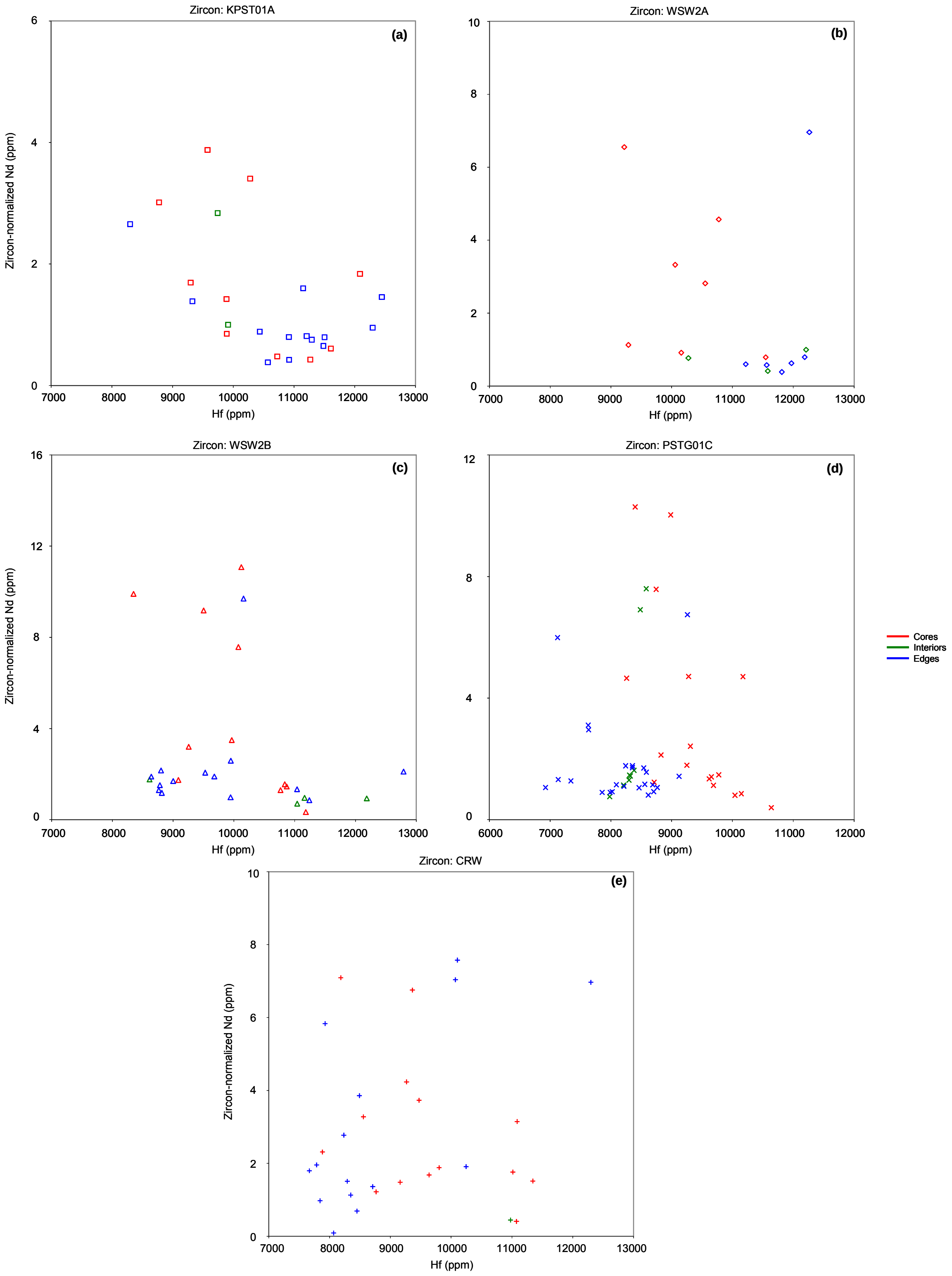


Figure 8. Zircon-normalized Nd v. Hf in zircon for (a) KPST01A, (b) WSW2A, (c) WSW2B, (d) PSTG01C, and (e) CRW. Nd and Hf are negatively correlated in (a) and (b), indicative of allanite+chevkinite fractionation. Higher Nd contents in zircon cores of these samples also suggests that zircon crystallization may have begun prior to allanite+chevkinite crystallization. Reverse trends are seen in (d) and (e). Core to edge trends are not clear in WSW2B.

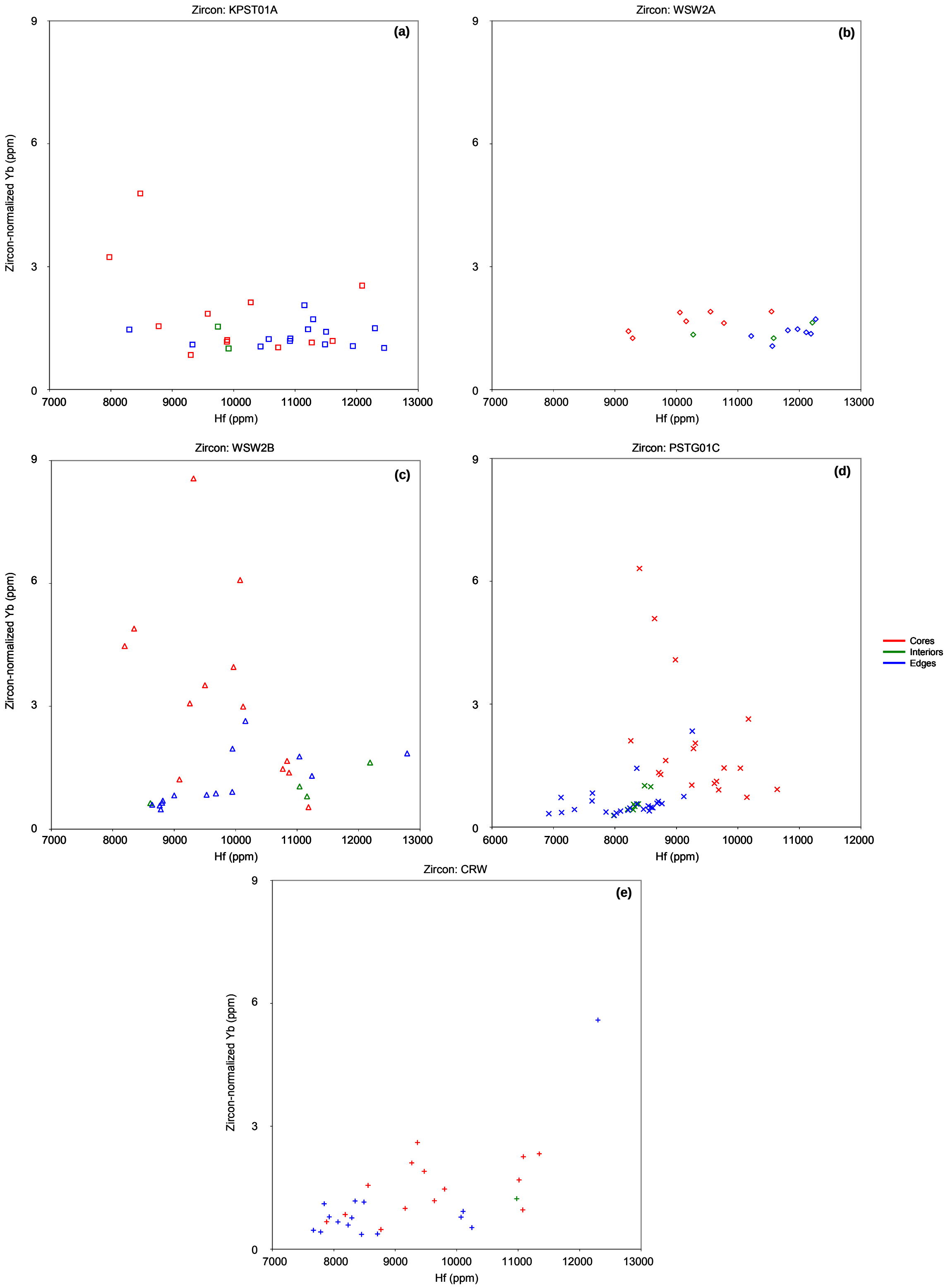


Figure 9. Zircon-normalized Yb v. Hf in zircon for (a) KPST01A, (b) WSW2A, (c) WSW2B, (d) PSTG01C, and (e) CRW. KPST01A and WSW2A do not show much change in Yb contents from core to edge, but intracaldera trachytes show core-to-edge depletion in both Yb and Hf. WSW2B does not show a clear trend.

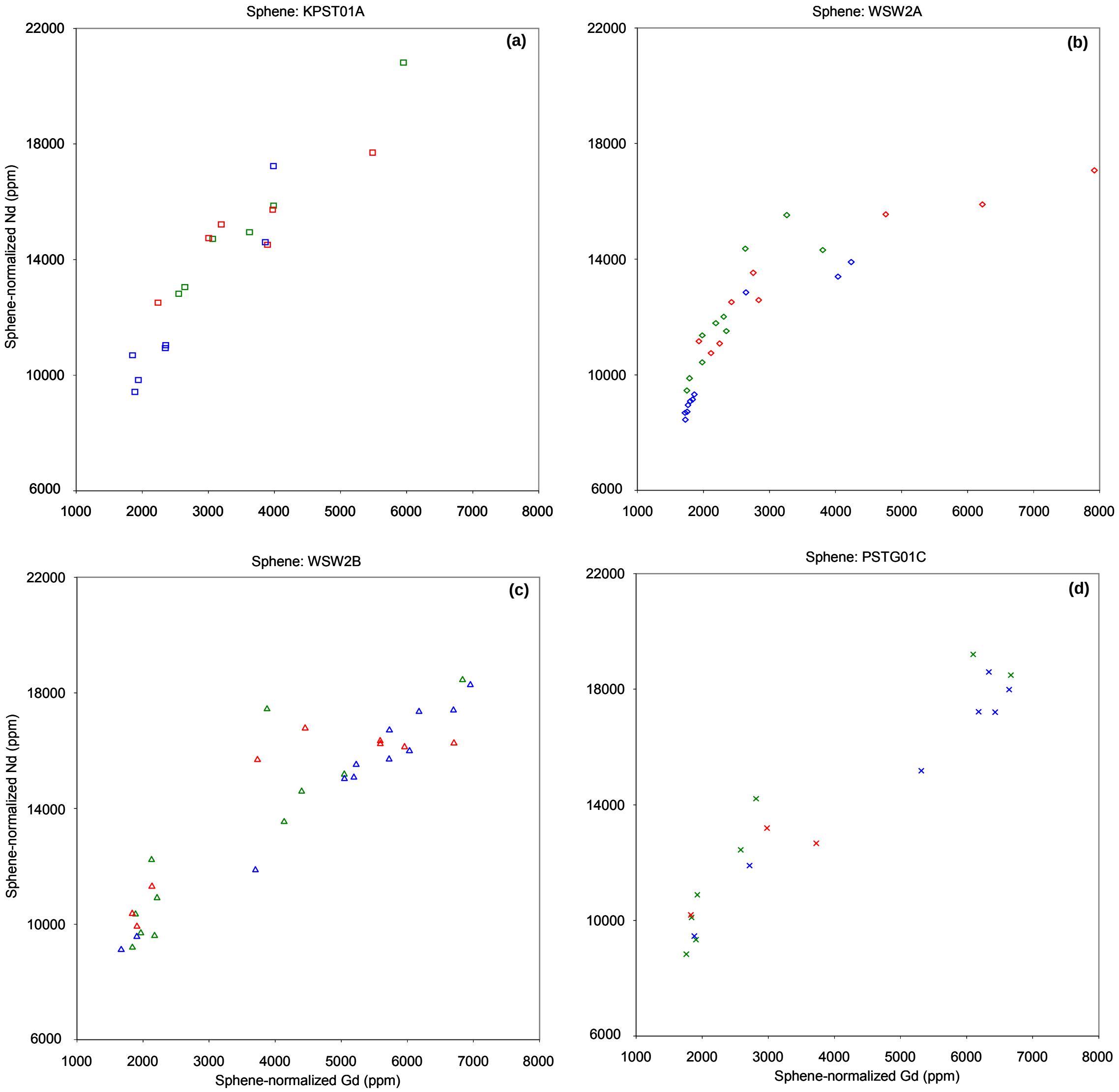


Figure 10. Sphene-normalized Nd v. Gd in sphene for (a) KPST01A, (b) WSW2A, (c) WSW2B and (d) PSTG01C. Nd is positively correlated with Gd in (a) and (b) such that edges are depleted relative to cores, indicative of fractionation by allanite+chevkinite crystallization. WSW2B (c) and PSTG01C (d) show the opposite trend which, similar to zircon trends, support a heating event that occurred between core and edge crystallization that caused resorption of allanite+chevkinite.

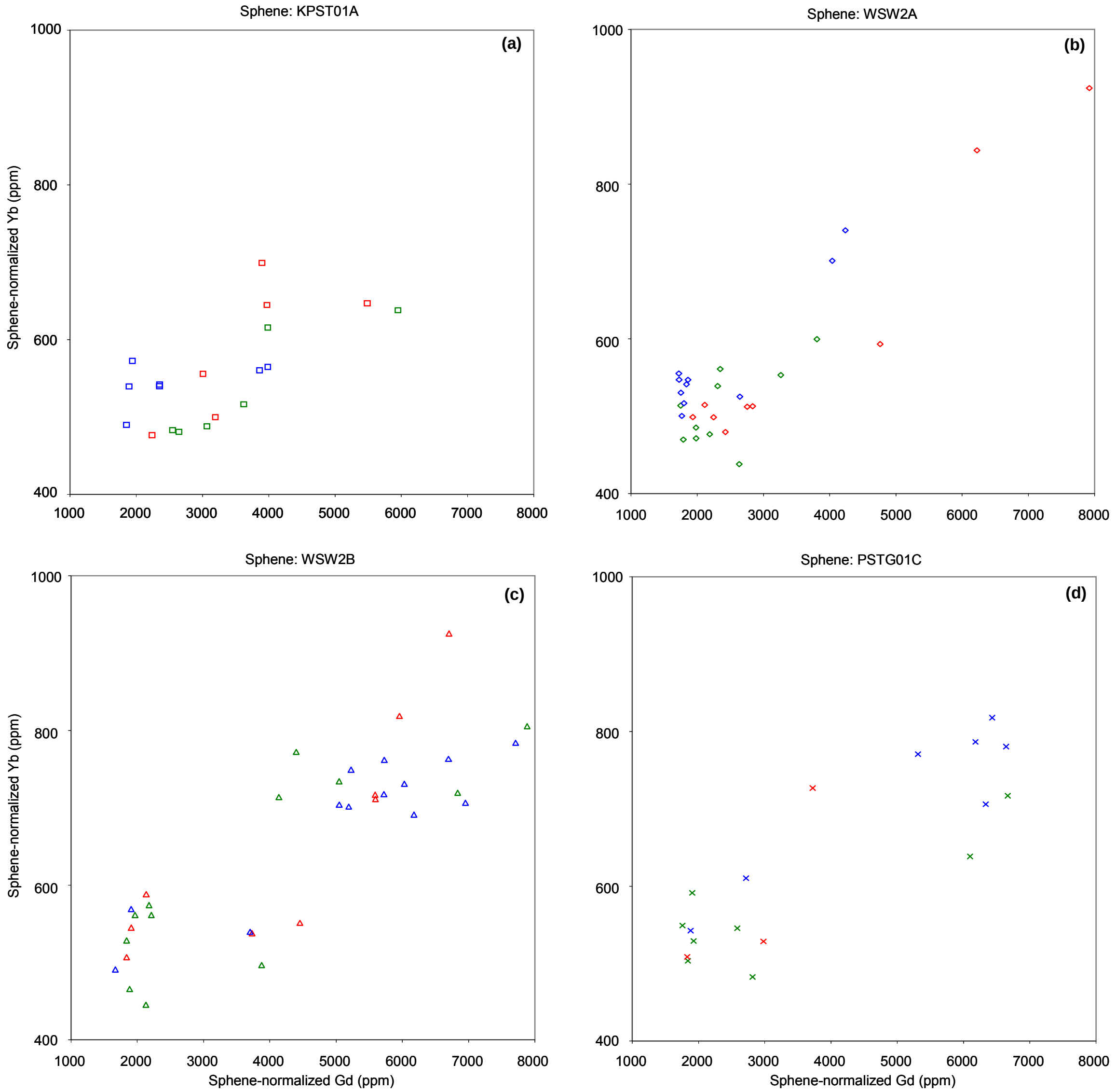


Figure 11. Sphene-normalized Yb and Gd in sphene for (a) KPST01A, (b) WSW2A, (c) WSW2B, and (d) PSTG01C. Trends are similar to those seen in Nd v. Gd plots, and suggest fractionation by zircon in (a) and (b), while a heating event that resulted in zircon resorption may be recorded by the enrichment in MREE and HREE in edges of (c) and (d).

Ti-in-Zircon and Zr-in-Sphene Thermometry

Ti and Zr contents in cores and edges of zircon and sphene crystals are plotted in figures 12 and 13. Increasing Ti in zircon and Zr in sphene are associated with increasing temperature (Ferry & Watson 2007; Hayden et al. 2008; see Methods). Reference temperatures, which are calculated using the parameters stated in Methods, are also plotted.

Zircon

In rhyolites from the outflow, Ti contents are generally in the range ~5-35 pm and are inversely correlated with Hf contents (fig. 11). In KPST01A, zircon cores extend from ~5 to 25 ppm, but fall primarily between ~5 and 15 ppm. Zircon cores in WSW2A and WSW2B cover a wider temperature range (~5-30 ppm and ~10-35 ppm Ti, respectively).

Edges of zircon crystals (fig. 11b) from these outflow samples show much more limited ranges of temperatures. KPST01A and WSW2A edges record notably cooler temperatures (~5-10 ppm Ti and ~10500-12500 ppm Hf), while WSW2B edges suggest generally warmer temperatures (~20-35 ppm Ti, ~8500-10000 ppm Hf).

The temperature trends in intracaldera trachytes are similar to those seen in the low-silica rhyolite, WSW2B. Cores of intracaldera fiamme display a similarly wide range of temperatures as outflow samples (~9-38 ppm Ti). Edges of intracaldera zircons, in contrast, record much higher temperatures than most outflow samples (~20-50 ppm Ti). As a result, there is a clear gap between temperatures in edges of intracaldera trachytes and those of KPST01A and WSW2A. WSW2B edge temperatures bridge this gap. It is also worth noting that a population of cooler rims (~10-15 ppm Ti) is also found in CRW edges.

Sphene

Zr concentrations in cores of outflow sphene crystals also suggest a wide spectrum of temperatures (~800-2100 ppm Zr), with WSW2A and KPST01A recording the highest temperatures and WSW2B recording the lowest temperatures. Higher Zr is associated with higher Gd contents.

Edges of outflow sphene crystals show the same relationships as seen in zircon edges. WSW2A records cooler temperatures, clustering tightly between ~700 and 900 ppm Zr and

~2000 ppm Gd. A number of KPST01A edges also fall into this group, but others show higher Zr and Gd (up to ~1400 ppm Zr and ~4000 ppm Gd). In turn, WSW2B edges have between ~1200 and 1500 ppm Zr and much higher Gd contents (~5500-8500 ppm).

Sphene crystals were not found in CRW (except for small, ragged remnants identified by tomography, see below), but PSTG01C trends follow those found in intracaldera zircons and are similar to patterns seen in WSW2B. Cores indicate a variety of temperatures (~1000-1500 ppm Zr, ~1800-6700 ppm Gd), while edges cluster at notably higher temperatures (~1400-1600 ppm Zr) and high Gd contents (~5500-7000 ppm).

In both the outflow and intracaldera samples, zircon shows a much wider temperature range than sphene. Zircon temperatures cover a range of ~160-180 °C, while sphene crystals record a ~30-60 °C temperature interval. In both zircon and sphene, the same core-to-edge trends (figs. 11a,b, 12a,b) are found for each sample: KPST01A and WSW2A show decreasing temperatures while WSW2B, PSTG01C, and CRW show increasing temperatures. This can be seen in individual zircon and sphene grains (figs. 11c, 12c).

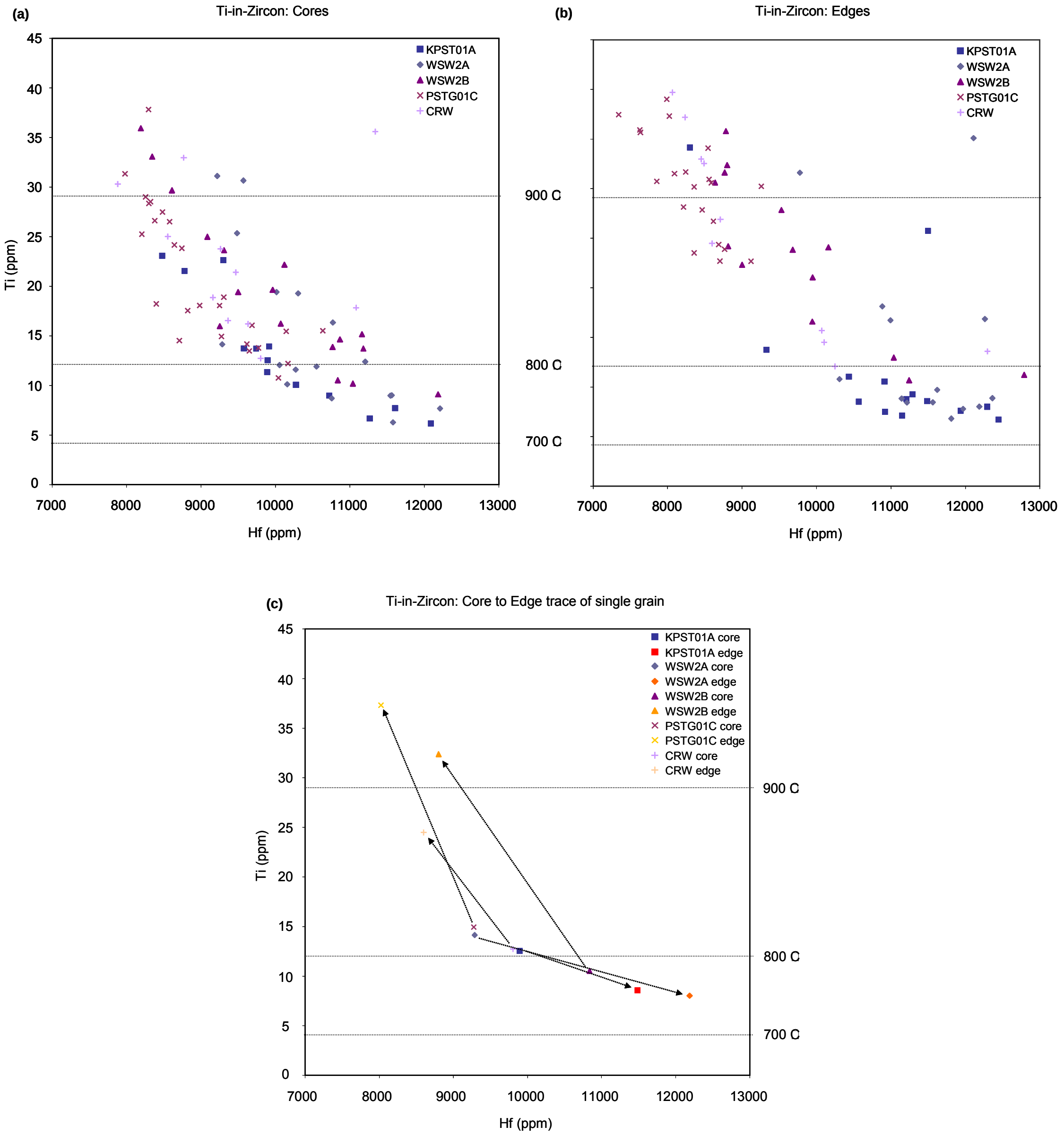


Figure 12. Ti-in-zircon temperatures. Reference temperatures are calculated using TiO_2 and SiO_2 activites of 0.7 and 1, respectively. (a) Temperatures recorded in cores show a wide spread of temperatures. (b) Edges of zircon from outflow rhyolites record cooler temperatures than cores, which is consistent with fractionation. Intracaldera trachytes record higher temperatures in edges than cores, consistent with a heating event also implied by other chemical and textural data. WSW2B temperatures span the gap between intracaldera fiamme and other outflow pumices, recording some very high temperatures. (c) Core-to-edge temperature trends of single grains illustrates that intracaldera trachytes and WSW2B get warmer, while KPST01A and WSW2A cool.

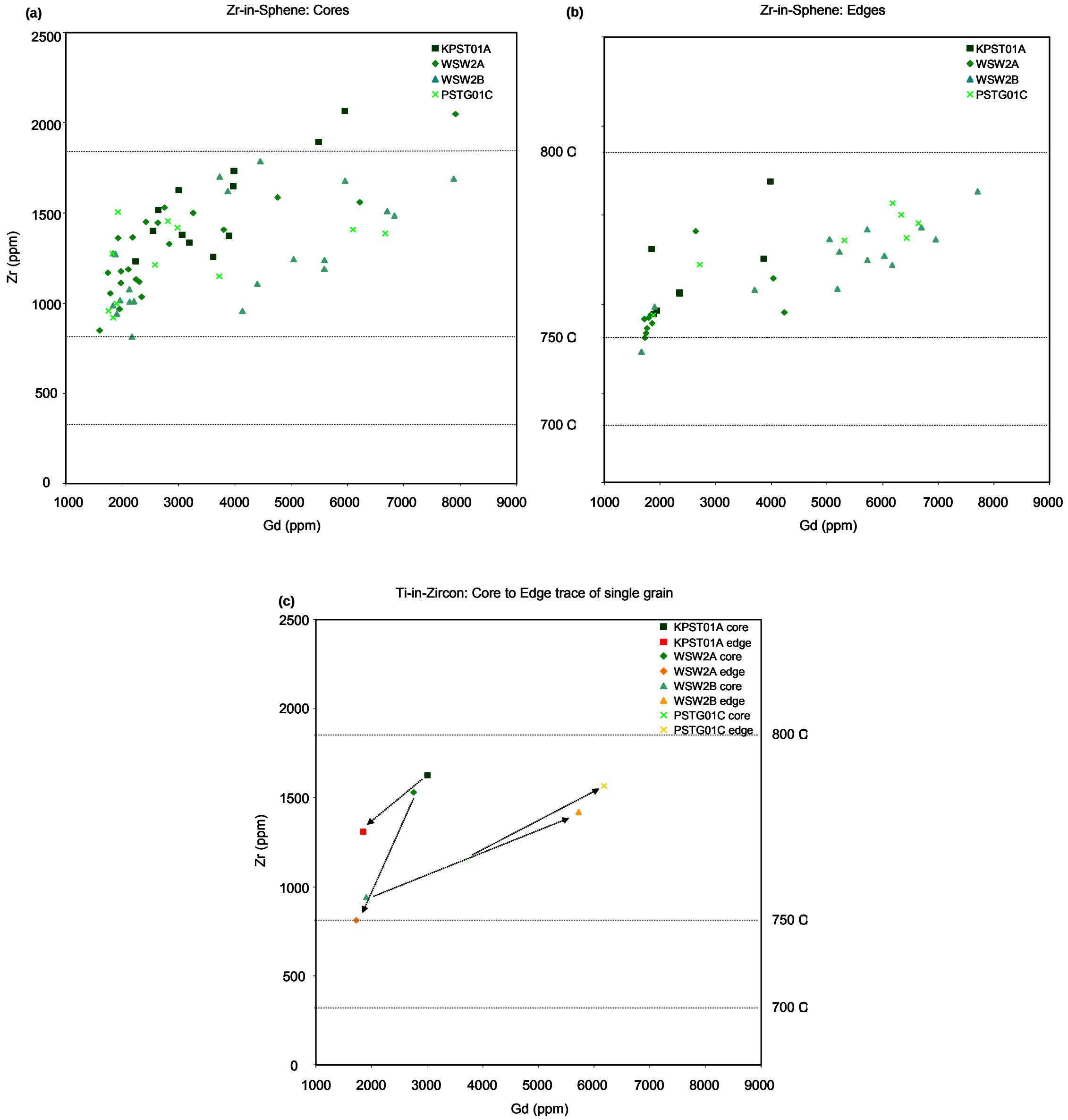


Figure 13. Zr-in-sphene temperatures. Reference temperatures have been calculated using activities of TiO_2, SiO_2, and Zr_2SiO_4 of 0.7, 1, and 1, respectively. Sphene temperature trends are similar to those in zircon, but record a smaller range of temperatures thereby suggesting that sphene had a shorter history of crystallization than did zircon.

Textures

Crystal Size Distributions

Crystal size distributions in this work (fig. 14) are plotted as semi-log plots of crystal size versus population density (# crystals counted/bin size [μm]/mass [g]), as is typical of many CSD studies (Marsh 1998, 1988). Bin sizes used increase by a factor of two with size (e.g. 17-35 μm, 35-70 μm), due to the overall trend of decreasing numbers of crystals with size (Gualda, 2006). Population densities are calculated as a function of mass instead of volume, due to the high porosity of pumice (Gualda 2006). Crystal size (μm) is taken here to be the maximum dimension of a best fit ellipsoid determined by Blob3D (Ketcham, 2005). Errors are based on counting statistics and are equal to 2√N, where N is the number of objects in a particular size bin (Gualda, 2006).

Marsh (1998) shows that exponential CSDs (which appear linear on semi-log plots) are typical of igneous rocks and can be modeled using simple nucleation and growth regimes. As a result, the focus in description and discussion of CSD results here will be on distinctions from this "typical" shape. We characterize some of the distributions found here as "kinked", in which two exponential segments can be recognized: a shallow-sloped tail characteristic of large crystal sizes and a steeply-sloped section showing enrichment (one or more orders of magnitude) in small crystals. Power-law, or fractal, size distributions are concave-up distributions in semi-log plots, but appear linear on log-log plots.

Unless otherwise noted, size distributions describe crystals ~17.5-840 μm in size. For the sake of simplicity, sizes given, unless otherwise noted, are the centers of bins and not maximum or minimum crystal size in a given bin. Crystal size distribution data can be found in Appendix E.

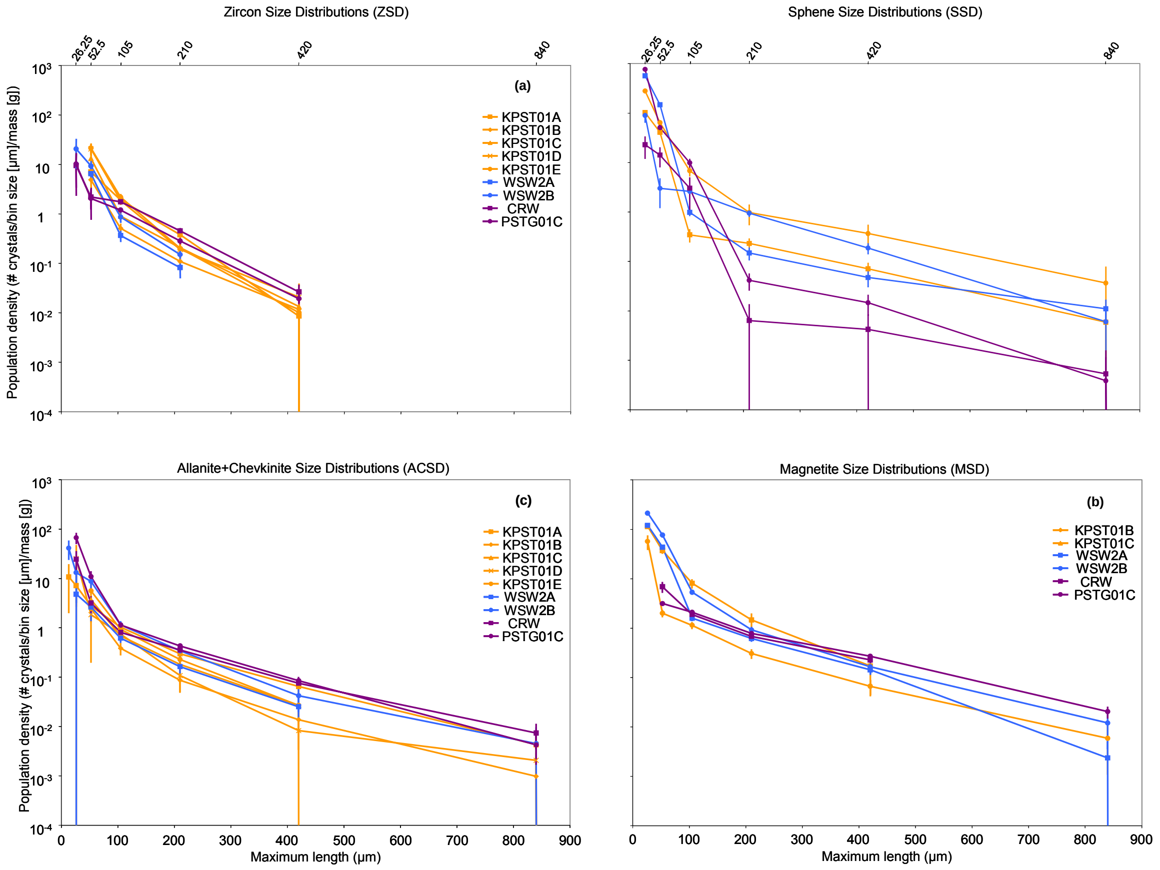


Figure 14. Crystal size distributions of (a) zircon, (b) sphene, (c) allanite+chevkinite and (d) magnetite. Upper x-axis shows bin centers. Zircon size distributions follow a linear trend, which is consistent with a simple nucleation and growth model. Sphene and magnetite size distributions of some outflow pumices are kinked, which may be indicative of a decompression event marking onset of eruption. Sphene size distributions in intracaldera fiamme are also kinked but show lower population densities than other phases, as well as a concave-down segment describing small crystals, which potentially reflects sphene resorption.

Zircon

Zircon size distributions (ZSD) of outflow pumice (fig. 14a) can be best described as following a simple linear trend that shows enrichment in small crystals and a comparative depletion in large crystals. In Kingman samples, this trend extends from crystals 26.25 to 840 µm in size. ZSDs of WSW samples differ from those of Kingman in that they do not contain crystals >210 µm. WSW2B is also distinct in that it contains a population of crystals <26.25 µm in size.

The ZSDs of both intracaldera fiamme (fig. 14a) contain crystals 26.25-420 µm in size and follow a kinked pattern. In both distributions, the kink occurs in the 52.5 µm bin and results in a notable enrichment in smaller crystals. Population densities in all bins are not significantly different from those seen in outflow pumices.

Sphene

Sphene size distributions (SSD) of outflow pumice display two patterns (fig. 14b). KPST01C (#1) follows a concave-up pattern, while the SSDs of KPST01B, WSW2A, and WSW2B (#2) are kinked with a sharp enrichment in smaller crystals. The kink occurs in different bins for the distributions (52.5 μm for WSW2B, 105 μm for KPST01B and WSW2A).

SSDs of intracaldera fiamme are similar to each other but differ significantly from outflow SSDs (fig. 14b). Intracaldera SSDs show a distinctive kinked pattern, in which the distribution follows a linear pattern with shallow slope for crystals >210 μm, and a concave-down pattern for smaller crystals. They do show the typical enrichment in small sizes and depletion of large crystals; however, the intracaldera SSDs are shifted downward by 1-2 orders of magnitude for crystals >210 μm.

Allanite+Chevkinite

All allanite+chevkinite size distributions (ACSD) from outflow pumice (fig. 14c) show concave-up patterns that can be reasonably described by power law (or fractal) functions; however, there are some notable distinctions between them. First, WSW2A, KPST01C, and KPST01E follow each other closely and do not contain crystals >420 μm. Second, the KPST01A, KPST01B, and KPST01D distributions include the gamut of crystal sizes, but KPST01A is more enriched than all outflow distributions for crystals >52.5 μm. WSW2B follows closely with the KPST01A pattern for crystals >105 μm, but shows a steep increase in crystals of smaller size, resulting in a kinked shape for the overall distribution. Finally, KPST01B and KPST01D follow each other closely and are the most depleted in large crystals.

The ACSDs of intracaldera fiamme also display power-law relationships (fig. 14c). Both distributions follow the WSW2B pattern closely, though neither contains the <52.5 μm population seen in the outflow pumice.

Magnetite

Magnetite size distributions (MSD) of outflow pumice clasts show both linear and kinked shapes (fig. 14d). KPST01C follows a linear trend, but does not contain crystals >420 μm. The remaining three distributions follow a kinked pattern. The kink occurs in the 105 μm bin in WSW distributions, and occurs at smaller sizes (52.5 μm) in KPST01B.

In contrast to the outflow MSDs, the MSDs of intracaldera fiamme (fig. 14d) follow a very simple linear pattern and are noticeably depleted in small crystals. Neither fiamme includes any crystals <52.5 μm, and CRW does not contain any crystals >420 μm.

Qualitative textural features of minerals in the PST

In the process of quantitatively detailing textures and phenocryst assemblages of samples, qualitative observations on textures of phenocrysts were also recorded.

In thin sections of outflow pumice clasts, crystals of all phases tend to be euhedral, with intact cores and no reaction rims. Some crystals are fragmented, but fragmentation is not a wide-spread phenomenon. Zoning patterns in feldspars are generally undisturbed: contacts between zones are sharp, and zone edges do not show embayments (fig. 15a). Physically separated crystals of zircon and sphene are generally euhedral, as well (fig. 15c, d). Tomographic images from outflow pumice clasts corroborate these observations (fig. 16a). An important exception is pumice clast WSW3A, in which many feldspar phenocrysts are fragmented, and large crystals show mild embayments and rounded edges. These features are similar to what is seen in the outflow fiamme (GJ1A-C, WSW4B,D), in which many phenocrysts of feldspar are fragmented and anhedral with rounded edges. Some feldspar crystals are also embayed significantly, such that glass has infilled from the edge to the core. Intracaldera fiamme, particularly CRW, display striking evidence of resorption and reaction. In PSTG01C, many feldspar phenocrysts are moderately embayed and/or have corroded cores. In CRW, nearly all feldspars are heavily embayed, a feature that is visible in both thin section and in tomographic images (figs. 15b,e, 16b). Additionally, biotite crystals in thin section and in crystal separates from intracaldera fiamme are rimmed by or entirely altered to chlorite.

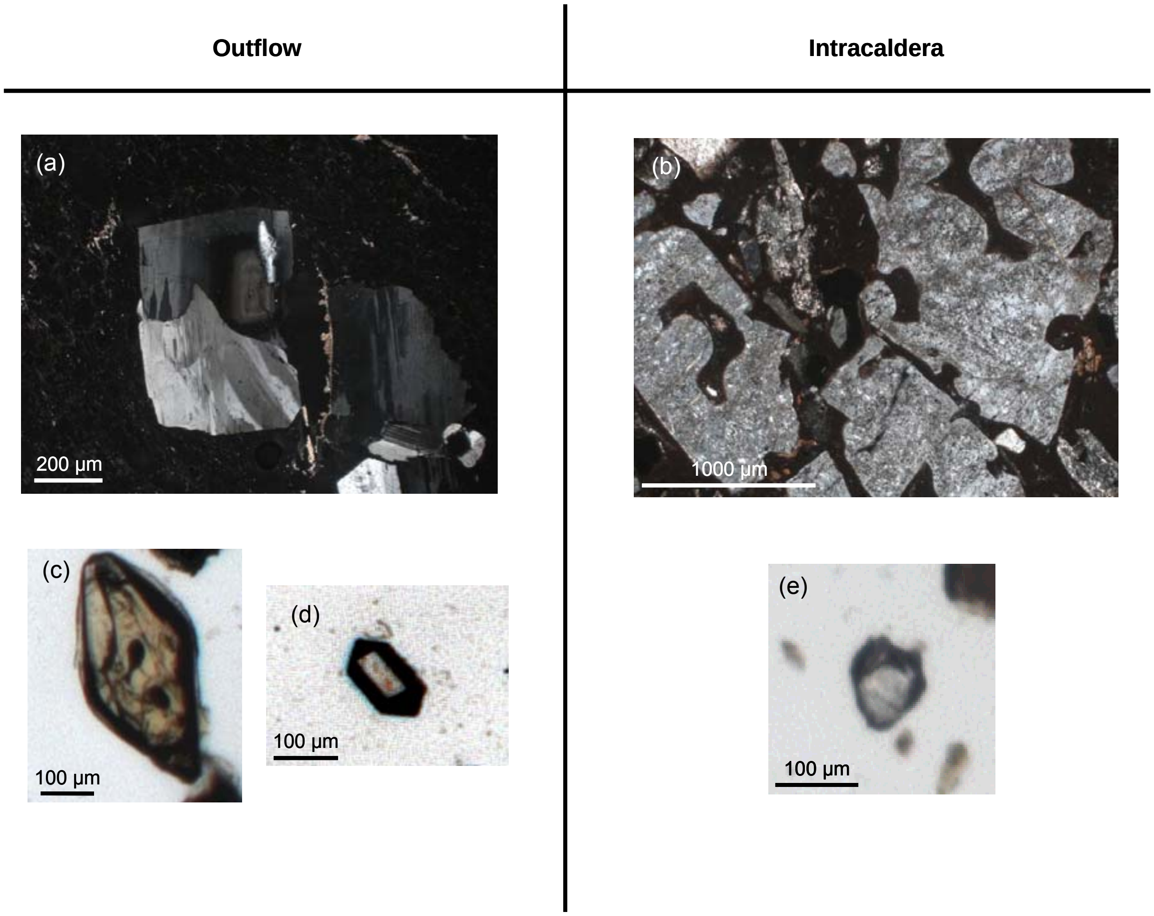


Figure 15. Phenocryst textures in thin section and crystal separates. Textures of phenocrysts are considerably different between outflow pumice clasts (a, c, d) and intracaldera fiamme (b, e). In outflow pumice clasts, feldspar (a), sphene (c) and zircon (d) crystals are generally euhedral. In intracaldera fiamme, feldspar (b) crystals are often embayed and zircon crystals (e) are rounded. Sphene is difficult, if not impossible, to find in thin sections and crystal separates of intracaldera samples. Textures of intracaldera fiamme are suggestive of a heating and resorption event.

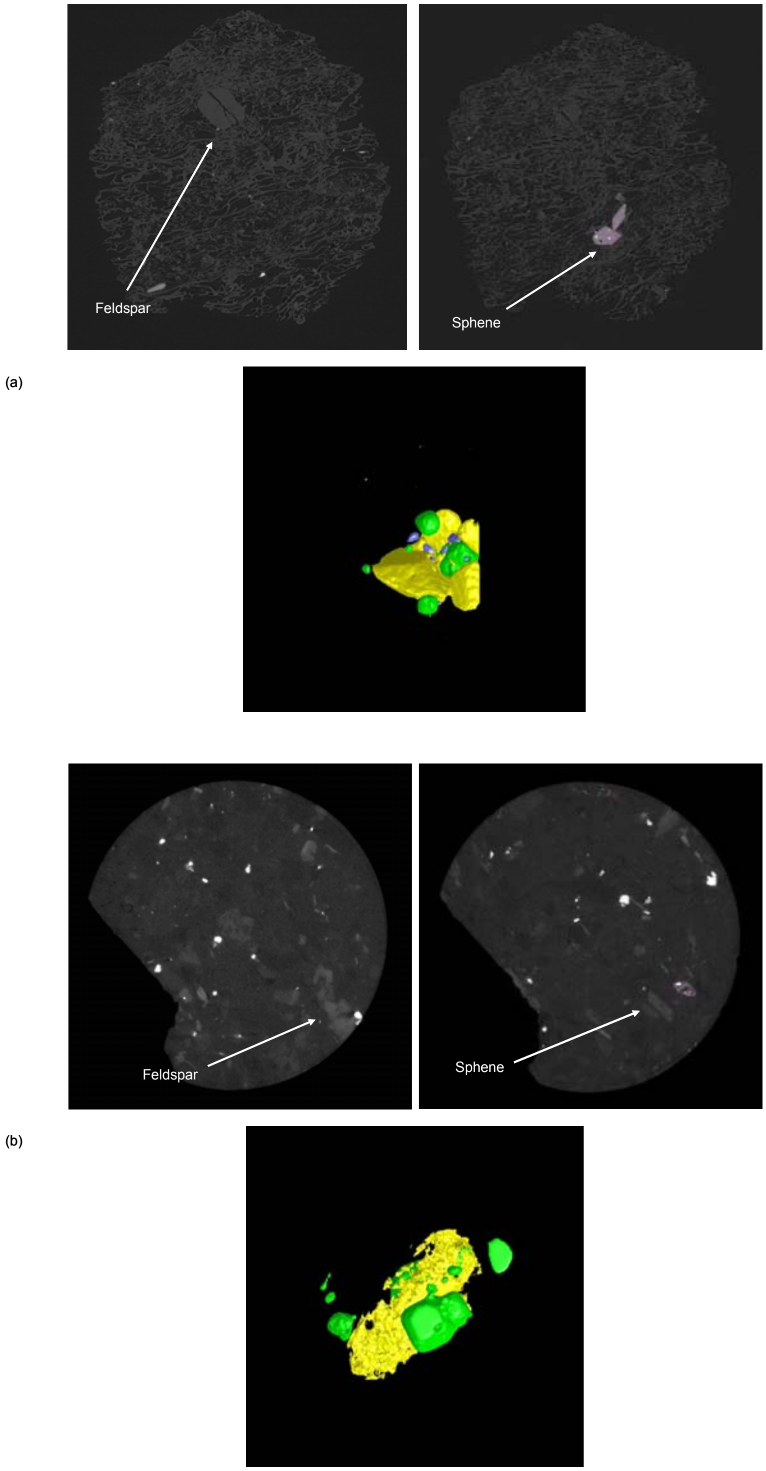


Figure 16. Tomograms and reconstructions of phenocrysts in outflow pumice (a) and intracaldera fiamma (b). Phenocrysts in outflow pumices are typically euhedral, while those in intracaldera fiamme are embayed or holey (likely due to resorption). Reconstructions of sphene and magnetite crystals (yellow and green, respectively) display the clustering tendency of accessory minerals.

Zircon crystals found in thin section and separated from PSTG01C and CRW are generally rounded (fig. 15f). Sphene could not be found in thin section or crystal separates from CRW, but tomography provides striking images of sphene crystals that are mostly skeletal (fig. 16b). Small anhedral crystals of sphene can also be found in tomographic images of PSTG01C and CRW. Similarly, small anhedral crystals of amphibole are found in tomographic images, though small euhedral crystals can also be found. Amphibole does not have the same holey texture as seen in sphene.

An additional intriguing textural feature in the PST is a strong tendency for accessory minerals to cluster together (fig. 16). In outflow samples, it is most common to find large magnetite crystals with smaller zircon, allanite+chevkinite, and sphene crystals attached to the edges of or included within them (fig. 16a), but the same phenomenon occurs with zircon and allanite+chevkinite in and around sphene crystals. It is also relatively common, particularly in Kingman samples, to find accessory minerals included in or attached to amphibole crystals.

This texture can be seen in thin sections of outflow samples, but is perhaps most strikingly illustrated in 3D renditions of accessory minerals derived from tomography. For example, fig. 17 shows the suite of accessory minerals rendered from KPST01C. Note that when the sphene (yellow) and magnetite (green) crystals are hidden, it becomes clear that most of the zircon in the sample is concentrated in clusters in and around the sphene and magnetite crystals (see Gualda et al., in press).

Clustering of accessory minerals also occurs in intracaldera fiamme, but it is less common than in outflow samples. In thin sections of intracaldera fiamme, clusters of magnetite, zircon, and allanite+chevkinite are found. In tomography of these samples, sphene can also be found in conjunction with allanite+chevkinite, zircon, and/or magnetite (fig. 16b).

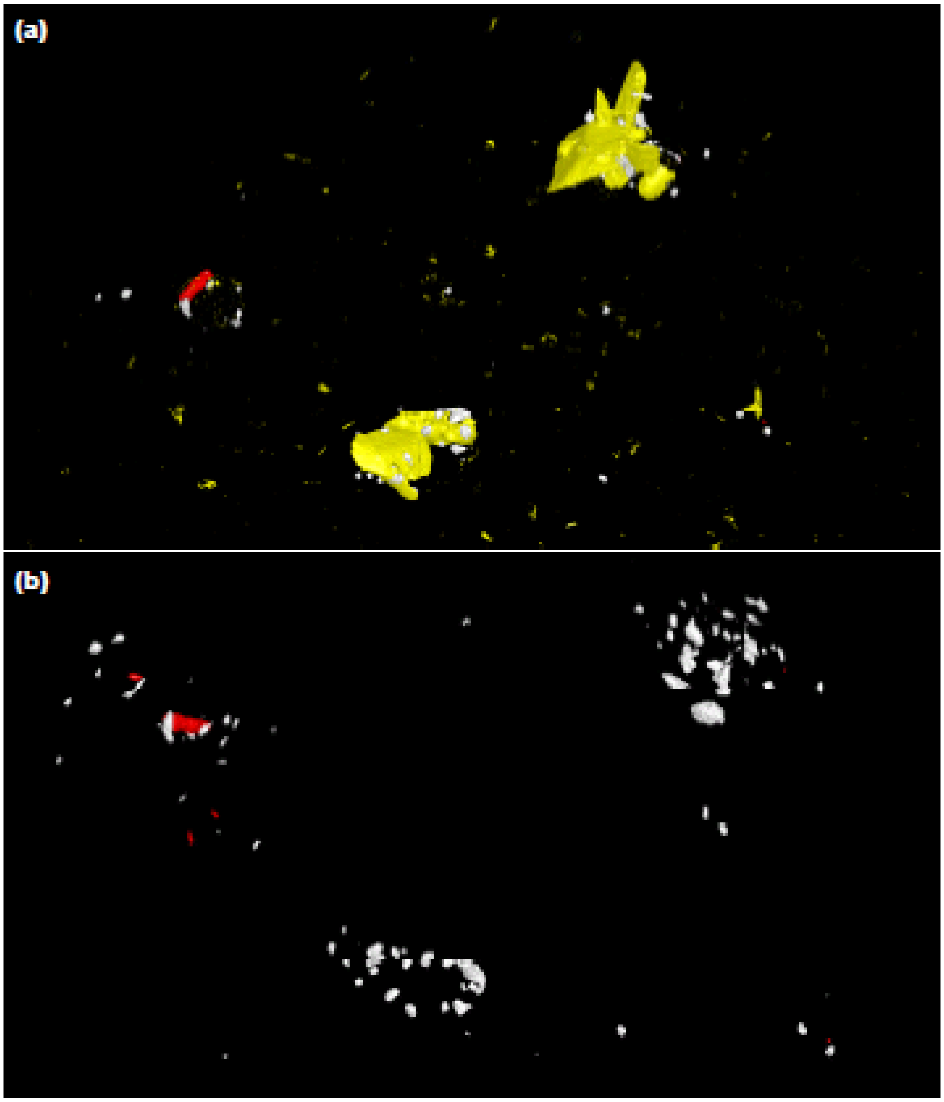


Figure 17. 3D rendition of sphene (yellow), allanite+chevkinite (red) and zircon (white) crystals from tomography. (a) 3D reconstruction of all three phases. (b) Same rendition with sphene crystals hidden. As evident from these renditions, accessory minerals in the PST tend to cluster together.

CHAPTER IV

DISCUSSION

Preserved in the textures and compositions of accessory minerals is an intriguing story of the pre- and syn-eruptive evolution of the PST system. Phenocrysts in the high-silica rhyolites (Kingman, WSW2A) record a simple cooling and crystallization history, as well as the possibility of a late-stage decompression event marking the onset of eruption. The low-silica rhyolite (WSW2B) and the trachytes (PSTG01C, CRW) record this cooling and crystallization history as well; however, they also provide evidence for a late-stage heating event that may have had a considerable impact on the PST system. The focus of this discussion will be on these two segments of the evolution of the PST, as evidenced by textures and compositions.

Cooling, crystallization, and decompression in the Peach Spring magma system

Textures and compositional variations in accessory minerals from the rhyolites show a pre-eruptive history of relatively uninterrupted cooling and crystallization. This is supported by qualitative observations of textures, in that phenocrysts are typically euhedral (fig. 15) and show no evidence of impact by widespread fragmentation, resorption, or mixing events. Fig. 16 depicts this well, showing a number of perfectly formed sphene crystals, as does fig. 15 in showing pristine zoning patterns in feldspar and large euhedral zircon and sphene grains.

Considering textures and compositions in greater detail, however, reveals significant evidence for cooling of the system and a distinct sequence of accessory mineral crystallization. First, core-to-edge temperature trends in zircon and sphene crystals from the rhyolites are clear evidence of overall cooling in this portion of the PST magma, as rims record notably cooler temperatures than cores (figs. 12, 13). This is consistent with basic differentiation of the system due to crystallization, which is also displayed in trace element variations. In particular, the relatively continuous core-to-edge depletion in REE contents with increasing Hf in zircon and with decreasing Gd in sphene is indicative of fractionation by zircon, allanite+chevkinite, and sphene crystallization. REEs act compatibly with these phases and continual growth of them depletes the melt in HREE, LREE, and MREE, respectively.

Textures and compositions of accessory minerals in rhyolites suggest that the onset and duration of crystallization of individual accessory minerals differed. Broadly, temperatures recorded by zircon and sphene grains differ significantly (figs. 12, 13), showing a spread of ~180-190 °C in zircon and ~50-60 °C in sphene, making it clear that zircon had a more protracted history of crystallization.

A closer look at trace elements also suggests differences in the onset of crystallization of the various accessory mineral phases. In particular, Gd and Nd in zircon show that cores grew from melt of higher Gd and Nd contents than did edges. These results suggest the possibility that zircon crystallization began prior to sphene and allanite+chevkinite, as crystallization of these phases would deplete the melt in Gd and Nd, respectively. The data, however, are insufficient to demonstrate this conclusively. Nonetheless, the data do permit zircon saturation prior to other accessory mineral phases, and necessitate co-crystallization of accessories.

At the same time, the prevalence of accessory minerals (magnetite, sphene, allanite+chevkinite, and zircon) as clusters rather than independently (fig 17) suggests that not only was crystallization of these phases relatively coeval, but that crystallization of one accessory phase may have caused growth of the others (Bacon 1989). On the whole, these results imply that while the onset of growth of these phases may have differed, the bulk of their crystallization was largely coeval.

Crystal size distributions also lend interesting insight into the crystallization history in the PST and have implications for the onset of the PST eruption. As mentioned above (Results), expected distributions are exponential (Marsh 1998), lognormal (Eberl et al. 2002), or fractal (Bindeman 2005). Exponential size distributions, which are linear on semi-log plots, are typically representative of a simple nucleation and growth history, and many of the CSDs of accessory minerals in the rhyolites follow linear trends. This is consistent with the simple cooling and crystallization history that has been discussed.

A number of the size distributions here, particularly for allanite+chevkinite, are concave-up, or fractal, in shape. Fractal distributions are typically considered to be the result of widespread fragmentation of a phase (Bindeman 2005); however, this does not appear to be the case in the PST, where outflow crystals tend to be euhedral. Fragmentation is therefore a non-unique explanation for fractal distributions; however, their origin in PST samples remains puzzling.

More interesting, however, are the kinked distributions displayed by magnetite and sphene in some rhyolite samples. In our work on quartz+feldspar size distributions in the Bishop Tuff (Pamukcu et al, in press, in prep), we found similar kinks, which we attributed to syn-eruptive depressurization of the system, marking a change in the crystallization regime from growth-dominated to nucleation-dominated. We also calculated timescales of crystallization from Bishop quartz+feldspar CSD slopes and crystal growth rates, which indicate that this decompression event began at most on the order of 1-10 years prior to final eruption. Similarly, the kinked sphene and magnetite size distributions seen in the PST rhyolite may record a similar decompression event in the PST system, which may be an indicator of the onset of the PST eruption.

Timescales of sphene crystallization could not be calculated due to the fact that sphene growth rates have not been determined. Timescales of magnetite crystallization were calculated using the CSD slopes we observe here and the magnetite phenocryst and groundmass growth rates (10^{-14}-10^{-15} m/s and 10^{-11}-10^{-14} m/s, respectively) estimated by Cashman (1988, 1992). Results show that the small crystal population grew on the order of <1-100 years prior to eruption, as compared to the large crystal population which grew 100s-1000s of years before eruption. These results are in good agreement with those obtained by Pamukcu et al (in prep) using CSDs, and by Gualda et al. (2007, in prep) using relaxation of Ti zoning profiles and faceting of melt inclusions in quartz of the Bishop Tuff.

Interestingly, these kinks are not found in zircon and allanite+chevkinite distributions. This may merely be due to a difference in growth rates. Unfortunately, growth rates are also not well constrained for these phases, but they are thought to be quite slow in zircon (10^{-17}-10^{-21} m/s, (Watson 1996). As a result, small populations of crystals that nucleated due to a decompression event that occurred near to the time of eruption may not have had the requisite time to grow to a resolvable size before the final eruption, thereby not recording the event.

Heating and zoning in the Peach Spring Tuff

Textures and compositions of accessory minerals in the PST trachytes introduce an additional facet into the history of the PST (figs. 5-11). Core-to-edge REE patterns in zircon, as well as core-to-interior REE trends in sphene, record a similar fractionation trend as seen in the rhyolites. However, edge compositions, general textural features, and core-to-edge temperature variations suggest that an important event occurred between the time of core and edge crystallization and that this event did not affect the entire PST system to the same extent. More specifically, evidence points to a heating event that affected the trachytes, possibly due to rejuvenation of the system by basaltic or andesitic magma.

Trace element compositions of sphene provide compelling evidence that an influential event occurred between the time of core and edge crystallization. Unlike in the rhyolites, edges of sphene crystals in the trachytes are significantly enriched in REEs relative to cores, particularly MREE (figs. 5, 6). This suggests that an event occurred between core and edge crystallization that replenished the MREE content. The positive correlation from core-to-edge between Gd and Nd or Yb in sphene supports this conclusion; however, the increase in Nd and Yb in edges also implies that the event increased HREE and LREE contents in the melt as well.

Release of REEs into the melt by resorption of zircon, sphene, and allanite+chevkinite is a possible mechanism to explain these REE enrichments, and textures provide evidence that this was the case. Qualitatively, textures of phenocrysts seen in thin sections, crystal separates, and tomography of CRW and PSTG01C show extensively resorbed feldspar, sphene, and zircon (figs. 15 and 16). The 3D reconstruction of sphene in CRW (fig. 16b) is particularly striking, as it shows a sphene crystal with only remnants of the original crystal remaining. Although separated zircons are rounded, they do not appear to have the same skeletal textures as sphene grains and are relatively common in trachytes as compared to sphene, which could not be found in CRW separates. This suggests that resorption of sphene was more extensive than zircon resorption.

CSDs also support the interpretation of resorption of accessories in general, and of sphene in particular. First, population densities of large sphene crystals in PSTG01C and CRW are considerably lower than those of other accessory phases, probably because sphene was resorbed more extensively than other phases. The SSDs also show kinks similar to those seen in rhyolites; however, unlike those in rhyolites, the kinks in these trachytes result in a concave-down segment in the small crystal sizes. The full implications of this pattern are still unclear, but it is possible that trachyte SSDs were originally (at least qualitatively) similar to those of rhyolites, and were then modified by preferential resorption of small sphene crystals.

One way to cause resorption of crystals is heating. Edge temperatures recorded in zircon and sphene grains are generally higher than cores in PSTG01C and CRW, suggesting that the system was, in fact, heated at some point between core and edge crystallization. Furthermore, as in rhyolites, zircon records higher temperatures and a larger range of temperatures than sphene (160-180 °C in zircon, as compared to 30-55 °C in sphene). This again implies a longer crystallization history for zircon, but also suggests an explanation for why sphene resorption is more extensive than zircon resorption, given that resorption of sphene would begin at lower temperatures (and possibly would go on for a longer period of time) than resorption of zircon.

Maximum edge temperatures of zircon are ~900 °C in intracaldera fiamme, requiring the presence of a sizable source of heat. The presence of mafic magmatic enclaves in the PST supports an argument for mafic input into the system, which may have provided the heat necessary to raise the temperature to the observed levels. A lack of significant chemical or textural evidence for mixing (lack of reaction rims or widespread xenocrysts) indicates that chemical interaction between mafic and felsic magmas was limited, suggesting that this event may have occurred close to the time of eruption and may have even acted as a trigger for the start of the eruptive process.

Importantly, textures and compositions of the outflow low-silica rhyolite (WSW2B) are notably different from the outflow pumice and the intracaldera fiamme. More specifically, they are interesting in that trace element trends in WSW2B are similar to those in the intracaldera trachytes, but the textures show no indication of resorption and are much more akin to those seen in rhyolites. In terms of temperatures, edges of zircon and sphene in this sample record temperatures that span from the high temperatures recorded by intracaldera fiamme to the low temperatures in outflow pumices. These results suggest that the heating event did not affect the entire PST system to the same extent.

There is significant evidence to suggest that the PST magma chamber was zoned. For one, there is a clear range in silica and crystal contents, from relatively crystal-poor high-silica rhyolites in the outflow to crystal-rich trachytes in the outflow and intracaldera deposits, which is consistent with zoning in composition and crystal content. Temperature trends are similar, such that crystal-rich intracaldera trachytes record the highest temperatures and crystal-poor outflow rhyolites record the lowest temperatures. Again, this suggests that the heat anomaly did not reach all regions of the magma chamber, which further implies that the heating event took place close to the time of eruption as there was not enough time for heat to spread throughout the system. This is also consistent with a zoned magma chamber as outflow samples, which were presumably in a higher region of the chamber and thus relatively crystal-poor and expelled early in the eruption (Smith 1979), may have been erupted before being affected by the heating event that is evidently recorded by the last erupted, and likely deeper, intracaldera samples.

These results also suggest that the heating and decompression events may have been linked. For one, evidence implies that both events occurred close to the time of eruption. Heating of a magmatic system by a mafic recharge event has been suggested as a possible eruptive trigger (Pallister et al. 1992). If, in fact, heating of the PST did act as an eruption trigger, decompression of the system would naturally follow as the eruptive process began. In this context, the timescales of magnetite crystallization (<1-100 years) record the timescale available after triggering for decompression and eruption. These timescales are short enough to prevent the heat input to diffuse through the whole system.

CHAPTER V

CONCLUSIONS

Whole rock compositions of pumice and fiamme from Peach Spring Tuff range from high-silica rhyolite to trachyte (66-76 wt. % SiO_2). High-silica outflow pumice clasts (distal: Kingman, proximal: WSW2A) are relatively crystal-poor, while intracaldera fiamme (PSTG01C, CRW) are crystal-rich and trachytic in composition (66-68 wt. % SiO_2). Proximal outflow pumice and fiamme span most of the compositional range (69-76 wt. % SiO_2).

High-silica rhyolites record a relatively simple history of cooling and crystallization, as evidenced by overall textural features, accessory mineral CSDs, core-to-edge trends in REEs and Ti-in-zircon and Zr-in-sphene temperatures. Sphene and magnetite size distributions in outflow pumice are kinked, suggesting growth of small crystals in conditions of increased nucleation during eruptive decompression.

Core-to-edge trends in REEs, as well as Ti-in-zircon and Zr-in-sphene temperatures, suggest a late-stage heating event occurred that had a marked effect only on the deeper parts of the PST system. Textures corroborate these results, as phenocrysts are typically euhedral in outflow pumice but display clear resorption features in intracaldera fiamme. Sphene size distributions in intracaldera fiamme are also kinked, but the CSDs for small crystals are concave-down, possibly modified by resorption. On the whole, textural features, geochemical trends, and estimated crystallization temperatures show that zircon had a much more protracted growth history than other accessory phases.

Overall, results of this study suggest the PST magma chamber was zoned, with crystal-poor high-silica rhyolites in the upper parts of the system, and crystal-rich trachytes in the deeper regions. Late-stage heating may have been caused by input of mafic magma (as suggested by the presence of mafic enclaves in the PST), which may have triggered eruption and induced decompression of the PST system. Calculated timescales of magnetite crystallization suggest that eruptive decompression, and thus the onset of the eruptive process, likely took place on the order of 1-100 years prior to eruption.

APPENDIX A:

Whole Rock Geochemistry of the Peach Spring Tuff

Table A1. Whole rock geochemistry of Peach Spring Tuff samples.

Analyte	Detection Limit	Analysis Method	PST01A	PST01B	PST01C	PST01D	PST01E	PSTG01A	PSTG01C	WSWPST1	WSWPST2A	WSWPST2B
La ppm	**0.05**	**FUS-MS**	70.1	72.1	68.8	69.7	69	173	173	151	78.3	115
Ce ppm	**0.1**	**FUS-MS**	127	131	124	124	121	336	338	238	141	231
Pr ppm	**0.02**	**FUS-MS**	14.7	15.2	13.9	13.9	14.5	38.7	35.6	30.8	15.6	30
Nd ppm	**0.05**	**FUS-MS**	42.2	43.4	38.6	38.7	41.7	109	106	104	48.2	107
(Pm)										0	0	0
Sm ppm	**0.01**	**FUS-MS**	7.82	7.93	6.81	6.72	7.52	17.6	18.1	15.8	8.5	22.3
Eu ppm	**0.005**	**FUS-MS**	0.582	0.635	0.511	0.567	0.576	3.23	3.14	3.38	0.629	1.55
Gd ppm	**0.02**	**FUS-MS**	6.51	6.62	5.66	5.51	6.48	11.1	10.9	11	6.48	15.9
Tb ppm	**0.01**	**FUS-MS**	1.06	1.08	0.91	0.89	1.02	1.45	1.45	1.2	1.03	2.63
Dy ppm	**0.02**	**FUS-MS**	6.07	6.17	5.44	5.2	5.71	7.44	7.6	5.64	5.85	14
Ho ppm	**0.01**	**FUS-MS**	1.17	1.19	1.07	1.03	1.1	1.39	1.41	1.01	1.19	2.49
Er ppm	**0.01**	**FUS-MS**	3.4	3.5	3.29	3.17	3.36	3.89	3.93	2.74	3.47	6.32
Tm ppm	**0.005**	**FUS-MS**	0.531	0.555	0.518	0.508	0.521	0.545	0.572	0.365	0.553	0.882
Yb ppm	**0.01**	**FUS-MS**	3.37	3.51	3.37	3.18	3.24	3.32	3.49	2.35	3.46	4.86
Lu ppm	**0.002**	**FUS-MS**	0.472	0.501	0.482	0.471	0.451	0.498	0.501	0.328	0.47	0.619
Tl ppm	**0.05**	**FUS-MS**	1.41	1.32	1.4	1.14	2.27	0.65	0.78	0.54	0.2	0.14
SiO2 %	**0.01**	**FUS-ICP**	72.62	73.46	73.57	73.81	72.03	68.26	68.08	55.29	72.13	67.19
Al2O3 %	**0.01**	**FUS-ICP**	12.29	12.52	11.94	12.85	12.36	15.97	15.99	16.28	12.33	13.91
Fe2O3(T) %	**0.01**	**FUS-ICP**	1.15	1.14	1.06	1.04	1.13	2.31	2.22	7.18	1.34	1.85
MnO %	**0.001**	**FUS-ICP**	0.076	0.07	0.072	0.068	0.071	0.068	0.066	0.064	0.079	0.075
MgO %	**0.01**	**FUS-ICP**	0.16	0.25	0.34	0.2	0.23	0.48	0.42	2.4	0.19	0.22
CaO %	**0.01**	**FUS-ICP**	1.09	0.6	1.12	0.73	0.98	1.38	1.28	5.19	0.59	0.8
Na2O %	**0.01**	**FUS-ICP**	2.15	2.57	2.55	2.66	2.19	4.13	3.96	3.36	3.49	3.82
K2O %	**0.01**	**FUS-ICP**	6.67	7	6.65	6.25	6.62	6.26	6.34	4.41	5.63	6.41
TiO2 %	**0.001**	**FUS-ICP**	0.223	0.206	0.19	0.192	0.207	0.487	0.467	1.271	0.219	0.334
P2O5 %	**0.01**	**FUS-ICP**	0.02	0.02	0.03	0.03	0.02	0.11	0.1	0.53	0.02	0.02
sum oxides			96.449	97.836	97.522	97.83	95.838	99.455	98.923	95.975	96.018	94.629
1/sum			1.04	1.02	1.03	1.02	1.04	1.01	1.01	1.04	1.04	1.06
Au ppb	**1**	**INAA**	< 1	< 1	< 1	< 1	3	< 1	< 1	< 1	< 1	< 1
Ag ppm	**0.5**	**MULT INAA / TD-ICP**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
As ppm	**1**	**INAA**	9	8	8	8	10	3	2	70	5	< 1
Ba ppm	**1**	**FUS-ICP**	32	51	34	40	48	1066	1016	1943	40	75
Be ppm	**1**	**FUS-ICP**	5	4	5	4	4	3	3	3	4	3
Bi ppm	**0.1**	**FUS-MS**	0.2	0.4	0.4	0.3	0.3	0.4	0.2	< 0.1	< 0.1	0.1
Br ppm	**0.5**	**INAA**	2.9	2.9	3.9	2.7	3.2	< 0.5	< 0.5	< 0.5	1.1	< 0.5
Cd ppm	**0.5**	**TD-ICP**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5	< 0.5
Co ppm	**0.1**	**INAA**	1.8	1.6	2.2	1.7	2.7	3.2	2.5	14.4	1.8	1.5
Cr ppm	**0.5**	**INAA**	< 0.5	2.1	< 0.5	< 0.5	< 0.5	12.1	16.1	123	29.8	8
Cs ppm	**0.1**	**FUS-MS**	3.5	3.8	3.9	3.3	3.3	1.2	1.5	6.3	1.5	1.4
Cu ppm	**1**	**TD-ICP**	1	1	3	2	2	5	10	33	10	4
Ga ppm	**1**	**FUS-MS**	19	22	21	20	18	20	21	22	18	19
Ge ppm	**0.5**	**FUS-MS**	1.3	1.5	1.4	1.3	1.3	2.2	1.9	1.9	1.8	2.1
Hf ppm	**0.1**	**FUS-MS**	8.6	9.1	8.7	8.8	7.9	13.1	13.3	9	8.1	12.2
Hg ppm	**1**	**INAA**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
In ppm	**0.1**	**FUS-MS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir ppm	**1**	**INAA**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo ppm	**2**	**FUS-MS**	5	5	5	5	4	< 2	< 2	< 2	< 2	< 2
Nb ppm	**0.2**	**FUS-MS**	37.8	44.5	43.4	39.4	38.4	21.7	21.8	21.5	34.3	31
Ni ppm	**1**	**TD-ICP**	< 1	< 1	< 1	< 1	< 1	< 1	2	51	4	3
Pb ppm	**5**	**TD-ICP**	30	34	23	24	26	131	140	46	24	25
Rb ppm	**2**	**FUS-MS**	201	217	221	198	194	30	39	96	195	178
S %	**0.001**	**TD-ICP**	0.006	0.018	0.043	0.01	0.283	0.002	0.008	0.035	0.006	0.004
Sb ppm	**0.1**	**INAA**	1	0.9	1	0.9	1	0.5	0.4	83.6	1	0.6
Sc ppm	**0.01**	**INAA**	3.63	3.42	3.43	3.48	3.59	6.55	6.05	12.2	3.63	3.58
Se ppm	**0.5**	**INAA**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.1	< 0.5
Sn ppm	**1**	**FUS-MS**	2	3	3	2	2	2	< 1	3	2	5
Sr ppm	**2**	**FUS-ICP**	17	14	17	17	18	208	199	1514	18	23
Ta ppm	**0.1**	**FUS-MS**	2.5	2.8	2.8	2.5	2.5	1.4	1.4	1.27	2.43	2.18
Th ppm	**0.05**	**FUS-MS**	32.2	34.4	35.3	32.9	30.2	19.4	19.8	20.3	24.5	20
U ppm	**0.05**	**FUS-MS**	6.06	6.3	6.69	6.18	5.69	3.83	4.11	4.15	4.1	2.77
V ppm	**5**	**FUS-ICP**	6	6	7	< 5	9	21	16	109	< 5	8
W ppm	**1**	**INAA**	5	5	5	3	5	< 1	< 1	7	< 1	< 1
Y ppm	**1**	**FUS-ICP**	38	36	33	33	38	33	34	31	33	57
Zn ppm	**1**	**MULT INAA / TD-ICP**	50	58	52	50	37	65	70	87	46	55
Zr ppm	**1**	**FUS-MS**	221	239	223	221	200	579	576	400	257	513
Mass g		**INAA**	1.414	1.566	1.471	1.607	1.091	1.331	1.36	1.53	1.468	1.661

Table A1, cont.

Analyte	Detection Limit	Analysis Method	WSWPST2D	WSWPST2F	WSWPST2G	WSWPST4B	WSWPST4D	PSTG01C	GJPST1A	GJPST1C	CRWPST
La ppm	**0.05**	**FUS-MS**	75.3	69.1	78.2	154	88.2	188	108	97.1	172
Ce ppm	**0.1**	**FUS-MS**	127	117	136	254	185	333	202	191	294
Pr ppm	**0.02**	**FUS-MS**	14.4	13.2	15.1	31	24.7	39.2	26.7	24.6	34.2
Nd ppm	**0.05**	**FUS-MS**	43.9	41.8	45.1	108	96.3	129	98.6	90.4	113
(Pm)			0	0	0	0	0	0	0	0	0
Sm ppm	**0.01**	**FUS-MS**	8.01	7.35	8.01	16.5	20.8	19.4	20.3	18	16
Eu ppm	**0.005**	**FUS-MS**	0.598	0.588	0.629	2.52	1.53	3.12	1.54	1.42	3.77
Gd ppm	**0.02**	**FUS-MS**	6.08	5.45	6.53	10.3	15.7	14.5	14.1	12.6	12
Tb ppm	**0.01**	**FUS-MS**	0.99	0.91	1.01	1.39	2.5	1.67	2.18	1.84	1.29
Dy ppm	**0.02**	**FUS-MS**	5.66	5.21	5.62	6.8	13.2	8.12	11.1	9.09	6.13
Ho ppm	**0.01**	**FUS-MS**	1.12	1.08	1.15	1.26	2.45	1.49	1.96	1.62	1.1
Er ppm	**0.01**	**FUS-MS**	3.18	3.14	3.37	3.43	6.16	4.04	4.88	4.06	3.08
Tm ppm	**0.005**	**FUS-MS**	0.537	0.516	0.548	0.503	0.852	0.578	0.725	0.584	0.415
Yb ppm	**0.01**	**FUS-MS**	3.17	3.31	3.47	3.02	4.79	3.53	3.83	3.42	2.72
Lu ppm	**0.002**	**FUS-MS**	0.437	0.46	0.482	0.445	0.597	0.504	0.509	0.45	0.404
Tl ppm	**0.05**	**FUS-MS**	0.33	0.38	0.41	0.12	0.24	0.24	0.32	0.33	0.45
SiO2 %	**0.01**	**FUS-ICP**	73.46	74.9	72.34	66.34	70.75	65.96	71.42	71.47	64.2
Al2O3 %	**0.01**	**FUS-ICP**	12.25	13.37	13.19	15.52	14.55	15.46	14.62	13.76	16.52
Fe2O3(T) %	**0.01**	**FUS-ICP**	1.05	1.27	1.28	1.9	1.66	2.65	1.81	1.76	3.17
MnO %	**0.001**	**FUS-ICP**	0.052	0.044	0.05	0.052	0.05	0.075	0.037	0.078	0.057
MgO %	**0.01**	**FUS-ICP**	0.09	0.13	0.12	0.58	0.34	0.44	0.17	0.19	0.79
CaO %	**0.01**	**FUS-ICP**	0.49	0.6	0.63	1.14	0.9	1.22	0.55	0.6	1.18
Na2O %	**0.01**	**FUS-ICP**	3.18	3.46	3.46	3.6	3.8	3.78	3.86	3.65	3.39
K2O %	**0.01**	**FUS-ICP**	5.78	6.18	5.89	6.4	5.93	6.42	6.27	5.82	7.12
TiO2 %	**0.001**	**FUS-ICP**	0.184	0.21	0.218	0.377	0.334	0.553	0.357	0.322	0.557
P2O5 %	**0.01**	**FUS-ICP**	0.02	0.02	0.02	0.04	0.03	0.1	0.06	0.06	0.19
sum oxides			96.556	100.184	97.198	95.949	98.344	96.658	99.154	97.71	97.174
1/sum			1.04	1.00	1.03	1.04	1.02	1.03	1.01	1.02	1.03
Au ppb	**1**	**INAA**	< 1	5	< 1	< 1	< 1	5	5	< 1	< 1
Ag ppm	**0.5**	**MULT INAA / TD-ICP**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
As ppm	**1**	**INAA**	5	5	7	52	65	2	5	5	2
Ba ppm	**1**	**FUS-ICP**	70	60	65	222	59	934	87	209	2850
Be ppm	**1**	**FUS-ICP**	4	4	4	2	3	3	3	3	2
Bi ppm	**0.1**	**FUS-MS**	< 0.1	< 0.1	0.1	0.1	< 0.1	0.2	0.1	< 0.1	0.2
Br ppm	**0.5**	**INAA**	< 0.5	0.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cd ppm	**0.5**	**TD-ICP**	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Co ppm	**0.1**	**INAA**	1.2	1.9	1.6	2.3	2	2.4	2.5	2.2	3.3
Cr ppm	**0.5**	**INAA**	39.6	5.4	29.6	4.6	39.7	3.9	48.1	2.8	52.2
Cs ppm	**0.1**	**FUS-MS**	1.4	1.4	1.7	1.9	2.1	1.2	0.9	1	1.8
Cu ppm	**1**	**TD-ICP**	5	7	4	7	2	7	3	4	10
Ga ppm	**1**	**FUS-MS**	17	18	18	17	20	19	20	18	19
Ge ppm	**0.5**	**FUS-MS**	1.7	2	1.7	2	1.8	2.1	1.9	1.7	1.7
Hf ppm	**0.1**	**FUS-MS**	7.6	7.5	7.6	11	11.8	14.5	11.4	11	14.9
Hg ppm	**1**	**INAA**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
In ppm	**0.1**	**FUS-MS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ir ppm	**1**	**INAA**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mo ppm	**2**	**FUS-MS**	3	< 2	2	< 2	4	< 2	4	< 2	5
Nb ppm	**0.2**	**FUS-MS**	30.9	34	33.9	24.1	30.8	32	28.3	31.8	18.5
Ni ppm	**1**	**TD-ICP**	6	3	4	2	3	2	4	2	6
Pb ppm	**5**	**TD-ICP**	20	16	18	25	25	30	25	20	28
Rb ppm	**2**	**FUS-MS**	196	213	211	157	162	125	142	138	149
S %	**0.001**	**TD-ICP**	0.012	0.015	0.007	0.016	0.002	0.003	< 0.001	0.018	0.002
Sb ppm	**0.1**	**INAA**	0.9	1.1	1.5	9.3	6.2	0.6	0.6	0.6	1.4
Sc ppm	**0.01**	**INAA**	2.71	3.15	3.31	5.3	3.28	6.77	3.22	3.31	7.36
Se ppm	**0.5**	**INAA**	2.7	2.4	< 0.5	< 0.5	< 0.5	3.3	0.5	1.9	< 0.5
Sn ppm	**1**	**FUS-MS**	2	2	2	2	2	3	2	2	2
Sr ppm	**2**	**FUS-ICP**	21	26	19	67	27	177	22	37	437
Ta ppm	**0.1**	**FUS-MS**	2.23	2.33	2.53	1.61	2.29	2.52	2.22	2.48	1.18
Th ppm	**0.05**	**FUS-MS**	27.6	28.4	29	19	20.8	21.1	22.2	20.6	16.7
U ppm	**0.05**	**FUS-MS**	4.89	4.07	4.62	2.53	2.91	3.27	2.82	2.5	2.39
V ppm	**5**	**FUS-ICP**	6	< 5	< 5	12	9	23	19	12	32
W ppm	**1**	**INAA**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Y ppm	**1**	**FUS-ICP**	33	32	33	30	61	38	47	38	30
Zn ppm	**1**	**MULT INAA / TD-ICP**	27	36	39	54	49	62	46	40	62
Zr ppm	**1**	**FUS-MS**	249	252	238	500	475	679	478	445	759
Mass g		**INAA**	1.504	1.579	1.451	1.306	1.527	1.698	1.58	1.537	1.749

APPENDIX B:

LA-ICPMS Analyses From the Peach Spring Tuff

Table B1. Glass compositions from LA-ICPMS analyses of Peach Spring Tuff samples.

Spot # Analyte	PSTG01C 7	PSTG01C 8	PSTG01C 9	PSTG01C 10	PSTG01C 11	PSTG01C 12	PSTG01C 13	PSTG01C 14	PSTG01C 15	PSTG01C 16	PSTG01C 17
Mg24	686.8	397.05	1158.64	1158.64	1440.77	338.88	237.8	199.26	1326.7	345.73	185.22
Al27	76504.43	60038.46	71025.71	71025.71	77347.97	65946.61	80966.89	67398.13	67019.6	87583.45	78888.15
Si29	350579.56	350579.56	350579.59	350579.59	350579.56	350579.56	350579.56	350579.56	350579.56	350579.56	350579.53
P31	184.05	107.03	119.1	119.1	186.95	115	52.78	125.84	139.21	111.78	442.58
Ca42	6333.52	3655.03	4777.26	4777.26	3811.27	2505.74	4965.79	2906.34	6407.24	4900.42	4358.7
Sc45	1.81	3.06	3.13	3.13	1.76	1.58	2.57	2.27	10.66	2.08	2.5
Ti49	990.26	993.93	1737.16	1737.16	1592.32	1345.71	1028.35	1242.17	2719.35	850.82	1725
V51	4.49	3.99	5.89	5.89	5.89	4.38	2.94	4.32	9.16	2.19	6.16
Cr52	2.79	<1.44	3.15	3.15	<2.08	1.98	3.1	2.57	<1.43	<2.07	2.78
Mn55	146.68	56.31	281.16	281.16	522.77	434.55	83.83	68.05	162.56	175.61	628.56
Fe57	8143.52	9467.4	9953.96	9953.96	12309.23	6934.63	4827.39	8346.86	9628.16	5121.19	9781.18
Co59	0.44	<0.20	0.93	0.93	0.66	0.39	<0.28	0.35	1.04	<0.41	0.6
Ni60	<1.28	<1.15	<1.52	<1.52	1.75	1.2	<1.51	<1.63	<1.19	<1.46	<2.32
Cu65	4.86	3.65	3.54	3.54	2.72	2.44	<1.34	3.56	2.84	3.44	<2.04
Zn66	13.52	<4.61	20.82	20.82	27.65	19.36	9.82	7.4	22.41	12.48	25.57
Ga71	20.2	14.2	17.99	17.99	18.87	15.44	18.4	14.37	20.75	19.1	18.57
Rb85	139.14	119.66	125.14	125.14	169.92	162.08	130.13	166	176.43	81.28	180.48
Sr88	218.35	115.46	119.45	119.45	116.51	123.21	128.46	108.22	123.04	176.26	137.09
Y89	43.43	24.54	17.91	17.91	30.2	25.04	20.37	33.63	38.95	20.37	14.03
Zr90	516.35	165.25	92.29	92.29	239.33	367.91	143.94	222.74	244.36	245.33	305.86
Nb93	19.78	17.2	23.32	23.32	21.84	21.38	19.17	26.92	33.06	14.8	13.15
Cs133	1.218	0.819	0.9	0.9	1.06	1.36	0.877	1.01	1.38	0.767	1.17
Ba137	805.14	647.06	601.86	601.86	688.29	676.36	418.83	505.79	726.47	429.64	716.27
La139	20.99	38.54	36.6	36.6	15.96	18.28	26.82	23.27	152.26	17.25	50.74
Ce140	56.02	77.57	80.29	80.29	42.21	41.78	55.84	55.8	291.74	36.2	84.18
Pr141	7.95	9.42	9.76	9.76	5.84	5.33	7.3	8.13	33.04	5.38	8.13
Nd143	36.76	40.27	39.12	39.12	26.98	30.23	29.89	38.94	120.01	23.99	31.23
Pm											
Sm147	10.51	8.5	7.04	7.04	6.14	7.6	6.91	10.29	18.02	6.06	4.7
Eu151	1.82	1.64	2.3	2.3	1.44	1.12	2.75	1.86	4.81	2	1.54
Gd155	6.98	7.74	5.63	5.63	6.54	5.38	5.72	7.62	13.79	4.55	4.08
Tb159	1.137	0.963	0.654	0.654	0.91	1.037	0.671	1.26	1.89	0.803	0.385
Dy163	8.04	5.13	4.28	4.28	4.73	5.24	3.68	6.97	10	4.07	2.57
Ho165	1.57	1.007	0.483	0.483	1.1	1.135	0.961	1.49	1.61	0.803	0.78
Er166	4.98	2.52	2.05	2.05	3.12	2.61	2.24	4.39	4.56	1.81	1.73
Tm169	0.741	0.357	0.332	0.332	0.439	0.475	0.335	0.342	0.638	0.251	0.332
Yb173	6.6	2.68	2.18	2.18	3.35	2.69	2.27	2.54	3.53	2.22	1.35
Lu175	0.733	0.305	0.171	0.171	0.433	0.423	0.351	0.497	0.576	0.343	0.285
Lu176	5.71	2.59	1.48	1.48	3.27	3.5	2.03	3.35	3.65	2.47	3.19
Hf179	9.55	3.74	2.28	2.28	4.76	8.18	3.56	4.8	5.37	7.68	5.95
Ta181	1.03	1.019	1.01	1.01	0.883	1.218	0.987	1.29	1.61	0.647	0.646
Pb208	38.25	23.18	24.61	24.61	38.26	48.04	27.22	49.37	30.99	35.44	84.57
Th232	39.74	18.94	11.21	11.21	28.05	22.38	15.49	29.54	24.47	13.27	12.91
U238	8.53	3.27	2.62	2.62	4.82	5.97	3.12	7.23	5.02	2.96	1.96

Table B1, cont.

	PSTG01C	PSTG01C	PSTG01C	PSTG01C	PSTG01C
Spot #	18				
Analyte		Avg	StDev/Avg	StDev	StErr
Mg24	1029.37	667.84	0.72	482.31	145.42
Al27	70177.53	72990.63	0.11	7992.28	2409.76
Si29	350579.56	350579.56	0.00	0.01	0.00
P31	202.46	162.43	0.63	102.38	30.87
Ca42	4225.95	4440.66	0.28	1233.49	371.91
Sc45	5.08	3.32	0.79	2.62	0.79
Ti49	1337.49	1414.78	0.37	529.04	159.51
V51	6.26	5.06	0.38	1.90	0.57
Cr52	<1.59	2.73	0.16	0.43	0.13
Mn55	199.68	250.89	0.77	194.26	58.57
Fe57	10960.29	8679.44	0.27	2316.86	698.56
Co59	0.6	0.63	0.40	0.25	0.07
Ni60	1.68	1.54	0.19	0.30	0.09
Cu65	2.7	3.31	0.22	0.74	0.22
Zn66	33.68	19.27	0.44	8.43	2.54
Ga71	16.56	17.68	0.13	2.24	0.67
Rb85	142.82	144.83	0.21	29.93	9.02
Sr88	143.57	137.24	0.24	32.68	9.85
Y89	31.95	27.31	0.34	9.16	2.76
Zr90	689.15	293.86	0.59	174.32	52.56
Nb93	20.37	21.00	0.26	5.54	1.67
Cs133	0.97	1.05	0.20	0.21	0.06
Ba137	607.81	620.32	0.20	123.97	37.38
La139	24.5	38.66	1.01	39.16	11.81
Ce140	56.65	79.84	0.90	72.08	21.73
Pr141	7.37	9.79	0.80	7.85	2.37
Nd143	40.1	41.59	0.64	26.62	8.03
Pm					
Sm147	8.34	0.00		6.02	3.01
Eu151	1.97	0.00		1.50	0.75
Gd155	7.02	7.36	0.61	4.48	2.24
Tb159	0.9	0.99	0.64	0.64	0.32
Dy163	6.43	5.77	0.56	3.24	1.62
Ho165	1.42	1.15	0.37	0.42	0.21
Er166	3.62	2.93	0.48	1.39	0.70
Tm169	0.509	0.43	0.40	0.17	0.09
Yb173	3.38	2.62	0.39	1.03	0.51
Lu175	0.701	0.48	0.41	0.20	0.10
Lu176	6.97	4.07	0.49	1.99	1.00
Hf179	20.92	9.98	0.74	7.36	3.68
Ta181	0.96	0.97	0.47	0.45	0.23
Pb208	64.06	53.77	0.47	25.23	12.61
Th232	23.7	18.59	0.34	6.36	3.18
U238	6.39	4.08	0.49	2.00	1.00

Table B1, cont.

	WSWPST1	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**	**WSWPST1**
Spot #	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Analyte										
Mg24	8009.16	7708.72	14780.08	13261.85	8623.77	18626.16	35195.57	10983.91	8058.27	11284.67
Al27	91240.97	104946.59	103395.5	107366.97	118701.27	83367.15	59246.63	96043.38	105706.39	96952.23
Si29	350579.53	350579.56	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.56
P31	2169.12	2072.57	2497.42	3386.94	2566.86	3579.04	236.32	2252.56	3101.91	5177.34
Ca42	41574.74	36254.29	34590.71	37315.34	40894.7	31534.63	21685.07	33966.05	39030.82	38782.30
Sc45	13.33	11.91	22.91	23.94	12.68	33.34	65.74	12.92	14.83	15.30
Ti49	8313.83	7128.57	12472.34	10550.26	8562.7	9411.64	6116.17	10040.42	9317.28	8683.73
V51	72.1	26.86	183.21	170.59	127.52	51.9	34.68	91.42	58.86	63.64
Cr52	15.65	13.76	125.81	27.84	60.99	148.46	286.10	17.62	15.17	58.98
Mn55	356.86	304.79	557.03	519.26	399.69	889.25	1015.52	451.62	394.56	421.34
Fe57	46054.24	34876.54	84566.49	73687.25	57362.67	124767.83	198821.48	54346.88	41033.03	52399.55
Co59	8.09	6.13	11.41	9.19	7.82	16.48	28.06	9.53	8.55	9.23
Ni60	39.21	27.94	59.67	55.95	40.41	97.48	215.70	37.70	28.08	42.23
Cu65	26.38	24.33	29.39	28.74	20.68	50.87	44.00	30.45	27.32	26.33
Zn66	190.73	199.58	303.52	264.93	180.04	658.85	1144.20	255.99	220.95	280.67
Ga71	34.61	28.75	38.25	30.72	31.93	46.65	69.03	32.79	31.02	34.63
Rb85	125.54	118.1	148.77	158.03	123.3	450.84	838.25	142.71	124.54	146.93
Sr88	1969.73	2080.77	1660.39	1767.42	2305.03	1104.04	173.38	1811.59	2017.60	1755.58
Y89	41.52	38.84	44.61	34.7	35.55	41.96	2.56	44.35	57.16	41.97
Zr90	434.92	474.6	610.94	490.73	466.33	632.24	166.40	565.54	596.14	474.98
Nb93	26.62	22.32	36.59	33.96	24.69	24.44	4.20	32.83	31.20	28.76
Cs133	8.53	7.65	13.02	9.38	9.13	269.94	581.33	11.50	9.73	12.94
Ba137	3123.64	2723.82	2672.51	2996.48	2736.74	1935.53	70.34	2751.59	2711.20	2781.02
La139	184.09	189.74	213.19	205.16	182.81	197.48	12.12	227.38	237.13	221.25
Ce140	291.09	287.11	324.06	332.21	274.39	314.1	18.06	342.30	364.80	343.84
Pr141	39.81	37.15	42.45	43	34.68	41.88	2.27	44.30	50.27	46.64
Nd143	140.87	141.31	164.95	155.99	130.88	147.02	8.16	168.95	186.30	172.67
Pm										
Sm147	19.8	20.48	22	22.57	18.35	22.29	1.22	24.92	26.65	23.71
Eu151	5.13	4.23	4.47	4.34	4.21	4.92	0.09	5.45	5.09	5.50
Gd155	12.27	12.71	14.03	14.29	12.31	12.03	0.68	15.58	18.80	16.43
Tb159	1.44	1.61	1.59	1.49	1.21	1.49	0.15	1.71	1.93	1.97
Dy163	7.1	8.87	9.99	8.07	7.32	9.8	0.52	8.28	10.75	8.09
Ho165	1.43	1.33	1.65	1.26	1.18	1.69	0.13	1.63	1.51	1.63
Er166	3.37	3.53	5.63	3.99	2.89	4.1	0.30	4.21	5.18	3.80
Tm169	0.572	0.408	0.442	0.573	0.479	0.497	<0.045	0.54	0.75	0.54
Yb173	3.12	3.99	4.3	2.07	3.56	4.93	0.53	3.64	4.22	3.87
Lu175	0.475	0.599	0.68	0.404	0.538	0.758	0.06	0.60	0.67	0.45
Lu176	5.6	6.22	5.47	4.77	4.83	7.1	1.58	5.55	6.88	5.57
Hf179	11.75	11.66	16.24	11.47	10.69	16.64	6.62	14.61	14.54	12.86
Ta181	0.97	1.27	1.75	1.44	0.89	1.15	0.24	1.34	1.36	1.14
Pb208	181.54	171.39	188.61	167.65	166.76	135.54	6.26	208.96	186.13	188.46
Th232	27.05	26.87	30.78	27.79	25.65	28.31	1.45	34.30	31.94	27.15
U238	5.36	5.59	5.98	5.66	4.49	6.74	2.24	6.26	6.07	5.49

Table B1, cont.

	WSWPST1	WSWPST1	WSWPST1	WSWPST1
Spot #				
Analyte	**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	13653.22	0.61	8345.01	2638.92
Al27	96696.71	0.17	16338.80	5166.78
Si29	350579.54	0.00	0.01	0.00
P31	2704.01	0.47	1271.37	402.04
Ca42	35562.87	0.16	5800.64	1834.32
Sc45	22.69	0.73	16.61	5.25
Ti49	9059.69	0.20	1775.08	561.33
V51	88.08	0.62	54.81	17.33
Cr52	77.04	1.14	87.76	27.75
Mn55	530.99	0.44	235.61	74.51
Fe57	76791.60	0.65	50243.46	15888.38
Co59	11.45	0.56	6.46	2.04
Ni60	64.44	0.88	56.90	17.99
Cu65	30.85	0.30	9.31	2.94
Zn66	369.95	0.83	305.28	96.54
Ga71	37.84	0.32	12.07	3.82
Rb85	237.70	0.98	233.42	73.82
Sr88	1664.55	0.37	612.78	193.78
Y89	38.32	0.37	14.01	4.43
Zr90	491.28	0.27	133.58	42.24
Nb93	26.56	0.34	9.11	2.88
Cs133	93.32	2.04	189.91	60.06
Ba137	2450.29	0.36	891.65	281.96
La139	187.04	0.34	64.17	20.29
Ce140	289.20	0.34	99.41	31.44
Pr141	38.25	0.35	13.40	4.24
Nd143	141.71	0.35	49.91	15.78
Pm				
Sm147	0.00		12.00	6.00
Eu151	0.00		2.63	1.32
Gd155	12.87	0.64	8.24	4.12
Tb159	1.44	0.60	0.87	0.43
Dy163	6.91	0.64	4.43	2.21
Ho165	1.22	0.60	0.73	0.37
Er166	3.37	0.63	2.13	1.06
Tm169	0.61	0.20	0.12	0.06
Yb173	3.07	0.56	1.71	0.85
Lu175	0.45	0.62	0.28	0.14
Lu176	4.90	0.47	2.30	1.15
Hf179	12.16	0.31	3.78	1.89
Ta181	1.02	0.52	0.53	0.26
Pb208	147.45	0.64	94.69	47.34
Th232	23.71	0.64	15.14	7.57
U238	5.02	0.37	1.88	0.94

Table B1, cont.

	GJPST1B	**GJPST1B**	**GJPST1B**	**GJPST1B**	**GJPST1B**	**GJPST1B**
Spot #	**43**	**44**	**45**	**46**	**47**	**48**
Analyte						
Mg24	197.94	642.73	353.1	396.65	535.31	170.17
Al27	57830.13	26628.27	45416.15	55239.96	69519.44	63971.55
Si29	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53
P31	<73.61	<35.61	90.54	97.36	70.57	60.04
Ca42	2121.3	1175.27	1636.54	2119.14	1407.74	2445.18
Sc45	<1.10	2.53	2.93	2.94	1.73	2.61
Ti49	597.47	919.61	811.26	853.77	646.09	502.34
V51	4.14	16.27	5.79	5.7	4.05	3.15
Cr52	<2.76	<1.58	1.91	2.24	1.86	<1.06
Mn55	108.1	107.21	179.15	87.26	121.49	90.83
Fe57	4407.88	12036.06	7531.75	5189.73	5729.19	3913.6
Co59	0.78	1	0.76	0.79	0.47	0.23
Ni60	<2.10	2.1	1.01	2.42	<1.11	0.88
Cu65	<2.08	1.71	3.55	2.43	<0.77	<0.93
Zn66	26.34	23.94	49.81	20.12	20.66	17.36
Ga71	13.71	9.56	18.03	18.84	27.27	25.55
Rb85	150.53	84.6	152.15	173.42	319.96	263.81
Sr88	14.1	18.89	7.03	10.02	4.52	5.79
Y89	28.08	4.13	32.51	20.75	11.43	14.13
Zr90	136.49	44.53	144.5	106.34	92.39	85.23
Nb93	26.39	15.89	20.81	25.06	21.51	10.25
Cs133	0.82	0.676	0.93	0.938	1.66	0.633
Ba137	51.94	59.8	38.71	48.8	22.94	30.77
La139	77.48	12.61	86.19	63.86	36.94	52.31
Ce140	157.92	23.33	176.92	127.81	63.22	103.83
Pr141	18.33	2.4	21.57	14.61	6.64	10.54
Nd143	66.74	8.3	78.01	56.61	24.3	38.46
Pm						
Sm147	13.93	1.69	17.17	12.23	5.58	8.23
Eu151	0.63	0.126	0.63	0.664	0.378	0.83
Gd155	9.26	1.43	12.39	7.98	3.8	6.23
Tb159	1.52	0.134	1.87	1.129	0.554	0.835
Dy163	7.18	1.01	8.47	5.48	2.52	4.23
Ho165	1.31	0.184	1.23	0.986	0.567	0.614
Er166	2.4	0.481	3.24	1.9	0.93	1.57
Tm169	0.404	<0.053	0.336	0.206	0.101	0.15
Yb173	2.18	0.37	2.23	1.31	0.72	0.95
Lu175	0.256	<0.032	0.23	0.177	0.095	0.083
Lu176	2.4	0.66	2.14	2.05	1.63	1.99
Hf179	4.95	2.62	5.41	4.06	4.76	4.25
Ta181	1.56	1.221	1.46	1.51	1.48	1.021
Pb208	20	12.37	21.63	19.78	27.07	29.34
Th232	29.06	4.15	18.63	18.34	16.13	36.52
U238	3.06	0.808	2.05	2.7	2.25	1.18

Table B1, cont.

Spot # Analyte	GJPST1B Avg	GJPST1B StDev/Avg	GJPST1B StDev	GJPST1B StErr
Mg24	382.65	0.48	185.08	75.56
Al27	53100.92	0.29	15326.68	6257.09
Si29	350579.53	0.00	0.00	0.00
P31	79.63	0.22	17.31	7.07
Ca42	1817.53	0.27	487.93	199.20
Sc45	2.55	0.19	0.49	0.20
Ti49	721.76	0.23	163.65	66.81
V51	6.52	0.75	4.89	1.99
Cr52	2.00	0.10	0.21	0.08
Mn55	115.67	0.29	33.52	13.68
Fe57	6468.04	0.46	3002.79	1225.88
Co59	0.67	0.41	0.27	0.11
Ni60	1.60	0.48	0.77	0.32
Cu65	2.56	0.36	0.93	0.38
Zn66	26.37	0.45	11.90	4.86
Ga71	18.83	0.36	6.77	2.76
Rb85	190.75	0.45	85.68	34.98
Sr88	10.06	0.55	5.52	2.25
Y89	18.51	0.58	10.66	4.35
Zr90	101.58	0.36	36.58	14.93
Nb93	19.99	0.30	6.02	2.46
Cs133	0.94	0.40	0.37	0.15
Ba137	42.16	0.33	13.87	5.66
La139	54.90	0.49	27.15	11.09
Ce140	108.84	0.53	58.00	23.68
Pr141	12.35	0.58	7.22	2.95
Nd143	45.40	0.58	26.51	10.82
Pm				
Sm147	0.00		5.05	2.52
Eu151	0.00		0.19	0.09
Gd155	7.60	0.48	3.62	1.81
Tb159	1.10	0.52	0.57	0.28
Dy163	5.18	0.48	2.51	1.25
Ho165	0.85	0.37	0.32	0.16
Er166	1.91	0.51	0.97	0.49
Tm169	0.20	0.51	0.10	0.05
Yb173	1.30	0.51	0.66	0.33
Lu175	0.15	0.48	0.07	0.03
Lu176	1.95	0.11	0.22	0.11
Hf179	4.62	0.13	0.60	0.30
Ta181	1.37	0.17	0.23	0.12
Pb208	24.46	0.18	4.49	2.25
Th232	22.41	0.42	9.48	4.74
U238	2.05	0.31	0.64	0.32

Table B1, cont.

Spot # Analyte	GJPST1A 8	GJPST1A 9	GJPST1A 10	GJPST1A 11	GJPST1A 12	GJPST1A 13	GJPST1A 14	GJPST1A 15	GJPST1A 16	GJPST1A 17	GJPST1A 18	GJPST1A 19
Mg24	2021.26	2317.47	1606.74	5419.21	2138.12	3613.46	3519.13	2364.41	4166.09	2390.1	722.63	397.35
Al27	49206.29	65110.54	63853.01	62502.14	68385.45	95442.3	90789.08	62001.16	88959.93	89781.52	52073.14	35765.96
Si29	350579.56	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53
P31	79.01	86.02	71.2	52.7	77.66	107.07	103.86	87.11	112.23	202.48	163.6	46.45
Ca42	3578.4	4580.84	3823.86	6524.82	4060.45	6092.79	6013.63	4544.76	6353.49	4166.56	2749.86	2003.97
Sc45	3.46	4.25	3.61	7.06	3.46	5.61	5.47	4.36	6.73	5.8	3.68	2.94
Ti49	466.92	380.74	481.5	325.89	568.29	1438.25	348.15	739.94	1153.7	778.26	1000.26	1201.99
V51	7.32	8.74	8.36	20.91	15.06	45.38	15.02	23.12	31.38	17.6	15.63	4.39
Cr52	<3.11	2.38	3.53	3.38	3.9	4.72	<2.43	2.53	<2.29	<6.63	1.19	2.81
Mn55	11.94	11.86	12.93	24.73	21.33	55.29	19.77	17.35	33.8	32.99	23.98	14.17
Fe57	4575.52	6329.2	5202.29	10726.81	6857.32	19798.52	7566.31	7994.91	13480.27	9155.55	6629.23	3025.95
Co59	2.71	2.09	1.62	5.73	2.68	4.19	3.09	2.38	3.72	2.11	1.34	0.67
Ni60	7.09	10.5	4.85	16.99	3.83	13.82	6.33	9.95	7.93	6.01	1.66	3.54
Cu65	7.69	5.09	3.42	17.65	4.25	9.15	6.24	6.79	5.26	8.34	4.86	4.7
Zn66	14.27	13.15	13.21	37.29	29.49	76.35	27.88	23.1	27.69	53.79	17.6	9.09
Ga71	16.81	26.88	24.55	29.55	19.32	31.33	25.76	27.58	31.2	35.76	22.42	9.64
Rb85	97.86	223.84	193.74	205.29	144.04	206.64	211.09	191.29	213.65	201.11	149.95	75.81
Sr88	25.64	15.73	14.67	29.62	21.78	28.01	24.4	19.87	31.77	18.61	11.66	5.64
Y89	2.44	11.41	9.66	2.99	5.62	20.14	6.31	10.99	10.59	13.92	36.47	11.88
Zr90	15.06	143.38	48.05	16.55	34.24	66.5	33.74	77.26	72.96	45.44	115.76	67.47
Nb93	4.98	4.22	6.44	2.87	3.74	15.97	3.06	8.35	12.39	9.34	19.34	15.05
Cs133	1.21	1.65	1.28	1.3	0.83	1.33	1.39	1.54	1.7	0.95	0.83	0.56
Ba137	89.63	49.24	38.14	63.79	79.85	58.77	55.39	45.08	86.23	46.84	27.1	13.56
La139	17.45	26.07	58.82	22.44	29.06	107.81	44.47	60.04	48.78	90	186.91	67.53
Ce140	27.48	40.28	104.96	38.11	48.86	195.09	73.01	111.74	82.47	163.41	374.34	127.41
Pr141	2.61	3.49	10.82	3.55	4.48	21.4	6.96	11.37	8.85	18.81	41.31	13.3
Nd143	7.75	11.29	41.88	11.26	17.02	79.26	25.59	43.01	30.65	57.92	152.18	48.15
Pm												
Sm147	1.31	1.39	6.28	1.83	2.77	13.57	3.95	4.82	5.66	12.25	23.74	7.56
Eu151	0.63	0.63	0.78	0.58	0.91	1.44	0.71	0.74	1.02	1.15	2.21	0.61
Gd155	0.79	1.86	3.94	0.96	1.5	7.36	1.97	3.41	4.05	7.01	16.76	4.15
Tb159	0.104	0.271	0.566	0.158	0.228	0.89	0.125	0.57	0.349	0.56	1.98	0.643
Dy163	0.33	1.28	2.51	0.47	0.89	3.67	1.32	2.63	2.1	3.23	10.43	2.92
Ho165	0.146	0.292	0.367	0.147	0.119	0.77	0.241	0.472	0.534	0.62	1.5	0.506
Er166	<0.22	1.19	1.02	0.33	0.74	1.87	0.37	1.04	0.8	1.15	3.07	1.04
Tm169	<0.087	0.285	0.119	0.046	<0.089	0.338	0.073	0.151	0.097	0.134	0.375	0.146
Yb173	<0.38	1.74	0.65	0.45	0.44	1.69	0.26	0.64	0.67	1.18	2.51	1.21
Lu175	<0.035	0.304	0.14	0.116	0.14	0.191	0.069	0.209	0.131	0.17	0.254	0.116
Hf179	0.59	4.48	2.31	1.15	0.96	2.52	1.8	3.5	2.76	<1.28	4.22	2.36
Ta181	0.83	0.399	0.548	0.221	0.438	1.36	0.311	0.81	1.03	0.81	1.224	1.28
Pb208	19.41	28.94	27.72	30.42	22.73	36.97	31.95	30.28	36.75	63.8	27.15	14.67
Th232	5.04	10.76	11.65	3.82	10.22	31.07	11.41	24.14	13.68	18.8	23.38	10.73
U238	0.12	1.95	0.922	0.363	0.307	1.77	0.494	1.11	0.65	0.74	2.01	0.583

Table B1, cont.

Spot #	GJPST1A 20	GJPST1A	GJPST1A	GJPST1A	GJPST1A
Analyte		**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	1885.79	2504.75	0.55	1377.05	381.92
Al27	75732.09	69200.20	0.26	18177.47	5041.52
Si29	350579.5	350579.53	0.00	0.01	0.00
P31	75.34	97.29	0.45	43.31	12.01
Ca42	4636	4548.42	0.31	1392.36	386.17
Sc45	4.19	4.66	0.29	1.33	0.37
Ti49	899.08	752.54	0.48	363.96	100.94
V51	12.54	17.34	0.64	11.14	3.09
Cr52	3.24	3.08	0.33	1.01	0.28
Mn55	15.31	22.73	0.54	12.22	3.39
Fe57	6485.7	8294.43	0.53	4374.50	1213.27
Co59	1.07	2.57	0.54	1.38	0.38
Ni60	<1.66	7.71	0.58	4.46	1.24
Cu65	2.21	6.59	0.59	3.86	1.07
Zn66	16.01	27.61	0.69	19.04	5.28
Ga71	26.22	25.16	0.27	6.89	1.91
Rb85	182.34	176.67	0.26	46.36	12.86
Sr88	15.8	20.25	0.37	7.59	2.10
Y89	27.9	13.10	0.75	9.83	2.73
Zr90	259.51	76.61	0.86	66.12	18.34
Nb93	17.91	9.51	0.63	5.96	1.65
Cs133	1.11	1.21	0.28	0.34	0.09
Ba137	46.48	53.85	0.41	22.21	6.16
La139	61.91	63.18	0.72	45.57	12.64
Ce140	116.19	115.64	0.80	92.48	25.65
Pr141	12.49	12.26	0.86	10.49	2.91
Nd143	46.84	44.06	0.88	38.59	10.70
Pm					
Sm147	8.49	7.20	0.88	6.31	1.75
Eu151	1.08	0.96	0.47	0.45	
Gd155	5.17	4.53	0.94	4.24	1.18
Tb159	0.94	0.57	0.89	0.51	0.14
Dy163	4.87	2.82	0.94	2.64	0.73
Ho165	0.938	0.51	0.76	0.39	0.11
Er166	3.58	1.35	0.75	1.01	0.28
Tm169	0.372	0.19	0.64	0.12	0.03
Yb173	3.04	1.21	0.73	0.88	0.24
Lu175	0.417	0.19	0.52	0.10	0.03
Hf179	6.57	2.77	0.62	1.71	0.47
Ta181	1.46	0.82	0.51	0.42	0.12
Pb208	29.63	30.80	0.38	11.71	3.25
Th232	22.94	15.20	0.54	8.16	2.26
U238	4.18	1.17	0.94	1.10	0.31

Table B1, cont.

Spot #	GJPST1B 29	GJPST1B 30	GJPST1B 31	GJPST1B 32	GJPST1B 33	GJPST1B 34	GJPST1B 35	GJPST1B 36	GJPST1B 37	GJPST1B 38
Analyte										
Mg24	193.06	1046.56	1578.07	454.7	783.16	299.8	10475.87	411.21	6650.55	677.71
Al27	50788.96	86087.75	74450.24	64966.23	34163.75	72758.39	77700.76	74589.83	102596.55	75321.33
Si29	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.53	350579.47
P31	191.36	209.81	146.38	183.16	58.08	75.22	40.58	82.09	<47.62	85.06
Ca42	2445.08	2699.55	4495.08	3589.34	1587.74	2893.98	20083.03	3069.5	23292.36	2568.53
Sc45	2.07	3.54	3.41	4.18	2.27	3.19	36.97	2.91	13.05	2.51
Ti49	1662.61	394.55	521.17	909.3	580.85	534.01	165.94	762	277.88	457.97
V51	12.37	8.29	11.3	10.18	13.46	4.64	209.06	5.61	58.49	6.65
Cr52	<1.90	3.43	<4.30	<2.18	3.49	2.17	2.69	2.2	<2.77	2.88
Mn55	165.54	160.71	238.23	91.84	93.45	75.35	376.08	57.84	440.62	97.49
Fe57	17383.59	6212.17	7593.22	9389.71	7263.7	4279.34	11934.92	4684.4	7439.48	4635.1
Co59	4.29	1.42	1.87	1.43	1.3	<0.28	4.55	0.81	3.08	1.14
Ni60	4.41	6.05	5.94	1.57	51.87	<1.26	8.55	1.67	2.52	4.82
Cu65	1.9	9.5	5.13	1.97	4.19	1.23	8.12	<1.26	8.37	2.99
Zn66	186.08	59.6	41.79	48.98	23.59	<5.01	87.07	15.77	92.38	24.6
Ga71	16.72	43.91	24.94	19.35	15.62	23.54	51.83	23.75	38.75	21.83
Rb85	138.31	295.14	192.19	132.14	96.03	221.26	30.86	203.34	19.56	188.6
Sr88	17.54	10.87	23.89	12.59	15.24	7.97	104.51	11.58	77.5	15.38
Y89	15.56	9.74	18.48	40.17	3.04	22.49	3.13	25.35	0.81	11.36
Zr90	79.91	102.77	156.24	166.25	39.73	151.04	8.09	93.98	7.45	82.09
Nb93	22.21	10.9	14.24	25.11	10.77	23.49	0.93	20.7	3.21	13.06
Cs133	0.572	2.26	1.24	0.58	0.949	1.65	0.13	0.78	<0.164	1.03
Ba137	51.43	49.89	118.14	40.03	48.22	34.02	89.09	32.56	96.84	60.14
La139	48.5	36.3	56.32	106.48	11.29	62.24	28.22	85.92	26.47	33.14
Ce140	90.72	63.33	106.11	212.81	19.92	121.62	47.09	164.94	31.77	63.07
Pr141	9.75	6.93	11.32	24.84	1.61	13.7	4.48	18.28	2.64	6.97
Nd143	40.89	26.95	56.42	94.96	6.43	50.84	16.47	65.7	7.11	25
Pm										
Sm147	8.36	4.71	10.76	19.64	1.38	11.25	3.55	15.37	0.92	5.28
Eu151	0.48	0.7	0.62	1.15	0.133	0.84	1.97	0.84	2.77	0.5
Gd155	5.38	3.2	7.51	12.88	0.99	6.51	1.86	11.47	0.78	2.66
Tb159	0.747	0.65	0.68	1.99	0.128	0.912	0.328	1.31	0.08	0.366
Dy163	4.54	2.14	4.96	10.6	0.84	5.27	1.5	6.7	0.28	2.44
Ho165	0.604	0.32	0.8	1.87	0.1	0.99	0.181	0.99	<0.070	0.404
Er166	1.57	0.8	2.03	4.73	0.358	2.42	0.5	2.47	<0.126	1.54
Tm169	0.223	0.262	0.334	0.672	0.054	0.247	0.061	0.396	<0.066	0.224
Yb173	1.22	0.75	1.89	3.14	0.196	2.13	<0.27	2.62	<0.28	1.27
Lu175	0.084	0.2	0.209	0.438	0.473	0.306	0.039	0.299	<0.063	0.16
Hf179	4.49	4.27	6.17	6.35	1.87	7.61	0.87	4.54	<0.43	5.2
Ta181	1.43	1.38	1.55	1.72	1.014	1.82	0.141	1.42	0.222	0.91
Pb208	28.3	26.59	29.22	24.22	14.55	25.42	12.17	26.02	21.11	20.35
Th232	9.83	12.7	22.4	31.18	4.23	24.39	1.91	22.31	0.8	13.9
U238	0.89	1.19	2.43	2.9	1.3	3.12	0.128	1.94	0.074	1.54

Table B1, cont.

Spot # **Analyte**	**GJPST1B** **Avg**	**GJPST1B** **StDev/Avg**	**GJPST1B** **StDev**	**GJPST1B** **StErr**
Mg24	2257.07	1.54	3467.17	1096.41
Al27	71342.38	0.26	18613.22	5886.02
Si29	350579.52	0.00	0.02	0.01
P31	119.08	0.54	63.88	20.20
Ca42	6672.42	1.20	7985.55	2525.25
Sc45	7.41	1.47	10.87	3.44
Ti49	626.63	0.67	422.88	133.73
V51	34.01	1.87	63.50	20.08
Cr52	2.81	0.20	0.57	0.18
Mn55	179.72	0.74	132.62	41.94
Fe57	8081.56	0.50	4024.61	1272.69
Co59	2.21	0.64	1.41	0.44
Ni60	9.71	1.64	15.97	5.05
Cu65	4.82	0.65	3.14	0.99
Zn66	64.43	0.82	53.02	16.77
Ga71	28.02	0.44	12.37	3.91
Rb85	151.74	0.57	86.16	27.24
Sr88	29.71	1.12	33.21	10.50
Y89	15.01	0.81	12.18	3.85
Zr90	88.76	0.65	58.03	18.35
Nb93	14.46	0.58	8.38	2.65
Cs133	1.02	0.62	0.64	0.20
Ba137	62.04	0.47	29.22	9.24
La139	49.49	0.59	29.19	9.23
Ce140	92.14	0.66	61.00	19.29
Pr141	10.05	0.72	7.29	2.30
Nd143	39.08	0.72	28.32	8.96
Pm				
Sm147	8.12	0.76	6.15	1.94
Eu151	1.00	0.79	0.79	
Gd155	5.32	0.80	4.27	1.35
Tb159	0.72	0.81	0.58	0.18
Dy163	3.93	0.80	3.16	1.00
Ho165	0.70	0.79	0.55	0.17
Er166	1.82	0.73	1.34	0.42
Tm169	0.27	0.68	0.19	0.06
Yb173	1.65	0.59	0.98	0.31
Lu175	0.25	0.60	0.15	0.05
Hf179	4.60	0.46	2.13	0.67
Ta181	1.16	0.51	0.59	0.19
Pb208	22.80	0.25	5.73	1.81
Th232	14.37	0.73	10.42	3.29
U238	1.55	0.68	1.06	0.33

Table B1, cont.

Spot #	CRWPST 48	CRWPST 49	CRWPST 50	CRWPST 51	CRWPST 52	CRWPST 53	CRWPST 54	CRWPST 55	CRWPST 56	CRWPST 57
Analyte										
Mg24	3428.84	4176.31	1143.61	2034.66	4117.85	1720.86	3172.67	3239.03	2836.39	1527.24
Al27	68457.55	80436.4	73707.26	93257.34	68021.73	73712.51	90599.48	63129.26	67100.88	72120.71
Si29	350579.6	350579.6	350579.6	350579.6	350579.6	350579.6	350579.6	350579.6	350579.6	350579.6
P31	195.11	293.72	376.19	92.94	326	450.44	401.81	268.97	239.8	413.79
Ca42	5875.87	4890.34	4617.39	4065.2	4771.45	3755.26	16940.73	4831.97	4248.69	14933.83
Sc45	5.5	6.4	6.55	0.85	5.65	5.05	6.42	6.66	3.99	7.1
Ti49	2093.92	1811.5	2188.97	919.71	1514.93	1179.68	2232.06	1695.71	1698.06	1713.54
V51	18.86	15.72	15.96	7.4	14.48	11.06	15.59	15.06	13.01	13.94
Cr52	<1.83	<1.86	<1.66	3.35	<2.37	3.63	3.05	1.47	<2.20	<2.51
Mn55	182.95	273.73	202.91	421.83	226.89	116	183.78	195.5	190.57	114.21
Fe57	16872.04	16827.08	11265.67	5083.2	14076.66	13905.12	13720.61	13930.74	15728.95	12983.71
Co59	3.05	3.48	1.82	2.82	2.7	1.32	2.19	2.22	2.74	1.05
Ni60	6.59	4.67	1.52	1.32	2.71	2.26	5.28	3.35	3.51	3.3
Cu65	16.77	16.88	9.98	6.97	13.54	10.07	13.54	14.79	13.6	10.98
Zn66	43.81	41.28	20.11	27.33	40.88	27.15	42.43	39.28	41.51	22.23
Ga71	19.36	21.58	20.38	16.11	18.85	19.57	21.96	19.01	16.59	21.24
Rb85	193.99	247.59	262.36	202.47	190.86	266.11	242.88	195.53	180.75	259.45
Sr88	304.98	342.58	340.53	562.01	336.53	339.71	348.49	294.99	258.07	339.91
Y89	28.78	38.04	35.22	10.3	30.65	34.65	36.06	32.19	24.85	34.17
Zr90	551.69	716.49	652.48	194.11	614.68	680.17	690.79	609.56	503.88	625
Nb93	17.97	14.86	19.91	6.51	15.76	9.95	16.61	14.17	15.37	14.48
Cs133	2.36	2.75	2.89	1.48	2.13	3.1	2.71	2.42	1.96	2.99
Ba137	1752.03	1904.76	2033.13	4665.64	1426.86	1924.68	2042.52	1564.42	1619.24	1798.08
La139	96.53	128.19	103.17	29.9	88.93	95.28	155.73	104.93	48.36	128.15
Ce140	165.64	219.54	183.37	43.86	162.6	162.31	257.14	184.99	88.81	216.33
Pr141	17.05	22.36	18.52	4.54	17.34	15.46	23.89	18.83	9.23	21.43
Nd143	60.79	77.54	69.68	15.62	60.27	56.78	84.48	65.52	38.2	76.29
Pm										
Sm147	9.56	10.6	11.58	3.13	11.03	8.52	11.22	9.76	6.81	11.47
Eu151	2.16	2.42	2.74	3.64	2.2	1.94	2.62	1.91	1.4	2.78
Gd155	7.45	8.84	8.38	2.88	8.44	8.13	8.24	6.91	5.92	8.92
Tb159	0.82	1.36	1.13	0.418	1.171	1.073	1.13	1.14	0.802	1.24
Dy163	6.64	7.2	7.53	2.03	6.34	7.55	7.89	6.56	5.52	6.97
Ho165	1.05	1.62	1.52	0.433	1.199	1.31	1.32	1.32	1.032	1.31
Er166	3	4.23	3.8	0.91	3.21	3.74	4.48	3.45	2.74	3.33
Tm169	0.443	0.502	0.442	0.155	0.545	0.584	0.352	0.403	0.424	0.416
Yb173	2.37	3.85	3.86	1.17	3.06	3.4	2.86	2.45	2.99	3.21
Lu175	0.344	0.586	0.414	0.132	0.463	0.512	0.551	0.502	0.4	0.504
Hf179	12.54	13.82	14.47	3.87	13.19	14.73	13.5	13.96	10.76	14.37
Ta181	0.94	0.619	1.041	0.39	0.852	0.512	0.89	0.73	0.626	0.85
Pb208	29.85	48.09	55.04	44.76	33.95	48.83	44.5	31.83	36.87	51.4
Th232	18.7	22.19	22.46	5.9	19.81	23.68	24.04	20.54	16.41	22.52
U238	2.81	3.25	3.22	0.537	3.26	3.3	3.26	2.71	2.56	3.34

Table B1, cont.

Spot #	CRWPST	CRWPST	CRWPST	CRWPST
Analyte	**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	2534.22	0.35	895.01	516.73
Al27	67450.28	0.07	4505.90	2601.48
Si29	350579.58	0.00	0.02	0.01
P31	307.52	0.30	93.18	53.80
Ca42	8004.83	0.75	6007.77	3468.59
Sc45	5.92	0.28	1.68	0.97
Ti49	1702.44	0.01	9.69	5.59
V51	14.00	0.07	1.03	0.59
Cr52	1.47			
Mn55	166.76	0.27	45.58	26.31
Fe57	14214.47	0.10	1394.44	805.08
Co59	2.00	0.43	0.87	0.50
Ni60	3.39	0.03	0.11	0.06
Cu65	13.12	0.15	1.95	1.13
Zn66	34.34	0.31	10.55	6.09
Ga71	18.95	0.12	2.33	1.34
Rb85	211.91	0.20	41.83	24.15
Sr88	297.66	0.14	40.99	23.66
Y89	30.40	0.16	4.91	2.83
Zr90	579.48	0.11	65.93	38.06
Nb93	14.67	0.04	0.62	0.36
Cs133	2.46	0.21	0.52	0.30
Ba137	1660.58	0.07	122.19	70.55
La139	93.81	0.44	41.04	23.69
Ce140	163.38	0.41	66.45	38.37
Pr141	16.50	0.39	6.43	3.71
Nd143	60.00	0.33	19.64	11.34
Pm				
Sm147	9.35	0.25	2.36	1.36
Eu151	2.03	0.34	0.70	
Gd155	7.25	0.21	1.53	0.88
Tb159	1.06	0.22	0.23	0.13
Dy163	6.35	0.12	0.75	0.43
Ho165	1.22	0.13	0.16	0.09
Er166	3.17	0.12	0.38	0.22
Tm169	0.41	0.03	0.01	0.01
Yb173	2.88	0.14	0.39	0.23
Lu175	0.47	0.13	0.06	0.03
Hf179	13.03	0.15	1.98	1.14
Ta181	0.74	0.15	0.11	0.06
Pb208	40.03	0.25	10.16	5.87
Th232	19.82	0.16	3.12	1.80
U238	2.87	0.14	0.41	0.24

Table B1, cont.

Spot # **Analyte**	**PSTG01C 67**	**PSTG01C 68**	**PSTG01C 69**
Mg24	626.45	548.76	438.38
Al27	45415.39	59121.48	51966.19
Si29	350579.5	350579.47	350579.5
P31	93.27	136.28	182.94
Ca42	5130.81	4144.49	5956.57
Sc45	3.57	2.79	3.43
Ti49	1821.84	1661.13	1429.29
V51	5.96	6.11	4.3
Cr52	<1.11	<1.46	1.98
Mn55	133.36	261.7	470.96
Fe57	9628.42	10372.78	7079.79
Co59	0.33	0.58	0.44
Ni60	1	<0.92	0.8
Cu65	3.22	3.37	0.93
Zn66	16.28	29.03	38.33
Ga71	18.92	16.97	18.89
Rb85	141.13	117.73	126.08
Sr88	174.3	116.81	125.95
Y89	41.19	48.39	25.65
Zr90	404.03	325.82	154.72
Nb93	24.56	35.51	21.94
Cs133	1.27	0.9	1.02
Ba137	883.21	480.35	529.25
La139	14.83	22.29	48.61
Ce140	50.06	67.82	97.87
Pr141	7.18	11.14	10.91
Nd143	40.39	59.13	46.86
Pm			
Sm147	9.61	15.03	7.52
Eu151	2.76	2.57	1.49
Gd155	7.09	12.25	6.75
Tb159	1.16	2.07	0.95
Dy163	7.24	9.99	4.76
Ho165	1.41	2.27	1
Er166	4.23	5.38	2.86
Tm169	0.781	0.709	0.505
Yb173	4.46	5.65	2.5
Lu175	0.624	0.487	0.417
Hf179	9.62	6.96	3.13
Ta181	1.59	2.08	1.3
Pb208	33.29	42.77	61.76
Th232	28.44	34.17	20.42
U238	5.53	8.95	6.63

Table B1, cont.

Spot #	PSTG01C	PSTG01C	PSTG01C	PSTG01C
Analyte	**Average**	**StDev/Average**	**StDev**	**StErr**
Mg24	537.86	0.18	94.51	54.56
Al27	52167.69	0.13	6855.27	3957.89
Si29	350579.49	0.00	0.02	0.01
P31	137.50	0.33	44.85	25.89
Ca42	5077.29	0.18	907.22	523.79
Sc45	3.26	0.13	0.42	0.24
Ti49	1637.42	0.12	197.35	113.94
V51	5.46	0.18	1.00	0.58
Cr52	1.98			
Mn55	288.67	0.59	170.41	98.39
Fe57	9027.00	0.19	1726.91	997.03
Co59	0.45	0.28	0.13	0.07
Ni60	0.90	0.16	0.14	0.08
Cu65	2.51	0.55	1.37	0.79
Zn66	27.88	0.40	11.07	6.39
Ga71	18.26	0.06	1.12	0.65
Rb85	128.31	0.09	11.86	6.85
Sr88	139.02	0.22	30.89	17.84
Y89	38.41	0.30	11.62	6.71
Zr90	294.86	0.43	127.51	73.62
Nb93	27.34	0.26	7.20	4.16
Cs133	1.06	0.18	0.19	0.11
Ba137	630.94	0.35	219.84	126.92
La139	28.58	0.62	17.75	10.25
Ce140	71.92	0.34	24.17	13.95
Pr141	9.74	0.23	2.22	1.28
Nd143	48.79	0.20	9.52	5.50
Pm				
Sm147	10.72	0.36	3.88	2.24
Eu151	2.27	0.30	0.69	
Gd155	8.70	0.35	3.08	1.78
Tb159	1.39	0.43	0.60	0.34
Dy163	7.33	0.36	2.62	1.51
Ho165	1.56	0.42	0.65	0.37
Er166	4.16	0.30	1.26	0.73
Tm169	0.67	0.22	0.14	0.08
Yb173	4.20	0.38	1.59	0.92
Lu175	0.51	0.21	0.11	0.06
Hf179	6.57	0.50	3.26	1.88
Ta181	1.66	0.24	0.39	0.23
Pb208	45.94	0.32	14.50	8.37
Th232	27.68	0.25	6.91	3.99
U238	7.04	0.25	1.75	1.01

Table B1, cont.

Spot #	WSWPST2A 10	WSWPST2A 11	WSWPST2A 12	WSWPST2A 13	WSWPST2A 14	WSWPST2A 15	WSWPST2A 16
Analyte							
Mg24	1798.02	1789.77	833.05	4080.27	2050.82	1747.83	2154.11
Al27	52001.06	48104.6	50824.41	70357.74	71264.22	63131.64	80921.03
Si29	350579.47	350579.47	350579.5	350579.47	350579.5	350579.5	350579.5
P31	<108.44	<95.87	<157.00	<420.62	<598.78	90.44	193.96
Ca42	1694.24	1068.19	2163.67	4056.35	5150.57	2419.26	2968.4
Sc45	<2.27	<2.33	<3.88	<9.77	<13.72	2.59	<2.74
Ti49	227.46	202.26	228.9	488.93	168.12	265.51	337.06
V51	<2.73	<2.74	4.12	<10.78	<15.02	3.73	<2.99
Cr52	<5.49	6.34	10.71	<23.96	<32.42	<4.75	12.41
Mn55	35.17	73.14	118.72	86.39	98.55	64.96	199.98
Fe57	1418.3	2140.29	2424.75	3932.36	2983.13	1727.63	4110.2
Co59	<1.13	<1.03	<1.55	4.63	<5.31	<0.88	1.96
Ni60	8.84	12.27	<5.39	67.9	<20.98	6.86	26.83
Cu65	7.79	7.13	<5.18	34.7	29.81	5.3	25.98
Zn66	18.77	15.15	<18.57	<66.80	<82.76	22.45	34.52
Ga71	17.77	17.11	13.78	21.29	28.23	21.8	25.41
Rb85	194.24	215.45	161.27	216.34	261.91	231.86	346.72
Sr88	7.81	10.26	11.08	20.42	11.17	13.03	13.82
Y89	1.32	0.98	5.13	4.95	2.31	3.21	4.54
Zr90	37.94	39.6	41.68	74.27	52.9	64.74	90.32
Nb93	2.58	2.38	5.92	7.97	3.53	4.44	7.65
Cs133	1.2	1.33	1.17	1.8	<2.02	1.57	1.5
Ba137	19.82	27.14	27.72	39.78	29.11	33.57	55.93
La139	16.23	16.23	19.13	25.4	21.17	27.84	27.44
Ce140	15.52	16.52	26.73	45.44	22.14	26.67	35.61
Pr141	0.94	1.28	1.77	3.68	0.81	2.19	2.06
Nd143	1.12	3.27	4.27	<4.23	<5.99	8.73	13.24
Pm							
Sm147	<0.72	<0.99	<1.47	3.49	3.02	1	0.83
Eu151	<0.23	<0.158	0.27	1.06	<1.60	0.24	0.42
Gd155	<0.47	0.91	<1.52	<2.82	<3.99	0.72	1.05
Tb159	<0.089	0.11	0.138	<0.44	<0.62	0.106	<0.071
Dy163	0.39	<0.45	<0.77	<1.75	<2.02	0.57	1.11
Ho165	<0.091	0.103	0.17	0.46	<0.81	0.078	0.233
Er166	<0.30	0.24	<0.48	<0.73	<2.06	<0.37	0.82
Tm169	<0.146	<0.130	<0.258	<0.75	<0.83	<0.100	0.197
Yb173	0.45	0.33	1.24	<3.19	<3.19	0.41	1.84
Lu175	0.23	0.339	<0.169	2.55	<0.63	0.342	0.61
Hf179	1.77	1.41	<1.50	3.52	<3.52	4.07	4.32
Ta181	0.401	0.59	0.71	3.21	1.09	1.16	1.95
Pb208	26.33	25.47	22.1	44.85	46.46	28.36	40.31
Th232	13.27	21.67	13.5	18.72	31.75	30.91	31.37
U238	0.92	0.71	1.79	3.51	<0.71	1.52	2.51

Table B1, cont.

	WSWPST2A	**WSWPST2A**	**WSWPST2A**	**WSWPST2A**	**WSWPST2A**	**WSWPST2A**	**WSWPST2A**
Spot #	**17**	**18**	**19**				
Analyte				**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	1269.47	2691.9	5653.73	2406.90	0.60	1436.46	454.25
Al27	51250.24	31763.86	73559.79	59317.86	0.25	14997.74	4742.70
Si29	350579.47	350579.5	350579.47	350579.49	0.00	0.02	0.01
P31	<73.84	<581.35	115.11	133.17	0.41	54.07	17.10
Ca42	1523.97	<4104.65	3428.44	2719.23	0.48	1316.63	416.36
Sc45	<1.60	<13.85	<2.74	2.59			
Ti49	169.59	130.95	354.85	257.36	0.42	108.49	34.31
V51	<1.82	<15.24	3.59	3.81	0.07	0.27	0.09
Cr52	<3.85	<30.45	7.83	9.32	0.29	2.74	0.87
Mn55	26.99	73.37	209.12	98.64	0.63	62.02	19.61
Fe57	1160.11	2299.27	7194.34	2939.04	0.61	1786.50	564.94
Co59	0.73	<6.05	2.47	2.45	0.67	1.63	0.51
Ni60	3.13	<23.67	9.98	19.40	1.17	22.66	7.17
Cu65	6.32	48.72	14.8	20.06	0.77	15.48	4.90
Zn66	<9.44	<84.37	48.52	27.88	0.49	13.64	4.31
Ga71	17.36	11.5	25.13	19.94	0.27	5.37	1.70
Rb85	211.36	89.33	225.11	215.36	0.31	65.88	20.83
Sr88	7.93	17.81	14.74	12.81	0.32	4.06	1.29
Y89	1.05	2.21	4.38	3.01	0.55	1.65	0.52
Zr90	36.32	28.29	48.08	51.41	0.38	19.45	6.15
Nb93	2.03	<1.39	7.45	4.88	0.49	2.41	0.76
Cs133	1.2	3.8	1.2	1.64	0.51	0.84	0.26
Ba137	19.69	18	33.86	30.46	0.37	11.36	3.59
La139	16	11.89	21.12	20.25	0.26	5.36	1.70
Ce140	19.19	17.33	29.36	25.45	0.37	9.52	3.01
Pr141	1.18	<0.81	1.92	1.76	0.50	0.88	0.28
Nd143	2.46	7.4	4.66	5.64	0.70	3.95	1.25
Pm							
Sm147	0.65	<4.97	1.14	1.69	0.73	1.23	0.39
Eu151	<0.215	<1.43	0.33	0.46	0.73	0.34	0.11
Gd155	<0.46	<3.26	<0.62	0.89	0.19	0.17	0.05
Tb159	<0.082	<0.71	0.119	0.12	0.12	0.01	0.00
Dy163	0.25	1.38	<0.90	0.74	0.65	0.48	0.15
Ho165	<0.093	<0.36	<0.119	0.21	0.73	0.15	0.05
Er166	<0.26	0.74	0.47	0.57	0.47	0.26	0.08
Tm169	<0.128	<0.90	<0.157	0.20			
Yb173	0.34	<3.19	<0.74	0.77	0.82	0.63	0.20
Lu175	0.298	<0.81	0.366	0.68	1.23	0.83	0.26
Hf179	2.49	<2.49	1.49	2.72	0.45	1.24	0.39
Ta181	0.471	0.85	0.95	1.14	0.75	0.85	0.27
Pb208	21.21	19.63	28.56	30.33	0.33	9.90	3.13
Th232	20.09	17.52	15.44	21.42	0.34	7.34	2.32
U238	1.15	1.33	1.41	1.65	0.53	0.87	0.28

Table B1, cont.

Spot #	WSWPST2B 29	WSWPST2B 30	WSWPST2B 31	WSWPST2B 32	WSWPST2B 33	WSWPST2B 34	WSWPST2B 35	WSWPST2B 36
Analyte								
Mg24	602.1	1080.66	805.57	1501.27	323.17	923.76	566.56	525.49
Al27	82146.55	74056.88	76624.52	71395.35	36372.06	81657.47	92503.27	71355.72
Si29	350579.53	350579.53	350579.53	350579.5	350579.53	350579.53	350579.53	350579.53
P31	<1228.23	<166.01	<225.92	303.76	<160.24	<121.48	<756.58	488.62
Ca42	6426.55	6208.18	7912.95	10105.78	4166.68	3536.19	5867.65	3882.38
Sc45	<19.41	4.08	<4.77	<3.51	<3.56	3.19	<16.63	<11.45
Ti49	2215.26	1055.26	446.48	786.99	554.13	1160.22	948.48	725.67
V51	<20.83	4.01	<5.69	7.12	<4.04	<3.04	<19.54	<12.46
Cr52	<53.06	<8.57	<12.66	14.64	14.58	<6.82	<41.15	<27.31
Mn55	248.85	602.44	97.38	403.75	62.2	162.82	302.92	105.57
Fe57	5307.4	18435.98	2156.71	8383.28	1841.98	3076	7638.07	2126.34
Co59	<8.02	1.89	<2.19	<1.79	<1.41	<1.22	<8.05	<4.84
Ni60	<31.28	11.29	<8.63	24.7	17.77	<4.75	<35.12	20.48
Cu65	<27.36	5.95	6.9	9.4	7.38	<3.60	<25.08	<13.33
Zn66	<106.48	52.4	<29.95	105.09	48.24	23.26	<101.71	<72.60
Ga71	49.57	24.34	34.91	29.64	17.42	22.78	30.74	38.74
Rb85	352.89	270.63	238.35	325.37	127.73	302	292.14	265.99
Sr88	38.1	21.88	15.55	32.78	15.1	25.58	26.08	29.71
Y89	110.37	39.87	17.48	18.55	20.49	36.62	36.32	17.99
Zr90	162.11	132.81	64.56	92	97.04	153.55	206.14	90.7
Nb93	77.55	32.94	10.17	19.01	17.02	33.46	26.3	18.2
Cs133	<2.36	1.34	1.16	1.48	0.54	1.67	<2.64	2.28
Ba137	154.2	33.36	22.68	83.97	18.35	49.55	42.19	43.02
La139	115.97	45.48	40.4	27.45	26.61	40.11	35.74	28.2
Ce140	253.91	96.77	63.74	57.51	58.38	82.13	73.54	47.67
Pr141	30.37	11.64	5.56	5.05	6.73	9.97	7.35	7.45
Nd143	102.35	39.74	24.58	25.65	17.68	32.19	23.32	14.51
Pm								
Sm147	27.83	7.51	<2.37	3.17	3.85	9.77	7.53	5.42
Eu151	2.05	0.43	<0.71	0.51	<0.34	0.54	<1.74	0.15
Gd155	18.96	6.06	6.42	3.48	4.02	6.65	<4.56	4.13
Tb159	4.19	1.5	0.32	<0.22	0.42	1.43	<1.00	0.9
Dy163	26.71	6.67	2.73	3.83	4.51	7.32	5.85	4.76
Ho165	4.35	1.51	0.64	0.63	0.76	1.25	1.37	0.96
Er166	8.82	4.48	1.22	1.36	2.15	2.8	5.48	2.73
Tm169	2.02	0.63	0.46	<0.23	<0.162	0.33	<0.95	<0.85
Yb173	10.93	4.19	1.97	3.41	<1.53	2.12	5.68	3.09
Lu175	1.72	0.66	<0.25	1.11	0.87	0.68	1.21	1.91
Hf179	<6.91	5.81	3.3	3.74	3.11	7.18	<6.01	<4.41
Ta181	3.63	1.37	1.14	1.8	1.27	2.84	3.36	2.96
Pb208	80.59	29.02	46.93	57.79	24.97	32.57	43.99	72.19
Th232	33.48	18.63	10.7	12.31	10.01	19.22	22.06	10.14
U238	3.67	2.3	0.97	1.86	3.03	3.23	5.65	2.49

Table B1, cont.

Spot # Analyte	WSWPST2B 37	WSWPST2B 38	WSWPST2B 39	WSWPST2B Avg	WSWPST2B StDev/Avg	WSWPST2B StDev	WSWPST2B StErr
Mg24	732.32	2275.66	1218.68	959.57	0.58	553.14	166.78
Al27	56048.54	79516.87	65820.62	71590.71	0.21	15032.12	4532.35
Si29	350579.53	350579.53	350579.53	350579.53	0.00	0.01	0.00
P31	<251.72	<131.07	<627.99	396.19	0.33	130.72	39.41
Ca42	4894.44	13074.28	<4382.59	6607.51	0.46	3023.10	911.50
Sc45	<5.90	3.96	<13.10	3.74	0.13	0.48	0.15
Ti49	508.99	2306.22	916.85	1056.78	0.60	636.62	191.95
V51	<5.96	11.22	<14.34	7.45	0.49	3.62	1.09
Cr52	<13.76	<6.97	60.83	30.02	0.89	26.69	8.05
Mn55	108.95	610.14	360.06	278.64	0.71	197.58	59.57
Fe57	3835.72	15776.58	8469.43	7004.32	0.80	5606.96	1690.56
Co59	<2.51	1.35	<6.33	1.62	0.24	0.38	0.12
Ni60	11.07	8	31.33	17.81	0.47	8.38	2.53
Cu65	<7.17	7.93	<18.23	7.51	0.17	1.28	0.39
Zn66	<34.99	71.02	<96.29	60.00	0.51	30.42	9.17
Ga71	18.39	27.7	22.89	28.83	0.33	9.50	2.86
Rb85	200.47	291.59	257.84	265.91	0.23	61.62	18.58
Sr88	16.17	33.76	32.53	26.11	0.31	8.07	2.43
Y89	21.23	88.88	17.55	38.67	0.82	31.68	9.55
Zr90	164.6	307.94	191.77	151.20	0.46	68.90	20.78
Nb93	15.69	77.89	13.74	31.09	0.78	24.22	7.30
Cs133	1.23	1.49	<1.99	1.40	0.35	0.49	0.15
Ba137	22.01	147.15	42.19	59.88	0.81	48.33	14.57
La139	18.57	73.73	30.16	43.86	0.64	27.98	8.43
Ce140	40.41	183.24	52.59	91.81	0.72	66.56	20.07
Pr141	4.67	22.66	6.45	10.72	0.77	8.26	2.49
Nd143	19.35	85.76	13.04	36.20	0.82	29.84	9.00
Pm							
Sm147	6.32	14.94	7.66	9.40	0.77	7.27	2.19
Eu151	<0.56	0.46	<1.88	0.69	0.99	0.68	0.21
Gd155	<2.53	14.95	<3.49	8.08	0.71	5.70	1.72
Tb159	0.43	2.93	0.85	1.44	0.91	1.31	0.40
Dy163	4.28	17.84	4.41	8.08	0.92	7.40	2.23
Ho165	0.59	3.38	0.87	1.48	0.83	1.24	0.37
Er166	1.92	9.64	3.21	3.98	0.73	2.89	0.87
Tm169	0.34	1.32	<1.03	0.85	0.80	0.68	0.21
Yb173	<2.02	11.11	3.88	5.15	0.68	3.51	1.06
Lu175	1.57	1.89	1.39	1.30	0.36	0.47	0.14
Hf179	5.67	10.19	<5.32	5.57	0.46	2.54	0.76
Ta181	1.35	3.43	1.3	2.22	0.46	1.01	0.31
Pb208	32.41	32.98	36.56	44.55	0.41	18.32	5.52
Th232	16.36	35.42	30.31	19.88	0.47	9.42	2.84
U238	5.19	5.57	3.8	3.43	0.45	1.54	0.46

Table B1, cont.

Spot #	WSWPST2D 49	WSWPST2D 50	WSWPST2D 51	WSWPST2D 52	WSWPST2D 53	WSWPST2D 54	WSWPST2D 55
Analyte							
Mg24	392.56	477.07	689.03	488.52	147.53	353.63	528.15
Al27	66862.81	48033.15	55562.7	56326.71	47629.55	50029.67	67169.38
Si29	350579.5	350579.5	350579.5	350579.47	350579.5	350579.5	350579.5
P31	<54.57	24.68	58.41	41.54	<37.12	31.63	31.08
Ca42	2299.79	2178.06	2065.1	3333.12	1610.72	2233.13	3020.25
Sc45	<0.90	1.1	1.19	1.74	<0.80	1.19	<0.59
Ti49	177.37	226.93	210.74	233.37	140.3	490.22	318.25
V51	<1.05	1.51	2.06	5.46	<0.84	2.26	1.29
Cr52	24.58	8.32	14.6	11.3	9.17	8.69	5.77
Mn55	63.28	189.56	106.56	297.59	72.65	117.06	181.49
Fe57	1716.09	1780.67	2062.61	8146.7	1268.02	1981.9	2352.72
Co59	2.86	1.71	6.82	1.4	0.44	1.5	1.49
Ni60	<1.66	<1.04	<1.07	3.6	<1.55	<0.73	1.38
Cu65	11.88	7.64	16.12	3.07	2.36	10.64	5.83
Zn66	7.28	7.2	6.63	16.4	9.92	8.52	7.26
Ga71	18.93	19.81	20.74	29.53	18.62	15.64	20.37
Rb85	274.8	289.71	290.87	364.56	232.36	249.41	313.88
Sr88	19.2	20.7	13.95	19.1	13.46	13.33	26.84
Y89	2.21	2.6	2.39	2.32	0.8	7.95	3.83
Zr90	38.17	42.53	32.94	25.73	27.28	38.56	50.25
Nb93	3.21	4.45	2.86	52.59	1.64	16.6	8.49
Cs133	1.05	1.4	1.54	1.26	1.17	1.35	1.82
Ba137	49.21	92.1	47.64	61.96	44.82	41.42	116.29
La139	25.39	24.84	21.96	23.73	21.13	25.99	29.95
Ce140	26.77	28.12	18.76	19.15	36.98	30.96	21.82
Pr141	2.13	2.4	1.59	1.93	1.52	3.35	2.77
Nd143	12.11	6.6	3.9	4.39	5.53	10.52	6.03
Pm							
Sm147	0.92	0.59	0.44	0.99	0.58	1.37	0.7
Eu151	0.054	0.11	0.057	0.236	0.219	0.189	0.109
Gd155	<0.37	0.97	<0.29	0.4	0.51	1.59	0.58
Tb159	<0.036	0.063	0.028	0.113	<0.049	0.141	0.049
Dy163	0.23	0.43	0.23	0.17	<0.17	1.17	0.38
Ho165	0.146	0.081	<0.035	0.087	0.111	0.307	0.081
Er166	0.156	0.254	0.22	0.096	0.134	1.25	0.182
Tm169	0.051	0.068	0.04	0.036	<0.0233	0.094	0.088
Yb173	<0.32	0.63	<0.19	0.44	<0.22	0.98	0.32
Lu175	0.082	0.043	0.068	0.034	<0.025	0.082	0.064
Hf179	2.06	2.47	2.2	1.52	1.87	3.31	2.55
Ta181	0.432	0.568	0.43	0.298	0.276	1.01	0.72
Pb208	40.47	33.36	35.22	49.44	32.87	31.6	45.84
Th232	<0.05	16.18	17.92	24.42	30.36	22.43	26.77
U238	0.627	0.538	0.59	0.516	0.55	1.09	0.98

Table B1, cont.

	WSWPST2D	**WSWPST2D**	**WSWPST2D**	**WSWPST2D**	**WSWPST2D**	**WSWPST2D**	**WSWPST2D**
Spot #	**56**	**57**	**58**				
Analyte				**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	470.57	612.17	575.66	473.49	0.32	151.48	47.90
Al27	52374.34	65844.5	47015.86	55684.87	0.15	8178.66	2586.32
Si29	350579.5	350579.47	350579.5	350579.49	0.00	0.01	0.00
P31	41.74	43.7	<124.96	38.97	0.28	11.07	3.50
Ca42	3335.54	2753.28	1532.05	2436.10	0.27	651.33	205.97
Sc45	1.83	1	<2.82	1.34	0.26	0.35	0.11
Ti49	235.32	208.04	229.28	246.98	0.39	96.80	30.61
V51	3.92	2.7	4.14	2.92	0.50	1.45	0.46
Cr52	7.84	11.09	14.32	11.57	0.46	5.36	1.69
Mn55	86.26	152.96	151.49	141.89	0.49	70.10	22.17
Fe57	2674.62	2337.66	2435.48	2675.65	0.73	1965.50	621.55
Co59	11.55	11.27	2.12	4.12	1.02	4.21	1.33
Ni60	<1.06	<1.24	28.35	11.11	1.35	14.97	4.73
Cu65	45.11	309.17	9.87	42.17	2.24	94.61	29.92
Zn66	7.37	5.46	42.76	11.88	0.95	11.27	3.56
Ga71	28.04	25.6	13.99	21.13	0.24	5.09	1.61
Rb85	354.47	362.14	225.43	295.76	0.18	52.21	16.51
Sr88	17.7	24.76	20.41	18.95	0.24	4.59	1.45
Y89	3.16	3.19	2.05	3.05	0.62	1.90	0.60
Zr90	33.77	57.66	40	38.69	0.25	9.81	3.10
Nb93	4.66	5	3.37	10.29	1.50	15.47	4.89
Cs133	1.53	1.49	0.86	1.35	0.20	0.28	0.09
Ba137	51.39	144.62	68.66	71.81	0.49	34.90	11.04
La139	28.66	37.87	20.71	26.02	0.20	5.15	1.63
Ce140	22.94	33.47	22.54	26.15	0.24	6.18	1.95
Pr141	6.38	3.22	2.77	2.81	0.50	1.40	0.44
Nd143	6.06	8.33	7.2	7.07	0.37	2.60	0.82
Pm							
Sm147	0.7	1.25	<1.02	0.84	0.38	0.32	0.10
Eu151	0.235	0.203	1.85	0.33	1.66	0.54	0.17
Gd155	0.59	0.62	1.16	0.80	0.51	0.41	0.13
Tb159	0.075	0.053	<0.115	0.07	0.53	0.04	0.01
Dy163	0.76	0.44	<0.73	0.48	0.71	0.34	0.11
Ho165	0.128	0.087	0.158	0.13	0.54	0.07	0.02
Er166	0.157	0.31	<0.53	0.31	1.17	0.36	0.11
Tm169	0.056	0.065	<0.23	0.06	0.34	0.02	0.01
Yb173	0.37	0.7	<0.89	0.57	0.43	0.25	0.08
Lu175	<0.027	0.044	0.93	0.17	1.83	0.31	0.10
Hf179	1.53	3.84	1.42	2.28	0.35	0.80	0.25
Ta181	0.438	0.882	1.02	0.61	0.47	0.28	0.09
Pb208	43.09	49.34	44.28	40.55	0.17	6.86	2.17
Th232	<0.01	41.66	16.74	24.56	0.35	8.54	2.70
U238	0.483	0.86	2.16	0.84	0.61	0.51	0.16

Table B1, cont.

	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F	WSWPST2F
Spot #	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Analyte									
Mg24	127.33	406.79	360.66	181.69	479.88	343.86	1233.67	424.33	974
Al27	80459.78	43177.98	58744.09	76332.63	68111.16	47214.32	72445.2	86988.31	58847.91
Si29	350579.47	350579.47	350579.47	350579.5	350579.47	350579.5	350579.5	350579.5	350579.47
P31	<105.51	<109.06	<221.40	175.87	509.03	<126.29	<288.64	<44.84	166.56
Ca42	2617.2	1239.66	3067.79	2064.5	<3396.02	1433.98	5457.94	2691.43	3003.79
Sc45	<1.99	2.21	<4.56	<1.23	<8.52	<2.53	<6.07	2	2.6
Ti49	181.54	190.15	252.04	284.46	1045.53	188.46	707	482.74	269.06
V51	<2.26	<2.68	<5.00	<1.45	<9.88	<3.07	<6.74	2.44	<2.28
Cr52	<5.48	10.9	<12.03	5.74	<22.67	<6.55	<15.84	<2.45	19.51
Mn55	13.82	84.46	165.62	47.51	87.25	74.68	151.95	289.65	142.48
Fe57	1600.45	2186.43	4395.84	1880.72	3254.64	1280.6	5276.38	5318.25	2984.14
Co59	1.09	1.04	<2.37	0.95	<3.45	<1.40	3.08	0.52	2.81
Ni60	7.64	13.03	10.36	11.46	19.14	<4.30	63.57	<1.73	38.4
Cu65	3.95	<3.36	20.52	4.43	<15.35	<3.76	40.72	2.51	12.71
Zn66	13.19	<14.27	32.26	27.02	<65.80	<16.54	<33.84	18.63	51.41
Ga71	32.65	13.91	19.16	21.36	28.72	12.97	28.02	24.96	24.49
Rb85	312.18	154.56	225.15	312.72	247.05	157.4	322.7	322.61	234.42
Sr88	12.36	10.65	13.69	17.56	13.63	14.84	24.15	25.69	17.35
Y89	1.26	1.41	6.93	2.21	36.29	2.46	2.45	4.46	4.48
Zr90	42.81	34.17	53.09	73.98	115.37	42.73	46.5	83.41	70.07
Nb93	1.89	2.62	5.82	3.85	41.34	3.58	4.86	8.71	34.63
Cs133	1.09	1.79	2.6	1.14	2.87	1.44	1.02	1.97	1.37
Ba137	11.18	9.45	18.04	22.96	30.37	18.96	77.53	46.74	19.97
La139	21.41	13.67	26.04	22.93	46.6	14.85	17.33	27.9	16.22
Ce140	16.62	14.86	32.47	25.11	90.91	15.65	25.64	35.47	22.99
Pr141	0.99	0.85	2.5	1.62	8.85	1.07	3.28	1.97	1.31
Nd143	2.88	<1.34	7.76	4.76	19.73	1.69	5.98	4.42	4.17
Pm									
Sm147	0.81	0.68	1.41	0.71	5.17	<0.99	5.61	0.84	<0.91
Eu151	0.18	<0.24	0.6	0.48	<1.05	<0.32	<0.35	0.158	1.29
Gd155	<0.62	1.14	<0.85	0.82	5.4	<1.26	<1.60	0.58	0.52
Tb159	<0.147	<0.084	<0.29	0.28	0.75	<0.138	<0.35	0.1	0.131
Dy163	<0.32	0.33	<0.53	0.2	6.22	<0.56	<1.00	0.15	<0.34
Ho165	<0.081	<0.149	0.43	0.18	<0.54	0.203	<0.36	0.078	0.56
Er166	<0.28	<0.24	1.81	0.33	5.07	0.36	<1.25	0.61	<0.17
Tm169	<0.130	0.1	<0.22	0.12	0.83	<0.170	<0.24	<0.067	<0.139
Yb173	0.42	<0.53	<1.44	<0.50	3.01	0.64	<2.21	0.51	1.53
Lu175	0.57	0.17	0.44	0.33	0.48	0.229	1.99	0.08	56.85
Hf179	1.35	2.98	3.05	5.28	4.15	2.31	3.47	4.11	2.78
Ta181	0.61	0.6	0.91	0.99	2.05	0.67	3.12	1.02	6.53
Pb208	33.39	20.76	52.23	42.02	57.3	17.98	44.73	38.38	44.9
Th232	17.23	14.45	22.23	22.79	38.41	12.83	19.96	26.91	22.97
U238	0.75	0.64	2.15	1.54	2.74	1.12	8.08	2.19	5.9

Table B1, cont.

Spot # Analyte	WSWPST2F Avg	WSWPST2F StDev/Avg	WSWPST2F StDev	WSWPST2F StErr
Mg24	503.58	0.72	364.29	121.43
Al27	65813.49	0.23	14914.71	4971.57
Si29	350579.48	0.00	0.02	0.01
P31	283.82	0.69	195.09	65.03
Ca42	2697.04	0.49	1308.21	436.07
Sc45	2.27	0.13	0.30	0.10
Ti49	400.11	0.74	297.22	99.07
V51	2.44			
Cr52	12.05	0.58	6.96	2.32
Mn55	117.49	0.69	81.59	27.20
Fe57	3130.83	0.50	1551.02	517.01
Co59	1.58	0.68	1.08	0.36
Ni60	23.37	0.88	20.52	6.84
Cu65	14.14	1.04	14.71	4.90
Zn66	28.50	0.52	14.77	4.92
Ga71	22.92	0.29	6.69	2.23
Rb85	254.31	0.27	67.77	22.59
Sr88	16.66	0.31	5.18	1.73
Y89	6.88	1.62	11.17	3.72
Zr90	62.46	0.41	25.85	8.62
Nb93	11.92	1.26	15.00	5.00
Cs133	1.70	0.39	0.67	0.22
Ba137	28.36	0.76	21.53	7.18
La139	22.99	0.44	10.15	3.38
Ce140	31.08	0.76	23.56	7.85
Pr141	2.49	1.01	2.51	0.84
Nd143	6.42	0.88	5.68	1.89
Pm				
Sm147	2.18	1.02	2.21	0.74
Eu151	0.54	0.85	0.46	0.15
Gd155	1.69	1.23	2.09	0.70
Tb159	0.32	0.95	0.30	0.10
Dy163	1.73	1.74	3.00	1.00
Ho165	0.29	0.68	0.20	0.07
Er166	1.64	1.23	2.01	0.67
Tm169	0.35	1.19	0.42	0.14
Yb173	1.22	0.89	1.09	0.36
Lu175	6.79	2.76	18.78	6.26
Hf179	3.28	0.35	1.15	0.38
Ta181	1.83	1.06	1.95	0.65
Pb208	39.08	0.34	13.20	4.40
Th232	21.98	0.35	7.61	2.54
U238	2.79	0.91	2.54	0.85

Table B1, cont.

	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B
Spot # **Analyte**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
Mg24	6817.89	5751.64	3073.03	5011.12	4226.13	898.39	3839.82	2968.39	3559.78	2156.28	3409.88
Al27	59392.32	87138.09	61022.44	88471.29	86859.59	41602.75	72638.43	55926.91	92477.03	64561.24	86612.1
Si29	350579.44	350579.44	350579.44	350579.47	350579.44	350579.47	350579.44	350579.47	350579.47	350579.47	350579.5
P31	44.6	63.4	85.78	63.29	111.61	41.54	77.73	59.93	50.14	54.42	79.14
Ca42	5664.77	7070	42982.73	14500.02	16808.01	1573.24	40730.55	4457.26	6440.09	29911.08	6378.99
Sc45	6.79	4.91	2.89	5.99	2.79	<0.75	4.52	6.38	3.16	2.67	3.89
Ti49	1467.38	1479.04	730.24	1280.29	926.58	354.38	1032.78	1122.79	772.49	1073.28	1162.37
V51	6.58	5.91	6.89	4.77	4.54	1.99	3.94	4.95	8.95	2.91	5.13
Cr52	1.62	3.15	<1.31	3.86	<2.22	<2.07	<1.60	<2.45	<2.19	<1.12	3.78
Mn55	481.7	439.81	157.73	369.97	221.22	59.13	230.51	247.99	138.1	207.47	334.7
Fe57	14447.57	13584.77	6015.1	9892.48	6570.44	2063.01	7748.23	7196.5	5356	6298.32	9422.72
Co59	0.76	0.81	0.6	0.87	0.46	<0.44	0.66	0.47	0.51	0.52	1.17
Ni60	4.39	2.77	2.42	3.14	<1.72	2.3	1.66	<2.09	1.39	2.34	3.96
Cu65	8.46	5.52	6.09	4.61	4.2	<0.75	5.25	2.23	4.83	2.4	<1.76
Zn66	72.37	73.58	26.14	61.82	37.11	12.75	28.55	53.46	30.07	30.79	44.6
Ga71	23.24	25.8	21.31	28.47	21.71	10.13	23.52	17.98	23.06	20.64	23.21
Rb85	265.43	281.85	221.24	272.62	244.37	138.31	276.42	166.35	212.73	235.86	267.2
Sr88	48.1	44.39	85.24	52.95	72.85	12.11	76.47	24.79	91.59	67.91	50.73
Y89	12.79	12.08	10.77	15.96	11.84	3.75	16.31	17.01	10.72	7.55	18.4
Zr90	155.23	148.42	96.73	186.21	118.97	41.08	176.34	164.79	90.88	78.67	177.85
Nb93	12.74	11.2	8.7	13.98	10.1	2.86	14.49	16.99	9.04	11.15	14.75
Cs133	3.38	2.98	2.13	3.98	2.44	1.65	2.99	2.19	2.08	2.51	2.46
Ba137	52.12	49.09	194.37	59.52	217.44	26.24	198.71	34.05	514.92	223.69	106.6
La139	83.58	85.13	105.37	105.86	100.87	23.43	78.03	221.79	97.26	44.56	102.94
Ce140	105.73	102.85	119.5	132.58	111.67	33.06	104.65	386.82	124.01	59.38	135
Pr141	14.19	13.04	17.03	17.76	15.65	3.26	13.18	36.29	15.53	7.26	18.15
Nd143	43.38	41.9	54.73	59.95	50.36	9.7	48.8	117.89	50.56	24.5	61.63
Pm											
Sm147	6.99	7.11	6.33	7.27	6.56	2.22	6.39	14.49	6.48	3.17	9.24
Eu151	0.96	1.28	2.28	1.9	2.67	0.86	2.22	1.08	2.85	1.99	1.84
Gd155	5.96	4.77	3.1	5.74	3.77	1.6	4.93	8.59	3.2	2.66	6.51
Tb159	0.513	0.476	0.481	0.69	0.472	0.275	0.601	0.89	0.466	0.348	0.68
Dy163	2.66	2.86	2.24	2.97	2.57	0.8	3.08	4.45	1.88	2.21	4.13
Ho165	0.791	0.487	0.4	0.596	0.558	0.21	0.788	0.749	0.46	0.353	0.784
Er166	1.19	1.09	1.18	1.45	1.38	0.46	1.4	2.1	1.7	0.68	1.98
Tm169	0.205	0.171	0.2	0.218	0.24	<0.045	0.213	0.329	<0.052	0.101	0.29
Yb173	1.08	0.99	0.95	1.21	0.98	0.26	1.41	1.75	1.69	0.62	1.3
Lu175	0.158	0.197	0.097	0.305	0.127	0.084	0.195	0.178	0.154	0.12	0.502
Hf179	6.02	4.78	3.29	6.41	2.88	1.83	5.27	7.33	2.03	2.49	4.41
Ta181	0.688	0.749	0.419	0.64	0.44	0.285	0.626	0.89	0.407	0.493	0.798
Pb208	32.53	34.41	32.77	42.84	37.84	18.04	33.94	25.74	35.17	35.72	38.75
Th232	15.38	16.13	10.13	13.31	11.31	3.01	15.39	27.63	9.6	7.67	18.5
U238	1.39	1.68	1.26	1.78	1.37	0.635	1.79	1.24	1.58	1.024	2.67

Table B1, cont.

	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B	WSWPST4B
Spot #	40	41	42	43	44	45				
Analyte							Avg	StDev/Avg	StDev	StErr
Mg24	4204.33	90.56	1247.81	3976.32	392.98	2148.81	3163.13	0.59	1854.47	449.77
Al27	72837.42	10624.35	31537.86	64730.97	46643.5	67633.98	64159.43	0.35	22285.47	5405.02
Si29	350579.5	350579.5	350579.5	350579.47	350579.5	350579.5	350579.47	0.00	0.02	0.01
P31	131.5	23.81	111.53	174.55	77.29	193.63	84.93	0.55	46.45	11.27
Ca42	17046.88	628.57	1672.26	91404.7	2244.91	3195.66	17218.22	1.35	23324.38	5656.99
Sc45	4.25	0.64	<0.85	4.23	0.74	3.17	3.80	0.48	1.81	0.44
Ti49	1926.09	311.2	531.1	1364.87	195.01	971.1	982.41	0.47	464.34	112.62
V51	8	0.84	3.02	7.93	1.27	4.36	4.82	0.49	2.37	0.58
Cr52	<1.51	1.06	<2.19	1.56	<1.60	<2.96	2.51	0.49	1.24	0.30
Mn55	487.25	10.34	132.57	376.72	24.59	243.66	244.91	0.62	151.19	36.67
Fe57	15570.24	482.79	4103.22	11325.62	1462.9	8032.82	7621.93	0.58	4405.68	1068.53
Co59	0.93	<0.110	<0.32	1.19	<0.35	0.96	0.76	0.33	0.25	0.06
Ni60	<1.14	<0.59	1.52	<0.88	3.19	<2.80	2.64	0.37	0.97	0.24
Cu65	4.49	0.71	<1.29	5.03	<0.91	2.5	4.33	0.46	2.00	0.48
Zn66	73.1	3.72	25.34	63.78	13.85	41.92	40.76	0.55	22.33	5.42
Ga71	23.25	2.32	7.32	24.06	16.66	19.25	19.53	0.35	6.90	1.67
Rb85	244.29	28.28	93.82	313.58	139.42	208.53	212.37	0.36	75.90	18.41
Sr88	42.95	3.18	8.45	102.11	12.04	18.01	47.87	0.65	31.33	7.60
Y89	29.75	2.28	6.14	20.06	2.6	20.71	12.87	0.57	7.30	1.77
Zr90	186.07	13.96	28.06	187.1	10.09	97.84	115.19	0.55	63.75	15.46
Nb93	21.09	3	2.63	14.2	0.28	7.18	10.26	0.55	5.68	1.38
Cs133	2.4	0.865	1.4	3.67	3	2.56	2.51	0.32	0.79	0.19
Ba137	42.93	4.56	16.53	81.51	30.84	32.67	110.93	1.16	128.26	31.11
La139	68.73	5.82	25.86	96.83	19.03	59.05	77.89	0.64	50.06	12.14
Ce140	121.49	15.69	38.66	136.81	27.63	117.77	110.19	0.75	82.28	19.96
Pr141	15.31	1.523	4.65	17.3	2.68	13.82	13.33	0.62	8.22	1.99
Nd143	67.6	5.17	13.06	63.85	7.87	48.87	45.28	0.62	27.98	6.79
Pm										
Sm147	14.06	0.91	1.42	10.44	2.04	8.7	6.70	0.60	4.00	0.97
Eu151	1.14	0.126	0.65	1.7	0.88	1.14	1.50	0.50	0.75	0.18
Gd155	7.37	0.82	1.55	6.82	1.36	6.91	4.45	0.54	2.40	0.58
Tb159	1.05	0.049	0.219	0.838	0.171	1.11	0.55	0.55	0.30	0.07
Dy163	7.75	0.48	1.4	4.91	1.13	4.19	2.92	0.61	1.78	0.43
Ho165	1.25	0.146	0.221	0.832	0.068	0.86	0.56	0.56	0.31	0.08
Er166	2.78	0.149	0.46	2.11	0.31	2.04	1.32	0.56	0.74	0.18
Tm169	0.32	0.04	<0.069	0.244	<0.033	0.265	0.22	0.37	0.08	0.02
Yb173	2.07	<0.124	<0.32	1.26	<0.127	0.35	1.14	0.45	0.51	0.12
Lu175	0.316	0.03	0.041	0.217	<0.035	0.113	0.18	0.67	0.12	0.03
Hf179	5.43	0.51	1	6.38	1.02	2.51	3.74	0.58	2.16	0.52
Ta181	1.4	0.061	0.244	0.752	<0.047	0.357	0.58	0.55	0.32	0.08
Pb208	33.26	4.47	13.08	37.25	28.83	30.37	30.29	0.33	9.92	2.41
Th232	17.77	1.135	3.59	13.84	1.33	9.84	11.50	0.61	6.97	1.69
U238	2.07	0.16	0.176	1.92	0.195	0.91	1.29	0.55	0.71	0.17

Table B1, cont.

	WSWPST3A	**WSWPST3A**	**WSWPST3A**	**WSWPST3A**	**WSWPST3A**	**WSWPST3A**	**WSWPST3A**	**WSWPST3A**
Spot #	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**
Analyte								
Mg24	6460.25	7650.18	6299	4198.79	4102.87	5584.06	4444.32	6017.37
Al27	61056.66	60764.8	76481.75	69249.12	68831.06	74122.34	69766.31	66198.09
Si29	350579.56	350579.56	350579.56	350579.56	350579.56	350579.56	350579.56	350579.56
P31	391.58	307.09	257.83	267.41	903.43	302.76	1433.7	768.35
Ca42	24875.54	22149.38	17244.92	13785.08	12721.09	16588.92	17986.63	17379.28
Sc45	5.11	6.34	6.8	6.94	5.43	8.57	<8.74	6.71
Ti49	1907.24	2007.51	2179.8	2040.03	1984	2062.07	2185.43	1922.53
V51	9.98	16.85	9.36	8.67	9.95	11.66	<10.39	17.2
Cr52	12.82	16.39	<6.87	<3.29	7.47	<5.38	<25.12	20.45
Mn55	720.23	808.75	496	369.07	432.72	474.28	557.49	570.3
Fe57	15271.79	17437.42	11194.79	8380.46	11507.52	11441.94	12504.05	12505.92
Co59	1.47	1.9	<1.03	1.09	0.95	<1.08	<4.21	3.89
Ni60	7.24	2.84	6.47	6.26	3.77	12.55	<16.04	173.25
Cu65	20.07	18.73	24.05	14.54	8.52	19.43	<17.99	34.81
Zn66	81.2	69.48	118.45	75.77	57.62	113.92	135.08	134.34
Ga71	33.61	23.42	36.19	32.68	27.33	35.7	41.01	36.81
Rb85	287.44	282.51	255.77	241.36	221.93	257.31	255.92	243.87
Sr88	321.19	279.4	287.36	242.17	188.41	269.74	280.6	263.64
Y89	22.38	28.29	30.05	28.71	35	26.78	32.21	25.99
Zr90	406.35	408.36	446.51	437.54	440.93	431.73	432.73	367.58
Nb93	20.44	20.8	22.96	23.84	22.89	23.46	21.83	20.44
Cs133	5.1	4.95	5.57	3.56	3.02	3.73	6.26	4.86
Ba137	435.68	418.66	513.86	526.75	527.07	455.9	559.02	491.72
La139	136.42	169.8	155.92	153.04	167	159.74	173.4	124.59
Ce140	268.01	306.57	279.27	291.45	291.29	286.94	312.37	252.2
Pr141	26.65	33.08	31.11	30.98	31.25	31.51	32.1	26.09
Nd143	91.25	120.59	109.61	112.01	107.06	111.24	104.12	88.52
Pm								
Sm147	13.01	17.26	13.37	13.64	14.8	16.51	16.87	12.41
Eu151	3.01	3.92	2.4	1.87	1.6	2.62	2.89	2.58
Gd155	8	10.05	9.33	10.2	8.41	8.03	10.75	8.38
Tb159	0.98	1.3	1.2	1.15	1.6	0.77	2.31	0.91
Dy163	4.34	6.82	6.56	6.32	9.14	4.71	11.37	5.13
Ho165	0.93	1.069	1.06	1.47	1.35	0.81	0.98	1.3
Er166	2.38	3.17	3.14	2.95	4	2.79	3.81	3.06
Tm169	0.263	0.356	0.52	0.55	0.71	0.56	<0.39	0.346
Yb173	2.32	3.35	2.95	2.57	3.64	2.88	3.16	1.72
Lu175	0.507	0.471	0.42	0.57	0.81	0.84	1.25	1.54
Hf179	10.11	10.87	9.26	10.97	12.79	12.15	18.19	7.98
Ta181	1.07	0.99	1.3	1.04	1.08	1.85	1.46	1.52
Pb208	67.4	52.29	83.84	74.45	53.62	77.28	96.69	79.65
Th232	17.38	20.33	21.74	20.99	18.4	21.28	25.15	17.52
U238	2.75	2.36	3.28	4.1	2.66	3.42	3.09	4.51

Table B1, cont.

	WSWPST3A	WSWPST3A	WSWPST3A	WSWPST3A	WSWPST3A	WSWPST3A	WSWPST3A	WSWPST3A
Spot #	**64**	**65**	**66**	**67**				
Analyte					**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	7368.67	7197.77	4711.05	5485.83	5793.35	0.22	1249.82	360.79
Al27	60917.61	61489.32	71580.21	55730.07	66348.95	0.10	6337.52	1829.48
Si29	350579.56	350579.56	350579.56	350579.59	350579.56	0.00	0.01	0.00
P31	301.75	447.05	479.63	420.6	523.43	0.67	350.25	101.11
Ca42	18512.18	27577.16	16678.65	18914.68	18701.13	0.23	4282.50	1236.25
Sc45	6.3	5.36	7.78	4.87	6.38	0.18	1.15	0.33
Ti49	2061.6	2044.11	2122.06	1882.76	2033.26	0.05	99.18	28.63
V51	10.24	11.74	15.65	10.67	12.00	0.26	3.09	0.89
Cr52	11.73	11.65	13.15	20.05	14.21	0.31	4.46	1.29
Mn55	732.17	782.56	490.59	559.88	582.84	0.25	144.44	41.70
Fe57	14889.38	15454.78	10316.66	12193.11	12758.15	0.20	2546.67	735.16
Co59	2.74	1.87	3.51	1.48	2.10	0.50	1.05	0.30
Ni60	1.71	8.17	28.37	14.57	24.11	2.07	50.02	14.44
Cu65	19.34	20.84	23.61	14.81	19.89	0.33	6.64	1.92
Zn66	49.34	62.66	113.97	55.44	88.94	0.36	32.03	9.25
Ga71	22.35	30.42	32.61	30.11	31.85	0.17	5.50	1.59
Rb85	295.16	278.82	255.61	239.5	259.60	0.09	22.13	6.39
Sr88	269.11	340.55	264.8	308.34	276.28	0.14	38.84	11.21
Y89	28.57	26.52	30.53	25.7	28.39	0.12	3.32	0.96
Zr90	439.14	414.05	444.71	350.54	418.35	0.07	31.07	8.97
Nb93	22.04	23.24	23.61	18.7	22.02	0.07	1.61	0.47
Cs133	4.71	4.79	4.07	4.54	4.60	0.19	0.89	0.26
Ba137	437.76	437.35	481.65	535.54	485.08	0.10	47.31	13.66
La139	166.27	144.55	157.44	134.55	153.56	0.10	15.47	4.47
Ce140	296.4	269.82	288.52	256.03	283.24	0.07	18.76	5.42
Pr141	32.85	27.67	30.75	26.9	30.08	0.08	2.52	0.73
Nd143	114.78	96.4	104.87	89.03	104.12	0.10	10.59	3.06
Pm								
Sm147	16.3	13.26	15.79	11.82	14.59	0.13	1.90	0.55
Eu151	3.55	3.31	2.22	3.13	2.76	0.25	0.68	0.20
Gd155	9.39	7.45	11	7.62	9.05	0.14	1.24	0.36
Tb159	1.139	1	1.08	0.67	1.18	0.37	0.43	0.12
Dy163	5.46	6.17	7.24	5.65	6.58	0.30	1.98	0.57
Ho165	1.107	1.04	1.14	0.72	1.08	0.20	0.22	0.06
Er166	2.55	2.62	3.48	2.33	3.02	0.18	0.54	0.15
Tm169	0.3	0.464	0.564	0.44	0.46	0.29	0.14	0.04
Yb173	3.41	1.67	2.67	3.09	2.79	0.23	0.63	0.18
Lu175	0.461	0.551	1.86	1.3	0.88	0.55	0.49	0.14
Hf179	10.99	11.28	10.13	6.73	10.95	0.26	2.83	0.82
Ta181	1.08	1.12	1.48	1.05	1.25	0.21	0.27	0.08
Pb208	48.8	61.18	63.97	67.22	68.87	0.21	14.19	4.10
Th232	20.44	19.62	21.95	15.39	20.02	0.13	2.58	0.74
U238	2.79	2.88	3.57	2.98	3.20	0.19	0.62	0.18

Table B1, cont.

Spot # Analyte	WSWPST4D 77	WSWPST4D 78	WSWPST4D 79
Mg24	40.88	3515.71	1014.5
Al27	61869.36	56704.81	66534.43
Si29	350579.47	350579.47	350579.44
P31	<28.64	99.03	64.29
Ca42	4162.15	5778.95	2528.93
Sc45	0.49	6.74	2.06
Ti49	138.99	3087.19	700.15
V51	<0.40	18.62	8.62
Cr52	1.78	4.2	<1.71
Mn55	4.24	538.04	276.11
Fe57	1527.2	10774.96	8408.96
Co59	<0.19	1.25	0.48
Ni60	<0.57	4.37	<1.28
Cu65	<0.53	3.29	1
Zn66	<3.02	62.45	27.79
Ga71	18.79	26.52	24.2
Rb85	130.35	215.15	261.67
Sr88	12.5	28.99	10.68
Y89	0.349	208.34	34.82
Zr90	2.04	453.35	463.52
Nb93	0.82	147.86	9.84
Cs133	0.171	2.03	1.99
Ba137	40.15	38.02	15.32
La139	8.61	99.5	34.05
Ce140	8.07	350.65	84.01
Pr141	0.777	40.12	6.46
Nd143	2.65	185.75	25.5
Pm			
Sm147	<0.191	47.34	5.84
Eu151	1.69	0.98	0.62
Gd155	<0.115	33.57	4.51
Tb159	<0.0217	7.03	0.95
Dy163	<0.071	37.32	4.48
Ho165	<0.018	8.08	1.2
Er166	0.051	19.02	4.1
Tm169	0.0084	2.28	0.75
Yb173	<0.112	14.56	4.9
Lu175	0.027	1.99	1.09
Hf179	<0.152	15.14	14.37
Ta181	0.056	8.57	0.81
Pb208	29.37	41.82	37.24
Th232	0.387	35.88	29.52
U238	0.13	11.34	6.79

Table B1, cont.

Spot #	WSWPST4D	WSWPST4D	WSWPST4D	WSWPST4D
Analyte	**Avg**	**StDev/Avg**	**StDev**	**StErr**
Mg24	1523.70	1.18	1792.50	1034.90
Al27	61702.87	0.08	4916.92	2838.79
Si29	350579.46	0.00	0.02	0.01
P31	81.66	0.30	24.56	14.18
Ca42	4156.68	0.39	1625.02	938.20
Sc45	3.10	1.05	3.25	1.88
Ti49	1308.78	1.20	1565.50	903.84
V51	13.62	0.52	7.07	4.08
Cr52	2.99	0.57	1.71	0.99
Mn55	272.80	0.98	266.92	154.10
Fe57	6903.71	0.70	4804.12	2773.66
Co59	0.87	0.63	0.54	0.31
Ni60	4.37			
Cu65	2.15	0.75	1.62	0.93
Zn66	45.12	0.54	24.51	14.15
Ga71	23.17	0.17	3.97	2.29
Rb85	202.39	0.33	66.58	38.44
Sr88	17.39	0.58	10.09	5.82
Y89	81.17	1.37	111.47	64.36
Zr90	306.30	0.86	263.55	152.16
Nb93	52.84	1.56	82.41	47.58
Cs133	1.40	0.76	1.06	0.61
Ba137	31.16	0.44	13.76	7.95
La139	47.39	0.99	46.89	27.07
Ce140	147.58	1.22	179.92	103.88
Pr141	15.79	1.35	21.26	12.28
Nd143	71.30	1.40	99.77	57.60
Pm				
Sm147	26.59	1.10	29.34	16.94
Eu151	1.10	0.50	0.54	0.31
Gd155	19.04	1.08	20.55	11.86
Tb159	3.99	1.08	4.30	2.48
Dy163	20.90	1.11	23.22	13.41
Ho165	4.64	1.05	4.86	2.81
Er166	7.72	1.29	9.99	5.77
Tm169	1.01	1.14	1.16	0.67
Yb173	9.73	0.70	6.83	3.94
Lu175	1.04	0.95	0.98	0.57
Hf179	14.76	0.04	0.54	0.31
Ta181	3.15	1.50	4.71	2.72
Pb208	36.14	0.17	6.30	3.64
Th232	21.93	0.86	18.93	10.93
U238	6.09	0.93	5.64	3.26

Table B1, cont.

Spot # Analyte	WSWPST1 80	WSWPST1 81	WSWPST1 82
Mg24	12659.28	7846.61	9474.33
Al27	100821.27	81244.11	90146.68
Si29	350579.44	350579.44	350579.44
P31	4357.77	2187.07	3761.91
Ca42	31185.98	38500.36	37529.2
Sc45	16.37	12.89	13.16
Ti49	8493.07	7661.68	9383.82
V51	61.61	30.6	87.21
Cr52	84.39	31.62	20.13
Mn55	350.14	354.91	403.68
Fe57	47005.48	34596.2	51215.84
Co59	11.67	8.24	7.01
Ni60	122.6	27.95	39.62
Cu65	94.14	24.86	27.54
Zn66	288.84	205.04	195
Ga71	35.41	30.88	29.62
Rb85	168.33	114.27	130.1
Sr88	1499.71	2182.27	1929.62
Y89	32.13	44.6	47.05
Zr90	482.68	500.92	576.03
Nb93	24.04	23.47	28.42
Cs133	15.1	6.95	9.07
Ba137	2496.87	2639.88	2666.68
La139	172.06	192.78	208.89
Ce140	325	315.29	325.12
Pr141	34.69	39.64	43.13
Nd143	120.38	146.42	154.72
Pm			
Sm147	17.63	20.13	24.2
Eu151	4.75	4.64	4.66
Gd155	12.55	12.59	15.73
Tb159	1.18	1.56	1.86
Dy163	7.07	8.65	9.06
Ho165	1.12	1.64	1.36
Er166	3.03	4	4.39
Tm169	0.248	0.395	0.554
Yb173	3.31	3.6	4.52
Lu175	4.65	0.532	0.796
Hf179	12.3	13.02	13.39
Ta181	2.26	1.34	1.54
Pb208	161.96	155.53	185.15
Th232	22.72	28.71	31.02
U238	9.5	5.3	5.95

Table B1, cont.

Spot # Analyte	WSWPST1 Avg	WSWPST1 StDev/Avg	WSWPST1 StDev	WSWPST1 StErr
Mg24	9993.41	0.24	2447.96	1413.33
Al27	90737.35	0.11	9801.94	5659.15
Si29	350579.44	0.00	0.00	0.00
P31	3435.58	0.33	1121.54	647.52
Ca42	35738.51	0.11	3972.40	2293.47
Sc45	14.14	0.14	1.94	1.12
Ti49	8512.86	0.10	861.24	497.24
V51	59.81	0.47	28.35	16.37
Cr52	45.38	0.76	34.27	19.79
Mn55	369.58	0.08	29.63	17.11
Fe57	44272.51	0.20	8640.31	4988.49
Co59	8.97	0.27	2.42	1.39
Ni60	63.39	0.81	51.61	29.80
Cu65	48.85	0.80	39.25	22.66
Zn66	229.63	0.22	51.53	29.75
Ga71	31.97	0.10	3.05	1.76
Rb85	137.57	0.20	27.79	16.05
Sr88	1870.53	0.18	345.09	199.24
Y89	41.26	0.19	8.00	4.62
Zr90	519.88	0.10	49.48	28.57
Nb93	25.31	0.11	2.71	1.56
Cs133	10.37	0.41	4.23	2.44
Ba137	2601.14	0.04	91.29	52.71
La139	191.24	0.10	18.46	10.66
Ce140	321.80	0.02	5.64	3.26
Pr141	39.15	0.11	4.24	2.45
Nd143	140.51	0.13	17.92	10.34
Pm				
Sm147	20.65	0.16	3.32	1.91
Eu151	4.68	0.01	0.06	0.03
Gd155	13.62	0.13	1.82	1.05
Tb159	1.53	0.22	0.34	0.20
Dy163	8.26	0.13	1.05	0.61
Ho165	1.37	0.19	0.26	0.15
Er166	3.81	0.18	0.70	0.40
Tm169	0.40	0.38	0.15	0.09
Yb173	3.81	0.17	0.63	0.36
Lu175	1.99	1.16	2.31	1.33
Hf179	12.90	0.04	0.55	0.32
Ta181	1.71	0.28	0.48	0.28
Pb208	167.55	0.09	15.58	9.00
Th232	27.48	0.16	4.28	2.47
U238	6.92	0.33	2.26	1.31

Figure B1. Photomicrograph of sample CRWPST with LA-ICPMS spot locations noted.

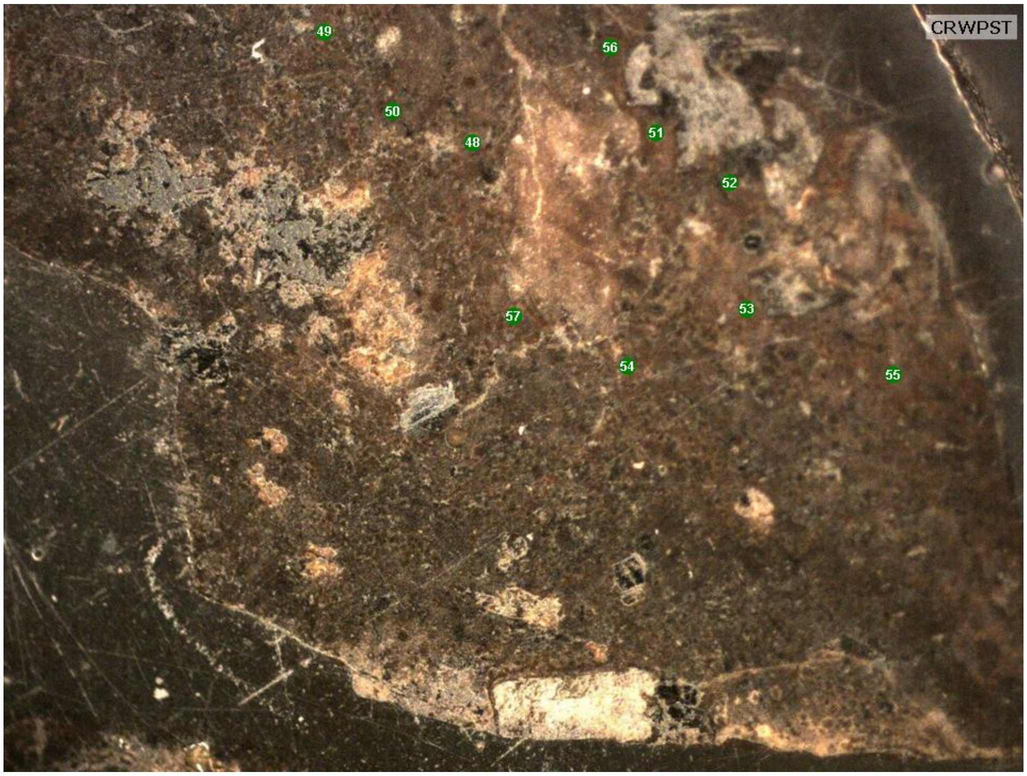


Figure B2. Photomicrograph of sample PSTG01C with LA-ICPMS spot locations noted.

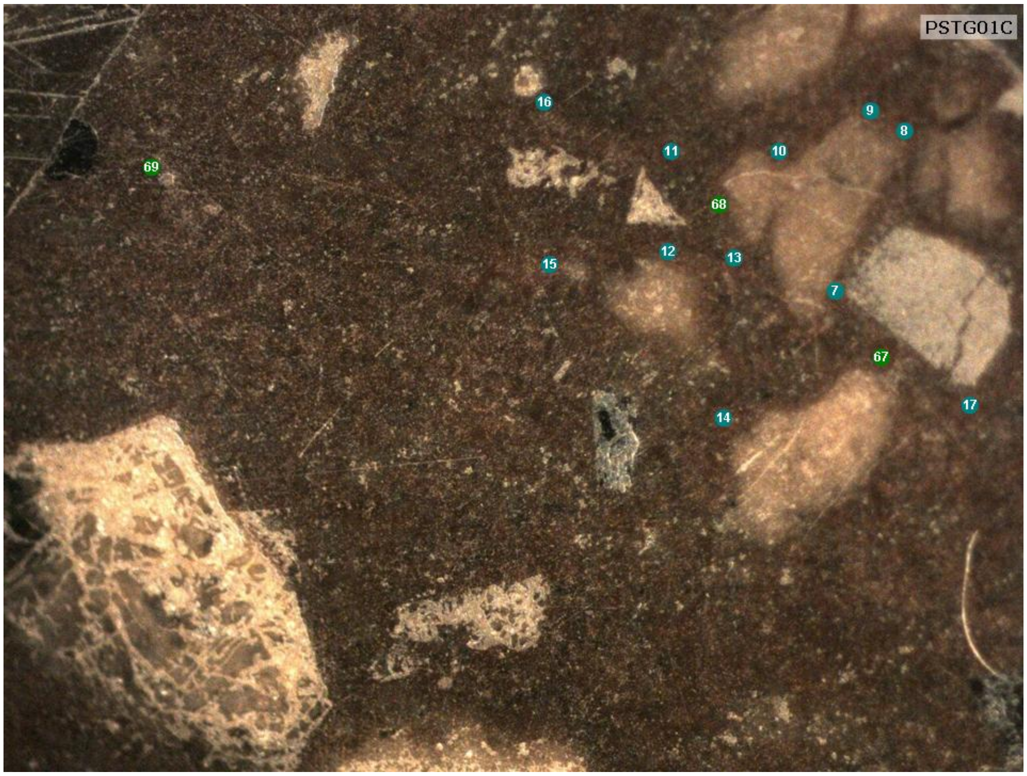


Figure B3. Photomicrograph of sample WSWPST1 with LA-ICPMS spot locations noted.

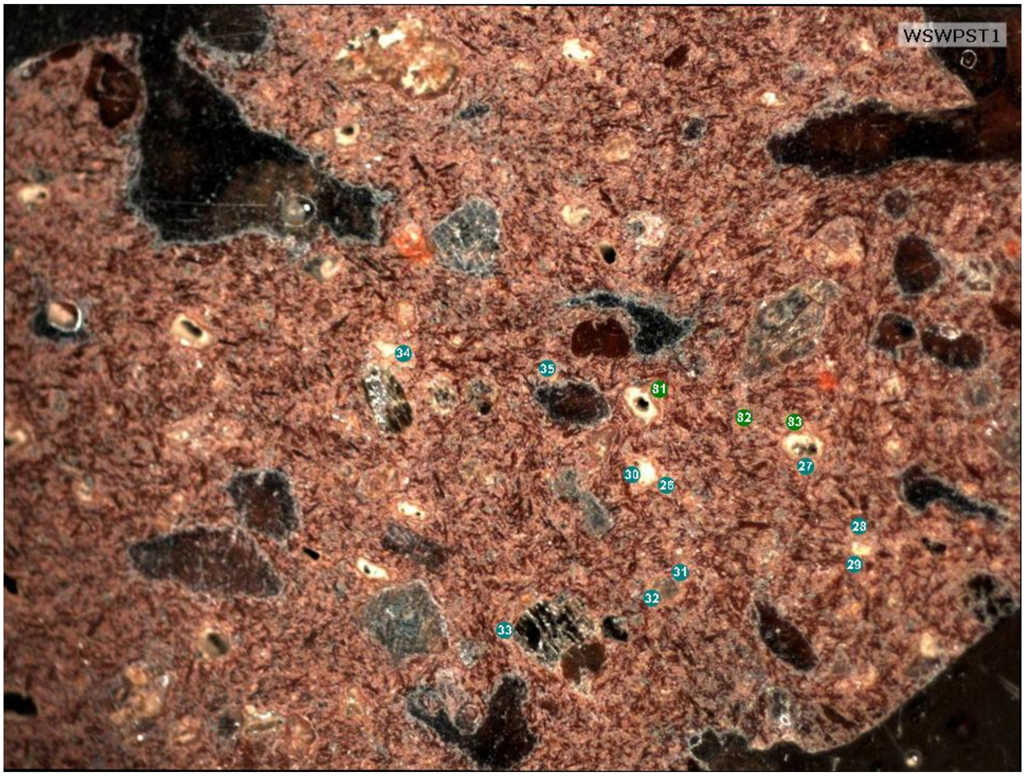


Figure B4. Photomicrograph of sample WSWPST3A with LA-ICPMS spot locations noted.

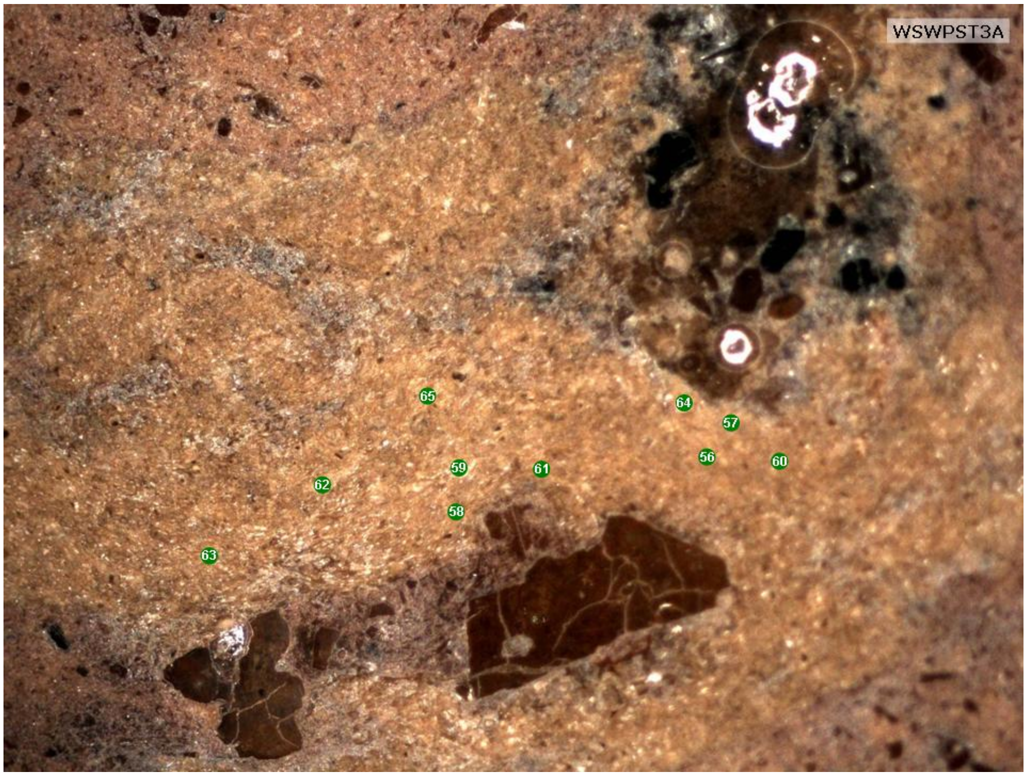


Figure B5. Photomicrograph of sample WSWPST4B with LA-ICPMS spot locations noted.

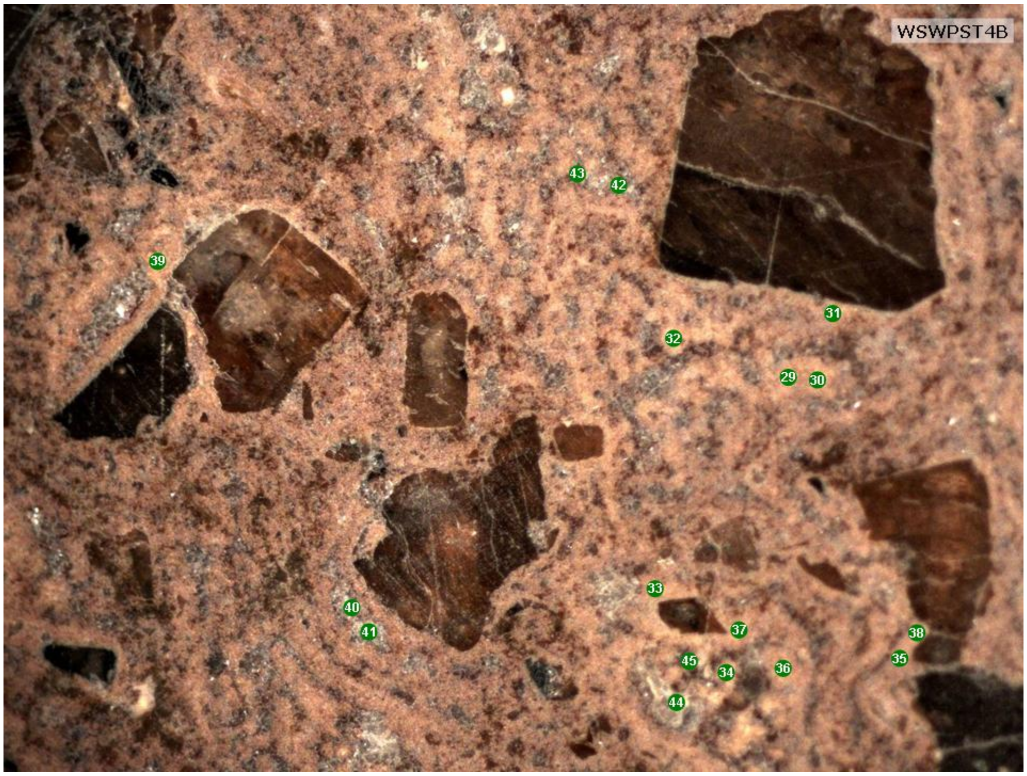


Figure B6. Photomicrograph of sample WSWPST4D with LA-ICPMS spot locations noted.

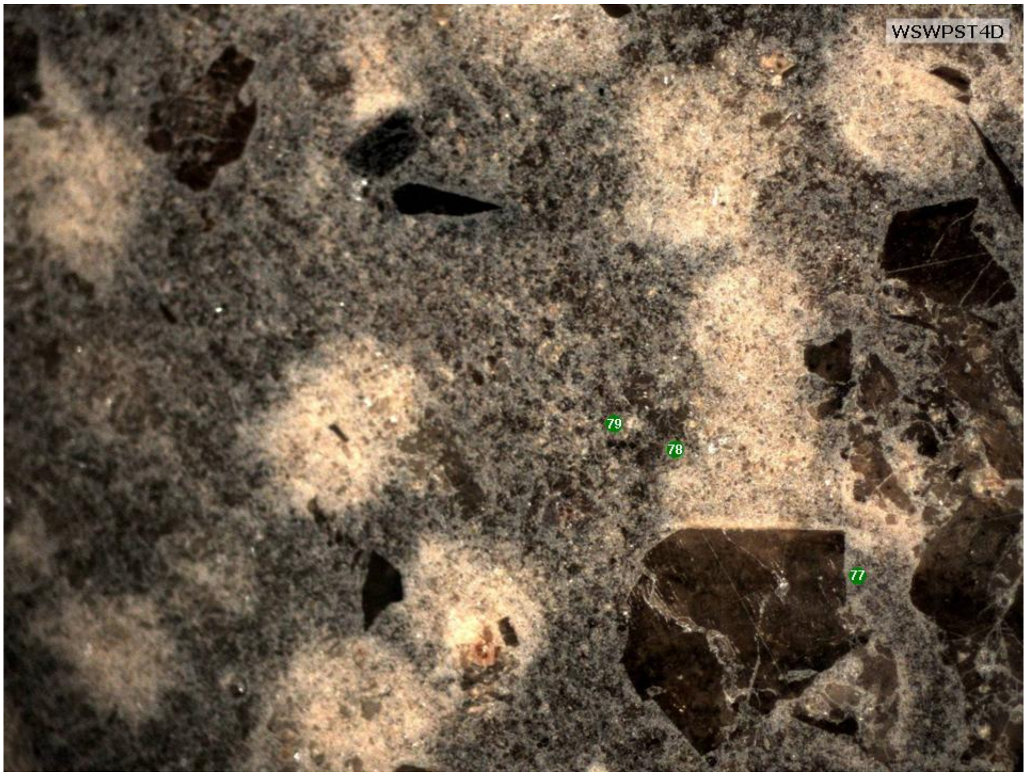


Figure B7. Photomicrograph of sample GJPST1A with LA-ICPMS spot locations noted.

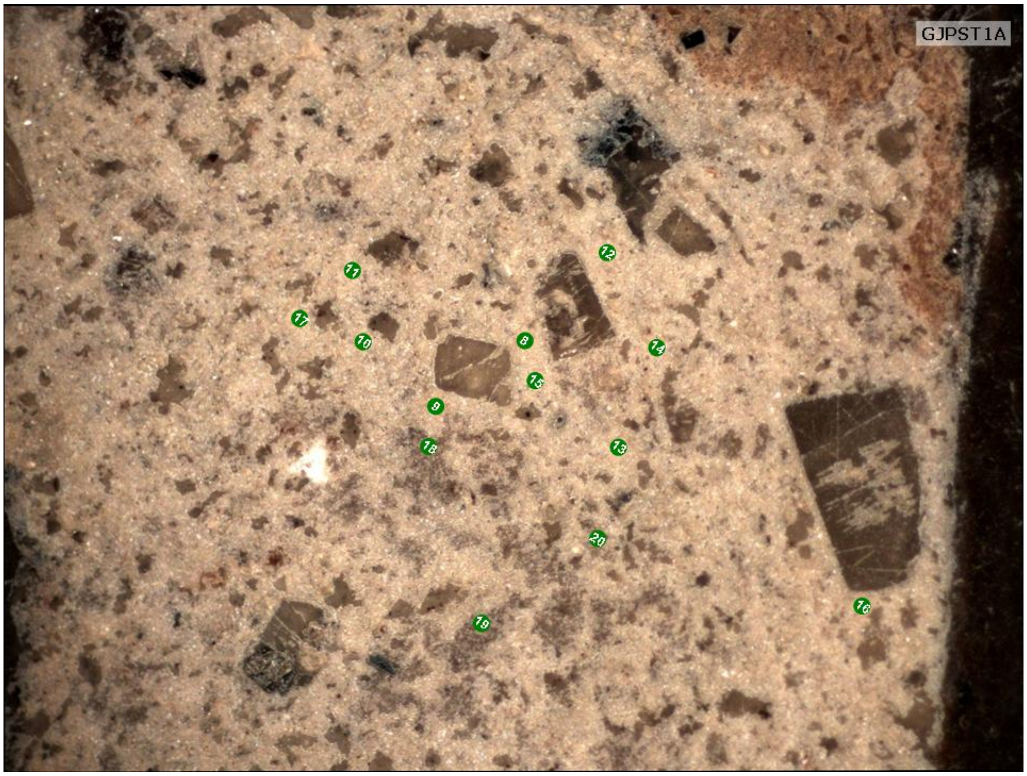
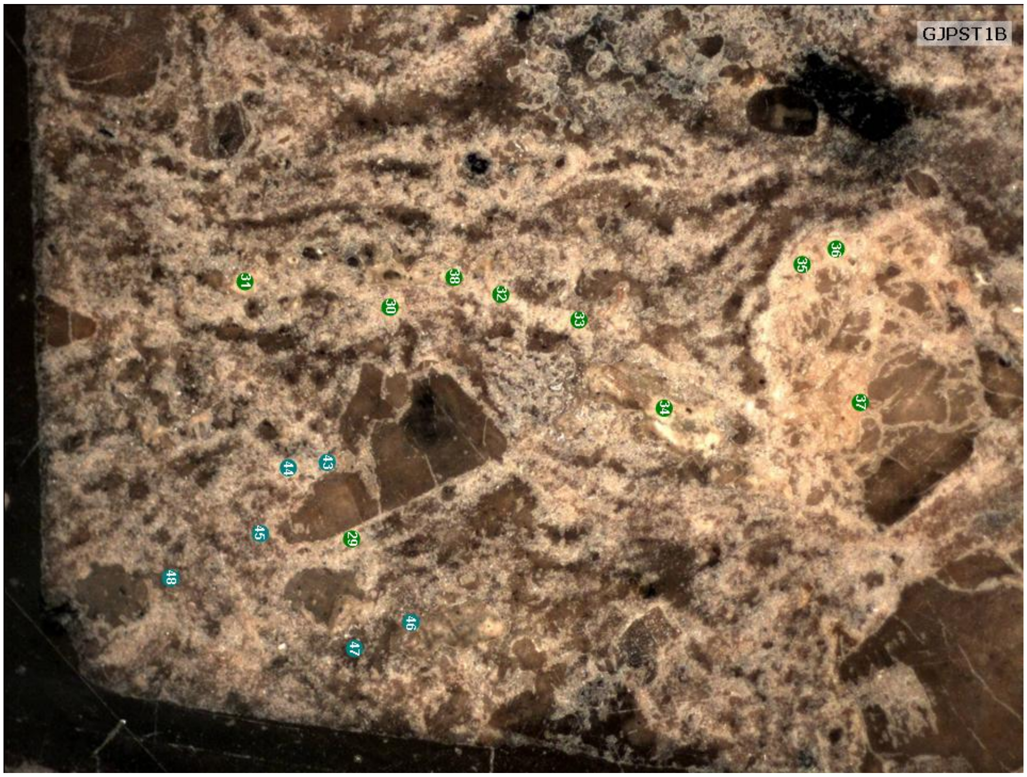


Figure B8. Photomicrograph of sample GJPST1B with LA-ICPMS spot locations noted.



APPENDIX C:

Trace Element Compositions From SHRIMP-RG of Zircon Grains From the Peach Spring Tuff and Cathodoluminescence Images of Analyzed Zircon Crystals

Table C1. SHRIMP-RG trace element analyses of zircon grains from KPST01A.

Element	KPST01A_3.1C	KPST01A_4.3C	KPST01A_6.1C	KPST01A_5.1C	KPST01A_11.1C	KPST01A_7.1C	KPST01A_9.1C
Li7	0.00002	0.00000	0.00010	0.00001	0.00001	0.00000	0.00001
Be9	0.00010	0.00009	0.00011	0.00000	0.00004	0.00000	0.00004
B11	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000
F19	0.00025	0.00024	0.00017	0.00014	0.00014	0.00011	0.00022
Na23	0.00860	0.00692	0.01194	0.01058	0.00893	0.00738	0.00857
Al27	0.02716	0.03850	0.02975	0.02436	0.02545	0.02508	0.02339
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00281	0.00457	0.00224	0.00486	0.00553	0.00413	0.00227
K39	0.00404	0.00321	0.00372	0.00355	0.00354	0.00276	0.00297
Ca40	0.01573	0.00940	0.01487	0.01923	0.01487	0.01099	0.01119
Sc45	0.04900	0.07233	0.07839	0.06161	0.06507	0.06709	0.05600
Ti48	0.00468	0.00824	0.00458	0.00228	0.00757	0.00311	0.00358
Ti49	0.00036	0.00059	0.00033	0.00017	0.00056	0.00024	0.00026
Fe56	0.00077	0.00068	0.00075	0.00070	0.00080	0.00078	0.00072
Y89	0.74097	0.31043	0.37793	0.33470	0.77927	0.29793	0.82387
Nb93	0.00048	0.00032	0.00105	0.00095	0.00131	0.00071	0.00071
Zr94H	0.00934	0.00869	0.00860	0.00866	0.00866	0.00826	0.00782
Zr96	2.36952	2.39216	2.39999	2.41408	2.35514	2.39783	2.37113
La139	0.00001	0.00002	0.00001	0.00000	0.00001	0.00000	0.00001
Ce140	0.01078	0.00779	0.00959	0.00758	0.02421	0.00767	0.01270
Nd146	0.00035	0.00015	0.00008	0.00004	0.00028	0.00004	0.00031
Sm147	0.00058	0.00025	0.00017	0.00008	0.00062	0.00012	0.00055
Eu153	0.00055	0.00029	0.00016	0.00004	0.00045	0.00009	0.00035
Gd155	0.00143	0.00060	0.00048	0.00028	0.00165	0.00029	0.00129
Ho165	0.01251	0.00522	0.00579	0.00484	0.01425	0.00458	0.01316
TbO175	0.00260	0.00122	0.00098	0.00066	0.00322	0.00074	0.00246
DyO179	0.00629	0.00276	0.00257	0.00199	0.00756	0.00183	0.00604
ErO182	0.01088	0.00496	0.00580	0.00522	0.01115	0.00469	0.01231
TmO185	0.00547	0.00258	0.00352	0.00306	0.00548	0.00288	0.00651
YbO188	0.00770	0.00352	0.00504	0.00477	0.00643	0.00428	0.00886
LuO191	0.00762	0.00389	0.00602	0.00559	0.00633	0.00466	0.00963
Zr2O	0.01579	0.01656	0.01723	0.01754	0.01691	0.01732	0.01727
HfO196	0.16498	0.16021	0.17044	0.19410	0.15123	0.18473	0.17704
Pb206	0.00003	0.00002	0.00003	0.00003	0.00003	0.00003	0.00004
207/206	0.58824	0.31250	0.76923	0.19231	0.17857	0.66667	0.27778
ThO248	0.03068	0.01043	0.01527	0.01763	0.03436	0.01405	0.04137
UO254	0.01759	0.00707	0.01588	0.02010	0.01642	0.01558	0.02340
	38394.00	38394.02	38394.06	38394.06	38394.08	38394.10	38394.12
206/238 Age	32.99	51.15	37.48	29.61	38.36	33.18	35.38
Li ppm Est	0.01	0.00	0.06	0.01	0.00	0.00	0.01
Be9 ppm	0.32	0.27	0.35	0.00	0.14	0.01	0.12
B11 ppm	0.05	0.10	0.06	0.07	0.06	0.09	0.03
F19 ppm	33.01	31.69	22.75	17.90	18.33	14.23	28.86
Na ppm Est.	2.04	1.64	2.83	2.50	2.11	1.75	2.03
Al27 ppm Est.	18.08	25.63	19.80	16.22	16.94	16.69	15.57
Si30							
P31 ppm	239.17	388.89	190.70	413.56	470.92	351.40	193.16
K39 Rel.	0.70	0.55	0.64	0.61	0.61	0.48	0.51
Ca40 ppm Est.	2.05	1.23	1.94	2.51	1.94	1.43	1.46
Sc45 ppm	43.10	63.63	68.96	54.19	57.24	59.02	49.26
48/49	13.03	13.92	13.94	13.05	13.43	13.22	13.60
Ti48 ppm	13.46	23.69	13.16	6.55	21.77	8.94	10.31
Ti49 ppm	13.74	22.62	12.55	6.67	21.55	8.99	10.07
Fe56 ppm	1.12	0.99	1.10	1.01	1.17	1.13	1.04
Y89 ppm	1748.75	732.63	891.96	789.92	1839.15	703.14	1944.40
Nb93 ppm	4.86	3.28	10.70	9.68	13.35	7.25	7.20
Zr94H Rel.	0.91	0.85	0.84	0.84	0.84	0.80	0.76
Zr96/Si30 ppm	2.37	2.39	2.40	2.41	2.36	2.40	2.37

Table C1, cont.

	KPST01A_3.1C	KPST01A_4.3C	KPST01A_6.1C	KPST01A_5.1C	KPST01A_11.1C	KPST01A_7.1C	KPST01A_9.1C
La139 ppm	0.08	0.14	0.03	0.00	0.06	0.02	0.04
Ce140 ppm	78.16	56.47	69.52	54.91	175.52	55.58	92.05
Nd146 ppm	4.92	2.15	1.08	0.54	3.82	0.61	4.32
Sm147 ppm	8.03	3.41	2.35	1.05	8.49	1.67	7.59
Eu153 ppm	2.66	1.42	0.75	0.20	2.17	0.46	1.68
Gd155 ppm	58.46	24.68	19.74	11.50	67.29	12.05	52.74
Ho165 ppm	70.64	29.46	32.66	27.35	80.43	25.87	74.29
TbO175 ppm	17.34	8.13	6.56	4.39	21.52	4.93	16.40
DyO179 ppm	186.13	81.54	76.09	58.76	223.56	54.03	178.78
ErO182 ppm	289.66	132.06	154.31	139.07	297.00	124.77	327.71
TmO185 ppm	56.96	26.82	36.69	31.85	57.04	29.99	67.73
YbO188 ppm	472.54	215.92	309.31	293.08	394.65	262.55	543.90
LuO191 ppm	77.10	39.38	60.93	56.54	64.06	47.18	97.39
Zr96/Zr2O	150.03	144.42	139.29	137.62	139.26	138.44	137.31
196/Si30	63.32	60.37	58.04	57.01	59.13	57.73	57.91
Hf ppm	9577.05	9300.31	9894.13	11267.37	8779.08	10723.93	10277.14
Pb7/6 Est	0.59	0.31	0.77	0.19	0.18	0.67	0.28
Th ppm	311.01	105.78	154.85	178.73	348.31	142.40	419.41
U ppm	170.72	68.64	154.09	195.02	159.36	151.21	227.07
Y/Nb	359.82	223.19	83.35	81.63	137.78	96.95	270.04
Th/U	1.82	1.54	1.00	0.92	2.19	0.94	1.85
Yb/Gd	8.08	8.75	15.67	25.49	5.86	21.78	10.31
U/Yb	0.36	0.32	0.50	0.67	0.40	0.58	0.42
Th/Yb	0.66	0.49	0.50	0.61	0.88	0.54	0.77
Ce/Sm	9.73	16.57	29.55	52.53	20.67	33.36	12.13
Ce/Lu	1.01	1.43	1.14	0.97	2.74	1.18	0.95
U/Ce	2.18	1.22	2.22	3.55	0.91	2.72	2.47
Th/Ce	3.98	1.87	2.23	3.25	1.98	2.56	4.56
Y/Yb	3.70	3.39	2.88	2.70	4.66	2.68	3.57
Yb/Nd	96.07	100.43	286.00	542.05	103.19	431.06	125.90
Y/Nb	359.82	223.19	83.35	81.63	137.78	96.95	270.04
Yb/Nb	97.23	65.78	28.90	30.29	29.56	36.20	75.54
Yb/Sc	10.96	3.39	4.49	5.41	6.89	4.45	11.04
Yb/Dy	2.54	2.65	4.06	4.99	1.77	4.86	3.04
Dy/Sm	23.17	23.92	32.35	56.21	26.33	32.43	23.56
Yb/Nd	96.07	100.43	286.00	542.05	103.19	431.06	125.90
Sm/Nd	1.63	1.59	2.18	1.93	2.22	2.74	1.76
U/Li	16459.25	#DIV/0!	2659.21	33661.54	46628.12	129964.24	32502.00
Estimated temperature							
Temp Ti48	763.56	818.19	761.47	701.30	809.66	727.29	739.57
Temp Ti49	765.41	813.53	757.14	702.77	808.63	727.74	737.55
Hf ppm	9577.05	9300.31	9894.13	11267.37	8779.08	10723.93	10277.14
Ferry Temp	813.41	869.44	803.85	741.32	863.71	769.95	781.23
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	799.36	850.76	790.55	732.70	845.52	759.24	769.68

Table C1, cont.

	KPST01A_3.1C	KPST01A_4.3C	KPST01A_6.1C	KPST01A_5.1C	KPST01A_11.1C	KPST01A_7.1C	KPST01A_9.1C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	0.24	0.45	0.11	0.00	0.18	0.07	0.13
Ce Ch (0.82)	95.32	68.86	84.78	66.97	214.04	67.79	112.26
Pr Ch (0.121)	2.48	1.76	0.69	0.00	1.90	0.41	1.87
Nd Ch (0.615)	8.00	3.50	1.76	0.88	6.22	0.99	7.02
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	40.16	17.04	11.76	5.23	42.46	8.33	37.95
Eu Ch (0.076)	35.01	18.70	9.89	2.59	28.50	5.99	22.17
Gd Ch (0.267)	218.94	92.44	73.92	43.07	252.04	45.14	197.52
Tb Ch (0.0493)	351.67	164.89	133.16	89.10	436.60	100.07	332.65
Dy Ch (0.33)	564.02	247.09	230.58	178.06	677.47	163.73	541.76
Ho Ch (0.0755)	935.66	390.14	432.63	362.21	1065.31	342.64	984.03
Er Ch (0.216)	1341.04	611.37	714.42	643.84	1374.99	577.66	1517.17
Tm Ch (0.0329)	1731.19	815.17	1115.15	967.94	1733.85	911.65	2058.63
Yb Ch (0.221)	2138.19	977.03	1399.61	1326.14	1785.75	1188.02	2461.09
Lu Ch (0.033)	2336.41	1193.21	1846.33	1713.19	1941.26	1429.68	2951.23
Ce/Ce*	124.09	77.34	310.26	#DIV/0!	369.93	392.57	225.77
Hf ppm	9577.05	9300.31	9894.13	11267.37	8779.08	10723.93	10277.14
Eu/Eu*	0.37	0.47	0.34	0.17	0.28	0.31	0.26
P Molar	7.72	12.56	6.16	13.35	15.21	11.35	6.24
3+ Molar	12.33	66.72	28.09	28.59	16.15	18.84	13.42
3+/P Molar	1.08	1.75	1.79	3.70	2.03	2.61	1.07

Table C1, cont.

Element	KPST01A_8.2C	KPST01A_10.2C	KPST01A_12.1C	KPST01A_13.1C	KPST01A_4.2I	KPST01A_11.2I	KPST01A_1.2E
Li7	0.00000	0.00000	0.03001	0.00000	0.00000	0.00001	0.07713
Be9	0.00069	0.00002	0.00038	0.00017	0.00005	0.00002	0.00077
B11	0.00001	0.00001	0.00029	0.00002	0.00001	0.00001	0.00234
F19	0.00022	0.00019	0.00020	0.00020	0.00024	0.00015	0.00304
Na23	0.01128	0.01088	3.18866	0.01248	0.00685	0.00832	11.01625
Al27	0.02524	0.02252	2.44911	0.02827	0.02362	0.02556	20.17151
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00935	0.00355	0.00302	0.00202	0.00256	0.00285	0.00041
K39	0.00467	0.00348	1.67958	0.03182	0.00316	0.00316	46.34567
Ca40	0.02399	0.01476	0.10332	0.01360	0.01227	0.01219	0.87593
Sc45	0.06752	0.07035	0.03501	0.04979	0.05937	0.04235	0.00323
Ti48	0.00853	0.00271	0.00379	0.00218	0.00506	0.00506	0.13357
Ti49	0.00060	0.00020	0.00030	0.00016	0.00036	0.00036	0.00998
Fe56	0.00081	0.00068	0.01044	0.00137	0.00067	0.00077	0.96178
Y89	2.74597	0.33356	0.47162	0.79436	0.53270	0.41230	0.04822
Nb93	0.00255	0.00086	0.00161	0.00091	0.00052	0.00072	0.00194
Zr94H	0.00867	0.00806	0.00651	0.00767	0.00871	0.00828	0.00236
Zr96	2.38584	2.45365	2.09691	2.41049	2.39224	2.41504	0.14500
La139	0.00005	0.00000	0.00005	0.00001	0.00003	0.00000	0.00328
Ce140	0.05495	0.00825	0.01656	0.01240	0.00965	0.00990	0.00672
Nd146	0.00126	0.00006	0.00013	0.00017	0.00026	0.00009	0.00031
Sm147	0.00311	0.00011	0.00030	0.00034	0.00040	0.00026	0.00005
Eu153	0.00191	0.00009	0.00018	0.00016	0.00037	0.00020	0.00001
Gd155	0.00806	0.00031	0.00086	0.00087	0.00093	0.00078	0.00007
Ho165	0.05265	0.00491	0.00833	0.01153	0.00872	0.00717	0.00075
TbO175	0.01424	0.00073	0.00188	0.00181	0.00170	0.00151	0.00013
DyO179	0.02987	0.00216	0.00445	0.00501	0.00417	0.00377	0.00032
ErO182	0.03882	0.00523	0.00742	0.01206	0.00827	0.00623	0.00080
TmO185	0.01722	0.00318	0.00380	0.00730	0.00457	0.00324	0.00057
YbO188	0.01992	0.00494	0.00484	0.01056	0.00639	0.00416	0.00069
LuO191	0.01815	0.00570	0.00507	0.01209	0.00685	0.00429	0.00092
Zr2O	0.01689	0.01895	0.01472	0.01725	0.01684	0.01804	0.00112
HfO196	0.14606	0.19997	0.17034	0.20824	0.16782	0.17080	0.01425
Pb206	0.00004	0.00002	0.00005	0.00005	0.00002	0.00002	0.00023
207/206	0.75758	0.00000	0.56818	0.00000	0.37037	0.27027	0.72046
ThO248	0.10917	0.02011	0.06050	0.05378	0.02702	0.01072	0.00483
UO254	0.03618	0.01904	0.02514	0.03334	0.01702	0.00817	0.00285
	38394.13	38394.14	38394.15	38394.17	38394.03	38394.08	38363.98
206/238 Age	22.30	21.19	36.82	27.85	17.90	53.07	1615.81
Li ppm Est	0.00	0.00	18.29	0.00	0.00	0.00	47.03
Be9 ppm	2.16	0.06	1.19	0.54	0.16	0.05	2.42
B11 ppm	0.08	0.13	2.81	0.15	0.07	0.06	22.43
F19 ppm	28.68	24.71	26.40	26.81	30.89	19.47	397.98
Na ppm Est.	2.67	2.58	754.90	2.96	1.62	1.97	2608.05
Al27 ppm Est.	16.80	14.99	1630.25	18.82	15.72	17.01	13427.22
Si30							
P31 ppm	796.12	302.56	257.08	171.60	218.25	242.68	34.68
K39 Rel.	0.81	0.60	289.87	5.49	0.55	0.55	7998.56
Ca40 ppm Est.	3.13	1.93	13.48	1.77	1.60	1.59	114.28
Sc45 ppm	59.39	61.88	30.80	43.80	52.22	37.25	2.84
48/49	14.13	13.46	12.79	13.50	14.10	13.86	13.39
Ti48 ppm	24.51	7.80	10.90	6.27	14.54	14.54	383.97
Ti49 ppm	23.06	7.70	11.33	6.18	13.70	13.94	381.24
Fe56 ppm	1.19	1.00	15.23	1.99	0.98	1.12	1403.03
Y89 ppm	6480.74	787.24	1113.07	1874.77	1257.21	973.06	113.80
Nb93 ppm	25.87	8.77	16.39	9.20	5.29	7.32	19.74
Zr94H Rel.	0.84	0.78	0.63	0.75	0.85	0.81	0.23
Zr96/Si30 ppm	2.39	2.45	2.10	2.41	2.39	2.42	0.15

Table C1, cont.

	KPST01A_8.2C	KPST01A_10.2C	KPST01A_12.1C	KPST01A_13.1C	KPST01A_4.2I	KPST01A_11.2I	KPST01A_1.2E
La139 ppm	0.30	0.03	0.30	0.04	0.18	0.02	21.95
Ce140 ppm	398.26	59.81	120.06	89.90	69.94	71.73	48.71
Nd146 ppm	17.54	0.77	1.81	2.33	3.60	1.27	4.30
Sm147 ppm	42.74	1.54	4.17	4.66	5.53	3.61	0.70
Eu153 ppm	9.20	0.45	0.85	0.75	1.76	0.97	0.06
Gd155 ppm	329.40	12.70	35.06	35.43	38.19	31.93	2.93
Ho165 ppm	297.26	27.75	47.01	65.12	49.25	40.50	4.22
TbO175 ppm	95.13	4.88	12.59	12.12	11.38	10.09	0.90
DyO179 ppm	883.76	63.95	131.51	148.22	123.36	111.58	9.59
ErO182 ppm	1033.77	139.30	197.46	321.15	220.13	165.87	21.40
TmO185 ppm	179.23	33.14	39.54	76.01	47.63	33.77	5.94
YbO188 ppm	1223.01	303.03	297.22	648.14	392.26	255.49	42.12
LuO191 ppm	183.62	57.65	51.25	122.28	69.35	43.38	9.27
Zr96/Zr2O	141.29	129.49	142.49	139.74	142.05	133.86	129.36
196/Si30	59.22	52.77	67.95	57.97	59.38	55.43	892.09
Hf ppm	8478.86	11608.38	9888.59	12088.53	9741.92	9914.81	826.94
Pb7/6 Est	0.76	0.00	0.57	0.00	0.37	0.27	0.72
Th ppm	1106.73	203.84	613.35	545.19	273.95	108.64	49.01
U ppm	351.05	184.77	243.97	323.54	165.15	79.25	27.66
Y/Nb	250.49	89.76	67.93	203.68	237.47	133.02	5.77
Th/U	3.15	1.10	2.51	1.69	1.66	1.37	1.77
Yb/Gd	3.71	23.86	8.48	18.29	10.27	8.00	14.38
U/Yb	0.29	0.61	0.82	0.50	0.42	0.31	0.66
Th/Yb	0.90	0.67	2.06	0.84	0.70	0.43	1.16
Ce/Sm	9.32	38.94	28.81	19.30	12.65	19.86	69.87
Ce/Lu	2.17	1.04	2.34	0.74	1.01	1.65	5.26
U/Ce	0.88	3.09	2.03	3.60	2.36	1.10	0.57
Th/Ce	2.78	3.41	5.11	6.06	3.92	1.51	1.01
Y/Yb	5.30	2.60	3.75	2.89	3.21	3.81	2.70
Yb/Nd	69.73	391.05	164.57	278.21	108.91	201.34	9.80
Y/Nb	250.49	89.76	67.93	203.68	237.47	133.02	5.77
Yb/Nb	47.27	34.55	18.14	70.42	74.09	34.93	2.13
Yb/Sc	20.59	4.90	9.65	14.80	7.51	6.86	14.85
Yb/Dy	1.38	4.74	2.26	4.37	3.18	2.29	4.39
Dy/Sm	20.68	41.64	31.56	31.83	22.32	30.90	13.75
Yb/Nd	69.73	391.05	164.57	278.21	108.91	201.34	9.80
Sm/Nd	2.44	1.98	2.31	2.00	1.53	2.85	0.16
U/Li	141806.31	#DIV/0!	13.34	135927.06	#DIV/0!	22271.51	0.59
Estimated temperature							
Temp Ti48	821.68	715.77	744.53	697.84	770.65	770.65	1201.30
Temp Ti49	815.47	714.70	747.97	696.59	765.19	766.75	1199.98
Hf ppm	8478.86	11608.38	9888.59	12088.53	9741.92	9914.81	826.94
Ferry Temp	871.71	754.98	793.25	734.25	813.16	814.96	1340.50
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	852.83	745.37	780.78	726.13	799.13	800.79	1269.25

Table C1, cont.

	KPST01A_8.2C	**KPST01A_10.2C**	**KPST01A_12.1C**	**KPST01A_13.1C**	**KPST01A_4.2I**	**KPST01A_11.2I**	**KPST01A_1.2E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	0.95	0.09	0.95	0.11	0.58	0.05	68.81
Ce Ch (0.82)	485.68	72.94	146.41	109.64	85.29	87.47	59.41
Pr Ch (0.121)	9.16	0.52	2.01	1.17	2.71	0.59	14.98
Nd Ch (0.615)	28.52	1.26	2.94	3.79	5.86	2.06	6.99
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	213.70	7.68	20.84	23.29	27.64	18.06	3.49
Eu Ch (0.076)	121.11	5.86	11.19	9.91	23.18	12.77	0.77
Gd Ch (0.267)	1233.69	47.57	131.32	132.70	143.03	119.60	10.97
Tb Ch (0.0493)	1929.57	99.05	255.28	245.84	230.81	204.70	18.22
Dy Ch (0.33)	2678.05	193.80	398.52	449.16	373.83	338.13	29.05
Ho Ch (0.0755)	3937.18	367.48	622.62	862.57	652.34	536.42	55.88
Er Ch (0.216)	4785.97	644.91	914.18	1486.79	1019.13	767.91	99.06
Tm Ch (0.0329)	5447.80	1007.19	1201.87	2310.26	1447.60	1026.40	180.49
Yb Ch (0.221)	5533.98	1371.20	1344.87	2932.74	1774.93	1156.07	190.61
Lu Ch (0.033)	5564.37	1746.84	1553.00	3705.45	2101.61	1314.41	280.83
Ce/Ce*	164.96	337.48	106.09	305.20	68.17	513.11	1.85
Hf ppm	8478.86	11608.38	9888.59	12088.53	9741.92	9914.81	826.94
Eu/Eu*	0.24	0.31	0.21	0.18	0.37	0.27	0.12
P Molar	25.71	9.77	8.30	5.54	7.05	7.84	1.12
3+ Molar	21.51	14.32	14.37	7.20	16.20	14.16	26.47
3+/P Molar	3.05	2.91	2.51	1.07	2.63	1.06	4.64

Table C1, cont.

Element	KPST01A-1.3E	KPST01A_2.2E	KPST01A_3.23E	KPST01A_3.3E	KPST01A_4.1E	KPST01A_6.2E	KPST01A_6.3E
Li7	0.00000	0.00017	0.00001	0.00000	0.00000	0.00472	0.00001
Be9	0.00002	0.00006	0.00003	0.00007	0.00006	0.00049	0.00017
B11	0.00001	0.00004	0.00000	0.00001	0.00001	0.00097	0.00001
F19	0.00011	0.00018	0.00018	0.00021	0.00019	0.00126	0.00014
Na23	0.06553	0.03421	0.00671	0.00824	0.00786	9.15755	0.01003
Al27	0.02214	1.09476	0.02699	0.02366	0.02345	11.91831	0.02662
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00414	0.00570	0.00289	0.00262	0.00179	0.00244	0.00208
K39	0.01480	1.51720	0.00316	0.00375	0.00319	24.83373	0.00353
Ca40	0.11267	0.01550	0.00817	0.01013	0.00874	0.65494	0.01272
Sc45	0.06032	0.06849	0.05393	0.05849	0.08164	0.02663	0.04935
Ti48	0.00252	0.01264	0.00499	0.00273	0.00301	0.06602	0.00281
Ti49	0.00020	0.00089	0.00036	0.00023	0.00022	0.00477	0.00022
Fe56	0.00068	0.06754	0.00070	0.00060	0.00043	0.36139	0.00070
Y89	0.29580	0.70479	0.39416	0.45502	0.31904	0.15825	0.34412
Nb93	0.00098	0.00125	0.00064	0.00165	0.00111	0.00121	0.00104
Zr94H	0.00609	0.00787	0.00881	0.00842	0.00911	0.00357	0.00870
Zr96	2.44245	2.22091	2.38493	2.34718	2.37443	1.03188	2.44420
La139	0.00001	0.00002	0.00002	0.00000	0.00000	0.00146	0.00000
Ce140	0.00000	0.02389	0.00828	0.01575	0.00880	0.00584	0.01197
Nd146	0.00000	0.00024	0.00013	0.00007	0.00003	0.00014	0.00006
Sm147	0.00008	0.00059	0.00026	0.00014	0.00008	0.00007	0.00012
Eu153	0.00006	0.00044	0.00027	0.00008	0.00007	0.00003	0.00007
Gd155	0.00000	0.00172	0.00071	0.00042	0.00026	0.00012	0.00036
Ho165	0.00432	0.01272	0.00662	0.00650	0.00440	0.00241	0.00501
TbO175	0.00063	0.00285	0.00128	0.00095	0.00066	0.00032	0.00073
DyO179	0.00165	0.00678	0.00328	0.00280	0.00188	0.00100	0.00225
ErO182	0.00488	0.01048	0.00614	0.00679	0.00511	0.00296	0.00514
TmO185	0.00288	0.00483	0.00334	0.00412	0.00321	0.00173	0.00301
YbO188	0.00442	0.00609	0.00457	0.00611	0.00513	0.00281	0.00459
LuO191	0.00499	0.00607	0.00495	0.00675	0.00623	0.00334	0.00495
Zr2O	0.01802	0.01503	0.01623	0.01603	0.01723	0.00736	0.01792
HfO196	0.20563	0.14300	0.16070	0.19308	0.18207	0.10028	0.19785
Pb206	0.00003	0.00003	0.00001	0.00005	0.00002	0.00006	0.00004
207/206	0.00000	0.30303	0.76923	0.45977	0.25641	0.48780	0.57971
ThO248	0.01567	0.07299	0.01504	0.06080	0.01803	0.01219	0.03211
UO254	0.01868	0.02497	0.01161	0.03946	0.01921	0.01362	0.02522
	38394.58	38363.99	38394.01	38394.02	38394.04	38394.05	38394.04
206/238 Age	32.48	28.10	25.51	24.68	22.42	84.38	31.18
Li ppm Est	0.00	0.10	0.00	0.00	0.00	2.88	0.00
Be9 ppm	0.05	0.20	0.10	0.21	0.17	1.54	0.52
B11 ppm	0.12	0.42	0.05	0.10	0.09	9.32	0.06
F19 ppm	14.50	23.91	23.76	27.73	24.83	164.47	17.83
Na ppm Est.	15.51	8.10	1.59	1.95	1.86	2168.01	2.37
Al27 ppm Est.	14.74	728.73	17.97	15.75	15.61	7933.46	17.72
Si30							
P31 ppm	352.68	485.20	246.18	223.21	152.58	207.76	177.01
K39 Rel.	2.55	261.85	0.55	0.65	0.55	4285.93	0.61
Ca40 ppm Est.	14.70	2.02	1.07	1.32	1.14	85.45	1.66
Sc45 ppm	53.07	60.25	47.44	51.45	71.82	23.43	43.41
48/49	12.70	14.14	13.85	11.91	13.49	13.83	12.52
Ti48 ppm	7.26	36.32	14.33	7.85	8.64	189.79	8.07
Ti49 ppm	7.60	34.14	13.75	8.76	8.51	182.40	8.57
Fe56 ppm	0.99	98.53	1.02	0.87	0.62	527.20	1.01
Y89 ppm	698.12	1663.36	930.26	1073.90	752.97	373.49	812.15
Nb93 ppm	9.95	12.70	6.48	16.80	11.24	12.31	10.60
Zr94H Rel.	0.59	0.77	0.86	0.82	0.89	0.35	0.85
Zr96/Si30 ppm	2.44	2.22	2.38	2.35	2.37	1.03	2.44

Table C1, cont.

	KPST01A-1.3E	**KPST01A_2.2E**	**KPST01A_3.23E**	**KPST01A_3.3E**	**KPST01A_4.1E**	**KPST01A_6.2E**	**KPST01A_6.3E**
La139 ppm	0.06	0.13	0.11	0.02	0.03	9.76	0.02
Ce140 ppm	0.00	173.19	59.98	114.15	63.77	42.34	86.79
Nd146 ppm	0.02	3.37	1.76	1.03	0.48	2.00	0.83
Sm147 ppm	1.12	8.10	3.59	1.96	1.05	0.94	1.69
Eu153 ppm	0.27	2.13	1.28	0.40	0.35	0.15	0.34
Gd155 ppm	0.00	70.52	29.01	16.99	10.83	5.02	14.74
Ho165 ppm	24.40	71.81	37.36	36.73	24.85	13.61	28.28
TbO175 ppm	4.24	19.05	8.53	6.32	4.42	2.17	4.88
DyO179 ppm	48.80	200.64	97.02	82.86	55.64	29.69	66.44
ErO182 ppm	129.97	279.12	163.47	180.93	135.97	78.86	136.79
TmO185 ppm	30.02	50.28	34.79	42.89	33.43	18.01	31.31
YbO188 ppm	271.10	373.80	280.29	375.03	314.94	172.27	281.92
LuO191 ppm	50.47	61.38	50.11	68.27	63.03	33.74	50.11
Zr96/Zr2O	135.55	147.77	146.98	146.45	137.83	140.20	136.38
196/Si30	55.50	66.53	61.63	62.39	58.05	135.87	55.80
Hf ppm	11936.79	8301.44	9328.56	11208.42	10569.08	5821.14	11485.62
Pb7/6 Est	0.00	0.30	0.77	0.46	0.26	0.49	0.58
Th ppm	158.84	739.98	152.48	616.35	182.82	123.62	325.52
U ppm	181.32	242.29	112.68	382.97	186.40	132.20	244.71
Y/Nb	70.19	130.94	143.55	63.92	67.01	30.33	76.64
Th/U	0.88	3.05	1.35	1.61	0.98	0.94	1.33
Yb/Gd	#DIV/0!	5.30	9.66	22.07	29.08	34.31	19.13
U/Yb	0.67	0.65	0.40	1.02	0.59	0.77	0.87
Th/Yb	0.59	1.98	0.54	1.64	0.58	0.72	1.15
Ce/Sm	0.00	21.39	16.70	58.36	60.94	45.21	51.30
Ce/Lu	0.00	2.82	1.20	1.67	1.01	1.25	1.73
U/Ce	#DIV/0!	1.40	1.88	3.35	2.92	3.12	2.82
Th/Ce	#DIV/0!	4.27	2.54	5.40	2.87	2.92	3.75
Y/Yb	2.58	4.45	3.32	2.86	2.39	2.17	2.88
Yb/Nd	17446.21	110.95	159.32	363.32	651.38	86.35	340.76
Y/Nb	70.19	130.94	143.55	63.92	67.01	30.33	76.64
Yb/Nb	27.26	29.43	43.25	22.32	28.03	13.99	26.60
Yb/Sc	5.11	6.20	5.91	7.29	4.39	7.35	6.49
Yb/Dy	5.56	1.86	2.89	4.53	5.66	5.80	4.24
Dy/Sm	43.42	24.78	27.02	42.36	53.17	31.70	39.28
Yb/Nd	17446.21	110.95	159.32	363.32	651.38	86.35	340.76
Sm/Nd	72.33	2.40	2.04	1.90	2.16	0.47	2.04
U/Li	132793.45	2394.50	32557.71	#DIV/0!	#DIV/0!	45.93	53017.70
Estimated temperature							
Temp Ti48	709.75	863.50	769.32	716.28	724.36	1081.04	718.63
Temp Ti49	713.55	856.71	765.50	725.53	723.09	1074.85	723.65
Hf ppm	11936.79	8301.44	9328.56	11208.42	10569.08	5821.14	11485.62
Ferry Temp	753.65	920.19	813.52	767.41	764.60	1183.72	765.25
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	744.14	897.02	799.46	756.89	754.29	1132.62	754.89

Table C1, cont.

	KPST01A-1.3E	KPST01A_2.2E	KPST01A_3.23E	KPST01A_3.3E	KPST01A_4.1E	KPST01A_6.2E	KPST01A_6.3E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	0.18	0.42	0.35	0.06	0.08	30.60	0.07
Ce Ch (0.82)	0.00	211.21	73.15	139.21	77.77	51.63	105.84
Pr Ch (0.121)	0.05	2.33	1.41	0.55	0.37	6.85	0.51
Nd Ch (0.615)	0.03	5.48	2.86	1.68	0.79	3.24	1.35
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	5.62	40.48	17.95	9.78	5.23	4.68	8.46
Eu Ch (0.076)	3.55	28.00	16.86	5.31	4.59	1.92	4.50
Gd Ch (0.267)	0.00	264.10	108.64	63.63	40.57	18.80	55.20
Tb Ch (0.0493)	86.03	386.48	172.93	128.25	89.57	44.01	98.99
Dy Ch (0.33)	147.88	608.01	294.00	251.08	168.59	89.97	201.33
Ho Ch (0.0755)	323.14	951.10	494.90	486.43	329.17	180.20	374.57
Er Ch (0.216)	601.72	1292.23	756.83	837.63	629.50	365.08	633.28
Tm Ch (0.0329)	912.56	1528.13	1057.53	1303.62	1016.14	547.56	951.77
Yb Ch (0.221)	1226.70	1691.42	1268.26	1696.96	1425.05	779.52	1275.64
Lu Ch (0.033)	1529.50	1859.89	1518.55	2068.75	1910.14	1022.57	1518.46
Ce/Ce*	0.00	212.80	104.64	776.89	450.73	3.56	556.51
Hf ppm	11936.79	8301.44	9328.56	11208.42	10569.08	5821.14	11485.62
Eu/Eu*	#DIV/0!	0.27	0.38	0.21	0.32	0.20	0.21
P Molar	11.39	15.67	7.95	7.21	4.93	6.71	5.72
3+ Molar	30.50	16.44	19.49	12.95	15.08	16.39	31.77
3+/P Molar	2.01	2.10	2.79	1.14	2.91	2.31	5.09

Table C1, cont.

Element	KPST01A_5.2E	KPST01A_11.2E	KPST01A_7.2E	KPST01A_9.2E	KPST01A_8.1E	KPST01A_10.1E
Li7	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
Be9	0.00009	0.00008	0.00003	0.00000	0.00002	0.00004
B11	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001
F19	0.00025	0.00018	0.00011	0.00011	0.00015	0.00021
Na23	0.00965	0.00906	0.00743	0.01046	0.00914	0.01197
Al27	0.02560	0.02680	0.02601	0.02427	0.02283	0.02260
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00207	0.00254	0.00188	0.00258	0.00245	0.00257
K39	0.00383	0.00482	0.00298	0.00339	0.00391	0.00375
Ca40	0.01411	0.01248	0.01167	0.01343	0.01947	0.01955
Sc45	0.05170	0.06061	0.07110	0.06327	0.05164	0.08369
Ti48	0.00250	0.00284	0.00290	0.00372	0.00378	0.00314
Ti49	0.00019	0.00021	0.00020	0.00028	0.00029	0.00024
Fe56	0.00074	0.00066	0.00082	0.00082	0.00057	0.00079
Y89	0.66934	0.46963	0.34679	0.38939	0.35230	0.49222
Nb93	0.00100	0.00158	0.00133	0.00118	0.00090	0.00217
Zr94H	0.00851	0.00806	0.00843	0.00857	0.00709	0.00793
Zr96	2.36555	2.47484	2.41690	2.43527	2.37901	2.39447
La139	0.00001	0.00000	0.00000	0.00001	0.00000	0.00001
Ce140	0.01239	0.01691	0.00887	0.01393	0.01217	0.01531
Nd146	0.00015	0.00009	0.00004	0.00007	0.00008	0.00007
Sm147	0.00033	0.00014	0.00011	0.00017	0.00017	0.00015
Eu153	0.00018	0.00007	0.00009	0.00015	0.00012	0.00011
Gd155	0.00077	0.00043	0.00033	0.00046	0.00049	0.00046
Ho165	0.00993	0.00657	0.00519	0.00591	0.00565	0.00720
TbO175	0.00162	0.00098	0.00073	0.00097	0.00097	0.00104
DyO179	0.00430	0.00285	0.00223	0.00263	0.00253	0.00298
ErO182	0.01040	0.00713	0.00559	0.00602	0.00556	0.00773
TmO185	0.00584	0.00432	0.00346	0.00326	0.00305	0.00481
YbO188	0.00857	0.00622	0.00517	0.00493	0.00437	0.00713
LuO191	0.00941	0.00732	0.00626	0.00538	0.00471	0.00814
Zr2O	0.01719	0.01838	0.01729	0.01792	0.01808	0.01780
HfO196	0.19207	0.21181	0.18813	0.18802	0.17977	0.19453
Pb206	0.00004	0.00007	0.00003	0.00004	0.00003	0.00004
207/206	0.40000	0.18182	0.52632	0.71429	0.63830	0.31250
ThO248	0.04275	0.06151	0.01677	0.04006	0.01676	0.03709
UO254	0.02792	0.04089	0.02052	0.02846	0.01251	0.03206
	38394.07	38394.09	38394.10	38394.11	38394.12	38394.15
206/238 Age	30.54	33.19	32.32	28.53	42.71	23.67
Li ppm Est	0.00	0.00	0.01	0.00	0.00	0.00
Be9 ppm	0.27	0.26	0.11	0.02	0.06	0.11
B11 ppm	0.09	0.10	0.16	0.09	0.05	0.07
F19 ppm	32.24	22.92	14.03	14.74	19.64	27.44
Na ppm Est.	2.29	2.14	1.76	2.48	2.16	2.83
Al27 ppm Est.	17.04	17.84	17.32	16.16	15.19	15.05
Si30						
P31 ppm	176.59	216.07	160.40	219.30	208.82	219.20
K39 Rel.	0.66	0.83	0.51	0.58	0.68	0.65
Ca40 ppm Est.	1.84	1.63	1.52	1.75	2.54	2.55
Sc45 ppm	45.48	53.32	62.55	55.66	45.43	73.62
48/49	13.41	13.54	14.76	13.45	13.07	12.97
Ti48 ppm	7.18	8.16	8.34	10.68	10.86	9.03
Ti49 ppm	7.12	8.01	7.51	10.55	11.04	9.26
Fe56 ppm	1.09	0.96	1.20	1.20	0.84	1.15
Y89 ppm	1579.70	1108.37	818.45	918.99	831.45	1161.69
Nb93 ppm	10.19	16.10	13.51	11.96	9.19	22.03
Zr94H Rel.	0.83	0.78	0.82	0.83	0.69	0.77
Zr96/Si30 ppm	2.37	2.47	2.42	2.44	2.38	2.39

Table C1, cont.

	KPST01A_5.2E	KPST01A_11.2E	KPST01A_7.2E	KPST01A_9.2E	KPST01A_8.1E	KPST01A_10.1E
La139 ppm	0.06	0.01	0.02	0.03	0.02	0.08
Ce140 ppm	89.81	122.60	64.27	100.98	88.22	110.99
Nd146 ppm	2.03	1.21	0.54	1.02	1.13	0.96
Sm147 ppm	4.53	1.97	1.49	2.34	2.40	2.11
Eu153 ppm	0.85	0.33	0.42	0.71	0.56	0.53
Gd155 ppm	31.61	17.64	13.59	18.66	20.22	18.64
Ho165 ppm	56.09	37.10	29.31	33.35	31.92	40.67
TbO175 ppm	10.79	6.53	4.87	6.45	6.49	6.94
DyO179 ppm	127.26	84.34	65.86	77.70	74.81	88.10
ErO182 ppm	276.93	189.95	148.89	160.17	148.17	205.73
TmO185 ppm	60.77	45.01	36.03	33.97	31.77	50.11
YbO188 ppm	525.90	382.09	317.65	302.60	268.06	437.89
LuO191 ppm	95.17	74.01	63.36	54.46	47.70	82.39
Zr96/Zr2O	137.64	134.67	139.76	135.86	131.61	134.53
196/Si30	58.19	54.41	57.83	55.79	55.32	56.19
Hf ppm	11149.62	12295.78	10921.23	10914.79	10435.81	11292.52
Pb7/6 Est	0.40	0.18	0.53	0.71	0.64	0.31
Th ppm	433.40	623.54	169.97	406.14	169.88	376.06
U ppm	270.93	396.83	199.09	276.15	121.42	311.07
Y/Nb	155.04	68.85	60.58	76.84	90.46	52.72
Th/U	1.60	1.57	0.85	1.47	1.40	1.21
Yb/Gd	16.64	21.67	23.38	16.22	13.25	23.50
U/Yb	0.52	1.04	0.63	0.91	0.45	0.71
Th/Yb	0.82	1.63	0.54	1.34	0.63	0.86
Ce/Sm	19.82	62.15	43.19	43.08	36.73	52.55
Ce/Lu	0.94	1.66	1.01	1.85	1.85	1.35
U/Ce	3.02	3.24	3.10	2.73	1.38	2.80
Th/Ce	4.83	5.09	2.64	4.02	1.93	3.39
Y/Yb	3.00	2.90	2.58	3.04	3.10	2.65
Yb/Nd	258.98	316.11	592.27	297.92	237.90	457.79
Y/Nb	155.04	68.85	60.58	76.84	90.46	52.72
Yb/Nb	51.62	23.73	23.51	25.30	29.16	19.87
Yb/Sc	11.56	7.17	5.08	5.44	5.90	5.95
Yb/Dy	4.13	4.53	4.82	3.89	3.58	4.97
Dy/Sm	28.09	42.76	44.26	33.15	31.15	41.71
Yb/Nd	258.98	316.11	592.27	297.92	237.90	457.79
Sm/Nd	2.23	1.63	2.77	2.31	2.13	2.21
U/Li	#DIV/0!	#DIV/0!	28164.69	117579.02	52734.18	#DIV/0!
Estimated temperature						
Temp Ti48	708.90	719.52	721.35	742.71	744.17	728.16
Temp Ti49	708.17	717.96	712.56	741.66	745.63	730.23
Hf ppm	11149.62	12295.78	10921.23	10914.79	10435.81	11292.52
Ferry Temp	747.50	758.72	752.52	785.97	790.55	772.82
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	738.43	748.84	743.10	774.05	778.28	761.89

Table C1, cont.

	KPST01A_5.2E	KPST01A_11.2E	KPST01A_7.2E	KPST01A_9.2E	KPST01A_8.1E	KPST01A_10.1E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.19	0.04	0.06	0.11	0.06	0.24
Ce Ch (0.82)	109.53	149.51	78.38	123.15	107.58	135.35
Pr Ch (0.121)	1.28	0.53	0.36	0.67	0.58	0.83
Nd Ch (0.615)	3.30	1.97	0.87	1.65	1.83	1.56
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	22.65	9.86	7.44	11.72	12.01	10.56
Eu Ch (0.076)	11.14	4.29	5.58	9.35	7.43	7.00
Gd Ch (0.267)	118.38	66.05	50.89	69.89	75.75	69.80
Tb Ch (0.0493)	218.87	132.46	98.71	130.88	131.64	140.76
Dy Ch (0.33)	385.63	255.59	199.59	235.46	226.69	266.97
Ho Ch (0.0755)	742.92	491.35	388.22	441.69	422.78	538.65
Er Ch (0.216)	1282.08	879.41	689.29	741.54	685.95	952.48
Tm Ch (0.0329)	1847.07	1368.17	1095.14	1032.60	965.72	1523.16
Yb Ch (0.221)	2379.66	1728.92	1437.34	1369.24	1212.93	1981.42
Lu Ch (0.033)	2883.87	2242.79	1920.08	1650.29	1445.51	2496.62
Ce/Ce*	222.37	1042.95	530.33	456.13	577.19	306.23
Hf ppm	11149.62	12295.78	10921.23	10914.79	10435.81	11292.52
Eu/Eu*	0.22	0.17	0.29	0.33	0.25	0.26
P Molar	5.70	6.98	5.18	7.08	6.74	7.08
3+ Molar	14.74	102.81	14.46	21.01	18.93	16.84
3+/P Molar	2.19	4.00	1.48	2.97	2.28	2.61

Table C1, cont.

Element	KPST01A_12.2E	KPST01A_13.2E
Li7	0.00017	0.00001
Be9	0.00001	0.00005
B11	0.00006	0.00002
F19	0.00017	0.00031
Na23	0.29753	0.01741
Al27	0.80769	0.02748
Si30	1.00000	1.00000
P31	0.00235	0.00360
K39	1.27510	0.00411
Ca40	0.06352	0.03531
Sc45	0.05063	0.04626
Ti48	0.00920	0.00237
Ti49	0.00067	0.00018
Fe56	0.09575	0.00305
Y89	0.39848	0.29355
Nb93	0.00185	0.00107
Zr94H	0.00590	0.00705
Zr96	2.26472	2.40854
La139	0.00021	0.00018
Ce140	0.01444	0.00779
Nd146	0.00007	0.00013
Sm147	0.00012	0.00014
Eu153	0.00006	0.00014
Gd155	0.00035	0.00027
Ho165	0.00579	0.00392
TbO175	0.00083	0.00058
DyO179	0.00243	0.00173
ErO182	0.00639	0.00435
TmO185	0.00388	0.00289
YbO188	0.00586	0.00423
LuO191	0.00669	0.00512
Zr2O	0.01555	0.01762
HfO196	0.19813	0.21442
Pb206	0.00005	0.00003
207/206	0.27397	1.05263
ThO248	0.05353	0.01493
UO254	0.03725	0.01866
	38394.16	38394.17
206/238 Age	24.52	36.55
Li ppm Est	0.10	0.00
Be9 ppm	0.02	0.17
B11 ppm	0.58	0.15
F19 ppm	21.62	40.57
Na ppm Est.	70.44	4.12
Al27 ppm Est.	537.64	18.29
Si30		
P31 ppm	200.12	306.33
K39 Rel.	220.06	0.71
Ca40 ppm Est.	8.29	4.61
Sc45 ppm	44.53	40.69
48/49	13.66	13.53
Ti48 ppm	26.45	6.82
Ti49 ppm	25.73	6.70
Fe56 ppm	139.68	4.45
Y89 ppm	940.44	692.79
Nb93 ppm	18.80	10.83
Zr94H Rel.	0.57	0.69
Zr96/Si30 ppm	2.26	2.41

Table C1, cont.

	KPST01A_12.2E	KPST01A_13.2E
La139 ppm	1.38	1.23
Ce140 ppm	104.67	56.44
Nd146 ppm	1.01	1.85
Sm147 ppm	1.71	1.91
Eu153 ppm	0.29	0.67
Gd155 ppm	14.32	11.21
Ho165 ppm	32.71	22.14
TbO175 ppm	5.53	3.90
DyO179 ppm	71.92	51.19
ErO182 ppm	170.14	115.95
TmO185 ppm	40.44	30.08
YbO188 ppm	359.64	259.75
LuO191 ppm	67.71	51.78
Zr96/Zr2O	145.60	136.73
196/Si30	64.29	56.77
Hf ppm	11501.70	12447.22
Pb7/6 Est	0.27	1.05
Th ppm	542.66	151.32
U ppm	361.52	181.11
Y/Nb	50.03	63.99
Th/U	1.50	0.84
Yb/Gd	25.12	23.16
U/Yb	1.01	0.70
Th/Yb	1.51	0.58
Ce/Sm	61.04	29.50
Ce/Lu	1.55	1.09
U/Ce	3.45	3.21
Th/Ce	5.18	2.68
Y/Yb	2.61	2.67
Yb/Nd	356.26	140.55
Y/Nb	50.03	63.99
Yb/Nb	19.13	23.99
Yb/Sc	8.08	6.38
Yb/Dy	5.00	5.07
Dy/Sm	41.94	26.76
Yb/Nd	356.26	140.55
Sm/Nd	1.70	1.04
U/Li	3566.20	37361.59
Estimated temperature		
Temp Ti48	829.53	704.64
Temp Ti49	826.67	703.17
Hf ppm	11501.70	12447.22
Ferry Temp	884.83	741.77
Act Ti	0.70	0.70
Act Si	1.00	1.00
Temp. Est.	864.82	733.12

Table C1, cont.

	KPST01A_12.2E	KPST01A_13.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)		
La Ch (0.319)	4.33	3.84
Ce Ch (0.82)	127.65	68.83
Pr Ch (0.121)	2.27	3.26
Nd Ch (0.615)	1.64	3.01
Pm	0.00	0.00
Sm Ch (0.2)	8.57	9.57
Eu Ch (0.076)	3.76	8.83
Gd Ch (0.267)	53.62	42.00
Tb Ch (0.0493)	112.08	79.05
Dy Ch (0.33)	217.93	155.13
Ho Ch (0.0755)	433.25	293.28
Er Ch (0.216)	787.68	536.82
Tm Ch (0.0329)	1229.18	914.21
Yb Ch (0.221)	1627.35	1175.33
Lu Ch (0.033)	2051.77	1569.16
Ce/Ce*	40.72	19.44
Hf ppm	11501.70	12447.22
Eu/Eu*	0.18	0.44
P Molar	6.46	9.89
3+ Molar	12.36	31.19
3+/P Molar	1.25	5.63

Table C2. SHRIMP-RG trace element analyses of zircon grains from WSW2A.

Element	WSWPST2A_1.2C	WSWPST2A_2.1C	WSWPST2A_3.1C	WSWPST2A_4.1C	WSWPST2A_5.1C
Li7	0.00002	0.00000	0.00002	0.00000	0.00016
Be9	0.02040	0.02095	0.02342	0.00593	0.00002
B11	0.00001	0.00001	0.00002	0.00001	0.00001
F19	0.00022	0.00018	0.00022	0.00011	0.00010
Na23	0.01085	0.00867	0.01218	0.01145	0.01449
Al27	0.02251	0.02387	0.02614	0.02382	0.03023
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00209	0.00304	0.00231	0.00552	0.00879
K39	0.00509	0.00466	0.00677	0.00375	0.00343
Ca40	0.01937	0.01911	0.02121	0.01842	0.01544
Sc45	0.05657	0.05752	0.05499	0.07722	0.05741
Ti48	0.00404	0.00617	0.00426	0.00363	0.00529
Ti49	0.00031	0.00043	0.00032	0.00027	0.00037
Fe56	0.00069	0.00060	0.00074	0.00077	0.00508
Y89	0.72029	0.76446	0.75068	0.56823	0.58871
Nb93	0.00051	0.00038	0.00058	0.00133	0.00062
Zr94H	0.00640	0.00666	0.00596	0.00605	0.00650
Zr96	2.44455	2.64618	2.37595	2.39943	2.43532
La139	0.00001	0.00001	0.00000	0.00000	0.00003
Ce140	0.01224	0.01326	0.01166	0.01320	0.00881
Nd146	0.00026	0.00042	0.00030	0.00008	0.00010
Sm147	0.00049	0.00084	0.00053	0.00020	0.00034
Eu153	0.00045	0.00081	0.00048	0.00016	0.00025
Gd155	0.00117	0.00220	0.00133	0.00074	0.00103
Ho165	0.01141	0.01373	0.01215	0.00901	0.01027
TbO175	0.00232	0.00358	0.00244	0.00171	0.00222
DyO179	0.00552	0.00758	0.00583	0.00434	0.00546
ErO182	0.01072	0.01132	0.01132	0.00884	0.00896
TmO185	0.00571	0.00542	0.00608	0.00485	0.00420
YbO188	0.00792	0.00676	0.00784	0.00695	0.00524
LuO191	0.00852	0.00681	0.00846	0.00756	0.00550
Zr2O	0.01824	0.01906	0.01651	0.01771	0.01805
HfO196	0.18178	0.18558	0.17324	0.17498	0.16000
Pb206	0.00004	0.00001	0.00003	0.00005	0.00003
207/206	0.00000	0.00000	0.17857	0.14085	0.00000
ThO248	0.03535	0.01903	0.03268	0.03306	0.01400
UO254	0.01990	0.00927	0.01883	0.02444	0.00992
	38394.44	38394.45	38394.46	38394.48	38394.51
206/238 Age	38.76	32.17	36.16	37.06	67.10
Li ppm Est	0.01	0.00	0.01	0.00	0.10
Be9 ppm	63.59	65.33	73.02	18.50	0.07
B11 ppm	0.06	0.09	0.18	0.13	0.09
F19 ppm	29.20	23.43	28.13	14.14	13.50
Na ppm Est.	2.57	2.05	2.88	2.71	3.43
Al27 ppm Est.	14.99	15.89	17.40	15.86	20.12
Si30					
P31 ppm	177.98	258.65	196.90	469.98	747.96
K39 Rel.	0.88	0.80	1.17	0.65	0.59
Ca40 ppm Est.	2.53	2.49	2.77	2.40	2.01
Sc45 ppm	49.76	50.60	48.37	67.93	50.50
48/49	12.95	14.43	13.49	13.68	14.28
Ti48 ppm	11.61	17.75	12.24	10.42	15.20
Ti49 ppm	11.92	16.34	12.06	10.13	14.15
Fe56 ppm	1.01	0.87	1.07	1.12	7.41
Y89 ppm	1699.95	1804.19	1771.67	1341.07	1389.40
Nb93 ppm	5.21	3.89	5.91	13.48	6.29
Zr94H Rel.	0.62	0.65	0.58	0.59	0.63
Zr96/Si30 ppm	2.44	2.65	2.38	2.40	2.44

Table C2, cont.

	WSWPST2A_1.2C	WSWPST2A_2.1C	WSWPST2A_3.1C	WSWPST2A_4.1C	WSWPST2A_5.1C
La139 ppm	0.08	0.04	0.01	0.01	0.17
Ce140 ppm	88.69	96.08	84.50	95.66	63.82
Nd146 ppm	3.57	5.80	4.22	1.16	1.43
Sm147 ppm	6.76	11.58	7.32	2.81	4.65
Eu153 ppm	2.16	3.93	2.33	0.77	1.19
Gd155 ppm	47.69	90.05	54.27	30.44	42.11
Ho165 ppm	64.42	77.51	68.58	50.89	57.99
TbO175 ppm	15.49	23.89	16.27	11.41	14.86
DyO179 ppm	163.38	224.26	172.63	128.28	161.58
ErO182 ppm	285.56	301.53	301.36	235.37	238.50
TmO185 ppm	59.46	56.40	63.32	50.45	43.77
YbO188 ppm	486.16	415.18	481.16	426.49	321.47
LuO191 ppm	86.21	68.89	85.55	76.46	55.62
Zr96/Zr2O	134.00	138.84	143.88	135.48	134.96
196/Si30	54.81	52.47	60.56	56.46	55.42
Hf ppm	10552.73	10773.29	10056.82	10157.56	9287.84
Pb7/6 Est	0.00	0.00	0.18	0.14	0.00
Th ppm	358.34	192.96	331.27	335.16	141.94
U ppm	193.16	90.00	182.72	237.16	96.24
Y/Nb	326.39	463.63	299.78	99.50	220.76
Th/U	1.86	2.14	1.81	1.41	1.47
Yb/Gd	10.19	4.61	8.87	14.01	7.63
U/Yb	0.40	0.22	0.38	0.56	0.30
Th/Yb	0.74	0.46	0.69	0.79	0.44
Ce/Sm	13.11	8.29	11.55	34.03	13.74
Ce/Lu	1.03	1.39	0.99	1.25	1.15
U/Ce	2.18	0.94	2.16	2.48	1.51
Th/Ce	4.04	2.01	3.92	3.50	2.22
Y/Yb	3.50	4.35	3.68	3.14	4.32
Yb/Nd	136.16	71.60	114.09	367.25	224.42
Y/Nb	326.39	463.63	299.78	99.50	220.76
Yb/Nb	93.34	106.69	81.42	31.64	51.08
Yb/Sc	9.77	8.21	9.95	6.28	6.37
Yb/Dy	2.98	1.85	2.79	3.32	1.99
Dy/Sm	24.16	19.36	23.59	45.63	34.78
Yb/Nd	136.16	71.60	114.09	367.25	224.42
Sm/Nd	1.89	2.00	1.73	2.42	3.24
U/Li	19162.77	65537.22	16491.08	183611.65	958.18
Estimated temperature					
Temp Ti48	750.10	789.58	754.87	740.55	774.85
Temp Ti49	752.45	781.67	753.53	738.04	768.15
Hf ppm	10552.73	10773.29	10056.82	10157.56	9287.84
Ferry Temp	798.43	832.29	799.67	781.79	816.59
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	785.55	816.72	786.70	770.20	802.28

Table C2, cont.

	WSWPST2A_1.2C	WSWPST2A_2.1C	WSWPST2A_3.1C	WSWPST2A_4.1C	WSWPST2A_5.1C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.26	0.11	0.04	0.03	0.53
Ce Ch (0.82)	108.15	117.17	103.05	116.66	77.83
Pr Ch (0.121)	2.06	2.16	1.22	0.46	1.42
Nd Ch (0.615)	5.81	9.43	6.86	1.89	2.33
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	33.82	57.92	36.58	14.06	23.23
Eu Ch (0.076)	28.38	51.65	30.68	10.08	15.61
Gd Ch (0.267)	178.61	337.28	203.27	114.01	157.72
Tb Ch (0.0493)	314.18	484.52	330.10	231.37	301.34
Dy Ch (0.33)	495.08	679.57	523.11	388.72	489.65
Ho Ch (0.0755)	853.24	1026.68	908.36	674.04	768.09
Er Ch (0.216)	1322.05	1395.98	1395.18	1089.67	1104.17
Tm Ch (0.0329)	1807.32	1714.36	1924.52	1533.48	1330.25
Yb Ch (0.221)	2199.83	1878.65	2177.19	1929.81	1454.60
Lu Ch (0.033)	2612.31	2087.43	2592.38	2316.98	1685.51
Ce/Ce*	147.62	236.63	478.68	1057.05	90.20
Hf ppm	10552.73	10773.29	10056.82	10157.56	9287.84
Eu/Eu*	0.37	0.37	0.36	0.25	0.26
P Molar	5.75	8.35	6.36	15.18	24.15
3+ Molar	16.70	28.11	29.75	18.33	29.07
3+/P Molar	2.95	4.89	3.56	2.71	4.57

Table C2, cont.

Element	WSWPST2A_6.1C	WSWPST2A_7.1C	WSWPST2A-9.2C	WSWPST2A_10.1C	WSWPST2A_13.1C	WSWPST2A_14.1C
Li7	0.00000	0.00002	0.00000	0.00003	0.00001	0.00009
Be9	0.01595	0.01582	0.00073	0.07803	0.01522	0.01482
B11	0.00001	0.00002	0.00001	0.00001	0.00002	0.00002
F19	0.00016	0.00033	0.00012	0.00034	0.00016	0.00029
Na23	0.00731	0.01137	0.01066	0.01668	0.01220	0.01724
Al27	0.02322	0.02160	0.02094	0.02161	0.02688	0.03163
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00273	0.00330	0.00301	0.01365	0.00507	0.00415
K39	0.00286	0.00434	0.00287	0.00399	0.00408	0.01390
Ca40	0.01705	0.02116	0.01745	0.02303	0.01983	0.04052
Sc45	0.08450	0.10600	0.05539	0.08391	0.06098	0.05320
Ti48	0.01072	0.00312	0.01089	0.00882	0.00730	0.00713
Ti49	0.00081	0.00023	0.00080	0.00066	0.00051	0.00050
Fe56	0.00056	0.00066	0.00055	0.00055	0.00067	0.01284
Y89	0.60646	0.56731	0.24859	2.93125	0.81501	0.69260
Nb93	0.00030	0.00161	0.00036	0.01147	0.00196	0.00110
Zr94H	0.00675	0.00624	0.00579	0.00657	0.00614	0.00592
Zr96	2.56184	2.48278	2.44395	2.36233	2.43638	2.38854
La139	0.00003	0.00002	0.00000	0.00000	0.00002	0.00048
Ce140	0.00969	0.01443	0.00000	0.00002	0.00001	0.00000
Nd146	0.00060	0.00007	0.00000	0.00000	0.00000	0.00000
Sm147	0.00072	0.00016	0.00020	0.00184	0.00059	0.00056
Eu153	0.00089	0.00012	0.00019	0.00062	0.00039	0.00035
Gd155	0.00153	0.00047	0.00000	0.00000	0.00000	0.00000
Ho165	0.01045	0.00747	0.00436	0.05268	0.01440	0.01126
TbO175	0.00255	0.00097	0.00095	0.01175	0.00315	0.00236
DyO179	0.00560	0.00313	0.00216	0.02763	0.00747	0.00561
ErO182	0.00914	0.00839	0.00393	0.04448	0.01228	0.01038
TmO185	0.00456	0.00536	0.00208	0.02128	0.00589	0.00532
YbO188	0.00594	0.00794	0.00295	0.02501	0.00765	0.00703
LuO191	0.00605	0.00977	0.00306	0.02123	0.00702	0.00727
Zr2O	0.01873	0.01633	0.01863	0.01690	0.01816	0.01699
HfO196	0.15881	0.19888	0.16487	0.16341	0.17254	0.17753
Pb206	0.00001	0.00004	0.00002	0.00010	0.00005	0.00003
207/206	0.00000	0.00000	0.34483	0.14388	0.27397	0.22727
ThO248	0.01937	0.04156	0.00947	0.26730	0.08403	0.04721
UO254	0.00926	0.03461	0.00617	0.10905	0.03822	0.02697
	38394.52	38394.53	38394.58	38394.63	38394.66	38394.68
206/238 Age	24.06	23.20	62.05	17.85	25.73	21.19
Li ppm Est	0.00	0.01	0.00	0.02	0.00	0.05
Be9 ppm	49.72	49.31	2.28	243.29	47.46	46.21
B11 ppm	0.12	0.21	0.08	0.12	0.17	0.17
F19 ppm	20.92	42.64	16.34	44.27	21.51	38.52
Na ppm Est.	1.73	2.69	2.52	3.95	2.89	4.08
Al27 ppm Est.	15.46	14.38	13.94	14.39	17.89	21.05
Si30						
P31 ppm	232.67	281.11	256.41	1161.90	431.74	353.15
K39 Rel.	0.49	0.75	0.50	0.69	0.70	2.40
Ca40 ppm Est.	2.22	2.76	2.28	3.00	2.59	5.29
Sc45 ppm	74.33	93.25	48.73	73.81	53.64	46.80
48/49	13.16	13.28	13.57	13.30	14.37	14.13
Ti48 ppm	30.82	8.97	31.31	25.37	20.99	20.51
Ti49 ppm	31.12	8.98	30.67	25.35	19.41	19.29
Fe56 ppm	0.82	0.97	0.80	0.80	0.98	18.73
Y89 ppm	1431.29	1338.91	586.70	6918.01	1923.49	1634.60
Nb93 ppm	3.03	16.35	3.70	116.56	19.94	11.18
Zr94H Rel.	0.66	0.61	0.56	0.64	0.60	0.58
Zr96/Si30 ppm	2.56	2.48	2.44	2.36	2.44	2.39

Table C2, cont.

	WSWPST2A_6.1C	**WSWPST2A_7.1C**	**WSWPST2A-9.2C**	**WSWPST2A_10.1C**	**WSWPST2A_13.1C**	**WSWPST2A_14.1C**
La139 ppm	0.17	0.15	0.03	0.03	0.13	3.21
Ce140 ppm	70.21	104.58				
Nd146 ppm	8.32	1.00				
Sm147 ppm	9.84	2.19	2.80	25.28	8.14	7.64
Eu153 ppm	4.27	0.60	0.91	2.97	1.89	1.69
Gd155 ppm	62.51	19.13				
Ho165 ppm	59.03	42.15	24.64	297.42	81.28	63.59
TbO175 ppm	17.00	6.49	6.36	78.47	21.05	15.79
DyO179 ppm	165.57	92.62	63.98	817.38	220.95	166.04
ErO182 ppm	243.50	223.30	104.71	1184.47	327.05	276.32
TmO185 ppm	47.47	55.79	21.69	221.49	61.28	55.41
YbO188 ppm	364.89	487.69	180.90	1535.46	469.64	431.78
LuO191 ppm	61.26	98.85	31.01	214.82	71.05	73.53
Zr96/Zr2O	136.76	152.04	131.19	139.80	134.15	140.55
196/Si30	53.38	61.24	53.68	59.18	55.06	58.84
Hf ppm	9219.22	11545.06	9570.82	9485.98	10016.20	10306.01
Pb7/6 Est	0.00	0.00	0.34	0.14	0.27	0.23
Th ppm	196.40	421.30	95.96	2709.95	851.91	478.62
U ppm	89.82	335.87	59.83	1058.23	370.87	261.74
Y/Nb	472.60	81.87	158.73	59.35	96.47	146.21
Th/U	2.19	1.25	1.60	2.56	2.30	1.83
Yb/Gd	5.84	25.50				
U/Yb	0.25	0.69	0.33	0.69	0.79	0.61
Th/Yb	0.54	0.86	0.53	1.76	1.81	1.11
Ce/Sm	7.13	47.77	0.00	0.00	0.00	0.00
Ce/Lu	1.15	1.06	0.00	0.00	0.00	0.00
U/Ce	1.28	3.21				
Th/Ce	2.80	4.03				
Y/Yb	3.92	2.75	3.24	4.51	4.10	3.79
Yb/Nd	43.88	487.60				
Y/Nb	472.60	81.87	158.73	59.35	96.47	146.21
Yb/Nb	120.48	29.82	48.94	13.17	23.55	38.62
Yb/Sc	4.91	5.23	3.71	20.80	8.76	9.23
Yb/Dy	2.20	5.27	2.83	1.88	2.13	2.60
Dy/Sm	16.82	42.31	22.84	32.33	27.15	21.74
Yb/Nd	43.88	487.60				
Sm/Nd	1.18	2.19				
U/Li	33860.90	28451.19	22394.87	49756.56	90633.95	4853.93
Estimated temperature						
Temp Ti48	845.65	727.56	847.33	825.20	806.02	803.71
Temp Ti49	846.68	727.61	845.12	825.14	798.30	797.66
Hf ppm	9219.22	11545.06	9570.82	9485.98	10016.20	10306.01
Ferry Temp	908.37	769.80	906.52	883.04	851.64	850.90
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	886.26	759.10	884.58	863.18	834.47	833.79

Table C2, cont.

	WSWPST2A_6.1C	**WSWPST2A_7.1C**	**WSWPST2A-9.2C**	**WSWPST2A_10.1C**	**WSWPST2A_13.1C**	**WSWPST2A_14.1C**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.55	0.47	0.08	0.09	0.39	10.07
Ce Ch (0.82)	85.62	127.54				
Pr Ch (0.121)	4.64	1.08				
Nd Ch (0.615)	13.52	1.63				
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	49.21	10.95	14.01	126.40	40.68	38.19
Eu Ch (0.076)	56.23	7.92	12.02	39.09	24.91	22.24
Gd Ch (0.267)	234.13	71.64				
Tb Ch (0.0493)	344.85	131.62	129.00	1591.77	426.97	320.35
Dy Ch (0.33)	501.71	280.65	193.89	2476.92	669.54	503.14
Ho Ch (0.0755)	781.81	558.28	326.40	3939.37	1076.52	842.24
Er Ch (0.216)	1127.30	1033.78	484.79	5483.65	1514.14	1279.26
Tm Ch (0.0329)	1442.91	1695.64	659.35	6732.24	1862.54	1684.29
Yb Ch (0.221)	1651.10	2206.75	818.53	6947.79	2125.07	1953.74
Lu Ch (0.033)	1856.31	2995.59	939.68	6509.85	2153.00	2228.24
Ce/Ce*	53.67	178.36				
Hf ppm	9219.22	11545.06	9570.82	9485.98	10016.20	10306.01
Eu/Eu*	0.52	0.28				
P Molar	7.51	9.08	8.28	37.52	13.94	11.40
3+ Molar	16.82	14.23	23.29	15.03	23.00	22.83
3+/P Molar	2.67	2.31	1.53	1.24	3.34	0.95

Table C2, cont.

Element	WSWPST2A_13.2I	WSWPST2A_11.2I	WSWPST2A_11.1I	WSWPST2A_7.2I	WSWPST2A_4.2I	WSWPST2A_3.2I
Li7	0.00000	0.00000	0.00001	0.00003	0.00000	0.00001
Be9	0.00097	0.00873	0.00597	0.00998	0.00143	0.00874
B11	0.00000	0.00001	0.00001	0.00002	0.00002	0.00001
F19	0.00011	0.00013	0.00017	0.00014	0.00012	0.00013
Na23	0.01060	0.01558	0.01170	0.01138	0.01341	0.01051
Al27	0.02094	0.02534	0.02344	0.02266	0.02656	0.02477
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00475	0.00290	0.00218	0.00285	0.00440	0.00229
K39	0.00305	0.00477	0.00339	0.00464	0.00420	0.00606
Ca40	0.01799	0.02460	0.02087	0.02526	0.01996	0.02009
Sc45	0.07177	0.08530	0.06190	0.06598	0.05783	0.08856
Ti48	0.00327	0.00448	0.00347	0.00280	0.00258	0.00398
Ti49	0.00023	0.00032	0.00024	0.00020	0.00016	0.00030
Fe56	0.00068	0.00083	0.00071	0.00063	0.00073	0.00091
Y89	0.34023	0.45641	0.37935	0.51433	0.35450	0.38341
Nb93	0.00073	0.00132	0.00101	0.00200	0.00096	0.00121
Zr94H	0.00579	0.00641	0.00638	0.00646	0.00593	0.00611
Zr96	2.38274	2.51344	2.41985	2.45813	2.41306	2.38018
La139	0.00004	0.00002	0.00000	0.00000	0.00000	0.00000
Ce140	0.00000	0.00001	0.00000	0.01804	0.00827	0.01029
Nd146	0.00000	0.00000	0.00000	0.00009	0.00004	0.00007
Sm147	0.00014	0.00020	0.00016	0.00012	0.00010	0.00016
Eu153	0.00010	0.00016	0.00013	0.00009	0.00008	0.00014
Gd155	0.00000	0.00000	0.00000	0.00043	0.00035	0.00045
Ho165	0.00521	0.00716	0.00581	0.00721	0.00529	0.00566
TbO175	0.00091	0.00120	0.00099	0.00106	0.00082	0.00090
DyO179	0.00235	0.00324	0.00269	0.00295	0.00231	0.00243
ErO182	0.00570	0.00723	0.00604	0.00795	0.00570	0.00607
TmO185	0.00302	0.00433	0.00347	0.00467	0.00341	0.00364
YbO188	0.00460	0.00632	0.00492	0.00681	0.00524	0.00558
LuO191	0.00518	0.00736	0.00537	0.00777	0.00588	0.00670
Zr2O	0.01740	0.01857	0.01796	0.01749	0.01749	0.01619
HfO196	0.18531	0.19304	0.19918	0.21035	0.19948	0.17697
Pb206	0.00004	0.00003	0.00004	0.00004	0.00003	0.00004
207/206	0.55556	0.22727	0.17857	0.15873	0.41667	0.00000
ThO248	0.01638	0.01994	0.03419	0.05813	0.02073	0.01740
UO254	0.01635	0.02072	0.02560	0.03975	0.02066	0.01828
	38394.67	38394.63	38394.64	38394.54	38394.49	38394.47
206/238 Age	43.03	30.18	30.01	20.03	29.39	46.36
Li ppm Est	0.00	0.00	0.01	0.02	0.00	0.01
Be9 ppm	3.03	27.22	18.60	31.11	4.46	27.26
B11 ppm	0.02	0.06	0.08	0.15	0.15	0.09
F19 ppm	14.86	17.14	22.36	18.94	16.08	16.41
Na ppm Est.	2.51	3.69	2.77	2.69	3.17	2.49
Al27 ppm Est.	13.94	16.87	15.60	15.08	17.68	16.49
Si30						
P31 ppm	404.50	246.73	185.99	242.80	374.28	195.33
K39 Rel.	0.53	0.82	0.59	0.80	0.73	1.05
Ca40 ppm Est.	2.35	3.21	2.72	3.30	2.60	2.62
Sc45 ppm	63.14	75.04	54.45	58.04	50.87	77.90
48/49	14.36	13.82	14.71	13.94	15.69	13.12
Ti48 ppm	9.40	12.89	9.97	8.05	7.42	11.45
Ti49 ppm	8.70	12.39	9.01	7.67	6.28	11.60
Fe56 ppm	0.99	1.21	1.03	0.92	1.07	1.33
Y89 ppm	802.98	1077.18	895.30	1213.86	836.65	904.89
Nb93 ppm	7.41	13.46	10.28	20.32	9.78	12.25
Zr94H Rel.	0.56	0.62	0.62	0.63	0.58	0.59
Zr96/Si30 ppm	2.38	2.51	2.42	2.46	2.41	2.38

Table C2, cont.

	WSWPST2A_13.2I	WSWPST2A_11.2I	WSWPST2A_11.1I	WSWPST2A_7.2I	WSWPST2A_4.2I	WSWPST2A_3.2I
La139 ppm	0.26	0.10	0.03	0.03	0.03	0.02
Ce140 ppm				130.73	59.93	74.59
Nd146 ppm				1.27	0.52	0.98
Sm147 ppm	1.90	2.71	2.15	1.69	1.36	2.19
Eu153 ppm	0.49	0.78	0.63	0.43	0.38	0.69
Gd155 ppm				17.63	14.17	18.38
Ho165 ppm	29.41	40.41	32.81	40.72	29.88	31.95
TbO175 ppm	6.05	8.03	6.63	7.07	5.47	6.01
DyO179 ppm	69.55	95.80	79.48	87.30	68.37	71.84
ErO182 ppm	151.84	192.64	160.91	211.60	151.66	161.74
TmO185 ppm	31.49	45.11	36.17	48.61	35.49	37.87
YbO188 ppm	282.34	387.86	302.27	417.82	321.43	342.48
LuO191 ppm	52.38	74.47	54.29	78.57	59.51	67.82
Zr96/Zr2O	136.97	135.35	134.75	140.55	137.98	146.99
196/Si30	57.48	53.85	55.69	57.18	57.18	61.76
Hf ppm	10757.09	11205.95	11562.53	12210.94	11579.93	10272.95
Pb7/6 Est	0.56	0.23	0.18	0.16	0.42	0.00
Th ppm	166.03	202.12	346.58	589.31	210.11	176.44
U ppm	158.64	201.08	248.46	385.72	200.47	177.35
Y/Nb	108.37	80.03	87.08	59.73	85.57	73.87
Th/U	1.05	1.01	1.39	1.53	1.05	0.99
Yb/Gd				23.70	22.68	18.63
U/Yb	0.56	0.52	0.82	0.92	0.62	0.52
Th/Yb	0.59	0.52	1.15	1.41	0.65	0.52
Ce/Sm	0.00	0.00	0.00	77.44	44.14	34.10
Ce/Lu	0.00	0.00	0.00	1.66	1.01	1.10
U/Ce				2.95	3.34	2.38
Th/Ce				4.51	3.51	2.37
Y/Yb	2.84	2.78	2.96	2.91	2.60	2.64
Yb/Nd				329.82	612.55	350.75
Y/Nb	108.37	80.03	87.08	59.73	85.57	73.87
Yb/Nb	38.10	28.82	29.40	20.56	32.87	27.96
Yb/Sc	4.47	5.17	5.55	7.20	6.32	4.40
Yb/Dy	4.06	4.05	3.80	4.79	4.70	4.77
Dy/Sm	36.53	35.34	37.03	51.71	50.36	32.84
Yb/Nd				329.82	612.55	350.75
Sm/Nd				1.33	2.59	2.24
U/Li	#DIV/0!	69852.65	44712.14	18841.95	78262.66	23771.67
Estimated temperature						
Temp Ti48	731.60	759.54	736.70	718.37	711.56	748.86
Temp Ti49	724.99	756.01	727.94	714.36	698.00	750.01
Hf ppm	10757.09	11205.95	11562.53	12210.94	11579.93	10272.95
Ferry Temp	766.79	802.53	770.17	754.59	735.87	795.61
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	756.31	789.34	759.45	745.01	727.63	782.95

Table C2, cont.

	WSWPST2A_13.2I	WSWPST2A_11.2I	WSWPST2A_11.1I	WSWPST2A_7.2I	WSWPST2A_4.2I	WSWPST2A_3.2I
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.82	0.33	0.09	0.08	0.08	0.05
Ce Ch (0.82)				159.42	73.09	90.97
Pr Ch (0.121)				0.70	0.39	0.51
Nd Ch (0.615)				2.06	0.85	1.59
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	9.52	13.55	10.73	8.44	6.79	10.94
Eu Ch (0.076)	6.45	10.26	8.24	5.66	5.06	9.12
Gd Ch (0.267)				66.03	53.07	68.85
Tb Ch (0.0493)	122.69	162.98	134.46	143.31	110.87	121.87
Dy Ch (0.33)	210.76	290.29	240.86	264.54	207.18	217.68
Ho Ch (0.0755)	389.54	535.20	434.51	539.30	395.73	423.15
Er Ch (0.216)	702.96	891.87	744.94	979.65	702.14	748.80
Tm Ch (0.0329)	957.12	1370.98	1099.36	1477.66	1078.86	1150.98
Yb Ch (0.221)	1277.55	1755.01	1367.74	1890.60	1454.44	1549.70
Lu Ch (0.033)	1587.14	2256.73	1645.26	2380.99	1803.30	2055.09
Ce/Ce*				678.90	417.25	564.28
Hf ppm	10757.09	11205.95	11562.53	12210.94	11579.93	10272.95
Eu/Eu*				0.24	0.27	0.33
P Molar	13.06	7.97	6.01	7.84	12.09	6.31
3+ Molar	24.48	20.70	23.95	21.26	16.87	17.22
3+/P Molar	3.26	3.14	2.64	2.71	1.27	2.81

Table C2, cont.

Element	WSWPST2A_1.1E	WSWPST2A_2.2E	WSWPST2A_3.3E	WSWPST2A_4.3E	WSWPST2A_5.2E	WSWPST2A_6.2E
Li7	0.00001	0.00001	0.00000	0.00002	0.00001	0.00002
Be9	0.00795	0.00768	0.00513	0.00852	0.00590	0.00594
B11	0.00001	0.00002	0.00001	0.00005	0.00001	0.00011
F19	0.00016	0.00017	0.00014	0.00015	0.00007	0.00025
Na23	0.01641	0.01065	0.01261	0.01209	0.01294	0.01046
Al27	0.02212	0.02567	0.02344	0.04193	0.02367	0.07959
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00206	0.00246	0.00224	0.00251	0.00223	0.00240
K39	0.00789	0.00831	0.00664	0.00617	0.00372	0.01257
Ca40	0.02976	0.01777	0.01984	0.03334	0.01908	0.07145
Sc45	0.08293	0.05876	0.04909	0.06485	0.05496	0.05680
Ti48	0.00319	0.00263	0.00315	0.00599	0.00294	0.01194
Ti49	0.00022	0.00020	0.00022	0.00044	0.00021	0.00092
Fe56	0.00062	0.00071	0.00071	0.00211	0.00065	0.00847
Y89	0.38408	0.43852	0.33920	0.53113	0.41033	0.44109
Nb93	0.00135	0.00145	0.00108	0.00257	0.00144	0.00332
Zr94H	0.00664	0.00601	0.00625	0.00643	0.00601	0.00513
Zr96	2.49553	2.36754	2.42448	2.40107	2.37931	2.37393
La139	0.00000	0.00001	0.00000	0.00067	0.00000	0.00230
Ce140	0.01039	0.01520	0.01184	0.03475	0.01421	0.05254
Nd146	0.00006	0.00006	0.00005	0.00064	0.00007	0.00216
Sm147	0.00011	0.00013	0.00015	0.00037	0.00013	0.00085
Eu153	0.00010	0.00007	0.00011	0.00032	0.00010	0.00077
Gd155	0.00040	0.00040	0.00036	0.00059	0.00041	0.00085
Ho165	0.00565	0.00617	0.00519	0.00753	0.00592	0.00652
TbO175	0.00085	0.00087	0.00092	0.00115	0.00097	0.00130
DyO179	0.00238	0.00259	0.00231	0.00318	0.00267	0.00300
ErO182	0.00631	0.00677	0.00526	0.00825	0.00642	0.00647
TmO185	0.00377	0.00394	0.00318	0.00513	0.00399	0.00378
YbO188	0.00545	0.00614	0.00442	0.00717	0.00568	0.00582
LuO191	0.00657	0.00693	0.00518	0.00837	0.00635	0.00642
Zr2O	0.01853	0.01649	0.01630	0.01696	0.01734	0.01624
HfO196	0.19321	0.20619	0.19917	0.21125	0.20995	0.20864
Pb206	0.00003	0.00004	0.00003	0.00005	0.00005	0.00004
207/206	0.47619	0.56338	0.35714	0.00000	0.26316	0.71429
ThO248	0.01792	0.05296	0.02925	0.06266	0.04796	0.06090
UO254	0.01894	0.03727	0.02240	0.04071	0.03431	0.04036
	38394.43	38394.45	38394.47	38394.49	38394.55	38394.52
206/238 Age	27.75	23.51	31.03	24.35	29.77	18.62
Li ppm Est	0.01	0.00	0.00	0.01	0.00	0.01
Be9 ppm	24.78	23.94	16.01	26.58	18.40	18.52
B11 ppm	0.09	0.20	0.09	0.44	0.10	1.02
F19 ppm	20.80	22.12	18.20	19.06	8.76	32.80
Na ppm Est.	3.88	2.52	2.98	2.86	3.06	2.48
Al27 ppm Est.	14.72	17.09	15.60	27.91	15.76	52.98
Si30						
P31 ppm	175.58	209.08	190.68	213.43	189.88	204.46
K39 Rel.	1.36	1.43	1.15	1.06	0.64	2.17
Ca40 ppm Est.	3.88	2.32	2.59	4.35	2.49	9.32
Sc45 ppm	72.95	51.69	43.18	57.05	48.34	49.96
48/49	14.47	12.90	14.23	13.56	13.97	13.00
Ti48 ppm	9.18	7.57	9.06	17.21	8.45	34.33
Ti49 ppm	8.43	7.80	8.46	16.87	8.04	35.10
Fe56 ppm	0.91	1.04	1.04	3.08	0.95	12.36
Y89 ppm	906.47	1034.95	800.54	1253.51	968.41	1041.02
Nb93 ppm	13.73	14.75	10.96	26.09	14.61	33.75
Zr94H Rel.	0.65	0.59	0.61	0.63	0.58	0.50
Zr96/Si30 ppm	2.50	2.37	2.42	2.40	2.38	2.37

Table C2, cont.

	WSWPST2A_1.1E	WSWPST2A_2.2E	WSWPST2A_3.3E	WSWPST2A_4.3E	WSWPST2A_5.2E	WSWPST2A_6.2E
La139 ppm	0.02	0.05	0.02	4.45	0.02	15.41
Ce140 ppm	75.28	110.15	85.80	251.90	102.99	380.84
Nd146 ppm	0.76	0.80	0.73	8.83	1.01	29.97
Sm147 ppm	1.56	1.78	2.01	5.14	1.72	11.66
Eu153 ppm	0.47	0.33	0.51	1.56	0.47	3.71
Gd155 ppm	16.35	16.51	14.62	24.04	16.56	34.62
Ho165 ppm	31.88	34.82	29.29	42.50	33.45	36.80
TbO175 ppm	5.67	5.82	6.13	7.67	6.47	8.67
DyO179 ppm	70.40	76.50	68.27	94.07	79.07	88.85
ErO182 ppm	168.01	180.35	140.09	219.76	170.95	172.16
TmO185 ppm	39.28	41.05	33.11	53.41	41.51	39.40
YbO188 ppm	334.82	377.04	271.36	440.00	348.80	357.53
LuO191 ppm	66.52	70.15	52.40	84.71	64.26	64.99
Zr96/Zr2O	134.70	143.53	148.76	141.61	137.21	146.20
196/Si30	53.98	60.63	61.36	58.98	57.67	61.59
Hf ppm	11216.23	11969.42	11561.83	12263.38	12187.66	12111.50
Pb7/6 Est	0.48	0.56	0.36	0.00	0.26	0.71
Th ppm	181.72	536.90	296.51	635.20	486.22	617.38
U ppm	183.77	361.71	217.37	395.08	332.99	391.63
Y/Nb	66.03	70.18	73.07	48.05	66.28	30.85
Th/U	0.99	1.48	1.36	1.61	1.46	1.58
Yb/Gd	20.47	22.84	18.56	18.31	21.06	10.33
U/Yb	0.55	0.96	0.80	0.90	0.95	1.10
Th/Yb	0.54	1.42	1.09	1.44	1.39	1.73
Ce/Sm	48.33	62.04	42.64	49.02	59.91	32.66
Ce/Lu	1.13	1.57	1.64	2.97	1.60	5.86
U/Ce	2.44	3.28	2.53	1.57	3.23	1.03
Th/Ce	2.41	4.87	3.46	2.52	4.72	1.62
Y/Yb	2.71	2.74	2.95	2.85	2.78	2.91
Yb/Nd	438.11	473.41	372.01	49.81	346.40	11.93
Y/Nb	66.03	70.18	73.07	48.05	66.28	30.85
Yb/Nb	24.39	25.57	24.77	16.86	23.87	10.59
Yb/Sc	4.59	7.29	6.28	7.71	7.21	7.16
Yb/Dy	4.76	4.93	3.97	4.68	4.41	4.02
Dy/Sm	45.20	43.08	33.93	18.31	45.99	7.62
Yb/Nd	438.11	473.41	372.01	49.81	346.40	11.93
Sm/Nd	2.04	2.23	2.76	0.58	1.71	0.39
U/Li	24173.56	72362.52	86481.67	38365.83	81545.49	32024.50
Estimated temperature						
Temp Ti48	729.57	713.24	728.40	786.60	722.43	857.32
Temp Ti49	722.29	715.73	722.55	784.68	718.22	859.74
Hf ppm	11216.23	11969.42	11561.83	12263.38	12187.66	12111.50
Ferry Temp	763.69	756.16	763.99	835.79	759.02	923.77
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	753.44	746.46	753.72	819.93	749.12	900.27

Table C2, cont.

	WSWPST2A_1.1E	WSWPST2A_2.2E	WSWPST2A_3.3E	WSWPST2A_4.3E	WSWPST2A_5.2E	WSWPST2A_6.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.07	0.17	0.08	13.96	0.06	48.30
Ce Ch (0.82)	91.80	134.33	104.64	307.19	125.60	464.44
Pr Ch (0.121)	0.47	0.66	0.48	14.23	0.53	48.59
Nd Ch (0.615)	1.24	1.29	1.19	14.36	1.64	48.73
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	7.79	8.88	10.06	25.69	8.60	58.30
Eu Ch (0.076)	6.20	4.29	6.73	20.56	6.16	48.77
Gd Ch (0.267)	61.25	61.82	54.76	90.02	62.04	129.66
Tb Ch (0.0493)	115.03	118.03	124.29	155.48	131.29	175.90
Dy Ch (0.33)	213.34	231.82	206.89	285.07	239.60	269.25
Ho Ch (0.0755)	422.25	461.21	387.91	562.94	443.02	487.41
Er Ch (0.216)	777.80	834.97	648.56	1017.41	791.42	797.04
Tm Ch (0.0329)	1194.03	1247.68	1006.27	1623.42	1261.56	1197.46
Yb Ch (0.221)	1515.03	1706.05	1227.86	1990.93	1578.30	1617.78
Lu Ch (0.033)	2015.72	2125.67	1587.91	2566.83	1947.30	1969.50
Ce/Ce*	525.85	405.13	542.04	21.80	726.04	9.59
Hf ppm	11216.23	11969.42	11561.83	12263.38	12187.66	12111.50
Eu/Eu*	0.28	0.18	0.29	0.43	0.27	0.56
P Molar	5.67	6.75	6.16	6.89	6.13	6.60
3+ Molar	13.95	10.27	87.28	105.55	18.79	15.27
3+/P Molar	1.83	1.24	3.97	2.81	2.36	2.54

Table C2, cont.

Element	WSWPST2A_7.3E	WSWPST2A_9.1E	WSWPST2A_10.2E	WSWPST2A_12.1E	WSWPST2A_12.2E	WSWPST2A_13.3E
Li7	0.00000	0.00001	0.00002	0.00002	0.00001	0.00000
Be9	0.00183	0.00280	0.08972	0.00195	0.00082	0.01103
B11	0.00000	0.00001	0.00003	0.00003	0.00001	0.00001
F19	0.00018	0.00017	0.00036	0.00014	0.00014	0.00013
Na23	0.01022	0.01138	0.02289	0.01683	0.01170	0.01146
Al27	0.02221	0.02775	0.02736	0.04407	0.02487	0.02410
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00484	0.00277	0.00800	0.00231	0.00223	0.00223
K39	0.00356	0.00418	0.00557	0.01625	0.00395	0.00378
Ca40	0.02115	0.04217	0.03667	0.02655	0.01581	0.02209
Sc45	0.07225	0.04168	0.04353	0.04069	0.04202	0.10225
Ti48	0.00273	0.00632	0.00374	0.00644	0.01099	0.00341
Ti49	0.00018	0.00044	0.00028	0.00047	0.00083	0.00023
Fe56	0.00067	0.00216	0.00076	0.00474	0.00107	0.00065
Y89	0.39187	0.35713	2.44808	0.29548	0.18913	0.45200
Nb93	0.00135	0.00076	0.00334	0.00074	0.00025	0.00156
Zr94H	0.00656	0.00633	0.00689	0.00581	0.00571	0.00589
Zr96	2.42287	2.43292	2.39237	2.42212	2.40104	2.38402
La139	0.00001	0.00015	0.00005	0.00017	0.00000	0.00001
Ce140	0.00928	0.00001	0.00001	0.00000	0.00000	0.00000
Nd146	0.00004	0.00000	0.00000	0.00000	0.00000	0.00000
Sm147	0.00009	0.00026	0.00141	0.00020	0.00014	0.00014
Eu153	0.00010	0.00018	0.00045	0.00019	0.00014	0.00011
Gd155	0.00032	0.00000	0.00000	0.00000	0.00000	0.00000
Ho165	0.00565	0.00591	0.04245	0.00471	0.00312	0.00659
TbO175	0.00083	0.00120	0.00869	0.00088	0.00062	0.00102
DyO179	0.00242	0.00294	0.02155	0.00213	0.00162	0.00281
ErO182	0.00654	0.00560	0.03644	0.00438	0.00286	0.00772
TmO185	0.00392	0.00314	0.01751	0.00242	0.00160	0.00462
YbO188	0.00603	0.00419	0.02117	0.00345	0.00210	0.00719
LuO191	0.00663	0.00440	0.01891	0.00373	0.00238	0.00862
Zr2O	0.01807	0.01813	0.01740	0.01699	0.01728	0.01749
HfO196	0.20346	0.18938	0.17761	0.18751	0.16841	0.19201
Pb206	0.00003	0.00003	0.00005	0.00002	0.00001	0.00003
207/206	0.76923	0.47619	0.42254	0.00000	2.85714	0.55556
ThO248	0.02295	0.02182	0.09855	0.01838	0.00785	0.02751
UO254	0.02389	0.01778	0.04997	0.01518	0.00560	0.02602
	38394.55	38394.57	38394.62	38394.65	38394.66	38394.68
206/238 Age	22.31	31.78	19.14	32.88	51.30	26.94
Li ppm Est	0.00	0.01	0.01	0.01	0.01	0.00
Be9 ppm	5.72	8.73	279.74	6.07	2.55	34.40
B11 ppm	0.03	0.12	0.27	0.25	0.13	0.12
F19 ppm	24.06	21.93	46.55	18.77	18.27	17.34
Na ppm Est.	2.42	2.70	5.42	3.98	2.77	2.71
Al27 ppm Est.	14.78	18.47	18.21	29.33	16.56	16.04
Si30						
P31 ppm	411.92	236.19	681.47	196.84	190.23	189.72
K39 Rel.	0.61	0.72	0.96	2.81	0.68	0.65
Ca40 ppm Est.	2.76	5.50	4.78	3.46	2.06	2.88
Sc45 ppm	63.56	36.66	38.29	35.80	36.97	89.95
48/49	15.31	14.44	13.24	13.58	13.29	14.72
Ti48 ppm	7.85	18.17	10.76	18.53	31.59	9.80
Ti49 ppm	6.82	16.73	10.80	18.13	31.60	8.85
Fe56 ppm	0.97	3.14	1.10	6.91	1.56	0.94
Y89 ppm	924.85	842.85	5777.69	697.36	446.37	1066.76
Nb93 ppm	13.75	7.68	33.98	7.50	2.54	15.82
Zr94H Rel.	0.64	0.62	0.67	0.57	0.56	0.57
Zr96/Si30 ppm	2.42	2.43	2.39	2.42	2.40	2.38

Table C2, cont.

	WSWPST2A_7.3E	WSWPST2A_9.1E	WSWPST2A_10.2E	WSWPST2A_12.1E	WSWPST2A_12.2E	WSWPST2A_13.3E
La139 ppm	0.04	0.97	0.36	1.16	0.01	0.05
Ce140 ppm	67.24					
Nd146 ppm	0.49					
Sm147 ppm	1.30	3.60	19.39	2.75	1.94	1.88
Eu153 ppm	0.48	0.85	2.19	0.92	0.66	0.53
Gd155 ppm	13.23					
Ho165 ppm	31.88	33.39	239.66	26.62	17.64	37.21
TbO175 ppm	5.54	8.05	58.02	5.86	4.16	6.80
DyO179 ppm	71.57	86.85	637.64	63.08	47.94	83.20
ErO182 ppm	174.06	149.07	970.41	116.52	76.28	205.65
TmO185 ppm	40.79	32.70	182.30	25.21	16.68	48.14
YbO188 ppm	370.07	256.95	1299.81	211.99	129.13	441.58
LuO191 ppm	67.12	44.53	191.35	37.76	24.06	87.22
Zr96/Zr2O	134.08	134.20	137.46	142.56	138.98	136.34
196/Si30	55.34	55.16	57.46	58.86	57.88	57.19
Hf ppm	11811.12	10993.76	10310.22	10884.87	9776.30	11146.30
Pb7/6 Est	0.77	0.48	0.42	0.00	2.86	0.56
Th ppm	232.70	221.18	999.13	186.38	79.56	278.90
U ppm	231.86	172.58	484.96	147.30	54.31	252.46
Y/Nb	67.26	109.80	170.03	93.04	175.85	67.45
Th/U	1.00	1.28	2.06	1.27	1.47	1.10
Yb/Gd	27.98					
U/Yb	0.63	0.67	0.37	0.69	0.42	0.57
Th/Yb	0.63	0.86	0.77	0.88	0.62	0.63
Ce/Sm	51.90	0.00	0.00	0.00	0.00	0.00
Ce/Lu	1.00	0.00	0.00	0.00	0.00	0.00
U/Ce	3.45					
Th/Ce	3.46					
Y/Yb	2.50	3.28	4.45	3.29	3.46	2.42
Yb/Nd	757.80					
Y/Nb	67.26	109.80	170.03	93.04	175.85	67.45
Yb/Nb	26.91	33.47	38.25	28.28	50.87	27.92
Yb/Sc	5.82	7.01	33.95	5.92	3.49	4.91
Yb/Dy	5.17	2.96	2.04	3.36	2.69	5.31
Dy/Sm	55.24	24.16	32.89	22.96	24.76	44.20
Yb/Nd	757.80					
Sm/Nd	2.65					
U/Li	167507.88	21109.59	39489.46	14208.68	9806.71	192099.26
Estimated temperature						
Temp Ti48	716.30	791.84	743.34	793.73	848.31	735.17
Temp Ti49	704.61	783.89	743.70	791.61	848.33	726.35
Hf ppm	11811.12	10993.76	10310.22	10884.87	9776.30	11146.30
Ferry Temp	743.43	834.86	788.32	843.85	910.31	768.36
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	734.65	819.08	776.23	827.33	888.03	757.76

Table C2, cont.

	WSWPST2A_7.3E	WSWPST2A_9.1E	WSWPST2A_10.2E	WSWPST2A_12.1E	WSWPST2A_12.2E	WSWPST2A_13.3E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.13	3.05	1.11	3.63	0.04	0.16
Ce Ch (0.82)	82.00					
Pr Ch (0.121)	0.43					
Nd Ch (0.615)	0.79					
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	6.48	17.98	96.94	13.74	9.68	9.41
Eu Ch (0.076)	6.34	11.20	28.82	12.13	8.64	6.97
Gd Ch (0.267)	49.53					
Tb Ch (0.0493)	112.28	163.22	1176.92	118.94	84.30	137.86
Dy Ch (0.33)	216.88	263.18	1932.24	191.14	145.26	252.11
Ho Ch (0.0755)	422.25	442.22	3174.30	352.55	233.58	492.86
Er Ch (0.216)	805.85	690.14	4492.63	539.46	353.14	952.06
Tm Ch (0.0329)	1239.79	993.93	5540.90	766.24	507.11	1463.08
Yb Ch (0.221)	1674.52	1162.68	5881.50	959.23	584.30	1998.12
Lu Ch (0.033)	2034.00	1349.53	5798.60	1144.22	728.95	2642.98
Ce/Ce*	347.45					
Hf ppm	11811.12	10993.76	10310.22	10884.87	9776.30	11146.30
Eu/Eu*	0.35					
P Molar	13.30	7.63	22.00	6.36	6.14	6.13
3+ Molar	11.55	7.73	30.34	14.13	19.37	25.93
3+/P Molar	1.82	1.26	2.18	1.08	3.16	2.27

Table C2, cont.

Element	WSWPST2A_14.3E	WSWPST2A_14.2E
Li7	0.00000	0.00001
Be9	0.00460	0.00474
B11	0.00001	0.00001
F19	0.00018	0.00018
Na23	0.00263	0.01267
Al27	0.00684	0.02286
Si30	1.00000	1.00000
P31	0.00119	0.00196
K39	0.00170	0.00384
Ca40	0.00491	0.01665
Sc45	0.06088	0.06013
Ti48	0.00298	0.00373
Ti49	0.00023	0.00025
Fe56	0.00040	0.00063
Y89	0.27688	0.31546
Nb93	0.00075	0.00083
Zr94H	0.01057	0.00561
Zr96	2.51904	2.39725
La139	0.00006	0.00000
Ce140	0.00001	0.00000
Nd146	0.00000	0.00000
Sm147	0.00013	0.00015
Eu153	0.00009	0.00015
Gd155	0.00000	0.00000
Ho165	0.00421	0.00478
TbO175	0.00066	0.00082
DyO179	0.00186	0.00224
ErO182	0.00444	0.00530
TmO185	0.00277	0.00317
YbO188	0.00416	0.00467
LuO191	0.00488	0.00513
Zr2O	0.02277	0.01815
HfO196	0.21299	0.20021
Pb206	0.00001	0.00004
207/206	0.00000	0.19608
ThO248	0.01418	0.03372
UO254	0.01380	0.02570
	38394.71	38394.71
206/238 Age	19.68	27.89
Li ppm Est	0.00	0.00
Be9 ppm	14.34	14.77
B11 ppm	0.05	0.09
F19 ppm	23.43	23.37
Na ppm Est.	0.62	3.00
Al27 ppm Est.	4.55	15.22
Si30		
P31 ppm	101.23	166.96
K39 Rel.	0.29	0.66
Ca40 ppm Est.	0.64	2.17
Sc45 ppm	53.56	52.90
48/49	12.83	14.67
Ti48 ppm	8.57	10.72
Ti49 ppm	8.88	9.71
Fe56 ppm	0.58	0.91
Y89 ppm	653.47	744.51
Nb93 ppm	7.60	8.47
Zr94H Rel.	1.03	0.55
Zr96/Si30 ppm	2.52	2.40

Table C2, cont.

	WSWPST2A_14.3E	WSWPST2A_14.2E
La139 ppm	0.41	0.00
Ce140 ppm		
Nd146 ppm		
Sm147 ppm	1.77	2.01
Eu153 ppm	0.43	0.71
Gd155 ppm		
Ho165 ppm	23.76	26.98
TbO175 ppm	4.44	5.47
DyO179 ppm	55.07	66.14
ErO182 ppm	118.26	141.04
TmO185 ppm	28.88	32.99
YbO188 ppm	255.57	286.81
LuO191 ppm	49.41	51.93
Zr96/Zr2O	110.64	132.07
196/Si30	43.92	55.09
Hf ppm	12364.26	11622.06
Pb7/6 Est	0.00	0.20
Th ppm	143.80	341.90
U ppm	133.87	249.41
Y/Nb	85.95	87.90
Th/U	1.07	1.37
Yb/Gd		
U/Yb	0.52	0.87
Th/Yb	0.56	1.19
Ce/Sm	0.00	0.00
Ce/Lu	0.00	0.00
U/Ce		
Th/Ce		
Y/Yb	2.56	2.60
Yb/Nd		
Y/Nb	85.95	87.90
Yb/Nb	33.61	33.86
Yb/Sc	4.77	5.42
Yb/Dy	4.64	4.34
Dy/Sm	31.12	32.96
Yb/Nd		
Sm/Nd		
U/Li	82763.12	58406.51
Estimated temperature		
Temp Ti48	723.69	743.03
Temp Ti49	726.69	734.42
Hf ppm	12364.26	11622.06
Ferry Temp	768.74	777.63
Act Ti	0.70	0.70
Act Si	1.00	1.00
Temp. Est.	758.12	766.35

Table C2, cont.

	WSWPST2A_14.3E	WSWPST2A_14.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)		
La Ch (0.319)	1.27	0.01
Ce Ch (0.82)		
Pr Ch (0.121)		
Nd Ch (0.615)		
Pm	0.00	0.00
Sm Ch (0.2)	8.85	10.03
Eu Ch (0.076)	5.72	9.40
Gd Ch (0.267)		
Tb Ch (0.0493)	90.05	111.04
Dy Ch (0.33)	166.86	200.42
Ho Ch (0.0755)	314.67	357.39
Er Ch (0.216)	547.51	652.97
Tm Ch (0.0329)	877.72	1002.86
Yb Ch (0.221)	1156.41	1297.79
Lu Ch (0.033)	1497.17	1573.55
Ce/Ce*		
Hf ppm	12364.26	11622.06
Eu/Eu*		
P Molar	3.27	5.39
3+ Molar	11.71	13.17
3+/P Molar	3.58	2.44

Table C3. SHRIMP-RG trace element analyses of zircon grains from WSW2B.

Element	WSWPST2B_1.1C	WSWPST2B_2.1C	WSWPST2B_3.1C	WSWPST2B_4.1C	WSWPST2B_5.1C	WSWPST2B_6.1C
Li7	0.00001	0.00000	0.00000	0.00002	0.00000	0.00000
Be9	0.00047	0.01025	0.00515	0.07296	0.01130	0.03112
B11	0.00001	0.00002	0.00001	0.00002	0.00000	0.00001
F19	0.00015	0.00022	0.00012	0.00021	0.00023	0.00023
Na23	0.01117	0.01129	0.00913	0.01133	0.01034	0.01530
Al27	0.02439	0.02726	0.02561	0.02023	0.02211	0.02498
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00193	0.00341	0.00408	0.01259	0.00222	0.00945
K39	0.00588	0.00381	0.00369	0.00368	0.00341	0.00470
Ca40	0.01967	0.01918	0.02698	0.02231	0.01656	0.02005
Sc45	0.03620	0.05968	0.06493	0.13150	0.08335	0.06980
Ti48	0.00481	0.00514	0.00836	0.01257	0.00393	0.00543
Ti49	0.00036	0.00036	0.00065	0.00087	0.00028	0.00042
Fe56	0.00181	0.00088	0.00057	0.00064	0.00063	0.00091
Y89	0.15401	0.59530	0.48617	2.62691	0.47421	1.46289
Nb93	0.00033	0.00159	0.00062	0.00540	0.00111	0.00317
Zr94H	0.00756	0.00787	0.00745	0.00641	0.00731	0.00732
Zr96	2.42293	2.49683	2.49563	2.42907	2.40263	2.40526
La139	0.00000	0.00001	0.00001	0.00002	0.00002	0.00001
Ce140	0.00220	0.01891	0.01165	0.07487	0.01226	0.03376
Nd146	0.00003	0.00012	0.00016	0.00091	0.00014	0.00029
Sm147	0.00007	0.00033	0.00036	0.00257	0.00022	0.00083
Eu153	0.00003	0.00023	0.00035	0.00127	0.00019	0.00051
Gd155	0.00020	0.00090	0.00099	0.00696	0.00061	0.00266
Ho165	0.00261	0.00970	0.00885	0.05066	0.00723	0.02556
TbO175	0.00041	0.00194	0.00203	0.01341	0.00126	0.00541
DyO179	0.00120	0.00469	0.00455	0.02877	0.00327	0.01275
ErO182	0.00261	0.00894	0.00773	0.03887	0.00775	0.02134
TmO185	0.00154	0.00450	0.00375	0.01703	0.00472	0.01018
YbO188	0.00222	0.00611	0.00505	0.02037	0.00693	0.01277
LuO191	0.00232	0.00657	0.00482	0.01911	0.00815	0.01225
Zr2O	0.01749	0.01830	0.01846	0.01757	0.01872	0.01738
HfO196	0.19265	0.18549	0.15653	0.14379	0.18671	0.15943
Pb206	0.00103	0.00005	0.00001	0.00005	0.00002	0.00006
207/206	0.16346	0.53333	1.25000	0.00000	0.55556	0.00000
ThO248	0.00490	0.05266	0.00940	0.13821	0.02757	0.06885
UO254	0.01198	0.02697	0.00662	0.05283	0.02333	0.04200
	38394.18	38394.19	38394.21	38394.25	38394.23	38394.26
206/238 Age	1718.74	34.97	31.66	19.58	19.79	26.92
Li ppm Est	0.01	0.00	0.00	0.01	0.00	0.00
Be9 ppm	1.48	31.96	16.06	227.48	35.22	97.04
B11 ppm	0.08	0.20	0.07	0.22	0.01	0.14
F19 ppm	19.98	28.28	15.38	27.40	30.10	30.64
Na ppm Est.	2.65	2.67	2.16	2.68	2.45	3.62
Al27 ppm Est.	16.24	18.15	17.05	13.47	14.72	16.63
Si30						
P31 ppm	164.37	290.25	347.65	1071.70	189.01	804.73
K39 Rel.	1.01	0.66	0.64	0.64	0.59	0.81
Ca40 ppm Est.	2.57	2.50	3.52	2.91	2.16	2.62
Sc45 ppm	31.84	52.50	57.12	115.68	73.32	61.40
48/49	13.38	14.15	12.78	14.53	14.28	12.99
Ti48 ppm	13.82	14.78	24.04	36.14	11.31	15.62
Ti49 ppm	13.73	13.88	25.00	33.07	10.52	15.99
Fe56 ppm	2.63	1.29	0.83	0.94	0.91	1.33
Y89 ppm	363.49	1404.95	1147.41	6199.74	1119.17	3452.55
Nb93 ppm	3.31	16.13	6.35	54.90	11.24	32.23
Zr94H Rel.	0.74	0.77	0.73	0.62	0.71	0.71
Zr96/Si30 ppm	2.42	2.50	2.50	2.43	2.40	2.41

Table C3, cont.

	WSWPST2B_1.1C	WSWPST2B_2.1C	WSWPST2B_3.1C	WSWPST2B_4.1C	WSWPST2B_5.1C	WSWPST2B_6.1C
La139 ppm	0.01	0.05	0.10	0.11	0.12	0.08
Ce140 ppm	15.96	137.06	84.46	542.65	88.83	244.68
Pr ppm	0.42	1.64	2.20	12.56	1.97	4.06
Nd146 ppm	0.92	4.48	4.97	35.33	3.06	11.37
Sm147 ppm	0.14	1.12	1.71	6.10	0.90	2.44
Eu153 ppm	8.12	36.84	40.48	284.43	24.82	108.69
Gd155 ppm	14.72	54.79	49.97	286.00	40.84	144.33
Ho165 ppm	2.71	12.93	13.58	89.58	8.44	36.16
TbO175 ppm	35.38	138.83	134.72	851.33	96.87	377.31
DyO179 ppm	69.49	237.97	205.77	1035.09	206.46	568.15
ErO182 ppm	15.99	46.81	39.07	177.32	49.15	105.94
TmO185 ppm	136.22	375.30	310.18	1250.53	425.31	784.20
YbO188 ppm	23.45	66.45	48.77	193.38	82.49	123.99
LuO191 ppm	138.53	136.44	135.17	138.25	128.31	138.41
Zr96/Zr2O	57.18	54.64	54.16	56.91	53.40	57.55
196/Si30	11183.72	10767.70	9086.42	8347.39	10838.42	9255.05
Hf ppm	0.16	0.53	1.25	0.00	0.56	0.00
Pb7/6 Est	49.66	533.87	95.33	1401.22	279.47	697.98
Th ppm	116.24	261.70	64.27	512.68	226.36	407.58
U ppm						
Y/Nb	109.93	87.11	180.75	112.92	99.61	107.12
Th/U	0.43	2.04	1.48	2.73	1.23	1.71
Yb/Gd	16.78	10.19	7.66	4.40	17.14	7.22
U/Yb	0.85	0.70	0.21	0.41	0.53	0.52
Th/Yb	0.36	1.42	0.31	1.12	0.66	0.89
Ce/Sm	17.36	30.60	17.00	15.36	29.02	21.51
Ce/Lu	0.68	2.06	1.73	2.81	1.08	1.97
U/Ce	7.28	1.91	0.76	0.94	2.55	1.67
Th/Ce	3.11	3.90	1.13	2.58	3.15	2.85
Y/Yb	2.67	3.74	3.70	4.96	2.63	4.40
Yb/Nd	327.82	229.21	140.68	99.53	216.35	193.36
Y/Nb	109.93	87.11	180.75	112.92	99.61	107.12
Yb/Nb	41.20	23.27	48.86	22.78	37.85	24.33
Yb/Sc	4.28	7.15	5.43	10.81	5.80	12.77
Yb/Dy	3.85	2.70	2.30	1.47	4.39	2.08
Dy/Sm	38.47	30.99	27.12	24.10	31.65	33.17
Yb/Nd	327.82	229.21	140.68	99.53	216.35	193.36
Sm/Nd	2.21	2.74	2.25	2.81	1.56	2.80
U/Li	19102.49	205540.95	24215.35	43495.17	87144.21	
Estimated temperature						
Temp Ti48	765.94	772.18	819.68	862.95	747.78	777.40
Temp Ti49	765.35	766.38	823.70	853.24	741.41	779.58
Hf ppm	11183.72	10767.70	9086.42	8347.39	10838.42	9255.05
Ferry Temp	813.35	814.55	881.35	916.09	785.69	829.86
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	799.30	800.40	861.64	893.29	773.79	814.49

Table C3, cont.

	WSWPST2B_1.1C	WSWPST2B_2.1C	WSWPST2B_3.1C	WSWPST2B_4.1C	WSWPST2B_5.1C	WSWPST2B_6.1C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.03	0.14	0.30	0.35	0.36	0.25
Ce Ch (0.82)	19.47	167.15	103.00	661.77	108.33	298.39
Pr Ch (0.121)	0.23	1.01	1.57	5.28	1.55	2.22
Nd Ch (0.615)	0.68	2.66	3.59	20.43	3.20	6.59
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	4.60	22.40	24.84	176.64	15.31	56.87
Eu Ch (0.076)	1.90	14.70	22.50	80.32	11.82	32.12
Gd Ch (0.267)	30.41	137.96	151.62	1065.27	92.95	407.07
Tb Ch (0.0493)	55.04	262.30	275.45	1817.10	171.16	733.38
Dy Ch (0.33)	107.21	420.71	408.23	2579.78	293.55	1143.35
Ho Ch (0.0755)	194.96	725.71	661.80	3788.07	540.99	1911.59
Er Ch (0.216)	321.70	1101.72	952.66	4792.09	955.83	2630.33
Tm Ch (0.0329)	486.06	1422.87	1187.52	5389.56	1493.90	3220.03
Yb Ch (0.221)	616.38	1698.19	1403.52	5658.52	1924.46	3548.40
Lu Ch (0.033)	710.59	2013.53	1477.97	5859.94	2499.72	3757.17
Ce/Ce*	258.51	437.65	149.66	485.85	144.74	398.35
Hf ppm	11183.72	10767.70	9086.42	8347.39	10838.42	9255.05
Eu/Eu*	0.16	0.26	0.37	0.19	0.31	0.21
P Molar	5.31	9.37	11.23	34.60	6.10	25.98
3+ Molar	6.73	12.34	23.75	11.39	14.09	19.85
3+/P Molar	1.27	1.37	2.53	1.48	1.57	1.77

Table C3, cont.

Element	WSWPST2B_7.1C	WSWPST2B_8.1C	WSWPST2B_9.1C	WSWPST2B_10.1C	WSWPST2B_11.1C	WSWPST2B_12.1C
Li7	0.00003	0.00001	0.00001	0.00000	0.00004	0.00003
Be9	0.09027	0.05619	0.07404	0.04753	0.04075	0.00726
B11	0.00001	0.00001	0.00001	0.00001	0.00002	0.00006
F19	0.00029	0.00024	0.00024	0.00024	0.00029	0.00014
Na23	0.01499	0.01097	0.01071	0.01200	0.01398	0.01499
Al27	0.02865	0.02413	0.02351	0.01977	0.02621	0.02617
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.01306	0.00635	0.00753	0.01033	0.00525	0.00270
K39	0.01589	0.00370	0.00355	0.00326	0.00481	0.00790
Ca40	0.01581	0.01731	0.02219	0.01781	0.02107	0.01955
Sc45	0.07123	0.04061	0.12134	0.06365	0.10075	0.05716
Ti48	0.00543	0.00704	0.01188	0.00694	0.00829	0.00513
Ti49	0.00043	0.00051	0.00094	0.00051	0.00058	0.00038
Fe56	0.00314	0.00071	0.00059	0.00070	0.00096	0.00230
Y89	3.08054	1.79757	1.99885	2.01421	1.30327	0.47683
Nb93	0.00664	0.00107	0.00097	0.00702	0.00106	0.00119
Zr94H	0.00686	0.00630	0.00674	0.00663	0.00684	0.00639
Zr96	2.38995	2.46046	2.39153	2.39935	2.45194	2.41761
La139	0.00002	0.00001	0.00007	0.00001	0.00003	0.00049
Ce140	0.06041	0.02631	0.04815	0.05069	0.03403	0.01274
Nd146	0.00069	0.00084	0.00183	0.00032	0.00101	0.00013
Sm147	0.00182	0.00192	0.00330	0.00112	0.00187	0.00026
Eu153	0.00054	0.00114	0.00340	0.00035	0.00165	0.00018
Gd155	0.00561	0.00490	0.00720	0.00371	0.00390	0.00080
Ho165	0.05387	0.03417	0.03811	0.03563	0.02386	0.00815
TbO175	0.01150	0.00930	0.01149	0.00791	0.00713	0.00154
DyO179	0.02677	0.02023	0.02296	0.01936	0.01425	0.00410
ErO182	0.04405	0.02730	0.03185	0.02990	0.02061	0.00819
TmO185	0.02125	0.01239	0.01483	0.01408	0.00973	0.00417
YbO188	0.02531	0.01461	0.01859	0.01647	0.01245	0.00574
LuO191	0.02255	0.01354	0.01870	0.01512	0.01219	0.00609
Zr2O	0.01696	0.01890	0.01733	0.01770	0.01949	0.01844
HfO196	0.17351	0.16367	0.14115	0.17166	0.17438	0.18721
Pb206	0.00009	0.00003	0.00003	0.00007	0.00004	0.00003
207/206	0.07299	0.20000	0.21739	0.09009	0.17544	0.44444
ThO248	0.16713	0.04958	0.09273	0.21406	0.06285	0.01685
UO254	0.07763	0.02036	0.02321	0.08393	0.02090	0.01466
	38394.28	38394.30	38394.31	38394.32	38394.34	38394.37
206/238 Age	22.67	33.98	26.01	17.47	39.30	43.05
Li ppm Est	0.02	0.00	0.01	0.00	0.03	0.02
Be9 ppm	281.47	175.19	230.86	148.18	127.06	22.64
B11 ppm	0.14	0.06	0.06	0.07	0.19	0.56
F19 ppm	37.68	32.02	31.23	30.99	37.57	18.74
Na ppm Est.	3.55	2.60	2.53	2.84	3.31	3.55
Al27 ppm Est.	19.07	16.06	15.65	13.16	17.45	17.42
Si30						
P31 ppm	1112.17	540.34	641.02	879.54	446.85	230.14
K39 Rel.	2.74	0.64	0.61	0.56	0.83	1.36
Ca40 ppm Est.	2.06	2.26	2.90	2.32	2.75	2.55
Sc45 ppm	62.65	35.73	106.74	55.99	88.63	50.28
48/49	12.77	13.85	12.63	13.50	14.29	13.37
Ti48 ppm	15.61	20.22	34.14	19.94	23.84	14.75
Ti49 ppm	16.24	19.41	35.94	19.64	22.17	14.66
Fe56 ppm	4.59	1.04	0.86	1.02	1.40	3.35
Y89 ppm	7270.34	4242.43	4717.45	4753.73	3075.84	1125.37
Nb93 ppm	67.52	10.86	9.90	71.33	10.78	12.05
Zr94H Rel.	0.67	0.61	0.66	0.65	0.67	0.62
Zr96/Si30 ppm	2.39	2.46	2.39	2.40	2.45	2.42

Table C3, cont.

	WSWPST2B_7.1C	WSWPST2B_8.1C	WSWPST2B_9.1C	WSWPST2B_10.1C	WSWPST2B_11.1C	WSWPST2B_12.1C
La139 ppm	0.10	0.09	0.48	0.06	0.22	3.27
Ce140 ppm	437.85	190.71	348.99	367.43	246.63	92.31
Pr ppm	9.61	11.64	25.37	4.43	14.05	1.84
Nd146 ppm	25.01	26.43	45.31	15.37	25.67	3.51
Sm147 ppm	2.60	5.50	16.40	1.68	7.93	0.86
Eu153 ppm	229.49	200.34	294.25	151.81	159.63	32.57
Gd155 ppm	304.13	192.93	215.16	201.19	134.71	45.99
Ho165 ppm	76.83	62.13	76.74	52.81	47.62	10.28
TbO175 ppm	791.88	598.48	679.40	572.75	421.62	121.41
DyO179 ppm	1172.89	726.94	848.01	796.13	548.88	217.96
ErO182 ppm	221.23	128.99	154.40	146.58	101.27	43.36
TmO185 ppm	1554.03	897.23	1141.42	1011.41	764.50	352.16
YbO188 ppm	228.11	137.02	189.24	153.02	123.38	61.64
LuO191 ppm	140.91	130.15	138.03	135.57	125.80	131.13
Zr96/Zr2O	58.96	52.90	57.72	56.50	51.31	54.24
196/Si30	10072.55	9501.16	8194.00	9965.13	10122.62	10867.87
Hf ppm	0.07	0.20	0.22	0.09	0.18	0.44
Pb7/6 Est	1694.41	502.62	940.08	2170.19	637.14	170.86
Th ppm	753.31	197.60	225.28	814.44	202.83	142.27
U ppm						
Y/Nb	107.67	390.66	476.33	66.64	285.46	93.39
Th/U	2.25	2.54	4.17	2.66	3.14	1.20
Yb/Gd	6.77	4.48	3.88	6.66	4.79	10.81
U/Yb	0.48	0.22	0.20	0.81	0.27	0.40
Th/Yb	1.09	0.56	0.82	2.15	0.83	0.49
Ce/Sm	17.51	7.21	7.70	23.91	9.61	26.32
Ce/Lu	1.92	1.39	1.84	2.40	2.00	1.50
U/Ce	1.72	1.04	0.65	2.22	0.82	1.54
Th/Ce	3.87	2.64	2.69	5.91	2.58	1.85
Y/Yb	4.68	4.73	4.13	4.70	4.02	3.20
Yb/Nd	161.73	77.08	44.99	228.36	54.41	191.11
Y/Nb	107.67	390.66	476.33	66.64	285.46	93.39
Yb/Nb	23.01	82.62	115.25	14.18	70.95	29.22
Yb/Sc	24.80	25.11	10.69	18.06	8.63	7.00
Yb/Dy	1.96	1.50	1.68	1.77	1.81	2.90
Dy/Sm	31.66	22.64	14.99	37.27	16.42	34.61
Yb/Nd	161.73	77.08	44.99	228.36	54.41	191.11
Sm/Nd	2.60	2.27	1.79	3.47	1.83	1.90
U/Li	44542.72	47010.12	28246.26	609006.69	7722.28	9106.19
Estimated temperature						
Temp Ti48	777.30	802.33	856.70	800.95	818.83	772.01
Temp Ti49	781.07	798.30	862.33	799.42	811.47	771.43
Hf ppm	10072.55	9501.16	8194.00	9965.13	10122.62	10867.87
Ferry Temp	831.59	851.65	926.83	852.96	867.04	820.40
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	816.07	834.48	903.04	835.68	848.56	805.79

Table C3, cont.

	WSWPST2B_7.1C	WSWPST2B_8.1C	WSWPST2B_9.1C	WSWPST2B_10.1C	WSWPST2B_11.1C	WSWPST2B_12.1C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.32	0.27	1.50	0.19	0.69	10.24
Ce Ch (0.82)	533.97	232.57	425.60	448.09	300.77	112.57
Pr Ch (0.121)	4.29	4.62	13.66	2.16	7.13	4.51
Nd Ch (0.615)	15.62	18.93	41.25	7.20	22.85	3.00
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	125.07	132.17	226.57	76.84	128.35	17.54
Eu Ch (0.076)	34.18	72.38	215.74	22.12	104.37	11.30
Gd Ch (0.267)	859.53	750.33	1102.05	568.56	597.86	121.98
Tb Ch (0.0493)	1558.35	1260.33	1556.52	1071.14	965.93	208.49
Dy Ch (0.33)	2399.65	1813.56	2058.79	1735.61	1277.65	367.91
Ho Ch (0.0755)	4028.20	2555.34	2849.79	2664.79	1784.21	609.13
Er Ch (0.216)	5430.06	3365.45	3925.95	3685.77	2541.10	1009.10
Tm Ch (0.0329)	6724.36	3920.82	4692.94	4455.47	3078.06	1318.02
Yb Ch (0.221)	7031.80	4059.85	5164.82	4576.51	3459.29	1593.47
Lu Ch (0.033)	6912.53	4152.10	5734.43	4636.92	3738.71	1867.97
Ce/Ce*	454.21	206.39	94.15	693.90	135.32	16.56
Hf ppm	10072.55	9501.16	8194.00	9965.13	10122.62	10867.87
Eu/Eu*	0.10	0.23	0.43	0.11	0.38	0.24
P Molar	35.91	17.45	20.70	28.40	14.43	7.43
3+ Molar	20.37	22.40	101.46	37.67	20.41	11.41
3+/P Molar	2.54	2.22	2.93	2.13	3.34	1.50

Table C3, cont.

Element	WSWPST2B_13.1C	WSWPST2B_11.2I	WSWPST2B_3.2I	WSWPST2B_2.2I	WSWPST2B_6.2I	WSWPST2B_1.2E
Li7	0.00005	0.00001	0.00000	0.00000	0.00001	0.00000
Be9	0.03917	0.00270	0.00737	0.00127	0.00415	0.00171
B11	0.00001	0.00001	0.00001	0.00000	0.00002	0.00001
F19	0.00046	0.00020	0.00017	0.00013	0.00015	0.00014
Na23	0.01424	0.01373	0.00938	0.01133	0.01149	0.00907
Al27	0.02440	0.02356	0.02387	0.02471	0.02082	0.02122
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.01896	0.00242	0.00291	0.00279	0.00235	0.00327
K39	0.00338	0.00441	0.00361	0.00380	0.00339	0.00432
Ca40	0.01652	0.02059	0.02052	0.01870	0.02069	0.01816
Sc45	0.06504	0.03422	0.06246	0.07918	0.04595	0.05972
Ti48	0.00826	0.00511	0.00294	0.01017	0.00395	0.00856
Ti49	0.00062	0.00040	0.00024	0.00078	0.00027	0.00063
Fe56	0.00154	0.00070	0.00055	0.00071	0.00069	0.00092
Y89	4.92907	0.32513	0.48603	0.24983	0.35054	0.28944
Nb93	0.00906	0.00066	0.00170	0.00023	0.00082	0.00029
Zr94H	0.00710	0.00714	0.00740	0.00752	0.00685	0.00745
Zr96	2.39731	2.40416	2.40193	2.48796	2.39919	2.38973
La139	0.00003	0.00000	0.00001	0.00000	0.00000	0.00000
Ce140	0.09190	0.01005	0.01724	0.00978	0.01147	0.00913
Nd146	0.00153	0.00009	0.00009	0.00016	0.00006	0.00011
Sm147	0.00403	0.00022	0.00017	0.00026	0.00019	0.00028
Eu153	0.00131	0.00016	0.00010	0.00036	0.00013	0.00025
Gd155	0.01180	0.00059	0.00041	0.00068	0.00055	0.00064
Ho165	0.09477	0.00564	0.00728	0.00445	0.00575	0.00522
TbO175	0.02439	0.00118	0.00111	0.00115	0.00106	0.00115
DyO179	0.05471	0.00292	0.00319	0.00242	0.00278	0.00278
ErO182	0.07444	0.00527	0.00766	0.00386	0.00560	0.00458
TmO185	0.03242	0.00252	0.00455	0.00185	0.00311	0.00218
YbO188	0.03563	0.00333	0.00676	0.00264	0.00433	0.00289
LuO191	0.02971	0.00349	0.00751	0.00286	0.00445	0.00322
Zr2O	0.01692	0.01865	0.01867	0.01876	0.01777	0.01749
HfO196	0.16043	0.19228	0.20992	0.14836	0.19020	0.15183
Pb206	0.00008	0.00003	0.00004	0.00002	0.00002	0.00001
207/206	0.36697	0.54054	0.32787	1.07143	0.00000	0.86957
ThO248	0.20900	0.01133	0.05550	0.00435	0.01662	0.00473
UO254	0.08513	0.00844	0.03811	0.00215	0.01263	0.00289
	38394.38	38394.34	38394.22	38394.20	38394.27	38394.19
206/238 Age	18.42	60.90	20.24	163.83	31.14	95.18
Li ppm Est	0.03	0.01	0.00	0.00	0.01	0.00
Be9 ppm	122.14	8.41	22.99	3.97	12.92	5.33
B11 ppm	0.13	0.13	0.12	0.04	0.23	0.13
F19 ppm	60.00	25.80	22.25	17.18	19.01	18.72
Na ppm Est.	3.37	3.25	2.22	2.68	2.72	2.15
Al27 ppm Est.	16.24	15.68	15.89	16.45	13.86	14.13
Si30						
P31 ppm	1614.36	205.82	248.07	237.59	200.23	278.10
K39 Rel.	0.58	0.76	0.62	0.66	0.58	0.74
Ca40 ppm Est.	2.16	2.69	2.68	2.44	2.70	2.37
Sc45 ppm	57.22	30.10	54.94	69.65	40.42	52.53
48/49	13.36	12.87	12.33	13.10	14.80	13.51
Ti48 ppm	23.76	14.70	8.44	29.25	11.34	24.61
Ti49 ppm	23.63	15.18	9.10	29.68	10.19	24.21
Fe56 ppm	2.24	1.02	0.80	1.03	1.00	1.33
Y89 ppm	11633.04	767.34	1147.07	589.61	827.31	683.12
Nb93 ppm	92.02	6.68	17.24	2.35	8.28	2.97
Zr94H Rel.	0.69	0.70	0.72	0.73	0.67	0.73
Zr96/Si30 ppm	2.40	2.40	2.40	2.49	2.40	2.39

Table C3, cont.

	WSWPST2B_13.1C	WSWPST2B_11.2I	WSWPST2B_3.2I	WSWPST2B_2.2I	WSWPST2B_6.2I	WSWPST2B_1.2E
La139 ppm	0.22	0.02	0.05	0.03	0.01	0.02
Ce140 ppm	666.09	72.85	124.97	70.89	83.14	66.16
Pr ppm	21.26	1.22	1.18	2.23	0.89	1.49
Nd146 ppm	55.44	3.01	2.37	3.64	2.62	3.80
Sm147 ppm	6.32	0.76	0.47	1.74	0.63	1.22
Eu153 ppm	482.23	23.95	16.61	27.91	22.65	26.24
Gd155 ppm	535.07	31.82	41.12	25.13	32.47	29.48
Ho165 ppm	162.90	7.88	7.39	7.67	7.06	7.71
TbO175 ppm	1618.76	86.33	94.39	71.58	82.17	82.13
DyO179 ppm	1982.29	140.40	203.91	102.88	149.00	121.83
ErO182 ppm	337.54	26.18	47.41	19.29	32.41	22.70
TmO185 ppm	2187.21	204.44	415.23	162.04	266.03	177.59
YbO188 ppm	300.55	35.29	75.94	28.98	44.98	32.60
LuO191 ppm	141.72	128.92	128.65	132.60	135.02	136.61
Zr96/Zr2O	59.12	53.62	53.56	53.29	56.28	57.17
196/Si30	9313.34	11162.03	12185.95	8612.24	11041.09	8813.64
Hf ppm	0.37	0.54	0.33	1.07	0.00	0.87
Pb7/6 Est	2118.85	114.84	562.63	44.10	168.49	47.98
Th ppm	826.07	81.87	369.78	20.82	122.53	28.06
U ppm						
Y/Nb	126.41	114.87	66.53	250.72	99.87	230.14
Th/U	2.56	1.40	1.52	2.12	1.38	1.71
Yb/Gd	4.54	8.54	25.00	5.81	11.75	6.77
U/Yb	0.38	0.40	0.89	0.13	0.46	0.16
Th/Yb	0.97	0.56	1.35	0.27	0.63	0.27
Ce/Sm	12.01	24.18	52.79	19.47	31.72	17.42
Ce/Lu	2.22	2.06	1.65	2.45	1.85	2.03
U/Ce	1.24	1.12	2.96	0.29	1.47	0.42
Th/Ce	3.18	1.58	4.50	0.62	2.03	0.73
Y/Yb	5.32	3.75	2.76	3.64	3.11	3.85
Yb/Nd	102.86	168.08	351.88	72.74	298.41	119.26
Y/Nb	126.41	114.87	66.53	250.72	99.87	230.14
Yb/Nb	23.77	30.60	24.08	68.90	32.12	59.83
Yb/Sc	38.23	6.79	7.56	2.33	6.58	3.38
Yb/Dy	1.35	2.37	4.40	2.26	3.24	2.16
Dy/Sm	29.20	28.65	39.87	19.66	31.35	21.62
Yb/Nd	102.86	168.08	351.88	72.74	298.41	119.26
Sm/Nd	2.61	2.48	2.01	1.63	2.94	2.55
U/Li	29853.96	9703.25	144432.57	#DIV/0!	23854.23	#DIV/0!
Estimated temperature						
Temp Ti48	818.49	771.68	722.36	840.07	748.06	822.09
Temp Ti49	817.93	774.67	728.76	841.64	738.57	820.42
Hf ppm	9313.34	11162.03	12185.95	8612.24	11041.09	8813.64
Ferry Temp	874.60	824.15	771.12	902.42	782.41	877.50
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	855.47	809.24	760.32	880.85	770.77	858.13

Table C3, cont.

	WSWPST2B_13.1C	WSWPST2B_11.2I	WSWPST2B_3.2I	WSWPST2B_2.2I	WSWPST2B_6.2I	WSWPST2B_1.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.68	0.07	0.15	0.08	0.03	0.05
Ce Ch (0.82)	812.30	88.84	152.41	86.45	101.39	80.68
Pr Ch (0.121)	9.32	0.66	0.81	1.01	0.38	0.66
Nd Ch (0.615)	34.58	1.98	1.92	3.62	1.45	2.42
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	277.22	15.07	11.84	18.20	13.11	18.99
Eu Ch (0.076)	83.11	9.95	6.19	22.88	8.28	16.01
Gd Ch (0.267)	1806.10	89.70	62.20	104.54	84.81	98.26
Tb Ch (0.0493)	3304.20	159.85	149.93	155.51	143.27	156.29
Dy Ch (0.33)	4905.32	261.59	286.04	216.92	248.99	248.87
Ho Ch (0.0755)	7087.03	421.46	544.60	332.78	430.02	390.50
Er Ch (0.216)	9177.28	650.00	944.04	476.31	689.79	564.01
Tm Ch (0.0329)	10259.46	795.89	1441.05	586.30	985.26	689.89
Yb Ch (0.221)	9896.87	925.07	1878.88	733.22	1203.78	803.56
Lu Ch (0.033)	9107.66	1069.26	2301.10	878.28	1362.98	987.86
Ce/Ce*	323.44	406.62	443.49	306.35	1007.24	442.44
Hf ppm	9313.34	11162.03	12185.95	8612.24	11041.09	8813.64
Eu/Eu*	0.12	0.27	0.23	0.52	0.25	0.37
P Molar	52.13	6.65	8.01	7.67	6.47	8.98
3+ Molar	55.45	14.60	10.02	113.83	49.65	67.76
3+/P Molar	2.13	2.26	1.38	3.17	2.30	3.88

Table C3, cont.

Element	**WSWPST2B_2.3E**	**WSWPST2B_3.3E**	**WSWPST2B_4.2E**	**WSWPST2B_5.2E**	**WSWPST2B_6.3E**	**WSWPST2B_7.2E**
Li7	0.00000	0.00001	0.00030	0.00000	0.00000	0.00002
Be9	0.00246	0.00656	0.01436	0.00129	0.00076	0.02283
B11	0.00002	0.00002	0.00000	0.00001	0.00003	0.00003
F19	0.00010	0.00017	0.00014	0.00015	0.00014	0.00014
Na23	0.01002	0.01234	0.01228	0.01187	0.01076	0.03316
Al27	0.02071	0.02187	0.02043	0.02373	0.02423	0.09725
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00326	0.00368	0.00644	0.00277	0.00265	0.00787
K39	0.00343	0.00394	0.00423	0.00392	0.00344	0.10587
Ca40	0.01499	0.01580	0.01920	0.01850	0.01464	0.02839
Sc45	0.04952	0.02595	0.05468	0.07632	0.06371	0.04932
Ti48	0.00802	0.00367	0.00711	0.01128	0.01075	0.00813
Ti49	0.00058	0.00028	0.00055	0.00085	0.00083	0.00063
Fe56	0.00058	0.00059	0.00064	0.00065	0.00072	0.00201
Y89	0.34104	0.59183	0.97394	0.24928	0.21745	1.28611
Nb93	0.00045	0.00214	0.00189	0.00020	0.00023	0.00395
Zr94H	0.00772	0.00758	0.00728	0.00773	0.00699	0.00556
Zr96	2.40900	2.45972	2.45906	2.45202	2.42382	2.39343
La139	0.00001	0.00000	0.00001	0.00001	0.00000	0.00080
Ce140	0.01053	0.01405	0.02821	0.01055	0.01163	0.04291
Nd146	0.00015	0.00008	0.00024	0.00020	0.00012	0.00089
Sm147	0.00030	0.00019	0.00068	0.00035	0.00029	0.00076
Eu153	0.00024	0.00007	0.00033	0.00036	0.00032	0.00049
Gd155	0.00077	0.00077	0.00205	0.00064	0.00062	0.00255
Ho165	0.00627	0.00987	0.01765	0.00458	0.00398	0.02360
TbO175	0.00147	0.00175	0.00414	0.00112	0.00095	0.00531
DyO179	0.00329	0.00476	0.00975	0.00247	0.00202	0.01247
ErO182	0.00528	0.00896	0.01472	0.00401	0.00347	0.01942
TmO185	0.00247	0.00444	0.00666	0.00194	0.00164	0.00912
YbO188	0.00342	0.00542	0.00817	0.00267	0.00240	0.01098
LuO191	0.00336	0.00551	0.00770	0.00284	0.00248	0.01020
Zr2O	0.01765	0.01850	0.01787	0.01866	0.01752	0.01718
HfO196	0.15507	0.19366	0.17138	0.15161	0.15101	0.17501
Pb206	0.00003	0.00002	0.00004	0.00002	0.00002	0.00004
207/206	0.24390	0.00000	0.00000	0.00000	0.66667	0.66667
ThO248	0.00676	0.02444	0.07659	0.00513	0.00543	0.06573
UO254	0.00435	0.01910	0.02944	0.00270	0.00264	0.03477
	38394.21	38394.23	38394.25	38394.24	38394.27	38394.29
206/238 Age	115.69	23.51	26.80	124.24	144.30	23.77
Li ppm Est	0.00	0.01	0.18	0.00	0.00	0.01
Be9 ppm	7.66	20.46	44.77	4.01	2.38	71.18
B11 ppm	0.16	0.15	0.03	0.06	0.30	0.30
F19 ppm	13.19	22.58	18.55	19.77	18.62	17.96
Na ppm Est.	2.37	2.92	2.91	2.81	2.55	7.85
Al27 ppm Est.	13.78	14.56	13.60	15.80	16.13	64.73
Si30						
P31 ppm	277.56	313.12	547.91	236.23	225.39	669.69
K39 Rel.	0.59	0.68	0.73	0.68	0.59	18.27
Ca40 ppm Est.	1.96	2.06	2.50	2.41	1.91	3.70
Sc45 ppm	43.56	22.83	48.10	67.13	56.04	43.39
48/49	13.74	13.09	12.90	13.31	12.99	12.91
Ti48 ppm	23.07	10.54	20.43	32.42	30.91	23.38
Ti49 ppm	22.32	10.70	21.05	32.37	31.63	24.08
Fe56 ppm	0.85	0.86	0.94	0.95	1.06	2.93
Y89 ppm	804.89	1396.78	2298.59	588.31	513.21	3035.33
Nb93 ppm	4.53	21.74	19.19	1.98	2.36	40.13
Zr94H Rel.	0.75	0.74	0.71	0.75	0.68	0.54
Zr96/Si30 ppm	2.41	2.46	2.46	2.45	2.42	2.39

Table C3, cont.

	WSWPST2B_2.3E	WSWPST2B_3.3E	WSWPST2B_4.2E	WSWPST2B_5.2E	WSWPST2B_6.3E	WSWPST2B_7.2E
La139 ppm	0.04	0.02	0.04	0.07	0.03	5.37
Ce140 ppm	76.33	101.82	204.44	76.47	84.33	311.02
Pr ppm	2.15	1.08	3.28	2.74	1.64	12.30
Nd146 ppm	4.06	2.58	9.35	4.85	4.00	10.48
Sm147 ppm	1.15	0.34	1.59	1.72	1.54	2.38
Eu153 ppm	31.39	31.40	83.76	26.12	25.25	104.34
Gd155 ppm	35.42	55.73	99.65	25.86	22.47	133.27
Ho165 ppm	9.84	11.71	27.66	7.46	6.37	35.47
TbO175 ppm	97.38	140.70	288.51	73.20	59.69	368.81
DyO179 ppm	140.57	238.50	392.02	106.75	92.46	517.13
ErO182 ppm	25.68	46.23	69.29	20.21	17.07	94.90
TmO185 ppm	209.79	332.78	501.82	164.08	147.36	674.16
YbO188 ppm	34.03	55.73	77.86	28.72	25.10	103.17
LuO191 ppm	136.49	132.99	137.57	131.43	138.38	139.28
Zr96/Zr2O	56.66	54.07	55.94	53.60	57.09	58.19
196/Si30	9001.70	11241.87	9948.50	8800.97	8766.03	10159.30
Hf ppm	0.24	0.00	0.00	0.00	0.67	0.67
Pb7/6 Est	68.57	247.81	776.50	52.04	55.05	666.32
Th ppm	42.17	185.34	285.67	26.22	25.61	337.45
U ppm						
Y/Nb	177.57	64.25	119.80	296.71	217.77	75.63
Th/U	1.63	1.34	2.72	1.98	2.15	1.97
Yb/Gd	6.68	10.60	5.99	6.28	5.84	6.46
U/Yb	0.20	0.56	0.57	0.16	0.17	0.50
Th/Yb	0.33	0.74	1.55	0.32	0.37	0.99
Ce/Sm	18.80	39.49	21.87	15.77	21.08	29.69
Ce/Lu	2.24	1.83	2.63	2.66	3.36	3.01
U/Ce	0.55	1.82	1.40	0.34	0.30	1.08
Th/Ce	0.90	2.43	3.80	0.68	0.65	2.14
Y/Yb	3.84	4.20	4.58	3.59	3.48	4.50
Yb/Nd	97.66	308.35	153.05	59.94	89.94	54.79
Y/Nb	177.57	64.25	119.80	296.71	217.77	75.63
Yb/Nb	46.28	15.31	26.16	82.75	62.53	16.80
Yb/Sc	4.82	14.58	10.43	2.44	2.63	15.54
Yb/Dy	2.15	2.37	1.74	2.24	2.47	1.83
Dy/Sm	23.98	54.57	30.86	15.09	14.92	35.20
Yb/Nd	97.66	308.35	153.05	59.94	89.94	54.79
Sm/Nd	1.89	2.39	2.85	1.77	2.44	0.85
U/Li	16981.18	35669.44	1547.14	#DIV/0!	19923.79	30237.85
Estimated temperature						
Temp Ti48	815.49	741.53	803.32	851.10	845.96	816.85
Temp Ti49	812.16	742.85	806.30	850.92	848.44	819.84
Hf ppm	9001.70	11241.87	9948.50	8800.97	8766.03	10159.30
Ferry Temp	867.84	787.34	860.99	913.36	910.44	876.83
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	849.29	775.32	843.03	890.80	888.15	857.52

Table C3, cont.

	WSWPST2B_2.3E	WSWPST2B_3.3E	WSWPST2B_4.2E	WSWPST2B_5.2E	WSWPST2B_6.3E	WSWPST2B_7.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.12	0.05	0.12	0.23	0.09	16.84
Ce Ch (0.82)	93.09	124.18	249.32	93.26	102.84	379.30
Pr Ch (0.121)	1.12	0.55	1.51	1.66	0.87	18.89
Nd Ch (0.615)	3.49	1.75	5.33	4.45	2.66	20.01
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	20.30	12.89	46.74	24.25	20.00	52.38
Eu Ch (0.076)	15.12	4.46	20.98	22.64	20.26	31.28
Gd Ch (0.267)	117.56	117.60	313.72	97.82	94.57	390.77
Tb Ch (0.0493)	199.66	237.60	560.96	151.36	129.26	719.41
Dy Ch (0.33)	295.08	426.37	874.27	221.83	180.88	1117.59
Ho Ch (0.0755)	469.11	738.19	1319.91	342.48	297.65	1765.20
Er Ch (0.216)	650.79	1104.16	1814.89	494.20	428.04	2394.10
Tm Ch (0.0329)	780.61	1405.20	2106.23	614.16	518.83	2884.44
Yb Ch (0.221)	949.26	1505.78	2270.66	742.44	666.77	3050.51
Lu Ch (0.033)	1031.29	1688.86	2359.40	870.20	760.62	3126.36
Ce/Ce*	258.80	723.59	581.07	151.24	361.59	21.26
Hf ppm	9001.70	11241.87	9948.50	8800.97	8766.03	10159.30
Eu/Eu*	0.31	0.11	0.17	0.46	0.47	0.22
P Molar	8.96	10.11	17.69	7.63	7.28	21.62
3+ Molar	13.86	79.99	14.55	75.88	15.27	52.37
3+/P Molar	1.52	3.86	1.62	2.67	1.62	3.63

Table C3, cont.

Element	WSWPST2B_8.2E	WSWPST2B_9.2E	WSWPST2B_10.1E	WSWPST2B_11.3E	WSWPST2B_12.3E
Li7	0.00001	0.00000	0.00001	0.00012	0.00001
Be9	0.00157	0.00242	0.00330	0.00785	0.00055
B11	0.00001	0.00002	0.00001	0.00003	0.00001
F19	0.00014	0.00012	0.00014	0.00016	0.00008
Na23	0.01263	0.01001	0.01218	0.03738	0.01089
Al27	0.02402	0.02134	0.02061	0.05228	0.02708
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00332	0.00327	0.00344	0.00256	0.00261
K39	0.00374	0.00368	0.00427	0.04213	0.00280
Ca40	0.01883	0.01603	0.02087	0.02653	0.01455
Sc45	0.06006	0.06476	0.02813	0.06656	0.06739
Ti48	0.00980	0.00837	0.00565	0.00369	0.01279
Ti49	0.00073	0.00062	0.00043	0.00029	0.00094
Fe56	0.00088	0.00066	0.00080	0.00900	0.00066
Y89	0.31998	0.33860	0.38262	0.53607	0.19178
Nb93	0.00037	0.00040	0.00059	0.00224	0.00017
Zr94H	0.00702	0.00724	0.00641	0.00667	0.00616
Zr96	2.44048	2.42522	2.41084	2.42321	2.43534
La139	0.00000	0.00004	0.00000	0.00017	0.00000
Ce140	0.01279	0.01323	0.01039	0.02169	0.01161
Nd146	0.00019	0.00017	0.00009	0.00019	0.00014
Sm147	0.00031	0.00039	0.00025	0.00017	0.00023
Eu153	0.00032	0.00039	0.00016	0.00011	0.00029
Gd155	0.00083	0.00076	0.00076	0.00049	0.00052
Ho165	0.00587	0.00590	0.00689	0.00792	0.00347
TbO175	0.00142	0.00142	0.00162	0.00113	0.00081
DyO179	0.00307	0.00318	0.00388	0.00338	0.00183
ErO182	0.00525	0.00521	0.00650	0.00892	0.00307
TmO185	0.00256	0.00268	0.00294	0.00540	0.00153
YbO188	0.00350	0.00362	0.00379	0.00769	0.00200
LuO191	0.00352	0.00383	0.00372	0.00893	0.00236
Zr2O	0.01919	0.01768	0.01695	0.02047	0.01829
HfO196	0.16413	0.16673	0.17131	0.22034	0.15129
Pb206	0.00002	0.00001	0.00002	0.00005	0.00002
207/206	3.20000	0.50000	0.00000	0.28169	0.96774
ThO248	0.00916	0.01317	0.01130	0.05950	0.00469
UO254	0.00518	0.00749	0.00731	0.04330	0.00218
	38394.30	38394.32	38394.33	38394.35	38394.36
206/238 Age	65.69	34.96	59.36	23.78	186.83
Li ppm Est	0.01	0.00	0.00	0.07	0.01
Be9 ppm	4.90	7.54	10.30	24.48	1.72
B11 ppm	0.12	0.15	0.10	0.33	0.05
F19 ppm	18.62	15.37	18.86	20.32	11.12
Na ppm Est.	2.99	2.37	2.88	8.85	2.58
Al27 ppm Est.	15.99	14.20	13.72	34.80	18.03
Si30					
P31 ppm	282.43	278.00	292.65	218.02	222.57
K39 Rel.	0.65	0.64	0.74	7.27	0.48
Ca40 ppm Est.	2.46	2.09	2.72	3.46	1.90
Sc45 ppm	52.83	56.96	24.74	58.55	59.28
48/49	13.45	13.42	13.00	12.53	13.66
Ti48 ppm	28.17	24.07	16.24	10.59	36.77
Ti49 ppm	27.84	23.84	16.60	11.24	35.78
Fe56 ppm	1.29	0.97	1.17	13.12	0.96
Y89 ppm	755.18	799.13	903.02	1265.18	452.63
Nb93 ppm	3.72	4.11	6.02	22.79	1.68
Zr94H Rel.	0.68	0.70	0.62	0.65	0.60
Zr96/Si30 ppm	2.44	2.43	2.41	2.42	2.44

Table C3, cont.

	WSWPST2B_8.2E	**WSWPST2B_9.2E**	**WSWPST2B_10.1E**	**WSWPST2B_11.3E**	**WSWPST2B_12.3E**
La139 ppm	0.03	0.25	0.02	1.11	0.01
Ce140 ppm	92.73	95.93	75.29	157.23	84.15
Pr ppm	2.62	2.40	1.24	2.67	1.92
Nd146 ppm	4.23	5.37	3.42	2.40	3.18
Sm147 ppm	1.54	1.88	0.79	0.53	1.41
Eu153 ppm	34.04	31.08	31.21	19.99	21.11
Gd155 ppm	33.13	33.30	38.88	44.69	19.58
Ho165 ppm	9.51	9.49	10.80	7.53	5.44
TbO175 ppm	90.82	93.96	114.67	100.09	54.21
DyO179 ppm	139.71	138.80	173.04	237.58	81.84
ErO182 ppm	26.69	27.92	30.56	56.21	15.94
TmO185 ppm	214.64	222.46	232.62	472.24	122.79
YbO188 ppm	35.63	38.73	37.64	90.38	23.87
LuO191 ppm	127.15	137.21	142.19	118.39	133.15
Zr96/Zr2O	52.10	56.58	58.98	48.86	54.67
196/Si30	9528.11	9678.97	9944.63	12791.05	8782.52
Hf ppm	3.20	0.50	0.00	0.28	0.97
Pb7/6 Est	92.88	133.51	114.59	603.24	47.51
Th ppm	50.24	72.70	70.95	420.22	21.12
U ppm					
Y/Nb	203.01	194.36	150.12	55.52	269.00
Th/U	1.85	1.84	1.62	1.44	2.25
Yb/Gd	6.31	7.16	7.45	23.63	5.82
U/Yb	0.23	0.33	0.30	0.89	0.17
Th/Yb	0.43	0.60	0.49	1.28	0.39
Ce/Sm	21.94	17.87	21.99	65.48	26.50
Ce/Lu	2.60	2.48	2.00	1.74	3.52
U/Ce	0.54	0.76	0.94	2.67	0.25
Th/Ce	1.00	1.39	1.52	3.84	0.56
Y/Yb	3.52	3.59	3.88	2.68	3.69
Yb/Nd	81.98	92.70	187.19	176.60	63.96
Y/Nb	203.01	194.36	150.12	55.52	269.00
Yb/Nb	57.70	54.10	38.67	20.72	72.97
Yb/Sc	4.06	3.91	9.40	8.07	2.07
Yb/Dy	2.36	2.37	2.03	4.72	2.27
Dy/Sm	21.49	17.50	33.49	41.68	17.07
Yb/Nd	81.98	92.70	187.19	176.60	63.96
Sm/Nd	1.61	2.24	2.76	0.90	1.65
U/Li	9117.31	27408.64	17759.11	5723.11	3180.17
Estimated temperature					
Temp Ti48	836.10	819.82	781.05	741.99	864.87
Temp Ti49	834.89	818.83	783.15	747.21	861.87
Hf ppm	9528.11	9678.97	9944.63	12791.05	8782.52
Ferry Temp	894.49	875.64	834.01	792.37	926.28
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	873.62	856.43	818.29	779.97	902.55

Table C3, cont.

	WSWPST2B_8.2E	WSWPST2B_9.2E	WSWPST2B_10.1E	WSWPST2B_11.3E	WSWPST2B_12.3E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.10	0.79	0.07	3.47	0.03
Ce Ch (0.82)	113.08	116.98	91.82	191.75	102.62
Pr Ch (0.121)	1.22	2.30	0.65	4.03	0.64
Nd Ch (0.615)	4.26	3.90	2.02	4.35	3.12
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	21.13	26.85	17.12	12.01	15.88
Eu Ch (0.076)	20.21	24.77	10.39	6.95	18.52
Gd Ch (0.267)	127.48	116.40	116.88	74.86	79.05
Tb Ch (0.0493)	192.88	192.47	219.00	152.74	110.26
Dy Ch (0.33)	275.21	284.74	347.49	303.30	164.27
Ho Ch (0.0755)	438.83	441.00	514.92	591.97	259.29
Er Ch (0.216)	646.80	642.58	801.12	1099.91	378.89
Tm Ch (0.0329)	811.34	848.70	928.89	1708.58	484.46
Yb Ch (0.221)	971.22	1006.60	1052.59	2136.84	555.59
Lu Ch (0.033)	1079.72	1173.49	1140.64	2738.91	723.42
Ce/Ce*	324.73	86.63	432.69	51.22	771.87
Hf ppm	9528.11	9678.97	9944.63	12791.05	8782.52
Eu/Eu*	0.39	0.44	0.23	0.23	0.52
P Molar	9.12	8.98	9.45	7.04	7.19
3+ Molar	13.16	22.77	9.10	10.75	19.75
3+/P Molar	1.98	3.23	1.27	1.53	2.66

Table C3, cont.

Element	WSWPST2B_12.2E	WSWPST2B_13.2E
Li7	0.00000	0.00025
Be9	0.00125	0.00852
B11	0.00001	0.00001
F19	0.00011	0.00016
Na23	0.01244	0.02853
Al27	0.02658	0.02972
Si30	1.00000	1.00000
P31	0.00256	0.00767
K39	0.00401	0.00663
Ca40	0.02274	0.04175
Sc45	0.08217	0.04215
Ti48	0.01109	0.00419
Ti49	0.00080	0.00034
Fe56	0.00071	0.00140
Y89	0.22738	0.74141
Nb93	0.00019	0.00090
Zr94H	0.00661	0.00588
Zr96	2.36923	2.41452
La139	0.00000	0.00000
Ce140	0.01041	0.01051
Nd146	0.00017	0.00012
Sm147	0.00027	0.00038
Eu153	0.00038	0.00014
Gd155	0.00061	0.00106
Ho165	0.00429	0.01255
TbO175	0.00113	0.00266
DyO179	0.00237	0.00671
ErO182	0.00363	0.01183
TmO185	0.00175	0.00608
YbO188	0.00249	0.00739
LuO191	0.00275	0.00751
Zr2O	0.01947	0.01729
HfO196	0.14883	0.19017
Pb206	0.00001	0.00002
207/206	1.42857	1.17647
ThO248	0.00435	0.02086
UO254	0.00183	0.01548
	38394.36	38394.38
206/238 Age	158.00	31.99
Li ppm Est	0.00	0.15
Be9 ppm	3.89	26.56
B11 ppm	0.07	0.08
F19 ppm	13.90	20.89
Na ppm Est.	2.94	6.75
Al27 ppm Est.	17.69	19.78
Si30		
P31 ppm	217.97	652.55
K39 Rel.	0.69	1.14
Ca40 ppm Est.	2.97	5.45
Sc45 ppm	72.28	37.08
48/49	13.84	12.34
Ti48 ppm	31.89	12.05
Ti49 ppm	30.63	12.98
Fe56 ppm	1.03	2.04
Y89 ppm	536.64	1749.79
Nb93 ppm	1.90	9.12
Zr94H Rel.	0.64	0.57
Zr96/Si30 ppm	2.37	2.41

Table C3, cont.

	WSWPST2B_12.2E	WSWPST2B_13.2E
La139 ppm	0.03	0.02
Ce140 ppm	75.43	76.15
Pr ppm	2.39	1.70
Nd146 ppm	3.68	5.21
Sm147 ppm	1.85	0.68
Eu153 ppm	24.90	43.51
Gd155 ppm	24.21	70.86
Ho165 ppm	7.55	17.77
TbO175 ppm	70.06	198.43
DyO179 ppm	96.77	315.13
ErO182 ppm	18.24	63.33
TmO185 ppm	152.60	453.45
YbO188 ppm	27.86	75.94
LuO191 ppm	121.71	139.68
Zr96/Zr2O	51.37	57.85
196/Si30	8639.75	11039.39
Hf ppm	1.43	1.18
Pb7/6 Est	44.14	211.49
Th ppm	17.75	150.23
U ppm		
Y/Nb	281.75	191.86
Th/U	2.49	1.41
Yb/Gd	6.13	10.42
U/Yb	0.12	0.33
Th/Yb	0.29	0.47
Ce/Sm	20.51	14.63
Ce/Lu	2.71	1.00
U/Ce	0.24	1.97
Th/Ce	0.59	2.78
Y/Yb	3.52	3.86
Yb/Nd	63.72	267.48
Y/Nb	281.75	191.86
Yb/Nb	80.12	49.72
Yb/Sc	2.11	12.23
Yb/Dy	2.18	2.29
Dy/Sm	19.05	38.12
Yb/Nd	63.72	267.48
Sm/Nd	1.54	3.07
U/Li	6368.69	979.45
Estimated temperature		
Temp Ti48	849.33	753.45
Temp Ti49	844.98	760.18
Hf ppm	8639.75	11039.39
Ferry Temp	906.36	807.37
Act Ti	0.70	0.70
Act Si	1.00	1.00
Temp. Est.	884.44	793.79

Table C3, cont.

	WSWPST2B_12.2E	WSWPST2B_13.2E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)		
La Ch (0.319)	0.10	0.06
Ce Ch (0.82)	91.99	92.87
Pr Ch (0.121)	1.15	0.77
Nd Ch (0.615)	3.89	2.76
Pm	0.00	0.00
Sm Ch (0.2)	18.39	26.03
Eu Ch (0.076)	24.28	8.98
Gd Ch (0.267)	93.26	162.96
Tb Ch (0.0493)	153.14	360.38
Dy Ch (0.33)	212.30	601.31
Ho Ch (0.0755)	320.65	938.60
Er Ch (0.216)	448.01	1458.93
Tm Ch (0.0329)	554.37	1924.93
Yb Ch (0.221)	690.51	2051.82
Lu Ch (0.033)	844.10	2301.28
Ce/Ce*	270.07	427.77
Hf ppm	8639.75	11039.39
Eu/Eu*	0.59	0.14
P Molar	7.04	21.07
3+ Molar	182.95	28.46
3+/P Molar	3.51	1.35

Table C4. SHRIMP-RG trace element analyses of zircon grains from PSTG01C.

Element	PSTG01C-1.2CDK	PSTG01C-2.1CDK	PSTG01C-3.1CDK	PSTG01C-6.1CDK	PSTG01C-6.2CDK	PSTG01C-8.1CDK
Li7	0.00006	0.00007	0.00007	0.00007	0.00000	0.00010
Be9	0.00007	0.00001	0.00125	0.00057	0.00000	0.00016
B11	0.00001	0.00001	0.00001	0.00001	0.00001	0.00004
F19	0.00028	0.00026	0.00043	0.00036	0.00018	0.00056
Na23	0.05754	0.05192	0.04942	0.03239	0.05036	0.08003
Mg24	0.01935	0.01709	0.02665	0.01179	0.02381	0.03565
Al27	0.02197	0.02034	0.02082	0.01531	0.02198	0.04618
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00502	0.00298	0.00786	0.00328	0.00263	0.00809
S32	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01503	0.01472	0.01355	0.00934	0.01484	0.02394
Ca40	0.04309	0.03008	0.03253	0.02039	0.03169	0.05796
Sc45	0.07741	0.07560	0.11783	0.04757	0.07560	0.04178
Ti48	0.00702	0.00950	0.00912	0.00450	0.00449	0.00696
Ti49	0.00053	0.00067	0.00068	0.00034	0.00030	0.00051
V51	0.00002	0.00003	0.00004	0.00004	0.00000	0.00001
Cr52	0.00003	0.00006	0.00005	0.00004	0.00002	0.00003
Mn55	0.00017	0.00014	0.00012	0.00008	0.00015	0.00024
Fe56	0.00129	0.00099	0.00106	0.00081	0.00149	0.00242
Ge74	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Y89	0.83798	0.58147	2.39037	1.15394	0.47610	2.16724
Nb93	0.00157	0.00017	0.00151	0.00092	0.00104	0.00161
Zr94H	0.00408	0.00411	0.00466	0.00499	0.00421	0.00450
Zr96	1.97683	2.00756	1.99933	2.03286	1.99534	2.00349
La139	0.00001	0.00001	0.00006	0.00001	0.00000	0.00002
Ce140	0.02340	0.01199	0.05683	0.01600	0.01097	0.03261
Pr141	0.00009	0.00031	0.00048	0.00013	0.00003	0.00032
Nd146	0.00022	0.00069	0.00187	0.00043	0.00007	0.00092
Sm147	0.00061	0.00102	0.00385	0.00094	0.00021	0.00218
Eu153	0.00044	0.00087	0.00341	0.00065	0.00015	0.00141
Ho165	0.01534	0.01084	0.04568	0.02037	0.00777	0.04254
GdO173	0.00230	0.00246	0.01044	0.00293	0.00086	0.00769
TbO175	0.00421	0.00372	0.01611	0.00545	0.00171	0.01344
DyO179	0.01000	0.00771	0.03361	0.01324	0.00449	0.03103
ErO182	0.01672	0.01117	0.04545	0.02214	0.00923	0.04093
TmO185	0.00789	0.00532	0.02034	0.01071	0.00503	0.01841
YbO188	0.01075	0.00672	0.02670	0.01384	0.00755	0.02144
LuO191	0.00988	0.00661	0.02481	0.01301	0.00789	0.01825
Zr2O	0.01660	0.01614	0.01724	0.01895	0.01657	0.01566
HfO196	0.17363	0.16312	0.16128	0.18974	0.18731	0.16759
Pb206	0.00003	0.00001	0.00004	0.00003	0.00002	0.00004
207/206	0.17544	0.00000	0.13333	0.28846	0.25000	0.00000
ThO248	0.03071	0.01277	0.11792	0.04384	0.01382	0.07907
UO254	0.01944	0.00566	0.03799	0.02456	0.01424	0.03442
	38163.22	38163.23	38163.24	38163.28	38163.29	38163.34
206/238 Age	24.00	24.08	15.55	16.92	24.82	18.89
Li ppm Est	0.04	0.04	0.04	0.04	0.00	0.06
Be9 ppm	0.16	0.03	3.11	1.43	0.01	0.39
B11 ppm	0.11	0.09	0.07	0.07	0.06	0.30
F19 ppm	24.77	22.68	38.18	31.57	16.34	49.62
Na ppm Est.	5.48	4.94	4.70	3.08	4.79	7.62
Mg ppm Est.	1.64	1.45	2.25	1.00	2.01	3.01
Al27 ppm Est.	8.35	7.73	7.91	5.82	8.35	17.55
Si30						
P31 ppm	465.94	276.40	730.03	304.25	244.52	751.07
S32 Rel.	0.83	0.52	0.96	0.08	0.18	0.32

Table C4, cont.

	PSTG01C-1.2CDK	PSTG01C-2.1CDK	PSTG01C-3.1CDK	PSTG01C-6.1CDK	PSTG01C-6.2CDK	PSTG01C-8.1CDK
K39 Rel.	1.81	1.77	1.63	1.12	1.78	2.88
Ca40 ppm Est.	4.61	3.22	3.48	2.18	3.39	6.20
Sc45 ppm	64.54	63.03	98.23	39.66	63.03	34.83
48/49						
Ti48 ppm						
Ti49 ppm	18.90	23.84	24.17	12.21	10.76	18.06
V51 ppm Rel.	0.14	0.17	0.23	0.27	0.02	0.04
Cr Rel.	0.04	0.07	0.06	0.05	0.02	0.04
Mn Rel.	0.07	0.06	0.05	0.04	0.07	0.10
Fe56 ppm	1.53	1.17	1.26	0.95	1.76	2.86
Ge74 Rel.	0.31	0.29	0.27	0.39	0.23	0.32
Y89 ppm	2106.57	1461.73	6009.04	2900.83	1196.84	5448.13
Nb93 ppm	21.09	2.31	20.23	12.38	13.96	21.63
Zr94H Rel.	0.79	0.79	0.90	0.96	0.81	0.87
Zr96/Si30 ppm	1.98	2.01	2.00	2.03	2.00	2.00
La139 ppm	0.04	0.03	0.24	0.03	0.02	0.09
Ce140 ppm	182.31	93.39	442.68	124.68	85.44	254.04
Pr ppm	0.16	0.54	0.85	0.23	0.05	0.57
Nd146 ppm	3.07	9.61	25.85	5.97	1.02	12.73
Sm147 ppm	8.24	13.80	52.30	12.72	2.87	29.69
Eu153 ppm	1.91	3.79	14.80	2.83	0.64	6.11
Gd155 ppm	90.35	63.84	269.08	119.98	45.75	250.62
Ho165 ppm	71.56	76.45	324.71	91.17	26.83	239.08
TbO175 ppm	23.19	20.47	88.66	30.01	9.42	73.94
DyO179 ppm	241.96	186.47	813.30	320.35	108.52	750.75
ErO182 ppm	366.81	245.04	996.89	485.54	202.40	897.70
TmO185 ppm	67.12	45.29	173.13	91.12	42.84	156.69
YbO188 ppm	523.13	327.33	1299.85	673.67	367.40	1043.48
LuO191 ppm	85.08	56.95	213.66	112.07	67.95	157.13
Zr96/Zr2O	119.06	124.36	115.99	107.26	120.39	127.92
196/Si30	60.23	61.95	58.02	52.76	60.34	63.85
Hf ppm	9307.37	8743.95	8645.23	10170.89	10040.59	8983.33
Pb7/6 Est	0.18	0.00	0.13	0.29	0.25	0.00
Th ppm	291.86	121.36	1120.60	416.65	131.31	751.40
U ppm	169.81	49.45	331.88	214.61	124.42	300.71
Y/Nb	99.87	632.34	296.99	234.38	85.73	251.82
Th/U	1.72	2.45	3.38	1.94	1.06	2.50
Yb/Gd	7.31	4.28	4.00	7.39	13.70	4.36
U/Yb	170.60	34.04	50.28	112.82	360.61	81.98
Th/Yb	0.32	0.15	0.26	0.32	0.34	0.29
Ce/Sm	0.56	0.37	0.86	0.62	0.36	0.72
Ce/Lu	22.13	6.77	8.46	9.81	29.80	8.56
U/Ce	2.14	1.64	2.07	1.11	1.26	1.62
Th/Ce	0.93	0.53	0.75	1.72	1.46	1.18
Y/Yb	1.60	1.30	2.53	3.34	1.54	2.96
Yb/Nd	4.03	4.47	4.62	4.31	3.26	5.22
Y/Nb	99.87	632.34	296.99	234.38	85.73	251.82
Yb/Nb	24.80	141.60	64.24	54.43	26.32	48.23
Yb/Sc	8.11	5.19	13.23	16.99	5.83	29.96
Yb/Dy	2.16	1.76	1.60	2.10	3.39	1.39
Dy/Sm	29.37	13.51	15.55	25.19	37.86	25.29
Yb/Nd	170.60	34.04	50.28	112.82	360.61	81.98
Sm/Nd	2.69	1.44	2.02	2.13	2.81	2.33
U/Li	4333.35	1148.39	7543.11	5047.47	#DIV/0!	4974.72

Table C4, cont.

	PSTG01C-1.2CDK	PSTG01C-2.1CDK	PSTG01C-3.1CDK	PSTG01C-6.1CDK	PSTG01C-6.2CDK	PSTG01C-8.1CDK
Temp Ti48						
Temp Ti49	795.70	818.86	820.24	754.64	743.40	791.28
Hf ppm	9307.37	8743.95	8645.23	10170.89	10040.59	8983.33
Ferry Temp	848.62	875.68	877.30	800.96	787.98	843.47
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	831.70	856.46	857.94	787.88	775.91	826.98
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.12	0.08	0.76	0.10	0.06	0.28
Ce Ch (0.82)	222.33	113.89	539.85	152.05	104.19	309.81
Pr Ch (0.121)	1.43	2.70	11.04	2.14	0.54	4.93
Nd Ch (0.615)	4.99	15.63	42.03	9.71	1.66	20.70
Pm						
Sm Ch (0.2)	41.19	69.02	261.51	63.58	14.33	148.44
Eu Ch (0.076)	25.11	49.81	194.69	37.25	8.48	80.33
Gd Ch (0.267)	268.00	286.32	1216.14	341.44	100.47	895.41
Tb Ch (0.0493)	470.42	415.22	1798.41	608.77	191.15	1499.87
Dy Ch (0.33)	733.22	565.05	2464.55	970.75	328.86	2275.00
Ho Ch (0.0755)	1196.75	845.52	3563.97	1589.09	605.95	3319.48
Er Ch (0.216)	1698.18	1134.46	4615.24	2247.87	937.05	4156.04
Tm Ch (0.0329)	2040.26	1376.53	5262.46	2769.69	1302.17	4762.55
Yb Ch (0.221)	2367.10	1481.11	5881.66	3048.29	1662.46	4721.64
Lu Ch (0.033)	2578.12	1725.87	6474.57	3396.03	2059.00	4761.49
Ce/Ce*	545.21	243.42	186.33	321.48	601.81	264.19
Hf ppm	9307.37	8743.95	8645.23	10170.89	10040.59	8983.33
Eu/Eu*	0.24	0.35	0.35	0.25	0.22	0.22
P Molar	15.04	8.92	23.57	9.82	7.90	24.25
3+ Molar	35.26	24.80	98.54	45.99	20.65	85.54
3+/P Molar	2.34	2.78	4.18	4.68	2.62	3.53

Table C4, cont.

Element	PSTG01C-1.2IDK	PSTG01C-2.1CDK	PSTG01C-3.2IDK	PSTG01C-5.4CDK	PSTG01C-6.3CDK
Li7	0.00026	0.00010	0.00004	0.00004	0.00007
Be9	0.00005	0.00620	0.00002	0.00156	0.00000
B11	0.00002	0.00002	0.00002	0.00001	0.00001
F19	0.00028	0.00071	0.00026	0.00025	0.00027
Na23	0.06339	0.06291	0.06086	0.05956	0.05428
Mg24	0.01987	0.01491	0.02678	0.01669	0.01854
Al27	0.02735	0.02523	0.02377	0.02066	0.02079
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00724	0.01220	0.00356	0.00523	0.00225
S32	0.00001	0.00001	0.00001	0.00000	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01626	0.01639	0.01446	0.01467	0.01365
Ca40	0.02695	0.02805	0.02911	0.02923	0.03127
Sc45	0.04588	0.04503	0.06117	0.04755	0.03634
Ti48	0.00525	0.00644	0.00519	0.00664	0.00532
Ti49	0.00041	0.00051	0.00039	0.00049	0.00038
V51	0.00003	0.00014	0.00001	0.00007	0.00006
Cr52	0.00007	0.00006	0.00007	0.00006	0.00006
Mn55	0.00013	0.00014	0.00010	0.00014	0.00024
Fe56	0.00442	0.00082	0.00089	0.00081	0.00286
Ge74	0.00000	0.00001	0.00001	0.00001	0.00001
Y89	0.61563	3.45016	0.55495	0.82684	0.49928
Nb93	0.00071	0.00407	0.00119	0.00138	0.00024
Zr94H	0.00753	0.00771	0.00789	0.00670	0.00663
Zr96	1.99324	1.94384	1.98145	1.95509	1.99008
La139	0.00000	0.00002	0.00000	0.00000	0.00001
Ce140	0.00973	0.05087	0.01314	0.02120	0.00973
Pr141	0.00009	0.00044	0.00008	0.00013	0.00004
Nd146	0.00011	0.00094	0.00014	0.00020	0.00013
Sm147	0.00042	0.00281	0.00032	0.00064	0.00041
Eu153	0.00028	0.00086	0.00024	0.00040	0.00043
Ho165	0.01125	0.06519	0.00950	0.01489	0.00921
GdO173	0.00157	0.01023	0.00119	0.00228	0.00153
TbO175	0.00306	0.01966	0.00241	0.00426	0.00282
DyO179	0.00722	0.04604	0.00590	0.01019	0.00642
ErO182	0.01160	0.06421	0.01066	0.01511	0.00940
TmO185	0.00567	0.02890	0.00560	0.00700	0.00465
YbO188	0.00698	0.03314	0.00757	0.00853	0.00585
LuO191	0.00628	0.02770	0.00751	0.00760	0.00577
Zr2O	0.01595	0.01474	0.01604	0.01528	0.01597
HfO196	0.16251	0.15671	0.18236	0.16463	0.18006
Pb206	0.00002	0.00007	0.00003	0.00003	0.00002
207/206	0.57143	0.35398	0.61224	0.00000	0.00000
ThO248	0.01710	0.13093	0.02643	0.03362	0.01265
UO254	0.01238	0.06136	0.01940	0.01967	0.00698
	38161.82	38161.83	38161.86	38161.93	38161.95
206/238 Age	26.58	18.26	23.23	27.41	37.78
Li ppm Est	0.17	0.06	0.03	0.02	0.04
Be9 ppm	0.11	15.47	0.05	3.88	0.00
B11 ppm	0.14	0.15	0.13	0.11	0.12
F19 ppm	24.51	63.07	22.94	22.12	24.27
Na ppm Est.	6.03	5.99	5.79	5.67	5.17
Mg ppm Est.	1.68	1.26	2.27	1.41	1.57
Al27 ppm Est.	10.39	9.59	9.03	7.85	7.90
Si30					
P31 ppm	672.53	1132.26	330.15	485.58	208.94
S32 Rel.	0.58	0.81	0.56	0.20	0.58

Table C4, cont.

	PSTG01C-1.2IDK	PSTG01C-2.1CDK	PSTG01C-3.2IDK	PSTG01C-5.4CDK	PSTG01C-6.3CDK
K39 Rel.	1.95	1.97	1.74	1.76	1.64
Ca40 ppm Est.	2.88	3.00	3.11	3.13	3.35
Sc45 ppm	38.25	37.54	51.00	39.64	30.29
48/49	12.90	12.61	13.41	13.51	14.07
Ti48 ppm	14.50	17.76	14.31	18.32	14.67
Ti49 ppm	14.53	18.22	13.79	17.53	13.48
V51 ppm Rel.	0.19	0.89	0.09	0.41	0.39
Cr Rel.	0.09	0.07	0.08	0.08	0.07
Mn Rel.	0.06	0.06	0.05	0.06	0.10
Fe56 ppm	5.23	0.97	1.05	0.96	3.37
Ge74 Rel.	0.18	0.48	0.45	0.33	0.28
Y89 ppm	1547.62	8673.21	1395.08	2078.55	1255.13
Nb93 ppm	9.57	54.64	15.94	18.47	3.19
Zr94H Rel.	1.46	1.49	1.52	1.29	1.28
Zr96/Si30 ppm	1.99	1.94	1.98	1.96	1.99
La139 ppm	0.02	0.08	0.02	0.02	0.04
Ce140 ppm	75.80	396.31	102.38	165.18	75.77
Pr ppm	0.17	0.77	0.14	0.23	0.07
Nd146 ppm	1.56	13.06	1.87	2.70	1.78
Sm147 ppm	5.77	38.24	4.32	8.69	5.61
Eu153 ppm	1.21	3.72	1.05	1.75	1.87
Gd155 ppm	66.30	384.04	55.99	87.70	54.28
Ho165 ppm	48.73	318.19	36.86	70.76	47.42
TbO175 ppm	16.83	108.17	13.25	23.44	15.54
DyO179 ppm	174.70	1114.07	142.75	246.46	155.32
ErO182 ppm	254.40	1408.28	233.86	331.44	206.07
TmO185 ppm	48.25	245.97	47.63	59.55	39.55
YbO188 ppm	339.67	1613.29	368.35	415.09	284.68
LuO191 ppm	54.09	238.57	64.70	65.41	49.68
Zr96/Zr2O	124.96	131.91	123.55	127.92	124.58
196/Si30	62.69	67.86	62.35	65.43	62.60
Hf ppm	8711.33	8400.40	9774.98	8824.97	9652.13
Pb7/6 Est	0.57	0.35	0.61	0.00	0.00
Th ppm	162.53	1244.30	251.14	319.47	120.22
U ppm	108.18	536.05	169.49	171.82	60.94
Y/Nb	161.72	158.73	87.53	112.52	393.19
Th/U	1.50	2.32	1.48	1.86	1.97
Yb/Gd	6.97	5.07	9.99	5.87	6.00
U/Yb	217.62	123.54	196.74	153.80	159.57
Th/Yb	0.32	0.33	0.46	0.41	0.21
Ce/Sm	0.48	0.77	0.68	0.77	0.42
Ce/Lu	13.13	10.36	23.71	19.01	13.52
U/Ce	1.40	1.66	1.58	2.53	1.53
Th/Ce	1.43	1.35	1.66	1.04	0.80
Y/Yb	2.14	3.14	2.45	1.93	1.59
Yb/Nd	4.56	5.38	3.79	5.01	4.41
Y/Nb	161.72	158.73	87.53	112.52	393.19
Yb/Nb	35.50	29.53	23.11	22.47	89.18
Yb/Sc	8.88	42.98	7.22	10.47	9.40
Yb/Dy	1.94	1.45	2.58	1.68	1.83
Dy/Sm	30.27	29.13	33.05	28.36	27.71
Yb/Nd	217.62	123.54	196.74	153.80	159.57
Sm/Nd	3.70	2.93	2.31	3.22	3.14
U/Li	650.14	8468.17	6021.90	7455.09	1431.66

Table C4, cont.

	PSTG01C-1.2IDK	**PSTG01C-2.1CDK**	**PSTG01C-3.2IDK**	**PSTG01C-5.4CDK**	**PSTG01C-6.3CDK**
Temp Ti48	770.39	789.65	769.19	792.64	771.51
Temp Ti49	770.59	792.09	765.80	788.40	763.66
Hf ppm	8711.33	8400.40	9774.98	8824.97	9652.13
Ferry Temp	819.42	844.41	813.86	840.12	811.39
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	804.89	827.84	799.78	823.90	797.50
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.05	0.25	0.06	0.05	0.11
Ce Ch (0.82)	92.44	483.31	124.85	201.44	92.41
Pr Ch (0.121)	0.70	4.84	0.81	1.01	0.98
Nd Ch (0.615)	2.54	21.23	3.04	4.39	2.90
Pm					
Sm Ch (0.2)	28.86	191.20	21.59	43.46	28.03
Eu Ch (0.076)	15.87	48.98	13.83	22.98	24.61
Gd Ch (0.267)	182.52	1191.73	138.07	265.00	177.59
Tb Ch (0.0493)	341.30	2194.15	268.68	475.47	315.13
Dy Ch (0.33)	529.39	3375.97	432.57	746.85	470.67
Ho Ch (0.0755)	878.12	5086.67	741.54	1161.56	718.90
Er Ch (0.216)	1177.76	6519.83	1082.70	1534.46	954.04
Tm Ch (0.0329)	1466.61	7476.21	1447.66	1809.97	1202.13
Yb Ch (0.221)	1536.97	7299.96	1666.76	1878.23	1288.14
Lu Ch (0.033)	1639.16	7229.28	1960.56	1982.10	1505.49
Ce/Ce*	485.65	438.42	573.19	868.22	279.23
Hf ppm	8711.33	8400.40	9774.98	8824.97	9652.13
Eu/Eu*	0.22	0.10	0.25	0.21	0.35
P Molar	21.72	36.56	10.66	15.68	6.75
3+ Molar	24.83	134.04	23.32	33.28	20.47
3+/P Molar	1.14	3.67	2.19	2.12	3.03

Table C4, cont.

Element	PSTG01C-7.3CDK	PSTG01C-8.1IDK	PSTG01C-9.2IDK	PSTG01C-10.2IDK	PSTG01C-11.2IDK
Li7	0.00016	0.00008	0.00003	0.00004	0.00006
Be9	0.00210	0.00001	0.00009	0.00000	0.00003
B11	0.00002	0.00002	0.00001	0.00001	0.00003
F19	0.00027	0.00034	0.00020	0.00022	0.00021
Na23	0.05871	0.06609	0.05317	0.05916	0.06912
Mg24	0.02088	0.01855	0.01631	0.01702	0.02209
Al27	0.02149	0.02956	0.02125	0.02185	0.02463
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00765	0.00234	0.00337	0.00254	0.00311
S32	0.00000	0.00002	0.00002	0.00001	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01530	0.01490	0.01420	0.01798	0.01534
Ca40	0.03210	0.03002	0.02811	0.02848	0.02564
Sc45	0.07900	0.04778	0.04597	0.03609	0.06381
Ti48	0.01081	0.00623	0.00552	0.00555	0.00710
Ti49	0.00081	0.00044	0.00040	0.00043	0.00051
V51	0.00008	0.00017	0.00005	0.00002	0.00003
Cr52	0.00006	0.00004	0.00007	0.00022	0.00005
Mn55	0.00015	0.00019	0.00008	0.00011	0.00012
Fe56	0.00086	0.00256	0.00083	0.00171	0.00085
Ge74	0.00001	0.00001	0.00000	0.00001	0.00001
Y89	1.15324	0.24339	0.43950	0.28631	0.41773
Nb93	0.00181	0.00023	0.00068	0.00040	0.00055
Zr94H	0.00676	0.00595	0.00617	0.00653	0.00605
Zr96	1.98345	1.97837	1.99946	2.04343	1.98417
La139	0.00001	0.00000	0.00000	0.00000	0.00000
Ce140	0.03525	0.00255	0.01178	0.00871	0.01391
Pr141	0.00012	0.00006	0.00005	0.00006	0.00009
Nd146	0.00043	0.00004	0.00012	0.00008	0.00016
Sm147	0.00114	0.00009	0.00033	0.00021	0.00039
Eu153	0.00077	0.00008	0.00028	0.00017	0.00037
Ho165	0.02167	0.00410	0.00787	0.00514	0.00744
GdO173	0.00389	0.00040	0.00130	0.00074	0.00122
TbO175	0.00696	0.00090	0.00227	0.00133	0.00218
DyO179	0.01556	0.00234	0.00520	0.00322	0.00497
ErO182	0.02122	0.00541	0.00854	0.00563	0.00807
TmO185	0.00930	0.00315	0.00439	0.00295	0.00412
YbO188	0.01105	0.00483	0.00560	0.00381	0.00537
LuO191	0.00980	0.00488	0.00553	0.00397	0.00527
Zr2O	0.01576	0.01536	0.01601	0.01594	0.01556
HfO196	0.15405	0.19847	0.17941	0.18928	0.17256
Pb206	0.00005	0.00236	0.00002	0.00001	0.00001
207/206	0.11905	0.08845	0.00000	0.00000	0.00000
ThO248	0.13758	0.00986	0.01616	0.00904	0.01871
UO254	0.04229	0.01986	0.01177	0.00714	0.01146
	38161.98	38162.00	38162.03	38162.04	38162.06
206/238 Age	19.06	1883.94	24.98	22.62	19.04
Li ppm Est	0.10	0.05	0.02	0.02	0.04
Be9 ppm	5.24	0.03	0.23	0.01	0.09
B11 ppm	0.13	0.15	0.07	0.10	0.22
F19 ppm	24.20	29.94	17.76	19.80	18.34
Na ppm Est.	5.59	6.29	5.06	5.63	6.58
Mg ppm Est.	1.77	1.57	1.38	1.44	1.87
Al27 ppm Est.	8.16	11.23	8.07	8.30	9.36
Si30					
P31 ppm	709.71	217.42	312.65	236.03	288.97
S32 Rel.	0.00	1.35	1.31	0.62	0.61

Table C4, cont.

	PSTG01C-7.3CDK	PSTG01C-8.1IDK	PSTG01C-9.2IDK	PSTG01C-10.2IDK	PSTG01C-11.2IDK
K39 Rel.	1.84	1.79	1.71	2.16	1.84
Ca40 ppm Est.	3.43	3.21	3.01	3.05	2.74
Sc45 ppm	65.86	39.83	38.32	30.09	53.20
48/49	13.29	14.31	13.87	12.82	14.02
Ti48 ppm	29.83	17.18	15.22	15.33	19.59
Ti49 ppm	29.01	15.52	14.19	15.46	18.06
V51 ppm Rel.	0.52	1.03	0.28	0.12	0.21
Cr Rel.	0.08	0.05	0.08	0.27	0.06
Mn Rel.	0.06	0.08	0.04	0.05	0.05
Fe56 ppm	1.02	3.03	0.98	2.03	1.01
Ge74 Rel.	0.51	0.36	0.10	0.46	0.45
Y89 ppm	2899.07	611.85	1104.84	719.74	1050.12
Nb93 ppm	24.32	3.15	9.14	5.42	7.40
Zr94H Rel.	1.31	1.15	1.19	1.26	1.17
Zr96/Si30 ppm	1.98	1.98	2.00	2.04	1.98
La139 ppm	0.04	0.00	0.01	0.01	0.02
Ce140 ppm	274.63	19.90	91.78	67.84	108.34
Pr ppm	0.21	0.11	0.09	0.11	0.17
Nd146 ppm	5.91	0.50	1.70	1.08	2.27
Sm147 ppm	15.53	1.28	4.54	2.89	5.37
Eu153 ppm	3.34	0.33	1.21	0.72	1.59
Gd155 ppm	127.65	24.16	46.34	30.26	43.83
Ho165 ppm	121.01	12.34	40.27	22.98	37.91
TbO175 ppm	38.30	4.93	12.51	7.30	11.99
DyO179 ppm	376.56	56.71	125.77	78.02	120.26
ErO182 ppm	465.44	118.61	187.32	123.49	176.90
TmO185 ppm	79.14	26.84	37.38	25.07	35.08
YbO188 ppm	538.09	235.20	272.54	185.58	261.46
LuO191 ppm	84.40	42.02	47.59	34.19	45.39
Zr96/Zr2O	125.89	128.77	124.86	128.16	127.53
196/Si30	63.47	65.09	62.45	62.72	64.28
Hf ppm	8257.74	10638.84	9617.36	10146.11	9249.91
Pb7/6 Est	0.12	0.09	0.00	0.00	0.00
Th ppm	1307.48	93.73	153.62	85.93	177.77
U ppm	369.44	173.49	102.79	62.38	100.08
Y/Nb	119.20	194.04	120.90	132.77	141.97
Th/U	3.54	0.54	1.49	1.38	1.78
Yb/Gd	4.45	19.06	6.77	8.07	6.90
U/Yb	91.08	474.66	160.22	171.12	115.25
Th/Yb	0.69	0.74	0.38	0.34	0.38
Ce/Sm	2.43	0.40	0.56	0.46	0.68
Ce/Lu	17.69	15.52	20.21	23.44	20.18
U/Ce	3.25	0.47	1.93	1.98	2.39
Th/Ce	1.35	8.72	1.12	0.92	0.92
Y/Yb	4.76	4.71	1.67	1.27	1.64
Yb/Nd	5.39	2.60	4.05	3.88	4.02
Y/Nb	119.20	194.04	120.90	132.77	141.97
Yb/Nb	22.12	74.59	29.82	34.23	35.35
Yb/Sc	8.17	5.90	7.11	6.17	4.91
Yb/Dy	1.43	4.15	2.17	2.38	2.17
Dy/Sm	24.25	44.23	27.70	26.96	22.40
Yb/Nd	91.08	474.66	160.22	171.12	115.25
Sm/Nd	2.63	2.59	2.67	2.67	2.37
U/Li	3664.66	3630.10	4673.68	2732.83	2448.26

Table C4, cont.

	PSTG01C-7.3CDK	PSTG01C-8.1IDK	PSTG01C-9.2IDK	PSTG01C-10.2IDK	PSTG01C-11.2IDK
Temp Ti48	842.17	786.46	774.95	775.59	799.18
Temp Ti49	839.21	776.77	768.40	776.39	791.25
Hf ppm	8257.74	10638.84	9617.36	10146.11	9249.91
Ferry Temp	899.57	826.60	816.88	826.15	843.43
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	878.26	811.49	802.55	811.08	826.94
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.11	0.00	0.03	0.04	0.05
Ce Ch (0.82)	334.91	24.27	111.93	82.73	132.12
Pr Ch (0.121)	2.19	0.00	0.61	0.50	0.86
Nd Ch (0.615)	9.61	0.81	2.77	1.76	3.69
Pm					
Sm Ch (0.2)	77.64	6.41	22.71	14.47	26.84
Eu Ch (0.076)	43.97	4.36	15.93	9.47	20.99
Gd Ch (0.267)	453.22	46.22	150.81	86.08	141.98
Tb Ch (0.0493)	776.80	99.93	253.73	148.07	243.20
Dy Ch (0.33)	1141.08	171.85	381.12	236.43	364.43
Ho Ch (0.0755)	1690.71	320.02	613.77	400.76	580.59
Er Ch (0.216)	2154.81	549.10	867.22	571.70	818.98
Tm Ch (0.0329)	2405.50	815.73	1136.11	762.12	1066.20
Yb Ch (0.221)	2434.78	1064.23	1233.23	839.73	1183.07
Lu Ch (0.033)	2557.71	1273.23	1442.07	1035.96	1375.43
Ce/Ce*	670.40	#DIV/0!	843.04	585.86	655.72
Hf ppm	8257.74	10638.84	9617.36	10146.11	9249.91
Eu/Eu*	0.23	0.25	0.27	0.27	0.34
P Molar	22.92	7.02	10.10	7.62	9.33
3+ Molar	47.14	11.00	18.56	12.29	18.19
3+/P Molar	2.06	1.57	1.84	1.61	1.95

Table C4, cont.

Element	**PSTG01C-12.3CDK**	**PSTG01C-12.4CDK**	**PSTG01C-4.1IM**	**PSTG01C-4.2ILT**	**PSTG01C-7.2IM**	**PSTG01C-7.3IDK**
Li7	0.00003	0.00004	0.00002	0.00003	0.00000	0.00000
Be9	0.00107	0.00003	0.00001	0.00000	0.00001	0.00000
B11	0.00000	0.00000	0.00002	0.00001	0.00001	0.00000
F19	0.00028	0.00023	0.00024	0.00018	0.00013	0.00016
Na23	0.04862	0.06228	0.06147	0.04226	0.04715	0.04170
Mg24	0.01361	0.01522	0.02238	0.01684	0.01667	0.03308
Al27	0.01502	0.02077	0.02801	0.02030	0.01974	0.01919
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00357	0.00281	0.00251	0.00232	0.00239	0.00239
S32	0.00001	0.00001	0.00000	0.00000	0.00001	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01480	0.01625	0.01645	0.01199	0.01328	0.01286
Ca40	0.02988	0.02856	0.03935	0.02907	0.02723	0.02566
Sc45	0.03703	0.04146	0.09008	0.07936	0.08040	0.08939
Ti48	0.00551	0.00559	0.01050	0.01036	0.00996	0.01021
Ti49	0.00042	0.00045	0.00074	0.00079	0.00075	0.00077
V51	0.00012	0.00003	0.00012	0.00004	0.00001	0.00002
Cr52	0.00003	0.00004	0.00007	0.00005	0.00005	0.00003
Mn55	0.00016	0.00013	0.00016	0.00012	0.00013	0.00008
Fe56	0.00159	0.00060	0.00166	0.00108	0.00119	0.00190
Ge74	0.00000	0.00000	0.00001	0.00001	0.00000	0.00001
Y89	0.97137	0.36072	0.43679	0.21677	0.21014	0.45272
Nb93	0.00049	0.00049	0.00012	0.00013	0.00019	0.00010
Zr94H	0.00616	0.00567	0.00451	0.00415	0.00389	0.00498
Zr96	1.97692	1.96691	2.06075	2.03728	2.00088	2.05578
La139	0.00002	0.00000	0.00004	0.00001	0.00000	0.00001
Ce140	0.01320	0.01088	0.01216	0.00914	0.00859	0.01200
Pr141	0.00017	0.00003	0.00027	0.00006	0.00003	0.00018
Nd146	0.00043	0.00010	0.00070	0.00013	0.00015	0.00063
Sm147	0.00106	0.00027	0.00099	0.00028	0.00027	0.00099
Eu153	0.00065	0.00023	0.00126	0.00040	0.00036	0.00122
Ho165	0.01806	0.00636	0.00825	0.00399	0.00395	0.00844
GdO173	0.00310	0.00093	0.00207	0.00079	0.00067	0.00214
TbO175	0.00562	0.00163	0.00300	0.00119	0.00124	0.00303
DyO179	0.01254	0.00413	0.00612	0.00264	0.00264	0.00621
ErO182	0.01769	0.00694	0.00821	0.00428	0.00396	0.00865
TmO185	0.00829	0.00317	0.00398	0.00224	0.00197	0.00400
YbO188	0.01007	0.00476	0.00516	0.00291	0.00296	0.00531
LuO191	0.00925	0.00459	0.00518	0.00308	0.00312	0.00530
Zr2O	0.01559	0.01544	0.01739	0.01862	0.01766	0.01943
HfO196	0.17305	0.18071	0.16009	0.15492	0.15636	0.15827
Pb206	0.00002	0.00002	0.00000	0.00000	0.00000	0.00001
207/206	0.34483	0.30303	1.11111	2.22222	0.00000	0.00000
ThO248	0.02859	0.01594	0.00901	0.00447	0.00407	0.00909
UO254	0.01528	0.01115	0.00320	0.00231	0.00193	0.00329
	38162.09	38162.09	38163.25	38163.25	38163.31	38163.32
206/238 Age	18.22	28.94	22.50	29.39	24.37	32.73
Li ppm Est	0.02	0.03	0.01	0.02	0.00	0.00
Be9 ppm	2.68	0.08	0.04	0.01	0.02	0.00
B11 ppm	0.02	0.02	0.20	0.08	0.10	0.04
F19 ppm	24.49	20.54	21.74	15.65	11.85	14.43
Na ppm Est.	4.63	5.93	5.85	4.02	4.49	3.97
Mg ppm Est.	1.15	1.29	1.89	1.42	1.41	2.80
Al27 ppm Est.	5.71	7.89	10.64	7.71	7.50	7.29
Si30						
P31 ppm	331.19	260.85	232.74	215.68	221.90	222.25
S32 Rel.	0.78	0.60	0.16	0.31	0.48	0.47

Table C4, cont.

	PSTG01C-12.3CDK	PSTG01C-12.4CDK	PSTG01C-4.1IM	PSTG01C-4.2ILT	PSTG01C-7.2IM	PSTG01C-7.3IDK
K39 Rel.	1.78	1.95	1.98	1.44	1.60	1.55
Ca40 ppm Est.	3.20	3.06	4.21	3.11	2.91	2.75
Sc45 ppm	30.87	34.56	75.10	66.16	67.03	74.52
48/49	13.15	12.41				
Ti48 ppm	15.20	15.42				
Ti49 ppm	14.94	16.07	26.51	28.35	26.61	27.49
V51 ppm Rel.	0.74	0.16	0.72	0.26	0.07	0.14
Cr Rel.	0.04	0.05	0.09	0.06	0.06	0.04
Mn Rel.	0.07	0.06	0.07	0.05	0.06	0.04
Fe56 ppm	1.88	0.71	1.97	1.28	1.41	2.25
Ge74 Rel.	0.11	0.15	0.18	0.37	0.15	0.26
Y89 ppm	2441.89	906.81	1098.02	544.92	528.25	1138.07
Nb93 ppm	6.62	6.60	1.67	1.79	2.52	1.37
Zr94H Rel.	1.19	1.10	0.87	0.80	0.75	0.96
Zr96/Si30 ppm	1.98	1.97	2.06	2.04	2.00	2.06
La139 ppm	0.06	0.01	0.17	0.02	0.02	0.04
Ce140 ppm	102.81	84.78	94.72	71.22	66.92	93.46
Pr ppm	0.30	0.05	0.48	0.11	0.06	0.32
Nd146 ppm	5.98	1.43	9.64	1.86	2.06	8.76
Sm147 ppm	14.44	3.72	13.40	3.82	3.70	13.46
Eu153 ppm	2.83	1.02	5.48	1.75	1.55	5.28
Gd155 ppm	106.42	37.49	48.63	23.50	23.25	49.70
Ho165 ppm	96.52	28.78	64.46	24.42	20.83	66.48
TbO175 ppm	30.90	8.96	16.50	6.56	6.82	16.68
DyO179 ppm	303.47	99.86	148.16	63.89	63.98	150.36
ErO182 ppm	387.97	152.29	180.08	93.85	86.93	189.71
TmO185 ppm	70.57	27.02	33.87	19.07	16.81	34.06
YbO188 ppm	490.09	231.81	251.35	141.55	144.01	258.66
LuO191 ppm	79.66	39.49	44.58	26.49	26.87	45.63
Zr96/Zr2O	126.83	127.40	118.47	109.40	113.27	105.79
196/Si30	64.16	64.77	57.49	53.70	56.61	51.46
Hf ppm	9276.44	9686.82	8581.68	8304.50	8381.35	8484.05
Pb7/6 Est	0.34	0.30	1.11	2.22	0.00	0.00
Th ppm	271.74	151.46	85.59	42.45	38.65	86.43
U ppm	133.52	97.38	27.94	20.19	16.85	28.71
Y/Nb	368.79	137.34	656.47	304.09	209.30	831.87
Th/U	2.04	1.56	3.06	2.10	2.29	3.01
Yb/Gd	5.08	8.06	3.90	5.80	6.91	3.89
U/Yb	81.96	161.61	26.07	76.13	69.92	29.51
Th/Yb	0.27	0.42	0.11	0.14	0.12	0.11
Ce/Sm	0.55	0.65	0.34	0.30	0.27	0.33
Ce/Lu	7.12	22.76	7.07	18.67	18.07	6.94
U/Ce	1.29	2.15	2.12	2.69	2.49	2.05
Th/Ce	1.30	1.15	0.29	0.28	0.25	0.31
Y/Yb	2.64	1.79	0.90	0.60	0.58	0.92
Yb/Nd	4.98	3.91	4.37	3.85	3.67	4.40
Y/Nb	368.79	137.34	656.47	304.09	209.30	831.87
Yb/Nb	74.02	35.11	150.27	78.99	57.06	189.07
Yb/Sc	15.88	6.71	3.35	2.14	2.15	3.47
Yb/Dy	1.61	2.32	1.70	2.22	2.25	1.72
Dy/Sm	21.02	26.81	11.05	16.75	17.27	11.17
Yb/Nd	81.96	161.61	26.07	76.13	69.92	29.51
Sm/Nd	2.41	2.60	1.39	2.05	1.80	1.54
U/Li	7467.59	3745.05	2387.83	1117.17	#DIV/0!	#DIV/0!

Table C4, cont.

	PSTG01C-12.3CDK	PSTG01C-12.4CDK	PSTG01C-4.1IM	PSTG01C-4.2ILT	PSTG01C-7.2IM	PSTG01C-7.3IDK
Temp Ti48	774.80	776.15	#NUM!	#NUM!	#NUM!	#NUM!
Temp Ti49	773.19	780.05	829.75	836.78	830.18	833.55
Hf ppm	9276.44	9686.82	8581.68	8304.50	8381.35	8484.05
Ferry Temp	822.44	830.40	888.45	896.71	888.95	892.92
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	807.67	814.98	868.12	875.65	868.58	872.19
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.20	0.02	0.53	0.08	0.06	0.12
Ce Ch (0.82)	125.37	103.39	115.52	86.86	81.61	113.98
Pr Ch (0.121)	2.65	0.50	5.07	0.89	0.86	2.86
Nd Ch (0.615)	9.72	2.33	15.67	3.02	3.35	14.25
Pm						
Sm Ch (0.2)	72.19	18.62	67.02	19.08	18.52	67.29
Eu Ch (0.076)	37.29	13.39	72.16	23.03	20.37	69.47
Gd Ch (0.267)	361.50	107.78	241.43	91.46	78.03	248.99
Tb Ch (0.0493)	626.82	181.71	334.63	132.96	138.26	338.28
Dy Ch (0.33)	919.62	302.61	448.97	193.62	193.87	455.65
Ho Ch (0.0755)	1409.51	496.53	644.05	311.31	307.90	658.32
Er Ch (0.216)	1796.14	705.04	833.69	434.50	402.46	878.30
Tm Ch (0.0329)	2144.89	821.35	1029.59	579.72	510.80	1035.29
Yb Ch (0.221)	2217.58	1048.90	1137.32	640.49	651.62	1170.40
Lu Ch (0.033)	2413.99	1196.72	1350.98	802.61	814.23	1382.75
Ce/Ce*	173.12	958.04	70.32	329.94	373.52	198.13
Hf ppm	9276.44	9686.82	8581.68	8304.50	8381.35	8484.05
Eu/Eu*	0.23	0.30	0.57	0.55	0.54	0.54
P Molar	10.69	8.42	7.51	6.96	7.17	7.18
3+ Molar	38.39	15.33	19.60	10.53	10.27	20.16
3+/P Molar	3.59	1.82	2.61	1.51	1.43	2.81

Table C4, cont.

Element	PSTG01C-9.1ILT	PSTG01C-9.2IM	PSTG01C-9.3ILT	PSTG01C-6.2IDK	PSTG01C-1.1ELT	PSTG01C-2.2ELT
Li7	0.00003	0.00003	0.00005	0.00006	0.00004	0.00003
Be9	0.00000	0.00001	0.00000	0.00001	0.00001	0.00000
B11	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002
F19	0.00023	0.00022	0.00039	0.00026	0.00024	0.00017
Na23	0.04681	0.04871	0.05324	0.07169	0.05017	0.04865
Mg24	0.01508	0.01415	0.01679	0.02702	0.01882	0.01734
Al27	0.03524	0.02540	0.03372	0.03091	0.02692	0.02329
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00258	0.00230	0.00180	0.00231	0.00268	0.00261
S32	0.00000	0.00001	0.00001	0.00002	0.00000	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01263	0.01447	0.01599	0.01887	0.01436	0.01383
Ca40	0.02999	0.03037	0.03149	0.03427	0.03144	0.03120
Sc45	0.08094	0.06297	0.06164	0.07718	0.07499	0.07495
Ti48	0.01488	0.00980	0.01233	0.01097	0.01188	0.01287
Ti49	0.00106	0.00071	0.00088	0.00080	0.00089	0.00096
V51	0.00004	0.00001	0.00002	0.00006	0.00003	0.00005
Cr52	0.00003	0.00005	0.00004	0.00010	0.00009	0.00006
Mn55	0.00008	0.00013	0.00011	0.00013	0.00012	0.00012
Fe56	0.00102	0.00115	0.00108	0.00116	0.00175	0.00154
Ge74	0.00000	0.00001	0.00001	0.00001	0.00000	0.00001
Y89	0.15194	0.16547	0.10026	0.18239	0.19200	0.19098
Nb93	0.00013	0.00014	0.00007	0.00011	0.00018	0.00016
Zr94H	0.00426	0.00376	0.00396	0.00669	0.00422	0.00452
Zr96	2.01636	1.95504	1.94936	1.99284	1.96761	2.05087
La139	0.00001	0.00000	0.00000	0.00001	0.00000	0.00001
Ce140	0.00830	0.00838	0.00709	0.00821	0.01015	0.01150
Pr141	0.00007	0.00003	0.00002	0.00004	0.00009	0.00006
Nd146	0.00012	0.00010	0.00007	0.00013	0.00016	0.00016
Sm147	0.00022	0.00022	0.00014	0.00023	0.00032	0.00031
Eu153	0.00042	0.00028	0.00019	0.00032	0.00041	0.00042
Ho165	0.00263	0.00287	0.00169	0.00323	0.00350	0.00348
GdO173	0.00059	0.00054	0.00031	0.00068	0.00075	0.00070
TbO175	0.00091	0.00088	0.00045	0.00101	0.00109	0.00112
DyO179	0.00179	0.00194	0.00113	0.00229	0.00258	0.00241
ErO182	0.00286	0.00319	0.00197	0.00359	0.00362	0.00363
TmO185	0.00145	0.00170	0.00096	0.00182	0.00188	0.00188
YbO188	0.00222	0.00226	0.00147	0.00266	0.00243	0.00271
LuO191	0.00230	0.00230	0.00153	0.00291	0.00259	0.00270
Zr2O	0.01708	0.01665	0.01575	0.01527	0.01668	0.01738
HfO196	0.15481	0.15311	0.14890	0.15527	0.15378	0.15936
Pb206	0.00000	0.00001	0.00000	0.00001	0.00001	0.00001
207/206	0.00000	0.00000	0.00000	5.00000	0.00000	0.00000
ThO248	0.00427	0.00456	0.00200	0.00342	0.00484	0.00545
UO254	0.00205	0.00271	0.00120	0.00167	0.00261	0.00263
	38163.35	38163.36	38163.37	38161.95	38163.21	38163.22
206/238 Age	22.23	77.55	64.36	57.50	32.27	44.26
Li ppm Est	0.02	0.02	0.03	0.04	0.02	0.02
Be9 ppm	0.00	0.01	0.01	0.03	0.02	0.01
B11 ppm	0.07	0.11	0.08	0.27	0.14	0.19
F19 ppm	20.63	19.85	34.40	23.36	21.00	14.69
Na ppm Est.	4.46	4.64	5.07	6.82	4.78	4.63
Mg ppm Est.	1.28	1.20	1.42	2.29	1.59	1.47
Al27 ppm Est.	13.39	9.65	12.81	11.74	10.23	8.85
Si30						
P31 ppm	239.05	213.64	166.80	214.73	249.21	242.28
S32 Rel.	0.31	0.63	0.35	0.98	0.31	0.51

Table C4, cont.

	PSTG01C-9.1ILT	PSTG01C-9.2IM	PSTG01C-9.3ILT	PSTG01C-6.2IDK	PSTG01C-1.1ELT	PSTG01C-2.2ELT
K39 Rel.	1.52	1.74	1.92	2.27	1.73	1.66
Ca40 ppm Est.	3.21	3.25	3.37	3.67	3.36	3.34
Sc45 ppm	67.48	52.50	51.39	64.35	62.52	62.48
48/49				13.72		
Ti48 ppm				30.27		
Ti49 ppm	37.82	25.25	31.33	28.52	31.68	34.08
V51 ppm Rel.	0.22	0.08	0.12	0.37	0.19	0.33
Cr Rel.	0.03	0.06	0.04	0.13	0.11	0.08
Mn Rel.	0.04	0.06	0.05	0.06	0.05	0.05
Fe56 ppm	1.21	1.36	1.27	1.37	2.07	1.82
Ge74 Rel.	0.09	0.23	0.39	0.25	0.06	0.25
Y89 ppm	381.95	415.97	252.04	458.50	482.66	480.10
Nb93 ppm	1.76	1.94	0.92	1.54	2.40	2.21
Zr94H Rel.	0.82	0.73	0.77	1.29	0.81	0.87
Zr96/Si30 ppm	2.02	1.96	1.95	1.99	1.97	2.05
La139 ppm	0.02	0.01	0.00	0.03	0.02	0.04
Ce140 ppm	64.69	65.31	55.25	63.93	79.05	89.59
Pr ppm	0.13	0.06	0.04	0.06	0.15	0.10
Nd146 ppm	1.65	1.44	0.96	1.82	2.25	2.16
Sm147 ppm	2.93	3.03	1.89	3.12	4.33	4.28
Eu153 ppm	1.84	1.22	0.82	1.38	1.80	1.82
Gd155 ppm	15.50	16.92	9.98	19.02	20.60	20.47
Ho165 ppm	18.37	16.65	9.66	21.06	23.19	21.89
TbO175 ppm	5.01	4.84	2.50	5.56	6.00	6.15
DyO179 ppm	43.35	46.94	27.43	55.45	62.44	58.20
ErO182 ppm	62.82	69.91	43.20	78.71	79.43	79.56
TmO185 ppm	12.32	14.44	8.21	15.47	16.04	15.98
YbO188 ppm	108.23	109.90	71.35	129.34	118.07	131.70
LuO191 ppm	19.83	19.79	13.16	25.05	22.31	23.26
Zr96/Zr2O	118.05	117.43	123.75	130.53	117.97	117.98
196/Si30	58.55	60.06	63.48	65.50	59.96	57.52
Hf ppm	8298.23	8207.06	7981.41	8323.15	8243.26	8542.34
Pb7/6 Est	0.00	0.00	0.00	5.00	0.00	0.00
Th ppm	40.62	43.38	19.03	32.48	45.98	51.80
U ppm	17.90	23.67	10.49	14.56	22.77	22.99
Y/Nb	217.12	214.89	273.40	297.02	201.22	217.15
Th/U	2.27	1.83	1.81	2.23	2.02	2.25
Yb/Gd	5.89	6.60	7.39	6.14	5.09	6.02
U/Yb	65.56	76.25	74.35	70.89	52.46	61.00
Th/Yb	0.17	0.22	0.15	0.11	0.19	0.17
Ce/Sm	0.38	0.39	0.27	0.25	0.39	0.39
Ce/Lu	22.12	21.54	29.29	20.46	18.25	20.94
U/Ce	3.26	3.30	4.20	2.55	3.54	3.85
Th/Ce	0.28	0.36	0.19	0.23	0.29	0.26
Y/Yb	0.63	0.66	0.34	0.51	0.58	0.58
Yb/Nd	3.53	3.78	3.53	3.54	4.09	3.65
Y/Nb	217.12	214.89	273.40	297.02	201.22	217.15
Yb/Nb	61.52	56.77	77.40	83.79	49.22	59.57
Yb/Sc	1.60	2.09	1.39	2.01	1.89	2.11
Yb/Dy	2.50	2.34	2.60	2.33	1.89	2.26
Dy/Sm	14.82	15.48	14.54	17.74	14.42	13.60
Yb/Nd	65.56	76.25	74.35	70.89	52.46	61.00
Sm/Nd	1.77	2.10	1.97	1.71	1.92	1.98
U/Li	1107.81	1429.14	367.35	368.48	973.45	1154.02

Table C4, cont.

	PSTG01C-9.1ILT	PSTG01C-9.2IM	PSTG01C-9.3ILT	PSTG01C-6.2IDK	PSTG01C-1.1ELT	PSTG01C-2.2ELT
Temp Ti48	#NUM!	#NUM!	#NUM!	843.72	#NUM!	#NUM!
Temp Ti49	867.99	824.74	847.41	837.42	848.59	856.53
Hf ppm	8298.23	8207.06	7981.41	8323.15	8243.26	8542.34
Ferry Temp	933.53	882.57	909.22	897.47	910.62	919.97
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	909.12	862.76	887.04	876.34	888.31	896.82
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.07	0.03	0.01	0.08	0.05	0.14
Ce Ch (0.82)	78.89	79.65	67.37	77.97	96.40	109.25
Pr Ch (0.121)	0.78	0.55	0.25	0.90	0.90	1.19
Nd Ch (0.615)	2.68	2.34	1.56	2.97	3.66	3.51
Pm						
Sm Ch (0.2)	14.63	15.16	9.43	15.62	21.65	21.39
Eu Ch (0.076)	24.17	16.11	10.83	18.18	23.66	24.01
Gd Ch (0.267)	68.82	62.36	36.18	78.89	86.84	81.97
Tb Ch (0.0493)	101.53	98.08	50.70	112.75	121.76	124.80
Dy Ch (0.33)	131.35	142.25	83.11	168.02	189.23	176.36
Ho Ch (0.0755)	205.26	224.14	132.20	251.87	272.79	271.15
Er Ch (0.216)	290.85	323.68	200.01	364.39	367.71	368.35
Tm Ch (0.0329)	374.40	438.88	249.55	470.28	487.65	485.57
Yb Ch (0.221)	489.74	497.29	322.86	585.24	534.23	595.93
Lu Ch (0.033)	600.81	599.71	398.74	759.22	676.03	704.96
Ce/Ce*	347.22	610.12	1619.01	284.15	435.29	268.73
Hf ppm	8298.23	8207.06	7981.41	8323.15	8243.26	8542.34
Eu/Eu*	0.76	0.52	0.59	0.52	0.55	0.57
P Molar	7.72	6.90	5.39	6.93	8.05	7.82
3+ Molar	8.00	8.13	5.50	9.17	9.51	9.61
3+/P Molar	1.04	1.18	1.02	1.32	1.18	1.23

Table C4, cont.

Element	PSTG01C-4.3ELT	PSTG01C-6.3ELT	PSTG01C-9.4EM	PSTG01C-5.1CDK	PSTG01C-5.2I	PSTG01C-3.1ELT	PSTG01C-2.2ELT
Li7	0.00001	0.00002	0.00002	0.00010	0.00016	0.00000	0.00001
Be9	0.00000	0.00000	0.00000	0.00042	0.00064	0.00000	0.00001
B11	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
F19	0.00017	0.00014	0.00013	0.00048	0.00034	0.00025	0.00017
Na23	0.05055	0.05100	0.04722	0.35674	0.09310	0.05354	0.03005
Mg24	0.02060	0.02459	0.02735	0.07909	0.39281	0.01806	0.07849
Al27	0.04536	0.02308	0.02097	0.20212	0.03026	0.02173	0.01780
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00262	0.00247	0.00234	0.00419	0.00470	0.00250	0.00251
S32	0.00001	0.00002	0.00000	0.00001	0.00008	0.00000	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01412	0.01406	0.01465	0.06647	0.01779	0.01291	0.00936
Ca40	0.03166	0.02907	0.03005	0.13106	0.03001	0.02469	0.01945
Sc45	0.07692	0.08856	0.05097	0.03938	0.08068	0.05472	0.05013
Ti48	0.01162	0.01098	0.00799	0.01148	0.00911	0.00910	0.00925
Ti49	0.00087	0.00085	0.00064	0.00085	0.00066	0.00068	0.00067
V51	0.00001	0.00002	0.00002	0.00072	0.00006	0.00004	0.00006
Cr52	0.00005	0.00006	0.00003	0.00006	0.00009	0.00007	0.00007
Mn55	0.00015	0.00014	0.00013	0.00459	0.00013	0.00014	0.00008
Fe56	0.00171	0.00176	0.00148	0.03941	0.00574	0.00079	0.00343
Ge74	0.00001	0.00001	0.00000	0.00001	0.00002	0.00001	0.00000
Y89	0.12975	0.20952	0.22146	1.15230	0.59261	0.22534	0.23232
Nb93	0.00008	0.00014	0.00026	0.00064	0.00063	0.00018	0.00018
Zr94H	0.00388	0.00402	0.00399	0.00458	0.00609	0.00688	0.00722
Zr96	1.98918	2.01966	1.99697	1.99931	1.95147	1.97507	2.01515
La139	0.00000	0.00000	0.00000	0.00015	0.00001	0.00000	0.00001
Ce140	0.00474	0.00905	0.00887	0.01765	0.01505	0.00943	0.01005
Pr141	0.00004	0.00006	0.00005	0.00027	0.00015	0.00008	0.00008
Nd146	0.00011	0.00016	0.00008	0.00062	0.00016	0.00010	0.00010
Sm147	0.00016	0.00027	0.00020	0.00129	0.00010	0.00026	0.00024
Eu153	0.00030	0.00040	0.00018	0.00085	0.00036	0.00026	0.00026
Ho165	0.00216	0.00386	0.00406	0.02243	0.01068	0.00429	0.00410
GdO173	0.00044	0.00075	0.00074	0.00393	0.00175	0.00081	0.00068
TbO175	0.00065	0.00120	0.00117	0.00700	0.00316	0.00125	0.00126
DyO179	0.00156	0.00263	0.00272	0.01573	0.00745	0.00289	0.00290
ErO182	0.00255	0.00391	0.00459	0.02192	0.01196	0.00438	0.00463
TmO185	0.00140	0.00207	0.00222	0.00982	0.00584	0.00225	0.00222
YbO188	0.00208	0.00296	0.00329	0.01228	0.00754	0.00305	0.00300
LuO191	0.00215	0.00310	0.00332	0.01110	0.00722	0.00308	0.00307
Zr2O	0.01630	0.01642	0.01671	0.01760	0.01453	0.01479	0.01575
HfO196	0.15966	0.15588	0.16238	0.17272	0.15586	0.16205	0.16352
Pb206	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001
207/206	0.00000	0.00000	2.00000	0.00000	0.00000	0.00000	0.00000
ThO248	0.00153	0.00373	0.00583	0.04246	0.01835	0.00547	0.00587
UO254	0.00107	0.00186	0.00395	0.02014	0.00950	0.00309	0.00353
	38163.26	38163.30	38163.38	38163.27	38161.91	38161.85	38161.84
206/238 Age	98.29	66.30	30.50	16.96	18.89	35.27	50.51
Li ppm Est	0.01	0.01	0.01	0.06	0.10	0.00	0.00
Be9 ppm	0.00	0.00	0.01	1.06	1.60	0.00	0.02
B11 ppm	0.06	0.08	0.10	0.06	0.06	0.12	0.09
F19 ppm	14.70	12.37	11.25	42.75	29.90	22.19	15.00
Na ppm Est.	4.81	4.85	4.49	33.96	8.86	5.10	2.86
Mg ppm Est.	1.74	2.08	2.31	6.69	33.22	1.53	6.64
Al27 ppm Est.	17.23	8.77	7.97	76.79	11.50	8.26	6.76
Si30							
P31 ppm	243.63	229.31	216.85	388.57	435.99	231.76	233.45
S32 Rel.	0.49	1.08	0.16	0.32	4.88	0.00	0.40

Table C4, cont.

	PSTG01C-4.3ELT	PSTG01C-6.3ELT	PSTG01C-9.4EM	PSTG01C-5.1CDK	PSTG01C-5.2I	PSTG01C-3.1ELT	PSTG01C-2.2ELT
K39 Rel.	1.70	1.69	1.76	7.99	2.14	1.55	1.12
Ca40 ppm Est.	3.39	3.11	3.21	14.02	3.21	2.64	2.08
Sc45 ppm	64.12	73.83	42.49	32.83	67.26	45.62	41.79
48/49					13.81	13.33	13.82
Ti48 ppm					25.13	25.11	25.53
Ti49 ppm	30.94	30.18	22.69	30.23	23.53	24.36	23.89
V51 ppm Rel.	0.05	0.10	0.12	4.45	0.39	0.26	0.37
Cr Rel.	0.06	0.07	0.04	0.07	0.11	0.09	0.08
Mn Rel.	0.06	0.06	0.06	1.99	0.06	0.06	0.03
Fe56 ppm	2.02	2.08	1.75	46.58	6.78	0.94	4.06
Ge74 Rel.	0.18	0.43	0.12	0.30	0.64	0.22	0.04
Y89 ppm	326.18	526.70	556.72	2896.71	1489.75	566.49	584.01
Nb93 ppm	1.03	1.82	3.50	8.62	8.40	2.43	2.41
Zr94H Rel.	0.75	0.78	0.77	0.88	1.18	1.33	1.39
Zr96/Si30 ppm	1.99	2.02	2.00	2.00	1.95	1.98	2.02
La139 ppm	0.01	0.02	0.01	0.61	0.06	0.01	0.03
Ce140 ppm	36.91	70.54	69.06	137.46	117.27	73.46	78.30
Pr ppm	0.07	0.11	0.09	0.47	0.27	0.14	0.14
Nd146 ppm	1.47	2.17	1.17	8.56	2.25	1.45	1.34
Sm147 ppm	2.17	3.69	2.72	17.57	1.39	3.55	3.22
Eu153 ppm	1.31	1.74	0.79	3.69	1.58	1.13	1.13
Gd155 ppm	12.73	22.74	23.95	132.10	62.89	25.25	24.15
Ho165 ppm	13.71	23.42	23.01	122.25	54.34	25.12	21.21
TbO175 ppm	3.58	6.58	6.46	38.52	17.40	6.87	6.96
DyO179 ppm	37.67	63.52	65.89	380.53	180.22	69.89	70.14
ErO182 ppm	55.92	85.79	100.60	480.80	262.23	95.99	101.58
TmO185 ppm	11.92	17.59	18.93	83.60	49.68	19.17	18.86
YbO188 ppm	101.03	144.14	160.03	597.77	366.82	148.26	145.93
LuO191 ppm	18.51	26.70	28.56	95.56	62.18	26.52	26.39
Zr96/Zr2O	122.03	122.98	119.50	113.62	134.33	133.58	127.94
196/Si30	61.35	60.89	59.84	56.83	68.84	67.63	63.49
Hf ppm	8558.60	8356.02	8704.18	9258.33	8354.85	8686.46	8765.54
Pb7/6 Est	0.00	0.00	2.00	0.00	0.00	0.00	0.00
Th ppm	14.55	35.44	55.43	403.48	174.36	52.01	55.79
U ppm	9.33	16.29	34.50	175.97	82.98	26.96	30.87
Y/Nb	317.70	289.14	159.28	335.95	177.41	232.78	242.35
Th/U	1.56	2.18	1.61	2.29	2.10	1.93	1.81
Yb/Gd	7.37	6.15	6.95	4.89	6.75	5.90	6.88
U/Yb	68.55	66.51	136.62	69.86	163.26	102.09	108.72
Th/Yb	0.09	0.11	0.22	0.29	0.23	0.18	0.21
Ce/Sm	0.14	0.25	0.35	0.67	0.48	0.35	0.38
Ce/Lu	17.02	19.11	25.43	7.82	84.08	20.69	24.28
U/Ce	1.99	2.64	2.42	1.44	1.89	2.77	2.97
Th/Ce	0.25	0.23	0.50	1.28	0.71	0.37	0.39
Y/Yb	0.39	0.50	0.80	2.94	1.49	0.71	0.71
Yb/Nd	3.23	3.65	3.48	4.85	4.06	3.82	4.00
Y/Nb	317.70	289.14	159.28	335.95	177.41	232.78	242.35
Yb/Nb	98.40	79.13	45.79	69.33	43.68	60.93	60.56
Yb/Sc	1.58	1.95	3.77	18.21	5.45	3.25	3.49
Yb/Dy	2.68	2.27	2.43	1.57	2.04	2.12	2.08
Dy/Sm	17.37	17.21	24.27	21.66	129.21	19.69	21.75
Yb/Nd	68.55	66.51	136.62	69.86	163.26	102.09	108.72
Sm/Nd	1.47	1.70	2.32	2.05	0.62	2.44	2.40
U/Li	1447.71	1260.82	2307.06	2822.22	812.55	20482.20	7801.76

Table C4, cont.

	PSTG01C-4.3ELT	**PSTG01C-6.3ELT**	**PSTG01C-9.4EM**	**PSTG01C-5.1CDK**	**PSTG01C-5.2I**	**PSTG01C-3.1ELT**	**PSTG01C-2.2ELT**
Temp Ti48	#NUM!	#NUM!	#NUM!	#NUM!	824.24	824.16	825.87
Temp Ti49	846.06	843.40	813.83	843.59	817.49	821.03	819.03
Hf ppm	8558.60	8356.02	8704.18	9258.33	8354.85	8686.46	8765.54
Ferry Temp	907.63	904.50	869.79	904.73	874.08	878.22	875.88
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	885.59	882.75	851.09	882.95	855.00	858.78	856.65
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	0.04	0.05	0.04	1.92	0.17	0.05	0.09
Ce Ch (0.82)	45.01	86.02	84.22	167.63	143.02	89.58	95.49
Pr Ch (0.121)	0.64	0.85	0.52	7.20	1.32	0.64	0.77
Nd Ch (0.615)	2.40	3.52	1.90	13.91	3.65	2.36	2.18
Pm							
Sm Ch (0.2)	10.84	18.45	13.58	87.86	6.97	17.75	16.12
Eu Ch (0.076)	17.23	22.89	10.43	48.51	20.82	14.92	14.84
Gd Ch (0.267)	51.33	87.73	86.19	457.87	203.51	94.09	79.44
Tb Ch (0.0493)	72.71	133.55	131.09	781.38	352.90	139.35	141.11
Dy Ch (0.33)	114.16	192.49	199.67	1153.12	546.12	211.80	212.55
Ho Ch (0.0755)	168.59	301.23	317.16	1749.74	832.99	334.41	319.86
Er Ch (0.216)	258.87	397.16	465.74	2225.91	1214.02	444.41	470.30
Tm Ch (0.0329)	362.25	534.62	575.46	2540.97	1509.95	582.72	573.22
Yb Ch (0.221)	457.14	652.20	724.13	2704.85	1659.83	670.87	660.34
Lu Ch (0.033)	560.84	809.00	865.47	2895.85	1884.24	803.73	799.85
Ce/Ce*	266.92	422.55	599.59	45.05	298.33	516.44	355.61
Hf ppm	8558.60	8356.02	8704.18	9258.33	8354.85	8686.46	8765.54
Eu/Eu*	0.73	0.57	0.30	0.24	0.55	0.37	0.41
P Molar	7.87	7.40	7.00	12.55	14.08	7.48	7.54
3+ Molar	6.91	10.44	10.27	46.03	25.41	10.43	10.57
3+/P Molar	0.88	1.41	1.47	3.67	1.80	1.39	1.40

Table C4, cont.

Element	PSTG01C-7.1ELT	PSTG01C-5.3ILT	PSTG01C-12.2IMED	PSTG01C-11.1ILT	PSTG01C-10.1ELT	PSTG01C-9.1ELT
Li7	0.00000	0.00002	0.00003	0.00004	0.00004	0.00005
Be9	0.00000	0.00004	0.00003	0.00000	0.00001	0.00000
B11	0.00001	0.00002	0.00001	0.00001	0.00002	0.00002
F19	0.00019	0.00020	0.00021	0.00014	0.00026	0.00020
Na23	0.04688	0.05883	0.05460	0.03916	0.06394	0.06424
Mg24	0.01538	0.01818	0.01668	0.01221	0.02147	0.02104
Al27	0.01923	0.02422	0.02788	0.02257	0.02731	0.03401
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00216	0.00221	0.00267	0.00217	0.00357	0.00254
S32	0.00001	0.00001	0.00000	0.00001	0.00001	0.00000
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01092	0.01596	0.01584	0.01128	0.01868	0.01629
Ca40	0.02328	0.02746	0.02872	0.02069	0.03069	0.03102
Sc45	0.05612	0.06257	0.07234	0.06061	0.12446	0.06549
Ti48	0.01023	0.01104	0.01160	0.01104	0.01310	0.01197
Ti49	0.00075	0.00079	0.00086	0.00078	0.00100	0.00088
V51	0.00006	0.00007	0.00009	0.00004	0.00006	0.00008
Cr52	0.00008	0.00006	0.00006	0.00003	0.00010	0.00007
Mn55	0.00008	0.00008	0.00011	0.00009	0.00012	0.00014
Fe56	0.00080	0.00099	0.00103	0.00076	0.00109	0.00103
Ge74	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001
Y89	0.17463	0.16195	0.18281	0.15711	0.28216	0.14641
Nb93	0.00018	0.00015	0.00015	0.00012	0.00020	0.00009
Zr94H	0.00652	0.00664	0.00540	0.00601	0.00576	0.00596
Zr96	2.02175	1.96145	2.00011	2.03212	1.97040	1.97934
La139	0.00000	0.00000	0.00000	0.00000	0.00001	0.00001
Ce140	0.00953	0.00911	0.00999	0.00875	0.01010	0.00699
Pr141	0.00006	0.00007	0.00007	0.00003	0.00012	0.00006
Nd146	0.00007	0.00010	0.00014	0.00010	0.00027	0.00011
Sm147	0.00018	0.00017	0.00027	0.00018	0.00042	0.00019
Eu153	0.00022	0.00027	0.00039	0.00028	0.00064	0.00032
Ho165	0.00309	0.00291	0.00336	0.00272	0.00494	0.00255
GdO173	0.00055	0.00061	0.00076	0.00055	0.00110	0.00051
TbO175	0.00094	0.00088	0.00108	0.00083	0.00159	0.00082
DyO179	0.00203	0.00193	0.00237	0.00189	0.00340	0.00169
ErO182	0.00329	0.00322	0.00355	0.00295	0.00570	0.00283
TmO185	0.00178	0.00162	0.00190	0.00153	0.00301	0.00143
YbO188	0.00247	0.00216	0.00252	0.00230	0.00435	0.00205
LuO191	0.00253	0.00226	0.00268	0.00229	0.00463	0.00234
Zr2O	0.01618	0.01567	0.01516	0.01580	0.01437	0.01482
HfO196	0.16074	0.15326	0.16017	0.15790	0.14242	0.15096
Pb206	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000
207/206	0.00000	0.00000	1.42857	0.00000	0.00000	0.00000
ThO248	0.00421	0.00410	0.00485	0.00364	0.00544	0.00315
UO254	0.00233	0.00207	0.00248	0.00220	0.00320	0.00173
	38161.96	38161.92	38162.08	38162.05	38162.03	38162.02
206/238 Age	81.34	33.45	27.08	17.92	27.63	43.55
Li ppm Est	0.00	0.02	0.02	0.02	0.02	0.03
Be9 ppm	0.00	0.09	0.08	0.00	0.02	0.01
B11 ppm	0.09	0.17	0.10	0.09	0.15	0.20
F19 ppm	16.75	17.74	18.83	12.14	23.12	17.69
Na ppm Est.	4.46	5.60	5.20	3.73	6.09	6.11
Mg ppm Est.	1.30	1.54	1.41	1.03	1.82	1.78
Al27 ppm Est.	7.31	9.20	10.59	8.57	10.38	12.92
Si30						
P31 ppm	200.76	205.37	247.42	201.67	331.41	235.60
S32 Rel.	0.61	0.81	0.20	0.40	0.80	0.00

Table C4, cont.

	PSTG01C-7.1ELT	PSTG01C-5.3ILT	PSTG01C-12.2IMED	PSTG01C-11.1ILT	PSTG01C-10.1ELT	PSTG01C-9.1ELT
K39 Rel.	1.31	1.92	1.90	1.36	2.24	1.96
Ca40 ppm Est.	2.49	2.94	3.07	2.21	3.28	3.32
Sc45 ppm	46.78	52.16	60.31	50.53	103.76	54.59
48/49	13.66	13.99	13.53	14.13	13.10	13.55
Ti48 ppm	28.21	30.46	32.00	30.45	36.14	33.03
Ti49 ppm	26.71	28.14	30.59	27.85	35.67	31.51
V51 ppm Rel.	0.35	0.42	0.57	0.24	0.37	0.48
Cr Rel.	0.09	0.07	0.07	0.04	0.12	0.09
Mn Rel.	0.03	0.04	0.05	0.04	0.05	0.06
Fe56 ppm	0.94	1.17	1.21	0.89	1.29	1.22
Ge74 Rel.	0.11	0.41	0.29	0.44	0.37	0.28
Y89 ppm	439.00	407.13	459.57	394.95	709.32	368.04
Nb93 ppm	2.45	1.96	1.98	1.59	2.66	1.20
Zr94H Rel.	1.26	1.28	1.04	1.16	1.11	1.15
Zr96/Si30 ppm	2.02	1.96	2.00	2.03	1.97	1.98
La139 ppm	0.01	0.01	0.02	0.01	0.03	0.03
Ce140 ppm	74.24	70.95	77.83	68.19	78.69	54.46
Pr ppm	0.10	0.12	0.13	0.05	0.21	0.11
Nd146 ppm	1.03	1.39	1.98	1.33	3.75	1.46
Sm147 ppm	2.50	2.27	3.70	2.41	5.72	2.56
Eu153 ppm	0.95	1.16	1.70	1.20	2.79	1.37
Gd155 ppm	18.22	17.12	19.77	16.01	29.08	15.04
Ho165 ppm	17.20	18.83	23.55	17.17	34.18	15.94
TbO175 ppm	5.17	4.85	5.95	4.55	8.77	4.51
DyO179 ppm	49.21	46.78	57.39	45.79	82.36	40.81
ErO182 ppm	72.15	70.62	77.93	64.78	125.01	62.15
TmO185 ppm	15.13	13.79	16.16	13.02	25.62	12.17
YbO188 ppm	120.35	105.22	122.87	112.06	211.57	99.70
LuO191 ppm	21.82	19.45	23.04	19.72	39.88	20.11
Zr96/Zr2O	124.98	125.21	131.96	128.62	137.16	133.56
196/Si30	61.82	63.83	65.98	63.29	69.61	67.48
Hf ppm	8616.47	8215.60	8585.57	8463.93	7634.25	8092.06
Pb7/6 Est	0.00	0.00	1.43	0.00	0.00	0.00
Th ppm	40.00	38.98	46.13	34.57	51.67	29.94
U ppm	20.32	18.08	21.68	19.20	27.95	15.13
Y/Nb	179.27	208.10	232.03	248.92	266.18	307.06
Th/U	1.97	2.16	2.13	1.80	1.85	1.98
Yb/Gd	7.00	5.59	5.22	6.53	6.19	6.26
U/Yb	117.25	75.66	62.09	84.04	56.44	68.42
Th/Yb	0.17	0.17	0.18	0.17	0.13	0.15
Ce/Sm	0.33	0.37	0.38	0.31	0.24	0.30
Ce/Lu	29.74	31.20	21.04	28.30	13.75	21.31
U/Ce	3.40	3.65	3.38	3.46	1.97	2.71
Th/Ce	0.27	0.25	0.28	0.28	0.36	0.28
Y/Yb	0.54	0.55	0.59	0.51	0.66	0.55
Yb/Nd	3.65	3.87	3.74	3.52	3.35	3.69
Y/Nb	179.27	208.10	232.03	248.92	266.18	307.06
Yb/Nb	49.15	53.78	62.03	70.63	79.39	83.18
Yb/Sc	2.57	2.02	2.04	2.22	2.04	1.83
Yb/Dy	2.45	2.25	2.14	2.45	2.57	2.44
Dy/Sm	19.72	20.57	15.51	19.01	14.39	15.97
Yb/Nd	117.25	75.66	62.09	84.04	56.44	68.42
Sm/Nd	2.43	1.64	1.87	1.81	1.53	1.75
U/Li	15340.92	1145.39	1131.91	862.16	1188.58	524.58

Table C4, cont.

	PSTG01C-7.1ELT	PSTG01C-5.3ILT	PSTG01C-12.2IMED	PSTG01C-11.1ILT	PSTG01C-10.1ELT	PSTG01C-9.1ELT
Temp Ti48	836.28	844.40	849.69	844.35	862.95	853.12
Temp Ti49	830.54	836.02	844.84	834.93	861.51	848.03
Hf ppm	8616.47	8215.60	8585.57	8463.93	7634.25	8092.06
Ferry Temp	889.37	895.81	906.19	894.54	925.86	909.95
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	868.96	874.83	884.29	873.67	902.16	887.71
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.02	0.04	0.06	0.02	0.09	0.09
Ce Ch (0.82)	90.53	86.53	94.91	83.15	95.97	66.41
Pr Ch (0.121)	0.40	0.58	0.86	0.48	1.47	0.80
Nd Ch (0.615)	1.67	2.26	3.22	2.17	6.10	2.37
Pm						
Sm Ch (0.2)	12.48	11.37	18.50	12.05	28.62	12.78
Eu Ch (0.076)	12.46	15.23	22.40	15.74	36.66	18.05
Gd Ch (0.267)	64.42	70.51	88.21	64.32	128.03	59.69
Tb Ch (0.0493)	104.79	98.48	120.63	92.30	177.97	91.53
Dy Ch (0.33)	149.13	141.74	173.90	138.75	249.59	123.67
Ho Ch (0.0755)	241.35	226.73	261.81	212.08	385.16	199.14
Er Ch (0.216)	334.04	326.93	360.77	299.89	578.75	287.71
Tm Ch (0.0329)	459.91	419.11	491.15	395.72	778.80	369.80
Yb Ch (0.221)	544.57	476.09	555.97	507.06	957.34	451.11
Lu Ch (0.033)	661.13	589.27	698.18	597.46	1208.56	609.33
Ce/Ce*	926.22	571.82	415.77	785.47	270.62	248.92
Hf ppm	8616.47	8215.60	8585.57	8463.93	7634.25	8092.06
Eu/Eu*	0.44	0.54	0.55	0.57	0.61	0.65
P Molar	6.48	6.63	7.99	6.51	10.70	7.61
3+ Molar	8.43	8.04	9.18	7.83	14.24	7.39
3+/P Molar	1.30	1.21	1.15	1.20	1.33	0.97

Table C4, cont.

Element	PSTG01C-6.1ELT	PSTG01C-5.1ELT	PSTG01C-1.1ELT	PSTG01C-7.2ILT	PSTG01C-12.1ELT
Li7	0.00003	0.00007	0.00005	0.00005	0.00001
Be9	0.00000	0.00000	0.00000	0.00000	0.00000
B11	0.00001	0.00002	0.00001	0.00001	0.00001
F19	0.00022	0.00030	0.00033	0.00014	0.00017
Na23	0.05754	0.07220	0.05690	0.05258	0.04909
Mg24	0.01884	0.03007	0.04731	0.01432	0.02016
Al27	0.03934	0.03715	0.05146	0.04722	0.04575
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00248	0.00327	0.00247	0.00213	0.00259
S32	0.00000	0.00001	0.00001	0.00001	0.00002
Cl35	0.00000	0.00000	0.00000	0.00000	0.00000
K39	0.01432	0.01829	0.01967	0.01332	0.01407
Ca40	0.02791	0.03937	0.02983	0.02566	0.02640
Sc45	0.08696	0.05396	0.07968	0.06092	0.06555
Ti48	0.01319	0.00835	0.01386	0.01465	0.01470
Ti49	0.00105	0.00064	0.00101	0.00109	0.00105
V51	0.00006	0.00005	0.00007	0.00007	0.00006
Cr52	0.00008	0.00011	0.00009	0.00008	0.00005
Mn55	0.00010	0.00021	0.00015	0.00014	0.00010
Fe56	0.00097	0.00122	0.00178	0.00098	0.00124
Ge74	0.00000	0.00001	0.00000	0.00000	0.00000
Y89	0.16696	0.27999	0.26891	0.10345	0.12850
Nb93	0.00009	0.00020	0.00009	0.00009	0.00007
Zr94H	0.00793	0.00676	0.00747	0.00654	0.00703
Zr96	1.98510	2.03025	1.97442	2.01636	2.03497
La139	0.00001	0.00000	0.00000	0.00001	0.00000
Ce140	0.00580	0.01046	0.00559	0.00529	0.00484
Pr141	0.00007	0.00005	0.00012	0.00006	0.00006
Nd146	0.00012	0.00013	0.00029	0.00008	0.00008
Sm147	0.00024	0.00006	0.00048	0.00013	0.00015
Eu153	0.00042	0.00027	0.00091	0.00027	0.00033
Ho165	0.00294	0.00501	0.00490	0.00188	0.00225
GdO173	0.00063	0.00098	0.00122	0.00037	0.00046
TbO175	0.00095	0.00152	0.00174	0.00059	0.00069
DyO179	0.00209	0.00359	0.00363	0.00127	0.00151
ErO182	0.00307	0.00557	0.00488	0.00195	0.00244
TmO185	0.00150	0.00291	0.00248	0.00107	0.00129
YbO188	0.00225	0.00391	0.00334	0.00149	0.00180
LuO191	0.00238	0.00407	0.00343	0.00163	0.00196
Zr2O	0.01624	0.01530	0.01591	0.01572	0.01582
HfO196	0.13695	0.17015	0.14229	0.14904	0.14967
Pb206	0.00000	0.00001	0.00000	0.00001	0.00000
207/206	0.00000	0.00000	0.00000	0.00000	0.00000
ThO248	0.00256	0.00882	0.00377	0.00229	0.00246
UO254	0.00123	0.00514	0.00159	0.00130	0.00134
	38161.94	38161.91	38161.82	38161.97	38162.07
206/238 Age	59.21	25.33	47.11	87.19	56.32
Li ppm Est	0.02	0.04	0.03	0.03	0.01
Be9 ppm	0.00	0.01	0.01	0.00	0.00
B11 ppm	0.12	0.19	0.11	0.09	0.11
F19 ppm	19.20	26.96	28.95	12.68	15.12
Na ppm Est.	5.48	6.87	5.42	5.01	4.67
Mg ppm Est.	1.59	2.54	4.00	1.21	1.71
Al27 ppm Est.	14.95	14.11	19.55	17.94	17.38
Si30					
P31 ppm	230.15	303.90	228.92	197.40	240.07
S32 Rel.	0.00	0.41	0.77	0.58	1.16

Table C4, cont.

	PSTG01C-6.1ELT	PSTG01C-5.1ELT	PSTG01C-1.1ELT	PSTG01C-7.2ILT	PSTG01C-12.1ELT
K39 Rel.	1.72	2.20	2.36	1.60	1.69
Ca40 ppm Est.	2.99	4.21	3.19	2.75	2.82
Sc45 ppm	72.50	44.98	66.43	50.78	54.65
48/49	12.56	13.12	13.76	13.40	14.05
Ti48 ppm	36.39	23.02	38.24	40.42	40.56
Ti49 ppm	37.45	22.68	35.92	39.00	37.32
V51 ppm Rel.	0.36	0.31	0.40	0.43	0.35
Cr Rel.	0.10	0.13	0.11	0.09	0.06
Mn Rel.	0.04	0.09	0.06	0.06	0.04
Fe56 ppm	1.15	1.44	2.11	1.16	1.47
Ge74 Rel.	0.17	0.38	0.11	0.14	0.18
Y89 ppm	419.72	703.86	676.00	260.05	323.04
Nb93 ppm	1.19	2.66	1.17	1.25	0.88
Zr94H Rel.	1.53	1.31	1.44	1.26	1.36
Zr96/Si30 ppm	1.99	2.03	1.97	2.02	2.03
La139 ppm	0.03	0.02	0.02	0.03	0.01
Ce140 ppm	45.15	81.46	43.54	41.19	37.67
Pr ppm	0.13	0.09	0.21	0.11	0.11
Nd146 ppm	1.62	1.81	3.95	1.14	1.17
Sm147 ppm	3.29	0.77	6.54	1.79	2.06
Eu153 ppm	1.82	1.18	3.97	1.18	1.45
Gd155 ppm	17.30	29.51	28.87	11.07	13.26
Ho165 ppm	19.63	30.62	37.97	11.54	14.27
TbO175 ppm	5.25	8.37	9.60	3.24	3.81
DyO179 ppm	50.64	86.94	87.76	30.75	36.44
ErO182 ppm	67.25	122.19	106.97	42.83	53.44
TmO185 ppm	12.77	24.76	21.14	9.12	10.96
YbO188 ppm	109.39	190.27	162.75	72.52	87.77
LuO191 ppm	20.52	35.06	29.50	14.07	16.88
Zr96/Zr2O	122.22	132.73	124.09	128.30	128.66
196/Si30	61.57	65.38	62.85	63.63	63.22
Hf ppm	7341.02	9120.75	7627.08	7988.92	8022.67
Pb7/6 Est	0.00	0.00	0.00	0.00	0.00
Th ppm	24.36	83.85	35.80	21.72	23.42
U ppm	10.78	44.94	13.93	11.34	11.75
Y/Nb	353.47	264.33	578.89	207.59	365.91
Th/U	2.26	1.87	2.57	1.92	1.99
Yb/Gd	5.57	6.21	4.29	6.29	6.15
U/Yb	67.55	104.99	41.25	63.80	75.29
Th/Yb	0.10	0.24	0.09	0.16	0.13
Ce/Sm	0.22	0.44	0.22	0.30	0.27
Ce/Lu	13.71	105.23	6.65	23.03	18.33
U/Ce	2.20	2.32	1.48	2.93	2.23
Th/Ce	0.24	0.55	0.32	0.28	0.31
Y/Yb	0.54	1.03	0.82	0.53	0.62
Yb/Nd	3.84	3.70	4.15	3.59	3.68
Y/Nb	353.47	264.33	578.89	207.59	365.91
Yb/Nb	92.12	71.45	139.37	57.89	99.42
Yb/Sc	1.51	4.23	2.45	1.43	1.61
Yb/Dy	2.16	2.19	1.85	2.36	2.41
Dy/Sm	15.38	112.29	13.41	17.19	17.73
Yb/Nd	67.55	104.99	41.25	63.80	75.29
Sm/Nd	2.03	0.43	1.66	1.57	1.76
U/Li	492.94	1053.39	413.08	392.99	1865.79

Table C4, cont.

	PSTG01C-6.1ELT	PSTG01C-5.1ELT	PSTG01C-1.1ELT	PSTG01C-7.2ILT	PSTG01C-12.1ELT
Temp Ti48	863.72	815.30	869.21	875.44	875.82
Temp Ti49	866.89	813.78	862.29	871.43	866.50
Hf ppm	7341.02	9120.75	7627.08	7988.92	8022.67
Ferry Temp	932.22	869.73	926.78	937.60	931.77
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	907.94	851.03	903.00	912.81	907.52
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.10	0.05	0.06	0.10	0.04
Ce Ch (0.82)	55.06	99.35	53.09	50.24	45.94
Pr Ch (0.121)	0.89	0.74	1.35	0.69	0.54
Nd Ch (0.615)	2.63	2.95	6.41	1.85	1.90
Pm					
Sm Ch (0.2)	16.46		32.72	8.94	10.28
Eu Ch (0.076)	23.95	15.47	52.25	15.58	19.12
Gd Ch (0.267)	73.52	114.69	142.20	43.21	53.46
Tb Ch (0.0493)	106.40	169.85	194.64	65.67	77.37
Dy Ch (0.33)	153.46	263.44	265.94	93.19	110.41
Ho Ch (0.0755)	229.14	390.92	382.43	146.63	175.62
Er Ch (0.216)	311.32	565.71	495.24	198.28	247.41
Tm Ch (0.0329)	388.22	752.61	642.61	277.24	333.16
Yb Ch (0.221)	494.98	860.94	736.42	328.14	397.16
Lu Ch (0.033)	621.74	1062.45	894.07	426.42	511.43
Ce/Ce*	183.58	527.53	187.54	193.82	293.57
Hf ppm	7341.02	9120.75	7627.08	7988.92	8022.67
Eu/Eu*	0.69	#DIV/0!	0.77	0.79	0.82
P Molar	7.43	9.81	7.39	6.37	7.75
3+ Molar	8.50	12.66	12.38	5.54	6.56
3+/P Molar	1.14	1.29	1.67	0.87	0.85

Table C4, cont.

Element	PSTG01C-8.2ELT	PSTG01C-7.1ELT	PSTG01C-4.2ILT	PSTG01C-4.1ELT
Li7	0.00003	0.00002	0.00002	0.00001
Be9	0.00000	0.00000	0.00002	0.00001
B11	0.00001	0.00001	0.00002	0.00001
F19	0.00025	0.00017	0.00027	0.00020
Na23	0.05371	0.04624	0.05021	0.05486
Mg24	0.01958	0.02125	0.01285	0.01743
Al27	0.03773	0.06679	0.05671	0.07828
Si30	1.00000	1.00000	1.00000	1.00000
P31	0.00164	0.00266	0.00300	0.00289
S32	0.00001	0.00000	0.00001	0.00001
Cl35	0.00000	0.00000	0.00000	0.00000
K39	0.01323	0.01380	0.01353	0.01395
Ca40	0.02382	0.02821	0.02536	0.02438
Sc45	0.06913	0.08218	0.09679	0.08346
Ti48	0.01211	0.01762	0.01945	0.01885
Ti49	0.00086	0.00127	0.00145	0.00135
V51	0.00006	0.00001	0.00004	0.00012
Cr52	0.00008	0.00009	0.00005	0.00006
Mn55	0.00006	0.00013	0.00009	0.00009
Fe56	0.00107	0.00210	0.00074	0.00118
Ge74	0.00001	0.00000	0.00000	0.00001
Y89	0.13839	0.13905	0.30925	0.13099
Nb93	0.00005	0.00008	0.00005	0.00007
Zr94H	0.00826	0.00405	0.00730	0.00711
Zr96	2.03538	1.96742	2.01417	1.96555
La139	0.00000	0.00001	0.00003	0.00000
Ce140	0.00440	0.00360	0.00453	0.00290
Pr141	0.00004	0.00010	0.00024	0.00007
Nd146	0.00008	0.00012	0.00055	0.00010
Sm147	0.00017	0.00022	0.00064	0.00018
Eu153	0.00035	0.00050	0.00140	0.00042
Ho165	0.00240	0.00250	0.00545	0.00228
GdO173	0.00044	0.00052	0.00142	0.00043
TbO175	0.00071	0.00082	0.00202	0.00067
DyO179	0.00157	0.00167	0.00387	0.00158
ErO182	0.00262	0.00272	0.00554	0.00245
TmO185	0.00135	0.00142	0.00289	0.00124
YbO188	0.00193	0.00185	0.00379	0.00172
LuO191	0.00212	0.00200	0.00373	0.00187
Zr2O	0.01802	0.01794	0.01613	0.01541
HfO196	0.14654	0.13308	0.13289	0.12920
Pb206	0.00001	0.00000	0.00000	0.00000
207/206	0.00000	0.00000	0.00000	1.66667
ThO248	0.00168	0.00180	0.00407	0.00134
UO254	0.00114	0.00097	0.00160	0.00070
	38162.01	38163.31	38161.88	38161.87
206/238 Age	91.60	56.86	23.29	79.87
Li ppm Est	0.02	0.02	0.01	0.01
Be9 ppm	0.01	0.01	0.05	0.02
B11 ppm	0.09	0.07	0.16	0.10
F19 ppm	22.15	15.01	24.03	18.11
Na ppm Est.	5.11	4.40	4.78	5.22
Mg ppm Est.	1.66	1.80	1.09	1.47
Al27 ppm Est.	14.33	25.37	21.54	29.74
Si30				
P31 ppm	152.17	247.17	278.47	268.57
S32 Rel.	0.53	0.16	0.38	0.57

Table C4, cont.

	PSTG01C-8.2ELT	PSTG01C-7.1ELT	PSTG01C-4.2ILT	PSTG01C-4.1ELT
K39 Rel.	1.59	1.66	1.63	1.68
Ca40 ppm Est.	2.55	3.02	2.71	2.61
Sc45 ppm	57.63	68.51	80.69	69.58
48/49	14.05		13.45	13.95
Ti48 ppm	33.41		53.66	52.01
Ti49 ppm	30.74	45.44	51.57	48.20
V51 ppm Rel.	0.35	0.08	0.22	0.73
Cr Rel.	0.10	0.11	0.06	0.07
Mn Rel.	0.03	0.05	0.04	0.04
Fe56 ppm	1.27	2.48	0.88	1.39
Ge74 Rel.	0.26	0.18	0.11	0.46
Y89 ppm	347.89	349.55	777.41	329.29
Nb93 ppm	0.74	1.11	0.61	1.01
Zr94H Rel.	1.60	0.78	1.41	1.37
Zr96/Si30 ppm	2.04	1.97	2.01	1.97
La139 ppm	0.02	0.04	0.12	0.02
Ce140 ppm	34.25	28.02	35.26	22.62
Pr ppm	0.08	0.18	0.42	0.13
Nd146 ppm	1.14	1.67	7.60	1.34
Sm147 ppm	2.24	3.01	8.68	2.48
Eu153 ppm	1.51	2.16	6.07	1.82
Gd155 ppm	14.12	14.75	32.08	13.45
Ho165 ppm	13.81	16.26	44.27	13.24
TbO175 ppm	3.89	4.49	11.11	3.67
DyO179 ppm	37.96	40.39	93.57	38.16
ErO182 ppm	57.39	59.69	121.55	53.70
TmO185 ppm	11.49	12.05	24.63	10.52
YbO188 ppm	93.80	90.30	184.32	83.63
LuO191 ppm	18.26	17.23	32.09	16.14
Zr96/Zr2O	112.98	109.69	124.90	127.56
196/Si30	55.51	55.76	62.01	64.90
Hf ppm	7855.17	7133.88	7123.62	6925.54
Pb7/6 Est	0.00	0.00	0.00	1.67
Th ppm	15.99	17.11	38.72	12.70
U ppm	9.94	8.47	13.98	6.15
Y/Nb	472.45	313.99	1283.00	327.27
Th/U	1.61	2.02	2.77	2.07
Yb/Gd	6.79	5.55	4.16	6.32
U/Yb	82.44	54.00	24.27	62.32
Th/Yb	0.11	0.09	0.08	0.07
Ce/Sm	0.17	0.19	0.21	0.15
Ce/Lu	15.27	9.31	4.06	9.11
U/Ce	1.88	1.63	1.10	1.40
Th/Ce	0.29	0.30	0.40	0.27
Y/Yb	0.47	0.61	1.10	0.56
Yb/Nd	3.71	3.87	4.22	3.94
Y/Nb	472.45	313.99	1283.00	327.27
Yb/Nb	127.39	81.11	304.20	83.12
Yb/Sc	1.63	1.32	2.28	1.20
Yb/Dy	2.47	2.24	1.97	2.19
Dy/Sm	16.92	13.43	10.78	15.36
Yb/Nd	82.44	54.00	24.27	62.32
Sm/Nd	1.97	1.80	1.14	1.85
U/Li	537.71	539.01	1025.24	986.79

Table C4, cont.

	PSTG01C-8.2ELT	PSTG01C-7.1ELT	PSTG01C-4.2ILT	PSTG01C-4.1ELT
Temp Ti48	854.35	#NUM!	908.29	904.59
Temp Ti49	845.37	888.80	903.57	895.63
Hf ppm	7855.17	7133.88	7123.62	6925.54
Ferry Temp	906.82	958.20	975.79	966.33
Act Ti	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00
Temp. Est.	884.86	931.47	947.35	938.81
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)				
La Ch (0.319)	0.06	0.13	0.36	0.06
Ce Ch (0.82)	41.77	34.17	43.00	27.59
Pr Ch (0.121)	0.57	0.99	3.81	0.66
Nd Ch (0.615)	1.85	2.72	12.35	2.18
Pm				
Sm Ch (0.2)	11.22	15.04	43.40	12.42
Eu Ch (0.076)	19.86	28.41	79.84	23.95
Gd Ch (0.267)	51.71	60.90	165.82	49.58
Tb Ch (0.0493)	78.84	91.03	225.28	74.37
Dy Ch (0.33)	115.03	122.40	283.54	115.64
Ho Ch (0.0755)	187.00	195.31	424.85	178.12
Er Ch (0.216)	265.68	276.35	562.71	248.62
Tm Ch (0.0329)	349.28	366.37	748.64	319.79
Yb Ch (0.221)	424.46	408.58	834.05	378.43
Lu Ch (0.033)	553.27	521.99	972.34	489.21
Ce/Ce*	235.26	94.93	36.65	139.81
Hf ppm	7855.17	7133.88	7123.62	6925.54
Eu/Eu*	0.82	0.94	0.94	0.97
P Molar	4.91	7.98	8.99	8.67
3+ Molar	6.96	7.22	14.19	6.83
3+/P Molar	1.42	0.90	1.58	0.79

Table C5. SHRIMP-RG trace element analyses of zircon grains from CRWPST.

Element	CRWPST-1.1C	CRWPST-2.2C	CRWPST-3.1C	CRWPST-4.1C	CRWPST-5.1C	CRWPST-6.1C
Li7	0.00006	0.00004	0.00003	0.00002	0.00000	0.00003
Be9	0.00002	0.00001	0.00003	0.00001	0.00004	0.00011
B11	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
F19	0.00016	0.00019	0.00015	0.00009	0.00011	0.00016
Na23	0.00661	0.00841	0.00788	0.00850	0.01079	0.01050
Al27	0.01658	0.02645	0.02277	0.02323	0.02397	0.02528
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00492	0.00671	0.00175	0.00398	0.00343	0.00620
K39	0.00215	0.00382	0.00798	0.00352	0.00338	0.00398
Ca40	0.01020	0.01121	0.01022	0.01092	0.01835	0.02004
Sc45	0.08224	0.03676	0.06284	0.04450	0.05313	0.08800
Ti48	0.00918	0.00432	0.00329	0.00586	0.00664	0.00828
Ti49	0.00065	0.00033	0.00023	0.00042	0.00049	0.00062
Fe56	0.00063	0.00107	0.00343	0.00072	0.00069	0.00076
Y89	0.72814	0.74211	0.26258	0.50559	0.42741	0.99124
Nb93	0.00122	0.00080	0.00080	0.00087	0.00068	0.00193
Zr94H	0.01168	0.01152	0.01110	0.01117	0.01126	0.01094
Zr96	2.43639	2.46476	2.40855	2.42376	2.42058	2.44248
La139	0.00001	0.00000	0.00001	0.00000	0.00000	0.00001
Ce140	0.02616	0.01007	0.00877	0.01452	0.01372	0.03558
Nd146	0.00030	0.00017	0.00004	0.00015	0.00014	0.00039
Sm147	0.00064	0.00046	0.00009	0.00036	0.00036	0.00087
Eu153	0.00049	0.00030	0.00009	0.00025	0.00026	0.00069
Gd155	0.00169	0.00139	0.00022	0.00107	0.00090	0.00238
Ho165	0.01288	0.01266	0.00375	0.00911	0.00736	0.01790
TbO175	0.00312	0.00274	0.00060	0.00208	0.00166	0.00453
DyO179	0.00701	0.00641	0.00160	0.00488	0.00387	0.00986
ErO182	0.01061	0.01035	0.00426	0.00784	0.00635	0.01477
TmO185	0.00512	0.00513	0.00262	0.00376	0.00338	0.00697
YbO188	0.00648	0.00610	0.00400	0.00492	0.00414	0.00876
LuO191	0.00654	0.00615	0.00486	0.00483	0.00436	0.00876
Zr2O	0.01853	0.01751	0.01704	0.01652	0.01719	0.01692
HfO196	0.14740	0.16888	0.19076	0.16597	0.15783	0.15963
Pb206	0.00003	0.00002	0.00003	0.00002	0.00002	0.00003
207/206	0.00000	0.83333	0.21739	0.90909	0.66667	0.67797
ThO248	0.06737	0.01350	0.01734	0.02125	0.02329	0.06189
UO254	0.02293	0.00988	0.01615	0.01363	0.01202	0.02369
	38363.63	38363.65	38363.66	38363.67	38363.69	38363.70
206/238 Age	24.74	42.63	32.02	27.65	28.06	29.11
Li ppm Est	0.03	0.02	0.02	0.01	0.00	0.02
Be9 ppm	0.06	0.04	0.09	0.04	0.11	0.34
B11 ppm	0.07	0.14	0.10	0.07	0.08	0.12
F19 ppm	20.34	24.79	19.42	11.53	14.66	20.57
Na ppm Est.	1.56	1.99	1.87	2.01	2.55	2.49
Al27 ppm Est.	11.03	17.61	15.16	15.46	15.95	16.83
P31 ppm	418.95	571.17	149.06	339.16	291.62	528.24
K39 Rel.	0.37	0.66	1.38	0.61	0.58	0.69
Ca40 ppm Est.	1.33	1.46	1.33	1.42	2.39	2.61
Sc45 ppm	72.34	32.34	55.28	39.14	46.74	77.41
48/49	14.02	12.97	14.02	13.80	13.45	13.32
Ti48 ppm	26.39	12.43	9.46	16.83	19.09	23.81
Ti49 ppm	25.02	12.74	8.97	16.21	18.87	23.76
Fe56 ppm	0.92	1.56	5.00	1.05	1.00	1.11

Table C5, cont.

	CRWPST-1.1C	CRWPST-2.2C	CRWPST-3.1C	CRWPST-4.1C	CRWPST-5.1C	CRWPST-6.1C
Y89 ppm	1718.48	1751.45	619.71	1193.23	1008.72	2339.41
Nb93 ppm	12.37	8.16	8.12	8.88	6.93	19.63
Zr94H Rel.	1.14	1.12	1.08	1.09	1.10	1.06
Zr96/Si30 ppm	2.44	2.46	2.41	2.42	2.42	2.44
La139 ppm	0.06	0.02	0.05	0.03	0.02	0.07
Ce140 ppm	189.60	73.01	63.60	105.23	99.43	257.88
Pr ppm						
Nd146 ppm	4.16	2.39	0.52	2.13	1.88	5.37
Sm147 ppm	8.82	6.27	1.22	4.99	5.00	11.94
Eu153 ppm	2.34	1.44	0.41	1.22	1.26	3.34
Gd155 ppm	68.99	56.69	8.97	43.64	36.96	97.44
Ho165 ppm	72.72	71.49	21.18	51.46	41.58	101.05
TbO175 ppm	20.81	18.32	4.01	13.87	11.11	30.26
DyO179 ppm	207.51	189.74	47.26	144.45	114.52	291.81
ErO182 ppm	282.62	275.71	113.53	208.64	169.12	393.33
TmO185 ppm	53.34	53.45	27.30	39.14	35.18	72.61
YbO188 ppm	397.62	374.45	245.43	302.07	254.10	537.75
LuO191 ppm	66.16	62.18	49.22	48.92	44.16	88.62
Zr96/Zr2O	131.48	140.78	141.32	146.76	140.84	144.39
196/Si30	53.96	57.12	58.67	60.55	58.19	59.12
Hf ppm	8556.73	9803.47	11073.66	9634.73	9162.15	9266.48
Pb7/6 Est	0.00	0.83	0.22	0.91	0.67	0.68
Th ppm	683.00	136.82	175.80	215.41	236.08	627.41
U ppm	222.54	95.91	156.70	132.23	116.69	229.87
Y/Nb	138.90	214.70	76.32	134.34	145.57	119.20
Th/U	3.07	1.43	1.12	1.63	2.02	2.73
Yb/Gd	5.76	6.61	27.37	6.92	6.87	5.52
U/Yb	0.56	0.26	0.64	0.44	0.46	0.43
Th/Yb	1.72	0.37	0.72	0.71	0.93	1.17
Ce/Sm	21.49	11.65	52.15	21.08	19.90	21.59
Ce/Lu	2.87	1.17	1.29	2.15	2.25	2.91
U/Ce	1.17	1.31	2.46	1.26	1.17	0.89
Th/Ce	3.60	1.87	2.76	2.05	2.37	2.43
Y/Yb	4.32	4.68	2.52	3.95	3.97	4.35
Yb/Nd	95.62	156.87	473.65	141.73	135.19	100.07
Y/Nb	138.90	214.70	76.32	134.34	145.57	119.20
Yb/Nb	32.14	45.90	30.22	34.01	36.67	27.40
Yb/Sc	5.50	11.58	4.44	7.72	5.44	6.95
Yb/Dy	1.92	1.97	5.19	2.09	2.22	1.84
Dy/Sm	23.52	30.27	38.75	28.93	22.92	24.43
Yb/Nd	95.62	156.87	473.65	141.73	135.19	100.07
Sm/Nd	2.12	2.63	2.35	2.34	2.66	2.22
U/Li	6455.83	4046.83	8097.88	12709.52	51224.08	10791.56
Estimated temperature						
Temp Ti48	829.30	756.29	732.13	784.49	796.64	818.71
Temp Ti49	823.77	758.53	727.52	780.91	795.50	818.50
Hf ppm	8556.73	9803.47	11073.66	9634.73	9162.15	9266.48
Ferry Temp	881.43	805.45	769.69	831.40	848.38	875.26
Act Ti	0.70	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00	1.00
Temp. Est.	861.72	792.03	759.00	815.90	831.48	856.08

Table C5, cont.

	CRWPST-1.1C	CRWPST-2.2C	CRWPST-3.1C	CRWPST-4.1C	CRWPST-5.1C	CRWPST-6.1C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	0.18	0.07	0.15	0.10	0.05	0.21
Ce Ch (0.82)	231.22	89.04	77.56	128.32	121.25	314.49
Pr Ch (0.121)	2.01	1.03	0.48	1.05	0.76	2.51
Nd Ch (0.615)	6.76	3.88	0.84	3.47	3.06	8.74
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	44.12	31.34	6.10	24.96	24.98	59.72
Eu Ch (0.076)	30.78	18.99	5.45	16.12	16.59	43.89
Gd Ch (0.267)	258.39	212.32	33.59	163.43	138.44	364.93
Tb Ch (0.0493)	422.11	371.60	81.33	281.31	225.41	613.82
Dy Ch (0.33)	628.82	574.97	143.20	437.72	347.05	884.28
Ho Ch (0.0755)	963.15	946.88	280.56	681.57	550.72	1338.41
Er Ch (0.216)	1308.43	1276.45	525.62	965.92	782.97	1820.95
Tm Ch (0.0329)	1621.32	1624.59	829.88	1189.71	1069.38	2206.89
Yb Ch (0.221)	1799.18	1694.35	1110.55	1366.82	1149.79	2433.27
Lu Ch (0.033)	2004.79	1884.33	1491.45	1482.39	1338.18	2685.57
Ce/Ce*	386.40	323.09	287.26	405.84	641.04	435.26
Hf ppm	8556.73	9803.47	11073.66	9634.73	9162.15	9266.48
Eu/Eu*	0.29	0.23	0.38	0.25	0.28	0.30
P Molar	13.53	18.44	4.81	10.95	9.42	17.06
3+ Molar	29.36	27.57	11.71	20.17	17.35	39.63
3+/P Molar	2.17	1.50	2.43	1.84	1.84	2.32

Table C5, cont.

Element	CRWPST-7.1C	CRWPST-8.1C	CRWPST-9.1C	CRWPST-10.1C	CRWPST-11.1C
Li7	0.00001	0.00002	0.00000	0.00003	0.00019
Be9	0.00000	0.00001	0.00000	0.00009	0.00019
B11	0.00002	0.00001	0.00001	0.00001	0.00001
F19	0.00014	0.00018	0.00008	0.00019	0.00018
Na23	0.00778	0.00955	0.00835	0.01116	0.02051
Al27	0.02645	0.02431	0.02361	0.02552	0.03433
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00349	0.00570	0.00290	0.00484	0.00352
K39	0.00354	0.00393	0.00339	0.00415	0.00379
Ca40	0.01640	0.01429	0.01753	0.02146	0.02198
Sc45	0.08770	0.07924	0.08732	0.03713	0.03186
Ti48	0.01069	0.00786	0.01051	0.00544	0.01252
Ti49	0.00079	0.00056	0.00080	0.00043	0.00093
Fe56	0.00084	0.00092	0.00063	0.00087	0.01542
Y89	0.25611	0.92090	0.38923	1.33539	0.70577
Nb93	0.00022	0.00184	0.00014	0.00093	0.00051
Zr94H	0.01050	0.01055	0.00962	0.00978	0.00947
Zr96	2.40251	2.48319	2.41411	2.39108	2.40475
La139	0.00001	0.00001	0.00002	0.00002	0.00000
Ce140	0.00978	0.02848	0.01172	0.01833	0.00513
Nd146	0.00021	0.00034	0.00065	0.00062	0.00014
Sm147	0.00038	0.00076	0.00079	0.00128	0.00027
Eu153	0.00049	0.00048	0.00089	0.00083	0.00012
Gd155	0.00079	0.00213	0.00131	0.00323	0.00083
Ho165	0.00456	0.01657	0.00712	0.02519	0.01158
TbO175	0.00117	0.00395	0.00199	0.00604	0.00197
DyO179	0.00247	0.00888	0.00398	0.01387	0.00535
ErO182	0.00385	0.01336	0.00606	0.02022	0.01158
TmO185	0.00205	0.00645	0.00277	0.00905	0.00656
YbO188	0.00278	0.00791	0.00352	0.01084	0.00969
LuO191	0.00305	0.00784	0.00410	0.01054	0.01071
Zr2O	0.01660	0.01774	0.01699	0.01639	0.01622
HfO196	0.13580	0.16314	0.14100	0.16128	0.19539
Pb206	0.00001	0.00002	0.00001	0.00003	0.00893
207/206	2.00000	0.00000	0.00000	0.20408	0.11251
ThO248	0.00460	0.04267	0.00778	0.04326	0.05774
UO254	0.00232	0.02047	0.00264	0.01941	0.09628
	38363.73	38363.75	38363.77	38363.78	38363.82
206/238 Age	99.05	23.85	80.23	29.70	1861.55
Li ppm Est	0.01	0.01	0.00	0.02	0.11
Be9 ppm	0.01	0.04	0.01	0.29	0.59
B11 ppm	0.17	0.11	0.07	0.07	0.11
F19 ppm	17.95	22.90	10.74	25.31	23.42
Na ppm Est.	1.84	2.26	1.98	2.64	4.86
Al27 ppm Est.	17.61	16.18	15.72	16.98	22.85
P31 ppm	297.11	485.56	246.71	411.83	299.29
K39 Rel.	0.61	0.68	0.58	0.72	0.65
Ca40 ppm Est.	2.14	1.86	2.29	2.80	2.87
Sc45 ppm	77.14	69.71	76.82	32.66	28.02
48/49	13.47	14.03	13.11	12.55	13.44
Ti48 ppm	30.73	22.59	30.21	15.63	35.98
Ti49 ppm	30.31	21.40	30.64	16.55	35.59
Fe56 ppm	1.23	1.35	0.92	1.27	22.49

Table C5, cont.

	CRWPST-7.1C	CRWPST-8.1C	CRWPST-9.1C	CRWPST-10.1C	CRWPST-11.1C
Y89 ppm	604.44	2173.41	918.62	3151.65	1665.68
Nb93 ppm	2.27	18.69	1.41	9.43	5.16
Zr94H Rel.	1.02	1.03	0.94	0.95	0.92
Zr96/Si30 ppm	2.40	2.48	2.41	2.39	2.40
La139 ppm	0.04	0.05	0.11	0.12	0.02
Ce140 ppm	70.88	206.41	84.92	132.89	37.20
Pr ppm					
Nd146 ppm	2.93	4.73	9.00	8.57	1.92
Sm147 ppm	5.19	10.46	10.88	17.61	3.77
Eu153 ppm	2.38	2.29	4.30	4.00	0.56
Gd155 ppm	32.40	87.16	53.71	132.12	33.95
Ho165 ppm	25.74	93.54	40.19	142.19	65.39
TbO175 ppm	7.79	26.41	13.31	40.32	13.18
DyO179 ppm	73.02	262.66	117.78	410.27	158.18
ErO182 ppm	102.54	355.86	161.43	538.53	308.25
TmO185 ppm	21.30	67.18	28.79	94.26	68.25
YbO188 ppm	170.54	485.33	216.37	665.45	594.70
LuO191 ppm	30.88	79.31	41.52	106.69	108.37
Zr96/Zr2O	144.75	139.96	142.07	145.88	148.25
196/Si30	60.25	56.36	58.85	61.01	61.65
Hf ppm	7883.58	9470.43	8185.10	9362.49	11342.54
Pb7/6 Est	2.00	0.00	0.00	0.20	0.11
Th ppm	46.67	432.62	78.92	438.60	585.34
U ppm	22.48	198.66	25.61	188.34	934.30
Y/Nb	266.83	116.27	651.62	334.13	322.55
Th/U	2.08	2.18	3.08	2.33	0.63
Yb/Gd	5.26	5.57	4.03	5.04	17.52
U/Yb	0.13	0.41	0.12	0.28	1.57
Th/Yb	0.27	0.89	0.36	0.66	0.98
Ce/Sm	13.67	19.74	7.80	7.55	9.86
Ce/Lu	2.30	2.60	2.05	1.25	0.34
U/Ce	0.32	0.96	0.30	1.42	25.12
Th/Ce	0.66	2.10	0.93	3.30	15.74
Y/Yb	3.54	4.48	4.25	4.74	2.80
Yb/Nd	58.11	102.50	24.04	77.66	309.22
Y/Nb	266.83	116.27	651.62	334.13	322.55
Yb/Nb	75.28	25.96	153.48	70.55	115.16
Yb/Sc	2.21	6.96	2.82	20.37	21.22
Yb/Dy	2.34	1.85	1.84	1.62	3.76
Dy/Sm	14.08	25.12	10.82	23.29	41.94
Yb/Nd	58.11	102.50	24.04	77.66	309.22
Sm/Nd	1.77	2.21	1.21	2.06	1.96
U/Li	3870.16	18304.26	21499.55	10539.28	8207.63
Estimated temperature					
Temp Ti48	845.34	813.38	843.52	777.45	862.46
Temp Ti49	843.87	807.95	845.02	782.88	861.26
Hf ppm	7883.58	9470.43	8185.10	9362.49	11342.54
Ferry Temp	905.06	862.92	906.41	833.69	925.56
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	883.25	844.80	884.48	818.01	901.89

Table C5, cont.

	CRWPST-7.1C	**CRWPST-8.1C**	**CRWPST-9.1C**	**CRWPST-10.1C**	**CRWPST-11.1C**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.13	0.15	0.33	0.37	0.05
Ce Ch (0.82)	86.44	251.72	103.56	162.06	45.36
Pr Ch (0.121)	1.44	2.07	4.14	4.15	0.78
Nd Ch (0.615)	4.77	7.70	14.64	13.93	3.13
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	25.94	52.29	54.41	88.06	18.86
Eu Ch (0.076)	31.30	30.17	56.64	52.68	7.39
Gd Ch (0.267)	121.34	326.45	201.18	494.84	127.16
Tb Ch (0.0493)	157.98	535.73	270.04	817.86	267.33
Dy Ch (0.33)	221.28	795.95	356.92	1243.26	479.32
Ho Ch (0.0755)	340.86	1238.98	532.36	1883.36	866.03
Er Ch (0.216)	474.72	1647.51	747.35	2493.21	1427.11
Tm Ch (0.0329)	647.46	2041.89	874.99	2864.97	2074.34
Yb Ch (0.221)	771.66	2196.07	979.04	3011.11	2690.96
Lu Ch (0.033)	935.78	2403.30	1258.03	3233.00	3283.80
Ce/Ce*	198.09	452.66	88.26	130.88	233.32
Hf ppm	7883.58	9470.43	8185.10	9362.49	11342.54
Eu/Eu*	0.56	0.23	0.54	0.25	0.15
P Molar	9.59	15.68	7.97	13.30	9.66
3+ Molar	11.85	36.28	16.82	50.04	27.65
3+/P Molar	1.24	2.31	2.11	3.76	2.86

Table C5, cont.

Element	CRWPST-12.1C	CRWPST-13.1C	CRWPST-14.1C	CRWPST-15.2I	CRWPST-2.1E
Li7	0.00002	0.00002	0.00003	0.00004	0.00001
Be9	0.00000	0.00001	0.00005	0.00002	0.00000
B11	0.00001	0.00001	0.00002	0.00001	0.00000
F19	0.00005	0.00014	0.00020	0.00010	0.00013
Na23	0.01239	0.05275	0.01130	0.00920	0.00390
Al27	0.02773	0.02665	0.02788	0.02232	0.01317
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00261	0.00331	0.00310	0.00429	0.00330
K39	0.00452	0.01604	0.00427	0.00330	0.00226
Ca40	0.01696	0.07935	0.01369	0.01251	0.00546
Sc45	0.05984	0.06499	0.03788	0.08279	0.06429
Ti48	0.01156	0.00325	0.00630	0.00315	0.00833
Ti49	0.00086	0.00026	0.00047	0.00023	0.00064
Fe56	0.00097	0.00081	0.00362	0.00074	0.00056
Y89	0.18310	0.56743	0.88587	0.33903	0.32866
Nb93	0.00019	0.00079	0.00139	0.00086	0.00035
Zr94H	0.00890	0.00888	0.00948	0.00895	0.01359
Zr96	2.44482	2.38803	2.39049	2.45754	2.46889
La139	0.00001	0.00001	0.00001	0.00000	0.00000
Ce140	0.01110	0.01080	0.01869	0.00860	0.00981
Nd146	0.00011	0.00016	0.00029	0.00004	0.00014
Sm147	0.00026	0.00029	0.00053	0.00009	0.00031
Eu153	0.00029	0.00020	0.00027	0.00009	0.00028
Gd155	0.00051	0.00075	0.00150	0.00036	0.00082
Ho165	0.00319	0.00880	0.01628	0.00498	0.00584
TbO175	0.00087	0.00147	0.00308	0.00072	0.00131
DyO179	0.00186	0.00389	0.00788	0.00207	0.00307
ErO182	0.00279	0.00869	0.01439	0.00525	0.00497
TmO185	0.00142	0.00500	0.00726	0.00317	0.00248
YbO188	0.00200	0.00703	0.00940	0.00513	0.00318
LuO191	0.00226	0.00776	0.00950	0.00617	0.00361
Zr2O	0.01757	0.01675	0.01681	0.01716	0.01962
HfO196	0.15105	0.18971	0.19095	0.18906	0.14810
Pb206	0.00002	0.00003	0.00003	0.00002	0.00002
207/206	1.14286	0.22727	0.42553	0.64516	1.11111
ThO248	0.00463	0.03140	0.05713	0.02221	0.00551
UO254	0.00206	0.02305	0.02947	0.02086	0.00319
	38363.84	38363.85	38363.87	38363.90	38363.64
206/238 Age	204.79	22.43	19.07	17.70	97.46
Li ppm Est	0.01	0.01	0.02	0.02	0.01
Be9 ppm	0.01	0.02	0.14	0.08	0.00
B11 ppm	0.08	0.09	0.15	0.10	0.04
F19 ppm	5.91	18.00	26.11	12.81	17.66
Na ppm Est.	2.93	12.49	2.68	2.18	0.92
Al27 ppm Est.	18.46	17.74	18.56	14.86	8.77
P31 ppm	222.58	281.92	264.08	365.03	280.89
K39 Rel.	0.78	2.77	0.74	0.57	0.39
Ca40 ppm Est.	2.21	10.35	1.79	1.63	0.71
Sc45 ppm	52.64	57.17	33.32	72.83	56.55
48/49	13.41	12.51	13.48	13.49	12.99
Ti48 ppm	33.24	9.35	18.10	9.04	23.94
Ti49 ppm	32.95	9.93	17.85	8.91	24.49
Fe56 ppm	1.42	1.18	5.28	1.08	0.82

Table C5, cont.

	CRWPST-12.1C	CRWPST-13.1C	CRWPST-14.1C	CRWPST-15.2I	CRWPST-2.1E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.14	0.17	0.19	0.09	0.08
Ce Ch (0.82)	98.12	95.47	165.25	76.02	86.70
Pr Ch (0.121)	0.96	1.31	1.99	0.42	0.93
Nd Ch (0.615)	2.51	3.63	6.50	0.91	3.11
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	17.59	19.66	36.39	6.39	21.00
Eu Ch (0.076)	18.26	12.63	16.82	5.58	18.04
Gd Ch (0.267)	78.17	114.29	228.98	55.12	125.32
Tb Ch (0.0493)	117.98	199.39	417.93	97.82	177.45
Dy Ch (0.33)	166.56	349.07	706.49	185.23	274.92
Ho Ch (0.0755)	238.47	658.00	1217.70	372.37	436.99
Er Ch (0.216)	343.53	1071.11	1773.90	647.38	612.16
Tm Ch (0.0329)	448.51	1583.09	2298.31	1002.66	785.19
Yb Ch (0.221)	554.26	1953.40	2611.15	1425.06	882.82
Lu Ch (0.033)	691.55	2379.89	2912.49	1892.56	1107.32
Ce/Ce*	269.02	200.76	270.22	398.24	308.67
Hf ppm	8768.36	11013.04	11084.67	10975.05	8597.47
Eu/Eu*	0.49	0.27	0.18	0.30	0.35
P Molar	7.19	9.10	8.53	11.79	9.07
3+ Molar	8.63	22.85	34.45	14.96	13.85
3+/P Molar	1.20	2.51	4.04	1.27	1.53

Table C5, cont.

Element	CRWPST-3.2E	CRWPST-4.2E	CRWPST-5.2E	CRWPST-6.2E	CRWPST-6.3E
Li7	0.00001	0.00003	0.00000	0.00000	0.00001
Be9	0.00000	0.00003	0.00000	0.00006	0.00001
B11	0.00000	0.00000	0.00001	0.00001	0.00001
F19	0.00014	0.00012	0.00015	0.00013	0.00014
Na23	0.00711	0.00739	0.01194	0.01216	0.00956
Al27	0.02403	0.02314	0.03980	0.02804	0.04166
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00273	0.00286	0.00310	0.00308	0.00314
K39	0.00248	0.00297	0.00338	0.00422	0.00376
Ca40	0.01052	0.01032	0.02055	0.02203	0.02042
Sc45	0.07315	0.04403	0.08103	0.08904	0.07844
Ti48	0.01074	0.00418	0.01346	0.01387	0.01365
Ti49	0.00078	0.00032	0.00095	0.00109	0.00099
Fe56	0.00066	0.00076	0.00086	0.00081	0.00069
Y89	0.22316	0.40759	0.17679	0.36788	0.17390
Nb93	0.00021	0.00084	0.00015	0.00010	0.00017
Zr94H	0.01153	0.01078	0.01077	0.01102	0.01089
Zr96	2.43741	2.36462	2.45411	2.41871	2.44961
La139	0.00000	0.00000	0.00000	0.00001	0.00001
Ce140	0.01024	0.01233	0.00572	0.00742	0.00679
Nd146	0.00017	0.00009	0.00016	0.00053	0.00018
Sm147	0.00028	0.00020	0.00024	0.00071	0.00025
Eu153	0.00038	0.00017	0.00044	0.00131	0.00043
Gd155	0.00063	0.00064	0.00046	0.00134	0.00054
Ho165	0.00392	0.00713	0.00309	0.00670	0.00310
TbO175	0.00102	0.00142	0.00079	0.00191	0.00079
DyO179	0.00212	0.00347	0.00163	0.00377	0.00165
ErO182	0.00346	0.00654	0.00264	0.00542	0.00252
TmO185	0.00172	0.00349	0.00138	0.00266	0.00133
YbO188	0.00220	0.00461	0.00191	0.00329	0.00175
LuO191	0.00251	0.00481	0.00208	0.00364	0.00197
Zr2O	0.01768	0.01628	0.01669	0.01792	0.01824
HfO196	0.14287	0.17652	0.13510	0.13210	0.13654
Pb206	0.00001	0.00002	0.00001	0.00001	0.00001
207/206	0.52632	0.48780	0.00000	0.50000	1.11111
ThO248	0.00478	0.01758	0.00264	0.00557	0.00289
UO254	0.00212	0.01247	0.00136	0.00190	0.00136
	38363.67	38363.68	38363.70	38363.71	38363.72
206/238 Age	101.55	37.13	177.83	119.02	76.21
Li ppm Est	0.01	0.02	0.00	0.00	0.00
Be9 ppm	0.01	0.08	0.01	0.17	0.02
B11 ppm	0.04	0.04	0.11	0.08	0.08
F19 ppm	18.79	15.83	19.87	16.56	18.39
Na ppm Est.	1.68	1.75	2.83	2.88	2.26
Al27 ppm Est.	15.99	15.40	26.49	18.66	27.73
P31 ppm	232.11	243.33	264.04	262.23	267.06
K39 Rel.	0.43	0.51	0.58	0.73	0.65
Ca40 ppm Est.	1.37	1.35	2.68	2.87	2.66
Sc45 ppm	64.34	38.73	71.28	78.32	69.01
48/49	13.74	13.21	14.24	12.78	13.79
Ti48 ppm	30.86	12.00	38.70	39.87	39.24
Ti49 ppm	29.85	12.08	36.13	41.48	37.81
Fe56 ppm	0.96	1.11	1.26	1.19	1.00

Table C5, cont.

	CRWPST-3.2E	CRWPST-4.2E	CRWPST-5.2E	CRWPST-6.2E	CRWPST-6.3E
Y89 ppm	526.68	961.94	417.23	868.24	410.42
Nb93 ppm	2.18	8.52	1.55	1.01	1.77
Zr94H Rel.	1.12	1.05	1.05	1.07	1.06
Zr96/Si30 ppm	2.44	2.36	2.45	2.42	2.45
La139 ppm	0.02	0.03	0.02	0.10	0.05
Ce140 ppm	74.23	89.37	41.45	53.78	49.23
Pr ppm					
Nd146 ppm	2.42	1.24	2.28	7.40	2.48
Sm147 ppm	3.90	2.73	3.31	9.72	3.42
Eu153 ppm	1.85	0.82	2.12	6.30	2.08
Gd155 ppm	25.87	26.18	18.90	54.76	22.05
Ho165 ppm	22.10	40.27	17.43	37.84	17.51
TbO175 ppm	6.82	9.46	5.27	12.78	5.30
DyO179 ppm	62.83	102.65	48.18	111.48	48.91
ErO182 ppm	92.25	174.24	70.35	144.24	67.03
TmO185 ppm	17.92	36.36	14.33	27.64	13.86
YbO188 ppm	134.79	283.25	117.51	201.85	107.51
LuO191 ppm	25.39	48.70	21.02	36.87	19.97
Zr96/Zr2O	137.89	145.22	147.08	134.96	134.27
196/Si30	56.57	61.41	59.93	55.80	54.81
Hf ppm	8293.55	10247.06	7842.66	7668.57	7926.17
Pb7/6 Est	0.53	0.49	0.00	0.50	1.11
Th ppm	48.46	178.20	26.81	56.51	29.28
U ppm	20.53	120.99	13.18	18.41	13.19
Y/Nb	242.12	112.91	268.66	859.75	232.07
Th/U	2.36	1.47	2.03	3.07	2.22
Yb/Gd	5.21	10.82	6.22	3.69	4.88
U/Yb	0.15	0.43	0.11	0.09	0.12
Th/Yb	0.36	0.63	0.23	0.28	0.27
Ce/Sm	19.04	32.69	12.53	5.53	14.40
Ce/Lu	2.92	1.84	1.97	1.46	2.47
U/Ce	0.28	1.35	0.32	0.34	0.27
Th/Ce	0.65	1.99	0.65	1.05	0.59
Y/Yb	3.91	3.40	3.55	4.30	3.82
Yb/Nd	55.62	229.12	51.55	27.27	43.33
Y/Nb	242.12	112.91	268.66	859.75	232.07
Yb/Nb	61.96	33.25	75.67	199.88	60.79
Yb/Sc	2.09	7.31	1.65	2.58	1.56
Yb/Dy	2.15	2.76	2.44	1.81	2.20
Dy/Sm	16.12	37.55	14.56	11.47	14.31
Yb/Nd	55.62	229.12	51.55	27.27	43.33
Sm/Nd	1.61	2.21	1.45	1.31	1.38
U/Li	3586.04	6224.39	5658.40	16103.77	3772.27
Estimated temperature					
Temp Ti48	845.81	753.13	870.55	873.89	872.10
Temp Ti49	842.25	753.70	862.92	878.36	867.96
Hf ppm	8293.55	10247.06	7842.66	7668.57	7926.17
Ferry Temp	903.15	799.87	927.52	945.81	933.49
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	881.51	786.88	903.67	920.25	909.09

Table C5, cont.

	CRWPST-3.2E	CRWPST-4.2E	CRWPST-5.2E	CRWPST-6.2E	CRWPST-6.3E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.06	0.08	0.06	0.31	0.14
Ce Ch (0.82)	90.52	108.99	50.55	65.58	60.04
Pr Ch (0.121)	0.97	0.69	0.94	3.54	1.33
Nd Ch (0.615)	3.94	2.01	3.71	12.04	4.03
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	19.49	13.67	16.55	48.60	17.09
Eu Ch (0.076)	24.36	10.77	27.93	82.90	27.35
Gd Ch (0.267)	96.88	98.06	70.78	205.11	82.57
Tb Ch (0.0493)	138.40	191.86	106.90	259.26	107.53
Dy Ch (0.33)	190.40	311.07	146.00	337.81	148.22
Ho Ch (0.0755)	292.77	533.37	230.85	501.20	231.89
Er Ch (0.216)	427.07	806.67	325.68	667.78	310.30
Tm Ch (0.0329)	544.54	1105.16	435.66	840.12	421.16
Yb Ch (0.221)	609.91	1281.67	531.73	913.35	486.49
Lu Ch (0.033)	769.43	1475.81	636.93	1117.14	605.09
Ce/Ce*	377.66	455.09	212.80	62.89	136.97
Hf ppm	8293.55	10247.06	7842.66	7668.57	7926.17
Eu/Eu*	0.56	0.29	0.82	0.83	0.73
P Molar	7.49	7.86	8.53	8.47	8.62
3+ Molar	10.25	16.63	8.49	15.79	8.35
3+/P Molar	1.37	2.12	1.00	1.87	0.97

Table C5, cont.

Element	**CRWPST-7.2E**	**CRWPST-8.2E**	**CRWPST-9.1E**	**CRWPST-10.2E**	**CRWPST-11.2E**
Li7	0.00000	0.00003	0.00000	0.00007	0.00008
Be9	0.00000	0.00000	0.00000	0.00006	0.00002
B11	0.00001	0.00001	0.00001	0.00006	0.00001
F19	0.00012	0.00013	0.00011	0.00023	0.00013
Na23	0.00659	0.00802	0.01061	0.00634	0.03050
Al27	0.02409	0.02455	0.02776	0.02004	0.03156
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00292	0.00332	0.00290	0.00561	0.00181
K39	0.00301	0.00331	0.00371	0.00642	0.00783
Ca40	0.01283	0.01642	0.01893	0.01368	0.00937
Sc45	0.09459	0.04149	0.09482	0.09464	0.02845
Ti48	0.01423	0.00516	0.01315	0.00537	0.00474
Ti49	0.00113	0.00041	0.00096	0.00038	0.00036
Fe56	0.00051	0.00076	0.00060	0.00108	0.00222
Y89	0.37158	0.49869	0.40947	2.23403	0.15386
Nb93	0.00011	0.00097	0.00011	0.00277	0.00036
Zr94H	0.01089	0.01013	0.01076	0.01083	0.01015
Zr96	2.45821	2.41856	2.55327	2.46592	2.54891
La139	0.00002	0.00000	0.00001	0.00004	0.00000
Ce140	0.00778	0.01383	0.00830	0.04510	0.00214
Nd146	0.00064	0.00010	0.00069	0.00064	0.00001
Sm147	0.00077	0.00031	0.00080	0.00114	0.00004
Eu153	0.00128	0.00022	0.00129	0.00055	0.00004
Gd155	0.00140	0.00087	0.00143	0.00333	0.00017
Ho165	0.00670	0.00889	0.00751	0.03523	0.00248
TbO175	0.00184	0.00179	0.00217	0.00658	0.00034
DyO179	0.00390	0.00433	0.00451	0.01685	0.00108
ErO182	0.00542	0.00762	0.00629	0.03246	0.00277
TmO185	0.00253	0.00384	0.00311	0.01728	0.00178
YbO188	0.00326	0.00489	0.00384	0.02328	0.00277
LuO191	0.00362	0.00505	0.00433	0.02414	0.00350
Zr2O	0.01849	0.01743	0.01808	0.01692	0.01767
HfO196	0.13414	0.17347	0.14377	0.17405	0.21183
Pb206	0.00001	0.00002	0.00002	0.00006	0.00260
207/206	0.95238	0.00000	1.28205	0.21505	0.08858
ThO248	0.00550	0.01836	0.00679	0.13881	0.01095
UO254	0.00202	0.01301	0.00239	0.06264	0.03136
	38363.73	38363.76	38363.77	38363.79	38363.83
206/238 Age	120.42	27.86	202.91	17.74	1665.70
Li ppm Est	0.00	0.02	0.00	0.04	0.05
Be9 ppm	0.02	0.01	0.01	0.18	0.07
B11 ppm	0.08	0.09	0.10	0.57	0.07
F19 ppm	16.25	17.35	14.20	29.98	16.71
Na ppm Est.	1.56	1.90	2.51	1.50	7.22
Al27 ppm Est.	16.04	16.34	18.48	13.34	21.01
P31 ppm	248.70	282.75	247.28	477.80	154.35
K39 Rel.	0.52	0.57	0.64	1.11	1.35
Ca40 ppm Est.	1.67	2.14	2.47	1.78	1.22
Sc45 ppm	83.21	36.50	83.41	83.25	25.02
48/49	12.61	12.55	13.67	14.14	13.33
Ti48 ppm	40.92	14.82	37.79	15.44	13.63
Ti49 ppm	43.11	15.69	36.74	14.51	13.59
Fe56 ppm	0.74	1.11	0.88	1.58	3.24

Table C5, cont.

	CRWPST-7.2E	CRWPST-8.2E	CRWPST-9.1E	CRWPST-10.2E	CRWPST-11.2E
Y89 ppm	876.97	1176.96	966.40	5272.51	363.12
Nb93 ppm	1.14	9.82	1.09	28.11	3.69
Zr94H Rel.	1.06	0.99	1.05	1.05	0.99
Zr96/Si30 ppm	2.46	2.42	2.55	2.47	2.55
La139 ppm	0.15	0.02	0.06	0.28	0.02
Ce140 ppm	56.38	100.21	60.17	326.88	15.53
Pr ppm					
Nd146 ppm	8.93	1.44	9.61	8.84	0.12
Sm147 ppm	10.58	4.32	11.06	15.69	0.56
Eu153 ppm	6.17	1.04	6.20	2.66	0.21
Gd155 ppm	57.36	35.48	58.29	135.99	6.75
Ho165 ppm	37.83	50.17	42.42	198.91	13.98
TbO175 ppm	12.32	11.97	14.46	43.94	2.29
DyO179 ppm	115.39	128.16	133.29	498.67	32.01
ErO182 ppm	144.39	202.80	167.47	864.25	73.70
TmO185 ppm	26.30	39.93	32.39	179.89	18.49
YbO188 ppm	200.07	300.26	235.58	1429.25	170.21
LuO191 ppm	36.60	51.12	43.77	244.28	35.43
Zr96/Zr2O	132.93	138.78	141.18	145.78	144.26
196/Si30	54.08	57.38	55.30	59.12	56.60
Hf ppm	7786.84	10069.94	8346.19	10103.46	12297.07
Pb7/6 Est	0.95	0.00	1.28	0.22	0.09
Th ppm	55.74	186.12	68.87	1407.26	111.04
U ppm	19.62	126.24	23.22	607.86	304.28
Y/Nb	772.53	119.80	884.33	187.57	98.32
Th/U	2.84	1.47	2.97	2.32	0.36
Yb/Gd	3.49	8.46	4.04	10.51	25.22
U/Yb	0.10	0.42	0.10	0.43	1.79
Th/Yb	0.28	0.62	0.29	0.98	0.65
Ce/Sm	5.33	23.20	5.44	20.83	27.90
Ce/Lu	1.54	1.96	1.37	1.34	0.44
U/Ce	0.35	1.26	0.39	1.86	19.59
Th/Ce	0.99	1.86	1.14	4.31	7.15
Y/Yb	4.38	3.92	4.10	3.69	2.13
Yb/Nd	22.41	209.16	24.50	161.69	1476.52
Y/Nb	772.53	119.80	884.33	187.57	98.32
Yb/Nb	176.24	30.56	215.57	50.85	46.09
Yb/Sc	2.40	8.23	2.82	17.17	6.80
Yb/Dy	1.73	2.34	1.77	2.87	5.32
Dy/Sm	10.91	29.67	12.05	31.78	57.49
Yb/Nd	22.41	209.16	24.50	161.69	1476.52
Sm/Nd	1.19	3.01	1.15	1.77	4.83
U/Li	8356.29	7863.44	9209.83	13957.00	6161.92
Estimated temperature					
Temp Ti48	876.82	772.47	867.90	776.30	764.72
Temp Ti49	882.76	777.84	864.78	770.48	764.43
Hf ppm	7786.84	10069.94	8346.19	10103.46	12297.07
Ferry Temp	951.03	827.83	929.72	819.30	812.28
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	924.98	812.62	905.67	804.78	798.32

Table C5, cont.

	CRWPST-7.2E	**CRWPST-8.2E**	**CRWPST-9.1E**	**CRWPST-10.2E**	**CRWPST-11.2E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.47	0.07	0.18	0.87	0.07
Ce Ch (0.82)	68.76	122.21	73.37	398.63	18.94
Pr Ch (0.121)	4.64	0.73	3.54	5.65	0.13
Nd Ch (0.615)	14.52	2.33	15.63	14.37	0.19
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	52.90	21.60	55.31	78.45	2.78
Eu Ch (0.076)	81.18	13.72	81.52	35.05	2.77
Gd Ch (0.267)	214.82	132.90	218.31	509.33	25.28
Tb Ch (0.0493)	249.87	242.87	293.37	891.28	46.43
Dy Ch (0.33)	349.67	388.35	403.91	1511.11	97.01
Ho Ch (0.0755)	501.07	664.45	561.91	2634.56	185.12
Er Ch (0.216)	668.48	938.88	775.32	4001.14	341.20
Tm Ch (0.0329)	799.42	1213.67	984.49	5467.77	561.86
Yb Ch (0.221)	905.28	1358.63	1065.95	6467.21	770.19
Lu Ch (0.033)	1108.98	1549.24	1326.27	7402.43	1073.54
Ce/Ce*	46.43	537.00	91.27	179.27	203.96
Hf ppm	7786.84	10069.94	8346.19	10103.46	12297.07
Eu/Eu*	0.76	0.26	0.74	0.18	0.33
P Molar	8.03	9.13	7.98	15.43	4.98
3+ Molar	16.05	19.68	17.67	84.99	6.83
3+/P Molar	2.00	2.16	2.21	5.51	1.37

Table C5, cont.

Element	CRWPST-12.2E	CRWPST-13.2E	CRWPST-14.2E	CRWPST-14.3E	CRWPST-15.1E
Li7	0.00002	0.00004	0.00002	0.00001	0.00001
Be9	0.00000	0.00000	0.00000	0.00000	0.00010
B11	0.00001	0.00002	0.00002	0.00001	0.00000
F19	0.00007	0.00020	0.00008	0.00013	0.00015
Na23	0.01137	0.07903	0.01087	0.01036	0.00735
Al27	0.04610	0.02794	0.02876	0.04363	0.01709
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00289	0.00315	0.00338	0.00260	0.00338
K39	0.00379	0.02654	0.00321	0.00335	0.00292
Ca40	0.01397	0.10447	0.01390	0.01386	0.01478
Sc45	0.06582	0.06028	0.07419	0.06132	0.07862
Ti48	0.01418	0.00927	0.01134	0.01347	0.01132
Ti49	0.00104	0.00070	0.00085	0.00097	0.00086
Fe56	0.00109	0.00100	0.00086	0.00129	0.00063
Y89	0.14968	0.52102	0.23098	0.12881	0.60898
Nb93	0.00014	0.00019	0.00022	0.00010	0.00035
Zr94H	0.00895	0.00876	0.00910	0.00917	0.00900
Zr96	2.43463	2.39627	2.41893	2.44852	2.40763
La139	0.00001	0.00001	0.00000	0.00000	0.00002
Ce140	0.00592	0.01197	0.01178	0.00554	0.01215
Nd146	0.00012	0.00035	0.00025	0.00006	0.00066
Sm147	0.00017	0.00070	0.00030	0.00013	0.00089
Eu153	0.00035	0.00071	0.00039	0.00026	0.00106
Gd155	0.00044	0.00166	0.00062	0.00031	0.00182
Ho165	0.00263	0.00963	0.00402	0.00229	0.01115
TbO175	0.00064	0.00260	0.00100	0.00056	0.00282
DyO179	0.00151	0.00548	0.00222	0.00124	0.00628
ErO182	0.00226	0.00804	0.00350	0.00203	0.00925
TmO185	0.00116	0.00389	0.00173	0.00103	0.00469
YbO188	0.00154	0.00478	0.00245	0.00149	0.00602
LuO191	0.00173	0.00487	0.00276	0.00170	0.00617
Zr2O	0.01683	0.01637	0.01655	0.01795	0.01625
HfO196	0.13896	0.15005	0.14627	0.14184	0.14559
Pb206	0.00002	0.00001	0.00002	0.00001	0.00001
207/206	0.24390	0.00000	1.15385	1.42857	0.86957
ThO248	0.00283	0.00993	0.00752	0.00240	0.01759
UO254	0.00133	0.00369	0.00359	0.00128	0.00749
	38363.84	38363.86	38363.87	38363.89	38363.89
206/238 Age	368.99	41.71	86.50	199.51	36.05
Li ppm Est	0.01	0.02	0.01	0.01	0.01
Be9 ppm	0.00	0.01	0.01	0.00	0.33
B11 ppm	0.14	0.17	0.15	0.09	0.01
F19 ppm	9.36	26.59	10.51	17.38	19.51
Na ppm Est.	2.69	18.71	2.57	2.45	1.74
Al27 ppm Est.	30.68	18.60	19.14	29.04	11.38
P31 ppm	246.15	268.17	287.48	221.47	287.94
K39 Rel.	0.65	4.58	0.55	0.58	0.50
Ca40 ppm Est.	1.82	13.63	1.81	1.81	1.93
Sc45 ppm	57.90	53.03	65.26	53.95	69.16
48/49	13.65	13.17	13.32	13.84	13.12
Ti48 ppm	40.76	26.66	32.59	38.73	32.54
Ti49 ppm	39.69	26.90	32.53	37.19	32.98
Fe56 ppm	1.59	1.46	1.26	1.89	0.91

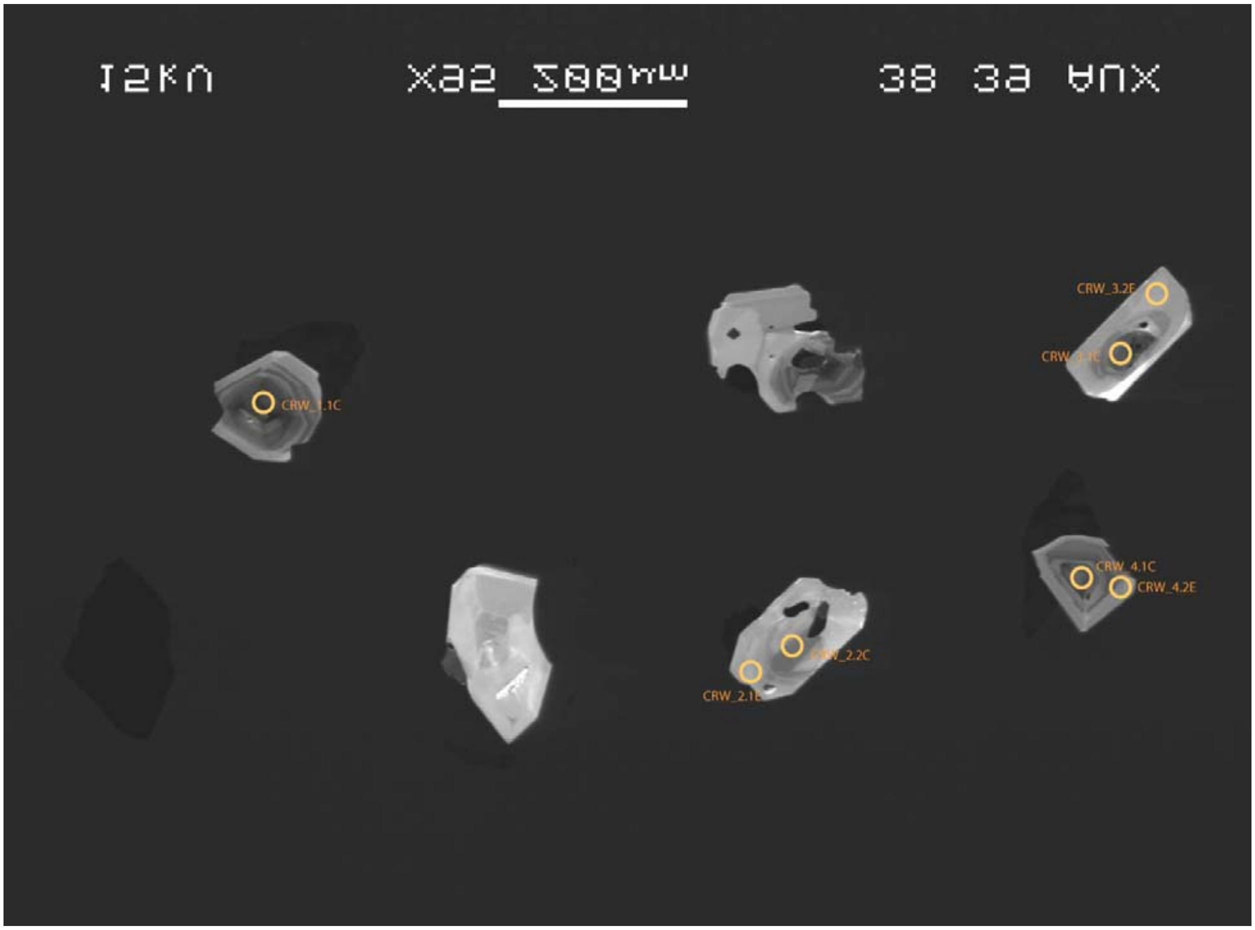
Table C5, cont.

	CRWPST-12.2E	CRWPST-13.2E	CRWPST-14.2E	CRWPST-14.3E	CRWPST-15.1E
Y89 ppm	353.27	1229.65	545.14	303.99	1437.24
Nb93 ppm	1.45	1.94	2.24	0.98	3.57
Zr94H Rel.	0.87	0.85	0.89	0.89	0.88
Zr96/Si30 ppm	2.43	2.40	2.42	2.45	2.41
La139 ppm	0.04	0.09	0.02	0.02	0.14
Ce140 ppm	42.90	86.75	85.41	40.18	88.04
Pr ppm					
Nd146 ppm	1.72	4.89	3.52	0.88	9.12
Sm147 ppm	2.34	9.61	4.10	1.74	12.25
Eu153 ppm	1.67	3.40	1.90	1.28	5.13
Gd155 ppm	17.92	67.85	25.29	12.75	74.34
Ho165 ppm	14.85	54.40	22.69	12.94	62.94
TbO175 ppm	4.28	17.37	6.66	3.74	18.81
DyO179 ppm	44.64	162.01	65.54	36.80	185.75
ErO182 ppm	60.27	214.09	93.23	54.15	246.33
TmO185 ppm	12.09	40.47	18.01	10.70	48.79
YbO188 ppm	94.83	293.65	150.30	91.66	369.86
LuO191 ppm	17.51	49.26	27.96	17.23	62.48
Zr96/Zr2O	144.63	146.39	146.18	136.41	148.16
196/Si30	59.41	61.09	60.43	55.71	61.54
Hf ppm	8066.98	8710.76	8491.15	8233.72	8451.51
Pb7/6 Est	0.24	0.00	1.15	1.43	0.87
Th ppm	28.72	100.63	76.27	24.30	178.32
U ppm	12.91	35.77	34.83	12.38	72.66
Y/Nb	242.87	635.12	243.70	309.61	403.11
Th/U	2.23	2.81	2.19	1.96	2.45
Yb/Gd	5.29	4.33	5.94	7.19	4.98
U/Yb	0.14	0.12	0.23	0.14	0.20
Th/Yb	0.30	0.34	0.51	0.27	0.48
Ce/Sm	18.36	9.02	20.81	23.04	7.19
Ce/Lu	2.45	1.76	3.05	2.33	1.41
U/Ce	0.30	0.41	0.41	0.31	0.83
Th/Ce	0.67	1.16	0.89	0.60	2.03
Y/Yb	3.73	4.19	3.63	3.32	3.89
Yb/Nd	55.00	60.02	42.67	104.18	40.57
Y/Nb	242.87	635.12	243.70	309.61	403.11
Yb/Nb	65.20	151.67	67.19	93.36	103.73
Yb/Sc	1.64	5.54	2.30	1.70	5.35
Yb/Dy	2.12	1.81	2.29	2.49	1.99
Dy/Sm	19.10	16.85	15.97	21.11	15.17
Yb/Nd	55.00	60.02	42.67	104.18	40.57
Sm/Nd	1.36	1.97	1.17	1.98	1.34
U/Li	1331.04	1659.32	3600.67	1441.03	12228.84
Estimated temperature					
Temp Ti48	876.37	830.34	851.66	870.65	851.49
Temp Ti49	873.40	831.30	851.45	866.13	852.94
Hf ppm	8066.98	8710.76	8491.15	8233.72	8451.51
Ferry Temp	939.93	890.27	913.99	931.32	915.74
Act Ti	0.70	0.70	0.70	0.70	0.70
Act Si	1.00	1.00	1.00	1.00	1.00
Temp. Est.	914.92	869.78	891.38	907.12	892.97

Table C5, cont.

	CRWPST-12.2E	**CRWPST-13.2E**	**CRWPST-14.2E**	**CRWPST-14.3E**	**CRWPST-15.1E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	0.13	0.27	0.07	0.06	0.43
Ce Ch (0.82)	52.32	105.80	104.16	49.00	107.37
Pr Ch (0.121)	0.99	2.58	1.35	0.51	4.55
Nd Ch (0.615)	2.80	7.96	5.73	1.43	14.82
Pm	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	11.69	48.07	20.52	8.72	61.24
Eu Ch (0.076)	22.00	44.73	25.03	16.79	67.51
Gd Ch (0.267)	67.11	254.10	94.73	47.77	278.43
Tb Ch (0.0493)	86.87	352.35	135.02	75.82	381.50
Dy Ch (0.33)	135.28	490.95	198.60	111.53	562.88
Ho Ch (0.0755)	196.68	720.51	300.52	171.37	833.68
Er Ch (0.216)	279.02	991.15	431.61	250.69	1140.40
Tm Ch (0.0329)	367.52	1230.09	547.33	325.31	1483.02
Yb Ch (0.221)	429.11	1328.73	680.08	414.77	1673.56
Lu Ch (0.033)	530.74	1492.70	847.27	522.11	1893.25
Ce/Ce*	148.28	126.21	327.57	273.57	76.77
Hf ppm	8066.98	8710.76	8491.15	8233.72	8451.51
Eu/Eu*	0.79	0.40	0.57	0.82	0.52
P Molar	7.95	8.66	9.28	7.15	9.30
3+ Molar	7.19	21.11	10.69	6.36	24.88
3+/P Molar	0.90	2.44	1.15	0.89	2.68

Figure C1. Cathodoluminescence images of sphene grains and approximate locations of SHRIMP-RG spots. Spot sizes are to scale.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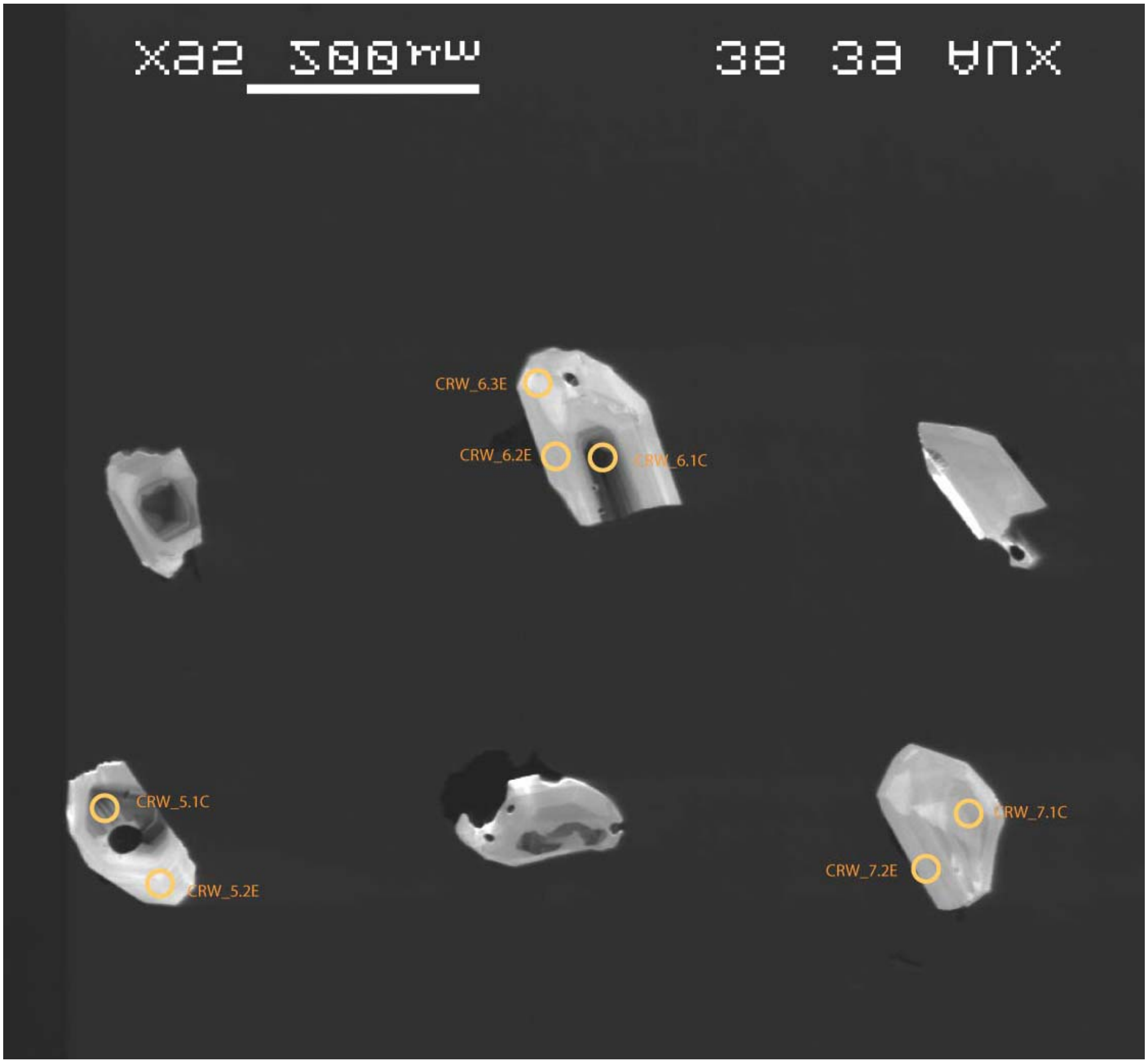
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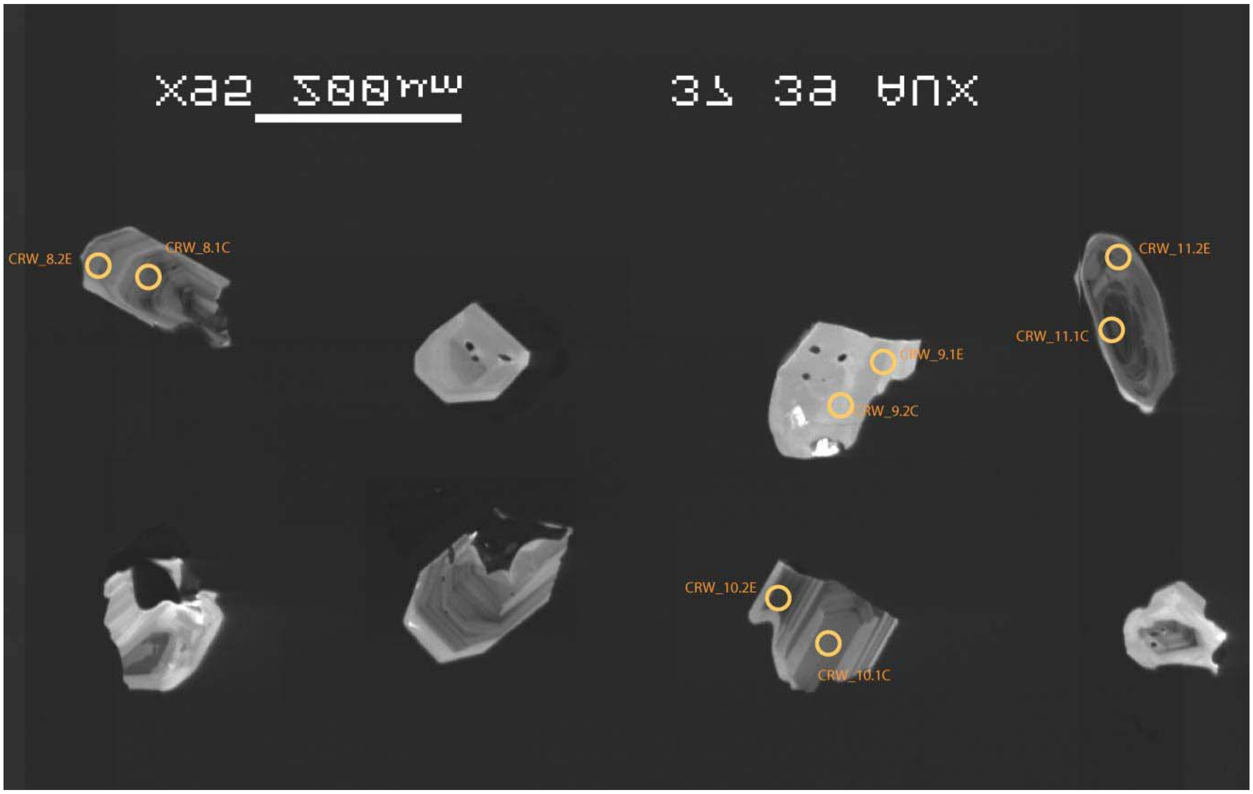
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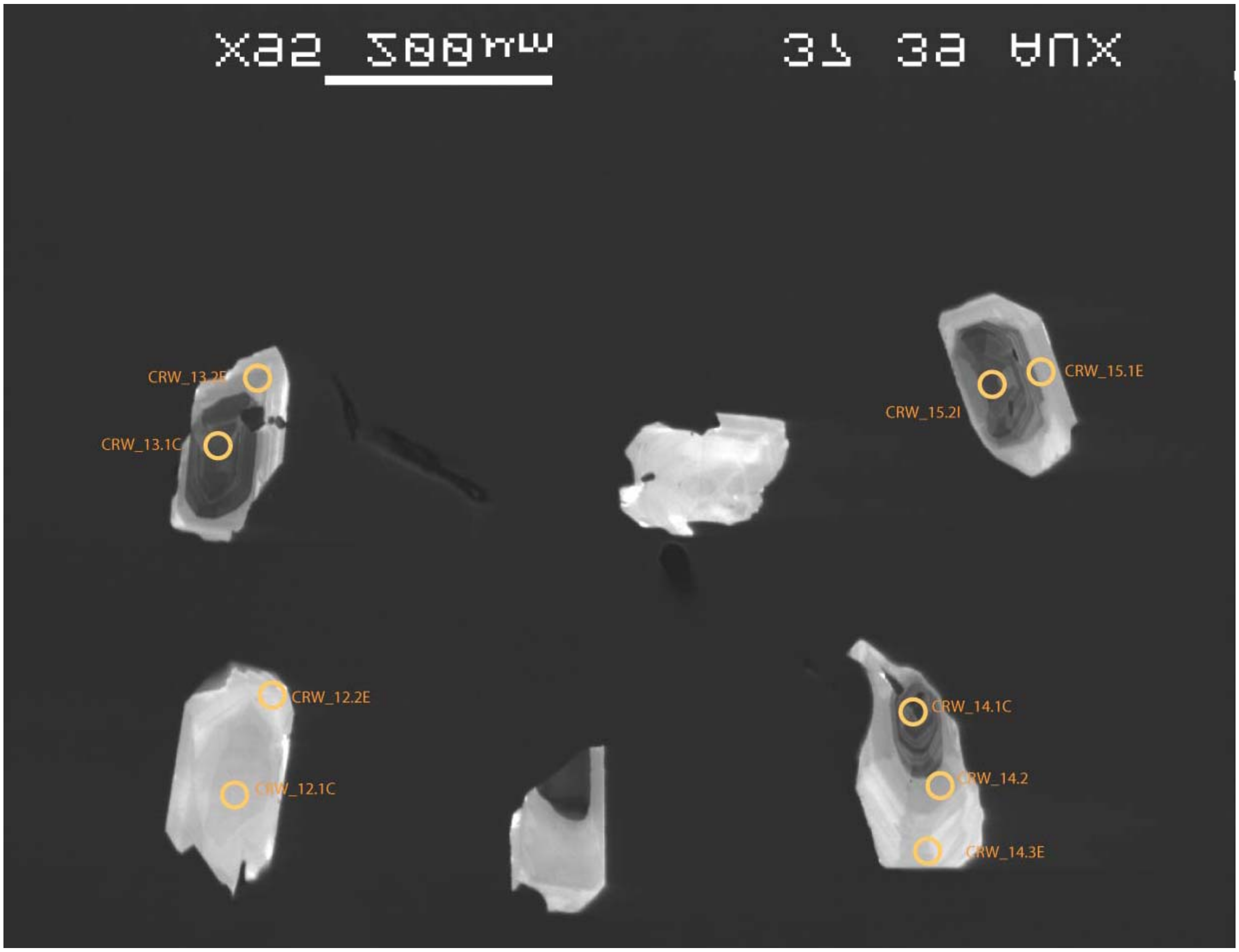
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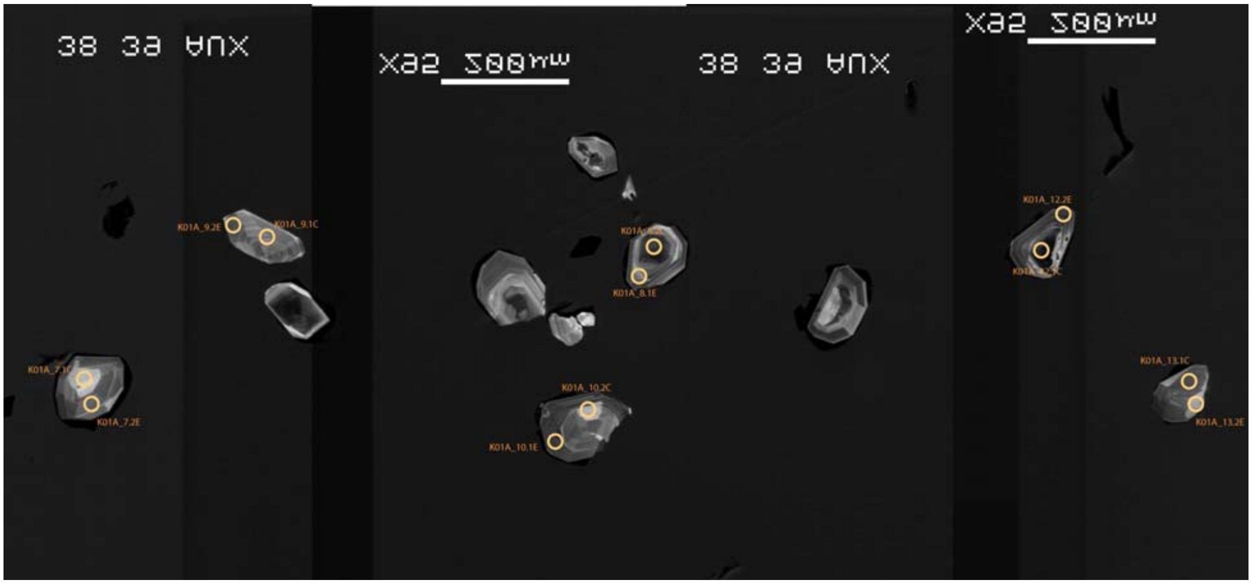
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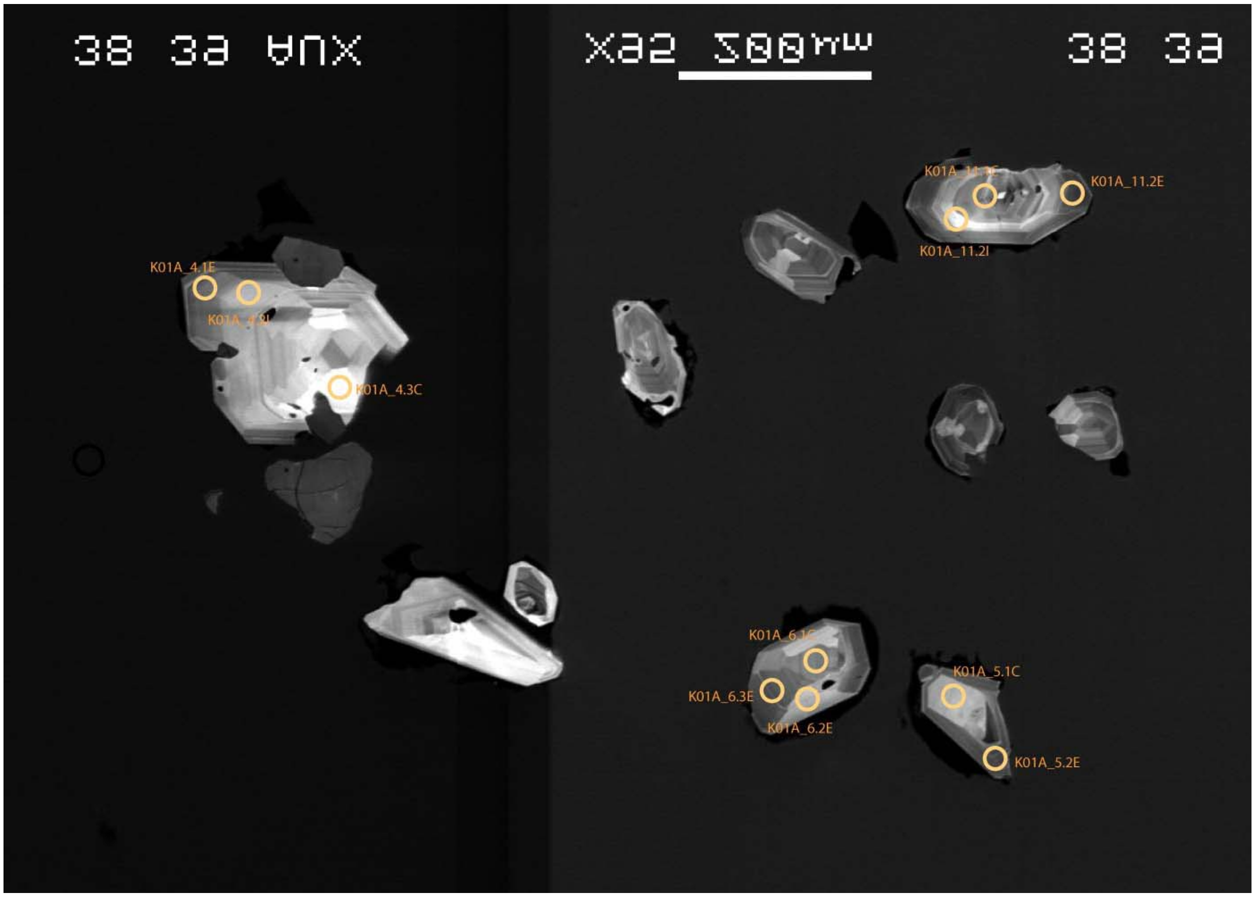
K01A_13.2E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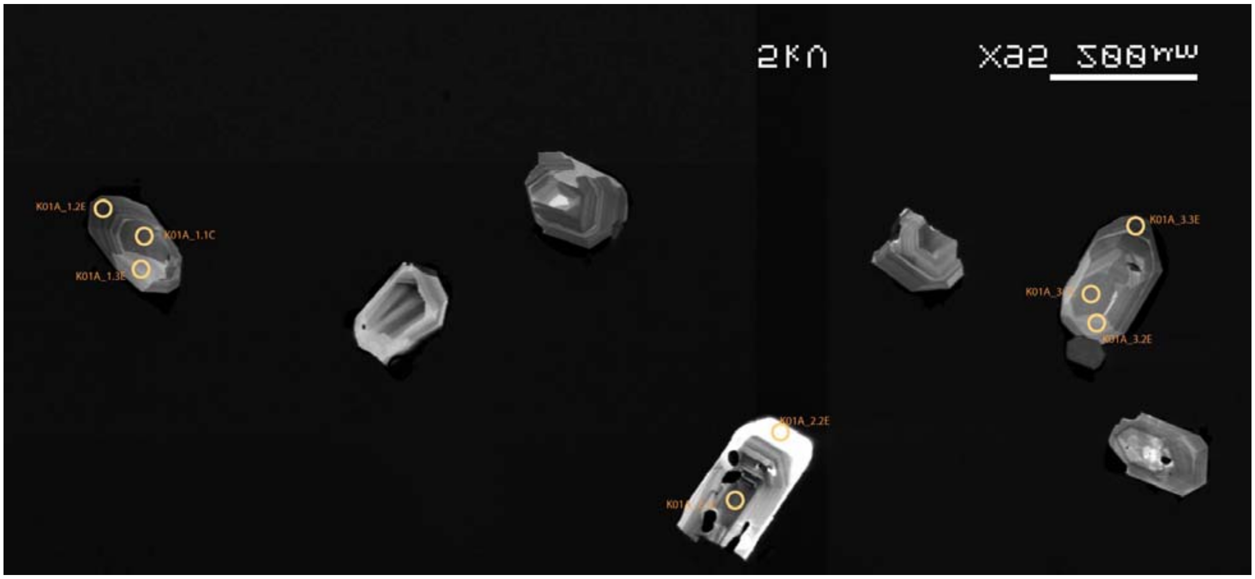
K01A_5.2E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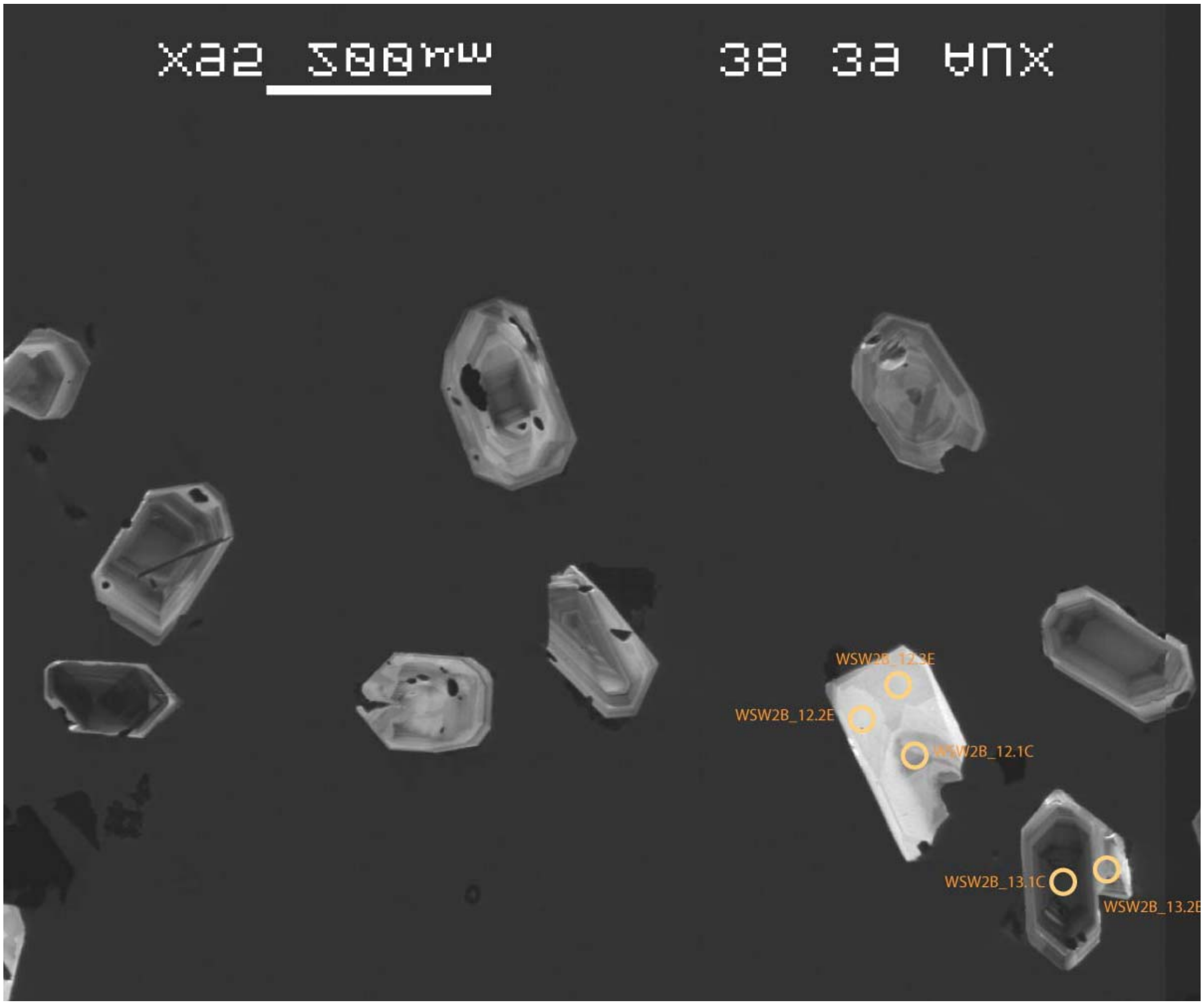
K01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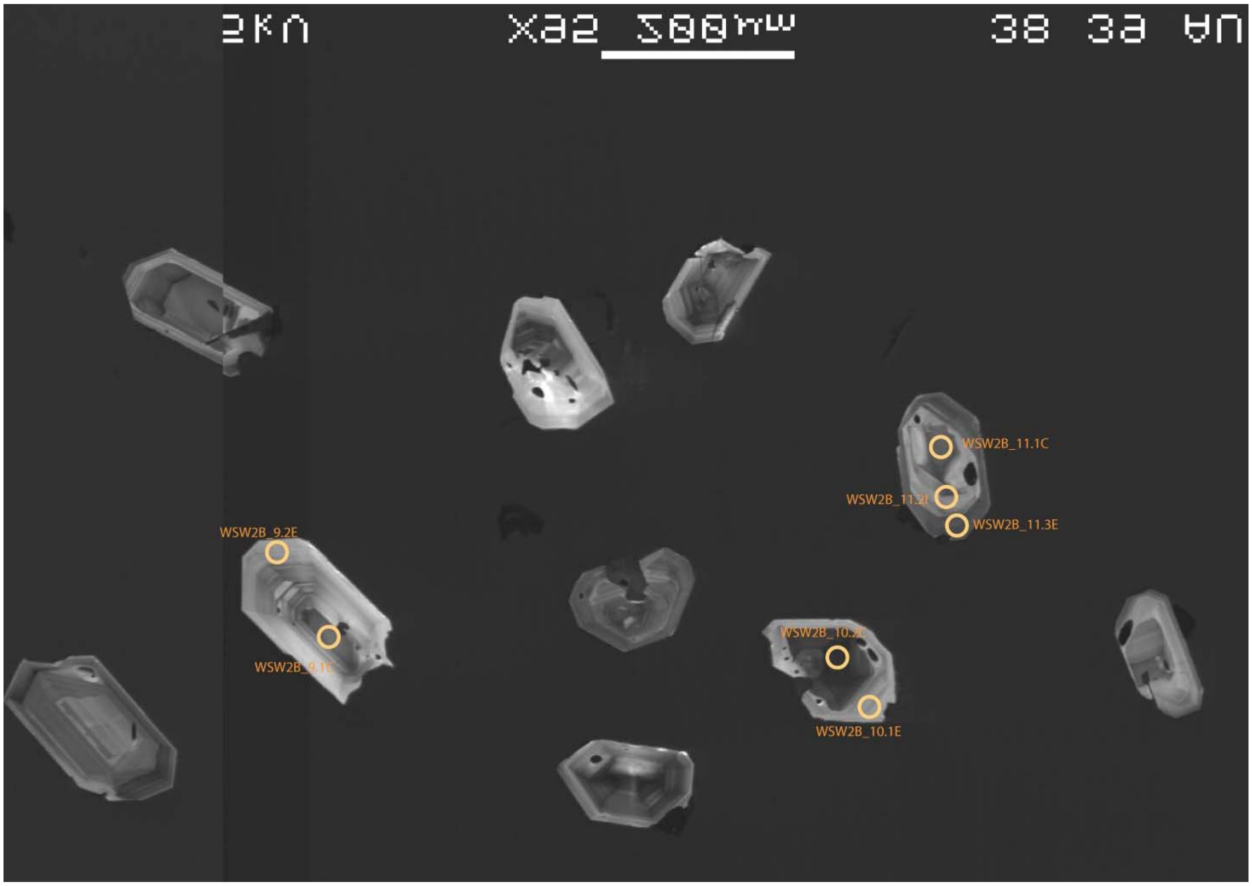
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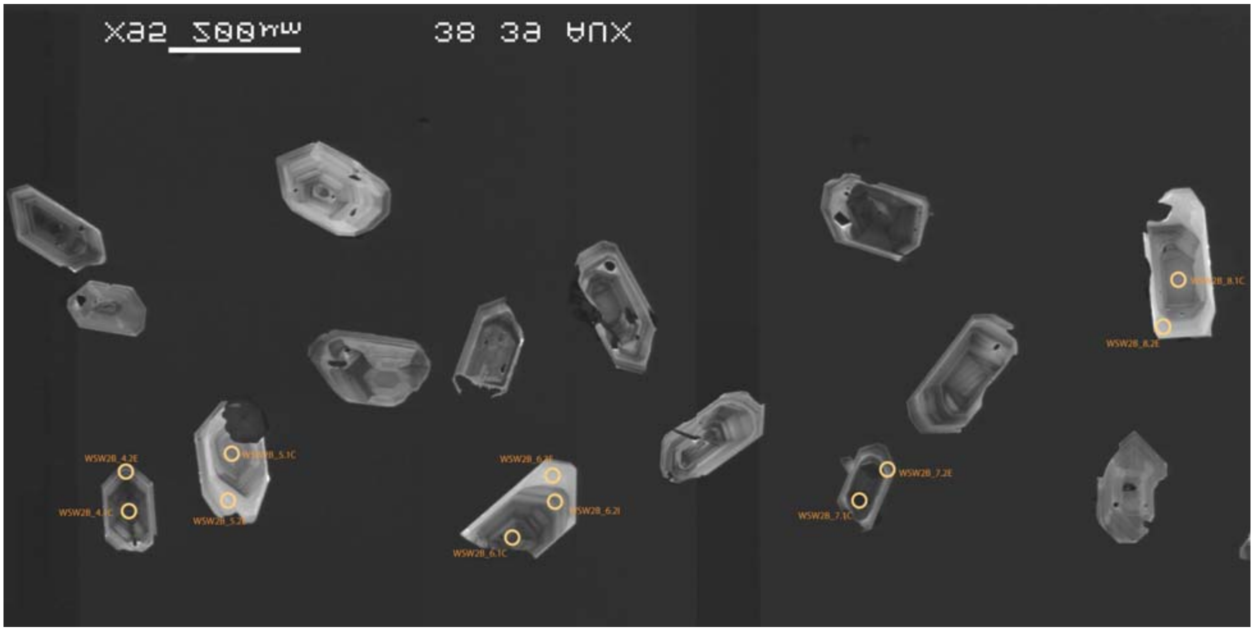
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WSW2B_6.1C
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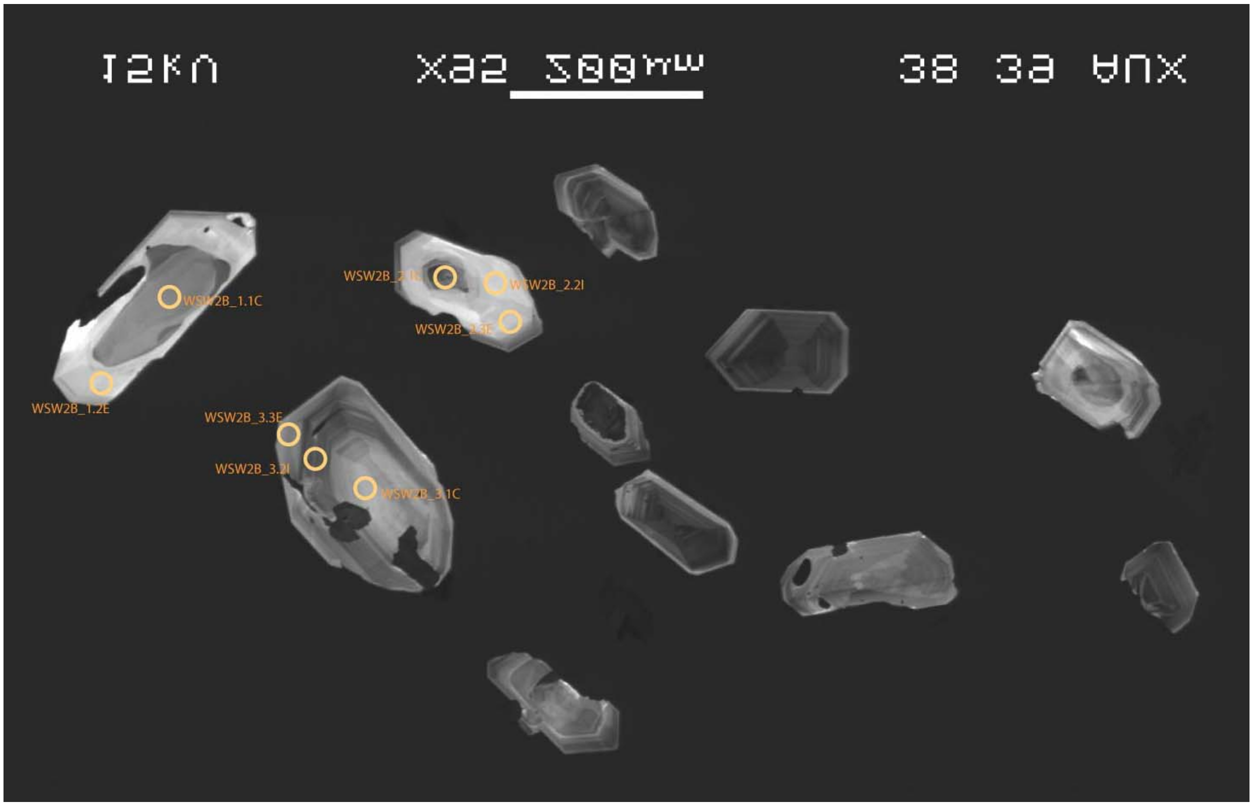
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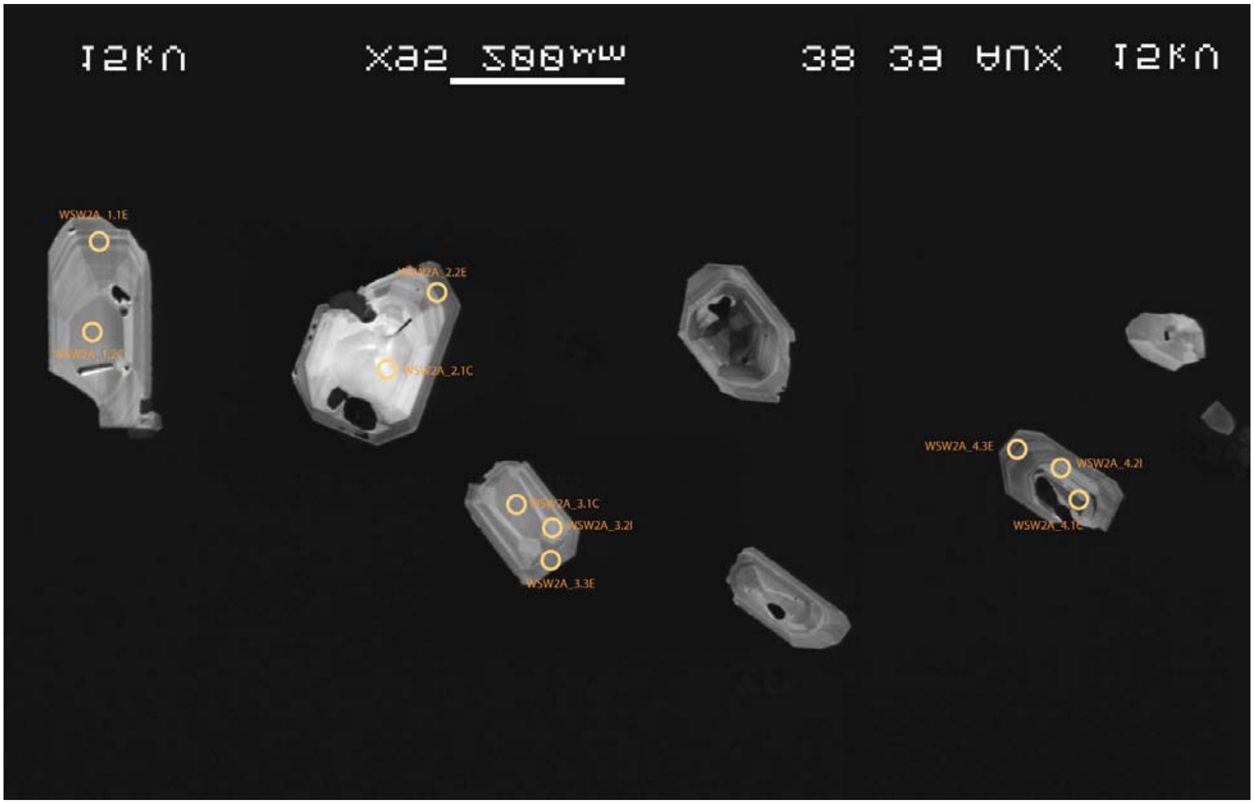
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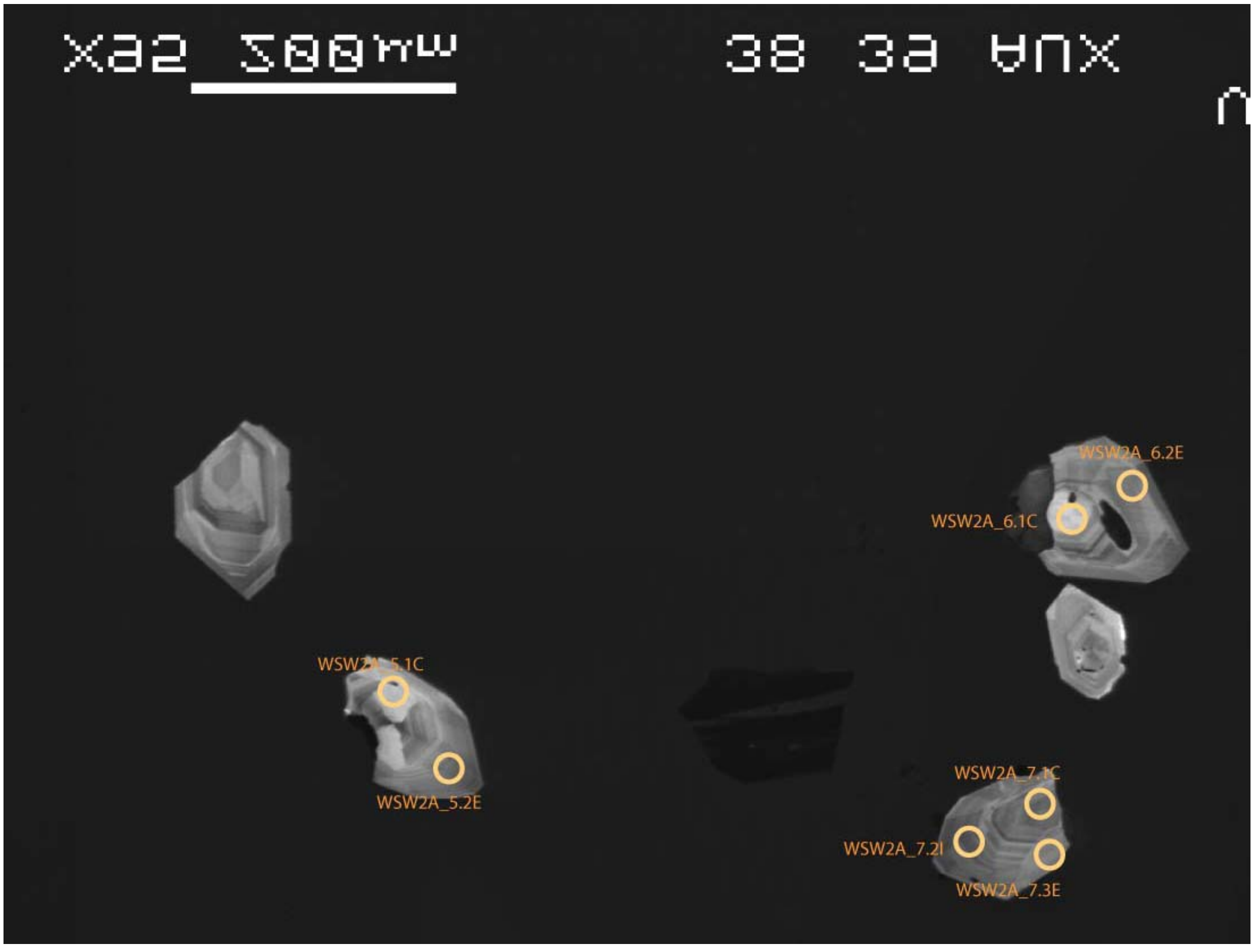
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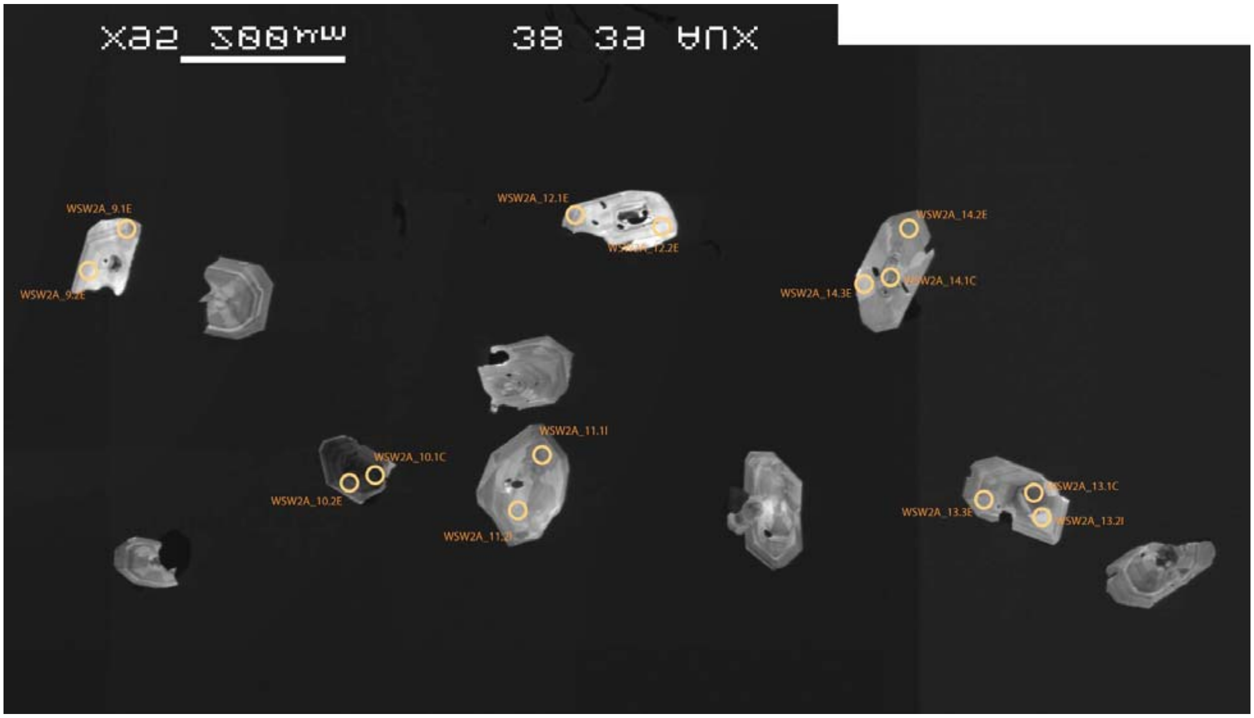
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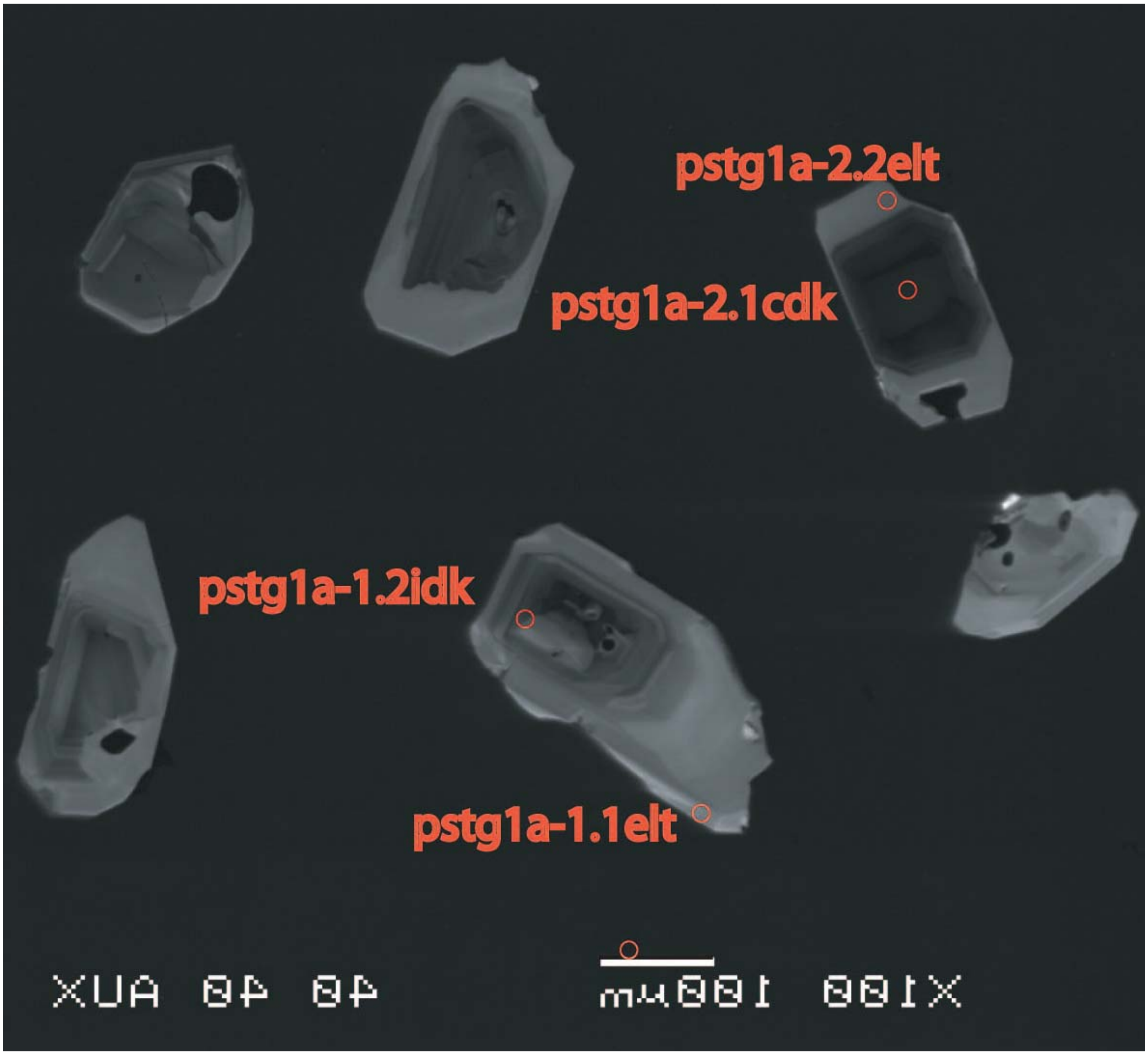
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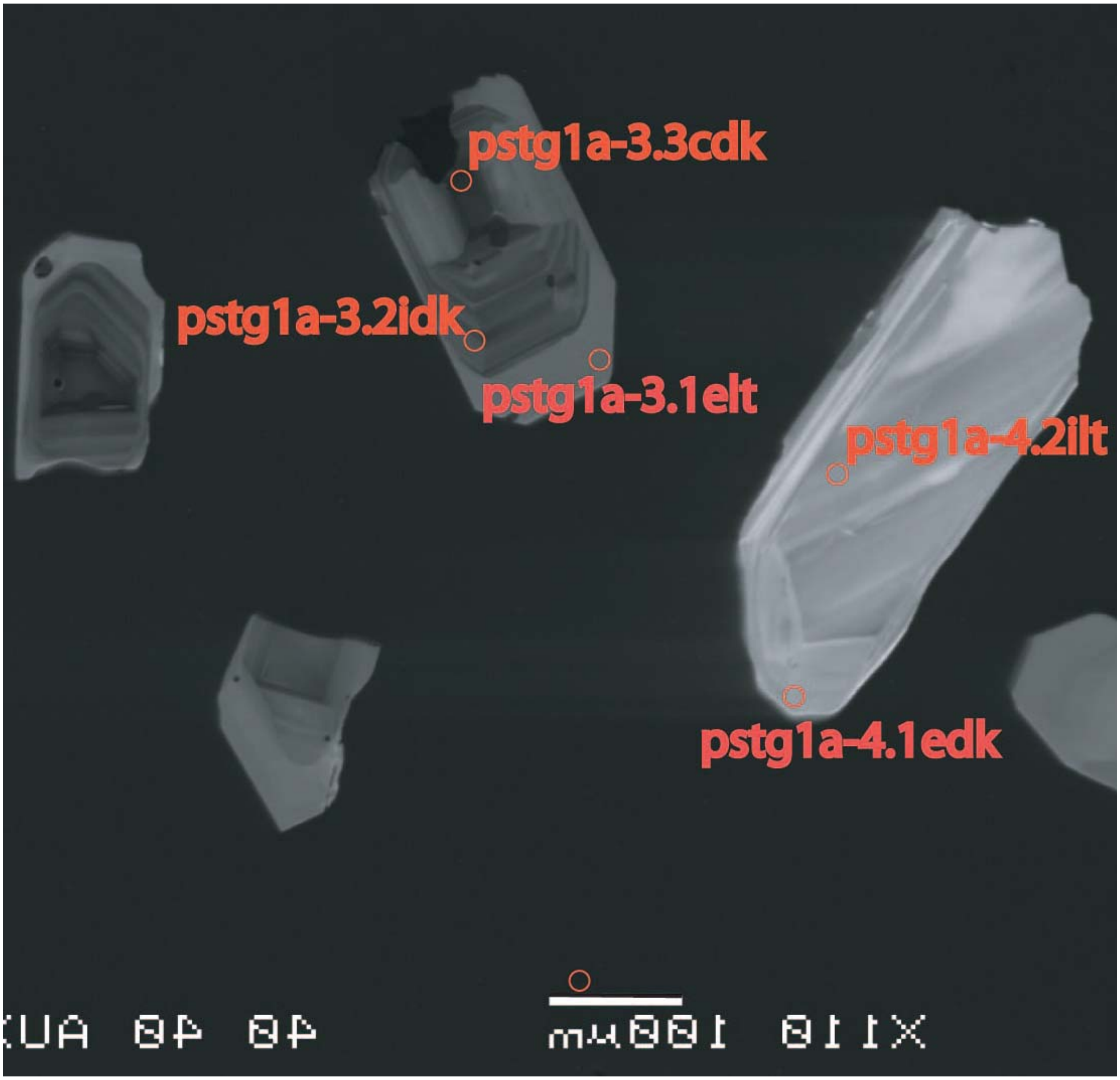
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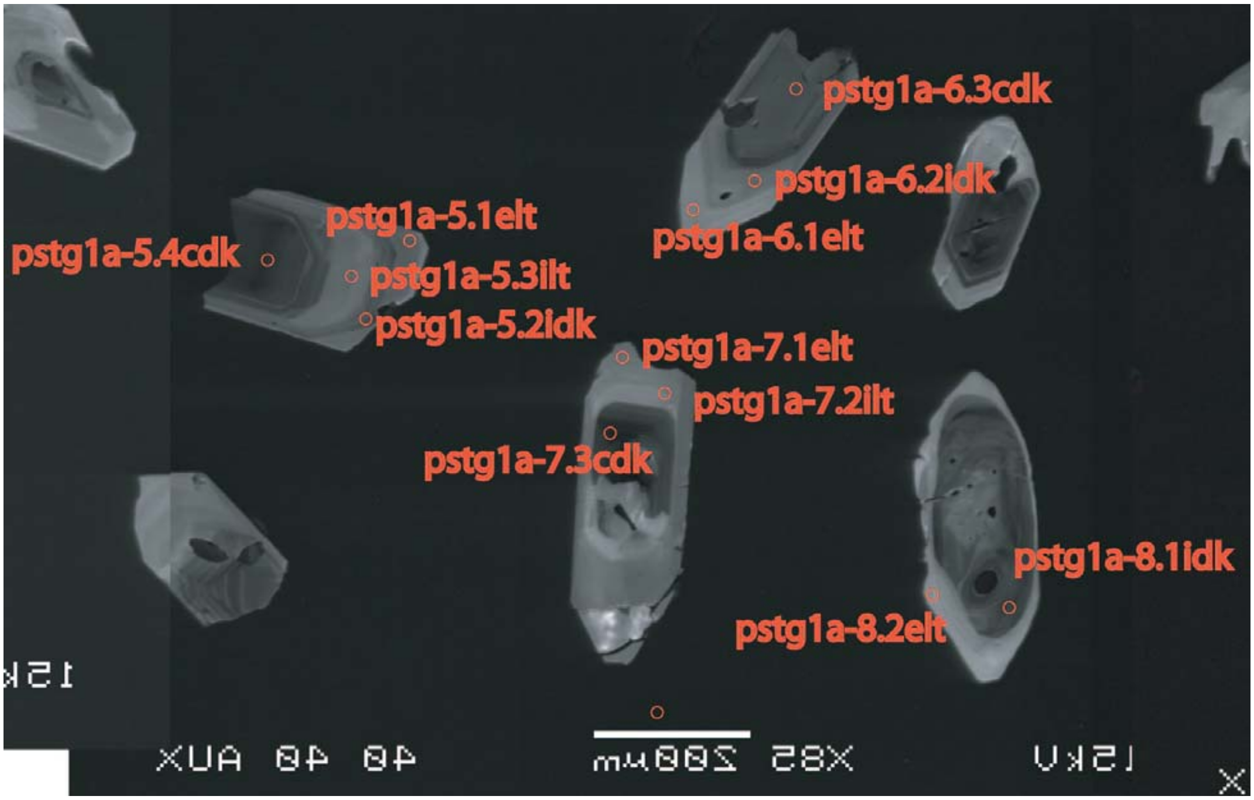
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pstg1a-5.2idk
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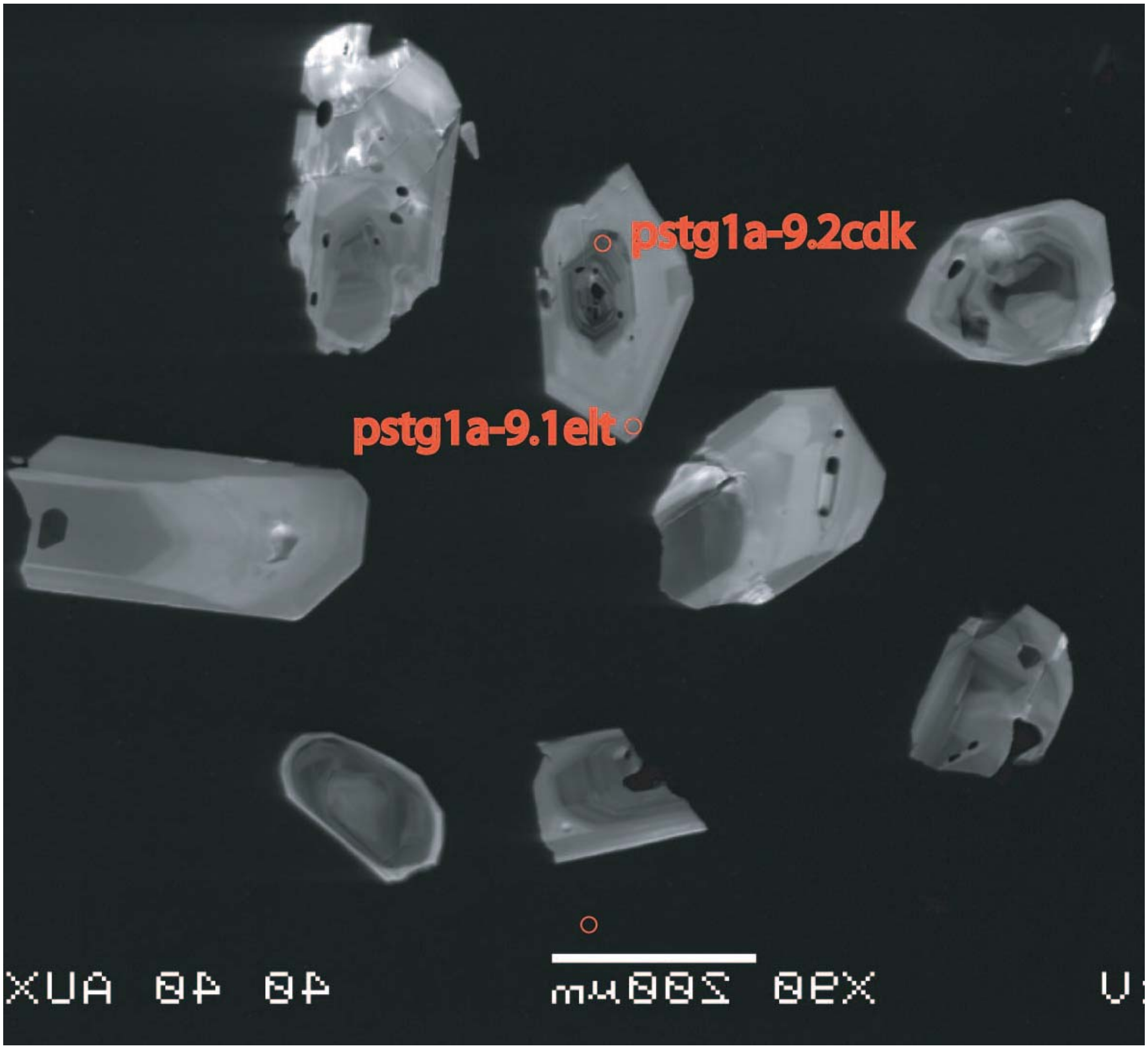
15kV X85 200µm 40 40 AUX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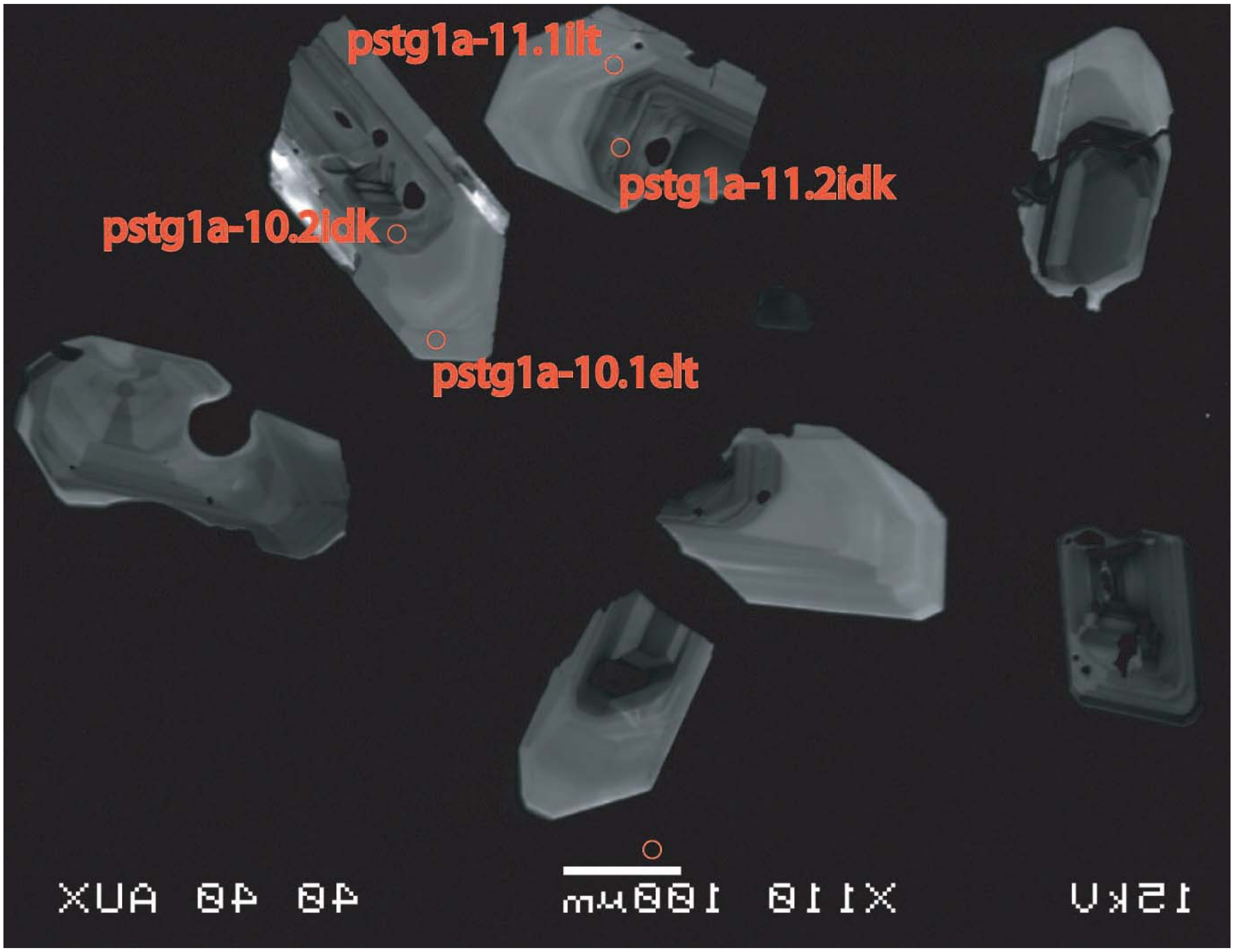
X90 200µm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15kV
X110
100µm
40 40 AUX


pstg1a-12.1elt
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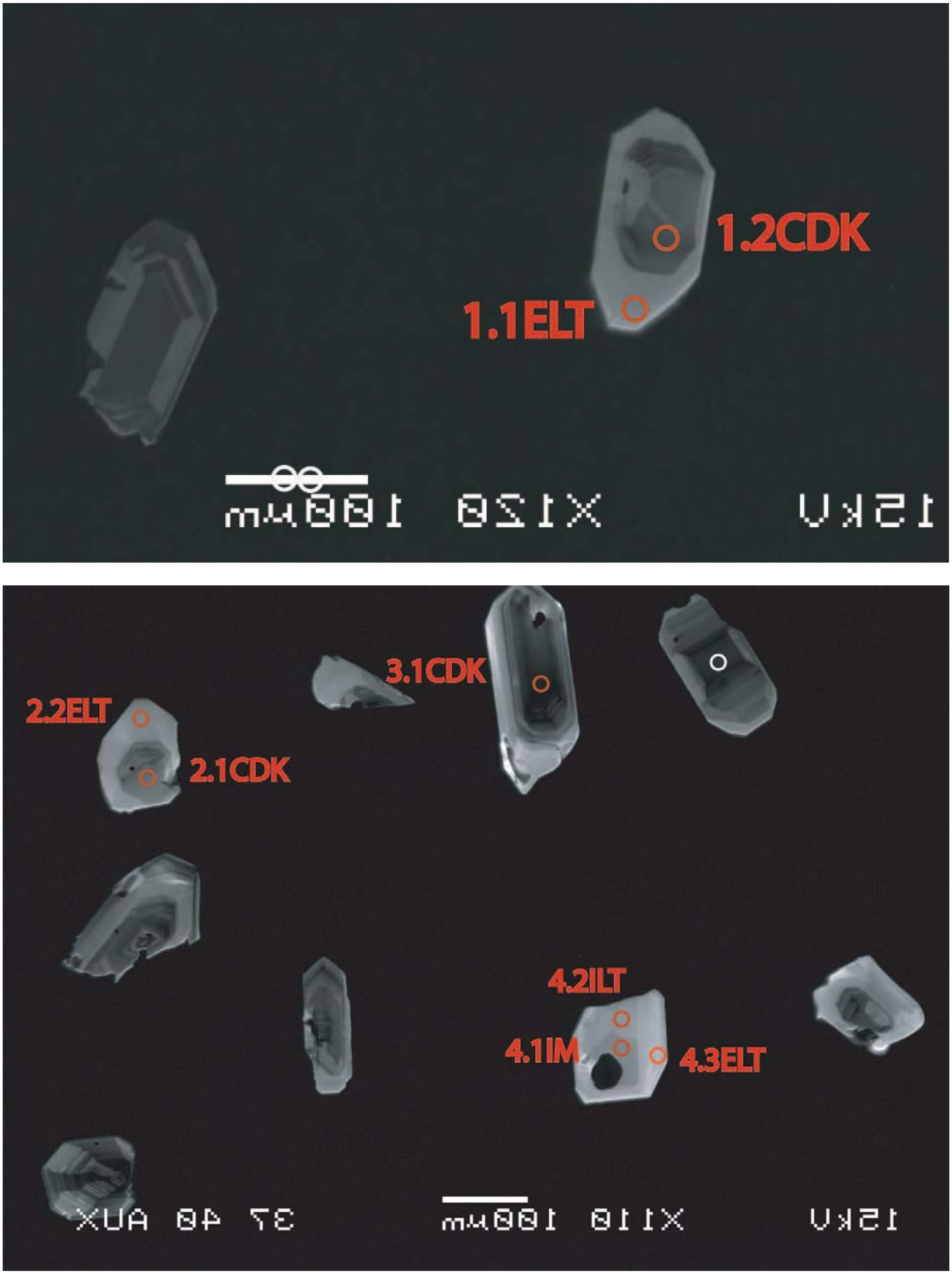
200µm
X75
15kV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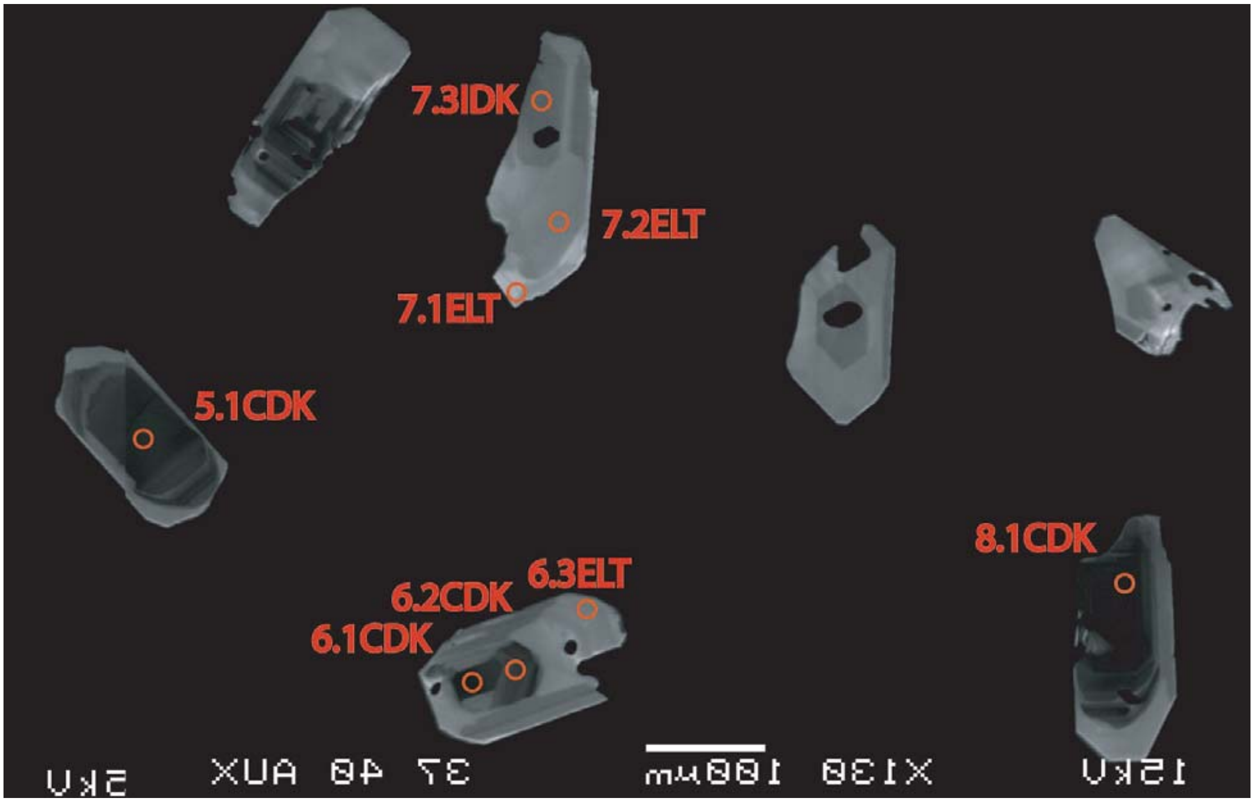
4.3ELT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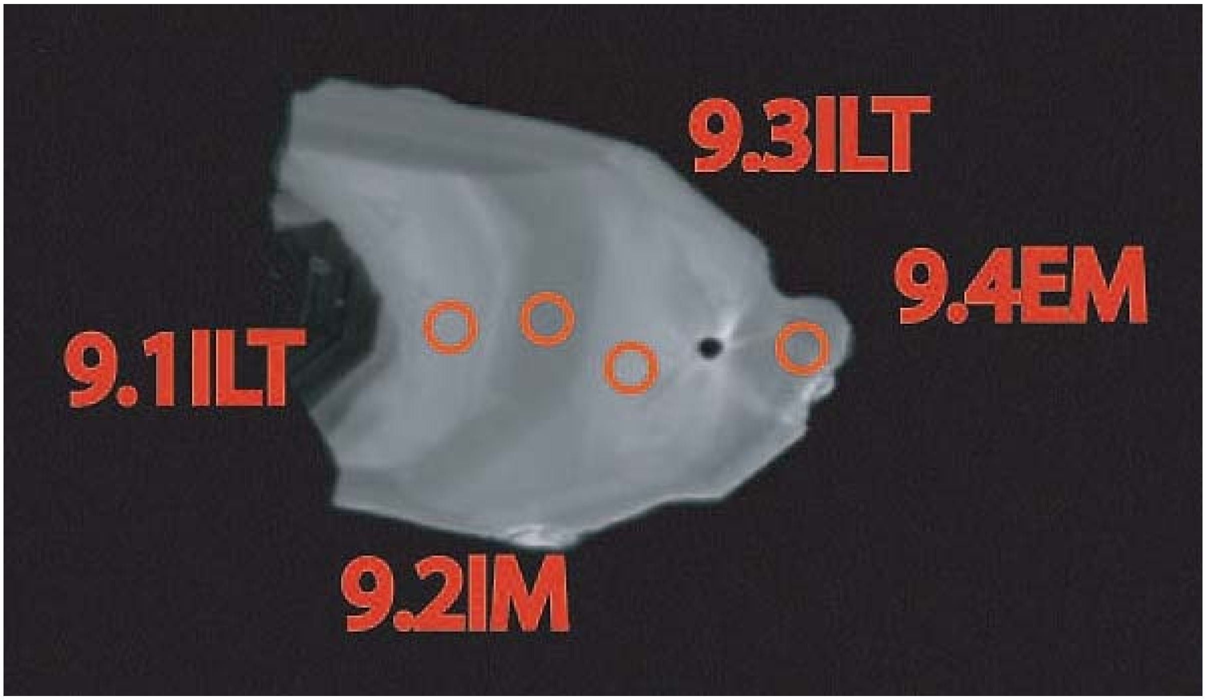
6.1CDK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9.4EM
9.1ILT
9.2IM

APPENDIX D:

Trace Element Compositions From SHRIMP-RG of Sphene Grains From the Peach Spring Tuff and Cathodoluminescence Images of Analyzed Sphene Crystals

Table D1. SHRIMP-RG trace element analyses of sphene grains from KPST01A.

	K01A-1.1C	**K01A-2.1C**	**K01A-4.1C**	**K01A-6.1C**	**K01A-7.1C**	**K01A-9.1C**	**K01A-9.2I**	**K01A-5.2I**
Element								
F19	0.08600	0.12133	0.07247	0.12533	0.10269	0.13519	0.12483	0.10009
Na23	1.42145	1.48743	1.88287	1.27999	1.47282	1.30343	1.25028	1.70260
Mg26	0.13240	0.13611	0.10288	0.15171	0.11757	0.14474	0.12779	0.12782
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00257	0.00224	0.00291	0.00206	0.00210	0.00217	0.00213	0.00253
K39	0.00947	0.00650	0.00540	0.00618	0.00587	0.00937	0.00675	0.00570
Ca43	0.54290	0.52992	0.52530	0.55884	0.53766	0.55550	0.55110	0.53892
AlO	0.02989	0.03830	0.02936	0.03530	0.03031	0.03786	0.03190	0.03174
Ti47	10.90470	10.28268	10.65754	10.93384	10.66253	10.82029	10.77761	10.69604
V51	0.17535	0.10201	0.07247	0.20235	0.12165	0.20433	0.15524	0.12968
Cr52	0.00247	0.00018	0.00054	0.00191	0.00054	0.00400	0.00175	0.00051
Mn55	0.98853	1.37489	1.42039	0.97725	1.24167	1.03990	1.08669	1.25831
Fe57	0.20986	0.24765	0.20280	0.23966	0.20406	0.23691	0.21250	0.20761
Sr86	0.06939	0.06604	0.06760	0.06947	0.06738	0.07242	0.06812	0.06669
Y89	2.65617	3.89713	2.61763	3.39768	2.14561	3.02935	2.27618	2.51892
Zr90	0.15273	0.17696	0.12478	0.12626	0.11713	0.15508	0.13962	0.13117
Zr91	0.03232	0.03760	0.02651	0.02717	0.02456	0.03277	0.03000	0.02748
Nb93	0.23428	0.12143	0.17504	0.17727	0.22528	0.13143	0.16088	0.19872
Ba137	0.00092	0.00110	0.00125	0.00143	0.00135	0.00243	0.00122	0.00161
La139	0.65272	0.44509	0.61246	0.45473	0.66183	0.51308	0.54433	0.61831
Ce140	2.12755	1.74984	2.06791	1.67332	2.06484	1.82556	1.79267	2.05301
Pr 141	0.49866	0.49541	0.50443	0.44181	0.45442	0.47569	0.42935	0.48933
Nd146	0.40932	0.49133	0.42249	0.40298	0.34729	0.43647	0.36226	0.40849
Sm147	0.11202	0.18365	0.11803	0.13423	0.08527	0.13723	0.09639	0.11466
Eu153	0.03895	0.06025	0.04045	0.03934	0.03063	0.05467	0.04333	0.04144
Gd157O	0.07817	0.14268	0.08307	0.10133	0.05821	0.10333	0.06873	0.07974
Tb159O	0.06165	0.11308	0.06491	0.08322	0.04659	0.08132	0.05340	0.06166
Dy163O	0.07238	0.12598	0.07391	0.09727	0.05539	0.09283	0.06150	0.07132
Ho165O	0.04430	0.07244	0.04413	0.05918	0.03493	0.05525	0.03831	0.04276
Er166O	0.03234	0.04688	0.03080	0.04176	0.02601	0.03883	0.02791	0.02982
Tm169O	0.01034	0.01308	0.00933	0.01307	0.00831	0.01203	0.00897	0.00897
Yb172O	0.00912	0.01062	0.00820	0.01148	0.00782	0.01058	0.00789	0.00801
Lu175O	0.00406	0.00419	0.00350	0.00480	0.00367	0.00434	0.00379	0.00345
Hf178O	0.00066	0.00070	0.00056	0.00069	0.00064	0.00078	0.00059	0.00058
Ta181O	0.00331	0.00151	0.00231	0.00213	0.00274	0.00167	0.00174	0.00236
Pb206	0.00006	0.00006	0.00005	0.00006	0.00007	0.00007	0.00007	0.00009
Pb208	0.00016	0.00015	0.00015	0.00019	0.00018	0.00018	0.00016	0.00018
Th232O	0.02814	0.01258	0.01618	0.02244	0.02369	0.01968	0.01697	0.01991
U238O	0.00164	0.00094	0.00079	0.00173	0.00134	0.00166	0.00139	0.00122
	39884.11	39884.12	39884.15	39884.18	39884.19	39884.34	39884.33	39884.16
Corr. 91Zr	3893.82	4693.57	3343.99	3247.32	2994.21	3702.82	3594.64	3410.52
Corr. 90Zr	17848.39	21514.30	15328.11	14884.98	13724.82	16972.89	16477.03	15633.06
Corr. 89Y	322105.02	489575.95	332272.59	407541.62	263917.75	344798.52	273618.81	315509.09
Corr. 93Nb	28465.73	15265.01	22247.43	21272.44	27779.09	14978.23	19358.73	24946.13
90ZrC/Si	0.15	0.17	0.12	0.12	0.11	0.15	0.14	0.12
91ZrC/Si	0.03	0.04	0.03	0.03	0.02	0.03	0.03	0.03
93Ycr/Si	2.65	3.89	2.61	3.40	2.14	3.02	2.27	2.51
93NbC/Si	0.23	0.12	0.17	0.18	0.23	0.13	0.16	0.20
90Zr Cr	1626.59	1894.09	1335.40	1373.81	1232.43	1648.27	1516.52	1378.65
91Zr Cr	1626.59	1894.09	1335.40	1373.81	1232.43	1648.27	1516.52	1378.65
Y Cr	8837.07	12975.55	8714.67	11323.52	7134.37	10080.26	7581.36	8376.32
Nb Cr	2989.45	1548.68	2233.54	2262.48	2874.50	1676.20	2053.22	2535.14
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	804.29	814.03	791.92	793.68	786.97	805.13	799.86	793.90
Temp./w P Zr91 Corr.	804.29	814.03	791.92	793.68	786.97	805.13	799.86	793.90
Age Ma 206/238	171.20	279.20	283.20	169.68	241.13	186.49	245.05	327.94
Age Ma 208/232	72.30	150.35	112.68	106.70	92.01	111.51	113.48	108.75

Table D1, cont.

	K01A-1.1C	K01A-2.1C	K01A-4.1C	K01A-6.1C	K01A-7.1C	K01A-9.1C	K01A-9.2I	K01A-5.2I
F19	5529.26	7800.94	4659.35	8058.62	6602.67	8692.29	8026.35	6435.59
Na23	435.24	455.45	576.53	391.93	450.97	399.10	382.83	521.33
Mg26	920.52	946.33	715.30	1054.81	817.43	1006.35	888.50	888.72
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	310.64	269.87	350.75	248.39	252.92	261.36	257.23	305.88
K39	2.97	2.04	1.70	1.94	1.84	2.94	2.12	1.79
Ca43	194696.59	190041.05	188385.19	200410.09	192817.47	199212.64	197635.03	193267.93
AlO	8414.21	10780.53	8264.04	9937.95	8531.39	10656.55	8980.69	8935.52
Ti47	224087.37	211305.05	219008.24	224686.17	219110.70	222352.65	221475.60	219799.36
V51	274.46	159.66	113.42	316.71	190.40	319.81	242.97	202.97
Cr52	5.37	0.39	1.17	4.16	1.17	8.69	3.80	1.10
Mn55	1842.58	2562.74	2647.55	1821.55	2314.43	1938.33	2025.55	2345.43
Fe57	21186.19	25001.92	20473.75	24195.04	20601.40	23917.66	21452.71	20959.06
Sr86	49.12	46.75	47.85	49.17	47.69	51.26	48.21	47.20
Y89	8809.90	12925.85	8682.08	11269.31	7116.48	10047.65	7549.54	8354.68
Zr90	1623.29	1880.74	1326.15	1341.91	1244.84	1648.21	1483.96	1394.13
Zr91	1625.81	1890.95	1333.23	1366.31	1235.34	1648.26	1508.87	1382.28
Nb93	2989.91	1549.68	2233.84	2262.25	2875.00	1677.24	2053.19	2535.98
Ba137	6.21	7.40	8.40	9.61	9.06	16.39	8.20	10.87
La139	5509.22	3756.75	5169.40	3838.13	5586.13	4330.61	4594.35	5218.78
Ce140	20446.49	16816.52	19873.32	16081.17	19843.85	17544.27	17228.14	19730.10
Pr	3110.53	3090.25	3146.49	2755.87	2834.56	2967.21	2678.15	3052.29
Nd146	14743.09	17697.11	15217.53	14514.90	12508.84	15721.34	13048.25	14713.27
Sm147	3520.81	5772.19	3709.86	4218.98	2680.02	4313.15	3029.62	3603.66
Eu153	256.66	397.07	266.58	259.26	201.89	360.26	285.57	273.11
Gd157O	3006.28	5487.53	3194.88	3897.12	2238.81	3973.90	2643.45	3066.90
Tb159O	402.41	738.12	423.72	543.21	304.13	530.81	348.54	402.46
Dy163O	2158.93	3757.77	2204.57	2901.51	1652.10	2768.95	1834.32	2127.42
Ho165O	396.24	647.88	394.66	529.28	312.44	494.13	342.65	382.39
Er166O	950.15	1377.22	904.80	1227.04	764.07	1140.73	819.87	876.12
Tm169O	111.47	140.99	100.58	140.89	89.53	129.63	96.73	96.73
Yb172O	555.76	647.07	499.67	699.26	476.49	644.76	480.70	488.04
Lu175O	60.36	62.28	51.96	71.38	54.61	64.48	56.27	51.34
Hf178O	70.32	74.55	59.99	74.06	68.07	83.73	63.38	62.09
Ta181O	285.47	130.15	199.15	183.26	235.87	143.56	150.10	203.24
Pb206	0.37	0.34	0.29	0.38	0.42	0.40	0.44	0.52
Pb208	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	619.61	277.04	356.28	494.26	521.66	433.43	373.74	438.48
U238O	33.84	19.38	16.30	35.73	27.62	34.20	28.65	25.07
90ZrC ppm	1626.59	1894.09	1335.40	1373.81	1232.43	1648.27	1516.52	1378.65
91ZrC ppm	1626.59	1894.09	1335.40	1373.81	1232.43	1648.27	1516.52	1378.65
Ycr ppm	8837.07	12975.55	8714.67	11323.52	7134.37	10080.26	7581.36	8376.32
NbC ppm	2989.45	1548.68	2233.54	2262.48	2874.50	1676.20	2053.22	2535.14
Estimated Temperature								
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	804.29	814.03	791.92	793.68	786.97	805.13	799.86	793.90
Temp./w P	804.29	814.03	791.92	793.68	786.97	805.13	799.86	793.90
Y89	8837.07	12975.55	8714.67	11323.52	7134.37	10080.26	7581.36	8376.32
Sum REE	55228.41	60388.76	55158.02	51678.01	49547.48	54984.23	47486.60	54082.62
Al+Fe	29600.40	35782.45	28737.78	34132.99	29132.79	34574.21	30433.41	29894.58
Sm/La	0.64	1.54	0.72	1.10	0.48	1.00	0.66	0.69
Yb/Gd	0.18	0.12	0.16	0.18	0.21	0.16	0.18	0.16
Th/U	18.31	14.30	21.86	13.83	18.89	12.67	13.05	17.49
Y/Nb	2.95	8.34	3.89	4.98	2.48	5.99	3.68	3.29
Zr/Hf	23.09	25.23	22.10	18.12	18.29	19.68	23.41	22.45
Nb/Ta	10.47	11.91	11.22	12.34	12.19	11.68	13.68	12.48

Table D1, cont.

	K01A-1.1C	K01A-2.1C	K01A-4.1C	K01A-6.1C	K01A-7.1C	K01A-9.1C	K01A-9.2I	K01A-5.2I
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)								
La Ch (0.319)	17270.30	11776.66	16205.02	12031.77	17511.37	13575.57	14402.35	16359.81
Ce Ch (0.82)	24934.74	20507.96	24235.75	19611.18	24199.81	21395.45	21009.93	24061.10
Pr Ch (0.121)	25706.83	25539.26	26004.08	22775.77	23426.11	24522.42	22133.44	25225.54
Nd Ch (0.615)	23972.51	28775.79	24743.94	23601.47	20339.58	25563.15	21216.67	23924.01
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	17604.07	28860.94	18549.31	21094.90	13400.08	21565.73	15148.08	18018.32
Eu Ch (0.076)	3377.15	5224.59	3507.64	3411.36	2656.48	4740.24	3757.47	3593.52
Gd Ch (0.267)	11259.49	20552.54	11965.84	14595.94	8385.07	14883.54	9900.56	11486.51
Tb Ch (0.0493)	8162.54	14972.08	8594.69	11018.39	6168.95	10766.92	7069.69	8163.46
Dy Ch (0.33)	6542.20	11387.19	6680.52	8792.47	5006.37	8390.77	5558.55	6446.73
Ho Ch (0.0755)	5248.21	8581.26	5227.31	7010.33	4138.23	6544.71	4538.40	5064.81
Er Ch (0.216)	4398.83	6376.00	4188.90	5680.72	3537.38	5281.17	3795.68	4056.12
Tm Ch (0.0329)	3388.25	4285.45	3057.18	4282.46	2721.36	3940.22	2940.13	2940.22
Yb Ch (0.221)	2514.74	2927.91	2260.96	3164.08	2156.08	2917.48	2175.13	2208.33
Lu Ch (0.033)	1829.23	1887.35	1574.46	2163.17	1654.91	1953.97	1705.22	1555.74
Ce/Ce*	1.05	1.05	1.06	1.06	1.06	1.05	1.05	1.05
Eu/Eu*	0.24	0.21	0.24	0.19	0.25	0.26	0.31	0.25
Ca Site Total ppm	64691.76	73611.02	64212.68	63477.31	57213.24	65499.52	55438.53	62900.85
Ti Site Total ppm	34849.21	39577.63	32671.52	38315.33	33748.13	38455.45	34430.79	34294.08
Ti/Ca Site Substitution	0.54	0.54	0.51	0.60	0.59	0.59	0.62	0.55
Ti/Ti Site All Wt%	0.87	0.84	0.87	0.85	0.87	0.85	0.87	0.87
Ca/Ca site	0.75	0.72	0.75	0.76	0.77	0.75	0.78	0.75

Table D1, cont.

	K01A-5.3I	K01A-4.2I	K01A-2.2I	K01A-8.2I	K01A-1.2E	K01A-2.3E	K01A-4.3E
Element							
F19	0.12861	0.09876	0.07819	0.13018	0.14170	0.15952	0.10968
Na23	1.17410	1.47911	2.36281	1.21966	1.15170	1.09700	1.30279
Mg26	0.12312	0.10254	0.13425	0.14259	0.12170	0.12951	0.10883
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00204	0.00217	0.00320	0.00198	0.00186	0.00160	0.00230
K39	0.01008	0.00493	0.00603	0.00823	0.00838	0.00452	0.00485
Ca43	0.53569	0.54038	0.54165	0.56611	0.54935	0.52694	0.53150
AlO	0.03394	0.03317	0.03367	0.03699	0.03345	0.03411	0.03395
Ti47	10.55847	10.74367	10.83507	10.87300	10.58570	10.11995	10.42973
V51	0.14045	0.07306	0.09816	0.21179	0.13514	0.08472	0.06683
Cr52	0.00146	0.00078	0.00016	0.00407	0.00099	0.00023	0.00021
Mn55	1.16119	1.47752	1.39047	0.96489	1.18378	1.59921	1.53230
Fe57	0.21051	0.21529	0.23481	0.24023	0.21917	0.23857	0.22518
Sr86	0.06737	0.06780	0.07075	0.07158	0.06842	0.06314	0.06648
Y89	2.23192	2.75562	4.07866	3.04814	2.04614	2.28094	3.10268
Zr90	0.12867	0.11985	0.19113	0.15769	0.12153	0.09276	0.12253
Zr91	0.02771	0.02508	0.04090	0.03419	0.02596	0.01897	0.02517
Nb93	0.14730	0.12965	0.19569	0.13503	0.17041	0.18241	0.12257
Ba137	0.00190	0.00121	0.00117	0.00115	0.00167	0.00152	0.00125
La139	0.54239	0.50133	0.58133	0.52249	0.57160	0.50926	0.46631
Ce140	1.79606	1.80066	2.18798	1.86546	1.78177	1.61942	1.70802
Pr 141	0.42762	0.46355	0.60486	0.48465	0.38734	0.35298	0.44811
Nd146	0.35587	0.41494	0.57781	0.44049	0.29677	0.26153	0.40541
Sm147	0.09156	0.12881	0.20809	0.13750	0.06872	0.06574	0.13189
Eu153	0.03959	0.04507	0.06724	0.05443	0.02760	0.01768	0.03831
Gd157O	0.06633	0.09419	0.15478	0.10366	0.04816	0.04915	0.10041
Tb159O	0.05088	0.07218	0.12125	0.08058	0.03800	0.04110	0.07955
Dy163O	0.05890	0.08162	0.13318	0.09113	0.04680	0.05273	0.09091
Ho165O	0.03724	0.04867	0.07500	0.05494	0.03039	0.03552	0.05360
Er166O	0.02687	0.03283	0.04815	0.03777	0.02453	0.02746	0.03669
Tm169O	0.00852	0.00989	0.01330	0.01180	0.00855	0.00936	0.01084
Yb172O	0.00793	0.00848	0.01047	0.01010	0.00804	0.00885	0.00920
Lu175O	0.00367	0.00373	0.00423	0.00454	0.00390	0.00396	0.00398
Hf178O	0.00063	0.00059	0.00082	0.00067	0.00066	0.00053	0.00058
Ta181O	0.00153	0.00144	0.00324	0.00163	0.00163	0.00159	0.00126
Pb206	0.00005	0.00009	0.00006	0.00007	0.00008	0.00007	0.00008
Pb208	0.00016	0.00017	0.00015	0.00016	0.00012	0.00017	0.00016
Th232O	0.01655	0.01198	0.01669	0.01977	0.01912	0.01807	0.01112
U238O	0.00132	0.00075	0.00098	0.00144	0.00161	0.00147	0.00084
	39884.16	39884.15	39884.13	39884.35	39884.12	39884.13	39884.14
Corr. 91Zr	3497.38	3043.67	4875.70	3956.42	3236.90	2434.17	3184.58
Corr. 90Zr	16031.21	13951.50	22349.13	18135.33	14837.26	11157.71	14597.41
Corr. 89Y	282462.96	337884.34	488361.53	353151.17	256326.07	297461.05	398608.57
Corr. 93Nb	18655.47	15921.93	23448.89	15648.57	21377.48	23854.30	15774.41
90ZrC/Si	0.13	0.11	0.19	0.16	0.12	0.09	0.11
91ZrC/Si	0.03	0.02	0.04	0.03	0.03	0.02	0.02
93Ycr/Si	2.23	2.75	4.07	3.05	2.04	2.27	3.09
93NbC/Si	0.15	0.13	0.20	0.14	0.17	0.18	0.12
90Zr Cr	1401.88	1257.34	2065.23	1733.36	1309.81	944.42	1254.64
91Zr Cr	1401.88	1257.34	2065.23	1733.36	1309.81	944.42	1254.64
Y Cr	7436.01	9167.08	13585.68	10161.49	6812.06	7579.74	10313.86
Nb Cr	1879.93	1653.55	2497.01	1723.57	2174.70	2326.74	1562.38
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	794.94	788.20	819.64	808.33	790.73	770.88	788.07
Temp./w P Zr91 Corr.	794.94	788.20	819.64	808.33	790.73	770.88	788.07
Age Ma 206/238	163.86	541.55	272.46	224.97	220.08	224.74	412.07
Age Ma 208/232	117.92	176.36	111.22	102.50	79.87	114.98	181.15

Table D1, cont.

	K01A-5.3I	**K01A-4.2I**	**K01A-2.2I**	**K01A-8.2I**	**K01A-1.2E**	**K01A-2.3E**	**K01A-4.3E**
F19	8269.00	6349.99	5027.61	8370.10	9110.96	10256.45	7052.39
Na23	359.50	452.90	723.48	373.46	352.65	335.90	398.91
Mg26	856.03	712.91	933.41	991.37	846.16	900.46	756.66
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	245.99	262.51	386.80	239.35	224.12	193.06	277.83
K39	3.17	1.55	1.90	2.58	2.63	1.42	1.52
Ca43	192109.00	193789.92	194247.62	203018.91	197009.29	188972.34	190607.15
AlO	9553.75	9338.73	9479.30	10413.06	9415.73	9603.36	9558.26
Ti47	216972.43	220778.13	222656.34	223435.76	217531.87	207960.94	214326.88
V51	219.83	114.35	153.63	331.49	211.52	132.60	104.61
Cr52	3.17	1.70	0.35	8.83	2.15	0.50	0.45
Mn55	2164.41	2754.03	2591.78	1798.52	2206.52	2980.86	2856.14
Fe57	21252.40	21734.91	23705.46	24252.61	22126.87	24084.70	22733.64
Sr86	47.68	47.99	50.08	50.67	48.43	44.69	47.06
Y89	7402.76	9139.74	13527.96	10109.95	6786.55	7565.34	10290.84
Zr90	1367.48	1273.83	2031.34	1675.98	1291.68	985.87	1302.30
Zr91	1393.80	1261.21	2057.27	1719.88	1305.55	954.16	1265.84
Nb93	1879.80	1654.61	2497.33	1723.26	2174.78	2327.86	1564.24
Ba137	12.79	8.14	7.87	7.72	11.27	10.23	8.44
La139	4578.04	4231.46	4906.71	4410.08	4824.59	4298.39	3935.85
Ce140	17260.74	17304.93	21027.27	17927.71	17123.46	15563.14	16414.64
Pr	2667.35	2891.50	3772.98	3023.14	2416.14	2201.82	2795.17
Nd146	12818.16	14945.85	20812.10	15866.14	10689.49	9419.90	14602.45
Sm147	2877.62	4048.71	6540.36	4321.54	2160.00	2066.38	4145.45
Eu153	260.88	297.03	443.14	358.71	181.90	116.50	252.44
Gd157O	2551.11	3622.53	5952.58	3986.77	1852.30	1890.09	3861.85
Tb159O	332.09	471.14	791.46	525.96	248.07	268.26	519.26
Dy163O	1756.95	2434.54	3972.52	2718.25	1395.92	1572.81	2711.75
Ho165O	333.05	435.26	670.76	491.40	271.75	317.63	479.37
Er166O	789.31	964.60	1414.54	1109.75	720.78	806.70	1077.94
Tm169O	91.87	106.59	143.33	127.20	92.13	100.92	116.86
Yb172O	482.88	516.39	637.92	615.56	489.70	539.36	560.25
Lu175O	54.52	55.46	62.89	67.41	57.90	58.81	59.12
Hf178O	66.80	62.93	87.34	71.90	70.50	56.49	62.01
Ta181O	132.13	124.39	279.40	140.11	140.12	136.98	108.20
Pb206	0.28	0.53	0.35	0.42	0.46	0.43	0.45
Pb208	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	364.52	263.75	367.57	435.42	421.03	398.05	244.88
U238O	27.14	15.51	20.12	29.71	33.15	30.32	17.24
90ZrC ppm	1401.88	1257.34	2065.23	1733.36	1309.81	944.42	1254.64
91ZrC ppm	1401.88	1257.34	2065.23	1733.36	1309.81	944.42	1254.64
Ycr ppm	7436.01	9167.08	13585.68	10161.49	6812.06	7579.74	10313.86
NbC ppm	1879.93	1653.55	2497.01	1723.57	2174.70	2326.74	1562.38
Estimated Temperature							
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	794.94	788.20	819.64	808.33	790.73	770.88	788.07
Temp./w P	794.94	788.20	819.64	808.33	790.73	770.88	788.07
Y89	7436.01	9167.08	13585.68	10161.49	6812.06	7579.74	10313.86
Sum REE	46854.58	52325.99	71148.57	55549.60	42524.13	39220.70	51532.39
Al+Fe	30806.15	31073.64	33184.76	34665.67	31542.60	33688.06	32291.90
Sm/La	0.63	0.96	1.33	0.98	0.45	0.48	1.05
Yb/Gd	0.19	0.14	0.11	0.15	0.26	0.29	0.15
Th/U	13.43	17.00	18.27	14.66	12.70	13.13	14.21
Y/Nb	3.94	5.52	5.42	5.87	3.12	3.25	6.58
Zr/Hf	20.47	20.24	23.26	23.31	18.32	17.45	21.00
Nb/Ta	14.23	13.30	8.94	12.30	15.52	16.99	14.46

Table D1, cont.

	K01A-5.3I	K01A-4.2I	K01A-2.2I	K01A-8.2I	K01A-1.2E	K01A-2.3E	K01A-4.3E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	14351.21	13264.77	15381.55	13824.69	15124.10	13474.59	12338.07
Ce Ch (0.82)	21049.68	21103.57	25643.02	21863.06	20882.27	18979.44	20017.85
Pr Ch (0.121)	22044.22	23896.68	31181.66	24984.63	19968.10	18196.85	23100.61
Nd Ch (0.615)	20842.53	24302.20	33840.81	25798.60	17381.29	15316.90	23743.82
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	14388.12	20243.53	32701.82	21607.68	10800.02	10331.90	20727.23
Eu Ch (0.076)	3432.60	3908.35	5830.75	4719.88	2393.39	1532.94	3321.60
Gd Ch (0.267)	9554.73	13567.54	22294.32	14931.71	6937.44	7079.00	14463.86
Tb Ch (0.0493)	6736.06	9556.56	16053.90	10668.48	5031.85	5441.31	10532.64
Dy Ch (0.33)	5324.09	7377.38	12037.94	8237.12	4230.05	4766.08	8217.41
Ho Ch (0.0755)	4411.32	5765.06	8884.19	6508.65	3599.37	4207.05	6349.33
Er Ch (0.216)	3654.23	4465.74	6548.78	5137.73	3336.92	3734.71	4990.47
Tm Ch (0.0329)	2792.43	3239.77	4356.56	3866.16	2800.17	3067.35	3551.86
Yb Ch (0.221)	2184.99	2336.59	2886.51	2785.34	2215.86	2440.53	2535.07
Lu Ch (0.033)	1652.15	1680.71	1905.88	2042.79	1754.69	1782.21	1791.55
	1.05	1.06	1.06	1.05	1.05	1.07	1.06
	0.29	0.24	0.22	0.26	0.28	0.18	0.19
Ca Site Total ppm	54649.01	61744.99	85064.21	66124.69	49764.85	47214.42	62085.35
Ti Site Total ppm	34475.37	34305.45	38234.17	38617.24	35433.34	37328.38	35433.71
Ti/Ca Site Substitution	0.63	0.56	0.45	0.58	0.71	0.79	0.57
Ti/Ti Site All Wt%	0.86	0.87	0.85	0.85	0.86	0.85	0.86
Ca/Ca site	0.78	0.76	0.70	0.75	0.80	0.80	0.75

Table D1, cont.

Element	K01A-6.2E	K01A-7.1E	K01A-8.1E	K01A-8.3E
F19	0.14584	0.15797	0.15053	0.09589
Na23	1.35173	1.45616	1.24939	1.75127
Mg26	0.12901	0.12816	0.13166	0.14383
Si30	1.00000	1.00000	1.00000	1.00000
P31	0.00155	0.00152	0.00130	0.00298
K39	0.00544	0.00683	0.01190	0.01044
Ca43	0.54709	0.55151	0.54247	0.55181
AlO	0.03360	0.03470	0.03418	0.03364
Ti47	10.62733	10.63696	10.44466	11.07329
V51	0.10301	0.08022	0.10187	0.19677
Cr52	0.00051	0.00038	0.00088	0.00309
Mn55	1.47400	1.72366	1.47263	0.93756
Fe57	0.22588	0.23465	0.23020	0.21980
Sr86	0.06678	0.06799	0.06627	0.07351
Y89	2.44674	2.37023	2.45700	2.86908
Zr90	0.10296	0.09214	0.10239	0.16058
Zr91	0.02124	0.01922	0.02129	0.03366
Nb93	0.19252	0.21668	0.17552	0.18431
Ba137	0.00118	0.00123	0.00130	0.00262
La139	0.52813	0.52533	0.52153	0.59421
Ce140	1.71199	1.69518	1.69599	2.06506
Pr 141	0.38872	0.36693	0.38736	0.53236
Nd146	0.30366	0.27298	0.30640	0.47838
Sm147	0.08295	0.06948	0.08149	0.14293
Eu153	0.02541	0.01831	0.02507	0.05691
Gd157O	0.06110	0.05049	0.06124	0.10363
Tb159O	0.05026	0.04261	0.04985	0.07949
Dy163O	0.06072	0.05388	0.06072	0.08880
Ho165O	0.03896	0.03611	0.03915	0.05217
Er166O	0.02908	0.02797	0.02949	0.03523
Tm169O	0.00930	0.00974	0.00947	0.01050
Yb172O	0.00886	0.00940	0.00890	0.00927
Lu175O	0.00412	0.00419	0.00390	0.00385
Hf178O	0.00045	0.00052	0.00055	0.00083
Ta181O	0.00183	0.00205	0.00171	0.00250
Pb206	0.00007	0.00006	0.00007	0.00006
Pb208	0.00018	0.00020	0.00013	0.00016
Th232O	0.01673	0.01821	0.01751	0.02370
U238O	0.00135	0.00137	0.00134	0.00157
	39884.17	39884.18	39884.19	39884.34
Corr. 91Zr	2620.21	2322.45	2639.00	3867.87
Corr. 90Zr	12010.46	10645.59	12096.57	17729.47
Corr. 89Y	305970.87	289622.99	308144.57	332607.71
Corr. 93Nb	24134.86	26527.34	22057.96	21413.60
90ZrC/Si	0.10	0.09	0.10	0.15
91ZrC/Si	0.02	0.02	0.02	0.03
93Ycr/Si	2.44	2.36	2.45	2.86
93NbC/Si	0.19	0.22	0.18	0.18
90Zr Cr	1060.57	962.84	1065.59	1689.03
91Zr Cr	1060.57	962.84	1065.59	1689.03
Y Cr	8133.74	7885.91	8171.73	9539.06
Nb Cr	2455.91	2764.84	2239.15	2350.83
Est. P	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	777.83	772.03	778.12	806.68
Temp./w P Zr91 Corr.	777.83	772.03	778.12	806.68
Age Ma 206/238	249.62	210.70	236.48	181.41
Age Ma 208/232	131.09	133.06	91.23	85.22

Table D1, cont.

	K01A-6.2E	K01A-7.1E	K01A-8.1E	K01A-8.3E
F19	9377.25	10157.18	9678.72	6165.39
Na23	413.89	445.87	382.56	536.23
Mg26	897.00	891.09	915.40	1000.05
Si30	139383.00	139383.00	139383.00	139383.00
P31	187.14	182.97	157.25	359.50
K39	1.71	2.14	3.74	3.28
Ca43	196196.85	197784.86	194542.06	197890.76
AlO	9458.82	9768.69	9621.74	9469.99
Ti47	218387.38	218585.39	214633.68	227551.75
V51	161.23	125.56	159.44	307.98
Cr52	1.11	0.82	1.91	6.71
Mn55	2747.47	3212.84	2744.92	1747.57
Fe57	22803.52	23688.78	23240.08	22189.57
Sr86	47.27	48.12	46.91	52.03
Y89	8115.26	7861.49	8149.30	9516.07
Zr90	1094.29	979.27	1088.22	1706.64
Zr91	1068.49	966.70	1070.91	1693.17
Nb93	2456.91	2765.20	2239.96	2352.10
Ba137	7.97	8.29	8.78	17.64
La139	4457.64	4434.04	4401.96	5015.42
Ce140	16452.79	16291.31	16299.08	19845.91
Pr	2424.74	2288.84	2416.25	3320.71
Nd146	10937.45	9832.28	11036.32	17230.64
Sm147	2607.05	2183.78	2561.39	4492.27
Eu153	167.48	120.68	165.19	375.05
Gd157O	2349.86	1941.98	2355.44	3985.49
Tb159O	328.05	278.12	325.37	518.87
Dy163O	1811.19	1607.17	1811.23	2648.87
Ho165O	348.46	322.95	350.15	466.60
Er166O	854.37	821.75	866.51	1035.13
Tm169O	100.19	105.00	102.03	113.16
Yb172O	539.66	572.55	541.95	564.62
Lu175O	61.19	62.26	57.97	57.17
Hf178O	47.69	55.13	58.45	88.39
Ta181O	158.16	176.35	147.08	215.55
Pb206	0.44	0.38	0.41	0.37
Pb208	0.00	0.00	0.00	0.00
Th232O	368.36	400.93	385.63	522.01
U238O	27.73	28.20	27.62	32.27
90ZrC ppm	1060.57	962.84	1065.59	1689.03
91ZrC ppm	1060.57	962.84	1065.59	1689.03
Ycr ppm	8133.74	7885.91	8171.73	9539.06
NbC ppm	2455.91	2764.84	2239.15	2350.83
Estimated Temperature				
Est. P	0.10	0.10	0.10	0.10
Temp./w P	777.83	772.03	778.12	806.68
Temp./w P	777.83	772.03	778.12	806.68
Y89	8133.74	7885.91	8171.73	9539.06
Sum REE	43440.14	40862.71	43290.83	59669.89
Al+Fe	32262.34	33457.47	32861.82	31659.56
Sm/La	0.58	0.49	0.58	0.90
Yb/Gd	0.23	0.29	0.23	0.14
Th/U	13.28	14.22	13.96	16.18
Y/Nb	3.30	2.84	3.64	4.05
Zr/Hf	22.94	17.76	18.62	19.31
Nb/Ta	15.53	15.68	15.23	10.91

Table D1, cont.

	K01A-6.2E	**K01A-7.1E**	**K01A-8.1E**	**K01A-8.3E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)				
La Ch (0.319)	13973.78	13899.81	13799.25	15722.30
Ce Ch (0.82)	20064.38	19867.45	19876.93	24202.33
Pr Ch (0.121)	20039.17	18916.04	19969.00	27443.88
Nd Ch (0.615)	17784.48	15987.45	17945.23	28017.29
Pm	0.00	0.00	0.00	0.00
Sm Ch (0.2)	13035.27	10918.89	12806.95	22461.33
Eu Ch (0.076)	2203.72	1587.90	2173.58	4934.85
Gd Ch (0.267)	8800.98	7273.32	8821.86	14926.95
Tb Ch (0.0493)	6654.06	5641.36	6599.87	10524.73
Dy Ch (0.33)	5488.47	4870.23	5488.57	8026.89
Ho Ch (0.0755)	4615.41	4277.46	4637.78	6180.13
Er Ch (0.216)	3955.41	3804.39	4011.61	4792.25
Tm Ch (0.0329)	3045.40	3191.48	3101.08	3439.37
Yb Ch (0.221)	2441.92	2590.72	2452.24	2554.83
Lu Ch (0.033)	1854.26	1886.74	1756.68	1732.51
	1.06	1.06	1.06	1.05
	0.21	0.18	0.20	0.27
Ca Site Total ppm	51951.49	49153.33	51853.39	69740.24
Ti Site Total ppm	36181.74	37559.80	36556.89	36336.93
Ti/Ca Site Substitution	0.70	0.76	0.71	0.52
Ti/Ti Site All Wt%	0.86	0.85	0.85	0.86
Ca/Ca site	0.79	0.80	0.79	0.74

Table D2. SHRIMP-RG trace element analyses of sphene grains from WSW2A.

	WSW2AS_2.1C	**WSW2AS_3.2C**	**WSW2AS-10.1C**	**WSW2AS-4.3C**	**WSW2AS-5.1C**	**WSW2AS-6.2C**
Element						
F19	0.12068	0.11769	0.13627	0.11823	0.12507	0.10853
Na23	1.29264	1.36893	1.22287	1.27418	1.73970	1.91435
Mg26	0.12761	0.11160	0.11919	0.11582	0.16754	0.15150
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00224	0.00198	0.00173	0.00201	0.00213	0.00216
K39	0.00670	0.00724	0.00761	0.00699	0.00699	0.00849
Ca43	0.55015	0.52751	0.53122	0.52958	0.50799	0.51806
AlO	0.03332	0.03376	0.03497	0.03072	0.03830	0.03514
Ti47	10.80248	10.48304	10.42191	10.38161	9.96441	10.35545
V51	0.16052	0.07780	0.11871	0.11949	0.06628	0.05659
Cr52	0.00187	0.00022	0.00074	0.00084	0.00014	0.00013
Mn55	1.06037	1.50795	1.32916	1.26446	1.59643	1.74790
Fe57	0.21107	0.21911	0.21740	0.20406	0.28804	0.26041
Sr86	0.07096	0.06546	0.06683	0.06442	0.06267	0.06452
Y89	2.33964	2.48771	2.21042	2.16224	6.11807	5.29869
Zr90	0.14144	0.12745	0.11285	0.10883	0.19266	0.15176
Zr91	0.03030	0.02654	0.02366	0.02263	0.04072	0.03126
Nb93	0.16035	0.15363	0.19612	0.18757	0.13461	0.18158
Ba137	0.00119	0.00107	0.00142	0.00097	0.00113	0.00103
La139	0.54937	0.50224	0.54352	0.52636	0.31174	0.37122
Ce140	1.82040	1.71033	1.73323	1.71989	1.37825	1.54666
Pr 141	0.43906	0.41773	0.38396	0.38709	0.44765	0.45329
Nd146	0.37562	0.34945	0.29850	0.30767	0.47391	0.44127
Sm147	0.10118	0.10148	0.07736	0.07976	0.23397	0.18926
Eu153	0.04531	0.03285	0.02678	0.02878	0.03709	0.02747
Gd157O	0.07162	0.07377	0.05494	0.05840	0.20593	0.16180
Tb159O	0.05555	0.05922	0.04442	0.04644	0.18051	0.14196
Dy163O	0.06405	0.06899	0.05418	0.05513	0.20557	0.16624
Ho165O	0.03970	0.04237	0.03474	0.03541	0.11713	0.09753
Er166O	0.02872	0.03010	0.02623	0.02654	0.07447	0.06438
Tm169O	0.00932	0.00962	0.00842	0.00869	0.01945	0.01766
Yb172O	0.00841	0.00842	0.00845	0.00819	0.01517	0.01385
Lu175O	0.00389	0.00371	0.00361	0.00377	0.00581	0.00551
Hf178O	0.00068	0.00060	0.00053	0.00058	0.00075	0.00073
Ta181O	0.00186	0.00157	0.00207	0.00185	0.00172	0.00227
Pb206	0.00005	0.00005	0.00007	0.00003	0.00007	0.00007
Pb208	0.00015	0.00015	0.00015	0.00014	0.00015	0.00019
Th232O	0.01723	0.01374	0.01721	0.01745	0.00990	0.01068
U238O	0.00137	0.00105	0.00147	0.00131	0.00084	0.00079
	39856.89	39856.91	39884.07	39856.98	39857.00	39884.01
Corr. 91Zr	3670.66	3306.68	2955.26	2791.45	5105.48	3846.91
Corr. 90Zr	16825.50	15157.09	13546.26	12795.41	23402.40	17633.41
Corr. 89Y	284488.83	313319.94	278638.27	269739.31	773278.36	662050.74
Corr. 93Nb	19519.29	19394.52	24778.21	23461.52	17016.82	22710.83
90ZrC/Si	0.14	0.12	0.11	0.10	0.18	0.14
91ZrC/Si	0.03	0.03	0.02	0.02	0.04	0.03
93Ycr/Si	2.34	2.48	2.20	2.15	6.11	5.29
93NbC/Si	0.16	0.15	0.20	0.19	0.13	0.18
90Zr Cr	1530.61	1328.83	1187.15	1132.50	2048.41	1559.95
91Zr Cr	1530.61	1328.83	1187.15	1132.50	2048.41	1559.95
Y Cr	7791.02	8269.39	7351.22	7187.20	20376.25	17631.81
Nb Cr	2046.21	1959.40	2502.34	2392.93	1716.42	2315.24
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	800.44	791.62	784.68	781.81	819.11	801.64
Temp./w P Zr91 Corr.	800.44	791.62	784.68	781.81	819.11	801.64
Age Ma 206/238	156.80	231.12	226.17	118.37	373.27	390.01
Age Ma 208/232	110.48	131.70	107.97	99.07	185.05	219.46

Table D2, cont.

	WSW2AS_2.1C	**WSW2AS_3.2C**	**WSW2AS-10.1C**	**WSW2AS-4.3C**	**WSW2AS-5.1C**	**WSW2AS-6.2C**
F19	7759.19	7567.08	8761.46	7601.63	8041.86	6977.99
Na23	395.80	419.16	374.44	390.15	532.69	586.16
Mg26	887.23	775.96	828.68	805.29	1164.88	1053.38
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	270.60	239.45	209.28	243.02	257.19	260.90
K39	2.10	2.27	2.39	2.20	2.20	2.67
Ca43	197295.65	189175.29	190506.96	189919.92	182176.54	185788.93
AlO	9379.19	9503.51	9843.91	8647.48	10781.61	9890.90
Ti47	221986.62	215422.27	214166.04	213338.04	204764.70	212800.45
V51	251.23	121.78	185.79	187.02	103.74	88.57
Cr52	4.07	0.48	1.61	1.83	0.31	0.28
Mn55	1976.49	2810.76	2477.50	2356.91	2975.68	3258.01
Fe57	21308.91	22119.93	21948.13	20601.25	29079.70	26290.02
Sr86	50.23	46.34	47.30	45.59	44.36	45.67
Y89	7760.02	8251.15	7331.45	7171.65	20292.20	17574.52
Zr90	1503.25	1354.53	1199.40	1156.64	2047.60	1612.89
Zr91	1524.18	1334.87	1190.03	1138.17	2048.22	1572.39
Nb93	2046.33	1960.65	2502.92	2393.78	1717.83	2317.27
Ba137	7.99	7.24	9.57	6.53	7.61	6.95
La139	4636.89	4239.12	4587.56	4442.71	2631.21	3133.29
Ce140	17494.69	16436.81	16656.90	16528.72	13245.44	14863.93
Pr	2738.71	2605.69	2395.01	2414.58	2792.31	2827.49
Nd146	13529.39	12586.64	10751.73	11081.78	17069.64	15893.94
Sm147	3180.00	3189.53	2431.48	2506.75	7353.82	5948.50
Eu153	298.61	216.52	176.46	189.67	244.46	181.04
Gd157O	2754.49	2837.08	2113.01	2245.86	7919.94	6222.87
Tb159O	362.57	386.58	289.96	303.16	1178.27	926.64
Dy163O	1910.55	2057.95	1616.16	1644.29	6131.82	4958.73
Ho165O	355.03	378.92	310.67	316.67	1047.52	872.25
Er166O	843.88	884.19	770.67	779.83	2187.91	1891.58
Tm169O	100.44	103.69	90.72	93.66	209.60	190.39
Yb172O	512.34	512.94	514.77	498.77	924.13	843.82
Lu175O	57.77	55.06	53.68	56.06	86.32	81.93
Hf178O	72.82	64.60	56.12	62.32	79.86	77.64
Ta181O	160.39	135.47	178.37	159.35	147.92	195.34
Pb206	0.28	0.32	0.43	0.20	0.41	0.40
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	379.43	302.67	379.03	384.25	217.97	235.29
U238O	28.27	21.70	30.38	26.93	17.39	16.34
90ZrC ppm	1530.61	1328.83	1187.15	1132.50	2048.41	1559.95
91ZrC ppm	1530.61	1328.83	1187.15	1132.50	2048.41	1559.95
Ycr ppm	7791.02	8269.39	7351.22	7187.20	20376.25	17631.81
NbC ppm	2046.21	1959.40	2502.34	2392.93	1716.42	2315.24
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	800.44	791.62	784.68	781.81	819.11	801.64
Temp./w P	800.44	791.62	784.68	781.81	819.11	801.64
Y89	7791.02	8269.39	7351.22	7187.20	20376.25	17631.81
Sum REE	48775.36	46490.73	42758.77	43102.52	63022.40	58836.39
Al+Fe	30688.10	31623.44	31792.05	29248.72	39861.31	36180.92
Sm/La	0.69	0.75	0.53	0.56	2.79	1.90
Yb/Gd	0.19	0.18	0.24	0.22	0.12	0.14
Th/U	13.42	13.95	12.48	14.27	12.53	14.40
Y/Nb	3.79	4.21	2.93	3.00	11.81	7.58
Zr/Hf	20.64	20.97	21.37	18.56	25.64	20.77
Nb/Ta	12.76	14.47	14.03	15.02	11.61	11.86

Table D2, cont.

	WSW2AS_2.1C	WSW2AS_3.2C	WSW2AS-10.1C	WSW2AS-4.3C	WSW2AS-5.1C	WSW2AS-6.2C
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	14535.72	13288.78	14381.06	13926.99	8248.32	9822.22
Ce Ch (0.82)	21334.98	20044.90	20313.30	20156.98	16152.97	18126.75
Pr Ch (0.121)	22633.96	21534.65	19793.45	19955.24	23076.97	23367.67
Nd Ch (0.615)	21999.01	20466.08	17482.48	18019.16	27755.51	25843.80
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	15900.02	15947.66	12157.39	12533.76	36769.10	29742.48
Eu Ch (0.076)	3929.03	2848.89	2321.81	2495.64	3216.61	2382.12
Gd Ch (0.267)	10316.43	10625.76	7913.90	8411.47	29662.70	23306.64
Tb Ch (0.0493)	7354.43	7841.46	5881.56	6149.27	23900.06	18796.03
Dy Ch (0.33)	5789.56	6236.23	4897.46	4982.69	18581.26	15026.46
Ho Ch (0.0755)	4702.43	5018.78	4114.84	4194.36	13874.46	11552.94
Er Ch (0.216)	3906.86	4093.46	3567.90	3610.32	10129.22	8757.30
Tm Ch (0.0329)	3052.87	3151.64	2757.54	2846.72	6370.83	5786.97
Yb Ch (0.221)	2318.28	2321.02	2329.28	2256.87	4181.58	3818.18
Lu Ch (0.033)	1750.50	1668.49	1626.52	1698.82	2615.77	2482.63
Ce/Ce*	1.04	1.06	1.05	1.05	1.09	1.08
Eu/Eu*	0.31	0.22	0.24	0.24	0.10	0.09
Ca Site Total ppm	56943.09	55066.25	50499.64	50685.36	83549.96	76662.55
Ti Site Total ppm	34726.18	35260.95	35916.27	33209.67	43958.57	40472.92
Ti/Ca Site Substitution	0.61	0.64	0.71	0.66	0.53	0.53
Ti/Ti Site All Wt%	0.86	0.86	0.86	0.87	0.82	0.84
Ca/Ca site	0.78	0.77	0.79	0.79	0.69	0.71

Table D2, cont.

	WSW2AS-7.1C	WSW2AS-8.1C	WSW2AS-9.2C	WSW2AS-9.1I	WSW2AS-7.2I	WSW2AS-4.4I	WSW2AS-4.2I
Element							
F19	0.11905	0.10246	0.13368	0.12203	0.12706	0.13859	0.10325
Na23	1.25369	1.80515	1.20585	1.31349	1.01277	1.12680	1.48037
Mg26	0.12723	0.12303	0.12173	0.11541	0.11699	0.11871	0.11738
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00213	0.00200	0.00213	0.00165	0.00178	0.00217	0.00258
K39	0.00624	0.00606	0.00649	0.01590	0.00625	0.00779	0.00991
Ca43	0.53324	0.52362	0.55476	0.54098	0.52044	0.53131	0.52872
AlO	0.03094	0.03169	0.03347	0.03046	0.03309	0.02959	0.02956
Ti47	10.57614	10.53996	10.98421	10.49230	10.40850	10.42282	10.56543
V51	0.15458	0.07237	0.13967	0.10955	0.13982	0.11190	0.10663
Cr52	0.00183	0.00019	0.00103	0.00053	0.00132	0.00054	0.00043
Mn55	1.02944	1.49977	1.17404	1.28311	1.07996	1.27104	1.24752
Fe57	0.21426	0.22859	0.21482	0.20711	0.21078	0.21176	0.19884
Sr86	0.06662	0.06606	0.06977	0.06679	0.06567	0.06505	0.06586
Y89	2.12227	3.84682	2.02191	1.97885	2.05179	1.95824	2.02931
Zr90	0.13782	0.14882	0.12960	0.10322	0.12826	0.10883	0.11176
Zr91	0.02891	0.03152	0.02715	0.02115	0.02714	0.02318	0.02344
Nb93	0.16234	0.16960	0.19268	0.21569	0.15055	0.20040	0.24838
Ba137	0.00124	0.00100	0.00129	0.00103	0.00104	0.00206	0.00101
La139	0.55531	0.42129	0.58807	0.53801	0.54762	0.53030	0.65832
Ce140	1.80181	1.64305	1.84425	1.69284	1.76997	1.64279	1.99354
Pr 141	0.42224	0.45648	0.40388	0.36546	0.40459	0.35391	0.42548
Nd146	0.34750	0.43179	0.30981	0.27429	0.32721	0.26248	0.31559
Sm147	0.09026	0.15850	0.07312	0.06605	0.08089	0.06260	0.07324
Eu153	0.03865	0.04460	0.02931	0.02304	0.03421	0.02213	0.02518
Gd157O	0.06303	0.12380	0.05024	0.04655	0.05686	0.04548	0.05155
Tb159O	0.04885	0.10219	0.04018	0.03821	0.04452	0.03724	0.04184
Dy163O	0.05744	0.11719	0.04857	0.04663	0.05224	0.04693	0.05021
Ho165O	0.03589	0.06774	0.03193	0.03043	0.03351	0.03102	0.03268
Er166O	0.02584	0.04463	0.02468	0.02372	0.02530	0.02446	0.02480
Tm169O	0.00849	0.01252	0.00872	0.00813	0.00845	0.00844	0.00797
Yb172O	0.00787	0.00974	0.00819	0.00771	0.00783	0.00843	0.00774
Lu175O	0.00349	0.00392	0.00383	0.00344	0.00354	0.00388	0.00350
Hf178O	0.00067	0.00066	0.00069	0.00056	0.00067	0.00065	0.00062
Ta181O	0.00193	0.00204	0.00207	0.00235	0.00153	0.00197	0.00317
Pb206	0.00007	0.00007	0.00009	0.00005	0.00005	0.00007	0.00007
Pb208	0.00020	0.00015	0.00016	0.00017	0.00015	0.00016	0.00014
Th232O	0.01894	0.01111	0.01989	0.01786	0.01799	0.01896	0.02496
U238O	0.00138	0.00085	0.00157	0.00145	0.00140	0.00161	0.00139
	39884.03	39884.04	39884.06	39884.05	39884.02	39856.97	39856.98
Corr. 91Zr	3650.64	3990.95	3279.60	2651.27	3459.47	2937.03	2947.73
Corr. 90Zr	16733.71	18293.65	15032.97	12152.85	15857.44	13462.70	13511.75
Corr. 89Y	270229.48	490700.56	246338.18	251711.39	263278.87	249461.77	257462.71
Corr. 93Nb	20726.45	21653.69	23543.28	27539.20	19356.25	25568.22	31593.41
90ZrC/Si	0.13	0.14	0.12	0.10	0.12	0.11	0.11
91ZrC/Si	0.03	0.03	0.03	0.02	0.03	0.02	0.02
93Ycr/Si	2.11	3.84	2.01	1.97	2.05	1.95	2.02
93NbC/Si	0.16	0.17	0.19	0.22	0.15	0.20	0.25
90Zr Cr	1450.75	1586.24	1362.02	1053.68	1365.41	1168.59	1176.29
91Zr Cr	1450.75	1586.24	1362.02	1053.68	1365.41	1168.59	1176.29
Y Cr	7052.89	12809.05	6719.00	6570.01	6824.64	6518.76	6747.58
Nb Cr	2070.70	2163.67	2458.09	2751.52	1920.63	2557.52	3169.48
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	797.08	802.70	793.15	777.44	793.30	783.72	784.12
Temp./w P Zr91 Corr.	797.08	802.70	793.15	777.44	793.30	783.72	784.12
Age Ma 206/238	238.32	396.90	254.64	141.35	158.56	199.93	218.69
Age Ma 208/232	127.74	165.49	101.68	119.21	100.16	106.04	70.08

Table D2, cont.

	WSW2AS-7.1C	WSW2AS-8.1C	WSW2AS-9.2C	WSW2AS-9.1I	WSW2AS-7.2I	WSW2AS-4.4I	WSW2AS-4.2I
F19	7654.35	6587.64	8594.97	7846.32	8169.37	8910.99	6638.75
Na23	383.87	552.73	369.23	402.18	310.11	345.02	453.28
Mg26	884.62	855.40	846.38	802.41	813.42	825.37	816.15
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	257.41	241.71	257.33	199.17	215.16	261.51	311.44
K39	1.96	1.90	2.04	4.99	1.96	2.45	3.11
Ca43	191231.57	187781.66	198949.79	194006.00	186639.07	190539.37	189609.25
AlO	8709.50	8922.35	9421.91	8573.49	9315.28	8329.68	8320.94
Ti47	217335.44	216592.09	225721.13	215612.68	213890.54	214184.79	217115.34
V51	241.94	113.27	218.60	171.47	218.84	175.15	166.90
Cr52	3.97	0.41	2.25	1.16	2.87	1.17	0.93
Mn55	1918.83	2795.51	2188.35	2391.66	2013.00	2369.16	2325.33
Fe57	21630.49	23077.41	21687.74	20909.39	21279.82	21378.72	20073.78
Sr86	47.15	46.76	49.38	47.27	46.48	46.05	46.62
Y89	7039.06	12759.00	6706.21	6563.37	6805.29	6495.03	6730.73
Zr90	1464.82	1581.71	1377.36	1097.07	1363.19	1156.66	1187.78
Zr91	1454.06	1585.18	1365.63	1063.88	1364.89	1165.78	1178.99
Nb93	2071.75	2164.36	2458.94	2752.64	1921.24	2557.47	3169.79
Ba137	8.36	6.76	8.69	6.91	7.02	13.90	6.78
La139	4687.05	3555.84	4963.59	4541.05	4622.17	4475.93	5556.52
Ce140	17316.03	15790.24	17723.92	16268.81	17010.00	15787.73	19158.65
Pr	2633.81	2847.39	2519.27	2279.62	2523.74	2207.61	2654.04
Nd146	12516.45	15552.45	11159.03	9879.50	11785.71	9454.26	11367.20
Sm147	2836.93	4981.75	2298.23	2076.06	2542.53	1967.50	2301.89
Eu153	254.70	293.96	193.14	151.84	225.48	145.86	165.97
Gd157O	2424.24	4761.37	1932.27	1790.40	2186.75	1749.06	1982.67
Tb159O	318.88	667.07	262.25	249.41	290.60	243.08	273.13
Dy163O	1713.20	3495.56	1448.62	1390.93	1558.16	1399.82	1497.64
Ho165O	320.96	605.81	285.53	272.18	299.71	277.47	292.25
Er166O	759.22	1311.27	725.10	696.96	743.32	718.53	728.62
Tm169O	91.52	134.90	94.00	87.68	91.08	90.92	85.90
Yb172O	479.69	593.34	498.91	469.81	476.90	513.78	471.53
Lu175O	51.80	58.32	56.95	51.08	52.62	57.68	52.08
Hf178O	71.07	70.25	73.58	60.21	71.42	69.15	66.33
Ta181O	166.07	175.68	178.77	202.38	131.85	169.79	273.51
Pb206	0.43	0.44	0.52	0.27	0.29	0.42	0.40
Pb208	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	417.02	244.67	438.01	393.26	396.16	417.44	549.58
U238O	28.52	17.59	32.42	29.89	28.77	33.12	28.68
90ZrC ppm	1450.75	1586.24	1362.02	1053.68	1365.41	1168.59	1176.29
91ZrC ppm	1450.75	1586.24	1362.02	1053.68	1365.41	1168.59	1176.29
Ycr ppm	7052.89	12809.05	6719.00	6570.01	6824.64	6518.76	6747.58
NbC ppm	2070.70	2163.67	2458.09	2751.52	1920.63	2557.52	3169.48
Estimated Temperature							
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	797.08	802.70	793.15	777.44	793.30	783.72	784.12
Temp./w P	797.08	802.70	793.15	777.44	793.30	783.72	784.12
Y89	7052.89	12809.05	6719.00	6570.01	6824.64	6518.76	6747.58
Sum REE	46404.48	54649.26	44160.82	40205.34	44408.76	39089.24	46588.10
Al+Fe	30339.99	31999.76	31109.65	29482.88	30595.10	29708.40	28394.73
Sm/La	0.61	1.40	0.46	0.46	0.55	0.44	0.41
Yb/Gd	0.20	0.12	0.26	0.26	0.22	0.29	0.24
Th/U	14.62	13.91	13.51	13.16	13.77	12.60	19.16
Y/Nb	3.40	5.90	2.73	2.38	3.54	2.54	2.12
Zr/Hf	20.61	22.52	18.72	18.22	19.09	16.73	17.91
Nb/Ta	12.47	12.32	13.75	13.60	14.57	15.06	11.59

Table D2, cont.

	WSW2AS-7.1C	**WSW2AS-8.1C**	**WSW2AS-9.2C**	**WSW2AS-9.1I**	**WSW2AS-7.2I**	**WSW2AS-4.4I**	**WSW2AS-4.2I**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	14692.96	11146.82	15559.85	14235.27	14489.57	14031.14	17418.56
Ce Ch (0.82)	21117.12	19256.39	21614.54	19840.01	20743.90	19253.33	23364.20
Pr Ch (0.121)	21767.03	23532.17	20820.38	18839.85	20857.39	18244.70	21934.20
Nd Ch (0.615)	20351.94	25288.53	18144.76	16064.23	19163.75	15372.78	18483.25
Pm	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	14184.66	24908.74	11491.16	10380.31	12712.65	9837.52	11509.46
Eu Ch (0.076)	3351.29	3867.88	2541.36	1997.91	2966.80	1919.21	2183.78
Gd Ch (0.267)	9079.53	17832.86	7236.96	6705.60	8190.08	6550.78	7425.73
Tb Ch (0.0493)	6468.11	13530.74	5319.39	5059.11	5894.47	4930.68	5540.07
Dy Ch (0.33)	5191.52	10592.61	4389.77	4214.95	4721.69	4241.88	4538.31
Ho Ch (0.0755)	4251.08	8023.94	3781.91	3605.01	3969.65	3675.05	3870.89
Er Ch (0.216)	3514.93	6070.67	3356.93	3226.68	3441.28	3326.51	3373.26
Tm Ch (0.0329)	2781.79	4100.24	2857.28	2665.06	2768.43	2763.61	2611.07
Yb Ch (0.221)	2170.55	2684.80	2257.52	2125.82	2157.90	2324.80	2133.64
Lu Ch (0.033)	1569.60	1767.22	1725.76	1547.86	1594.61	1747.93	1578.25
	1.05	1.07	**1.05**	1.06	1.05	1.06	1.06
	0.30	0.18	**0.28**	0.24	0.29	0.24	0.24
Ca Site Total ppm	53889.08	67670.52	51337.45	47191.86	51638.98	46034.82	53897.09
Ti Site Total ppm	34359.62	36105.43	35419.15	33767.80	34304.51	33837.79	33259.97
Ti/Ca Site Substitution	0.64	0.53	0.69	0.72	0.66	0.74	0.62
Ti/Ti Site All Wt%	0.86	0.86	0.86	0.86	0.86	0.86	0.87
Ca/Ca site	0.78	0.74	0.79	0.80	0.78	0.81	0.78

Table D2, cont.

	WSW2AS-10.2I	**WSW2AS-10.3I**	**WSW2AS_1.3I**	**WSW2AS_2.2I**	**WSW2AS_2.4I**	**WSW2AS_3.1I**
Element						
F19	0.11878	0.11216	0.12629	0.12611	0.09133	0.08255
Na23	1.55333	1.82580	1.99742	1.26485	1.54445	1.94396
Mg26	0.12049	0.12865	0.13386	0.11603	0.12158	0.11378
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00230	0.00258	0.00241	0.00160	0.00329	0.00351
K39	0.00700	0.00707	0.00379	0.00589	0.00589	0.00801
Ca43	0.53246	0.53387	0.55160	0.53257	0.52877	0.54880
AlO	0.03433	0.03071	0.03165	0.03267	0.03148	0.03065
Ti47	10.44299	10.59031	10.82272	10.38533	10.61654	10.93120
V51	0.09387	0.09004	0.09638	0.11591	0.14498	0.07696
Cr52	0.00033	0.00049	0.00188	0.00063	0.00112	0.00015
Mn55	1.47051	1.52075	1.52686	1.22866	1.02547	1.51920
Fe57	0.22983	0.21523	0.20960	0.20517	0.19428	0.21650
Sr86	0.06667	0.06742	0.06787	0.06590	0.06729	0.07038
Y89	3.26974	2.48979	2.37071	2.01605	2.09568	2.77641
Zr90	0.13179	0.10623	0.10058	0.10806	0.13709	0.13774
Zr91	0.02796	0.02228	0.02073	0.02227	0.02880	0.02966
Nb93	0.17494	0.26317	0.24667	0.19251	0.18819	0.21417
Ba137	0.00125	0.00098	0.00371	0.00118	0.00096	0.00176
La139	0.47892	0.65506	0.61037	0.53450	0.67584	0.67549
Ce140	1.72955	2.04008	1.94134	1.68811	2.12970	2.22654
Pr 141	0.44829	0.44430	0.42476	0.37810	0.48727	0.52557
Nd146	0.39735	0.33336	0.31966	0.28957	0.39882	0.43105
Sm147	0.12903	0.08374	0.08244	0.07178	0.10018	0.11986
Eu153	0.03893	0.02382	0.02415	0.02650	0.04430	0.03868
Gd157O	0.09897	0.05999	0.06102	0.05148	0.06848	0.08481
Tb159O	0.08084	0.05077	0.05091	0.04172	0.05121	0.06676
Dy163O	0.09404	0.06041	0.06202	0.05055	0.05902	0.07775
Ho165O	0.05654	0.03949	0.04002	0.03266	0.03495	0.04698
Er166O	0.03854	0.02916	0.03013	0.02508	0.02534	0.03261
Tm169O	0.01194	0.00954	0.00970	0.00860	0.00784	0.00997
Yb172O	0.00984	0.00885	0.00921	0.00797	0.00719	0.00908
Lu175O	0.00424	0.00396	0.00423	0.00367	0.00352	0.00387
Hf178O	0.00059	0.00060	0.00067	0.00055	0.00060	0.00069
Ta181O	0.00190	0.00316	0.00311	0.00205	0.00259	0.00287
Pb206	0.00007	0.00005	0.00006	0.00007	0.00006	0.00008
Pb208	0.00015	0.00020	0.00017	0.00015	0.00014	0.00014
Th232O	0.01339	0.02482	0.02478	0.01785	0.02044	0.01926
U238O	0.00097	0.00147	0.00135	0.00140	0.00141	0.00100
	39884.07	39884.08	39856.85	39856.88	39856.90	39856.90
Corr. 91Zr	3477.15	2780.36	2274.23	2795.32	3553.86	3590.43
Corr. 90Zr	15938.49	12744.53	10424.55	12813.12	16290.11	16457.75
Corr. 89Y	409322.29	313623.24	263710.51	256348.76	260632.83	337037.62
Corr. 93Nb	21922.46	33213.78	27514.04	24561.75	23468.18	26016.78
90ZrC/Si	0.13	0.10	0.09	0.10	0.13	0.14
91ZrC/Si	0.03	0.02	0.02	0.02	0.03	0.03
93Ycr/Si	3.26	2.48	2.36	2.01	2.09	2.77
93NbC/Si	0.17	0.26	0.25	0.19	0.19	0.21
90Zr Cr	1408.30	1118.27	1034.77	1111.67	1446.13	1500.60
91Zr Cr	1408.30	1118.27	1034.77	1111.67	1446.13	1500.60
Y Cr	10887.94	8284.44	7880.36	6695.53	6965.37	9251.35
Nb Cr	2232.17	3358.39	3147.25	2455.68	2400.78	2733.62
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	795.23	781.04	776.35	780.68	796.88	799.20
Temp./w P Zr91 Corr.	795.23	781.04	776.35	780.68	796.88	799.20
Age Ma 206/238	327.28	160.00	211.11	242.37	200.53	374.81
Age Ma 208/232	139.89	100.61	86.05	105.79	86.03	88.47

Table D2, cont.

	WSW2AS-10.2I	WSW2AS-10.3I	WSW2AS_1.3I	WSW2AS_2.2I	WSW2AS_2.4I	WSW2AS_3.1I
F19	7637.24	7211.70	8120.31	8108.38	5872.16	5307.64
Na23	475.62	559.05	611.60	387.29	472.90	595.23
Mg26	837.73	894.47	930.71	806.73	845.31	791.11
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	277.27	312.00	290.94	193.32	396.90	423.72
K39	2.20	2.22	1.19	1.85	1.85	2.52
Ca43	190950.25	191458.12	197814.61	190990.39	189628.43	196812.39
AlO	9663.41	8645.39	8908.75	9197.62	8861.75	8628.08
Ti47	214599.32	217626.74	222402.61	213414.53	218165.74	224631.74
V51	146.92	140.93	150.85	181.42	226.92	120.45
Cr52	0.71	1.05	4.09	1.37	2.43	0.34
Mn55	2740.96	2834.61	2846.00	2290.18	1911.43	2831.72
Fe57	23202.58	21728.58	21160.61	20712.69	19613.76	21856.46
Sr86	47.19	47.72	48.04	46.65	47.63	49.82
Y89	10844.96	8258.04	7863.08	6686.75	6950.88	9208.70
Zr90	1400.72	1128.99	1068.97	1148.49	1457.03	1463.93
Zr91	1406.52	1120.79	1042.81	1120.32	1448.69	1491.98
Nb93	2232.58	3358.55	3147.98	2456.80	2401.62	2733.22
Ba137	8.42	6.63	25.00	7.95	6.45	11.88
La139	4042.33	5528.97	5151.79	4511.44	5704.38	5701.40
Ce140	16621.61	19605.91	18656.90	16223.33	20467.11	21397.86
Pr	2796.34	2771.42	2649.55	2358.50	3039.47	3278.33
Nd146	14312.25	12007.40	11513.72	10429.96	14365.03	15525.93
Sm147	4055.46	2632.14	2591.27	2256.15	3148.56	3767.28
Eu153	256.55	156.97	159.17	174.67	291.98	254.90
Gd157O	3806.18	2307.04	2346.67	1979.78	2633.62	3261.64
Tb159O	527.69	331.40	332.31	272.35	334.24	435.75
Dy163O	2805.17	1801.96	1850.07	1507.92	1760.36	2319.08
Ho165O	505.67	353.14	357.91	292.07	312.56	420.17
Er166O	1132.43	856.74	885.22	736.87	744.55	958.02
Tm169O	128.71	102.79	104.52	92.74	84.49	107.45
Yb172O	599.57	539.15	561.12	485.29	438.17	553.23
Lu175O	63.08	58.92	62.85	54.51	52.35	57.46
Hf178O	62.72	64.15	71.61	58.91	64.04	74.22
Ta181O	163.89	272.26	267.84	177.00	223.65	247.30
Pb206	0.41	0.31	0.37	0.44	0.37	0.49
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	294.95	546.60	545.78	393.05	450.17	424.26
U238O	20.02	30.21	27.90	28.82	29.08	20.62
90ZrC ppm	1408.30	1118.27	1034.77	1111.67	1446.13	1500.60
91ZrC ppm	1408.30	1118.27	1034.77	1111.67	1446.13	1500.60
Ycr ppm	10887.94	8284.44	7880.36	6695.53	6965.37	9251.35
NbC ppm	2232.17	3358.39	3147.25	2455.68	2400.78	2733.62
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	795.23	781.04	776.35	780.68	796.88	799.20
Temp./w P	795.23	781.04	776.35	780.68	796.88	799.20
Y89	10887.94	8284.44	7880.36	6695.53	6965.37	9251.35
Sum REE	51653.04	49053.93	47223.05	41375.58	53376.85	58038.50
Al+Fe	32865.99	30373.96	30069.36	29910.31	28475.50	30484.54
Sm/La	1.00	0.48	0.50	0.50	0.55	0.66
Yb/Gd	0.16	0.23	0.24	0.25	0.17	0.17
Th/U	14.73	18.09	19.57	13.64	15.48	20.58
Y/Nb	4.86	2.46	2.50	2.72	2.89	3.37
Zr/Hf	22.33	17.60	14.93	19.50	22.75	19.72
Nb/Ta	13.62	12.34	11.75	13.88	10.74	11.05

Table D2, cont.

	WSW2AS-10.2I	**WSW2AS-10.3I**	**WSW2AS_1.3I**	**WSW2AS_2.2I**	**WSW2AS_2.4I**	**WSW2AS_3.1I**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	12671.88	17332.18	16149.81	14142.44	17882.06	17872.74
Ce Ch (0.82)	20270.26	23909.65	22752.31	19784.55	24959.88	26094.95
Pr Ch (0.121)	23110.22	22904.26	21897.08	19491.75	25119.55	27093.66
Nd Ch (0.615)	23271.95	19524.23	18721.50	16959.29	23357.77	25245.42
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	20277.31	13160.69	12956.33	11280.76	15742.80	18836.39
Eu Ch (0.076)	3375.70	2065.34	2094.34	2298.31	3841.81	3353.99
Gd Ch (0.267)	14255.35	8640.59	8789.01	7414.90	9863.76	12215.86
Tb Ch (0.0493)	10703.69	6722.09	6740.58	5524.33	6779.65	8838.73
Dy Ch (0.33)	8500.52	5460.49	5606.28	4569.44	5334.42	7027.52
Ho Ch (0.0755)	6697.55	4677.41	4740.53	3868.48	4139.92	5565.15
Er Ch (0.216)	5242.74	3966.38	4098.25	3411.42	3446.97	4435.27
Tm Ch (0.0329)	3912.20	3124.22	3176.78	2818.73	2568.05	3265.90
Yb Ch (0.221)	2712.98	2439.58	2539.00	2195.89	1982.66	2503.29
Lu Ch (0.033)	1911.44	1785.47	1904.44	1651.87	1586.28	1741.19
	1.06	1.06	1.06	1.06	**1.04**	1.06
	0.20	0.19	0.20	0.25	**0.31**	0.22
Ca Site Total ppm	62812.97	57888.78	55659.81	48484.20	60806.97	67692.07
Ti Site Total ppm	36873.54	35339.90	34780.70	33934.31	32851.20	35124.01
Ti/Ca Site Substitution	0.59	0.61	0.62	0.70	0.54	0.52
Ti/Ti Site All Wt%	0.85	0.86	0.86	0.86	0.87	0.86
Ca/Ca site	0.75	0.77	0.78	0.80	0.76	0.74

Table D2, cont.

Element	WSW2AS_11.1GI	WSW2AS_12.DI	WSW2AS_1.4E	WSW2AS_2.3E	WSW2AS_3.3E	WSW2AS-10.4E
F19	0.16651	0.13481	0.12469	0.14566	0.14832	0.15585
Na23	1.40292	1.60444	1.20857	1.43679	1.25221	1.46588
Mg26	0.13025	0.11238	0.12919	0.11646	0.12533	0.12462
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00143	0.00196	0.00192	0.00159	0.00150	0.00165
K39	0.00599	0.00458	0.00427	0.00421	0.00826	0.01072
Ca43	0.53787	0.53275	0.54157	0.53863	0.53144	0.53195
AlO	0.03540	0.03200	0.03338	0.03218	0.03225	0.03349
Ti47	10.44066	10.48249	10.69504	10.37048	10.26175	10.49640
V51	0.08919	0.06869	0.16381	0.07123	0.07898	0.07218
Cr52	0.00033	0.00020	0.01768	0.00026	0.00030	0.00037
Mn55	1.61606	1.66569	1.00601	1.77967	1.65919	1.77204
Fe57	0.22328	0.19625	0.20534	0.21850	0.22748	0.22374
Sr86	0.06596	0.06455	0.06956	0.06667	0.06472	0.06505
Y89	2.27870	2.07213	2.24881	2.18776	2.21472	2.24771
Zr90	0.09030	0.07945	0.13212	0.07978	0.08759	0.08605
Zr91	0.01920	0.01686	0.02801	0.01631	0.01841	0.01822
Nb93	0.19636	0.27623	0.14579	0.22038	0.21295	0.22248
Ba137	0.00135	0.00104	0.00080	0.00092	0.00093	0.00117
La139	0.48937	0.54227	0.53198	0.47785	0.50042	0.49911
Ce140	1.58294	1.66994	1.77306	1.51664	1.59026	1.56510
Pr 141	0.34686	0.34810	0.42536	0.32601	0.34268	0.33529
Nd146	0.25984	0.24235	0.35677	0.23454	0.25222	0.24102
Sm147	0.06752	0.05777	0.09534	0.05832	0.06263	0.06027
Eu153	0.01944	0.01476	0.04183	0.01481	0.01705	0.01509
Gd157O	0.05088	0.04167	0.06871	0.04488	0.04681	0.04475
Tb159O	0.04283	0.03589	0.05265	0.03844	0.03961	0.03883
Dy163O	0.05350	0.04539	0.06196	0.04923	0.05009	0.05006
Ho165O	0.03531	0.03023	0.03916	0.03330	0.03317	0.03343
Er166O	0.02778	0.02432	0.02843	0.02666	0.02652	0.02692
Tm169O	0.00922	0.00839	0.00911	0.00918	0.00895	0.00939
Yb172O	0.00891	0.00800	0.00862	0.00898	0.00848	0.00911
Lu175O	0.00414	0.00387	0.00392	0.00426	0.00408	0.00423
Hf178O	0.00046	0.00045	0.00068	0.00052	0.00051	0.00048
Ta181O	0.00183	0.00287	0.00159	0.00188	0.00198	0.00192
Pb206	0.00007	0.00005	0.00003	0.00007	0.00007	0.00006
Pb208	0.00013	0.00018	0.00014	0.00012	0.00013	0.00014
Th232O	0.01674	0.01872	0.01794	0.01629	0.01676	0.01765
U238O	0.00134	0.00124	0.00144	0.00138	0.00145	0.00139
	38422.55	38422.56	39856.87	39856.88	39856.92	39884.09
Corr. 91Zr	2436.17	2183.74	3398.27	2026.77	2338.88	2322.00
Corr. 90Zr	11166.88	10009.78	15576.93	9290.27	10720.90	10643.51
Corr. 89Y	290936.73	270264.26	274514.98	276466.81	284050.16	288599.51
Corr. 93Nb	25099.21	36074.94	17826.41	27924.04	27357.48	28602.81
90ZrC/Si	0.09	0.08	0.13	0.07	0.08	0.08
91ZrC/Si	0.02	0.02	0.03	0.02	0.02	0.02
93Ycr/Si	2.28	2.07	2.24	2.18	2.21	2.24
93NbC/Si	0.20	0.28	0.15	0.22	0.21	0.22
90Zr Cr	967.57	848.96	1410.36	811.79	924.14	916.88
91Zr Cr	967.57	848.96	1410.36	811.79	924.14	916.88
Y Cr	7588.94	6900.54	7482.48	7272.65	7371.14	7484.40
Nb Cr	2506.11	3525.80	1859.95	2811.81	2717.53	2839.41
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	772.33	764.58	795.32	761.95	769.59	769.12
Temp./w P Zr91 Corr.	772.33	764.58	795.32	761.95	769.59	769.12
Age Ma 206/238	225.70	183.00	90.30	241.05	232.28	196.89
Age Ma 208/232	93.88	118.80	95.75	91.31	93.25	99.43

Table D2, cont.

	WSW2AS_11.1GI	WSW2AS_12.DI	WSW2AS_1.4E	WSW2AS_2.3E	WSW2AS_3.3E	WSW2AS-10.4E
F19	10706.11	8667.92	8017.46	9365.25	9536.34	10020.69
Na23	429.57	491.27	370.06	439.94	383.42	448.85
Mg26	905.62	781.33	898.26	809.70	871.39	866.48
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	172.77	237.04	232.00	192.48	180.80	199.77
K39	1.88	1.44	1.34	1.32	2.59	3.37
Ca43	192892.13	191054.93	194217.08	193164.27	190585.70	190767.39
AlO	9964.94	9009.49	9397.15	9059.15	9077.99	9426.78
Ti47	214551.50	215411.02	219778.94	213109.32	210874.98	215696.78
V51	139.60	107.51	256.38	111.49	123.61	112.98
Cr52	0.71	0.44	38.39	0.57	0.65	0.80
Mn55	3012.26	3104.77	1875.15	3317.23	3092.65	3303.01
Fe57	22540.99	19812.64	20730.06	22059.26	22965.71	22587.91
Sr86	46.69	45.69	49.24	47.19	45.81	46.04
Y89	7557.91	6872.76	7458.77	7256.28	7345.71	7455.13
Zr90	959.75	844.36	1404.14	847.97	930.90	914.56
Zr91	965.73	847.88	1408.90	820.29	925.73	916.34
Nb93	2505.98	3525.25	1860.53	2812.49	2717.63	2839.23
Ba137	9.08	7.00	5.41	6.22	6.25	7.86
La139	4130.52	4576.98	4490.14	4033.23	4223.75	4212.70
Ce140	15212.56	16048.74	17039.69	14575.40	15282.90	15041.18
Pr	2163.63	2171.35	2653.27	2033.59	2137.56	2091.42
Nd146	9359.15	8729.02	12850.47	8447.73	9084.78	8681.24
Sm147	2122.29	1815.59	2996.65	1833.01	1968.54	1894.20
Eu153	128.12	97.27	275.69	97.62	112.34	99.48
Gd157O	1956.90	1602.69	2642.51	1726.15	1800.25	1721.11
Tb159O	279.55	234.26	343.70	250.92	258.54	253.45
Dy163O	1595.75	1353.77	1848.27	1468.40	1494.00	1493.18
Ho165O	315.78	270.34	350.25	297.80	296.63	299.00
Er166O	816.18	714.39	835.15	783.34	779.02	791.04
Tm169O	99.39	90.44	98.24	98.98	96.52	101.20
Yb172O	542.69	487.36	525.36	547.19	516.86	555.18
Lu175O	61.46	57.47	58.20	63.29	60.66	62.93
Hf178O	49.14	48.10	72.65	55.45	54.54	51.35
Ta181O	157.75	247.46	136.67	161.95	170.89	165.82
Pb206	0.39	0.30	0.17	0.43	0.44	0.36
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	368.59	412.34	395.11	358.69	369.18	388.59
U238O	27.66	25.53	29.74	28.42	29.88	28.74
90ZrC ppm	967.57	848.96	1410.36	811.79	924.14	916.88
91ZrC ppm	967.57	848.96	1410.36	811.79	924.14	916.88
Ycr ppm	7588.94	6900.54	7482.48	7272.65	7371.14	7484.40
NbC ppm	2506.11	3525.80	1859.95	2811.81	2717.53	2839.41
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	772.33	764.58	795.32	761.95	769.59	769.12
Temp./w P	772.33	764.58	795.32	761.95	769.59	769.12
Y89	7588.94	6900.54	7482.48	7272.65	7371.14	7484.40
Sum REE	38783.97	38249.69	47007.60	36256.64	38112.33	37297.29
Al+Fe	32505.93	28822.13	30127.21	31118.41	32043.70	32014.69
Sm/La	0.51	0.40	0.67	0.45	0.47	0.45
Yb/Gd	0.28	0.30	0.20	0.32	0.29	0.32
Th/U	13.33	16.15	13.28	12.62	12.36	13.52
Y/Nb	3.02	1.95	4.01	2.58	2.70	2.63
Zr/Hf	19.53	17.56	19.33	15.29	17.07	17.81
Nb/Ta	15.89	14.25	13.61	17.37	15.90	17.12

Table D2, cont.

	WSW2AS_11.1GI	WSW2AS_12.DI	WSW2AS_1.4E	WSW2AS_2.3E	WSW2AS_3.3E	WSW2AS-10.4E
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	12948.35	14347.91	14075.68	12643.36	13240.59	13205.97
Ce Ch (0.82)	18551.91	19571.63	20780.11	17774.87	18637.68	18342.90
Pr Ch (0.121)	17881.21	17945.05	21927.88	16806.49	17665.76	17284.44
Nd Ch (0.615)	15218.14	14193.53	20895.07	13736.14	14772.00	14115.84
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	10611.45	9077.94	14983.27	9165.03	9842.69	9471.00
Eu Ch (0.076)	1685.73	1279.90	3627.48	1284.46	1478.14	1308.90
Gd Ch (0.267)	7329.22	6002.60	9897.05	6464.98	6742.52	6446.09
Tb Ch (0.0493)	5670.33	4751.82	6971.60	5089.73	5244.29	5141.06
Dy Ch (0.33)	4835.61	4102.34	5600.82	4449.70	4527.27	4524.79
Ho Ch (0.0755)	4182.47	3580.68	4639.05	3944.37	3928.85	3960.22
Er Ch (0.216)	3778.63	3307.36	3866.46	3626.57	3606.56	3662.20
Tm Ch (0.0329)	3021.04	2748.94	2986.02	3008.42	2933.60	3075.91
Yb Ch (0.221)	2455.60	2205.27	2377.20	2475.99	2338.71	2512.12
Lu Ch (0.033)	1862.43	1741.66	1763.61	1918.00	1838.12	1906.97
	1.06	1.08	1.05	1.08	1.06	1.07
	0.19	0.17	0.30	0.17	0.18	0.17
Ca Site Total ppm	46738.13	45560.32	54891.21	43900.03	45857.10	45169.75
Ti Site Total ppm	36318.86	33595.25	33895.98	35108.33	36041.92	36099.43
Ti/Ca Site Substitution	0.78	0.74	0.62	0.80	0.79	0.80
Ti/Ti Site All Wt%	0.86	0.87	0.87	0.86	0.85	0.86
Ca/Ca site	0.80	0.81	0.78	0.81	0.81	0.81

Table D2, cont.

	WSW2AS-4.1E	WSW2AS-5.2E	WSW2AS-6.1E	WSW2AS-7.3E	WSW2AS-8.2E	WSW2AS-9.3E
Element						
F19	0.14746	0.10715	0.11133	0.13946	0.13612	0.13813
Na23	1.42386	1.91523	1.85965	1.24155	1.49093	1.63221
Mg26	0.13068	0.12701	0.13173	0.12188	0.11965	0.11717
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00169	0.00183	0.00204	0.00162	0.00138	0.00134
K39	0.01092	0.00504	0.00719	0.00644	0.00979	0.00648
Ca43	0.54115	0.53233	0.49923	0.51156	0.51582	0.54083
AlO	0.03172	0.03205	0.03336	0.03220	0.03111	0.03082
Ti47	10.58635	10.31678	10.18645	10.30006	10.19470	10.80651
V51	0.08411	0.05838	0.05936	0.07835	0.07601	0.07235
Cr52	0.00036	0.00011	0.00015	0.00043	0.00033	0.00041
Mn55	1.64113	1.81310	1.81712	1.60091	1.63263	1.76038
Fe57	0.22078	0.24107	0.24370	0.22148	0.20886	0.21078
Sr86	0.06653	0.06564	0.06442	0.06437	0.06342	0.06585
Y89	2.23858	3.98397	3.97962	2.23464	2.16598	2.21264
Zr90	0.09131	0.09191	0.10602	0.08543	0.08098	0.07928
Zr91	0.01884	0.01908	0.02267	0.01782	0.01717	0.01667
Nb93	0.22105	0.21664	0.22180	0.19334	0.21468	0.24244
Ba137	0.00123	0.00110	0.00112	0.00108	0.00107	0.00160
La139	0.49960	0.45259	0.45321	0.49978	0.49436	0.49763
Ce140	1.58715	1.67617	1.66770	1.60089	1.56470	1.59175
Pr 141	0.34667	0.43556	0.43338	0.34871	0.33875	0.33893
Nd146	0.25392	0.38593	0.37181	0.25872	0.24850	0.24213
Sm147	0.06383	0.13287	0.13023	0.06477	0.06279	0.06190
Eu153	0.01762	0.02104	0.02034	0.01711	0.01655	0.01549
Gd157O	0.04776	0.11016	0.10499	0.04839	0.04590	0.04560
Tb159O	0.04104	0.09522	0.09146	0.04099	0.03933	0.03868
Dy163O	0.05119	0.11480	0.10998	0.05185	0.04928	0.04942
Ho165O	0.03468	0.07016	0.06696	0.03459	0.03311	0.03339
Er166O	0.02730	0.04870	0.04708	0.02777	0.02591	0.02661
Tm169O	0.00913	0.01437	0.01406	0.00934	0.00881	0.00903
Yb172O	0.00889	0.01215	0.01151	0.00898	0.00821	0.00871
Lu175O	0.00406	0.00503	0.00470	0.00416	0.00391	0.00400
Hf178O	0.00055	0.00046	0.00061	0.00054	0.00048	0.00051
Ta181O	0.00200	0.00243	0.00271	0.00176	0.00198	0.00229
Pb206	0.00007	0.00007	0.00007	0.00006	0.00007	0.00007
Pb208	0.00017	0.00013	0.00016	0.00017	0.00020	0.00015
Th232O	0.01770	0.01292	0.01336	0.01798	0.01715	0.01664
U238O	0.00144	0.00089	0.00096	0.00148	0.00135	0.00138
	39856.99	39884.00	39884.01	39884.03	39884.04	39884.05
Corr. 91Zr	2352.88	2324.75	2926.81	2274.73	2263.25	2106.24
Corr. 90Zr	10785.10	10656.15	13415.87	10426.88	10374.22	9654.54
Corr. 89Y	283443.86	492104.66	516395.99	288520.85	287553.21	282273.53
Corr. 93Nb	28059.80	26787.31	28794.78	25010.06	28535.43	30977.17
90ZrC/Si	0.08	0.09	0.10	0.08	0.08	0.08
91ZrC/Si	0.02	0.02	0.02	0.02	0.02	0.02
93Ycr/Si	2.23	3.98	3.98	2.23	2.16	2.21
93NbC/Si	0.22	0.22	0.22	0.19	0.21	0.24
90Zr Cr	940.69	954.22	1144.55	892.54	864.42	836.85
91Zr Cr	940.69	954.22	1144.55	892.54	864.42	836.85
Y Cr	7442.53	13265.95	13262.74	7435.04	7213.03	7365.76
Nb Cr	2820.31	2764.19	2830.88	2467.05	2739.95	3094.19
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	770.65	771.50	782.45	767.53	765.64	763.73
Temp./w P Zr91 Corr.	770.65	771.50	782.45	767.53	765.64	763.73
Age Ma 206/238	230.50	381.21	336.99	196.19	221.99	245.11
Age Ma 208/232	119.60	123.79	144.26	118.22	140.99	109.03

Table D2, cont.

	WSW2AS-4.1E	WSW2AS-5.2E	WSW2AS-6.1E	WSW2AS-7.3E	WSW2AS-8.2E	WSW2AS-9.3E
F19	9480.99	6889.69	7158.17	8966.70	8751.93	8881.55
Na23	435.98	586.44	569.42	380.16	456.52	499.78
Mg26	908.56	883.10	915.86	847.38	831.93	814.65
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	204.33	221.48	246.18	195.86	165.99	161.66
K39	3.43	1.58	2.26	2.02	3.07	2.04
Ca43	194067.11	190903.13	179033.01	183457.95	184984.88	193952.99
AlO	8930.64	9023.12	9392.18	9065.91	8759.16	8676.93
Ti47	217545.40	212005.66	209327.54	211662.16	209497.05	222069.45
V51	131.64	91.37	92.91	122.63	118.97	113.23
Cr52	0.78	0.25	0.33	0.93	0.72	0.89
Mn55	3059.01	3379.54	3387.04	2984.03	3043.15	3281.28
Fe57	22289.12	24337.10	24603.15	22359.26	21085.80	21279.42
Sr86	47.09	46.46	45.59	45.56	44.89	46.61
Y89	7424.84	13213.88	13199.48	7411.78	7184.03	7338.80
Zr90	970.46	976.84	1126.76	907.96	860.67	842.61
Zr91	947.69	959.54	1140.37	896.16	863.54	838.20
Nb93	2820.95	2764.70	2830.56	2467.43	2739.72	3094.04
Ba137	8.27	7.41	7.54	7.25	7.22	10.81
La139	4216.86	3820.07	3825.29	4218.34	4172.62	4200.21
Ce140	15253.09	16108.55	16027.13	15385.09	15037.29	15297.29
Pr	2162.46	2716.91	2703.33	2175.19	2113.02	2114.13
Nd146	9145.88	13900.73	13392.02	9318.76	8950.79	8721.44
Sm147	2006.33	4176.04	4093.24	2035.82	1973.64	1945.54
Eu153	116.12	138.66	134.03	112.77	109.10	102.08
Gd157O	1836.90	4236.73	4038.00	1860.94	1765.28	1753.93
Tb159O	267.87	621.51	597.02	267.58	256.73	252.46
Dy163O	1526.96	3424.32	3280.51	1546.52	1469.99	1474.07
Ho165O	310.13	627.45	598.88	309.34	296.11	298.65
Er166O	802.08	1430.87	1383.09	815.86	761.24	781.69
Tm169O	98.41	154.89	151.60	100.67	94.95	97.34
Yb172O	541.30	740.29	700.97	547.05	500.34	530.50
Lu175O	60.28	74.69	69.85	61.80	58.16	59.51
Hf178O	59.22	49.57	65.17	57.79	51.75	54.84
Ta181O	172.64	209.71	233.78	151.72	170.63	197.74
Pb206	0.43	0.44	0.42	0.38	0.39	0.44
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	389.85	284.45	294.32	395.96	377.64	366.36
U238O	29.67	18.42	19.85	30.51	27.84	28.47
90ZrC ppm	940.69	954.22	1144.55	892.54	864.42	836.85
91ZrC ppm	940.69	954.22	1144.55	892.54	864.42	836.85
Ycr ppm	7442.53	13265.95	13262.74	7435.04	7213.03	7365.76
NbC ppm	2820.31	2764.19	2830.88	2467.05	2739.95	3094.19
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	770.65	771.50	782.45	767.53	765.64	763.73
Temp./w P	770.65	771.50	782.45	767.53	765.64	763.73
Y89	7442.53	13265.95	13262.74	7435.04	7213.03	7365.76
Sum REE	38344.65	52171.71	50994.97	38755.73	37559.26	37628.85
Al+Fe	31219.76	33360.22	33995.33	31425.16	29844.97	29956.35
Sm/La	0.48	1.09	1.07	0.48	0.47	0.46
Yb/Gd	0.29	0.17	0.17	0.29	0.28	0.30
Th/U	13.14	15.45	14.83	12.98	13.57	12.87
Y/Nb	2.63	4.78	4.66	3.00	2.62	2.37
Zr/Hf	16.39	19.70	17.29	15.71	16.63	15.36
Nb/Ta	16.34	13.18	12.11	16.26	16.06	15.65

Table D2, cont.

	WSW2AS-4.1E	**WSW2AS-5.2E**	**WSW2AS-6.1E**	**WSW2AS-7.3E**	**WSW2AS-8.2E**	**WSW2AS-9.3E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	13219.01	11975.15	11991.51	13223.65	13080.32	13166.80
Ce Ch (0.82)	18601.33	19644.57	19545.28	18762.30	18338.16	18655.23
Pr Ch (0.121)	17871.56	22453.83	22341.61	17976.75	17462.99	17472.15
Nd Ch (0.615)	14871.35	22602.81	21775.64	15152.46	14554.13	14181.20
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	10031.65	20880.22	20466.21	10179.12	9868.22	9727.72
Eu Ch (0.076)	1527.88	1824.44	1763.57	1483.80	1435.47	1343.21
Gd Ch (0.267)	6879.77	15867.91	15123.58	6969.82	6611.55	6569.03
Tb Ch (0.0493)	5433.37	12606.78	12109.94	5427.52	5207.50	5120.95
Dy Ch (0.33)	4627.15	10376.74	9940.93	4686.42	4454.51	4466.87
Ho Ch (0.0755)	4107.63	8310.58	7932.14	4097.18	3921.93	3955.69
Er Ch (0.216)	3713.31	6624.39	6403.21	3777.14	3524.26	3618.94
Tm Ch (0.0329)	2991.04	4707.87	4607.94	3060.00	2885.97	2958.62
Yb Ch (0.221)	2449.32	3349.71	3171.83	2475.36	2263.98	2400.46
Lu Ch (0.033)	1826.57	2263.28	2116.76	1872.64	1762.56	1803.24
	1.07	1.07	**1.08**	1.07	1.07	1.07
	0.18	0.10	**0.10**	0.18	0.18	0.17
Ca Site Total ppm	46189.00	65688.46	64508.62	46593.98	45148.78	45362.48
Ti Site Total ppm	35375.47	37452.66	38344.84	35133.62	33787.43	34259.70
Ti/Ca Site Substitution	0.77	0.57	0.59	0.75	0.75	0.76
Ti/Ti Site All Wt%	0.86	0.85	0.85	0.86	0.86	0.87
Ca/Ca site	0.81	0.74	0.74	0.80	0.80	0.81

Table D3. SHRIMP-RG trace element analyses of sphene grains from WSW2B.

	WSW2B-1.1C	**WSW2B-2.1C**	**WSW2B-3.1C**	**WSW2B-4.1C**	**WSW2B-5.2C**	**WSW2BS-6.1C**	**WSW2BS-7.3DC**	**WSW2BS-8.2DC**
Element								
F19	0.08699	0.12643	0.14416	0.10329	0.11957	0.11313	0.12159	0.12156
Na23	2.43654	1.81840	1.33008	1.96475	1.31266	1.81446	1.81383	1.92054
Mg26	0.13119	0.15576	0.12774	0.13545	0.14103	0.14699	0.11640	0.13185
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00269	0.00221	0.00183	0.00178	0.00220	0.00280	0.00226	0.00287
K39	0.00937	0.00673	0.00957	0.00871	0.00576	0.00488	0.00605	0.00512
Ca43	0.53595	0.53007	0.55618	0.54268	0.55425	0.52702	0.53604	0.56292
AlO	0.03222	0.03869	0.03411	0.03520	0.03510	0.03577	0.02976	0.03191
Ti47	10.66086	10.24670	10.70195	10.73699	10.72176	10.33066	10.43267	10.87574
V51	0.05594	0.05953	0.11655	0.06607	0.19131	0.12875	0.07357	0.08068
Cr52	0.00009	0.00015	0.00051	0.00019	0.00339	0.00049	0.00028	0.00041
Mn55	1.82099	1.78131	1.33639	1.66310	0.94062	1.32237	1.68545	1.72238
Fe57	0.24875	0.28280	0.22820	0.25176	0.22235	0.23212	0.21207	0.22104
Sr86	0.06693	0.06362	0.06830	0.06622	0.07056	0.06518	0.06516	0.06876
Y89	5.10166	5.64166	2.04946	4.41741	2.83517	3.21328	2.33905	2.51056
Zr90	0.15755	0.14002	0.12150	0.11858	0.16040	0.16704	0.09101	0.09720
Zr91	0.03337	0.02994	0.02545	0.02475	0.03387	0.03547	0.01884	0.02016
Nb93	0.23243	0.14988	0.22077	0.16250	0.13072	0.16416	0.26710	0.27349
Ba137	0.00149	0.00173	0.00137	0.00156	0.00165	0.00092	0.00115	0.00187
La139	0.42334	0.35439	0.59509	0.43041	0.51781	0.51032	0.56969	0.65537
Ce140	1.68270	1.50426	1.83671	1.68332	1.82914	1.86837	1.78319	2.02537
Pr 141	0.47036	0.45722	0.39478	0.47488	0.47570	0.49597	0.37907	0.43071
Nd146	0.44852	0.45225	0.28853	0.45159	0.43626	0.46659	0.27624	0.31459
Sm147	0.18135	0.19780	0.06797	0.17568	0.13230	0.15723	0.06808	0.07734
Eu153	0.02791	0.02995	0.02472	0.03074	0.05925	0.05347	0.01766	0.02022
Gd157O	0.15489	0.17436	0.04780	0.14542	0.09708	0.11582	0.04962	0.05550
Tb159O	0.13541	0.15231	0.03925	0.12365	0.07392	0.09032	0.04229	0.04623
Dy163O	0.15951	0.17932	0.04862	0.14199	0.08345	0.10167	0.05327	0.05872
Ho165O	0.09295	0.10608	0.03215	0.08238	0.04932	0.05840	0.03552	0.03905
Er166O	0.06156	0.06938	0.02524	0.05338	0.03398	0.03812	0.02817	0.02976
Tm169O	0.01673	0.01920	0.00896	0.01479	0.01046	0.01105	0.00942	0.01007
Yb172O	0.01344	0.01519	0.00832	0.01168	0.00883	0.00905	0.00895	0.00966
Lu175O	0.00510	0.00594	0.00410	0.00458	0.00399	0.00371	0.00403	0.00427
Hf178O	0.00084	0.00069	0.00063	0.00057	0.00074	0.00069	0.00057	0.00057
Ta181O	0.00328	0.00171	0.00244	0.00182	0.00164	0.00211	0.00295	0.00317
Pb206	0.00006	0.00007	0.00007	0.00005	0.00006	0.00007	0.00007	0.00007
Pb208	0.00017	0.00014	0.00013	0.00015	0.00014	0.00016	0.00016	0.00020
Th232O	0.01308	0.01047	0.02166	0.01042	0.01684	0.01570	0.02111	0.02586
U238O	0.00070	0.00079	0.00166	0.00069	0.00131	0.00101	0.00135	0.00142
	39884.23	39884.26	39884.27	39884.29	39884.32	39884.39	38422.44	38422.46
Corr. 91Zr	3943.44	3582.59	2976.22	2880.50	3874.61	4535.23	2415.56	2428.17
Corr. 90Zr	18075.84	16421.79	13642.34	13203.56	17760.34	20788.48	11072.41	11130.19
Corr. 89Y	607547.71	678564.46	241795.28	520253.56	326731.06	413320.44	303865.54	306198.53
Corr. 93Nb	27700.89	18030.64	26119.28	19154.36	15088.11	21141.78	34780.89	33431.45
90ZrC/Si	0.15	0.14	0.12	0.11	0.15	0.16	0.08	0.09
91ZrC/Si	0.03	0.03	0.03	0.02	0.03	0.04	0.02	0.02
93Ycr/Si	5.10	5.64	2.04	4.41	2.83	3.21	2.33	2.50
93NbC/Si	0.23	0.15	0.22	0.16	0.13	0.16	0.27	0.27
90Zr Cr	1679.40	1511.53	1276.75	1239.96	1702.92	1786.96	941.57	1008.27
91Zr Cr	1679.40	1511.53	1276.75	1239.96	1702.92	1786.96	941.57	1008.27
Y Cr	16992.94	18802.66	6812.34	14708.31	9431.18	10695.73	7779.01	8350.42
Nb Cr	2965.79	1912.48	2816.87	2072.88	1667.13	2094.22	3408.33	3489.94
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	806.32	799.66	789.15	787.35	807.20	810.28	770.70	774.79
Temp./w P Zr91 Corr.	806.32	799.66	789.15	787.35	807.20	810.28	770.70	774.79
Age Ma 206/238	406.60	383.49	203.04	320.31	195.71	305.34	246.16	228.68
Age Ma 208/232	156.53	161.94	75.95	173.54	101.64	128.34	94.39	96.74

Table D3, cont.

	WSW2B-1.1C	WSW2B-2.1C	WSW2B-3.1C	WSW2B-4.1C	WSW2B-5.2C	WSW2BS-6.1C	WSW2BS-7.3DC	WSW2BS-8.2DC
F19	5593.00	8129.15	9268.90	6641.48	7688.04	7273.68	7817.57	7816.05
Na23	746.06	556.79	407.26	601.60	401.93	555.58	555.39	588.06
Mg26	912.15	1082.94	888.12	941.76	980.56	1022.03	809.28	916.72
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	325.12	267.11	221.45	214.71	265.36	337.49	273.34	346.62
K39	2.94	2.11	3.01	2.73	1.81	1.53	1.90	1.61
Ca43	192203.04	190094.23	199458.13	194618.28	198765.27	188999.41	192235.30	201874.75
AlO	9069.15	10892.11	9601.49	9910.31	9879.71	10069.36	8378.62	8981.94
Ti47	219076.47	210565.60	219920.80	220640.99	220327.91	212290.88	214387.15	223492.23
V51	87.55	93.18	182.41	103.40	299.43	201.52	115.14	126.28
Cr52	0.20	0.32	1.10	0.40	7.35	1.07	0.61	0.90
Mn55	3394.26	3320.29	2490.98	3099.95	1753.28	2464.84	3141.60	3210.44
Fe57	25112.85	28550.04	23038.38	25416.68	22447.68	23433.35	21409.52	22315.06
Sr86	47.37	45.03	48.34	46.87	49.94	46.14	46.12	48.67
Y89	16921.00	18712.05	6797.59	14651.50	9403.59	10657.71	7758.07	8326.94
Zr90	1674.51	1488.15	1291.34	1260.31	1704.81	1775.37	967.26	1033.05
Zr91	1678.25	1506.03	1280.18	1244.74	1703.37	1784.23	947.61	1014.09
Nb93	2966.27	1912.72	2817.49	2073.87	1668.27	2094.97	3408.66	3490.29
Ba137	10.03	11.68	9.23	10.48	11.09	6.21	7.76	12.63
La139	3573.20	2991.18	5022.86	3632.85	4370.52	4307.32	4808.47	5531.59
Ce140	16171.31	14456.45	17651.39	16177.23	17578.62	17955.69	17137.04	19464.49
Pr	2934.01	2852.00	2462.51	2962.17	2967.30	3093.70	2364.53	2686.66
Nd146	16155.15	16289.41	10392.44	16265.75	15713.66	16806.19	9949.69	11331.36
Sm147	5699.80	6217.07	2136.31	5521.76	4158.33	4941.66	2139.82	2430.75
Eu153	183.92	197.36	162.93	202.55	390.46	352.41	116.38	133.25
Gd157O	5956.93	6705.76	1838.54	5592.67	3733.49	4454.26	1908.35	2134.62
Tb159O	883.89	994.16	256.17	807.12	482.54	589.55	276.03	301.76
Dy163O	4757.97	5348.76	1450.18	4235.42	2489.08	3032.55	1589.02	1751.57
Ho165O	831.27	948.77	287.51	736.81	441.10	522.27	317.70	349.27
Er166O	1808.74	2038.45	741.69	1568.20	998.40	1120.05	827.60	874.31
Tm169O	180.32	206.91	96.54	159.42	112.79	119.09	101.57	108.52
Yb172O	818.66	925.33	506.91	711.40	537.80	551.33	545.24	588.40
Lu175O	75.80	88.33	60.91	68.07	59.29	55.09	59.95	63.50
Hf178O	89.79	74.21	67.52	61.05	79.16	73.95	60.53	60.81
Ta181O	282.50	147.81	210.29	156.95	141.45	181.78	254.20	273.05
Pb206	0.37	0.39	0.44	0.29	0.33	0.40	0.43	0.42
Pb208	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	288.11	230.49	477.00	229.43	370.96	345.68	464.99	569.58
U238O	14.52	16.27	34.18	14.29	26.99	20.88	27.82	29.38
90ZrC ppm	1679.40	1511.53	1276.75	1239.96	1702.92	1786.96	941.57	1008.27
91ZrC ppm	1679.40	1511.53	1276.75	1239.96	1702.92	1786.96	941.57	1008.27
Ycr ppm	16992.94	18802.66	6812.34	14708.31	9431.18	10695.73	7779.01	8350.42
NbC ppm	2965.79	1912.48	2816.87	2072.88	1667.13	2094.22	3408.33	3489.94
Estimated Temperature								
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	806.32	799.66	789.15	787.35	807.20	810.28	770.70	774.79
Temp./w P	806.32	799.66	789.15	787.35	807.20	810.28	770.70	774.79
Y89	16992.94	18802.66	6812.34	14708.31	9431.18	10695.73	7779.01	8350.42
Sum REE	60030.95	60259.94	43066.88	58641.43	54033.37	57901.18	42141.38	47750.04
Al+Fe	34182.00	39442.15	32639.86	35326.99	32327.39	33502.71	29788.14	31297.00
Sm/La	1.60	2.08	0.43	1.52	0.95	1.15	0.45	0.44
Yb/Gd	0.14	0.14	0.28	0.13	0.14	0.12	0.29	0.28
Th/U	19.84	14.16	13.95	16.06	13.74	16.56	16.72	19.39
Y/Nb	5.70	9.78	2.41	7.06	5.64	5.09	2.28	2.39
Zr/Hf	18.65	20.05	19.13	20.64	21.54	24.01	15.98	16.99
Nb/Ta	10.50	12.94	13.40	13.21	11.79	11.52	13.41	12.78

Table D3, cont.

Element	WSW2BS_10.3GC	WSW2BS_9.1GI	WSW2BS-7.4DI	WSW2BS-8.1DI	WSW2BS_10.2LI	WSW2BS-6.2I
F19	0.09647	0.14464	0.13096	0.17390	0.09059	0.10916
Na23	2.17870	1.26924	1.74970	1.38693	2.19081	1.75991
Mg26	0.13191	0.12230	0.12478	0.14303	0.13117	0.11595
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00233	0.00186	0.00162	0.00168	0.00197	0.00201
K39	0.00472	0.00604	0.00495	0.00514	0.00390	0.00727
Ca43	0.54719	0.55026	0.53229	0.54660	0.54506	0.55438
AlO	0.03461	0.03354	0.03222	0.03706	0.03574	0.03291
Ti47	10.73839	10.53864	10.17485	10.50898	10.71985	10.77719
V51	0.06541	0.13217	0.06590	0.09034	0.07796	0.11572
Cr52	0.00024	0.00089	0.00034	0.00033	0.00021	0.00061
Mn55	1.71437	1.22073	1.84222	1.67519	1.51237	1.28720
Fe57	0.24488	0.21645	0.21838	0.24874	0.25067	0.19763
Sr86	0.06827	0.06645	0.06465	0.06599	0.06761	0.06888
Y89	4.40778	1.98930	2.60082	2.34313	4.75461	2.00522
Zr90	0.11506	0.11799	0.07776	0.09634	0.13834	0.10421
Zr91	0.02381	0.02522	0.01625	0.02024	0.02947	0.02155
Nb93	0.16440	0.18755	0.23135	0.20196	0.15059	0.22995
Ba137	0.00184	0.00161	0.00199	0.00107	0.00110	0.00113
La139	0.43512	0.54468	0.48401	0.52130	0.42331	0.71368
Ce140	1.69736	1.71309	1.58321	1.64849	1.72317	2.12496
Pr 141	0.47944	0.37598	0.35067	0.36125	0.50778	0.45667
Nd146	0.45438	0.28796	0.26728	0.26981	0.51302	0.34016
Sm147	0.17597	0.06943	0.07398	0.06847	0.21436	0.07930
Eu153	0.03024	0.02665	0.01572	0.01861	0.04135	0.02861
Gd157O	0.14534	0.04901	0.05657	0.05111	0.17773	0.05535
Tb159O	0.12396	0.03884	0.04919	0.04318	0.14717	0.04343
Dy163O	0.14133	0.04742	0.06071	0.05392	0.16598	0.05107
Ho165O	0.08168	0.03063	0.04012	0.03621	0.09160	0.03210
Er166O	0.05361	0.02356	0.03089	0.02806	0.05758	0.02465
Tm169O	0.01467	0.00800	0.01013	0.00964	0.01558	0.00795
Yb172O	0.01177	0.00764	0.00943	0.00922	0.01181	0.00731
Lu175O	0.00458	0.00360	0.00437	0.00434	0.00470	0.00341
Hf178O	0.00053	0.00060	0.00044	0.00047	0.00063	0.00045
Ta181O	0.00196	0.00196	0.00217	0.00192	0.00224	0.00283
Pb206	0.00006	0.00004	0.00007	0.00006	0.00005	0.00007
Pb208	0.00013	0.00017	0.00016	0.00017	0.00012	0.00017
Th232O	0.01084	0.01810	0.01652	0.01879	0.01028	0.02218
U238O	0.00068	0.00149	0.00111	0.00168	0.00076	0.00131
	38422.53	38422.51	38422.45	38422.45	38422.52	39884.40
Corr. 91Zr	2849.85	3223.34	2087.69	2529.35	3525.41	2565.50
Corr. 90Zr	13063.07	14775.09	9569.51	11593.97	16159.70	11759.69
Corr. 89Y	535001.26	255425.27	338019.89	295486.67	572377.02	241709.69
Corr. 93Nb	19973.90	24114.76	30110.10	25512.04	18136.01	27807.52
90ZrC/Si	0.11	0.11	0.07	0.09	0.13	0.10
91ZrC/Si	0.02	0.03	0.02	0.02	0.03	0.02
93Ycr/Si	4.40	1.99	2.60	2.34	4.75	2.00
93NbC/Si	0.16	0.19	0.23	0.20	0.15	0.23
90Zr Cr	1190.05	1272.63	814.25	1016.33	1485.68	1076.64
91Zr Cr	1190.05	1272.63	814.25	1016.33	1485.68	1076.64
Y Cr	14672.58	6623.20	8658.52	7797.83	15841.83	6661.94
Nb Cr	2096.88	2393.56	2952.37	2577.14	1921.42	2933.78
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	784.83	788.95	762.13	775.27	798.57	778.74
Temp./w P Zr91 Corr.	784.83	788.95	762.13	775.27	798.57	778.74
Age Ma 206/238	397.78	130.79	299.39	166.67	311.91	244.99
Age Ma 208/232	147.75	115.54	119.26	109.36	149.71	94.42

Table D3, cont.

	WSW2BS_10.3GC	WSW2BS_9.1GI	WSW2BS-7.4DI	WSW2BS-8.1DI	WSW2BS_10.2LI	WSW2BS-6.2I
F19	6202.41	9299.76	8420.00	11181.43	5824.79	7018.60
Na23	667.11	388.64	535.75	424.67	670.82	538.88
Mg26	917.15	850.31	867.54	994.45	911.99	806.16
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	280.91	224.30	196.08	202.65	237.75	243.07
K39	1.48	1.90	1.56	1.61	1.22	2.28
Ca43	196235.49	197333.48	190889.91	196022.07	195469.88	198813.61
AlO	9742.19	9440.85	9068.99	10433.50	10060.63	9263.73
Ti47	220669.75	216564.82	209089.12	215955.36	220288.76	221466.90
V51	102.38	206.87	103.14	141.40	122.01	181.13
Cr52	0.53	1.94	0.73	0.71	0.46	1.32
Mn55	3195.51	2275.40	3433.82	3122.48	2818.99	2399.29
Fe57	24722.43	21851.43	22046.45	25112.18	25306.86	19952.26
Sr86	48.32	47.03	45.76	46.71	47.86	48.76
Y89	14619.55	6598.05	8626.32	7771.63	15769.93	6650.85
Zr90	1222.90	1254.02	826.45	1023.96	1470.29	1107.60
Zr91	1197.77	1268.25	817.12	1018.12	1482.06	1083.91
Nb93	2098.11	2393.51	2952.41	2577.41	1921.83	2934.55
Ba137	12.38	10.84	13.39	7.22	7.39	7.63
La139	3672.58	4597.35	4085.25	4400.02	3572.92	6023.74
Ce140	16312.22	16463.36	15215.15	15842.55	16560.21	20421.60
Pr	2990.62	2345.29	2187.36	2253.36	3167.41	2848.56
Nd146	16366.29	10372.09	9627.24	9718.20	18478.52	12252.18
Sm147	5530.83	2182.30	2325.16	2152.10	6737.51	2492.35
Eu153	199.27	175.63	103.63	122.66	272.48	188.52
Gd157O	5589.49	1884.80	2175.80	1965.56	6835.20	2128.75
Tb159O	809.12	253.54	321.05	281.88	960.65	283.48
Dy163O	4215.51	1414.41	1810.81	1608.48	4950.90	1523.43
Ho165O	730.49	273.97	358.81	323.86	819.23	287.08
Er166O	1575.09	692.25	907.65	824.29	1691.57	724.16
Tm169O	158.09	86.20	109.15	103.88	167.99	85.67
Yb172O	716.86	465.68	574.29	561.38	719.40	445.35
Lu175O	68.07	53.45	64.97	64.53	69.83	50.72
Hf178O	56.41	64.13	46.94	49.71	67.57	48.04
Ta181O	169.26	169.15	187.35	165.19	192.85	243.76
Pb206	0.35	0.25	0.43	0.36	0.31	0.42
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	238.68	398.51	363.87	413.72	226.39	488.56
U238O	14.07	30.70	22.88	34.55	15.61	26.92
90ZrC ppm	1190.05	1272.63	814.25	1016.33	1485.68	1076.64
91ZrC ppm	1190.05	1272.63	814.25	1016.33	1485.68	1076.64
Ycr ppm	14672.58	6623.20	8658.52	7797.83	15841.83	6661.94
NbC ppm	2096.88	2393.56	2952.37	2577.14	1921.42	2933.78
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	784.83	788.95	762.13	775.27	798.57	778.74
Temp./w P	784.83	788.95	762.13	775.27	798.57	778.74
Y89	14672.58	6623.20	8658.52	7797.83	15841.83	6661.94
Sum REE	58934.52	41260.32	39866.32	40222.76	65003.81	49755.58
Al+Fe	34464.62	31292.28	31115.45	35545.68	35367.49	29215.98
Sm/La	1.51	0.47	0.57	0.49	1.89	0.41
Yb/Gd	0.13	0.25	0.26	0.29	0.11	0.21
Th/U	16.96	12.98	15.90	11.98	14.50	18.15
Y/Nb	6.97	2.76	2.92	3.02	8.21	2.27
Zr/Hf	21.68	19.55	17.61	20.60	21.76	23.06
Nb/Ta	12.40	14.15	15.76	15.60	9.97	12.04

Table D3, cont.

	WSW2BS_10.3GC	WSW2BS_9.1GI	WSW2BS-7.4DI	WSW2BS-8.1DI	WSW2BS_10.2LI	WSW2BS-6.2I
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	11512.80	14411.76	12806.43	13793.17	11200.38	18883.20
Ce Ch (0.82)	19892.95	20077.26	18555.06	19320.19	20195.38	24904.39
Pr Ch (0.121)	24715.85	19382.55	18077.32	18622.78	26176.91	23541.78
Nd Ch (0.615)	26611.85	16865.19	15654.05	15801.95	30046.38	19922.24
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	27654.15	10911.50	11625.80	10760.50	33687.55	12461.77
Eu Ch (0.076)	2621.92	2310.97	1363.57	1613.93	3585.24	2480.46
Gd Ch (0.267)	20934.43	7059.16	8149.06	7361.66	25600.02	7972.85
Tb Ch (0.0493)	16412.09	5142.85	6512.24	5717.62	19485.77	5750.08
Dy Ch (0.33)	12774.28	4286.10	5487.30	4874.18	15002.73	4616.46
Ho Ch (0.0755)	9675.32	3628.70	4752.50	4289.53	10850.66	3802.41
Er Ch (0.216)	7292.08	3204.88	4202.09	3816.18	7831.35	3352.59
Tm Ch (0.0329)	4805.18	2620.06	3317.49	3157.50	5105.98	2604.07
Yb Ch (0.221)	3243.71	2107.16	2598.60	2540.17	3255.21	2015.14
Lu Ch (0.033)	2062.59	1619.63	1968.67	1955.49	2115.92	1536.96
Ce/Ce*	1.18	1.20	1.22	1.21	1.18	1.18
Eu/Eu*	0.11	0.26	0.14	0.18	0.12	0.25
Ca Site Total ppm	73806.82	48287.58	48879.39	48442.65	81015.75	56921.92
Ti Site Total ppm	38114.21	35381.90	35232.48	39504.07	39142.50	33732.38
Ti/Ca Site Substitution	0.52	0.73	0.72	0.82	0.48	0.59
Ti/Ti Site All Wt%	0.85	0.86	0.86	0.85	0.85	0.87
Ca/Ca site	0.73	0.80	0.80	0.80	0.71	0.78

Table D3, cont.

Element	WSW2B-5.1I	WSW2B-4.2I	WSW2B-3.2I	WSW2B-1.4I	WSW2B-2.3I	WSW2BS-6.3I
F19	0.08354	0.06275	0.12673	0.12199	0.10601	0.15435
Na23	1.81175	2.36391	1.78538	1.90047	1.89112	1.42719
Mg26	0.13560	0.13040	0.13156	0.13277	0.14167	0.13042
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00318	0.00302	0.00201	0.00174	0.00191	0.00129
K39	0.00616	0.00785	0.00824	0.00884	0.01099	0.00650
Ca43	0.55129	0.56083	0.54835	0.53116	0.53787	0.53415
AlO	0.03090	0.03391	0.03260	0.03363	0.03470	0.03404
Ti47	10.74729	11.02604	10.72992	10.33113	10.51710	10.34562
V51	0.17939	0.08362	0.08723	0.05989	0.05930	0.08776
Cr52	0.00249	0.00017	0.00044	0.00011	0.00020	0.00022
Mn55	0.93313	1.52837	1.63313	1.84940	1.89778	1.59674
Fe57	0.21120	0.25633	0.22572	0.25246	0.25798	0.22399
Sr86	0.07044	0.07023	0.06807	0.06491	0.06584	0.06334
Y89	2.65656	5.28282	2.41271	3.95502	4.23247	2.17854
Zr90	0.15431	0.16048	0.09780	0.09400	0.10439	0.09308
Zr91	0.03233	0.03369	0.02024	0.01922	0.02202	0.01965
Nb93	0.16898	0.20538	0.23325	0.19923	0.23235	0.21893
Ba137	0.00156	0.00161	0.00137	0.00115	0.00122	0.00115
La139	0.62438	0.52367	0.57533	0.44077	0.49417	0.49889
Ce140	2.12057	2.06434	1.83822	1.64724	1.79602	1.58244
Pr 141	0.53813	0.60118	0.40593	0.42699	0.46312	0.34309
Nd146	0.48491	0.60261	0.30356	0.37671	0.40584	0.25597
Sm147	0.14396	0.25014	0.07775	0.13129	0.13995	0.06411
Eu153	0.06215	0.04774	0.02217	0.02099	0.02206	0.01812
Gd157O	0.10079	0.20503	0.05752	0.10754	0.11442	0.04783
Tb159O	0.07600	0.16969	0.04861	0.09287	0.09879	0.04014
Dy163O	0.08420	0.18805	0.05948	0.11176	0.11994	0.05057
Ho165O	0.04886	0.10421	0.03971	0.06817	0.07418	0.03350
Er166O	0.03275	0.06431	0.02971	0.04747	0.05205	0.02666
Tm169O	0.00944	0.01703	0.01012	0.01401	0.01558	0.00898
Yb172O	0.00815	0.01322	0.00921	0.01172	0.01268	0.00868
Lu175O	0.00350	0.00463	0.00418	0.00473	0.00522	0.00399
Hf178O	0.00063	0.00084	0.00047	0.00052	0.00060	0.00051
Ta181O	0.00282	0.00320	0.00257	0.00204	0.00285	0.00204
Pb206	0.00007	0.00008	0.00006	0.00005	0.00010	0.00008
Pb208	0.00017	0.00016	0.00017	0.00016	0.00014	0.00013
Th232O	0.02233	0.01398	0.02093	0.01252	0.01549	0.01759
U238O	0.00110	0.00069	0.00147	0.00097	0.00104	0.00144
	39884.32	39884.29	39884.28	39884.23	39884.25	38422.41
Corr. 91Zr	3754.58	3713.68	2343.07	2316.87	2596.69	2499.64
Corr. 90Zr	17210.15	17022.71	10740.11	10620.04	11902.66	11457.78
Corr. 89Y	311271.30	588141.58	283078.75	485293.28	503708.54	279351.05
Corr. 93Nb	19845.39	22884.58	27432.20	24479.21	27673.01	28117.71
90ZrC/Si	0.15	0.15	0.09	0.09	0.10	0.09
91ZrC/Si	0.03	0.03	0.02	0.02	0.02	0.02
93Ycr/Si	2.65	5.27	2.41	3.95	4.23	2.17
93NbC/Si	0.17	0.21	0.23	0.20	0.23	0.22
90Zr Cr	1621.90	1691.17	1011.10	956.82	1106.71	987.97
91Zr Cr	1621.90	1691.17	1011.10	956.82	1106.71	987.97
Y Cr	8831.04	17590.33	8022.80	13162.61	14099.47	7251.49
Nb Cr	2155.21	2619.95	2976.03	2541.52	2965.09	2793.92
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	804.10	806.76	774.96	771.66	780.41	773.57
Temp./w P Zr91 Corr.	804.10	806.76	774.96	771.66	780.41	773.57
Age Ma 206/238	291.80	535.76	197.14	247.70	457.22	258.82
Age Ma 208/232	96.56	142.77	99.16	154.60	108.88	88.90

Table D3, cont.

	WSW2B-5.1I	WSW2B-4.2I	WSW2B-3.2I	WSW2B-1.4I	WSW2B-2.3I	WSW2BS-6.3I
F19	5371.31	4034.39	8148.39	7843.63	6816.08	9924.19
Na23	554.75	723.82	546.67	581.92	579.05	437.00
Mg26	942.77	906.63	914.72	923.15	984.98	906.81
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	383.87	364.62	242.08	210.08	230.48	156.12
K39	1.93	2.47	2.59	2.78	3.45	2.04
Ca43	197705.23	201123.69	196648.35	190483.56	192890.21	191558.51
AlO	8697.53	9546.27	9177.65	9466.53	9767.23	9582.60
Ti47	220852.55	226580.71	220495.63	212300.54	216122.30	212598.46
V51	280.78	130.88	136.52	93.73	92.81	137.35
Cr52	5.40	0.37	0.96	0.23	0.44	0.48
Mn55	1739.32	2848.81	3044.08	3447.21	3537.38	2976.26
Fe57	21322.06	25878.40	22787.79	25487.66	26044.36	22612.68
Sr86	49.86	49.71	48.18	45.94	46.61	44.84
Y89	8811.19	17521.87	8002.39	13117.88	14038.10	7225.72
Zr90	1640.03	1705.56	1039.44	999.08	1109.43	989.23
Zr91	1626.16	1694.55	1017.76	966.75	1107.35	988.27
Nb93	2156.50	2621.04	2976.66	2542.59	2965.18	2793.93
Ba137	10.53	10.81	9.23	7.72	8.23	7.75
La139	5270.02	4420.02	4856.00	3720.27	4171.00	4210.89
Ce140	20379.43	19839.04	17665.89	15830.52	17260.38	15207.83
Pr	3356.70	3750.02	2532.10	2663.48	2888.79	2140.12
Nd146	17465.99	21705.51	10934.06	13568.61	14617.88	9219.68
Sm147	4524.65	7862.09	2443.58	4126.52	4398.57	2015.15
Eu153	409.56	314.60	146.13	138.34	145.41	119.43
Gd157O	3876.50	7885.45	2212.35	4135.99	4400.49	1839.50
Tb159O	496.10	1107.64	317.27	606.23	644.82	261.99
Dy163O	2511.55	5609.13	1774.11	3333.60	3577.56	1508.54
Ho165O	436.97	931.97	355.17	609.67	663.44	299.60
Er166O	962.05	1889.53	872.77	1394.78	1529.18	783.38
Tm169O	101.72	183.62	109.07	151.02	167.94	96.85
Yb172O	496.56	805.47	561.37	713.91	772.25	528.49
Lu175O	52.08	68.82	62.13	70.26	77.55	59.22
Hf178O	67.44	89.88	50.67	55.44	63.85	54.06
Ta181O	242.70	275.65	221.65	176.23	245.82	175.91
Pb206	0.42	0.48	0.38	0.31	0.62	0.48
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	491.76	307.83	460.83	275.72	341.06	387.38
U238O	22.58	14.14	30.36	20.04	21.54	29.65
90ZrC ppm	1621.90	1691.17	1011.10	956.82	1106.71	987.97
91ZrC ppm	1621.90	1691.17	1011.10	956.82	1106.71	987.97
Ycr ppm	8831.04	17590.33	8022.80	13162.61	14099.47	7251.49
NbC ppm	2155.21	2619.95	2976.03	2541.52	2965.09	2793.92
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	804.10	806.76	774.96	771.66	780.41	773.57
Temp./w P	804.10	806.76	774.96	771.66	780.41	773.57
Y89	8831.04	17590.33	8022.80	13162.61	14099.47	7251.49
Sum REE	60339.90	76372.90	44842.00	51063.20	55315.27	38290.67
Al+Fe	30019.59	35424.67	31965.43	34954.19	35811.59	32195.28
Sm/La	0.86	1.78	0.50	1.11	1.05	0.48
Yb/Gd	0.13	0.10	0.25	0.17	0.18	0.29
Th/U	21.78	21.76	15.18	13.76	15.83	13.07
Y/Nb	4.09	6.69	2.69	5.16	4.73	2.59
Zr/Hf	24.32	18.98	20.52	18.02	17.38	18.30
Nb/Ta	8.89	9.51	13.43	14.43	12.06	15.88

Table D3, cont.

	WSW2B-5.1I	WSW2B-4.2I	WSW2B-3.2I	WSW2B-1.4I	WSW2B-2.3I	WSW2BS-6.3I
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	16520.43	13855.87	15222.58	11662.28	13075.24	13200.28
Ce Ch (0.82)	24852.97	24193.95	21543.76	19305.52	21049.24	18546.13
Pr Ch (0.121)	27741.33	30991.91	20926.41	22012.22	23874.30	17686.98
Nd Ch (0.615)	28399.98	35293.51	17778.96	22062.78	23768.91	14991.36
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	22623.25	39310.44	12217.92	20632.59	21992.84	10075.75
Eu Ch (0.076)	5388.93	4139.42	1922.80	1820.26	1913.32	1571.48
Gd Ch (0.267)	14518.74	29533.51	8285.97	15490.61	16481.22	6889.49
Tb Ch (0.0493)	10062.96	22467.29	6435.42	12296.72	13079.54	5314.16
Dy Ch (0.33)	7610.77	16997.38	5376.09	10101.83	10841.11	4571.33
Ho Ch (0.0755)	5787.72	12344.01	4704.17	8075.07	8787.34	3968.25
Er Ch (0.216)	4453.94	8747.81	4040.58	6457.30	7079.56	3626.75
Tm Ch (0.0329)	3091.87	5581.04	3315.26	4590.22	5104.53	2943.70
Yb Ch (0.221)	2246.88	3644.67	2540.15	3230.37	3494.35	2391.37
Lu Ch (0.033)	1578.25	2085.38	1882.74	2129.21	2350.07	1794.54
Ce/Ce*	1.16	1.17	1.21	1.20	1.19	1.21
Eu/Eu*	0.30	0.12	0.19	0.10	0.10	0.19
Ca Site Total ppm	69665.43	94216.75	53335.57	64476.84	69715.98	45933.42
Ti Site Total ppm	34412.45	40248.05	36391.33	38821.49	40289.13	36346.23
Ti/Ca Site Substitution	0.49	0.43	0.68	0.60	0.58	0.79
Ti/Ti Site All Wt%	0.87	0.85	0.86	0.85	0.84	0.85
Ca/Ca site	0.74	0.68	0.79	0.75	0.73	0.81

Table D3, cont.

Element	WSW2BS-7.2GI	WSW2B-1.2E	WSW2B-1.3E	WSW2B-2.2E	WSW2B-3.3E	WSW2B-4.3E
F19	0.12270	0.10815	0.06260	0.09074	0.08438	0.10655
Na23	1.86603	1.71196	2.71078	1.56564	2.02581	1.81302
Mg26	0.12997	0.12743	0.13280	0.12072	0.11999	0.11402
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00180	0.00223	0.00312	0.00200	0.00218	0.00207
K39	0.00432	0.01030	0.00977	0.01450	0.00758	0.00870
Ca43	0.54724	0.52722	0.56539	0.53735	0.52749	0.54876
AlO	0.03490	0.03723	0.03388	0.03505	0.03526	0.03485
Ti47	10.41576	10.31301	11.52813	10.51974	10.59410	10.71412
V51	0.06650	0.08494	0.08567	0.08727	0.07495	0.07552
Cr52	0.00016	0.00019	0.00017	0.00021	0.00036	0.00015
Mn55	1.71415	1.44945	1.54897	1.45669	1.53931	1.58216
Fe57	0.25374	0.26499	0.25888	0.24552	0.23507	0.24464
Sr86	0.06805	0.06437	0.07201	0.06747	0.06705	0.06804
Y89	4.39248	4.92491	5.44787	4.83611	4.51413	4.21544
Zr90	0.11823	0.13550	0.15136	0.12708	0.11723	0.12209
Zr91	0.02480	0.02850	0.03238	0.02707	0.02437	0.02683
Nb93	0.15611	0.12386	0.20245	0.13750	0.15122	0.17177
Ba137	0.00128	0.00098	0.00194	0.00118	0.00153	0.00130
La139	0.42760	0.38542	0.52251	0.39389	0.40998	0.41333
Ce140	1.66808	1.59173	2.08870	1.64638	1.65569	1.61518
Pr 141	0.45883	0.47256	0.60585	0.49753	0.48528	0.44533
Nd146	0.42219	0.48389	0.60365	0.50812	0.48251	0.41789
Sm147	0.15685	0.20720	0.25174	0.21842	0.19908	0.15850
Eu153	0.02701	0.03947	0.04769	0.04335	0.03897	0.03020
Gd157O	0.13121	0.17413	0.20045	0.18081	0.16060	0.13127
Tb159O	0.11319	0.14688	0.16583	0.15094	0.13423	0.11352
Dy163O	0.13117	0.16746	0.18613	0.16844	0.15160	0.13185
Ho165O	0.07885	0.09409	0.10145	0.09288	0.08441	0.07750
Er166O	0.05308	0.05908	0.06365	0.05761	0.05362	0.05188
Tm169O	0.01488	0.01582	0.01644	0.01575	0.01454	0.01472
Yb172O	0.01205	0.01253	0.01287	0.01160	0.01135	0.01156
Lu175O	0.00484	0.00486	0.00486	0.00443	0.00455	0.00466
Hf178O	0.00054	0.00062	0.00061	0.00053	0.00050	0.00056
Ta181O	0.00158	0.00153	0.00299	0.00162	0.00183	0.00196
Pb206	0.00005	0.00005	0.00009	0.00005	0.00006	0.00007
Pb208	0.00015	0.00011	0.00017	0.00011	0.00015	0.00016
Th232O	0.01142	0.01023	0.01407	0.00940	0.00940	0.01122
U238O	0.00082	0.00074	0.00067	0.00062	0.00060	0.00083
	38422.43	39884.24	39884.24	39884.26	39884.27	39884.30
Corr. 91Zr	3022.30	3460.79	3656.70	3155.22	2908.88	3154.15
Corr. 90Zr	13853.56	15863.49	16761.50	14462.85	13333.66	14457.93
Corr. 89Y	540808.16	603693.56	618441.89	567356.80	545743.91	494723.23
Corr. 93Nb	19233.62	15188.69	22990.58	16136.08	18295.76	20155.75
90ZrC/Si	0.11	0.13	0.15	0.12	0.11	0.12
91ZrC/Si	0.02	0.03	0.03	0.03	0.02	0.03
93Ycr/Si	4.39	4.92	5.44	4.83	4.51	4.22
93NbC/Si	0.16	0.12	0.20	0.14	0.15	0.17
90Zr Cr	1244.72	1431.71	1634.52	1364.56	1219.73	1365.21
91Zr Cr	1244.72	1431.71	1634.52	1364.56	1219.73	1365.21
Y Cr	14628.07	16402.32	18155.47	16114.85	15029.18	14063.31
Nb Cr	1991.42	1579.67	2583.55	1754.39	1928.66	2193.22
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	787.58	796.26	804.60	793.26	786.34	793.29
Temp./w P Zr91 Corr.	787.58	796.26	804.60	793.26	786.34	793.29
Age Ma 206/238	283.20	336.87	597.24	357.47	466.27	399.05
Age Ma 208/232	158.06	132.89	150.85	145.62	198.15	180.78

Table D3, cont.

	WSW2BS-7.2GI	WSW2B-1.2E	WSW2B-1.3E	WSW2B-2.2E	WSW2B-3.3E	WSW2B-4.3E
F19	7889.36	6953.39	4025.07	5834.14	5425.36	6850.56
Na23	571.37	524.19	830.03	479.39	620.29	555.14
Mg26	903.68	885.98	923.36	839.37	834.26	792.76
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	217.33	269.12	376.31	241.58	263.64	249.84
K39	1.36	3.23	3.07	4.55	2.38	2.73
Ca43	196250.19	189070.63	202762.23	192704.52	189168.37	196797.63
AlO	9825.24	10481.66	9536.25	9867.86	9926.65	9809.95
Ti47	214039.79	211928.37	236898.51	216176.52	217704.62	220170.91
V51	104.08	132.94	134.09	136.58	117.31	118.21
Cr52	0.34	0.41	0.36	0.45	0.77	0.33
Mn55	3195.10	2701.71	2887.21	2715.21	2869.21	2949.08
Fe57	25616.24	26752.29	26135.64	24786.87	23731.94	24697.44
Sr86	48.17	45.56	50.97	47.75	47.46	48.16
Y89	14568.83	16334.75	18069.31	16040.24	14972.31	13981.61
Zr90	1256.52	1440.13	1608.67	1350.60	1245.91	1297.57
Zr91	1247.50	1433.69	1628.44	1361.28	1225.88	1349.31
Nb93	1992.23	1580.74	2583.61	1754.77	1929.82	2192.12
Ba137	8.59	6.61	13.09	7.95	10.30	8.77
La139	3609.15	3253.12	4410.25	3324.57	3460.38	3488.65
Ce140	16030.86	15297.09	20073.08	15822.27	15911.74	15522.39
Pr	2862.06	2947.68	3779.15	3103.46	3027.05	2777.86
Nd146	15206.95	17429.13	21742.77	18301.95	17379.54	15051.96
Sm147	4929.87	6512.23	7912.15	6865.01	6257.05	4981.59
Eu153	178.02	260.12	314.29	285.70	256.83	199.06
Gd157O	5046.21	6696.88	7709.30	6953.80	6176.51	5048.41
Tb159O	738.80	958.72	1082.41	985.26	876.15	740.96
Dy163O	3912.44	4994.92	5551.96	5024.34	4522.07	3932.94
Ho165O	705.25	841.51	907.31	830.72	754.96	693.11
Er166O	1559.55	1735.67	1869.89	1692.61	1575.35	1524.17
Tm169O	160.41	170.49	177.16	169.75	156.70	158.72
Yb172O	734.38	763.29	783.97	706.42	691.16	703.99
Lu175O	71.98	72.23	72.26	65.78	67.59	69.21
Hf178O	58.06	66.68	64.71	56.78	52.94	60.29
Ta181O	136.60	131.87	257.66	139.92	157.44	168.83
Pb206	0.30	0.33	0.52	0.29	0.37	0.43
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	251.48	225.33	309.81	207.01	207.07	247.11
U238O	16.81	15.33	13.84	12.86	12.47	17.05
90ZrC ppm	1244.72	1431.71	1634.52	1364.56	1219.73	1365.21
91ZrC ppm	1244.72	1431.71	1634.52	1364.56	1219.73	1365.21
Ycr ppm	14628.07	16402.32	18155.47	16114.85	15029.18	14063.31
NbC ppm	1991.42	1579.67	2583.55	1754.39	1928.66	2193.22
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	787.58	796.26	804.60	793.26	786.34	793.29
Temp./w P	787.58	796.26	804.60	793.26	786.34	793.29
Y89	14628.07	16402.32	18155.47	16114.85	15029.18	14063.31
Sum REE	55745.95	61933.08	76385.94	64131.65	61113.07	54893.01
Al+Fe	35441.48	37233.95	35671.89	34654.73	33658.59	34507.39
Sm/La	1.37	2.00	1.79	2.06	1.81	1.43
Yb/Gd	0.15	0.11	0.10	0.10	0.11	0.14
Th/U	14.96	14.70	22.39	16.09	16.60	14.50
Y/Nb	7.31	10.33	6.99	9.14	7.76	6.38
Zr/Hf	21.64	21.60	24.86	23.79	23.54	21.52
Nb/Ta	14.58	11.99	10.03	12.54	12.26	12.98

Table D3, cont.

	WSW2BS-7.2GI	**WSW2B-1.2E**	**WSW2B-1.3E**	**WSW2B-2.2E**	**WSW2B-3.3E**	**WSW2B-4.3E**
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	11313.96	10197.87	13825.22	10421.85	10847.58	10936.22
Ce Ch (0.82)	19549.83	18654.99	24479.37	19295.45	19404.56	18929.75
Pr Ch (0.121)	23653.41	24360.98	31232.64	25648.42	25016.98	22957.49
Nd Ch (0.615)	24726.75	28340.05	35354.10	29759.26	28259.41	24474.74
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	24649.34	32561.17	39560.75	34325.07	31285.25	24907.95
Eu Ch (0.076)	2342.43	3422.60	4135.44	3759.20	3379.29	2619.20
Gd Ch (0.267)	18899.66	25081.96	28873.77	26044.19	23132.99	18907.89
Tb Ch (0.0493)	14985.89	19446.57	21955.55	19985.02	17771.85	15029.63
Dy Ch (0.33)	11855.89	15136.12	16824.12	15225.27	13703.25	11918.01
Ho Ch (0.0755)	9341.03	11145.87	12017.32	11002.97	9999.43	9180.24
Er Ch (0.216)	7220.14	8035.51	8656.89	7836.17	7293.30	7056.33
Tm Ch (0.0329)	4875.74	5182.14	5384.68	5159.58	4762.86	4824.24
Yb Ch (0.221)	3323.00	3453.79	3547.38	3196.47	3127.41	3185.46
Lu Ch (0.033)	2181.07	2188.66	2189.62	1993.48	2048.08	2097.21
Ce/Ce*	1.20	1.18	1.18	1.18	1.18	1.19
Eu/Eu*	0.11	0.12	0.12	0.13	0.13	0.12
Ca Site Total ppm	70583.06	78508.49	94778.89	80391.77	76304.93	69138.78
Ti Site Total ppm	38989.32	40586.72	40320.99	38093.83	37162.77	38344.74
Ti/Ca Site Substitution	0.55	0.52	0.43	0.47	0.49	0.55
Ti/Ti Site All Wt%	0.85	0.84	0.85	0.85	0.85	0.85
Ca/Ca site	0.74	0.71	0.68	0.71	0.71	0.74

Table D3, cont,

Element	WSW2B-5.3E	WSW2B-5.4E	WSW2B-5.4E2	WSW2BS-6.4E	WSW2BS-7.1E	WSW2BS-8.3LE
F19	0.14231	0.10861	0.09555	0.09525	0.12355	0.10916
Na23	1.57295	1.58854	2.03377	1.79763	1.63554	1.73986
Mg26	0.12880	0.15517	0.12575	0.11339	0.12116	0.12628
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00164	0.00132	0.00221	0.00208	0.00203	0.00214
K39	0.01149	0.17420	0.00717	0.00594	0.00597	0.00531
Ca43	0.56030	0.47763	0.55676	0.52977	0.52916	0.52937
AlO	0.03353	0.03301	0.03252	0.03362	0.03703	0.03388
Ti47	10.79885	9.16634	10.80850	10.41829	10.27398	10.36675
V51	0.08453	0.05941	0.06761	0.08130	0.08367	0.06266
Cr52	0.00029	0.00051	0.00035	0.00023	0.00019	0.00020
Mn55	1.67119	1.46525	1.68561	1.48412	1.49400	1.66273
Fe57	0.23004	0.20870	0.24397	0.23808	0.26822	0.24047
Sr86	0.06709	0.05755	0.07003	0.06491	0.06489	0.06430
Y89	2.32093	3.37348	4.56277	4.52124	4.58804	4.22292
Zr90	0.09133	0.09615	0.11785	0.11995	0.13144	0.10221
Zr91	0.01953	0.02121	0.02486	0.02531	0.02813	0.02160
Nb93	0.22501	0.17141	0.17429	0.15842	0.12957	0.15355
Ba137	0.00133	0.00120	0.00109	0.00323	0.00109	0.00148
La139	0.52776	0.38315	0.44528	0.37670	0.39664	0.40950
Ce140	1.66017	1.39198	1.73812	1.54037	1.57203	1.58998
Pr 141	0.36223	0.36899	0.48828	0.45299	0.45301	0.44557
Nd146	0.26636	0.33040	0.46457	0.44470	0.43683	0.41932
Sm147	0.06706	0.11912	0.18079	0.18814	0.17939	0.16319
Eu153	0.01870	0.02260	0.03295	0.03603	0.03389	0.02866
Gd157O	0.04958	0.09625	0.14896	0.15682	0.14881	0.13496
Tb159O	0.04265	0.08127	0.12680	0.13286	0.12614	0.11466
Dy163O	0.05364	0.09477	0.14607	0.15268	0.14403	0.13168
Ho165O	0.03582	0.05615	0.08358	0.08537	0.08230	0.07675
Er166O	0.02837	0.03681	0.05475	0.05487	0.05356	0.05021
Tm169O	0.00941	0.01080	0.01527	0.01514	0.01500	0.01453
Yb172O	0.00934	0.00886	0.01251	0.01200	0.01178	0.01152
Lu175O	0.00437	0.00363	0.00510	0.00459	0.00469	0.00441
Hf178O	0.00055	0.00050	0.00053	0.00053	0.00059	0.00051
Ta181O	0.00205	0.00176	0.00185	0.00172	0.00172	0.00175
Pb206	0.00009	0.00003	0.00008	0.00006	0.00007	0.00006
Pb208	0.00018	0.00011	0.00015	0.00013	0.00013	0.00015
Th232O	0.01853	0.01196	0.01074	0.00967	0.01035	0.01001
U238O	0.00150	0.00129	0.00068	0.00070	0.00078	0.00070
	39884.31	39884.30	39884.39	38422.42	38422.42	38422.47
Corr. 91Zr	2301.82	2090.27	2921.93	3132.27	3574.37	2768.94
Corr. 90Zr	10551.05	9581.34	13393.48	14357.66	16384.13	12692.23
Corr. 89Y	274962.20	331534.88	541152.84	564361.21	585775.88	545900.62
Corr. 93Nb	26680.74	16840.80	20683.66	19785.98	16546.57	19860.01
90ZrC/Si	0.09	0.10	0.11	0.11	0.13	0.10
91ZrC/Si	0.02	0.02	0.02	0.03	0.03	0.02
93Ycr/Si	2.32	3.38	4.56	4.52	4.58	4.22
93NbC/Si	0.22	0.17	0.17	0.16	0.13	0.15
90Zr Cr	985.56	1080.57	1249.56	1272.72	1420.59	1086.56
91Zr Cr	985.56	1080.57	1249.56	1272.72	1420.59	1086.56
Y Cr	7731.99	11256.15	15198.99	15060.43	15290.02	14068.94
Nb Cr	2871.93	2188.67	2223.72	2021.14	1653.26	1959.23
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	773.43	778.96	787.82	788.95	795.77	779.30
Temp./w P Zr91 Corr.	773.43	778.96	787.82	788.95	795.77	779.30
Age Ma 206/238	287.41	90.18	510.72	391.45	389.03	403.67
Age Ma 208/232	120.98	115.77	176.94	168.74	158.93	181.40

Table D3, cont.

	WSW2B-5.3E	WSW2B-5.4E	WSW2B-5.4E2	WSW2BS-6.4E	WSW2BS-7.1E	WSW2BS-8.3LE
F19	9150.36	6983.25	6143.43	6124.16	7943.94	7018.69
Na23	481.63	486.40	622.73	550.43	500.79	532.74
Mg26	895.51	1078.85	874.29	788.39	842.43	877.98
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	197.96	159.13	266.84	251.28	245.47	258.69
K39	3.61	54.71	2.25	1.86	1.87	1.67
Ca43	200935.29	171287.15	199666.49	189987.11	189768.34	189842.51
AlO	9439.55	9292.19	9154.37	9463.73	10425.55	9538.83
Ti47	221912.11	188364.66	222110.48	214091.70	211126.19	213032.59
V51	132.31	92.99	105.82	127.24	130.96	98.07
Cr52	0.63	1.12	0.76	0.50	0.40	0.44
Mn55	3115.04	2731.16	3141.91	2766.34	2784.76	3099.25
Fe57	23223.78	21069.82	24630.06	24035.20	27078.48	24276.61
Sr86	47.49	40.74	49.57	45.94	45.93	45.51
Y89	7697.98	11189.03	15133.63	14995.89	15217.43	14006.44
Zr90	970.62	1021.89	1252.51	1274.88	1396.97	1086.31
Zr91	982.05	1066.78	1250.25	1273.22	1415.04	1086.50
Nb93	2871.50	2187.51	2224.23	2021.73	1653.50	1959.60
Ba137	8.96	8.09	7.36	21.79	7.37	9.94
La139	4454.51	3233.97	3758.33	3179.55	3347.82	3456.33
Ce140	15954.85	13377.39	16703.96	14803.47	15107.79	15280.23
Pr	2259.48	2301.67	3045.73	2825.65	2825.73	2779.33
Nd146	9594.08	11900.65	16733.29	16017.78	15734.12	15103.54
Sm147	2107.71	3743.85	5682.40	5913.34	5638.38	5129.28
Eu153	123.22	148.94	217.16	237.46	223.37	188.88
Gd157O	1906.89	3701.68	5729.00	6031.15	5723.22	5190.48
Tb159O	278.37	530.50	827.66	867.22	823.35	748.45
Dy163O	1600.02	2826.93	4356.90	4554.21	4296.05	3927.77
Ho165O	320.35	502.19	747.47	763.52	736.09	686.46
Er166O	833.41	1081.49	1608.55	1612.07	1573.60	1475.05
Tm169O	101.48	116.42	164.55	163.19	161.65	156.61
Yb172O	569.01	539.66	762.05	730.97	717.75	701.51
Lu175O	64.95	53.98	75.81	68.28	69.71	65.57
Hf178O	58.74	53.95	56.33	56.77	63.55	54.33
Ta181O	176.90	151.28	159.70	148.15	148.55	150.80
Pb206	0.56	0.15	0.45	0.36	0.39	0.37
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	407.99	263.36	236.50	213.04	227.94	220.38
U238O	30.99	26.50	13.93	14.39	16.06	14.38
90ZrC ppm	985.56	1080.57	1249.56	1272.72	1420.59	1086.56
91ZrC ppm	985.56	1080.57	1249.56	1272.72	1420.59	1086.56
Ycr ppm	7731.99	11256.15	15198.99	15060.43	15290.02	14068.94
NbC ppm	2871.93	2188.67	2223.72	2021.14	1653.26	1959.23
Estimated Temperature						
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P	773.43	778.96	787.82	788.95	795.77	779.30
Temp./w P	773.43	778.96	787.82	788.95	795.77	779.30
Y89	7731.99	11256.15	15198.99	15060.43	15290.02	14068.94
Sum REE	40168.34	44059.30	60412.86	57767.86	56978.65	54889.50
Al+Fe	32663.33	30362.01	33784.43	33498.93	37504.03	33815.44
Sm/La	0.47	1.16	1.51	1.86	1.68	1.48
Yb/Gd	0.30	0.15	0.13	0.12	0.13	0.14
Th/U	13.17	9.94	16.97	14.80	14.20	15.33
Y/Nb	2.68	5.11	6.80	7.42	9.20	7.15
Zr/Hf	16.52	18.94	22.24	22.46	21.98	20.00
Nb/Ta	16.23	14.46	13.93	13.65	11.13	12.99

Table D3, cont.

	WSW2B-5.3E	WSW2B-5.4E	WSW2B-5.4E2	WSW2BS-6.4E	WSW2BS-7.1E	WSW2BS-8.3LE
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	13963.99	10137.84	11781.59	9967.25	10494.74	10834.90
Ce Ch (0.82)	19457.13	16313.89	20370.68	18053.02	18424.13	18634.43
Pr Ch (0.121)	18673.38	19022.08	25171.32	23352.50	23353.15	22969.71
Nd Ch (0.615)	15600.13	19350.64	27208.61	26045.17	25583.94	24558.60
Pm	0.00	0.00	0.00	0.00	0.00	0.00
Sm Ch (0.2)	10538.56	18719.25	28411.98	29566.68	28191.92	25646.39
Eu Ch (0.076)	1621.35	1959.69	2857.31	3124.47	2939.13	2485.30
Gd Ch (0.267)	7141.91	13863.96	21456.94	22588.58	21435.28	19439.99
Tb Ch (0.0493)	5646.44	10760.61	16788.24	17590.63	16700.85	15181.63
Dy Ch (0.33)	4848.55	8566.44	13202.73	13800.64	13018.33	11902.34
Ho Ch (0.0755)	4243.01	6651.50	9900.33	10112.79	9749.58	9092.22
Er Ch (0.216)	3858.38	5006.89	7446.99	7463.31	7285.18	6828.93
Tm Ch (0.0329)	3084.44	3538.64	5001.56	4960.30	4913.35	4760.06
Yb Ch (0.221)	2574.72	2441.92	3448.18	3307.55	3247.73	3174.27
Lu Ch (0.033)	1968.29	1635.65	2297.36	2068.95	2112.51	1986.96
Ce/Ce*	1.20	1.17	1.18	1.18	1.18	1.18
Eu/Eu*	0.19	0.12	0.12	0.12	0.12	0.11
Ca Site Total ppm	48305.29	55538.19	75796.93	72991.19	72440.07	69130.70
Ti Site Total ppm	36874.02	33870.75	37583.78	37128.19	40897.97	37164.98
Ti/Ca Site Substitution	0.76	0.61	0.50	0.51	0.56	0.54
Ti/Ti Site All Wt%	0.86	0.85	0.86	0.85	0.84	0.85
Ca/Ca site	0.81	0.76	0.72	0.72	0.72	0.73

Table D3, cont.

Element	WSW2BS_9.1GE	WSW2BS_10.1GE
F19	0.12432	0.12668
Na23	1.83895	1.68389
Mg26	0.11674	0.12195
Si30	1.00000	1.00000
P31	0.00158	0.00172
K39	0.00645	0.00407
Ca43	0.52628	0.55480
AlO	0.03173	0.03784
Ti47	10.48979	10.89250
V51	0.06340	0.08320
Cr52	0.00022	0.00015
Mn55	1.72270	1.57756
Fe57	0.19099	0.26070
Sr86	0.06565	0.06854
Y89	2.11296	4.35253
Zr90	0.06974	0.12554
Zr91	0.01463	0.02594
Nb93	0.26390	0.13888
Ba137	0.00102	0.00115
La139	0.56682	0.42488
Ce140	1.73770	1.65935
Pr 141	0.36227	0.45732
Nd146	0.25378	0.43150
Sm147	0.06093	0.16535
Eu153	0.01477	0.03182
Gd157O	0.04340	0.13589
Tb159O	0.03760	0.11693
Dy163O	0.04767	0.13618
Ho165O	0.03219	0.07955
Er166O	0.02466	0.05242
Tm169O	0.00843	0.01480
Yb172O	0.00806	0.01230
Lu175O	0.00377	0.00488
Hf178O	0.00035	0.00055
Ta181O	0.00281	0.00159
Pb206	0.00007	0.00005
Pb208	0.00010	0.00013
Th232O	0.01817	0.01099
U238O	0.00123	0.00070
	38422.50	38422.52
Corr. 91Zr	1885.23	3024.02
Corr. 90Zr	8641.47	13861.45
Corr. 89Y	275069.93	514869.49
Corr. 93Nb	34407.68	16443.01
90ZrC/Si	0.07	0.12
91ZrC/Si	0.01	0.03
93Ycr/Si	2.11	4.34
93NbC/Si	0.26	0.14
90Zr Cr	734.06	1295.36
91Zr Cr	734.06	1295.36
Y Cr	7034.31	14484.76
Nb Cr	3368.15	1770.73
Est. P	0.10	0.10
Temp./w P Zr90 Corr.	756.09	790.04
Temp./w P Zr91 Corr.	756.09	790.04
Age Ma 206/238	269.13	342.92
Age Ma 208/232	69.14	147.10

Table D3, cont.

	WSW2BS_9.1GE	WSW2BS_10.1GE
F19	7993.10	8145.16
Na23	563.08	515.60
Mg26	811.70	847.91
Si30	139383.00	139383.00
P31	190.51	207.38
K39	2.03	1.28
Ca43	188735.44	198962.87
AlO	8933.03	10653.67
Ti47	215561.05	223836.59
V51	99.23	130.23
Cr52	0.48	0.33
Mn55	3211.03	2940.50
Fe57	19281.48	26319.56
Sr86	46.47	48.52
Y89	7008.20	14436.32
Zr90	741.18	1334.28
Zr91	735.74	1304.51
Nb93	3367.83	1772.35
Ba137	6.87	7.71
La139	4784.17	3586.14
Ce140	16699.90	15946.93
Pr	2259.72	2852.65
Nd146	9140.89	15542.07
Sm147	1915.09	5196.96
Eu153	97.35	209.69
Gd157O	1669.15	5226.12
Tb159O	245.42	763.25
Dy163O	1421.77	4061.89
Ho165O	287.86	711.49
Er166O	724.62	1540.19
Tm169O	90.83	159.48
Yb172O	491.03	749.23
Lu175O	56.06	72.45
Hf178O	37.03	59.13
Ta181O	242.30	136.84
Pb206	0.43	0.31
Pb208	0.00	0.00
Th232O	400.11	242.00
U238O	25.41	14.44
90ZrC ppm	734.06	1295.36
91ZrC ppm	734.06	1295.36
Ycr ppm	7034.31	14484.76
NbC ppm	3368.15	1770.73
Estimated Temperature		
Est. P	0.10	0.10
Temp./w P	756.09	790.04
Temp./w P	756.09	790.04
Y89	7034.31	14484.76
Sum REE	39883.87	56618.52
Al+Fe	28214.51	36973.23
Sm/La	0.40	1.45
Yb/Gd	0.29	0.14
Th/U	15.74	16.76
Y/Nb	2.08	8.15
Zr/Hf	20.01	22.57
Nb/Ta	13.90	12.95

Table D3, cont.

	WSW2BS_9.1GE	WSW2BS_10.1GE
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)		
La Ch (0.319)	14997.41	11241.80
Ce Ch (0.82)	20365.74	19447.47
Pr Ch (0.121)	18675.34	23575.61
Nd Ch (0.615)	14863.23	25271.65
Pm	0.00	0.00
Sm Ch (0.2)	9575.45	25984.81
Eu Ch (0.076)	1280.98	2759.05
Gd Ch (0.267)	6251.50	19573.48
Tb Ch (0.0493)	4978.18	15481.67
Dy Ch (0.33)	4308.41	12308.76
Ho Ch (0.0755)	3812.67	9423.72
Er Ch (0.216)	3354.70	7130.50
Tm Ch (0.0329)	2760.81	4847.35
Yb Ch (0.221)	2221.85	3390.18
Lu Ch (0.033)	1698.83	2195.57
Ce/Ce*	1.22	1.19
Eu/Eu*	0.17	0.12
Ca Site Total ppm	47317.60	71311.28
Ti Site Total ppm	32702.56	40406.39
Ti/Ca Site Substitution	0.69	0.57
Ti/Ti Site All Wt%	0.87	0.85
Ca/Ca site	0.80	0.74

Table D4. SHRIMP-RG trace element analyses of sphene grains from PSTG01C.

Element	PSTG01C-1.3LOWZ	PSTG01C-5.2LOZ	PSTG01C-6.3MODZ	PSTG01C-1.2HVZ	PSTG01C-2.2LOWZ
Li7	0.00290	0.00330	0.00309	0.00529	0.00346
Be9	0.00003	0.00002	0.00001	0.00004	0.00001
B11	0.00002	0.00001	0.00000	0.00000	0.00001
F19	0.22105	0.22907	0.17364	0.10087	0.24233
Na23	2.87058	1.95127	2.35131	4.05771	2.52304
Mg26	0.19581	0.16553	0.13667	0.14729	0.16525
Si30	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00207	0.00165	0.00247	0.00335	0.00175
Cl35	0.00002	0.00001	0.00003	0.00003	0.00001
K39	0.00349	0.00320	0.00505	0.00592	0.00314
Ca43	0.68080	0.71885	0.68736	0.68531	0.69290
AlO	0.04598	0.04401	0.04280	0.04443	0.04393
Sc45	0.05461	0.08318	0.05633	0.02993	0.06415
28Si16O1H	0.13373	0.11410	0.11186	0.12424	0.12353
Ti47	11.14613	11.68138	11.38174	11.82380	11.39184
V51	0.07080	0.13455	0.08489	0.08719	0.08440
Cr52	0.00013	0.00073	0.00061	0.00011	0.00028
Mn55	2.41255	1.59251	1.87032	1.95069	2.26007
Fe57	0.33597	0.29687	0.27984	0.28413	0.29544
Co59	0.00009	0.00010	0.00008	0.00005	0.00007
Ni60	0.00005	0.00005	0.00004	0.00004	0.00005
Zn66	0.00005	0.00003	0.00004	0.00004	0.00004
Ga69	0.00330	0.00292	0.00294	0.00298	0.00292
Ge74	0.00013	0.00010	0.00009	0.00008	0.00010
40Ca40Ca	0.18853	0.20480	0.19076	0.18945	0.20242
40Ca42Ca	0.00275	0.00277	0.00248	0.00264	0.00259
Sr86	0.00033	0.00108	0.00056	0.00034	0.00039
Y89	3.43472	1.80901	2.36797	3.86837	2.02737
Zr90	0.08062	0.09182	0.10110	0.10088	0.06954
Zr91	0.01704	0.01903	0.02112	0.02100	0.01432
Nb93	0.16457	0.13914	0.11294	0.16584	0.17263
Sn117	0.00276	0.00254	0.00171	0.00259	0.00229
Ba137	0.00008	0.00003	0.00002	0.00006	0.00006
La139	0.39020	0.49319	0.43413	0.47171	0.44059
Ce140	1.39230	1.51975	1.48453	1.76394	1.38252
Pr 141	0.37687	0.34634	0.39350	0.51487	0.31013
Nd146	0.32931	0.26502	0.34301	0.49937	0.22956
Sm147	0.11985	0.06748	0.10871	0.20997	0.06209
Eu153	0.02008	0.02650	0.04031	0.04079	0.01682
Gd157O	0.12909	0.06341	0.10333	0.21138	0.06095
Tb159O	0.11354	0.05122	0.08168	0.17566	0.05261
Dy163O	0.13955	0.06479	0.09758	0.19767	0.06808
Ho165O	0.08810	0.04259	0.05958	0.10914	0.04617
Er166O	0.06239	0.03362	0.04174	0.06710	0.03671
Tm169O	0.01887	0.01170	0.01299	0.01835	0.01252
Yb172O	0.01636	0.01144	0.01190	0.01437	0.01236
Lu175O	0.00685	0.00527	0.00514	0.00547	0.00575
Hf178O	0.00063	0.00066	0.00065	0.00069	0.00056
Ta181O	0.00198	0.00157	0.00147	0.00275	0.00183
Pb206	0.00009	0.00011	0.00008	0.00010	0.00010
Pb208	0.00006	0.00007	0.00006	0.00009	0.00008
Th232O	0.01502	0.02102	0.01323	0.01289	0.01864
U238O	0.00120	0.00165	0.00102	0.00072	0.00165
	38163.96	38164.09	38164.15	38163.95	38163.99
Corr. 91Zr	1724.56	1906.97	2210.15	1964.09	1525.95
Corr. 90Zr	7904.99	8741.12	10130.86	9002.97	6994.64
Corr. 89Y	350519.68	183508.46	250384.93	366374.22	219306.52
Corr. 93Nb	16805.30	14153.83	11960.24	15721.73	18714.33
90ZrC/Si	0.08	0.09	0.10	0.09	0.06
91ZrC/Si	0.02	0.02	0.02	0.02	0.01
93Ycr/Si	3.43	1.80	2.36	3.86	2.02
93NbC/Si	0.16	0.14	0.11	0.17	0.17
90Zr Cr	1148.88	1274.73	1418.87	1408.94	957.41
91Zr Cr	1148.88	1274.73	1418.87	1408.94	957.41
Y Cr	12366.79	6496.51	8512.85	13918.86	7287.13
Nb Cr	2949.50	2492.62	2022.85	2971.23	3093.41
Est. P	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	782.68	789.05	795.69	795.26	771.70
Temp./w P Zr91 Corr.	782.68	789.05	795.69	795.26	771.70
Age Ma 206/238	268.07	233.71	264.76	485.32	213.85
Age Ma 208/232	86.24	63.75	97.31	148.22	83.60

Table D4, cont.

	PSTG01C-1.3LOWZ	**PSTG01C-5.2LOZ**	**PSTG01C-6.3MODZ**	**PSTG01C-1.2HVZ**	**PSTG01C-2.2LOWZ**
Li7	2.89	3.29	3.08	5.28	3.45
Be9	5.88	4.92	2.83	8.97	2.77
B11	0.32	0.23	0.04	0.05	0.13
F19	9145.58	9477.41	7183.82	4173.41	10025.94
Na23	518.29	352.31	424.53	732.63	455.54
Mg26	998.15	843.76	696.67	750.78	842.36
Si30	139383.00	139383.00	139383.00	139383.00	139383.00
P31	229.22	182.85	274.33	371.40	194.41
Cl35	6.74	5.07	12.18	11.79	5.55
K39	1.86	1.71	2.69	3.16	1.68
Ca43	198026.49	209095.53	199934.29	199339.62	201546.67
AlO	9828.68	9407.70	9148.87	9496.43	9389.71
Sc45	73.56	112.06	75.89	40.31	86.41
28Si16O1H	0.99	0.85	0.83	0.92	0.92
Ti47	217723.24	228178.58	222325.51	230960.62	222522.79
V51	113.15	215.06	135.68	139.35	134.91
Cr52	0.25	1.43	1.20	0.22	0.56
Mn55	4072.30	2688.10	3157.03	3292.69	3814.92
Fe57	19221.56	16984.58	16010.22	16255.56	16902.88
Co59	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Ni60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Zn66	0.02	0.01	0.01	0.01	0.01
Ga69	5.19	4.60	4.64	4.69	4.59
Ge74	1.54	1.12	1.05	0.97	1.19
Sr86	2.63	8.63	4.50	2.71	3.16
Y89	12301.91	6479.20	8481.21	13855.06	7261.30
Zr90	1129.37	1286.20	1416.26	1413.21	974.17
Zr91	1144.23	1277.46	1418.24	1409.96	961.40
Nb93	2949.10	2493.47	2023.80	2971.83	3093.60
Ba137	18.65	7.02	5.62	13.81	14.27
La139	3843.07	4857.41	4275.73	4645.84	4339.37
Ce140	15125.05	16509.60	16127.00	19162.31	15018.77
Pr	2561.20	2353.74	2674.25	3499.09	2107.69
Nd146	12665.56	10192.71	13192.25	19206.01	8829.19
Sm147	3692.29	2078.89	3349.21	6468.54	1912.74
Eu153	120.90	159.54	242.71	245.60	101.27
Gd157O	3724.92	1829.69	2981.54	6099.43	1758.80
Tb159O	562.03	253.55	404.33	869.50	260.42
Dy163O	3077.34	1428.61	2151.79	4358.77	1501.25
Ho165O	585.66	283.13	396.09	725.49	306.93
Er166O	1363.56	734.89	912.37	1466.63	802.29
Tm169O	150.94	93.60	103.92	146.77	100.17
Yb172O	726.99	508.63	528.81	638.57	549.23
Lu175O	74.46	57.34	55.84	59.47	62.51
Hf178O	42.34	44.84	44.19	46.70	37.69
Ta181O	224.85	177.88	166.29	311.26	207.64
Pb206	0.37	0.44	0.31	0.40	0.41
Pb208	0.00	0.00	0.00	0.00	0.00
Th232O	286.84	401.31	252.51	246.06	355.84
U238O	21.89	30.13	18.50	13.16	30.11
90ZrC ppm	1148.88	1274.73	1418.87	1408.94	957.41
91ZrC ppm	1148.88	1274.73	1418.87	1408.94	957.41
Ycr ppm	12366.79	6496.51	8512.85	13918.86	7287.13
NbC ppm	2949.50	2492.62	2022.85	2971.23	3093.41
Estimated Temperature					
Est. P	0.22	0.22	0.22	0.22	0.22
Temp./w P	797.34	803.80	810.54	810.09	786.21
Temp./w P	797.34	803.80	810.54	810.09	786.21
Y89	12366.79	6496.51	8512.85	13918.86	7287.13
Sum REE	48273.96	41341.32	47395.85	67592.02	37650.63
Al+Fe	29050.24	26392.28	25159.10	25751.99	26292.59
Sm/La	0.96	0.43	0.78	1.39	0.44
Yb/Gd	0.20	0.28	0.18	0.10	0.31
Th/U	13.10	13.32	13.65	18.70	11.82
Y/Nb	4.17	2.60	4.19	4.66	2.35
Zr/Hf	26.68	28.68	32.05	30.26	25.85
Nb/Ta	13.12	14.02	12.17	9.55	14.90

Table D4, cont.

	PSTG01C-1.3LOWZ	PSTG01C-5.2LOZ	PSTG01C-6.3MODZ	PSTG01C-1.2HVZ	PSTG01C-2.2LOWZ
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)					
La Ch (0.319)	12047.23	15227.00	13403.55	14563.77	13603.03
Ce Ch (0.82)	18445.19	20133.66	19667.07	23368.67	18315.58
Pr Ch (0.121)	21166.92	19452.42	22101.27	28918.06	17418.91
Nd Ch (0.615)	20594.41	16573.51	21450.82	31229.28	14356.41
Pm					
Sm Ch (0.2)	18461.43	10394.46	16746.05	32342.71	9563.68
Eu Ch (0.076)	1590.84	2099.15	3193.52	3231.55	1332.55
Gd Ch (0.267)	13951.01	6852.79	11166.82	22844.30	6587.28
Tb Ch (0.0493)	11400.14	5142.98	8201.49	17636.95	5282.27
Dy Ch (0.33)	9325.27	4329.11	6520.58	13208.40	4549.24
Ho Ch (0.0755)	7757.04	3750.04	5246.22	9609.15	4065.32
Er Ch (0.216)	6312.80	3402.26	4223.93	6789.94	3714.31
Tm Ch (0.0329)	4587.73	2844.96	3158.53	4461.16	3044.66
Yb Ch (0.221)	3289.54	2301.49	2392.81	2889.45	2485.22
Lu Ch (0.033)	2256.31	1737.61	1692.23	1802.18	1894.29
Ce/Ce*	1.16	1.17	1.14	1.14	1.19
Eu/Eu*	0.10	0.25	0.23	0.12	0.17
Ca Site Total ppm	60884.60	48251.96	56148.06	81706.29	45297.88
Ti Site Total ppm	33509.30	30611.16	28946.50	30634.55	30741.14
Ti/Ca Site Substitution	0.55	0.63	0.52	0.37	0.68
Ti/Ti Site All Wt%	0.87	0.88	0.88	0.88	0.88
Ca/Ca site	0.76	0.81	0.78	0.71	0.82

Table D4, cont.

Element	**PSTG01C-2.3MODZ**	**PSTG01C-3.1LOWZ**	**PSTG01C-4.2LOWZ**	**PSTG01C-5.3HIZ**	**PSTG01C-6.2HIZ**	**PSTG01C-7.2LOZ**
Li7	0.00222	0.00132	0.00636	0.00592	0.00293	0.00435
Be9	0.00006	0.00001	0.00008	0.00007	0.00005	0.00002
B11	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
F19	0.19174	0.24820	0.09869	0.17953	0.13174	0.25952
Na23	2.68049	2.29951	3.86350	3.13640	2.98262	1.84048
Mg26	0.15730	0.18082	0.14368	0.17316	0.13249	0.17221
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00185	0.00161	0.00272	0.00262	0.00284	0.00205
Cl35	0.00001	0.00002	0.00002	0.00001	0.00002	0.00002
K39	0.00366	0.00537	0.00413	0.00216	0.00468	0.00504
Ca43	0.71064	0.68976	0.69663	0.69439	0.69028	0.71404
AlO	0.04119	0.04601	0.04317	0.03945	0.03761	0.04498
Sc45	0.05652	0.06643	0.03147	0.06055	0.05544	0.09246
28Si16O1H	0.12069	0.12823	0.11574	0.10560	0.10592	0.10711
Ti47	11.65643	11.43448	11.88377	11.47925	11.56576	11.64792
V51	0.08164	0.09050	0.08714	0.10575	0.07761	0.15641
Cr52	0.00034	0.00035	0.00015	0.00045	0.00046	0.00096
Mn55	2.08321	2.21106	1.90064	1.86957	1.84609	1.48537
Fe57	0.26230	0.30539	0.28743	0.27781	0.26590	0.30500
Co59	0.00007	0.00007	0.00005	0.00009	0.00005	0.00011
Ni60	0.00005	0.00004	0.00003	0.00004	0.00003	0.00006
Zn66	0.00005	0.00004	0.00003	0.00003	0.00003	0.00003
Ga69	0.00264	0.00301	0.00297	0.00272	0.00275	0.00300
Ge74	0.00008	0.00012	0.00009	0.00009	0.00009	0.00012
40Ca40Ca	0.19949	0.19170	0.18835	0.19576	0.19001	0.20015
40Ca42Ca	0.00282	0.00255	0.00264	0.00269	0.00251	0.00240
Sr86	0.00048	0.00049	0.00032	0.00067	0.00056	0.00140
Y89	1.96934	2.10444	4.19260	2.27386	2.19196	1.86655
Zr90	0.06776	0.07120	0.09869	0.08662	0.10165	0.10829
Zr91	0.01380	0.01485	0.02065	0.01808	0.02157	0.02246
Nb93	0.20934	0.14783	0.14306	0.19362	0.13360	0.12815
Sn117	0.00264	0.00249	0.00252	0.00268	0.00209	0.00234
Ba137	0.00003	0.00014	0.00005	0.00003	0.00002	0.00001
La139	0.52574	0.43824	0.38673	0.55204	0.52680	0.50466
Ce140	1.60195	1.40895	1.54194	1.74234	1.72084	1.56704
Pr 141	0.35935	0.32068	0.47438	0.41183	0.43757	0.36436
Nd146	0.26281	0.24270	0.48072	0.32346	0.36957	0.28296
Sm147	0.06820	0.06711	0.21666	0.09299	0.10636	0.07276
Eu153	0.02002	0.01965	0.04409	0.02981	0.04091	0.03130
Gd157O	0.06377	0.06603	0.23112	0.08955	0.09757	0.06679
Tb159O	0.05417	0.05732	0.19408	0.07382	0.07640	0.05406
Dy163O	0.06864	0.07432	0.22138	0.09052	0.09017	0.06754
Ho165O	0.04546	0.05092	0.12269	0.05689	0.05529	0.04439
Er166O	0.03532	0.03982	0.07610	0.04187	0.03927	0.03494
Tm169O	0.01176	0.01373	0.02046	0.01349	0.01228	0.01186
Yb172O	0.01133	0.01331	0.01613	0.01228	0.01086	0.01191
Lu175O	0.00509	0.00616	0.00587	0.00547	0.00468	0.00548
Hf178O	0.00052	0.00065	0.00068	0.00066	0.00072	0.00080
Ta181O	0.00285	0.00161	0.00234	0.00287	0.00213	0.00157
Pb206	0.00008	0.00010	0.00010	0.00009	0.00008	0.00009
Pb208	0.00008	0.00008	0.00007	0.00008	0.00007	0.00008
Th232O	0.01960	0.01942	0.01189	0.02502	0.01636	0.02256
U238O	0.00134	0.00158	0.00068	0.00143	0.00100	0.00183
	38164.00	38164.02	38164.07	38164.11	38164.13	38164.17
Corr. 91Zr	1404.69	1411.30	2002.80	1968.49	2235.09	2304.13
Corr. 90Zr	6438.77	6469.10	9180.40	9023.13	10245.14	10561.64
Corr. 89Y	204091.01	202255.64	411332.64	250397.37	228679.35	193630.90
Corr. 93Nb	21753.14	14230.12	14044.31	21360.65	13955.82	13333.34
90ZrC/Si	0.06	0.07	0.09	0.08	0.10	0.10
91ZrC/Si	0.01	0.01	0.02	0.02	0.02	0.02
93Ycr/Si	1.96	2.10	4.19	2.27	2.19	1.86
93NbC/Si	0.21	0.15	0.14	0.19	0.13	0.13
90Zr Cr	919.45	997.26	1387.39	1213.70	1455.39	1505.47
91Zr Cr	919.45	997.26	1387.39	1213.70	1455.39	1505.47
Y Cr	7074.91	7568.96	15090.44	8176.27	7886.04	6700.19
Nb Cr	3751.26	2649.12	2563.11	3469.74	2394.11	2295.14
Est. P	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	769.29	774.13	794.29	786.04	797.28	799.40
Temp./w P Zr91 Corr.	769.29	774.13	794.29	786.04	797.28	799.40
Age Ma 206/238	213.99	213.37	483.70	211.24	264.21	162.05
Age Ma 208/232	83.93	88.18	113.29	63.42	84.57	72.80

Table D4, cont.

	PSTG01C-2.3MODZ	PSTG01C-3.1LOWZ	PSTG01C-4.2LOWZ	PSTG01C-5.3HIZ	PSTG01C-6.2HIZ	PSTG01C-7.2LOZ
Li7	2.22	1.32	6.34	5.90	2.93	4.34
Be9	12.03	2.08	16.81	14.96	10.06	4.80
B11	0.04	0.10	0.14	0.13	0.04	0.09
F19	7932.76	10268.58	4083.10	7427.66	5450.37	10737.19
Na23	483.97	415.18	697.56	566.28	538.52	332.30
Mg26	801.82	921.71	732.39	882.65	675.36	877.83
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	205.49	179.01	301.66	289.99	315.28	227.37
Cl35	5.79	6.70	7.01	6.24	8.65	10.33
K39	1.95	2.86	2.20	1.15	2.50	2.69
Ca43	206707.53	200632.93	202630.57	201978.81	200783.35	207696.51
AlO	8805.00	9833.80	9227.01	8431.37	8039.83	9615.08
Sc45	76.14	89.50	42.40	81.58	74.68	124.56
28Si16O1H	0.90	0.95	0.86	0.78	0.79	0.80
Ti47	227691.13	223355.66	232131.90	224230.19	225920.13	227524.99
V51	130.49	144.64	139.28	169.03	124.04	249.99
Cr52	0.66	0.68	0.30	0.88	0.91	1.89
Mn55	3516.38	3732.20	3208.20	3155.77	3116.14	2507.25
Fe57	15006.58	17472.14	16444.25	15893.86	15212.88	17449.42
Co59	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Ni60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Zn66	0.01	0.01	0.01	0.01	0.01	0.01
Ga69	4.17	4.74	4.68	4.28	4.33	4.72
Ge74	0.96	1.37	1.02	1.04	1.07	1.43
Sr86	3.82	3.92	2.52	5.34	4.49	11.19
Y89	7053.46	7537.33	15016.36	8144.13	7850.80	6685.28
Zr90	949.20	997.43	1382.50	1213.38	1423.93	1517.01
Zr91	926.53	997.30	1386.23	1213.62	1447.90	1508.22
Nb93	3751.38	2649.17	2563.65	3469.66	2394.15	2296.44
Ba137	8.02	33.38	12.12	7.55	5.70	3.43
La139	5177.93	4316.23	3808.86	5436.96	5188.43	4970.32
Ce140	17402.52	15305.93	16750.61	18927.71	18694.14	17023.30
Pr	2442.18	2179.33	3223.93	2798.85	2973.78	2476.22
Nd146	10107.80	9334.51	18488.97	12440.65	14213.98	10882.80
Sm147	2100.99	2067.48	6674.62	2864.74	3276.53	2241.65
Eu153	120.52	118.32	265.42	179.46	246.31	188.44
Gd157O	1840.18	1905.22	6669.24	2583.89	2815.46	1927.34
Tb159O	268.16	283.72	960.66	365.41	378.18	267.59
Dy163O	1513.64	1638.91	4881.74	1995.97	1988.44	1489.43
Ho165O	302.21	338.49	815.61	378.20	367.53	295.06
Er166O	772.08	870.28	1663.27	915.07	858.29	763.64
Tm169O	94.08	109.82	163.62	107.91	98.22	94.84
Yb172O	503.65	591.48	717.13	545.87	482.85	529.20
Lu175O	55.36	66.94	63.79	59.51	50.88	59.54
Hf178O	35.25	43.78	45.96	44.77	48.48	53.91
Ta181O	323.41	182.62	265.58	325.11	240.86	177.67
Pb206	0.33	0.39	0.38	0.35	0.30	0.34
Pb208	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	374.24	370.80	227.04	477.58	312.28	430.68
U238O	24.45	28.87	12.36	25.98	18.13	33.32
90ZrC ppm	919.45	997.26	1387.39	1213.70	1455.39	1505.47
91ZrC ppm	919.45	997.26	1387.39	1213.70	1455.39	1505.47
Ycr ppm	7074.91	7568.96	15090.44	8176.27	7886.04	6700.19
NbC ppm	3751.26	2649.12	2563.11	3469.74	2394.11	2295.14
Estimated Temperature						
Est. P	0.22	0.22	0.22	0.22	0.22	0.22
Temp./w P	783.77	788.68	809.12	800.74	812.15	814.30
Temp./w P	783.77	788.68	809.12	800.74	812.15	814.30
Y89	7074.91	7568.96	15090.44	8176.27	7886.04	6700.19
Sum REE	42701.29	39126.66	65147.47	49600.18	51633.02	43209.39
Al+Fe	23811.59	27305.94	25671.26	24325.22	23252.71	27064.50
Sm/La	0.41	0.48	1.75	0.53	0.63	0.45
Yb/Gd	0.27	0.31	0.11	0.21	0.17	0.27
Th/U	15.31	12.84	18.37	18.38	17.22	12.92
Y/Nb	1.88	2.85	5.86	2.35	3.28	2.91
Zr/Hf	26.93	22.78	30.08	27.10	29.37	28.14
Nb/Ta	11.60	14.51	9.65	10.67	9.94	12.93

Table D4, cont.

	PSTG01C-2.3MODZ	PSTG01C-3.1LOWZ	PSTG01C-4.2LOWZ	PSTG01C-5.3HIZ	PSTG01C-6.2HIZ	PSTG01C-7.2LOZ
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)						
La Ch (0.319)	16231.75	13530.50	11939.99	17043.77	16264.67	15580.94
Ce Ch (0.82)	21222.59	18665.77	20427.58	23082.57	22797.73	20760.12
Pr Ch (0.121)	20183.27	18010.99	26644.03	23131.01	24576.68	20464.66
Nd Ch (0.615)	16435.45	15178.06	30063.36	20228.70	23112.17	17695.62
Pm						
Sm Ch (0.2)	10504.97	10337.40	33373.11	14323.68	16382.67	11208.27
Eu Ch (0.076)	1585.85	1556.86	3492.42	2361.26	3240.93	2479.51
Gd Ch (0.267)	6892.05	7135.65	24978.41	9677.50	10544.80	7218.51
Tb Ch (0.0493)	5439.25	5754.93	19486.07	7411.89	7670.90	5427.75
Dy Ch (0.33)	4586.77	4966.38	14793.16	6048.38	6025.57	4513.42
Ho Ch (0.0755)	4002.74	4483.32	10802.74	5009.23	4867.94	3908.08
Er Ch (0.216)	3574.44	4029.08	7700.31	4236.46	3973.54	3535.39
Tm Ch (0.0329)	2859.56	3338.02	4973.38	3279.94	2985.28	2882.64
Yb Ch (0.221)	2278.97	2676.37	3244.94	2470.00	2184.85	2394.57
Lu Ch (0.033)	1677.55	2028.57	1932.99	1803.31	1541.77	1804.38
Ce/Ce*	1.17	1.20	1.15	1.16	1.14	1.16
Eu/Eu*	0.19	0.18	0.12	0.20	0.25	0.28
Ca Site Total ppm	50153.44	47063.66	80403.23	58247.87	59814.23	50358.67
Ti Site Total ppm	29001.97	31324.28	30068.52	29548.06	27485.08	31361.41
Ti/Ca Site Substitution	0.58	0.67	0.37	0.51	0.46	0.62
Ti/Ti Site All Wt%	0.89	0.88	0.89	0.88	0.89	0.88
Ca/Ca site	0.80	0.81	0.72	0.78	0.77	0.80

Table D4, cont.

Element	PSTG01C-1.1MOD	PSTG01C-2.1HVZ	PSTG01C-3.2HVZ	PSTG01C-4.1HVZ	PSTG01C-5.1MODZ	PSTG01C-6.1LOZ	PSTG01C-7.1HIZ
Li7	0.00305	0.00342	0.00271	0.00646	0.00390	0.00799	0.00640
Be9	0.00003	0.00004	0.00005	0.00006	0.00003	0.00005	0.00007
B11	0.00001	0.00001	0.00001	0.00000	0.00001	0.00000	0.00000
F19	0.14865	0.12600	0.15990	0.10742	0.22615	0.22461	0.21276
Na23	2.89847	3.20946	2.98231	4.01525	2.37241	2.98122	3.09925
Mg26	0.15839	0.16395	0.16915	0.14359	0.17764	0.15652	0.16273
Si30	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
P31	0.00212	0.00241	0.00574	0.00306	0.00179	0.00162	0.00192
Cl35	0.00003	0.00002	0.00002	0.00001	0.00003	0.00002	0.00001
K39	0.00733	0.00429	0.00484	0.00321	0.00424	0.02103	0.00431
Ca43	0.70851	0.69283	0.68068	0.68910	0.71918	0.70438	0.68844
AlO	0.04745	0.04425	0.04671	0.03968	0.04601	0.04004	0.04566
Sc45	0.04212	0.04383	0.04574	0.03408	0.07038	0.05533	0.04743
28Si16O1H	0.12932	0.12119	0.12162	0.11229	0.11703	0.10727	0.11540
Ti47	11.87324	11.74816	11.56465	11.79977	11.81494	11.64497	11.65880
V51	0.09122	0.08042	0.07941	0.08694	0.11502	0.07969	0.07354
Cr52	0.00021	0.00067	0.00023	0.00015	0.00071	0.00061	0.00016
Mn55	2.04409	2.06744	2.13251	1.89866	1.98261	2.34413	2.16828
Fe57	0.35137	0.31517	0.32818	0.30190	0.30977	0.27813	0.32805
Co59	0.00006	0.00006	0.00007	0.00004	0.00007	0.00009	0.00008
Ni60	0.00005	0.00004	0.00005	0.00004	0.00003	0.00004	0.00005
Zn66	0.00003	0.00004	0.00003	0.00004	0.00003	0.00005	0.00003
Ga69	0.00355	0.00333	0.00321	0.00319	0.00301	0.00268	0.00351
Ge74	0.00009	0.00007	0.00008	0.00010	0.00009	0.00013	0.00013
40Ca40Ca	0.20208	0.19847	0.20376	0.19825	0.20293	0.20177	0.19089
40Ca42Ca	0.00287	0.00275	0.00272	0.00258	0.00279	0.00291	0.00265
Sr86	0.00031	0.00041	0.00040	0.00032	0.00076	0.00035	0.00032
Y89	4.35238	4.27524	4.30635	4.17877	2.36361	2.05464	3.95838
Zr90	0.11210	0.10394	0.09827	0.10787	0.08766	0.06590	0.09558
Zr91	0.02335	0.02167	0.02045	0.02241	0.01823	0.01393	0.02016
Nb93	0.11402	0.11768	0.10566	0.15276	0.14636	0.19334	0.12451
Sn117	0.00294	0.00226	0.00241	0.00314	0.00250	0.00261	0.00288
Ba137	0.00005	0.00009	0.00009	0.00004	0.00003	0.00006	0.00008
La139	0.38073	0.37363	0.36399	0.43136	0.47185	0.46335	0.36869
Ce140	1.50474	1.46998	1.44097	1.68155	1.56148	1.46157	1.41689
Pr 141	0.45352	0.45917	0.44451	0.49938	0.38003	0.32875	0.41545
Nd146	0.44772	0.46759	0.44739	0.48356	0.30931	0.24594	0.39462
Sm147	0.19688	0.21015	0.19851	0.20811	0.09295	0.06712	0.16277
Eu153	0.03914	0.04255	0.03865	0.04242	0.03028	0.01781	0.03097
Gd157O	0.21418	0.23019	0.22290	0.21958	0.09415	0.06521	0.18414
Tb159O	0.18498	0.19477	0.19049	0.18564	0.07759	0.05579	0.15857
Dy163O	0.21449	0.22625	0.22453	0.21276	0.09541	0.07237	0.19009
Ho165O	0.12406	0.12445	0.12841	0.12005	0.06110	0.04837	0.11174
Er166O	0.07975	0.07872	0.08276	0.07468	0.04522	0.03785	0.07416
Tm169O	0.02246	0.02157	0.02304	0.02029	0.01485	0.01292	0.02123
Yb172O	0.01769	0.01756	0.01840	0.01589	0.01373	0.01221	0.01734
Lu175O	0.00698	0.00661	0.00711	0.00603	0.00613	0.00563	0.00677
Hf178O	0.00075	0.00067	0.00067	0.00071	0.00074	0.00055	0.00067
Ta181O	0.00152	0.00165	0.00146	0.00250	0.00169	0.00220	0.00163
Pb206	0.00010	0.00009	0.00007	0.00009	0.00007	0.00011	0.00010
Pb208	0.00010	0.00006	0.00008	0.00007	0.00005	0.00005	0.00007
Th232O	0.01257	0.01095	0.01099	0.01433	0.01959	0.01870	0.01176
U238O	0.00093	0.00084	0.00085	0.00077	0.00156	0.00149	0.00078
	38163.94	38163.98	38164.03	38164.05	38164.08	38164.12	38164.16
Corr. 91Zr	2224.01	2214.98	2109.34	2374.85	1854.89	1457.45	1992.20
Corr. 90Zr	10194.38	10152.98	9668.73	10885.79	8502.43	6680.61	9131.80
Corr. 89Y	419809.04	442307.81	449925.44	448724.46	243483.68	216735.28	394589.80
Corr. 93Nb	11003.43	12180.93	11043.59	16417.65	15103.10	20417.83	12417.54
90ZrC/Si	0.11	0.10	0.09	0.10	0.08	0.06	0.09
91ZrC/Si	0.02	0.02	0.02	0.02	0.02	0.01	0.02
93Ycr/Si	4.35	4.27	4.30	4.17	2.36	2.05	3.95
93NbC/Si	0.11	0.12	0.11	0.15	0.15	0.19	0.12
90Zr Cr	1566.60	1454.82	1371.93	1502.48	1222.41	938.96	1358.56
91Zr Cr	1566.60	1454.82	1371.93	1502.48	1222.41	938.96	1358.56
Y Cr	15661.00	15385.49	15497.95	15034.93	8497.96	7394.92	14250.85
Nb Cr	2041.99	2107.78	1892.35	2736.47	2622.22	3465.54	2230.94
Est. P	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Temp./w P Zr90 Corr.	801.91	797.26	793.60	799.28	786.47	770.54	792.99
Temp./w P Zr91 Corr.	801.91	797.26	793.60	799.28	786.47	770.54	792.99
Age Ma 206/238	349.19	345.54	290.49	393.54	160.51	252.40	447.24
Age Ma 208/232	165.94	120.21	145.23	104.37	50.32	58.77	119.76

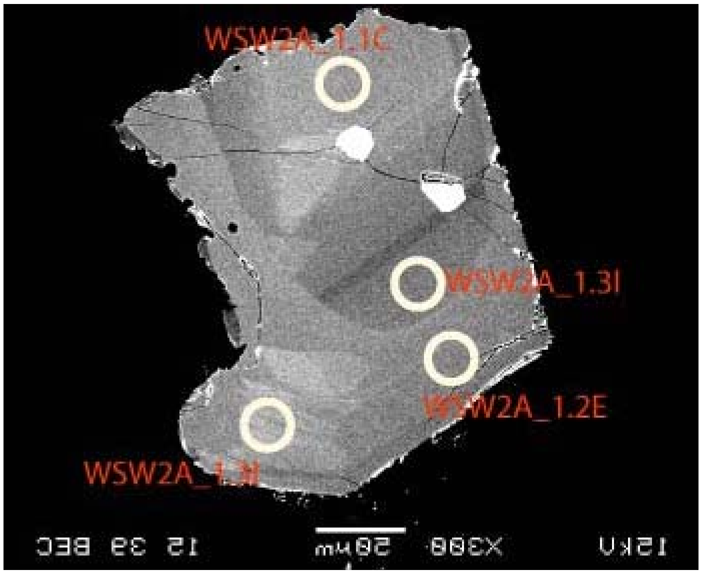
Table D4, cont.

	PSTG01C-1.1MOD	PSTG01C-2.1HVZ	PSTG01C-3.2HVZ	PSTG01C-4.1HVZ	PSTG01C-5.1MODZ	PSTG01C-6.1LOZ	PSTG01C-7.1HIZ
Li7	3.04	3.41	2.71	6.44	3.89	7.96	6.38
Be9	6.73	8.69	9.57	11.17	6.30	10.90	13.54
B11	0.10	0.22	0.22	0.04	0.22	0.00	0.00
F19	6149.89	5213.01	6615.59	4444.37	9356.44	9292.89	8802.50
Na23	523.32	579.47	538.46	724.96	428.34	538.26	559.57
Mg26	807.37	835.73	862.22	731.96	905.51	797.87	829.52
Si30	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00	139383.00
P31	235.48	266.76	636.09	339.31	198.95	179.27	212.98
Cl35	12.47	7.48	9.87	6.40	13.33	6.93	4.74
K39	3.91	2.29	2.58	1.71	2.26	11.22	2.30
Ca43	206085.89	201526.78	197992.14	200440.09	209189.74	204887.01	200249.43
AlO	10142.47	9457.72	9983.49	8481.17	9834.15	8558.60	9759.12
Sc45	56.75	59.05	61.62	45.92	94.81	74.54	63.89
28Si16O1H	0.96	0.90	0.90	0.83	0.87	0.80	0.86
Ti47	231926.23	229483.02	225898.45	230491.12	230787.47	227467.39	227737.60
V51	145.80	128.54	126.93	138.96	183.84	127.36	117.53
Cr52	0.41	1.32	0.46	0.31	1.41	1.21	0.31
Mn55	3450.35	3489.76	3599.59	3204.87	3346.58	3956.80	3659.97
Fe57	20102.51	18031.48	18775.83	17272.25	17722.59	15912.63	18768.46
Co59	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Ni60	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Zn66	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Ga69	5.60	5.24	5.06	5.03	4.74	4.22	5.53
Ge74	1.04	0.83	0.90	1.12	1.08	1.54	1.49
Sr86	2.47	3.27	3.17	2.56	6.12	2.78	2.56
Y89	15588.61	15312.34	15423.74	14966.82	8465.57	7358.97	14177.44
Zr90	1570.31	1455.98	1376.54	1511.08	1227.93	923.17	1338.90
Zr91	1567.48	1455.09	1373.03	1504.53	1223.72	935.20	1353.88
Nb93	2043.31	2108.83	1893.49	2737.45	2622.76	3464.65	2231.24
Ba137	12.32	20.69	21.62	9.96	8.07	14.65	17.90
La139	3749.75	3679.89	3584.87	4248.43	4647.24	4563.54	3631.21
Ce140	16346.52	15968.98	15653.80	18267.29	16962.91	15877.59	15392.19
Pr	3082.17	3120.52	3020.89	3393.84	2582.68	2234.23	2823.44
Nd146	17219.72	17983.76	17206.90	18597.88	11896.37	9459.19	15177.15
Sm147	6065.22	6474.07	6115.46	6411.33	2863.55	2067.82	5014.42
Eu153	235.62	256.17	232.67	255.41	182.27	107.22	186.44
Gd157O	6180.27	6642.27	6432.08	6336.02	2716.80	1881.54	5313.60
Tb159O	915.62	964.08	942.89	918.91	384.08	276.15	784.89
Dy163O	4729.77	4989.03	4951.13	4691.59	2103.92	1595.91	4191.65
Ho165O	824.69	827.32	853.63	798.08	406.14	321.58	742.78
Er166O	1743.14	1720.61	1808.87	1632.19	988.27	827.18	1620.94
Tm169O	179.64	172.53	184.25	162.26	118.74	103.35	169.78
Yb172O	786.49	780.63	817.94	706.19	610.47	542.68	770.79
Lu175O	75.89	71.85	77.28	65.58	66.71	61.27	73.57
Hf178O	50.94	45.30	45.58	47.95	50.15	37.06	45.38
Ta181O	172.37	186.42	165.44	283.63	191.71	249.08	184.30
Pb206	0.37	0.34	0.28	0.35	0.29	0.43	0.40
Pb208	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Th232O	240.06	209.12	209.78	273.56	374.08	356.96	224.44
U238O	16.85	15.36	15.45	14.02	28.34	27.12	14.26
90ZrC ppm	1566.60	1454.82	1371.93	1502.48	1222.41	938.96	1358.56
91ZrC ppm	1566.60	1454.82	1371.93	1502.48	1222.41	938.96	1358.56
Ycr ppm	15661.00	15385.49	15497.95	15034.93	8497.96	7394.92	14250.85
NbC ppm	2041.99	2107.78	1892.35	2736.47	2622.22	3465.54	2230.94
Estimated Temperature							
Est. P	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Temp./w P	816.84	812.12	808.41	814.17	801.19	785.03	807.79
Temp./w P	816.84	812.12	808.41	814.17	801.19	785.03	807.79
Y89	15661.00	15385.49	15497.95	15034.93	8497.96	7394.92	14250.85
Sum REE	62134.51	63651.70	61882.67	66485.01	46530.14	39919.25	55892.86
Al+Fe	30244.99	27489.20	28759.32	25753.42	27556.74	24471.23	28527.58
Sm/La	1.62	1.76	1.71	1.51	0.62	0.45	1.38
Yb/Gd	0.13	0.12	0.13	0.11	0.22	0.29	0.15
Th/U	14.24	13.61	13.57	19.52	13.20	13.16	15.74
Y/Nb	7.63	7.26	8.15	5.47	3.23	2.12	6.35
Zr/Hf	30.83	32.14	30.20	31.51	24.49	24.91	29.51
Nb/Ta	11.85	11.31	11.45	9.65	13.68	13.91	12.11

Table D4, cont.

	PSTG01C-1.1MOD	PSTG01C-2.1HVZ	PSTG01C-3.2HVZ	PSTG01C-4.1HVZ	PSTG01C-5.1MODZ	PSTG01C-6.1LOZ	PSTG01C-7.1HIZ
chondrite normalized REE (Anders & Grevesse (1989) (in parentheses) * 1.3596 Korotev Wed Site Wash. U)							
La Ch (0.319)	11754.71	11535.71	11237.84	13317.97	14568.14	14305.78	11383.10
Ce Ch (0.82)	19934.78	19474.36	19090.00	22277.19	20686.48	19362.92	18770.97
Pr Ch (0.121)	25472.49	25789.43	24966.05	28048.23	21344.45	18464.74	23334.19
Nd Ch (0.615)	27999.54	29241.89	27978.70	30240.46	19343.69	15380.79	24678.30
Pm							
Sm Ch (0.2)	30326.08	32370.34	30577.31	32056.64	14317.74	10339.10	25072.11
Eu Ch (0.076)	3100.24	3370.67	3061.41	3360.70	2398.35	1410.74	2453.20
Gd Ch (0.267)	23147.08	24877.41	24090.20	23730.41	10175.30	7046.96	19901.12
Tb Ch (0.0493)	18572.46	19555.41	19125.54	18639.15	7790.69	5601.49	15920.72
Dy Ch (0.33)	14332.64	15118.27	15003.42	14216.95	6375.51	4836.08	12701.98
Ho Ch (0.0755)	10923.09	10957.87	11306.42	10570.57	5379.30	4259.30	9838.17
Er Ch (0.216)	8070.07	7965.80	8374.41	7556.46	4575.32	3829.53	7504.34
Tm Ch (0.0329)	5460.04	5244.22	5600.25	4931.89	3609.12	3141.31	5160.62
Yb Ch (0.221)	3558.80	3532.25	3701.09	3195.43	2762.29	2455.56	3487.75
Lu Ch (0.033)	2299.79	2177.16	2341.89	1987.32	2021.44	1856.69	2229.27
Ce/Ce*	1.15	1.13	1.14	1.15	1.17	1.19	1.15
Eu/Eu*	0.12	0.12	0.11	0.12	0.20	0.17	0.11
Ca Site Total ppm	77980.04	79188.53	77531.63	81739.40	55398.14	47662.29	70309.00
Ti Site Total ppm	34228.12	31415.60	32367.75	30472.79	31834.53	29273.77	32445.24
Ti/Ca Site Substitution	0.44	0.40	0.42	0.37	0.57	0.61	0.46
Ti/Ti Site All Wt%	0.87	0.88	0.87	0.88	0.88	0.89	0.88
Ca/Ca site	0.73	0.72	0.72	0.71	0.79	0.81	0.74

Figure D1. Cathodoluminescence images of sphene grains and approximate locations of SHRIMP-RG spots. Spot sizes are to scale.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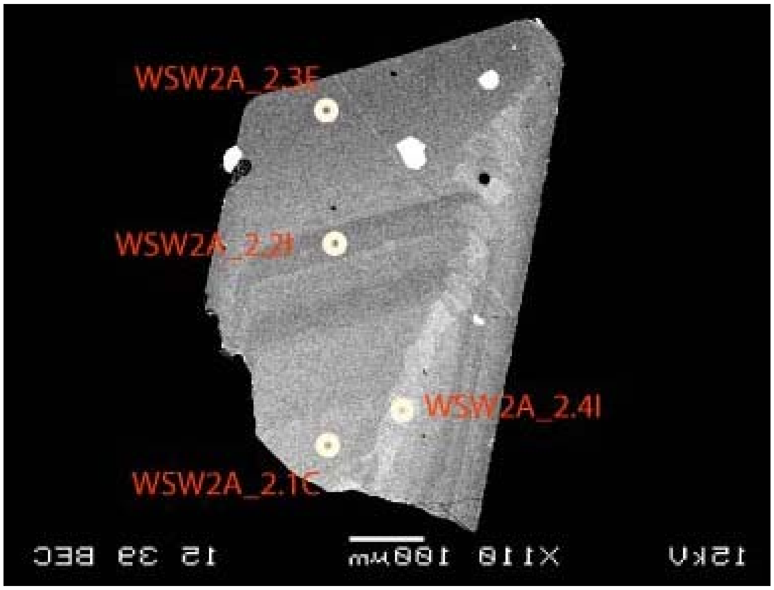
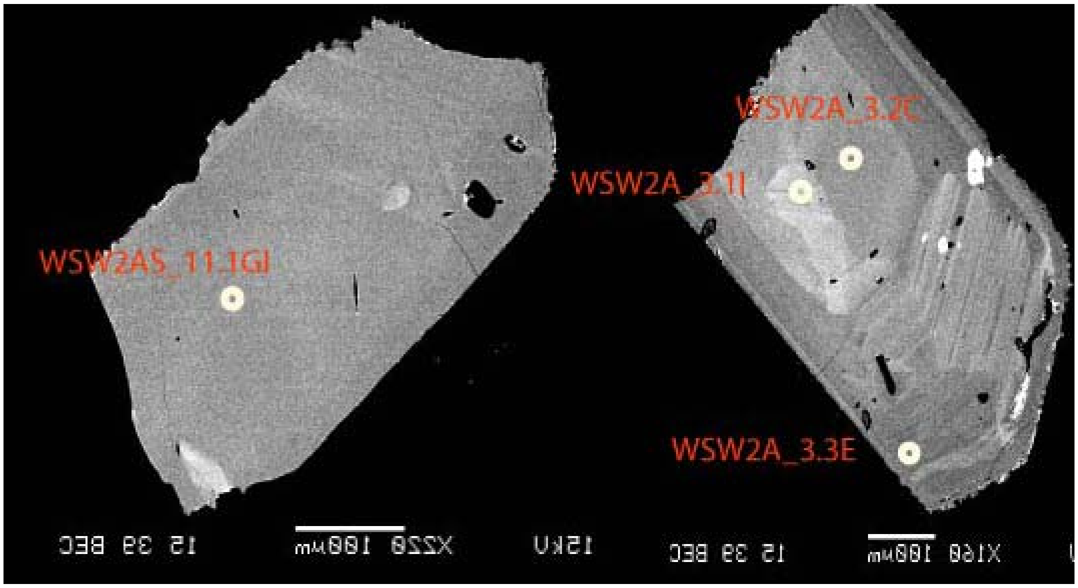
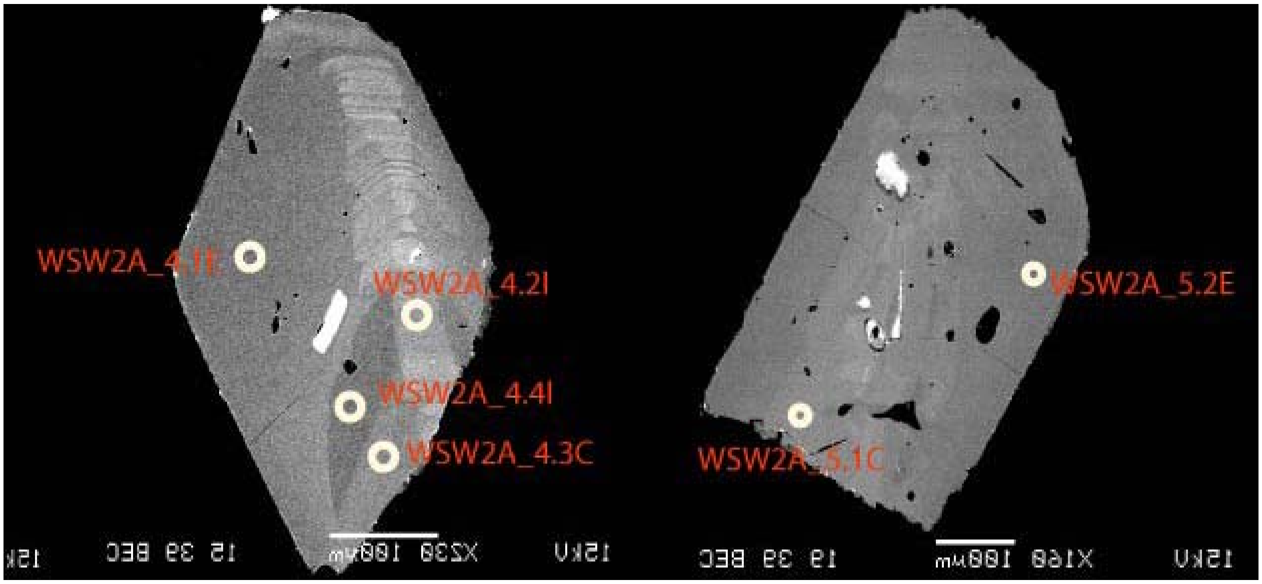
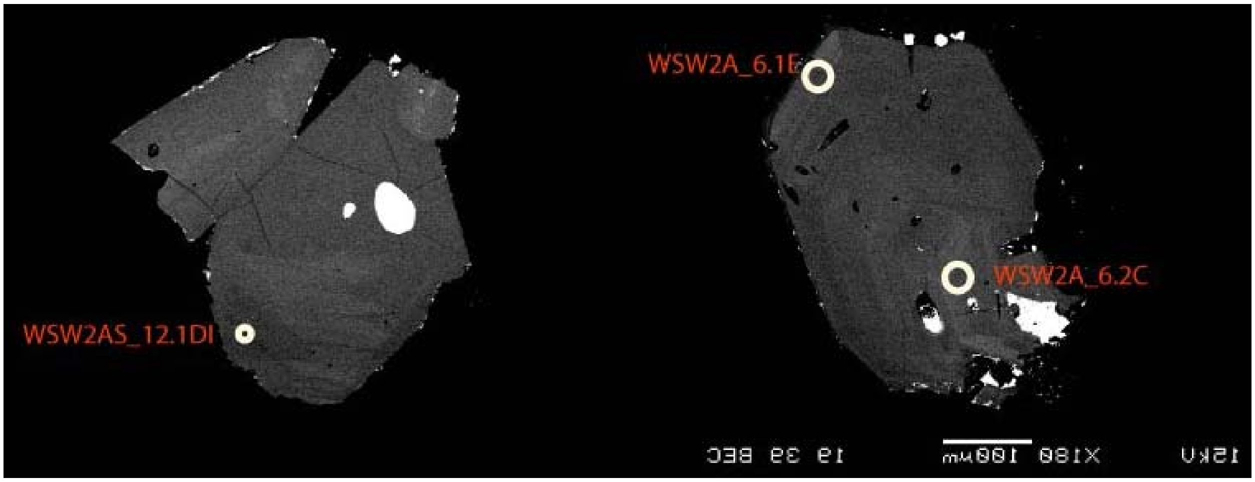
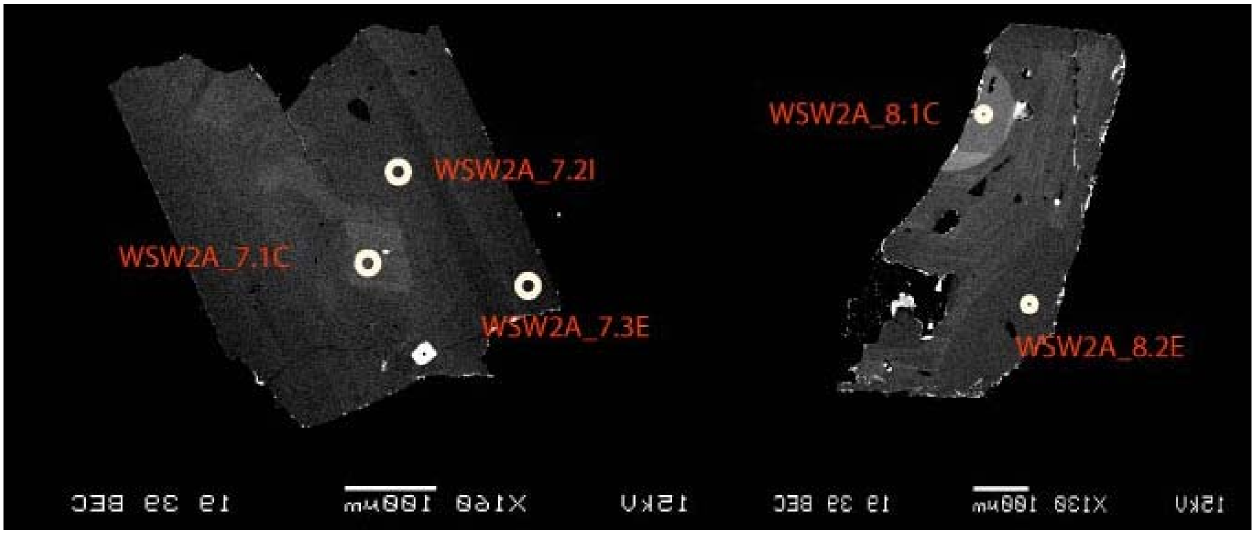
WSW2A_1.2E
WSW2A_1.3I

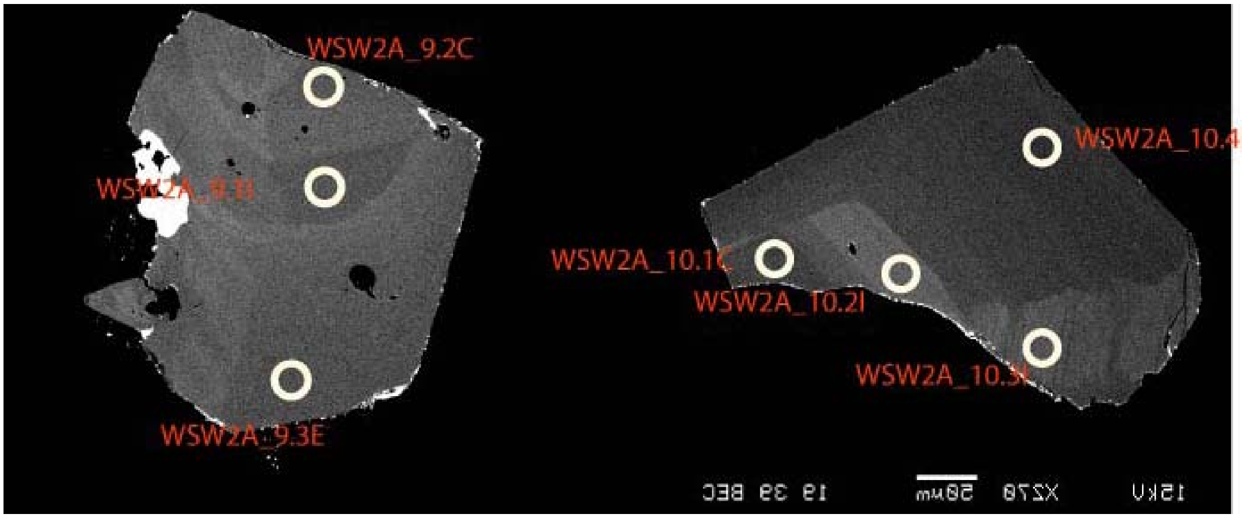

WSW2A_2.3E
WSW2A_2.2I
WSW2A_2.4I
WSW2A_2.1C

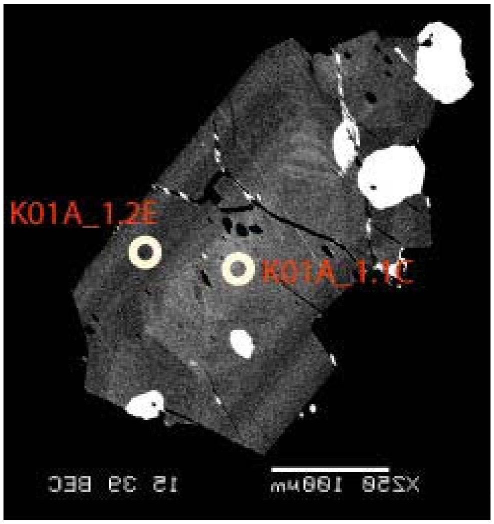

WSW2A_3.2C
WSW2A_3.1I
WSW2AS_11.1GI
WSW2A_3.3E

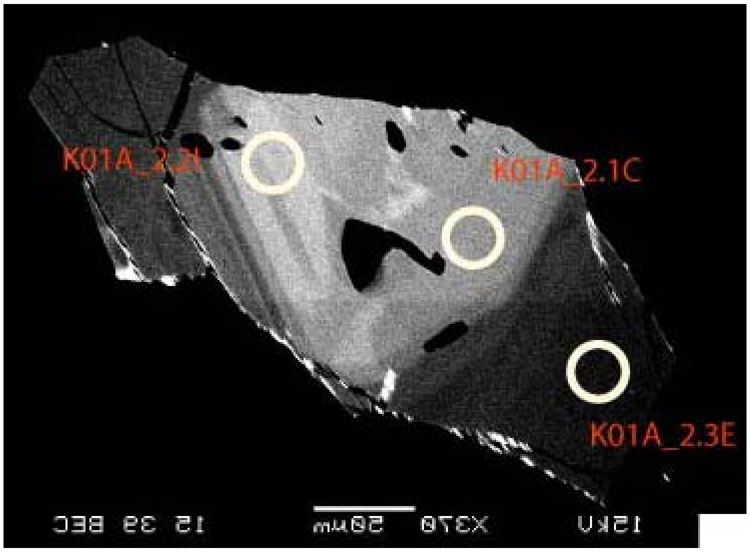

WSW2A_4.1I
WSW2A_4.2I
WSW2A_4.4I
WSW2A_4.3C
WSW2A_5.2E
WSW2A_5.1C

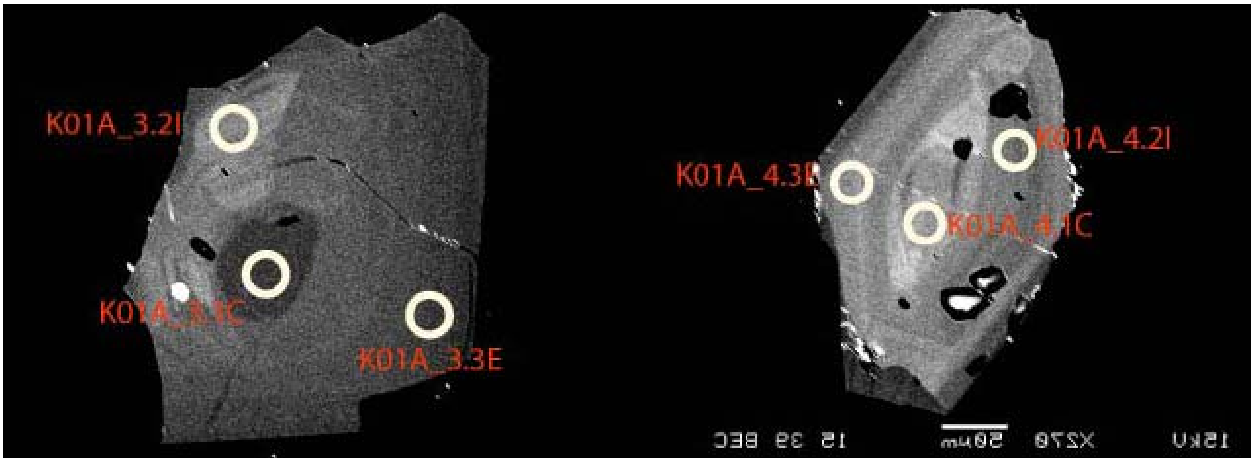

WSW2A_6.1E
WSW2A_6.2C
WSW2AS_12.1DI
15kV X180 100µm 19 39 BEC

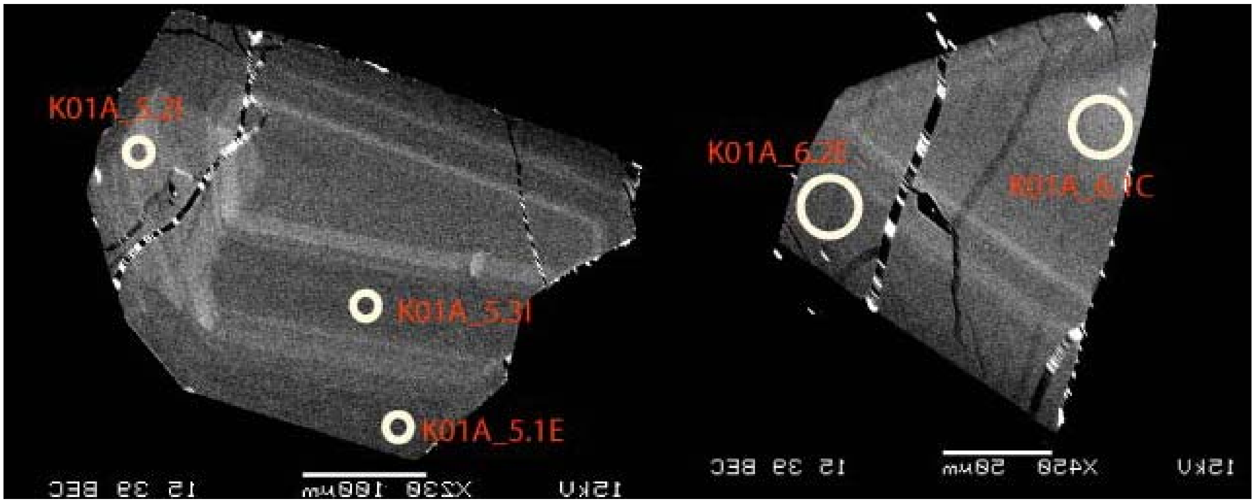

WSW2A_8.1C
WSW2A_7.2I
WSW2A_7.1C
WSW2A_7.3E
WSW2A_8.2E
19 39 BEC
X160 100µm
15kV
19 39 BEC
X130 100µm
15kV

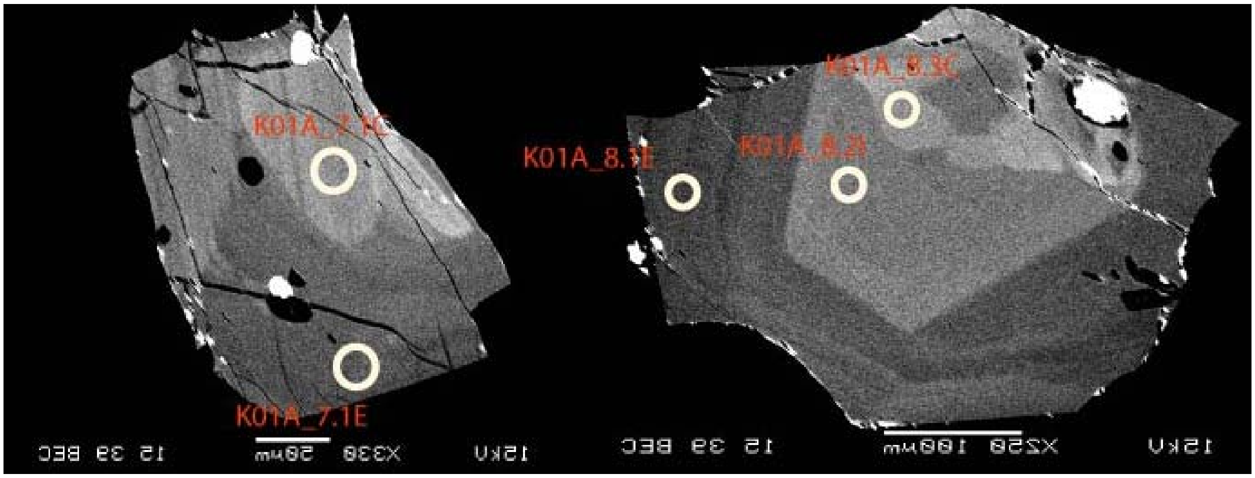

WSW2A_9.2C
WSW2A_10.4E
WSW2A_9.1I
WSW2A_10.1C
WSW2A_10.2I
WSW2A_10.3E
WSW2A_9.3E
15kV X270 50µm 19 39 BEC

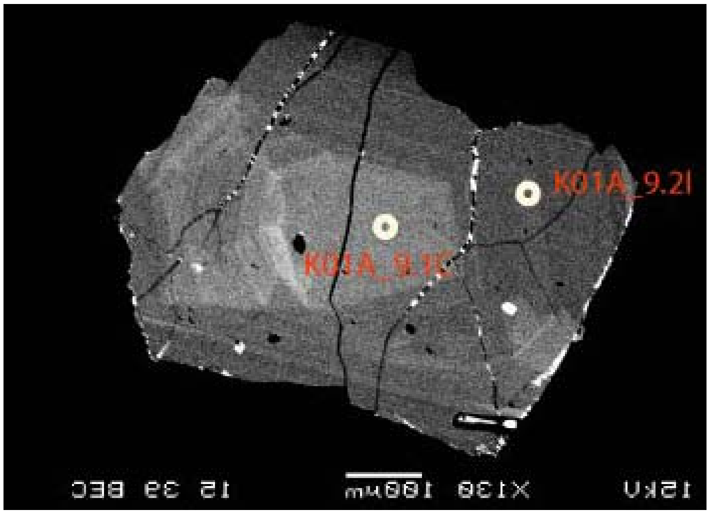

K01A_1.2E
K01A_1.1C

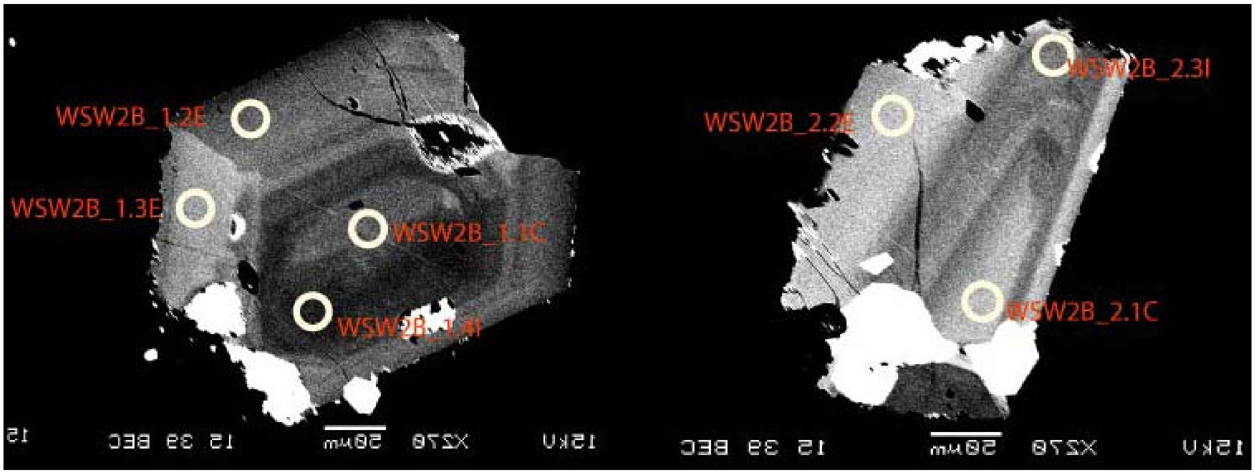

K01A_2.2I
K01A_2.1C
K01A_2.3E

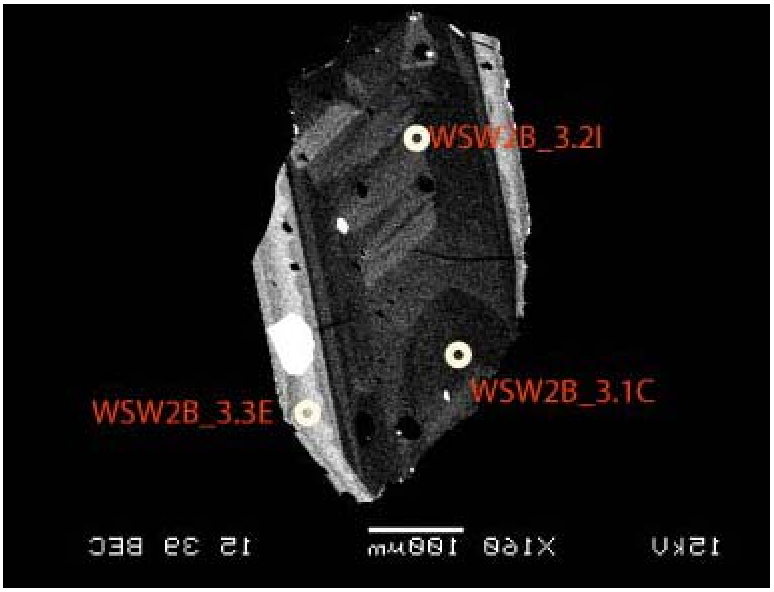

K01A_3.2I
K01A_3.1C
K01A_3.3E
K01A_4.2I
K01A_4.3E
K01A_4.1C

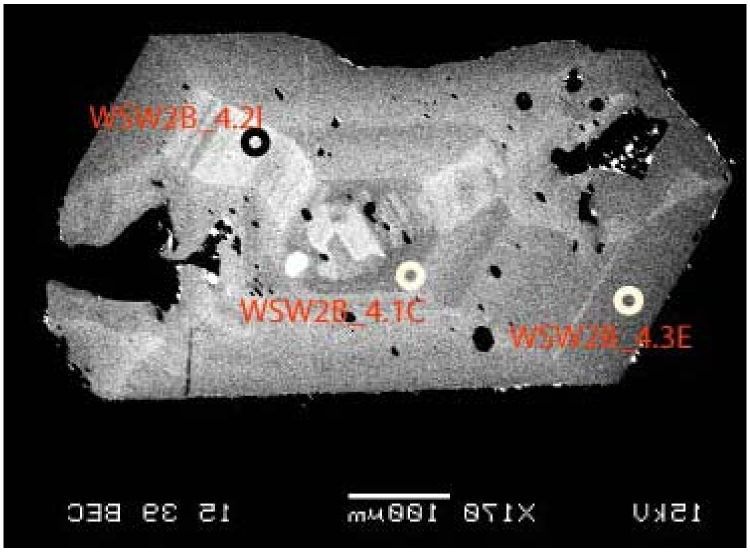

K01A_5.2I
K01A_5.3I
K01A_5.1E
100µm
K01A_6.2E
K01A_6.1C
50µm

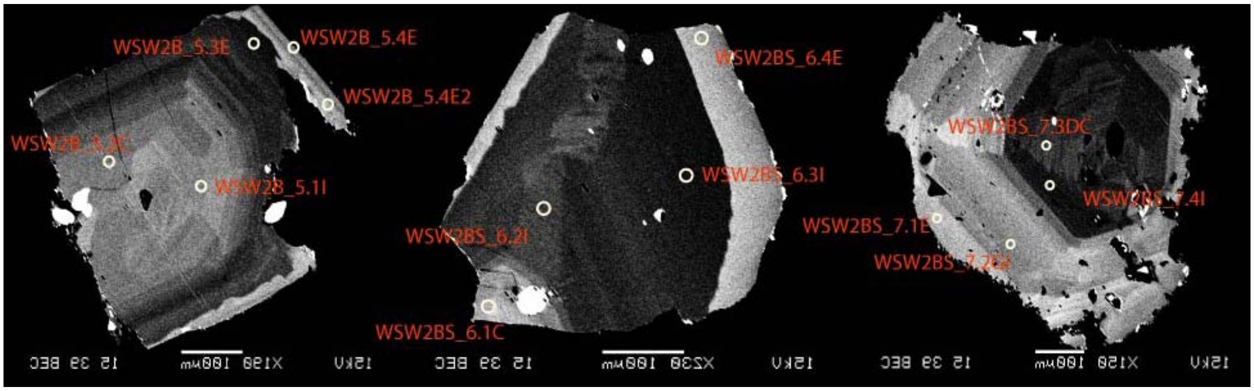

K01A_7.1C
K01A_7.1E
50µm
K01A_8.3C
K01A_8.1E
K01A_8.2I
100µm

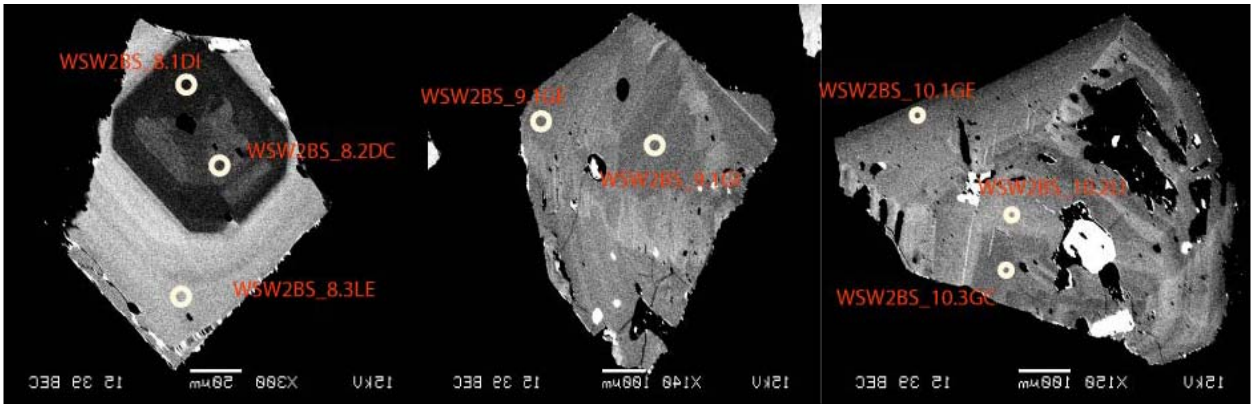

K01A_9.2I
K01A_9.1C
100µm

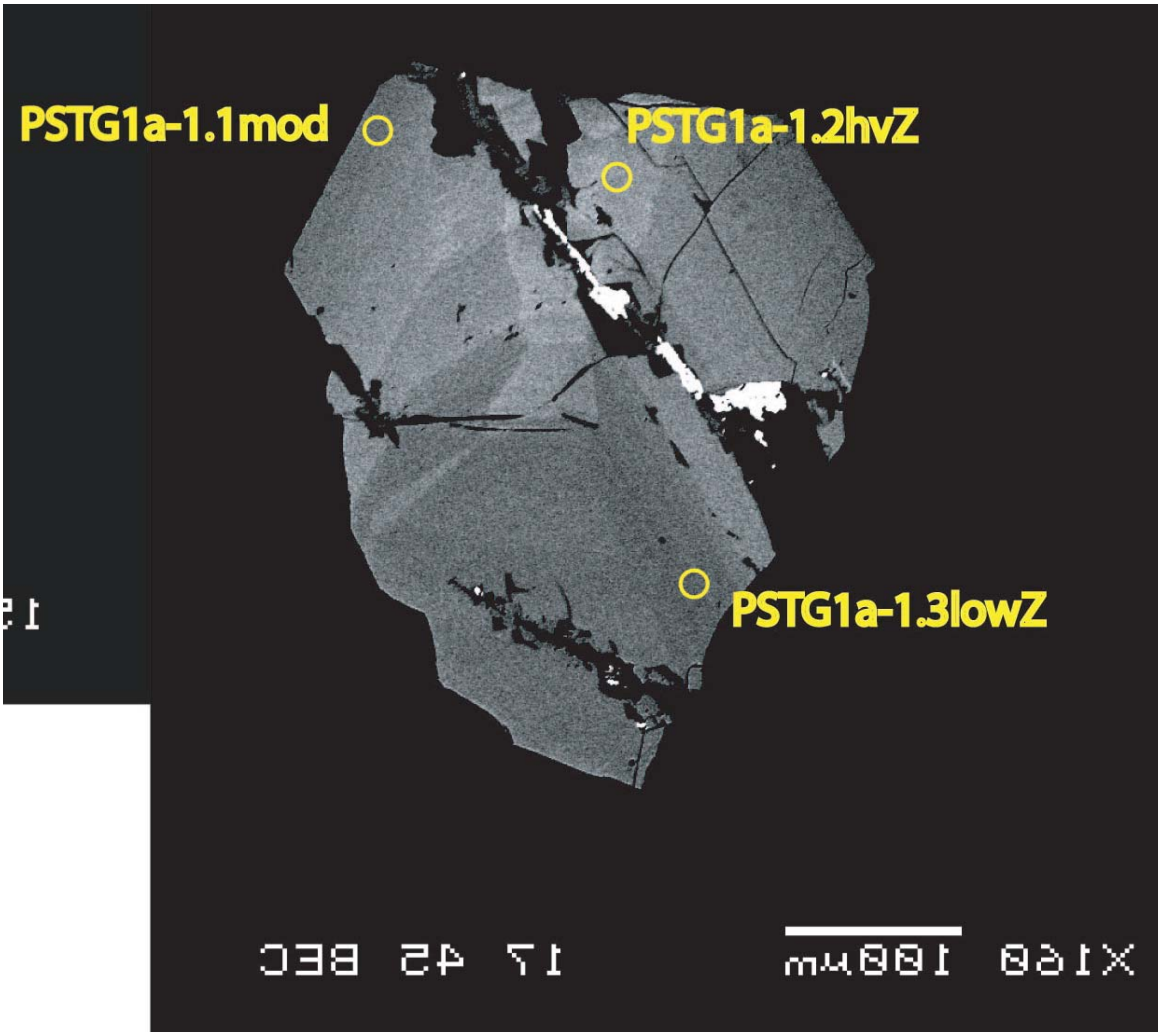

WSW2B_1.2E
WSW2B_1.3E
WSW2B_1.1C
WSW2B_1.4I
WSW2B_2.3I
WSW2B_2.2E
WSW2B_2.1C

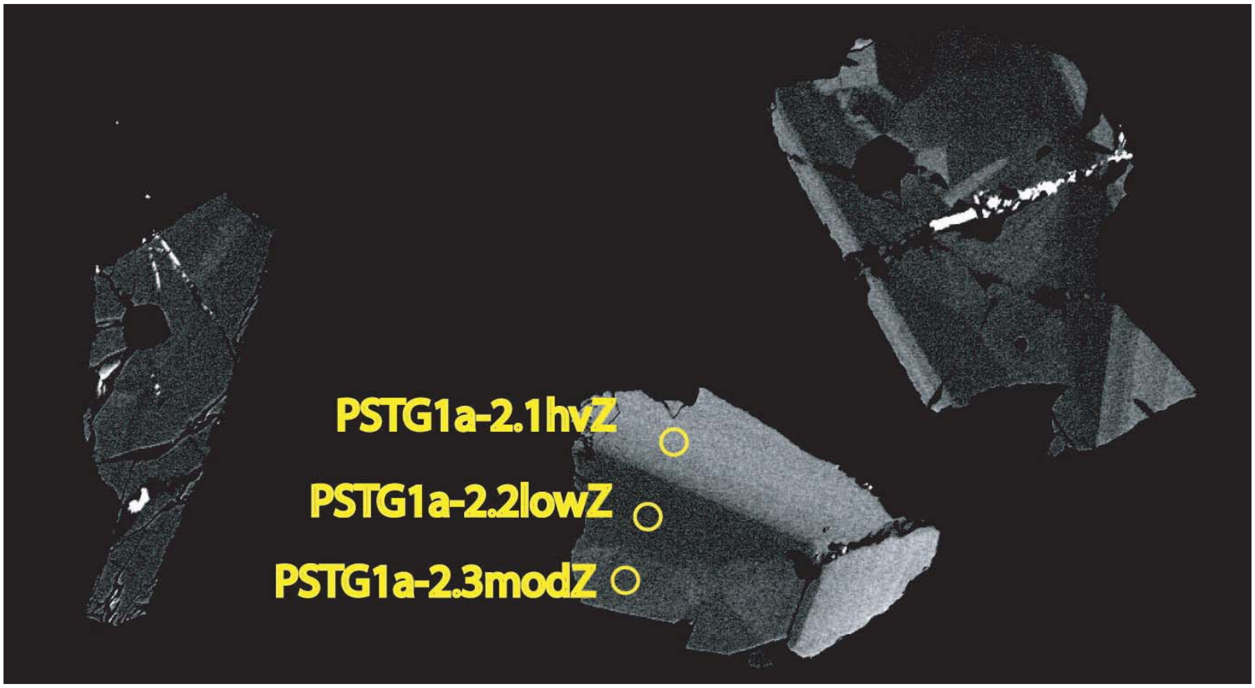

WSW2B_3.2I
WSW2B_3.1C
WSW2B_3.3E

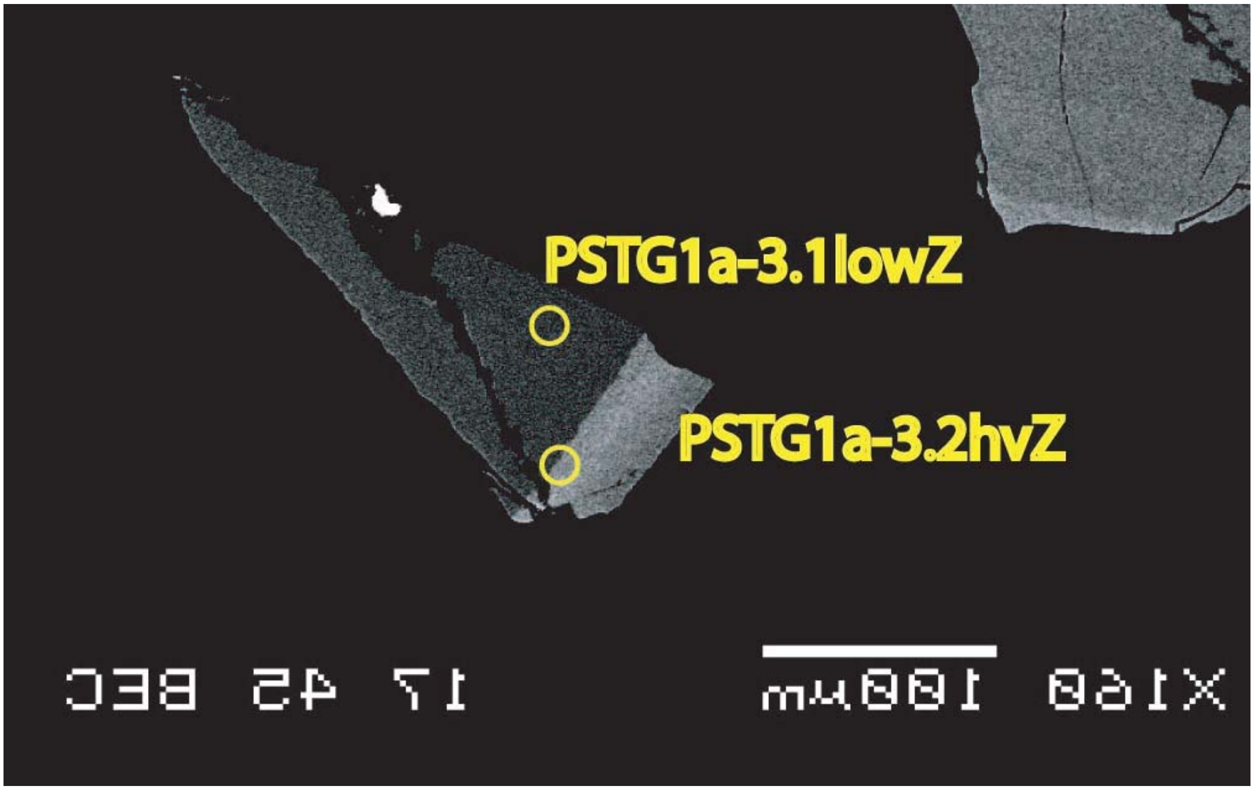

WSW2B_4.2I
WSW2B_4.1C
WSW2B_4.3E


WSW2B_5.3E
WSW2B_5.4E
WSW2B_5.4E2
WSW2B_5.2C
WSW2B_5.1I
WSW2BS_6.4E
WSW2BS_6.3I
WSW2BS_6.2I
WSW2BS_6.1C
WSW2BS_7.3DC
WSW2BS_7.4I
WSW2BS_7.1E
WSW2BS_7.2EI

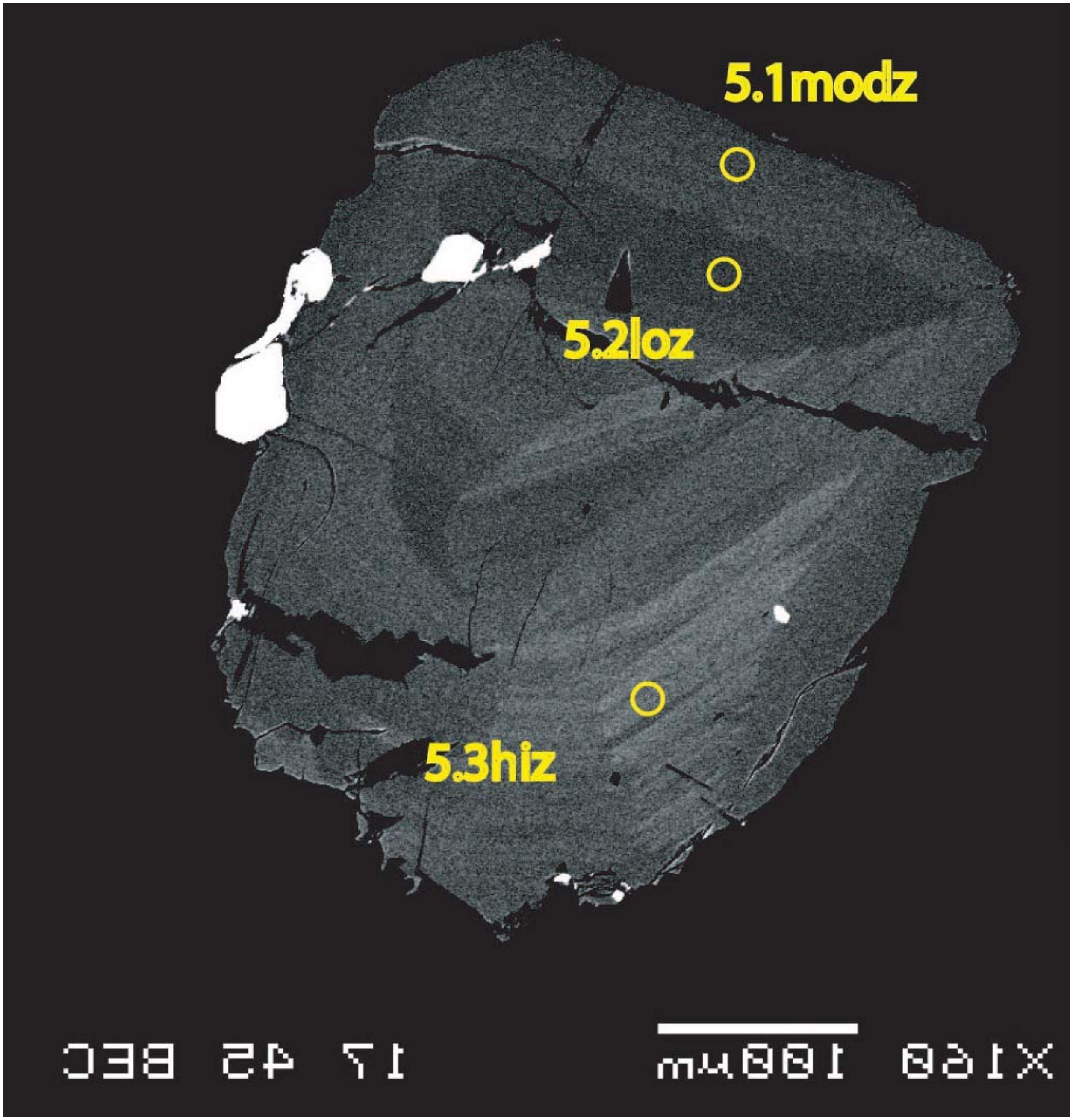

WSW2BS_8.1DI
WSW2BS_8.2DC
WSW2BS_8.3LE
WSW2BS_9.1GE
WSW2BS_9.1GI
WSW2BS_10.1GE
WSW2BS_10.2GI
WSW2BS_10.3GC

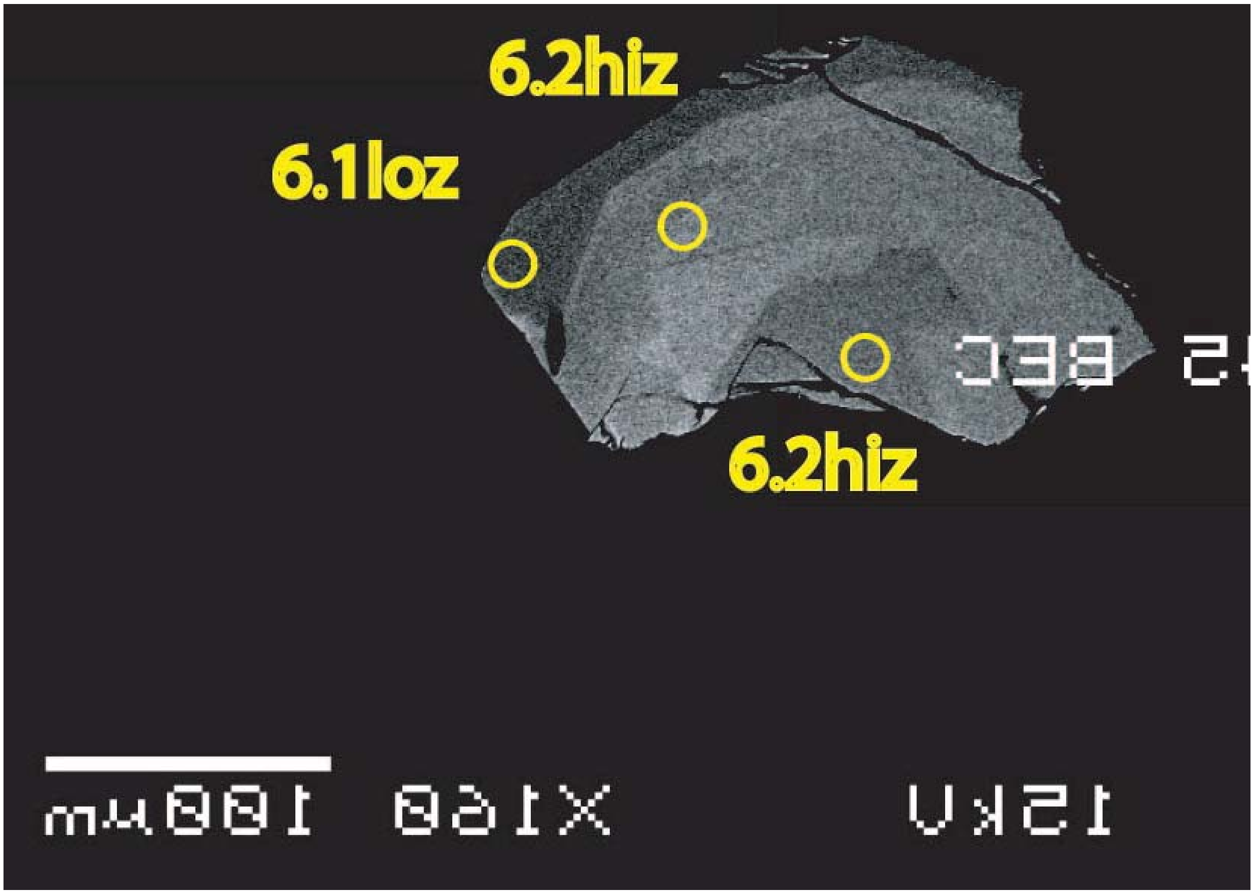

PSTG1a-1.1mod
PSTG1a-1.2hvZ
PSTG1a-1.3lowZ
17 45 BEC
100μm
X160

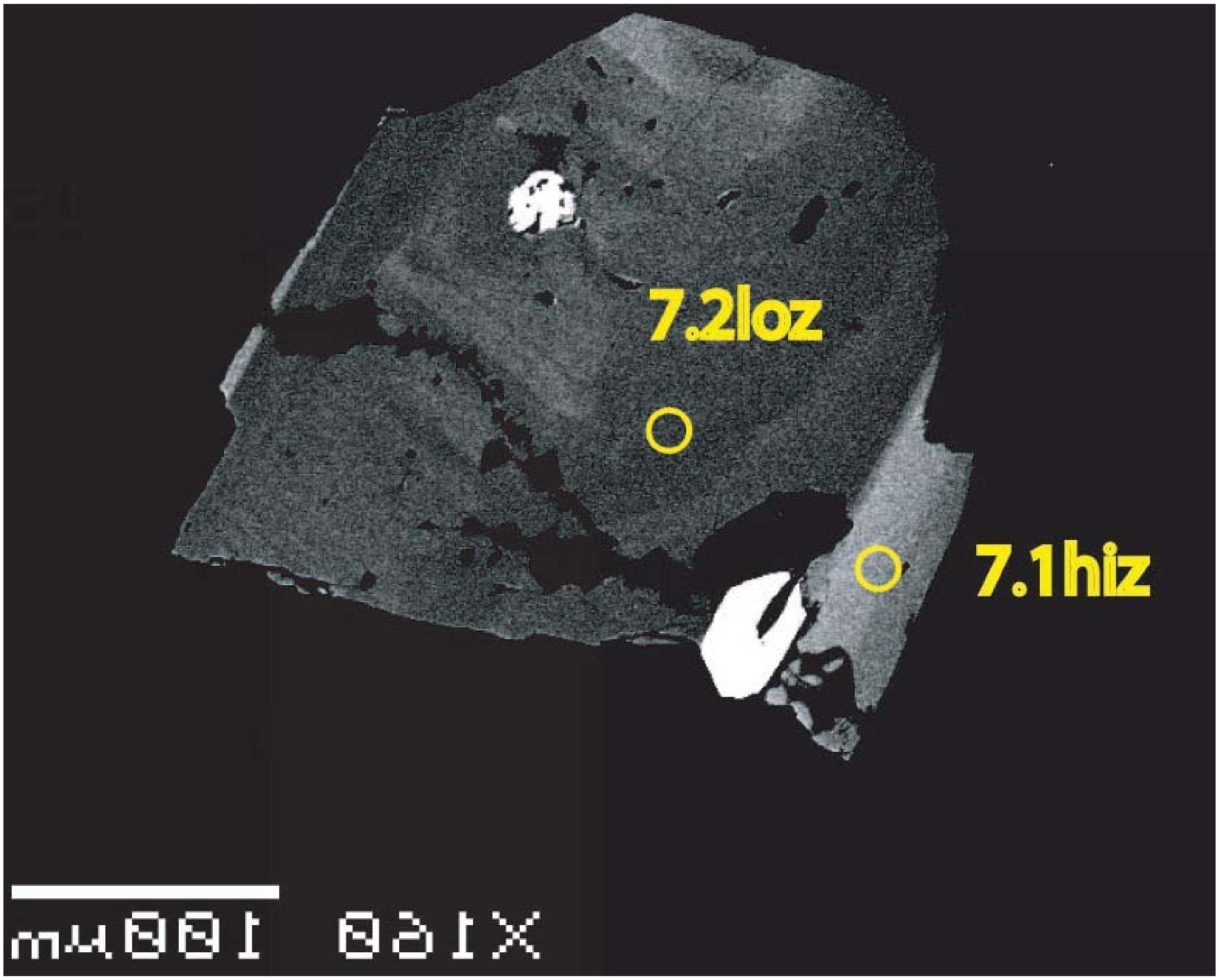

PSTG1a-2.1hvZ
PSTG1a-2.2lowZ
PSTG1a-2.3modZ


PSTG1a-3.1lowZ
PSTG1a-3.2hvZ
X160 100µm 17 45 BEC


PSTG1a-4.1hvZ
PSTG1a-4.2lowz


5.1modz
5.2loz
5.3hiz
X160 100μm 17 45 BEC


6.2hiz
6.1loz
6.2hiz


7.2loz
7.1hiz
100µm
X160

APPENDIX E:

Blob3D Extracted Data Used to Determine Crystal Size Distributions

Table E1. Zircon size distribution data

KPST01A Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	0.091399324	0.182798647	0.091399323	Run C
17.5	35	26.25	4	0.365597295	0.365597295	0.365597294	Run C
35	70	52.5	51	7.032542747	1.96950591	1.969505909	Run B
70	140	105	223	1.917026288	0.256747151	0.25674715	Run A
140	280	210	88	0.378247339	0.080642604	0.080642603	Run A
280	560	420	4	0.00859653	0.00859653	0.008596529	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	2	0.068772244	0.09725864	0.068772243
17.5	35	26.25	0	0	0	0
35	70	52.5	356	6.120729674	0.648796048	0.648796047
70	140	105	223	1.917026288	0.256747151	0.25674715
140	280	210	88	0.378247339	0.080642604	0.080642603
280	560	420	4	0.00859653	0.00859653	0.008596529
560	1120	840	0	0	0	0
		chip mass (g)	1.6618			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	20	5.515719801	2.466704884	2.466704883
35	70	52.5	51	7.032542747	1.96950591	1.969505909
70	140	105	26	1.792608935	0.703119072	0.703119071
140	280	210	3	0.103419746	0.119418837	0.103419745
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.2072			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	0.091399324	0.182798647	0.091399323
17.5	35	26.25	4	0.365597295	0.365597295	0.365597294
35	70	52.5	10	0.456996618	0.289030039	0.289030038
70	140	105	6	0.137098985	0.111940853	0.111940852
140	280	210	2	0.022849831	0.032314541	0.02284983
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.63			

Table E1, cont.

KPST01B Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	2	3.088803089	4.36822722	3.088803088	Run C
17.5	35	26.25	13	20.07722008	11.13683792	11.13683792	Run C
35	70	52.5	36	4.886325076	1.628775025	1.628775024	Run B
70	140	105	12	0.814387513	0.47018685	0.470186849	Run B
140	280	210	28	0.11004732	0.041593977	0.041593976	Run A
280	560	420	6	0.011790784	0.009627135	0.009627134	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	25	0.393026144	0.157210458	0.157210457
70	140	105	65	0.510933987	0.126747123	0.126747122
140	280	210	28	0.11004732	0.041593977	0.041593976
280	560	420	6	0.011790784	0.009627135	0.009627134
560	1120	840	0	0	0	0
		chip mass (g)	1.8174			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	6	1.628775025	1.329889239	1.329889238
35	70	52.5	36	4.886325076	1.628775025	1.628775024
70	140	105	12	0.814387513	0.47018685	0.470186849
140	280	210	2	0.067865626	0.095976489	0.067865625
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.2105			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	2	3.088803089	4.36822722	3.088803088
17.5	35	26.25	13	20.07722008	11.13683792	11.13683792
35	70	52.5	9	6.94980695	4.633204633	4.633204632
70	140	105	3	1.158301158	1.337490971	1.158301157
140	280	210	0	0	0	0
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E1, cont.

KPST01C Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0	0	0	
17.5	35	26.25	19	7.426226304	3.407386315	3.407386314	Run B
35	70	52.5	68	13.28903654	3.223064785	3.223064784	Run B
70	140	105	67	0.898219648	0.219469991	0.21946999	Run A
140	280	210	31	0.207797083	0.074642916	0.074642915	Run A
280	560	420	4	0.013406263	0.013406263	0.013406262	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	26	0.697125697	0.273435195	0.273435194
70	140	105	67	0.898219648	0.219469991	0.21946999
140	280	210	31	0.207797083	0.074642916	0.074642915
280	560	420	4	0.013406263	0.013406263	0.013406262
560	1120	840	0	0	0	0
		chip mass (g)	1.0656			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	19	7.426226304	3.407386315	3.407386314
35	70	52.5	68	13.28903654	3.223064785	3.223064784
70	140	105	25	2.4428376	0.97713504	0.977135039
140	280	210	1	0.048856752	0.097713504	0.048856751
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.1462			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E1, cont.

KPST01D Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0	0	0	Run C
17.5	35	26.25	17	12.55075674	6.08801126	6.088011259	Run B
35	70	52.5	56	20.67183463	5.524780195	5.524780194	Run B
70	140	105	112	1.852924146	0.350169749	0.350169748	Run A
140	280	210	23	0.190255604	0.079342072	0.079342071	Run A
280	560	420	5	0.020679957	0.018496716	0.018496715	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	80	2.647034494	0.591894907	0.591894906
70	140	105	112	1.852924146	0.350169749	0.350169748
140	280	210	23	0.190255604	0.079342072	0.079342071
280	560	420	5	0.020679957	0.018496716	0.018496715
560	1120	840	0	0	0	0
		chip mass (g)	0.8635			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	17	12.55075674	6.08801126	6.088011259
35	70	52.5	56	20.67183463	5.524780195	5.524780194
70	140	105	34	6.275378368	2.152437023	2.152437022
140	280	210	3	0.276854928	0.319684534	0.276854927
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.0774			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	3	7.585335019	8.75879043	7.585335018
70	140	105	13	16.43489254	9.116438117	9.116438116
140	280	210	16	10.11378003	5.056890013	5.056890012
280	560	420	4	1.264222503	1.264222503	1.264222502
560	1120	840	0	0	0	0
		chip mass (g)	0.01			

Table E1, cont.

KPST01E Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0	0	0	Run C
17.5	35	26.25	2	10.2960103	14.5607574	10.2960103	Run C
35	70	52.5	65	21.37103403	5.301501067	5.301501066	Run B
70	140	105	162	2.179997847	0.342553613	0.342553612	Run A
140	280	210	30	0.201851652	0.073705802	0.073705801	Run A
280	560	420	3	0.010092583	0.011653911	0.010092582	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	144	3.875551728	0.645925288	0.645925287
70	140	105	162	2.179997847	0.342553613	0.342553612
140	280	210	30	0.201851652	0.073705802	0.073705801
280	560	420	3	0.010092583	0.011653911	0.010092582
560	1120	840	0	0	0	0
		chip mass (g)	1.0616			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	-0.000000001
17.5	35	26.25	73	48.00263028	11.23656583	11.23656583
35	70	52.5	65	21.37103403	5.301501067	5.301501066
70	140	105	5	0.821962847	0.735185921	0.73518592
140	280	210	0	0	0	0
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	300			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	2	10.2960103	14.5607574	10.2960103
35	70	52.5	1	2.574002574	5.148005148	2.574002573
70	140	105	0	0	0	0
140	280	210	0	0	0	0
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.01			

Table E1, cont.

WSW2A Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	2.390914525	4.78182905	2.390914524	Run C
17.5	35	26.25	2	4.78182905	6.762527495	4.781829049	Run C
35	70	52.5	42	6.511123169	2.009376234	2.009376233	Run B
70	140	105	8	0.620106968	0.438481842	0.438481841	Run B
140	280	210	26	0.082003924	0.032164585	0.032164584	Run A
280	560	420	0				Run A
560	1120	840	0				Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	37	0.466791565	0.153480121	0.15348012
70	140	105	58	0.365863659	0.096080504	0.096080503
140	280	210	26	0.082003924	0.032164585	0.032164584
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	2.26			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	19	5.8910162	2.70298361	2.702983609
35	70	52.5	42	6.511123169	2.009376234	2.009376233
70	140	105	8	0.620106968	0.438481842	0.438481841
140	280	210	1	0.038756686	0.077513371	0.038756685
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.18			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	2.390914525	4.78182905	2.390914524
17.5	35	26.25	2	4.78182905	6.762527495	4.781829049
35	70	52.5	5	5.977286312	5.346247406	5.346247405
70	140	105	2	1.195457262	1.690631874	1.195457261
140	280	210	0	0	0	0
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.02			

Table E1, cont.

WSW2B Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	5	9.367681499	8.378709049	8.378709048	Run C
17.5	35	26.25	11	20.6088993	12.42763387	12.42763387	Run C
35	70	52.5	34	9.304871374	3.191544551	3.19154455	Run B
70	140	105	72	0.866311319	0.204191536	0.204191535	Run A
140	280	210	25	0.150401271	0.060160508	0.060160507	Run A
280	560	420	1	0	0	0	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	-0.000000001
35	70	52.5	35	0.842247115	0.284731493	0.284731492
70	140	105	72	0.866311319	0.204191536	0.204191535
140	280	210	25	0.150401271	0.060160508	0.060160507
280	560	420	1	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	1.19			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	12	6.568144499	3.792119995	3.792119994
35	70	52.5	34	9.304871374	3.191544551	3.19154455
70	140	105	36	4.926108374	1.642036125	1.642036124
140	280	210	10	0.684181719	0.432714513	0.432714512
280	560	420	1	0.034209086	0.068418172	0.034209085
560	1120	840	0	0	0	0
		chip mass (g)	0.10			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	5	9.367681499	8.378709049	8.378709048
17.5	35	26.25	11	20.6088993	12.42763387	12.42763387
35	70	52.5	8	7.494145199	5.299160889	5.299160888
70	140	105	4	1.8735363	1.8735363	1.873536299
140	280	210	2	0.468384075	0.662395111	0.468384074
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.03			

Table E1, cont.

PSTG01C Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0	0	0	Run C
17.5	35	26.25	9	10.18387553	6.789250354	6.789250353	Run C
35	70	52.5	10	2.06291903	1.304704553	1.304704552	Run B
70	140	105	8	0.825167612	0.583481614	0.583481613	Run B
140	280	210	184	0.283673073	0.041825313	0.041825312	Run X
280	560	420	25	0.019271269	0.007708507	0.007708506	Run X
560	1120	840	0	0	0	0	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	2	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	220	1.356697305	0.182937027	0.182937026
70	140	105	388	1.196360351	0.121471989	0.121471988
140	280	210	184	0.283673073	0.041825313	0.041825312
280	560	420	25	0.019271269	0.007708507	0.007708506
560	1120	840	0	0	0	0
		chip mass (g)	4.63			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	7	2.888086643	2.183188292	2.183188291
35	70	52.5	10	2.06291903	1.304704553	1.304704552
70	140	105	8	0.825167612	0.583481614	0.583481613
140	280	210	1	0.051572976	0.103145952	0.051572975
280	560	420	1	0.025786488	0.051572976	0.025786487
560	1120	840	0	0	0	0
		chip mass (g)	0.1385			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	9	10.18387553	6.789250354	6.789250353
35	70	52.5	6	3.394625177	2.77169985	2.771699849
70	140	105	5	1.414427157	1.265102109	1.265102108
140	280	210	3	0.424328147	0.48997194	0.424328146
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.05			

Table E1, cont.

CRW Zircon Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0	0	0	Run C
17.5	35	26.25	7	9.456264775	7.148264265	7.148264264	Run C
35	70	52.5	20	2.194426158	0.981377212	0.981377211	Run B
70	140	105	18	0.987491771	0.465508085	0.465508084	Run B
140	280	210	214	0.453555109	0.062008778	0.062008777	Run A
280	560	420	25	0.026492705	0.010597082	0.010597081	Run A
560	1120	840	0	0	0	0	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	93	0.7884229	0.163511292	0.163511291
70	140	105	413	1.750637944	0.172286523	0.172286522
140	280	210	214	0.453555109	0.062008778	0.062008777
280	560	420	25	0.026492705	0.010597082	0.010597081
560	1120	840	0	0	0	0
		chip mass (g)	3.37			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	11	2.413868773	1.455617639	1.455617638
35	70	52.5	20	2.194426158	0.981377212	0.981377211
70	140	105	18	0.987491771	0.465508085	0.465508084
140	280	210	11	0.301733597	0.181952205	0.181952204
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.26			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	7	9.456264775	7.148264265	7.148264264
35	70	52.5	8	5.403579872	3.82090797	3.820907969
70	140	105	3	1.013171226	1.16990936	1.013171225
140	280	210	2	0.337723742	0.477613496	0.337723741
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E2. Sphene size distribution data.

KPST01B Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run X
17.5	35	26.25	380	103.1557516	10.5835568	10.5835568	Run X
35	70	52.5	302	40.99083814	4.717515357	4.717515356	Run X
70	140	105	44	0.345863007	0.10428162	0.104281619	Run X
140	280	210	59	0.231885425	0.060377822	0.060377821	Run X
280	560	420	36	0.070744706	0.023581569	0.023581568	Run X
560	1120	840	6	0.005895392	0.004813568	0.004813567	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	18	0.282978824	0.133397497	0.133397496
70	140	105	44	0.345863007	0.10428162	0.104281619
140	280	210	59	0.231885425	0.060377822	0.060377821
280	560	420	36	0.070744706	0.023581569	0.023581568
560	1120	840	6	0.005895392	0.004813568	0.004813567
		chip mass (g)	1.82			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	0.271462504	0.542925008	0.271462503
17.5	35	26.25	380	103.1557516	10.5835568	10.5835568
35	70	52.5	302	40.99083814	4.717515357	4.717515356
70	140	105	96	6.515100102	1.329889239	1.329889238
140	280	210	9	0.305395317	0.203596878	0.203596877
280	560	420	4	0.067865626	0.067865626	0.067865625
560	1120	840	0	0	0	0
		chip mass (g)	0.21			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	37	57.14285714	18.78845569	18.78845569
35	70	52.5	13	10.03861004	5.568418958	5.568418957
70	140	105	3	1.158301158	1.337490971	1.158301157
140	280	210	3	0.579150579	0.668745486	0.579150578
280	560	420	2	0.193050193	0.273014201	0.193050192
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E2, cont.

KPST01C Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	81	31.6591753	7.035372288	7.035372287	Run Y
17.5	35	26.25	720	281.4148915	20.97542758	20.97542758	Run Y
35	70	52.5	329	64.29548564	7.089449735	7.089449734	Run Y
70	140	105	70	6.83994528	1.635059657	1.635059656	Run Y
140	280	210	20	0.97713504	0.436988075	0.436988074	Run Y
280	560	420	15	0.36642564	0.189221387	0.189221386	Run Y
560	1120	840	3	0.036642564	0.042311188	0.036642563	Run Y

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	81	31.6591753	7.035372288	7.035372287
17.5	35	26.25	720	281.4148915	20.97542758	20.97542758
35	70	52.5	329	64.29548564	7.089449735	7.089449734
70	140	105	70	6.83994528	1.635059657	1.635059656
140	280	210	20	0.97713504	0.436988075	0.436988074
280	560	420	15	0.36642564	0.189221387	0.189221386
560	1120	840	3	0.036642564	0.042311188	0.036642563
		chip mass (g)	0.15			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E2, cont.

WSW2A Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run XY
17.5	35	26.25	1840	570.498411	26.59962557	26.59962557	Run Y
35	70	52.5	952	147.5854585	9.566544374	9.566544373	Run Y
70	140	105	156	0.984047083	0.157573643	0.157573642	Run X
140	280	210	47	0.148237862	0.043245429	0.043245428	Run X
280	560	420	30	0.047309956	0.017275153	0.017275152	Run X
560	1120	840	14	0.01103899	0.005900588	0.005900587	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	325	4.100196179	0.454875925	0.454875924
70	140	105	156	0.984047083	0.157573643	0.157573642
140	280	210	47	0.148237862	0.043245429	0.043245428
280	560	420	30	0.047309956	0.017275153	0.017275152
560	1120	840	14	0.01103899	0.005900588	0.005900587
		chip mass (g)	2.26			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	1840	570.498411	26.59962557	26.59962557
35	70	52.5	952	147.5854585	9.566544374	9.566544373
70	140	105	69	5.348422603	1.287748835	1.287748834
140	280	210	12	0.465080226	0.268514194	0.268514193
280	560	420	3	0.058135028	0.067128548	0.058135027
560	1120	840	1	0.009689171	0.019378343	0.00968917
		chip mass (g)	0.18			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E2, cont.

WSW2B Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run C
17.5	35	26.25	48	89.92974239	25.96048049	25.96048049	Run C
35	70	52.5	11	3.010399562	1.815339239	1.815339238	Run Y
70	140	105	17	2.326217843	1.128381397	1.128381396	Run Y
140	280	210	157	0.944519979	0.150761802	0.150761801	Run X
280	560	420	62	0.186497576	0.047370432	0.047370431	Run X
560	1120	840	4	0.006016051	0.006016051	0.00601605	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	246	5.91979401	0.754864561	0.75486456
70	140	105	218	2.622998159	0.355303704	0.355303703
140	280	210	157	0.944519979	0.150761802	0.150761801
280	560	420	62	0.186497576	0.047370432	0.047370431
560	1120	840	4	0.006016051	0.006016051	0.00601605
		chip mass (g)	1.19			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	21	11.49425287	5.016503224	5.016503223
35	70	52.5	11	3.010399562	1.815339239	1.815339238
70	140	105	17	2.326217843	1.128381397	1.128381396
140	280	210	6	0.410509031	0.33517922	0.335179219
280	560	420	3	0.102627258	0.11850375	0.102627257
560	1120	840	0	0	0	0
		chip mass (g)	0.10			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	48	89.92974239	25.96048049	25.96048049
35	70	52.5	10	9.367681499	5.924641986	5.924641985
70	140	105	4	1.8735363	1.8735363	1.873536299
140	280	210	2	0.468384075	0.662395111	0.468384074
280	560	420	1	0.117096019	0.234192037	0.117096018
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E2, cont.

PSTG01C Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	2	2.263083451	3.200483309	2.26308345	Run C
17.5	35	26.25	677	766.0537482	58.88367448	58.88367448	Run C
35	70	52.5	247	50.95410005	6.484263495	6.484263494	Run Y
70	140	105	96	9.902011346	2.021239602	2.021239601	Run Y
140	280	210	27	0.04162594	0.016021832	0.016021831	Run X
280	560	420	19	0.014646164	0.006720121	0.00672012	Run X
560	1120	840	1	0.000385425	0.000770851	0.000385424	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	9	0.055501253	0.037000836	0.037000835
70	140	105	20	0.061668059	0.027578795	0.027578794
140	280	210	27	0.04162594	0.016021832	0.016021831
280	560	420	19	0.014646164	0.006720121	0.00672012
560	1120	840	1	0.000385425	0.000770851	0.000385424
		chip mass (g)	4.63			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	269	110.9850438	13.5337551	13.5337551
35	70	52.5	247	50.95410005	6.484263495	6.484263494
70	140	105	96	9.902011346	2.021239602	2.021239601
140	280	210	34	1.753481176	0.601439081	0.60143908
280	560	420	3	0.077359464	0.089327014	0.077359463
560	1120	840	0	0	0	0
		chip mass (g)	0.14			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	2	2.263083451	3.200483309	2.26308345
17.5	35	26.25	677	766.0537482	58.88367448	58.88367448
35	70	52.5	326	184.4413013	20.43051778	20.43051778
70	140	105	124	35.07779349	6.300157695	6.300157694
140	280	210	23	3.253182461	1.356670869	1.356670868
280	560	420	4	0.282885431	0.282885431	0.28288543
560	1120	840	0	0	0	0
		chip mass (g)	0.05			

Table E2, cont.

CRW Sphene Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	14	18.91252955	10.10917227	10.10917227	Run C
17.5	35	26.25	17	22.96521445	11.13976528	11.13976528	Run C
35	70	52.5	21	14.18439716	6.190578446	6.190578445	Run C
70	140	105	9	3.039513678	2.026342452	2.026342451	Run C
140	280	210	3	0.006358249	0.007341874	0.006358248	Run X
280	560	420	4	0.004238833	0.004238833	0.004238832	Run X
560	1120	840	1	0.000529854	0.001059708	0.000529853	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	0	0	0	0
70	140	105	0	0	0	0
140	280	210	3	0.006358249	0.007341874	0.006358248
280	560	420	4	0.004238833	0.004238833	0.004238832
560	1120	840	1	0.000529854	0.001059708	0.000529853
		chip mass (g)	3.37			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	2	0.438885232	0.620677447	0.438885231
35	70	52.5	1	0.109721308	0.219442616	0.109721307
70	140	105	0	0	0	0
140	280	210	4	0.109721308	0.109721308	0.109721307
280	560	420	2	0.027430327	0.03879234	0.027430326
560	1120	840	0	0	0	0
		chip mass (g)	0.26			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	14	18.91252955	10.10917227	10.10917227
17.5	35	26.25	17	22.96521445	11.13976528	11.13976528
35	70	52.5	21	14.18439716	6.190578446	6.190578445
70	140	105	9	3.039513678	2.026342452	2.026342451
140	280	210	2	0.337723742	0.477613496	0.337723741
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E3. Allanite+Chevkinite size distribution data.

PST01A Allanite+Chevkinite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	6	10.74787282	8.775601407	8.775601406	Run C
17.5	35	26.25	4	7.165248545	7.165248545	7.165248544	Run C
35	70	52.5	20	2.757859901	1.233352442	1.233352441	Run B
70	140	105	120	1.031583653	0.188340546	0.188340545	Run A
140	280	210	69	0.2965803	0.071408145	0.071408144	Run A
280	560	420	30	0.064473978	0.023542568	0.023542567	Run A
560	1120	840	4	0.004298265	0.004298265	0.004298264	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	50	0.859653044	0.243146599	0.243146598
70	140	105	120	1.031583653	0.188340546	0.188340545
140	280	210	69	0.2965803	0.071408145	0.071408144
280	560	420	30	0.064473978	0.023542568	0.023542567
560	1120	840	4	0.004298265	0.004298265	0.004298264
		chip mass (g)	1.6618			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	5	1.37892995	1.233352442	1.233352441
35	70	52.5	20	2.757859901	1.233352442	1.233352441
70	140	105	24	1.65471594	0.675534954	0.675534953
140	280	210	11	0.379205736	0.228669663	0.228669662
280	560	420	2	0.034473249	0.048752536	0.034473248
560	1120	840	0	0	0	0
		chip mass (g)	0.2072			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	6	10.74787282	8.775601407	8.775601406
17.5	35	26.25	4	7.165248545	7.165248545	7.165248544
35	70	52.5	3	2.686968204	3.102643632	2.686968203
70	140	105	1	0.447828034	0.895656068	0.447828033
140	280	210	0	0	0	0
280	560	420	0	0	0	0
560	1120	840	0	0	0	0
		chip mass (g)	300.00			

Table E3, cont.

PST01B AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	2	3.088803	4.368227	3.088803	Run C
17.5	35	26.25	2	3.088803	4.368227	3.088803	Run C
35	70	52.5	18	2.443162538	1.151717866	1.151717865	Run B
70	140	105	49	0.385165621	0.11004732	0.110047319	Run A
140	280	210	22	0.086465752	0.03686912	0.036869119	Run A
280	560	420	7	0.013755915	0.010398494	0.010398493	Run A
560	1120	840	1	0.000982565	0.001965131	0.000982564	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	27	0.424468236	0.1633779	0.163377899
70	140	105	49	0.385165621	0.11004732	0.110047319
140	280	210	22	0.086465752	0.03686912	0.036869119
280	560	420	7	0.013755915	0.010398494	0.010398493
560	1120	840	1	0.000982565	0.001965131	0.000982564
		chip mass (g)	1.8174			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	1	0.271462504	0.542925008	0.271462503
35	70	52.5	18	2.443162538	1.151717866	1.151717865
70	140	105	8	0.542925008	0.383905955	0.383905954
140	280	210	5	0.169664065	0.151752153	0.151752152
280	560	420	1	0.016966407	0.033932813	0.016966406
560	1120	840	0	0	0	0
		chip mass (g)	0.2105			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	2	3.088803	4.368227	3.088803
17.5	35	26.25	2	3.088803	4.368227	3.088803
35	70	52.5	2	1.544402	2.184114	1.544402
70	140	105	3	1.158301	1.337491	1.158301
140	280	210	2	0.386100	0.546028	0.386100
280	560	420	1	0.096525	0.193050	0.096525
560	1120	840	0	0.000000	0.000000	0.000000
		chip mass (g)	0.04			

Table E3, cont.

PST01C AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0.000000	0.000000	0.000000	Run C
17.5	35	26.25	5	1.95427008	1.747952298	1.747952297	Run B
35	70	52.5	19	3.713113152	1.703693158	1.703693157	Run B
70	140	105	51	0.683719434	0.191479741	0.19147974	Run A
140	280	210	27	0.180984556	0.069660988	0.069660987	Run A
280	560	420	8	0.026812527	0.01895932	0.018959319	Run A
560	1120	840	0				Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	39	1.045688546	0.334888353	0.334888352
70	140	105	51	0.683719434	0.191479741	0.19147974
140	280	210	27	0.180984556	0.069660988	0.069660987
280	560	420	8	0.026812527	0.01895932	0.018959319
560	1120	840	0	0	0	0
		chip mass (g)	1.0656			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	5	1.95427008	1.747952298	1.747952297
35	70	52.5	19	3.713113152	1.703693158	1.703693157
70	140	105	9	0.879421536	0.586281024	0.586281023
140	280	210	2	0.097713504	0.138187763	0.097713503
280	560	420	3	0.073285128	0.084622377	0.073285127
560	1120	840	0	0	0	0
		chip mass (g)	0.1462			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E3, cont.

PST01D AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	5.056890	10.113780	5.056890	Run C
17.5	35	26.25	5	25.284450	22.615100	22.615100	Run C
35	70	52.5	5	1.84569952	1.650843837	1.650843836	Run B
70	140	105	45	0.744478451	0.22196059	0.221960589	Run A
140	280	210	13	0.107535776	0.059650116	0.059650115	Run A
280	560	420	2	0.008271983	0.01169835	0.008271982	Run A
560	1120	840	1	0.002067996	0.004135991	0.002067995	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	29	0.959550004	0.356367925	0.356367924
70	140	105	45	0.744478451	0.22196059	0.221960589
140	280	210	13	0.107535776	0.059650116	0.059650115
280	560	420	2	0.008271983	0.01169835	0.008271982
560	1120	840	1	0.002067996	0.004135991	0.002067995
		chip mass (g)	0.8635			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	1	0.738279808	1.476559616	0.738279807
35	70	52.5	5	1.84569952	1.650843837	1.650843836
70	140	105	1	0.184569952	0.369139904	0.184569951
140	280	210	2	0.184569952	0.261021329	0.184569951
280	560	420	1	0.046142488	0.092284976	0.046142487
560	1120	840	0	0	0	0
		chip mass (g)	0.0774			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	5.056890	10.113780	5.056890
17.5	35	26.25	5	25.284450	22.615100	22.615100
35	70	52.5	5	12.642225	11.307550	11.307550
70	140	105	5	6.321113	5.653775	5.653775
140	280	210	2	1.264223	1.787881	1.264223
280	560	420	0	0.000000	0.000000	0.000000
560	1120	840	0	0.000000	0.000000	0.000000
		chip mass (g)	0.01			

Table E3, cont.

PST01E AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0.000000	0.000000	0.000000	Run C
17.5	35	26.25	0	0.000000	0.000000	0.000000	Run B
35	70	52.5	17	5.589347361	2.711231712	2.711231711	Run B
70	140	105	69	0.928517601	0.223560767	0.223560766	Run A
140	280	210	34	0.228765206	0.078465818	0.078465817	Run A
280	560	420	8	0.026913554	0.019030756	0.019030755	Run A
560	1120	840	0				Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	31	0.834320164	0.29969665	0.299696649
70	140	105	69	0.928517601	0.223560767	0.223560766
140	280	210	34	0.228765206	0.078465818	0.078465817
280	560	420	8	0.026913554	0.019030756	0.019030755
560	1120	840	0	0	0	0
		chip mass (g)	1.0616			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	13	8.548413612	4.741806708	4.741806707
35	70	52.5	17	5.589347361	2.711231712	2.711231711
70	140	105	6	0.986355417	0.805355825	0.805355824
140	280	210	0	0	0	-0.000000001
280	560	420	0	0	0	-0.000000001
560	1120	840	0	0	0	0
		chip mass (g)	0.0869			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E3, cont.

WSW2A AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0	0.000000	0.000000	0.000000	Run C
17.5	35	26.25	2	4.781829	6.762527	4.781829	Run C
35	70	52.5	17	2.635454616	1.278383265	1.278383264	Run B
70	140	105	98	0.618183424	0.124891912	0.124891911	Run A
140	280	210	52	0.164007847	0.045487592	0.045487591	Run A
280	560	420	16	0.025231976	0.012615988	0.012615987	Run A
560	1120	840	0				Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	54	0.681263365	0.185416403	0.185416402
70	140	105	98	0.618183424	0.124891912	0.124891911
140	280	210	52	0.164007847	0.045487592	0.045487591
280	560	420	16	0.025231976	0.012615988	0.012615987
560	1120	840	0	0	0	0
		chip mass (g)	2.26			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	17	2.635454616	1.278383265	1.278383264
70	140	105	15	1.162700566	0.60041599	0.600415989
140	280	210	9	0.34881017	0.232540113	0.232540112
280	560	420	4	0.077513371	0.077513371	0.07751337
560	1120	840	0	0	0	0
		chip mass (g)	0.18			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0.000000	0.000000	0.000000
17.5	35	26.25	2	4.781829	6.762527	4.781829
35	70	52.5	1	1.195457	2.390915	1.195457
70	140	105	1	0.597729	1.195457	0.597729
140	280	210	0	0.000000	0.000000	0.000000
280	560	420	0	0.000000	0.000000	0.000000
560	1120	840	0	0.000000	0.000000	0.000000
		chip mass (g)	0.02			

Table E3, cont.

WSW2B AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	22	41.217799	17.575328	17.575328	Run C
17.5	35	26.25	7	13.114754	9.913822	9.913822	Run C
35	70	52.5	32	8.757525999	3.09625301	3.096253009	Run B
70	140	105	95	1.143049656	0.234548841	0.23454884	Run A
140	280	210	57	0.342914897	0.090840375	0.090840374	Run A
280	560	420	14	0.042112356	0.022510001	0.02251	Run A
560	1120	840	3	0.004512038	0.005210053	0.004512037	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	37	0.890375522	0.292753668	0.292753667
70	140	105	95	1.143049656	0.234548841	0.23454884
140	280	210	57	0.342914897	0.090840375	0.090840374
280	560	420	14	0.042112356	0.022510001	0.02251
560	1120	840	3	0.004512038	0.005210053	0.004512037
		chip mass (g)	1.19			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	32	8.757525999	3.09625301	3.096253009
70	140	105	32	4.378762999	1.548126505	1.548126504
140	280	210	33	2.257799672	0.786064949	0.786064948
280	560	420	12	0.410509031	0.2370075	0.237007499
560	1120	840	7	0.119731801	0.090508734	0.090508733
		chip mass (g)	0.10			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	22	41.217799	17.575328	17.575328
17.5	35	26.25	7	13.114754	9.913822	9.913822
35	70	52.5	4	3.747073	3.747073	3.747073
70	140	105	2	0.936768	1.324790	0.936768
140	280	210	2	0.468384	0.662395	0.468384
280	560	420	0	0.000000	0.000000	0.000000
560	1120	840	1	0.058548	0.117096	0.058548
		chip mass (g)	0.03			

Table E3, cont.

PSTG01C AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	14	15.841584	8.467683	8.467683	Run C
17.5	35	26.25	59	66.760962	17.383074	17.383074	Run C
35	70	52.5	53	10.93347086	3.003655447	3.003655446	Run B
70	140	105	368	1.134692292	0.118299849	0.118299848	Run A
140	280	210	278	0.428593012	0.051410601	0.0514106	Run A
280	560	420	110	0.084793582	0.016169502	0.016169501	Run A
560	1120	840	11	0.004239679	0.002556623	0.002556622	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	202	1.245694799	0.17529356	0.175293559
70	140	105	368	1.134692292	0.118299849	0.118299848
140	280	210	278	0.428593012	0.051410601	0.0514106
280	560	420	110	0.084793582	0.016169502	0.016169501
560	1120	840	11	0.004239679	0.002556623	0.002556622
		chip mass (g)	4.6331			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	-0.000000001
17.5	35	26.25	31	12.79009799	4.594338824	4.594338823
35	70	52.5	53	10.93347086	3.003655447	3.003655446
70	140	105	19	1.959773079	0.899205558	0.899205557
140	280	210	0	0	0	-0.000000001
280	560	420	0	0	0	-0.000000001
560	1120	840	0	0	0	-0.000000001
		chip mass (g)	0.14			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	14	15.841584	8.467683	8.467683
17.5	35	26.25	59	66.760962	17.383074	17.383074
35	70	52.5	55	31.117397	8.391738	8.391738
70	140	105	3	0.848656	0.979944	0.848656
140	280	210	3	0.424328	0.489972	0.424328
280	560	420	0	0.000000	0.000000	0.000000
560	1120	840	0	0.000000	0.000000	0.000000
		chip mass (g)	0.05			

Table E3, cont.

CRW AllChev Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	1.350895	2.701790	1.350895	Run C
17.5	35	26.25	18	24.316109	11.462724	11.462724	Run C
35	70	52.5	29	3.181917928	1.181734652	1.181734651	Run B
70	140	105	191	0.809617064	0.117163669	0.117163668	Run A
140	280	210	168	0.356061955	0.054941552	0.054941551	Run A
280	560	420	71	0.075239282	0.01785852	0.017858519	Run A
560	1120	840	14	0.007417957	0.003965065	0.003965064	Run A

Run A

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	53	0.449316276	0.123436674	0.123436673
70	140	105	191	0.809617064	0.117163669	0.117163668
140	280	210	168	0.356061955	0.054941552	0.054941551
280	560	420	71	0.075239282	0.01785852	0.017858519
560	1120	840	14	0.007417957	0.003965065	0.003965064
		chip mass (g)	3.37			

Run B

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	10	2.194426158	1.387876963	1.387876962
35	70	52.5	29	3.181917928	1.181734652	1.181734651
70	140	105	21	1.152073733	0.502806199	0.502806198
140	280	210	16	0.438885232	0.219442616	0.219442615
280	560	420	11	0.150866798	0.090976102	0.090976101
560	1120	840	0	0	0	0
		chip mass (g)	0.26			

Run C

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	1.350895	2.701790	1.350895
17.5	35	26.25	18	24.316109	11.462724	11.462724
35	70	52.5	4	2.701790	2.701790	2.701790
70	140	105	3	1.013171	1.169909	1.013171
140	280	210	2	0.337724	0.477613	0.337724
280	560	420	0	0.000000	0.000000	0.000000
560	1120	840	0	0.000000	0.000000	0.000000
		chip mass (g)	0.04			

Table E4. Magnetite size distribution data.

KPST01B Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run Z
17.5	35	26.25	19	5.157787581	2.366555246	2.366555245	Run Z
35	70	52.5	110	14.93043773	2.847122764	2.847122763	Run Y
70	140	105	146	1.147636341	0.189958119	0.189958118	Run X
140	280	210	78	0.306560392	0.069422258	0.069422257	Run X
280	560	420	34	0.066814444	0.022917165	0.022917164	Run X
560	1120	840	6	0.005895392	0.004813568	0.004813567	Run X

Run X

Bin start	Bin end	Bin center	# crystals			
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	128	2.012293858	0.355726658	0.355726657
70	140	105	146	1.147636341	0.189958119	0.189958118
140	280	210	78	0.306560392	0.069422258	0.069422257
280	560	420	34	0.066814444	0.022917165	0.022917164
560	1120	840	6	0.005895392	0.004813568	0.004813567
		chip mass (g)	1.82			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	19	5.157787581	2.366555246	2.366555245
35	70	52.5	110	14.93043773	2.847122764	2.847122763
70	140	105	57	3.868340685	1.024748481	1.02474848
140	280	210	22	0.746521887	0.318318002	0.318318001
280	560	420	2	0.033932813	0.047988244	0.033932812
560	1120	840	0	0	0	0
		chip mass (g)	0.21			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	37	57.14285714	18.78845569	18.78845569
35	70	52.5	13	10.03861004	5.568418958	5.568418957
70	140	105	3	1.158301158	1.337490971	1.158301157
140	280	210	3	0.579150579	0.668745486	0.579150578
280	560	420	2	0.193050193	0.273014201	0.193050192
560	1120	840	0	0	0	0
		chip mass (g)	0.04			

Table E4, cont.

KPST01C Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	33	12.89818253	4.490570761	4.49057076	Run Y
17.5	35	26.25	292	114.1293727	13.35783271	13.35783271	Run Y
35	70	52.5	191	37.32655853	5.401709971	5.40170997	Run Y
70	140	105	83	8.110220833	1.780424776	1.780424775	Run Y
140	280	210	30	1.46570256	0.535198903	0.535198902	Run Y
280	560	420	7	0.170998632	0.129262816	0.129262815	Run Y
560	1120	840	0				Run Y

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	33	12.89818253	4.490570761	4.49057076
17.5	35	26.25	292	114.1293727	13.35783271	13.35783271
35	70	52.5	191	37.32655853	5.401709971	5.40170997
70	140	105	83	8.110220833	1.780424776	1.780424775
140	280	210	30	1.46570256	0.535198903	0.535198902
280	560	420	7	0.170998632	0.129262816	0.129262815
560	1120	840	0	0	0	-0.000000001
		chip mass (g)	0.21			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E4, cont.

WSW2A Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	0.310053484	0.620106968	0.310053483	Run Y
17.5	35	26.25	389	120.6108054	12.23042116	12.23042116	Run Y
35	70	52.5	281	43.56251453	5.197443489	5.197443488	Run Y
70	140	105	252	1.589614518	0.200272605	0.200272604	Run X
140	280	210	196	0.618183424	0.088311918	0.088311917	Run X
280	560	420	91	0.143506866	0.030087214	0.030087213	Run X
560	1120	840	3	0.002365498	0.002731442	0.002365497	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	194	2.447501719	0.351440765	0.351440764
70	140	105	252	1.589614518	0.200272605	0.200272604
140	280	210	196	0.618183424	0.088311918	0.088311917
280	560	420	91	0.143506866	0.030087214	0.030087213
560	1120	840	3	0.002365498	0.002731442	0.002365497
		chip mass (g)	2.26			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	0.310053484	0.620106968	0.310053483
17.5	35	26.25	389	120.6108054	12.23042116	12.23042116
35	70	52.5	281	43.56251453	5.197443489	5.197443488
70	140	105	47	3.64312844	1.062809798	1.062809797
140	280	210	10	0.387566855	0.245118802	0.245118801
280	560	420	1	0.019378343	0.038756686	0.019378342
560	1120	840	0	0	0	0
		chip mass (g)	0.18			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E4, cont.

WSW2B Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	1	1.8735363	3.7470726	1.873536299	Run Z
17.5	35	26.25	389	212.9173508	21.59067643	21.59067643	Run Y
35	70	52.5	281	76.90202518	9.175180413	9.175180412	Run Y
70	140	105	443	5.33022103	0.506492887	0.506492886	Run X
140	280	210	153	0.920455776	0.148828878	0.148828877	Run X
280	560	420	55	0.165441398	0.044616227	0.044616226	Run X
560	1120	840	8	0.012032102	0.008507981	0.00850798	Run X

Run X

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	204	4.909097472	0.687411142	0.687411141
70	140	105	443	5.33022103	0.506492887	0.506492886
140	280	210	153	0.920455776	0.148828878	0.148828877
280	560	420	55	0.165441398	0.044616227	0.044616226
560	1120	840	8	0.012032102	0.008507981	0.00850798
		chip mass (g)	1.19			

Run Y

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	0.547345375	1.09469075	0.547345374
17.5	35	26.25	389	212.9173508	21.59067643	21.59067643
35	70	52.5	281	76.90202518	9.175180413	9.175180412
70	140	105	47	6.431308155	1.876205419	1.876205418
140	280	210	10	0.684181719	0.432714513	0.432714512
280	560	420	1	0.034209086	0.068418172	0.034209085
560	1120	840	0	0	0	0
		chip mass (g)	0.10			

Run Z

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	1	1.8735363	3.7470726	1.873536299
17.5	35	26.25	9	16.8618267	11.2412178	11.2412178
35	70	52.5	12	11.2412178	6.490120122	6.490120121
70	140	105	1	0.468384075	0.93676815	0.468384074
140	280	210	7	1.639344262	1.23922778	1.239227779
280	560	420	1	0.117096019	0.234192037	0.117096018
560	1120	840	0	0	0	0
		chip mass (g)	0.03			

Table E4, cont.

PSTG01C Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run Y
17.5	35	26.25	3	1.237751418	1.429232229	1.237751417	Run Y
35	70	52.5	13	2.68179474	1.487592068	1.487592067	Run X
70	140	105	682	2.102880823	0.161046937	0.161046936	Run X
140	280	210	508	0.783184354	0.069496373	0.069496372	Run X
280	560	420	351	0.27056861	0.028883768	0.028883767	Run X
560	1120	840	53	0.020427545	0.005611878	0.005611877	Run X

Run X

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	12	0.148003342	0.08544977	0.085449769
17.5	35	26.25	0	0	0	0
35	70	52.5	512	3.157404638	0.279077779	0.279077778
70	140	105	682	2.102880823	0.161046937	0.161046936
140	280	210	508	0.783184354	0.069496373	0.069496372
280	560	420	351	0.27056861	0.028883768	0.028883767
560	1120	840	53	0.020427545	0.005611878	0.005611877
1120	2240	1680	0	0	0	0
		chip mass (g)	4.63			

Run Y

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	3	1.237751418	1.429232229	1.237751417
35	70	52.5	13	2.68179474	1.487592068	1.487592067
70	140	105	20	2.06291903	0.922565437	0.922565436
140	280	210	7	0.36101083	0.272898536	0.272898535
280	560	420	2	0.051572976	0.072935202	0.051572975
560	1120	840	0	0	0	0
		chip mass (g)	0.14			

Run Z

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

Table E4, cont.

CRW Magnetite Size Distribution

Combined Runs

Bin start	Bin end	Bin center	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)	
8.75	17.5	13.125	0				Run Y
17.5	35	26.25	13	2.852754005	1.582423206	1.582423205	Run Y
35	70	52.5	63	6.912442396	1.741771765	1.741771764	Run Y
70	140	105	449	1.903235925	0.179638513	0.179638512	Run X
140	280	210	323	0.684571496	0.076181154	0.076181153	Run X
280	560	420	216	0.228896971	0.031148932	0.031148931	Run X
560	1120	840	39	0.02066431	0.006617876	0.006617875	Run X

Run X

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0	0	0	0
17.5	35	26.25	0	0	0	0
35	70	52.5	363	3.077392609	0.323042446	0.323042445
70	140	105	449	1.903235925	0.179638513	0.179638512
140	280	210	323	0.684571496	0.076181154	0.076181153
280	560	420	216	0.228896971	0.031148932	0.031148931
560	1120	840	39	0.02066431	0.006617876	0.006617875
		chip mass (g)	3.37			

Run Y

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125	0			
17.5	35	26.25	13	2.852754005	1.582423206	1.582423205
35	70	52.5	63	6.912442396	1.741771765	1.741771764
70	140	105	60	3.291639236	0.849897596	0.849897595
140	280	210	25	0.685758174	0.27430327	0.274303269
280	560	420	2	0.027430327	0.03879234	0.027430326
560	1120	840	0	0	0	0
		chip mass (g)	0.26			

Run Z

Bin start	Bin end	chip mass (g)	# crystals	#/bin size/mass	sqrt(#)/bin size/mass (+)	sqrt(#)/bin size/mass (-)
8.75	17.5	13.125				
17.5	35	26.25				
35	70	52.5				
70	140	105				
140	280	210				
280	560	420				
560	1120	840				
		chip mass (g)				

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