AN ABSTRACT OF THE THESIS OF

Claire M. McKee for the degree of Master of Science in Geology presented on June 29, 2001.
Title: Volcanology and Petrology of Volcán Miño, Andean Central Volcanic Zone.

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Anita L. Grunder

Volcán Miño (21°11'S) is located on the westernmost periphery of a long-lived complex of stratovolcanoes and domes called the Aucanquilcha Complex. The Aucanquilcha Complex ranges in age from 11 Ma to Holocene and lies along the main N-S trending axis of Quaternary volcanoes in the Andean Central Volcanic Zone (CVZ). Volcán Aucanquilcha lies at the center of the complex and forms a ridge extending 10 km in an east-west direction; defined by a distinct cluster of andesite and dacite stratocones, dacite domes and a prominent collapse structure and two debris avalanche deposits. In contrast to the main edifice, Volcán Miño (5611 m) is a steep-sided, symmetric andesitic stratovolcano. Volcán Miño lavas range in age from 3.0 to 3.7 Ma and eruptive products are dominantly two-pyroxene ± hornblende andesites. Basaltic andesites and dacites are rare.

Volcán Miño lavas conform to regional med- to high-potassium calc-alkaline trends and are characterized by subduction-related light rare earth and large ion lithophile-element enrichments and high field strength element depletions. Miño lavas are distinctive in that they display a restricted range in whole-rock composition, 60±2 weight percent SiO_2. Despite this whole-rock compositional homogeneity, lavas are texturally and mineralogically diverse as evidenced by variations of proportions and textures of clinopyroxene, orthopyroxene, and amphibole in assemblages with similar weight percent SiO_2.

Volcán Miño lavas exhibit textural evidence for both thermal and chemical disequilibrium including mixed phenocryst populations, xenocrysts, and amphibole breakdown textures. Petrographic observation suggests that these lavas have undergone complicated magmatic histories involving combined mixing, assimilation, fractionation, and hybridization. Major and trace element modeling and petrographic interpretation of disequilibrium phenocryst assemblages elucidate the importance of magma mixing in buffering whole-rock composition in an open magmatic system. Amphibole disequilibrium textures preserve important information about the pre-eruptive conditions of Volcán Miño's magma chamber and are used here to constrain the range in pressure, temperature, f_{O2}, and water concentration responsible for the generation of Miño andesites.

Volcanology and Petrology of Volcán Miño, Andean Central Volcanic Zone

by

Claire M. McKee

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CHAPTER 1: INTRODUCTION

Processes involved in magmagenesis along subduction zones and the interactions between the crust and mantle at volcanic arcs continue to be a focus of much research (Tatsumi and Eggins, 1995). In the past, studies of subduction zones have focused on across-arc and along-arc variations in composition and crustal and mantle contributions to magmatism (Hildreth and Moorbath, 1988), yet the geology and petrology of individual volcanic centers have largely been overlooked. It is in this respect that the Central Andes represent an ideal laboratory in which to study both the interactions between the crust and the mantle and the evolution of individual eruptive centers.

The Central Andes (CVZ) are located between 16° and 28° S latitude along the South American convergent plate margin. One of three active volcanic zones within the Andes, the CVZ is anomalous because it constitutes an area of extremely thick continental crust as thick as 60-70 km. Magmatic processes within the CVZ are not well understood due to a lack of comprehensive studies of individual volcanoes combined with the inherent complexities involved in tracing true mantle and crustal signatures in an anomalous geologic setting. Magmas ascending through 70 km of

crust are contaminated and have acquired crustal signatures while in transit at one or more levels in the crust. Furthermore, no primary melts have been identified in the CVZ. Owing to these unknowns, a consensus regarding the interplay of petrogenetic processes active at CVZ volcanoes has not been reached.

The purpose of this study is to understand the petrologic evolution of Volcán Miño, a Pliocene stratovolcano, which lies along the main axis of Quaternary volcanoes in the Central Andes. Volcán Miño is a 5611m andesitic stratovolcano located on the westernmost periphery of the Aucanquilcha Complex (21°11'S/68°35'W), a cluster of thirteen overlapping stratovolcanoes and domes in the Central Andes of northern Chile. The broader context of the study of Volcán Miño, as part of the Aucanquilcha Complex, is to establish the mass and heat budget for the complex and thereby determine the evolution of a long-lived magmatic system through time, from 10 Ma to present (A.L. Grunder, Oregon State University, and student E. Klemetti, in progress). This work will contribute to a better understanding of detailed-scale petrogenetic processes active at individual CVZ volcanoes and elucidate uncertainties involved in broad-scale Andean magmagenesis.

Eruptive products from the Aucanquilcha Complex are largely 2-pyroxene±hornblende andesites, hornblende-biotite dacites, and olivine- and clinopyroxene-bearing basaltic andesites. Despite the compositional

diversity of the Complex as a whole, Volcán Miño is significant because it erupted 22 km^3 of chemically homogeneous lava during its ~700,000-1,000,000 year lifetime. All lavas within the complex conform to regional medium- to high-K calc-alkaline trends. Miño lavas, however, plot between 60±2% SiO_2 and are dominantly 2-pyroxene andesites ± hornblende. Basaltic andesites and dacites are rare. Despite the homogeneous major and trace element character of Volcán Miño lavas, lavas are texturally and mineralogically diverse. The mineralogic and textural variation will be addressed here to constrain pre-eruptive magma chamber conditions and the evolution of the Miño magmatic system in time. In combining field efforts with petrographic interpretation, geochemical analysis, and radiometric age dating, I will present a simple geochemical model to explain chemical homogeneity of Miño lavas, despite their marked mineralogic complexity. The minerals tell a story, which is otherwise overprinted by whole-rock homogeneity.

Of the work synthesized here, my contributions to the gathering of data include detailed mapping and sampling, and sample preparation for all analyses excluding X-Ray Fluorescence Spectrometry (XRF). Diane Johnson at Washington State University's GeoAnalytical Laboratory performed XRF analyses on selected samples. I conducted all of the electron microprobe analyses and $^{40}Ar/^{39}Ar$ age dating in the College of Oceanic and Atmospherice Sciences, Oregon State University (COAS).

Samples analyzed by Inductively Coupled Mass Spectrometry (ICP-AES) were prepared with the help of Vaughn Balzer at COAS. Neutron Activation Analyses were performed by Erwin Schutfort in the Oregon State University's Triga Reactor Facility. Isotopic analyses were conducted by G. Lang Farmer at University of Colorado at Boulder, Department of Geological Sciences and CIRES.

CHAPTER 2: REGIONAL TECTONIC AND GEOLOGIC SETTING

2.1 Introduction

Subduction of the Nazca Plate beneath the South American Plate since the Jurassic has resulted in the formation of the Andean volcanic arc 250-300 km inland from the Peru-Chile trench (Wömer et al., 1992) (Figure 1). The orogenic belt, continuous for more than 7000 km, is divided into eight distinct tectonic segments, which coincide with variations in the geometry of the subducted Nazca Plate (Dorbath, 1997). The distribution of Wadati Benioff zone seismicity provides evidence that the Andean orogen is segmented into zones of shallow (0-10°) and moderate dip (25-30°) along strike (Isacks, 1988).

Zones of shallow subduction are associated with the absence of present-day volcanic activity and mark the boundaries between the Northern (NVZ), Central (CVZ), and Southern (SVZ) volcanic zones (Figure 1). In the NVZ (2-5°S) and SVZ (33-46°S) Paleozoic to Mesozoic crust attains a thickness on the order of 45 km, whereas Proterozoic and Paleozoic crust in the CVZ exceeds 70 km in thickness (James, 1971; Rogers and Hawkesworth, 1989; Zandt et al., 1994). Compositions of the volcanic rocks vary systematically along strike of the arc within and between these zones. Volcanic rocks of the NVZ and the SVZ are dominated by abundant basaltic andesites and andesites, whereas

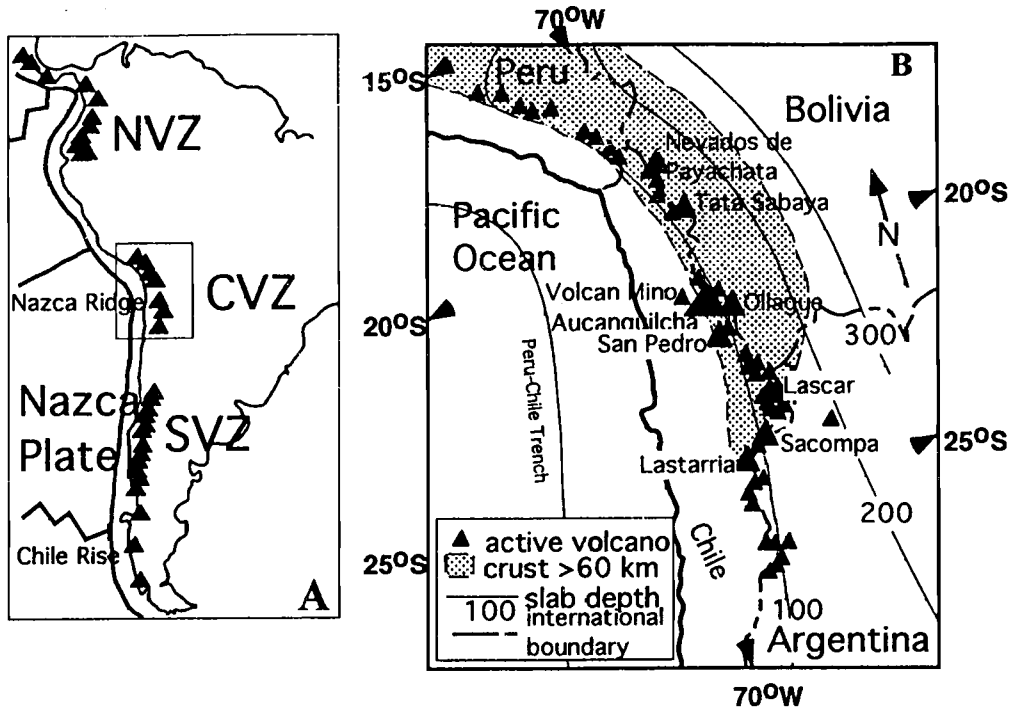


Figure.1A. The three active volcanic zones of the Andes: Northern (NVZ); Central (CVZ); and Southern (SVZ). CVZ=Central Andes. Box indicates area of B.
1B. Volcanoes of the Central Andes illustrated relative to crustal thickness and depth of downgoing Nazca Plate. Volcan Aucanquilcha is labeled, as are nearby volcanoes for which some detailed work has been published (Nevados de Payachata- Wőrner et al., 1988; Davidson et al., 1990. Tata Sabaya- deSilva et al., 1993. Ollagűe- Feeley et al., 1993; Feeley and Hacker, 1995. San Pedro-San Pablo- O'Callaghan and Francis, 1986. Lascar- Matthews et al., 1996; Gardeweg et al., 1998. Socompa- Ramirez, 1990).

andesites, dacites, and voluminous dacite-rhyolite ignimbrite sheets characterize the CVZ volcanics (Rogers and Hawkesworth, 1989). The focus herein will be on the CVZ, where convergence and crustal thickening have created a continental plateau second only in thickness to the Tibetan Plateau and volcanoes are dominated by crustally contaminated compositions.

2.2 Evolution of the CVZ

The Central Volcanic Zone of southern Peru, western Bolivia, northern Chile, and northwestern Argentina (16-28°S) constitutes one of the best-developed examples of a subduction zone setting and is noted for both it's great crustal thickness and strong "crustal signature" of the volcanic rocks (Davidson et al., 1990; Feeley and Davidson, 1994). The rate of convergence along the South American margin is 8.7 cm/a (Scheuber et al., 1999), where motion is accommodated near the top of the subducting Nazca Plate (Demets et al., 1990). The age of the downgoing Nazca plate is thought to be between 45 and 55 Ma (de Silva et. al, 1993). Angle of plate convergence changes from 75° in the northern CVZ to 90° in the southern CVZ due to bending of the South American Plate in the Arica Elbow (18° S), where the strike of the Andean chain changes and no deep seismicity has ever been recorded (Wörner et al., 1992; Dorbath, 1997).

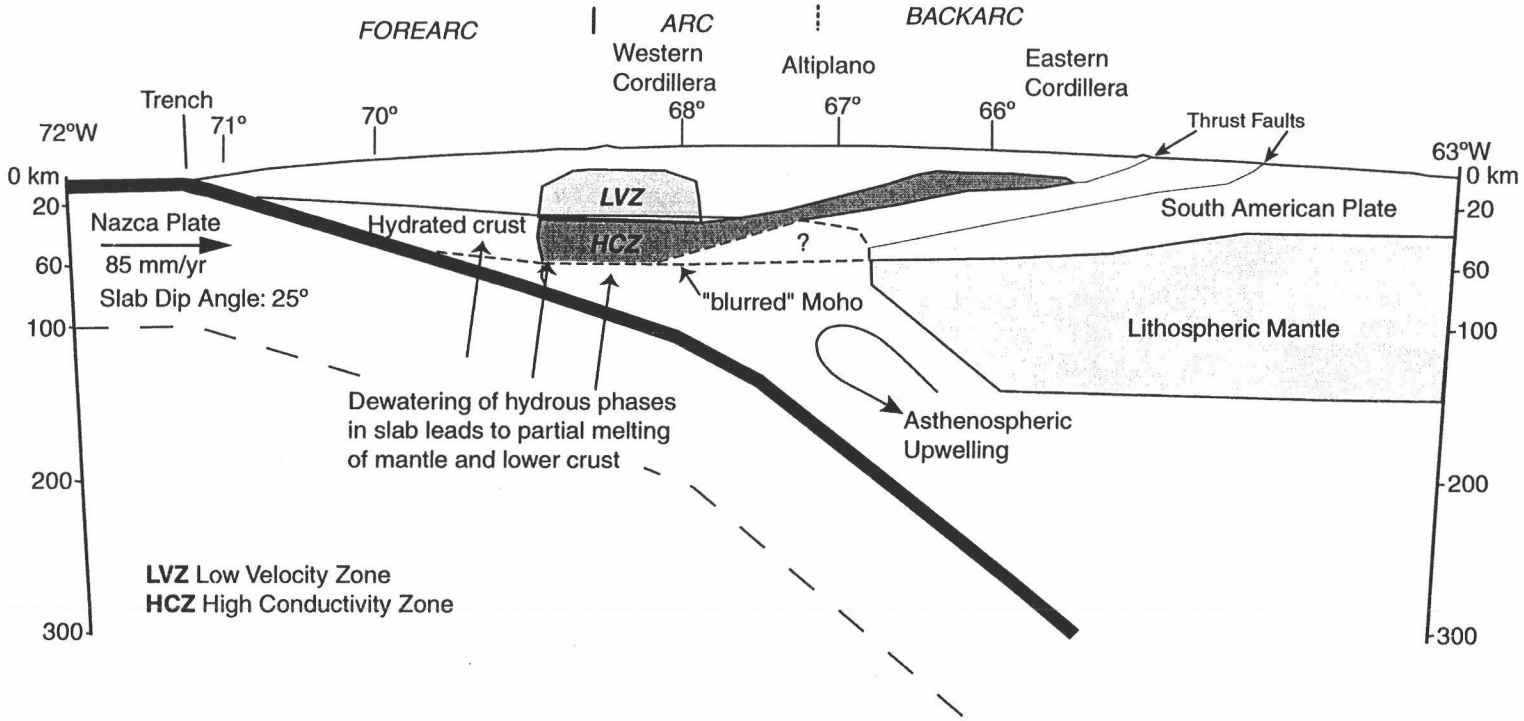


Figure 2. Schematic cross section of the Central Andes subduction zone. Topography, crustal thickness, thrust configuration, brittle-ductile transition, Moho and possible lithospheric boundary are taken from Okaya et al. (1997). Crustal thickness also after Beck et al. (1996), who suggest that the crust is thickest under the Eastern and Western Cordilleras. Geophysic provinces are taken from Reutter et al. (1998). The box labeled HCZ is a zone of high electrical conductivity; LVZ is a zone of low seismic wave attenuation.

Volcanoes of the Central Andes lie approximately 135 to 180m above the moderately dipping (25-30°) Wadati-Benioff zone (Feeley, 1993).

The Peru-Chile trench, in the CVZ sector of the Andean arc is deep, (ca. 7000 m) and starved of sediments (Thornburg and Kulm, 1987). Topographic relief across the CVZ climbs to >6000 m in the high Cordillera. From west to east across the orogen, changes in structure, geomorphology, and distribution of magmatism are defined by eight north-trending trench parallel structural belts, including the Coastal Cordillera, Longitudinal Valley, and the PreCordillera, which constitute the forearc. The Western Cordillera, the Altiplano, the Eastern Cordillera, SubAndean Zone, and the Chaco Plain (Wörner et al., 1992) define structural belts in the arc and back arc (Figure 2).

The forearc is characterized by Mesozoic to Paleogene volcanic rocks that are younger eastward, marking the migration of the Andean arc since the Jurassic to its location in the Western Cordillera from the Late Miocene to Recent. Upper Miocene to Recent stratovolcanoes of the Western Cordillera form an almost continuous N-S aligned volcanic zone with nearly 1100 active volcanoes (deSilva and Francis, 1990). The Altiplano, Eastern Cordillera, InterAndean Zone, and the Chaco Plain comprise structural belts in the backarc. The Altiplano is a high plateau with a mean elevation of 4 km. The Eastern Cordillera is a mountain belt dominated by folding and thrusting of Paleozoic through Cenozoic rocks.

Paleozoic to Cenozoic sediments in the backarc have been subjected to compressional deformation since the late Oligocene. Contraction and compression have led to the thrusting of the Andean orogen over the foreland, resulting in a doubling of the continental crust in the backarc.

Tectonic evolution of the Central Andes throughout the Cenozoic occurred in response to changes in plate convergence rate, obliquity, and steepness of the subducting Nazca Plate (Trumbell et al., 1999). Estimates for plate motion from Pardo-Casas and Molnar (1987) show a doubling of the convergence rate (from 5 to 10 cm/year) and a major decrease in the angle of obliquity to the margin at about 25 Ma (Trumbull et al., 1999). Central Andean topography is consequently considered to be a primary tectonic signal of late Cenozoic mountain building as a result of changes in convergence and consequent crustal thickening.

Recent geophysical models emphasize the relationship between Andean topography and thick crustal roots beneath the volcanic arc (Isacks, 1988; Gubbels et al., 1993, Okaya et al., 1997). The thickness of Central Andean crust has been evaluated by both seismological and seismic refraction studies and gravimetric surveys (James, 1971; Schmitz et al., 1997). Continental crust achieves a maximum thickness of between 60-70 km beneath the Western Cordillera and the Altiplano, almost twice the thickness of crust in the forearc and foreland regions of the CVZ. The thickening of the Andean crust has been explained by a number of different

mechanisms such as magmatic addition (James, 1971; Thorpe et al., 1981), crustal shortening (Ruetter et al., 1988), and thermal uplift coupled with shortening (Isacks, 1988). Most workers agree that igneous activity is insufficient to account for 30-45 km of crustal thickening in the CVZ since the Late Miocene. Recent models suggest that the last mountain building phase, which thickened the crust and uplifted the Altiplano resulted in response to compressional deformation and accommodation through crustal shortening along the active plate margin (Isacks, 1988; Gubbels et al., 1993, Okaya et al., 1997). Several workers suggest that erosion and replacement of cold lithospheric mantle by asthenospheric mantle may have contributed to the present-day high elevation Western Cordillera and Altiplano (Okaya et al., 1997). There is an agreement among geophysicists that little or no lithospheric mantle exists beneath the active arc. The timing of plateau uplift and deformation is argued to be synchronous with an increase in convergence rate between the Nazca and South American Plates during the late Oligocene, which coincided with widespread ignimbrite and stratovolcanic activity beginning ~27 Ma. Since the middle Miocene, ignimbrite and stratovolcanic activity have overlapped in time and space becoming progressively more focused in the Western Cordillera today.

Recent geophysical work in the CVZ has revealed a zone of low seismic velocities (LSV) beneath the arc at depths from 20 km to the base

of the crust at 70 km (Wigger et al., 1994) (Figure 2). A zone of exceptionally high electric conductivity has likewise been identified (Schwarz et al., 1994), which coincides with low seismic velocity and low-density areas of the crust. Together, these lines of geophysical evidence combined with high heat flow values (>100 mW/m^2) and negative gravimetric anomalies beneath the active volcanic zone suggest that an area of interconnected partial melting exists within the thick crustal roots of the Western Cordillera (Schmitz et al., 1997; Schilling et al., 1997).

2.3 Geology of the CVZ

Volcanoes of the CVZ are part of a broad north-northwest trending belt of late-Cenozoic calc-alkalic and alkalic volcanic rocks. The northern segment of the CVZ between 16° and 22° S is characterized by a regular chain of evenly spaced volcanoes, while further south between 22° and 28° S the volcanic chain steps back to the east, becomes wider and more irregular (Wörner et al., 1992).

Late Cenozoic volcanic activity appears to have initiated during the Miocene (Baker and Francis, 1978) and is characterized by two episodes on the basis of composition and eruptive style. First, large scale regionally extensive rhyolite to dacite ignimbrite volcanism began ~23 Ma. The second episode overlaps in time and consists of eruptions of basaltic andesite through dacite lavas ranging from 23 Ma to present, with the largest volumes erupted throughout the Pleistocene and Pliocene. This

group is not as regionally extensive and forms the large stratovolcanoes confined to the Western Cordillera. Volcanic stratigraphy of the CVZ indicates that volcanic activity was dominated by early eruptions of silicic material and that a greater proportion of mafic material has been erupted over time (Baker and Francis, 1978).

The crust beneath the Western Cordillera achieves a maximum thickness of 70 km and decreases to ~60 km on the eastern-most margin (James, 1971). Volcanic centers in the CVZ were built on top of a 150,000km^2 Tertiary rhyolitic to dacitic ignimbrite plateau. The upper crust beneath the active volcanic front consists of Mesozoic igneous and marine sedimentary rocks overlain by Cretaceous continental volcaniclastic sedimentary and younger Miocene to Holocene volcanic rocks. Geophysical studies suggest that the upper 20 km of crust is probably composed of granitic and intermediate composition plutonic rocks comagmatic with the late Cenozoic rocks (Feeley and Hacker, 1995). Middle crustal to deep crustal sources can be estimated by comparison to Paleozoic (south) and Proterozoic (north) basement rocks exposed in the PreCordillera. The lower 40-50 km are composed of amphibolite and more silicic anhydrous metamorphic rocks, pyroxene gneisses and gabbros.

2.4 CVZ Petrology

The Andes are a type area in which to consider continental growth through subduction zone processes. In the past, research in the CVZ has focused on regional-scale studies of Quaternary volcanic centers (Rogers and Hawkesworth, 1989; Wörner et al., 1992). Compositional studies combining detailed field, geochemical, and mineralogic data are few. Single-scale studies include Volcán Parincota (18°S) (Wörner et al, 1988; Davidson et al., 1990), Volcán Tata Sabaya (19°S) (deSilva et al., 1993), Volcán Ollagüe (21°S) (Feeley et al., 1993; Feeley and Davidson, 1994), San Pedro-San Pablo (22°S) (Francis et al., 1995) and Lascar Volcano (23°S) (Matthews et al., 1994; Gardeweg, 1998). To date, regional studies have failed to provide a consensus regarding the complex nature of mantle sources and the crustal interaction with mantle derived melts in an anomalously thick crustal setting.

Volcanic rocks of the Central Andes are highly differentiated (Davidson et. al, 1991). Stratocones are constructed of predominately metaluminous, medium- to high-potassium calc-alkaline andesites and dacites. Basalts are rare along the arc front. Chemical variations in the volcanic rocks are typical with an overall decrease in FeO*, MgO, and TiO_2 and an increase in alkalies with increasing silica. CVZ lavas likewise conform to subduction related trace element trends, and demonstrate a

relative depletion in the high-field strength elements Nb and Ta, and relative enrichment in the large ion lithophile elements (such as Ba, K, Sr, and Rb).

The nature of magmatism in the Andes has attracted attention due to the elevated isotopic and trace element compositions of CVZ volcanic rocks when compared to those in the north and south in the NVZ and SVZ respectively. Volcanic rocks of the Central Andes have elevated oxygen isotopic ratios and initial Sr isotope ratios, and have lower Nd isotope ratios than do volcanic rocks from the NVZ and SVZ. Most workers agree that a strong correlation exists between isotope and trace element composition and variations in crustal thickness. Enriched isotope and trace element signatures of CVZ volcanics have been ascribed to (1.) extensive crustal contamination of a depleted asthenospheric mantle source (Davidson, 1990), (2.) recycling of crustal or sedimentary components into the mantle (James, 1982), and (3.) involvement of an enriched subcontinental mantle lithosphere (Rogers and Hawkesworth, 1989).

Isotopic enrichment from a crustal or sedimentary source is unlikely because oxygen isotopes are too far removed from mantle values and volcanic rocks have a positive correlation with Sr and Pb isotope patterns (Deruelle et al., 1983). It is likewise difficult to support a model for involvement of "enriched subcontinental mantle lithosphere" because the there are NO primative volcanic rocks in the Central Andes and CVZ lithospheric mantle is thought to be highly depleted, cold and infertile

(Davidson et al., 1990). Geophysical data also suggest that lithospheric mantle has been absent beneath the Western Cordillera since the Miocene and volcanism corresponds rather to places where there is a substantial asthenospheric wedge (Thorpe et al., 1980). It is also unlikely that a mantle melt could traverse 60-70 km of crust unaffected (c.f., Reiners et al., 1995).

The principal argument for crustal interactions as the leading cause for generation of CVZ compositional trends is the correlation between isotopic and trace element variation with crustal thickness (Wörner et al., 1992; Hildreth and Moorbath, 1988). Wörner and coworkers established two isotopic provinces defined by variations in Sr- and Pb- isotopic compositions in a north-south traverse of the CVZ between 17.5° and 22°S latitude. In northern Chile, crustal thickness, distance to the trench, height above the Benioff zone, and sediment supply to the trench are constant. The only subduction zone parameter, which varies within this segment of the arc, is the age and composition of continental crust. Wörner et al. consequently attribute changes in isotopic signatures to crustal influences within the CVZ. In an analogous study, Hildreth and Moorbath (1988) correlate changes in isotopic composition with crustal thickness in the SVZ. Isotopic variations in the northern part of the SVZ are independent of subduction angle, convergence rate, composition of the downgoing slab, and mantle composition, which remain constant along strike between 33-36°S. The only parameter which varies here is crustal thickness. The crust

nearly doubles in thickness from north to south in this segment of the SVZ. Hildreth and Moorbath (1988) conclude that isotopic variation in the SVZ must be attributed to differences in crustal thickness. As a result of this study, Hildreth and Moorbath (1988) introduce the MASH (melting, assimilation, storage, and hybridization) model for deep crustal hybridization between crustal and mantle reservoirs to yield parental base-level magmas, which will be addressed here in regard to Volcán Miño.

2.5 Geology of the Aucanquilcha Complex

The Aucanquilcha Complex is located along the main axis of Quaternary volcanoes within the CVZ of northern Chile (21°11'S/68°35'W) (Figure 3). Volcán Aucanquilcha (6176m) lies at the center of the complex and forms a ridge extending 10 km in an east-west direction, defined by an alignment of andesite and dacite stratocones and domes. Both the eastern and western ends of the ridge that make up Aucanquilcha were sources of major debris avalanche deposits. The western termination has a prominent collapse structure. Volcán Aucanquilcha is flanked on all-sides by at least twelve overlapping stratovolcanoes and one dome, which span a wide range in age from the Late Miocene based on onlap of 9.4 Ma Ujina Ignimbrite (Vergara, 1978), to Recent; deSilva and Francis (1991) report that feeble fumarolic activity persists to the present day and is most obvious

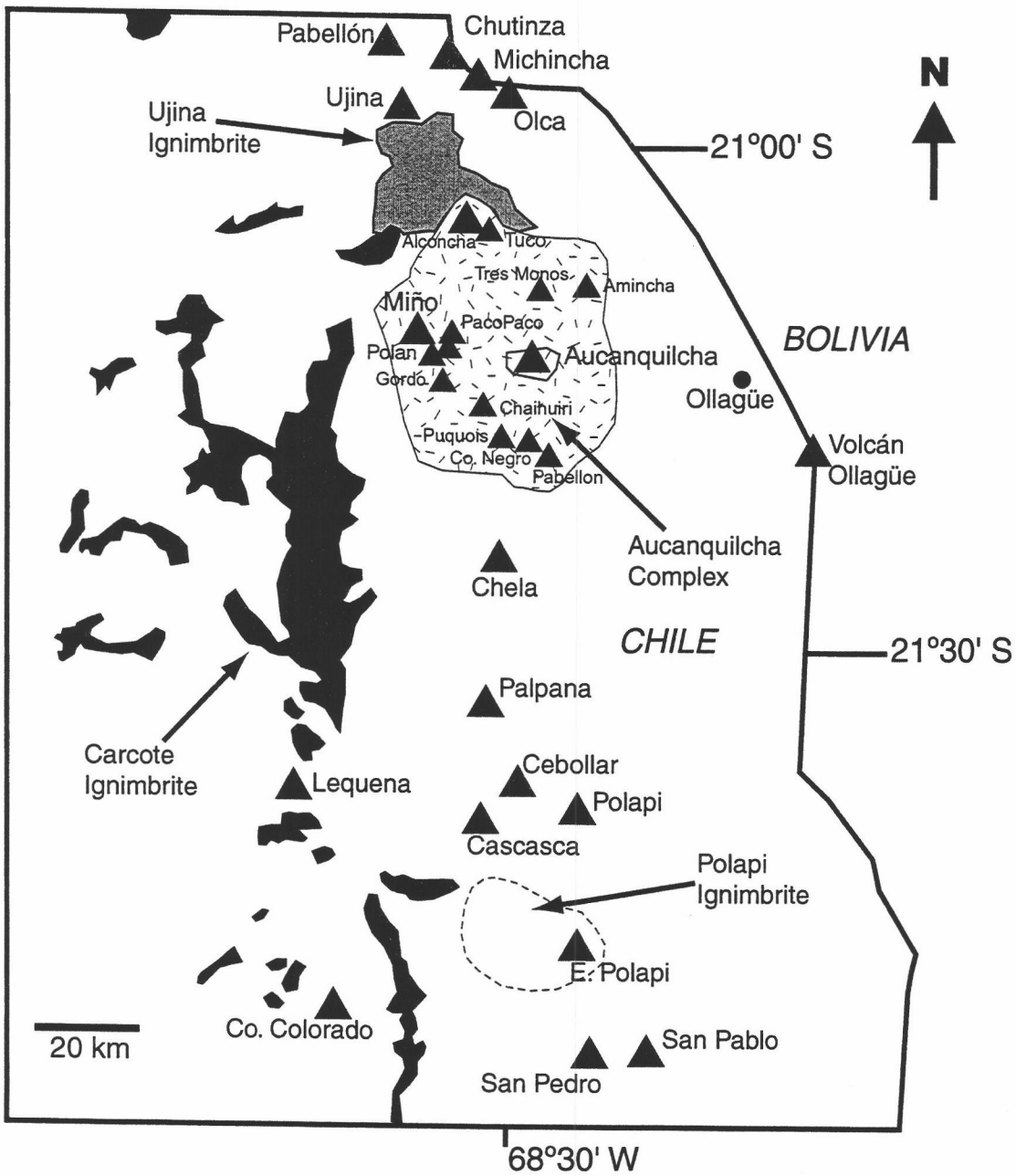


Figure 3. The Aucanquilcha Complex, Volcán Miño,and vicinity. Volcanoes are illustrated here as triangles. The cross-hatched region represents the area of extent for the Aucanquilcha Complex. Regional ignimbrites (Ujina, Carcote) are outlined in varying shades of gray.

within shallow sulfur mine workings (Figure 4). Work in progress yields ages ranging from 11 Ma to 0.6 Ma for the Aucanquilcha Complex.

The Aucanquilcha Complex encompasses an area of 1000 km^2. The exposed geology in the vicinity includes Miocene to Recent volcanic rocks, late Miocene silicic ignimbrites, glacial moraines and sediments, and alluvial deposits. The immediate upper crustal basement beneath the Aucanquilcha Complex, although not well exposed, is predominantly composed of Tertiary ignimbrite (Carcote Ignimbrite 5.6±0.4 Ma; Baker and Francis, 1978) and late Miocene to Recent intermediate volcanic rocks. Jurassic marine sediments, volcaniclastics, and lavas unconformably underlie late Cenozoic volcanics. Wörner et al. (1992) suggest that the lower crust at 21°S latitude is analogous to Paleozoic basement exposed in the PreCordillera, predominantly composed of amphibolites, pyroxene gneisses, and gabbros.

Volcanic edifices within the Aucanquilcha Complex overlap in both time and space (Figure 4 and Appendix B). The oldest edifice within the complex is Volcán Tuco(10.96 ± 0.17 and 11.08 ± 0.69 Ma), which lies directly east of Volcán Alconcha (10.43 ± 0.09 Ma) at the northernmost extent of the Aucanquilcha complex. The Ujina Ignimbrite (9.4 Ma) laps on to both Volcán Tuco and Volcán Alconcha to the north and stratigraphic relationships between the centers suggest that Tuco is the older of the two. Volcán Tuco lavas are predominantly basaltic andesites and hornblende

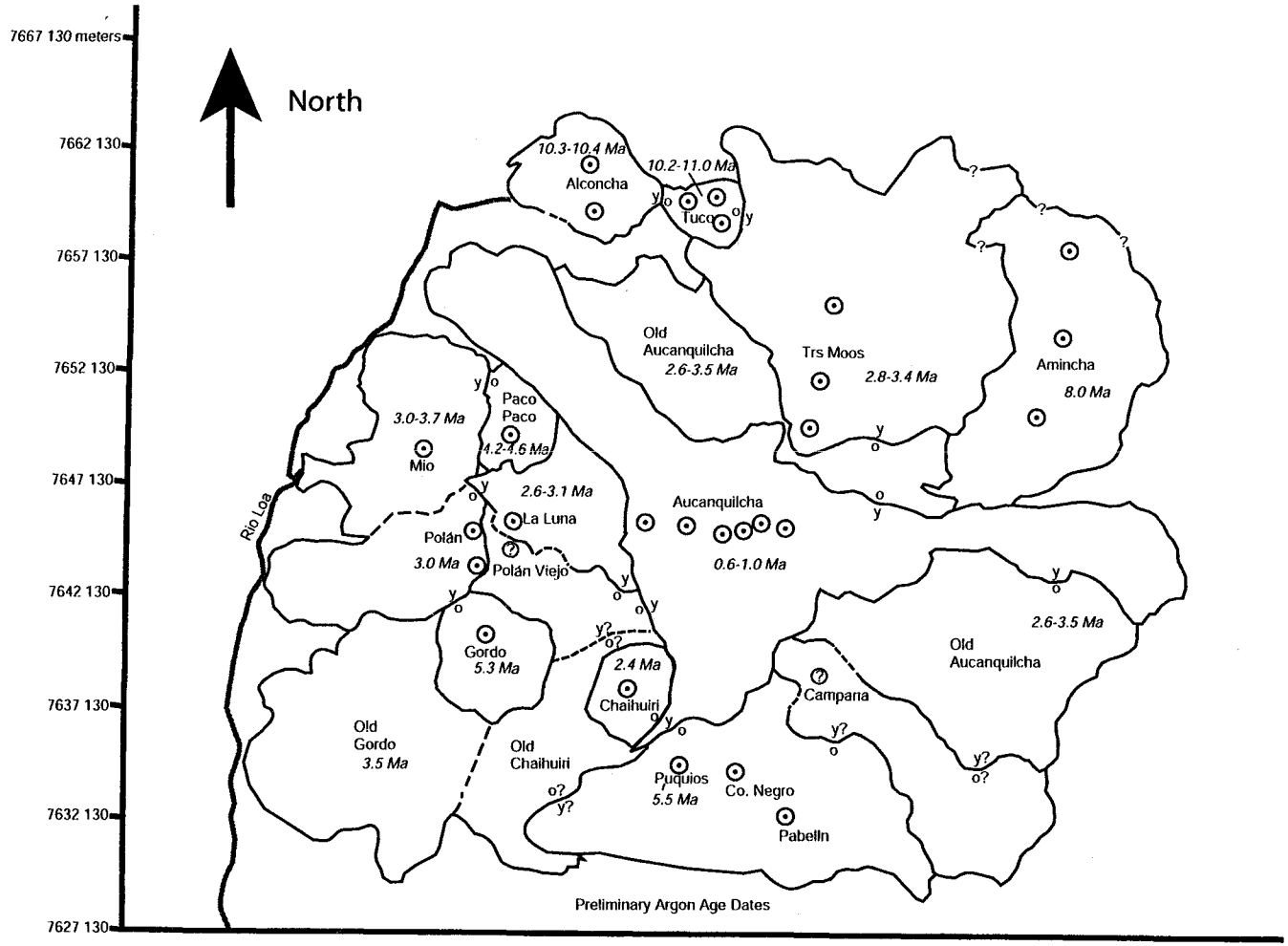


Figure 4. Generalized map of the Aucanquilcha Complex. Volcanic centers within the complex are outlined and central vents for each center are shown here as circles. Preliminary argon dates illustrate the range of volcanic activity for the complex. Stratigraphic relationships and relative ages are represented with the symbols y, o; meaning young or old respectively.

andesites, while Volcán Alconcha lavas are 2-pyroxene and hornblende-rich andesites. East of Volcán Tuco and Alconcha lies Trés Monos, a 7-8 km long N-S trending ridge comprised of three overlapping edifices, which erupted dominantly 2 pyroxene ± amphibole andesites and basaltic andesites. Trés Monos is highly dissected and hydrothermally altered. Ages range from 2.8 to 3.4 Ma (Grunder, unpublished).

In time, volcanic activity within the Aucanquilcha Complex appears to have shifted from the north to the south toward volcanoes Chaihuiri and Campana and to the west toward Cerro Gordo and Volcán Polan. Chaihuiri (2.4 ± 0.04 Ma) is a dacite dome composed of a hydrous biotite and amphibole mineral assemblage and abundant magmatic inclusions. Chaihuiri lavas overlie Cerro Gordo (5.28 ± 0.54 Ma) lavas to the west. Cerro Gordo is an asymmetrical, highly glaciated stratocone with a prominent W-SW trending collapse scar. The lavas of Cerro Gordo resemble the lavas of Cerro PacoPaco (4.51 ± 0.10 Ma) and suggest a time-synchronized evolution of the two volcanic edifices. PacoPaco is a scoria-rich and little dissected volcanic edifice, which lies north of Cerro Gordo and east of Volcán Miño. The main edifices at Cerro Gordo and PacoPaco are characterized by cpx- and olivine-bearing basaltic andesites. The youngest lavas are more silicic in time, marked by a dome-building event at Co. Gordo and eruption of two-pyroxene andesites at both edifices. Volcán Polan (3.35 ± 0.08 Ma) is stratigraphically younger than Cerro

Gordo. Polan is a poorly preserved, glaciated, and hydrothermally altered stratocone with remnant sulfur mine workings on its S-SE flank. Volcán Polan lavas are dominantly two-pyroxene ± hornblende and biotite andesites. Polan lavas underlie Volcán Miño lavas to the north.

Volcán Miño is a steep-sided symmetric composite cone on the westernmost periphery of the Aucanquilcha Complex with an age of about 3.3 Ma (Figure 9, Appendix B). Stratigraphic relationships suggest that Miño's two-pyroxene ± amphibole-rich andesites and dacites overlie Polan and PacoPaco lavas to the south and east, respectively. The geology of Volcán Miño will be discussed in more detail below. The lavas of Cerro Gordo, Co. PacoPaco, Vn. Polan, and Vn. Miño overly exposures of the 5.6 Ma Carcote Ignimbrite to the west. East of Volcán Miño and PacoPaco lies La Luna, a broad hydrothermally altered lava plateau and dome complex (Figure 4).

Aucanquilcha Volcano is young and considered active. The central region of this 10 km long E-W trending ridge is strongly altered by ongoing fumarolic activity. Eruptive products include two-pyroxene andesites (± biotite, hornblende) and biotite-hornblende dacites. Pristine morphology of lava flows attests to rather recent postglacial eruptions; however the presence of deeply glaciated lava flows exposed at the base of the volcano and glacial moraines overlying older lava flows suggests extended activity. An escarpment on the NW flank of Aucanquilcha marks the head of a

prominent NNW trending debris avalanche deposit. Interestingly, Volcán Aucanquilcha's E-W trending chain of edifices resembles other transverse volcanic alignments found in the CVZ (Volcán Tata Sabaya at 19°S and the Cordon de Punta Negra at 23°30' S) (deSilva et al.,1993). These lineaments are not known to be tectonically active.

CHAPTER 3: GEOLOGY OF VOLCAN MINO

3.1 Introduction

Fieldwork at Volcán Miño was conducted in April 1999 followed by a second field season of reconnaissance mapping and sampling at the Aucanquilcha Complex in March 2000. The geology of Volcán Miño was mapped on a 1:50,000-scale topographic map and on aerial photographs of similar scale (Figure 8).

Volcán Miño (21°11'S/68°35'W) lies on the westernmost periphery of the Aucanquilcha Complex. Miño is a steep-sided, symmetric composite volcano with a summit elevation of 5611 m and an edifice height of 1680 m above the Altiplano (Figure 5). Slow erosion rates in the Andes have contributed to the preservation of 22 km^3 of volcanic material, which constitute Volcán Miño's edifice. A lack of erosion has prevented exposure of the oldest volcanic rocks and therefore hinders interpretation of Volcán Miño's early eruptive history.

Volcán Miño is composed nearly entirely of lavas that unconformably overly the regionally extensive Carcote Ignimbrite (5.6±0.4 Ma) and Tertiary volcaniclastics. The Carcote ignimbrite is part of a voluminous (<10,000 km^3) package of late Miocene ignimbrites (the Altiplano-Puna Complex), which forms the upper-crustal basement in this region (deSilva and Francis, 1991). Volcán Miño was active around 3.3 Ma ($^{40}Ar/^{39}Ar$ age dates for two

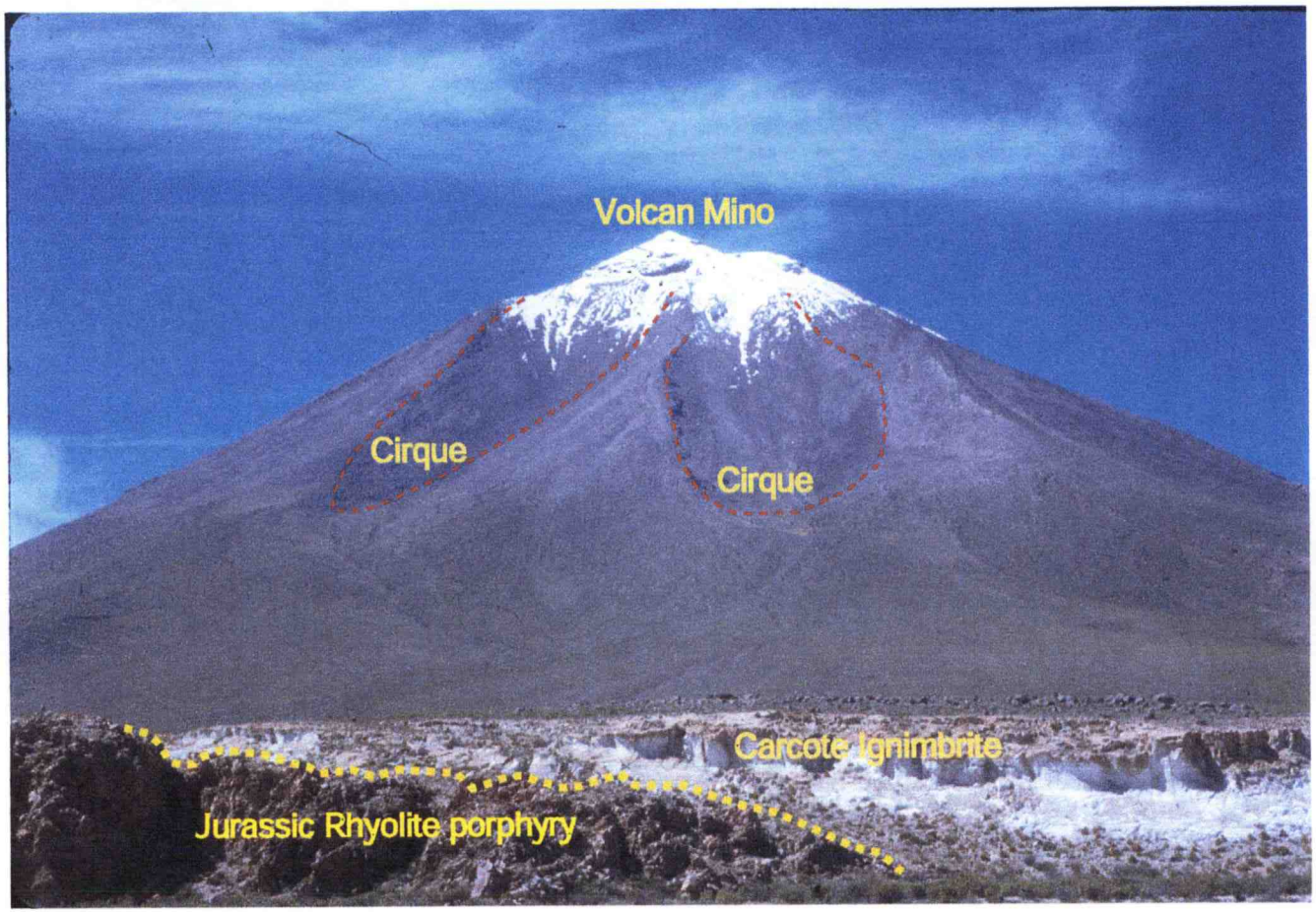
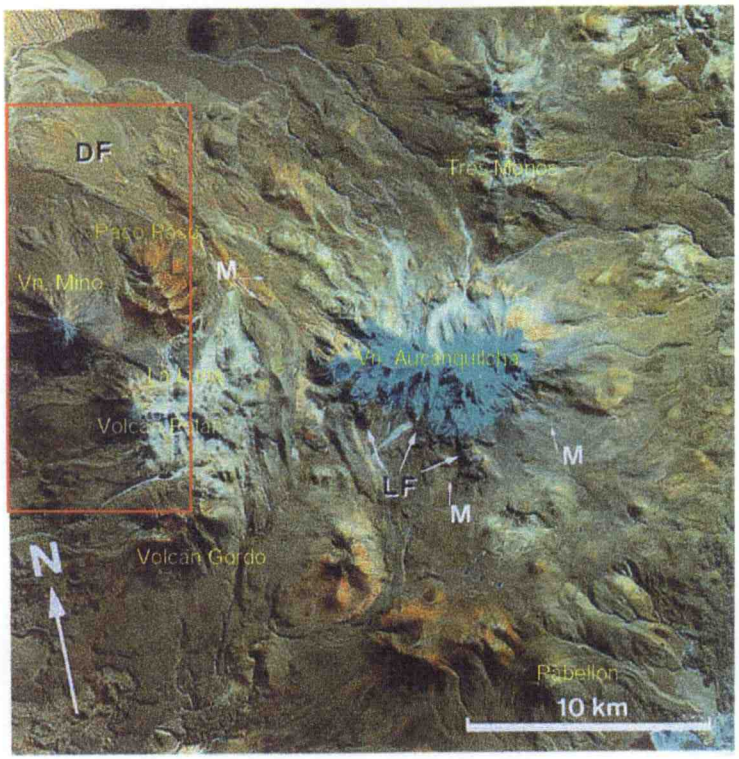


Figure 5. Picture of Volcan Mino taken from the Rio Loa facing the northeast. Miño's summit elevation and edifice heights are 5611 and 1680 meters respectively. Two prominent cirques on the western face of Mino are outlined. Contacts illustrate age relationships between the lavas of Volcan Mino and the 5.6 Ma Carcote Ignimbrite. An unconformity exists, which separates the Carcote Ignimbrite from underlying Jurassic rhyolite porphyry.

lavas; 3.32 ± 0.09, 3.35 ± 0.04, 3.73 ± 0.32 Ma; McKee, unpublished). Eruptive activity at Volcán Miño predates glaciation. Deep glacial scars are not well developed, probably because of the smaller size and lower elevation (5611 m) of the cone compared to Aucanquilcha. Evidence for glaciation includes the presence of three prominent cirques exposed within the western (2) and southern walls (1) of the edifice (Figure 5), the presence of two lateral moraines exposed on the northeastern and southwestern flanks of Miño, and evidence for deeply eroded lava flows (i.e. glacial striae and polish) and glacial colluvium. Slopes near the summit are oversteepened with exposures limited to the lateral edges of cirques. Outcrops in cirques were too dangerous to sample due to seasonal snow cover.

The morphology and geology of Volcán Miño are illustrated in Figures 6, 7, and 8. NW-SE and SSW-NNE cross-sections through Volcán Miño (Figure 7) display stratigraphic relationships and relative ages of adjacent edifices. Stratigraphic position relative to adjoining units is well constrained. Volcán Miño lavas are overlain to the northwest by the NNW trending Aucanquilcha debris avalanche deposit, and underlain by lavas from Cerro PacoPaco, Volcán Polan to the east and south, respectively. A sample taken from juvenile debris within the debris deposit was dated by $^{40}K/^{39}Ar$ methods and produced an age of 0.6±0.5 Ma (Tomlinson, unpublished). Stratigraphic and age relationships east of Volcán Miño



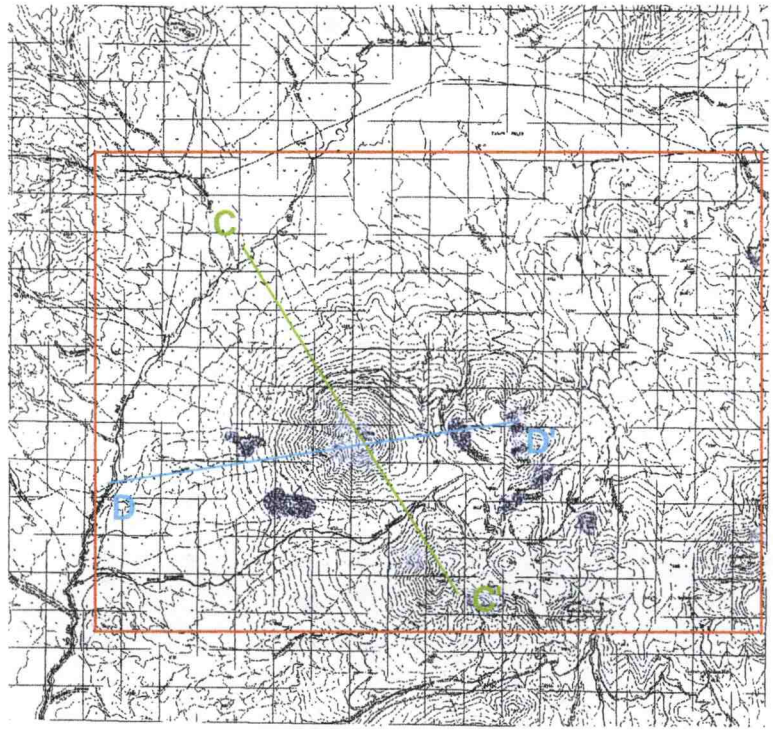


Figure 6A. Landsat Thematic Mapper image of Volcan Aucanquilcha, Volcán Miño, and the surrounding area. The box highlights area outlined on Fig. B. Symbols include DF, Aucanquilcha debris flow; M, glacial moraine; LF, lava flow. 6B. Topographic map of Volcán Miño, Cerro PacoPaco, and Volcán Polan. Trace of cross sections in Figure 7 are shown here as C-C' and D-D'.

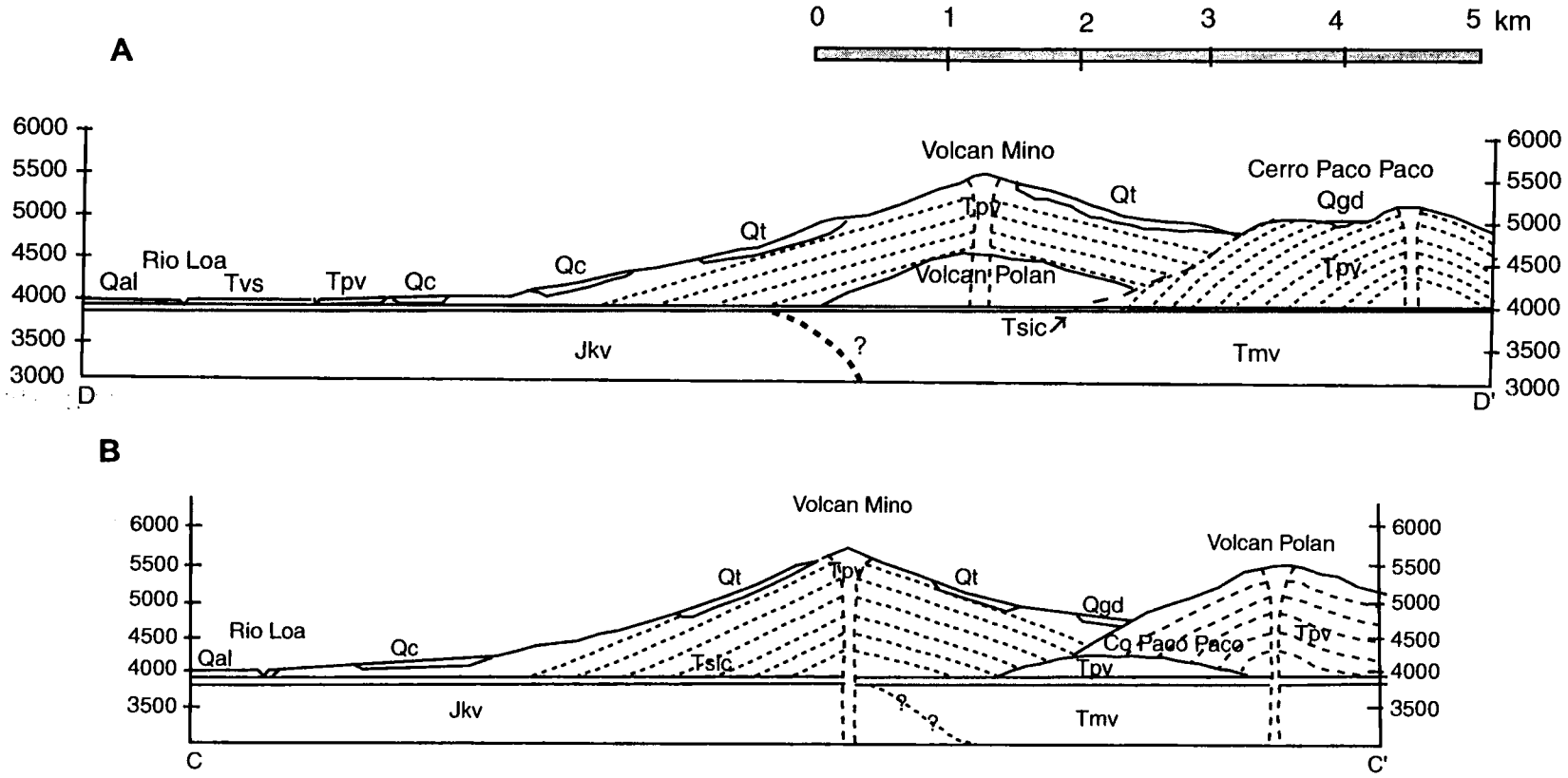


Figure 7A. C-C' cross section of Volcán Miño. Lithologic units include Qal, Quaternary alluvium; Qc, Quaternary colluvium; Qt, Quaternary talus; Qgd, Quaternary glacial deposits; Tpv, Tertiary Pliocene volcanics; Tsic, Tertiary silicic ignimbrite Carcote; Tmv, Tertiary Miocene volcanics; and Jkv; Jurassic volcanics.
7B. D-D' cross section of Volcán Miño. Same units as above.

suggest that Cerro PacoPaco is older than Volcán Polan. West of Miño, Rio Loa river-cuts expose regionally extensive late-Miocene ignimbrite deposits (the Ujina and Carcote Ignimbrites), lavas, and sediments.

Volcán Miño lavas are dominately chemically homogeneous (57-65 wt.% SiO_2) two-pyroxene andesites (± minor hornblende). Lavas are defined by three types: (1) two-pyroxene andesites, (2) hornblende-rich andesites and dacites, and (3) olivine phyric basaltic andesite. Grouping of lavas into eruptive series was based principally on mineralogic and petrologic information. Due to the difficulty of correlating individual flows, lavas types were assigned based on flow morphology, outcrop character, and petrographic description. Stratigraphic relationships suggest that olivine phyric basaltic andesites occur low in the stratigraphic sequence and may consequently represent an earlier eruptive phase at Miño (Figure 8, sample VM99-16). Hornblende-rich andesites are intercalated with pyroxene andesites over time.

3.2 Lithologic Character of Map Units

Field descriptions and general petrographic character of map units are presented here. Lithologic units are illustrated in Figure 8 and detailed petrographic descriptions of all analyzed samples are listed in the Appendices D.

3.2.1 Jkv- Jurassic Rhyolite Porphyry

A ten-meter outcrop of Jurassic rhyolite porphyry is exposed along the Rio Loa on the lower western flank of Volcán Miño. The exposure is forty meters wide and unconformably underlies the Carcote ignimbrite and Quaternary colluvium. The outcrop is oxidized with quartz sericite hydrothermal alteration.

3.2.2 Tvs- Tertiary volcaniclastic sediments

A series of laminations and thin, red volcaniclastic deposits are exposed within a quebrada on the W-SW flank of Volcán Miño. Sedimentary beds are matrix supported and the deposit is interpreted to be an alluvial debris flow. Clasts coarsen upsection from silt and sand sized particles in the thin laminae to poorly sorted sand-sized grains and cobbles in the thin beds. Clasts are re-worked andesites, dacites, and scoria, and few with tuffaceous character. Thin beds and laminations are oxidized red and yellow in color and are relatively flat-lying, dipping slightly to the NW (82, 6° NW; 74, 4° NW). A thin exposure of volcaniclastic debris flow deposit or channel-fill underlies the red bed deposits. Volcaniclasts are sand to boulder-sized grains set in an ashy matrix. There are no prominent cooling joints in the clasts, thus they do not appear to be juvenile clasts from a pyroclastic flow. Gravels and red bed deposits underly Pliocene

andesite lava flows and overly the Carcote ignimbrite suggesting that deposition occurred sometime during the late Miocene to early Pliocene.

3.2.3 Tsic- Tertiary silicic ignimbrite; Carcote

A small outcrop of dacitic ignimbrite is exposed in a bank along the Rio Loa on the western flank of Volcán Miño. The outcrop is 7 meters thick and gray to tan in color. The ignimbrite is non-welded and contains 2-15% crystals (biotite, plagioclase, alkali feldspar), andesitic lithic fragments up to 3x3 mm in size and 1 cm pumice clasts. The regionally extensive ignimbrite crops out to the west of the Rio Loa and to the east on the Bolivian Altiplano.

3.2.4 Tpv- Tertiary Pliocene volcanics

Lava flows erupted from Volcán Miño are dominantly andesites and rare dacites and basaltic andesites. Flows are platy to massive and blocky, with occasional columnar jointing. Lavas are sparsely vesicular and commonly exhibit flow banding. Flows are between 5 to 30 meters thick and generally thin and widen downslope, ending abruptly with steep, vertical termini. Outcrops are weathered spheroidally exhibiting a bulbous and oxidized appearance and scoriaceous, autobrecciated flow bases mark the break between successive flows.

3.2.5 Qgd- Quaternary Glacial Deposits

Unconsolidated Quaternary glacial deposits are exposed on the eastern, western, and southern slopes of Volcán Miño. Glacial deposits were identified based on the presence of moraines and field evidence for deeply eroded lava flows; glacial grooves and polish. 1:50,000 scale aerial photographs were used to map morainal deposits, which are exposed between Volcán Miño and Cerro PacoPaco to the east and Volcán Miño and Volcán Polan to the south. Three glacially carved cirques were mapped, two on the western flank and one on the S-SW flank respectively.

3.2.6 Qt and Qc- Quaternary talus and colluvium

Holocene talus is exposed on oversteepened slopes of Volcán Miño. Talus of heterogeneous composition dominates above 4000 meters. Loose and incoherent Holocene colluvium dominates the lower slopes of Volcán Miño and is characterized by variable debris size from gravel-sized grains to large boulders of andesitic composition.

3.2.7 Qal- Quaternary Alluvium

Alluvial deposits are exposed at low elevations west and north of Volcán Miño respectively. Alluvium consists of unconsolidated clay, silt, and gravels. Seasonal and permanent streams represent the source for these recent deposits.

3.2.8 Sn- Snow

Seasonal snow exposed on Volcán Miño's summit (April 1999) hindered mapping efforts and limited sampling to outcrops below the snow-line. Slopes of the edifice are oversteepened (talus) with good exposures to the lateral edges of icey cirques. These outcrops were however too difficult to sample.

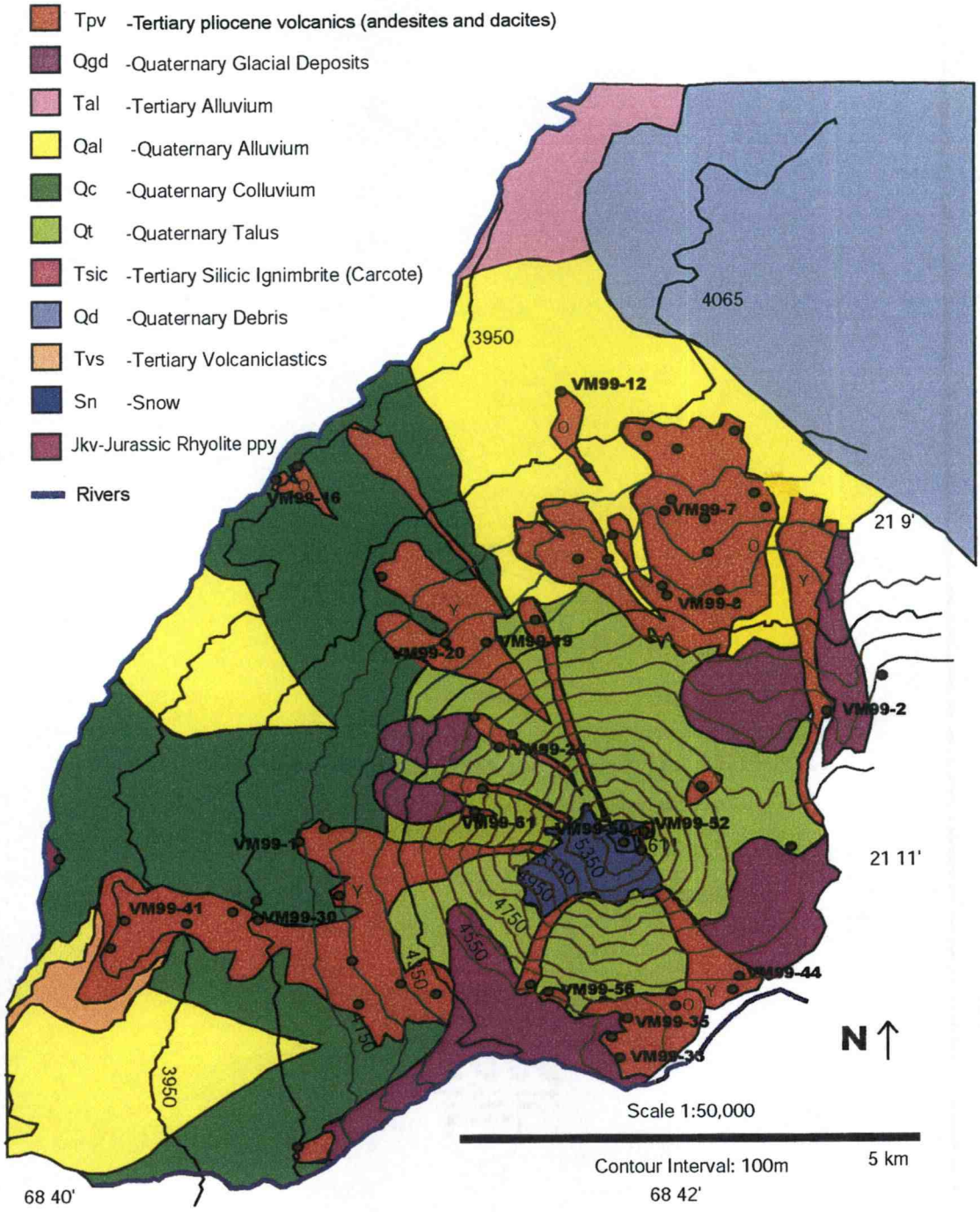


Figure 8. Schematic geologic map of Volcán Miño based on field mapping and aerial photography.

3.3 $^{40}Ar/^{39}Ar$ dates

The $^{40}Ar/^{39}Ar$ method was applied to analyze andesites from Volcán Miño in order to determine the active lifetime of the volcano. Two samples were chosen for dating based on sample freshness and stratigraphic position so to best represent the range in age for Miño lavas. Sample VM99-10 is a hornblende-bearing andesite, which occurs low in the stratigraphic section on the gently-dipping northern slopes of Miño (Figure 8). Sample VM99-52 is a hornblende-bearing dacite from the summit of Volcán Miño.

Groundmass and amphibole separates from sample VM99-10 and a plagioclase separate from sample VM99-52 were handpicked for argon analysis following conventional crushing and magnetic separation procedures. Samples were incrementally heated in 6-8 temperature steps at increments of 100 to 150° C ranging from 600° to 1400°C. A series of dates were obtained for each sample by releasing argon from the irradiated sample in successive steps at increasing temperatures intervals. If the sample has remained closed to argon and potassium since the time of initial cooling, the $^{40}Ar/^{39}Ar$ ratios of the sample should remain constant after each successive heating step. If the sample has lost radiogenic argon from some of the crystallographic sites, but not from others, some time after initial cooling, the $^{40}Ar/^{39}Ar$ ratios of the gas released will vary from step to step and the calculated age of the sample will be erroneous. The

assumptions for the incremental heating method do not consider ^{39}Ar loss due to recoil of the nucleus of ^{39}K, which is attributed to the emission of a proton rather than a neutron during the reaction. In this case, the resultant age of the sample is older than its actual geologic age. Another possible source for error involving mineral separates is the likelihood that not all crystals are representative of an equilibrium phenocryst assemblage. It is likely that some of the amphibole and plagioclase phenocrysts selected for argon analysis from Volcán Miño lavas are xenocrystic in that they may be a product of a past mixing event, or relicts of an earlier part of the magmatic history.

Age spectra for incremental heating of samples VM99-10 and VM99-52 are illustrated in Figure 9. Largely atmospheric argon outgassed at low and high temperatures, while higher proportions of ^{39}Ar were released during the intermediate heating steps. I chose the plateau ages to represent the age of Miño lavas. Plateau ages are in agreement with criteria for a valid age estimation; (1) 50% of ^{39}Ar is released in a contiguous plateau involving three or more temperature steps and, (2) the mean standard weighted deviation (MSWD) is between 2.5-3. If either of these criteria is not met, the age estimate is inaccurate. In all three cases here, age approximations are in compliance with the above criteria.

Duplicate analyses of amphibole and groundmass separates were completed for sample VM99-10 (Appendix B, Figure 9A and 9B). I interpret

the groundmass age to represent the actual age of the sample, because the MSWD is low, the weighted plateau and isochron ages are consistent, and 50% of 39Ar is released in five temperature steps.

Overall, Volcán Miño was active for a period of no more than 200,000 years around 3.3 Ma. Older argon age estimates by $^{40}K/^{39}Ar$ (Appendix B) are consistent but exhibit larger error and are disregarded here.

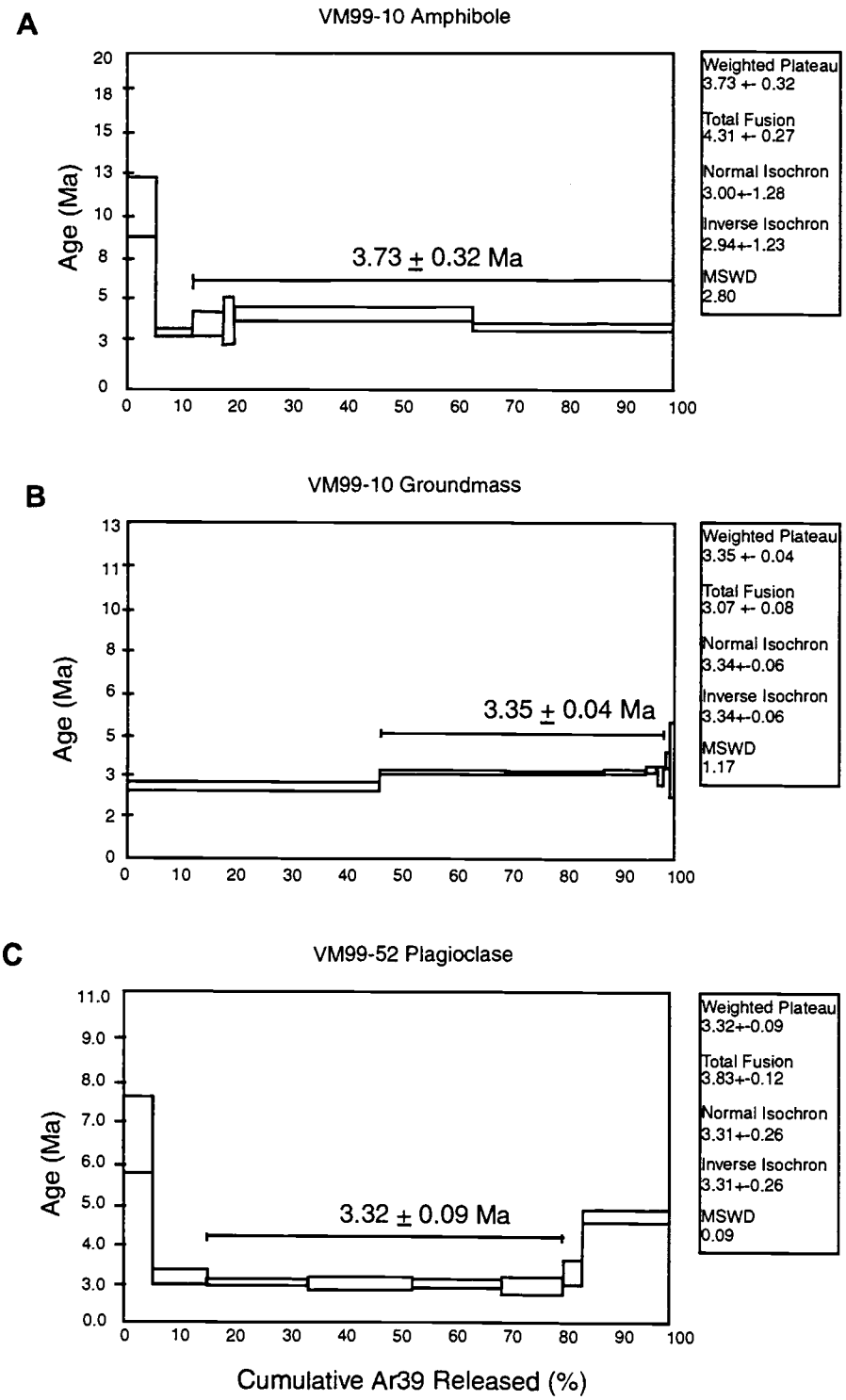


Figure 9. Argon Plateau for Volcán Miño lavas. A.Sample VM99-10, 4-step amphibole plateau age, B.sample VM99-10, 5-step groundmass plateau age, and C. sample VM99-52 4-step, plagioclase plateau age.

CHAPTER 4: ANALYTICAL METHODS AND FACILITIES

Sixty-six samples were collected and petrographically examined to determine modes and mineralogic and textural diversity of Volcán Miño lavas. Eight samples were selected for detailed electron microprobe analysis on the basis of their mineralogic and textural variability. These samples were chosen to represent the range in mode, type, and texture of crystals identified in Volcán Miño lavas, as well as to represent the whole rock compositional range, albeit limited.

Prior to major and trace element analyses, all samples were cleaned of their weathered surfaces and broken into smaller pieces. All of the samples were passed through a small tungsten carbide jaw crusher. Samples to be analyzed by ICP-AES and XRF were ground to a fine powder in a tungsten carbide shatterbox. Samples to be analyzed by INAA were ground in an alumina shatterbox to prevent contamination with tungsten.

Ten samples were prepared for major and trace element analysis using Inductively-Coupled Plasma Atomic Emission Spectrometry (ICP-AES) at the College of Oceanic and Atmospheric Sciences (COAS), Oregon State University. Sample powders were mixed with a lithium metaborate flux in a 1:4 ratio and fused at 1050°C for 20 minutes. Following fusions, sample beads were dissolved in a 1.5 N HNO_3 (5 ppm

Ge) stock solution and diluted further with a matrix solution of HNO_3 and de-ionized H_2O. A set of standards and sample unknowns were analyzed on Varian Model Liberty 150 ICP-AES. Eight of the ten major element analyses were duplicated using X-Ray Fluorescence Spectrometry. Major element abundances determined by each method are within reasonable error for all elements except Na_2O and K_2O, where ICP data were subsequently corrected to match XRF data (Appendix A).

Whole-rock major and trace element abundances for seventeen samples were measured by X-Ray Fluorescence Spectrometry (XRF) using the Rigaku 3370 Spectrometer at Washington State University's GeoAnalytical Laboratory, Pullman, Washington. Samples were crushed into pea-sized grains in a tungsten carbide jaw crusher. Approximately 1kg of the crushed material was then prepared for XRF analysis using the technique described by Johnson et al. (1999). Prior to analysis, samples were mixed with a lithium tetraborate flux in a 1:2 ratio respectively and fused. The fused bead was used for both major and trace element XRF analysis at a constant voltage (50kV, 50mA) on an Rh target for all elements. Estimated precision is better than 1% for most elements except Y, Nb, and Cr (better than 5%).

Ten samples were analyzed by instrumental neutron activation analysis (INAA) for a further set of trace elements. Samples were irradiated and analyzed at the Oregon State University Triga Reactor facility following

the procedure outlined by Laul (1979). Precision is better than 3% for Sc, 5% for Cs, Sm, Eu, Tb, Yb, Hf, Ta, 7% for Ce, and 12% for Nd.

Major element analyses of plagioclase, pyroxene, amphibole, Fe-Ti oxides, and olivine were performed using the CAMECA SX-50 Electron Microprobe at Oregon State University. Plagioclase and amphibole analyses were conducted using a beam current of 30 nA, an accelerating voltage of 15kV, and a beam diameter of 3 to 5 micrometers. Analyses of Fe-Ti oxides, pyroxene, and olivine were performed using a beam current of 50 nA and a beam diameter of 1 micrometer.

$^{40}Ar/^{39}Ar$ age experiments were run for whole-rock andesite, plagioclase, and amphibole separates. Two Volcán Miño samples were selected for dating based on freshness and stratigraphic position. Samples were crushed in an alumina mortar and pestle and sieved to separate out 0.3-0.5 mm size fractions. Plagioclase separates were cleaned in 5% N HF acid, washed in an ultrasonic bath, and handpicked. Groundmass and amphibole separates were cleaned, washed in distilled H_2O, frantzed, and handpicked. Following sample preparation, groundmass, amphibole, and plagioclase separates were wrapped in Cu-foil, labeled and loaded in to quartz vials. Quartz vials were evacuated, sealed in standard Al tubes, and irradiated at the Triga Reactor, Oregon State University Radiation Center. Incremental heating methods by Duncan and Hogan (1994) were used to analyze sample argon. Following irradiation, separates were loaded into a

sample manifold, which feeds into a Ta-crucible with Mo-liner. Temperatures in the crucible were monitored and controlled with a programmable power supply thermocouple system. With increasing temperature, gases expanded and moved through the extraction system, and active gases were removed by a series of Zr-V-Fe and Zr-Al getters. Ar isotopic compositions were measured on a Mass Analyser Products model MAP 215/50 mass spectrometer at COAS, Oregon State University. Ion beam currents were measured with an electron multiplie at m/z of 35/36/37/38/39/40, and intervening baselines. Peak decay was less than 10% during analysis.

CHAPTER 5: RESULTS

5.1 General petrographic overview of Volcan Miño lavas

Volcán Miño andesites and dacites conform to medium- to high-K calc alkaline trends characteristic of Central Volcanic Zone lavas (Figure 10 and 11), but are generally lower in alkalies. Lavas range from 57 to 65-wt% SiO_2, but cluster tightly between 60±2 wt%. The phenocryst assemblage of Volcán Miño lavas includes plagioclase, clinopyroxene, orthopyroxene, amphibole, and Fe-Ti oxides. Apatite occurs as an accessory phase. Biotite and alkali feldspar are absent. Olivine is present as a xenocryst in some Miño lavas, but has also been identified as a phenocryst in basaltic andesite (Figure 11). Magmatic inclusions and gabbroic xenoliths are sparse and quartz, when present, is always xenocrystic.

Volcán Miño lavas can be subdivided based on mineral assemblage into eight different eruptive types (Figure 11). In most cases, pyroxene is more abundant than amphibole. Orthopyroxene is subordinate to clinopyroxene at low SiO_2 and K_2O. With increasing SiO_2, orthopyroxene exceeds clinopyroxene in abundance. Hornblende is the dominant mafic mineral in only a few samples. There are no obvious trends that relate changes in whole-rock composition to the presence or absence of amphibole in the mineral mode. This observation will become important when considering the intensive parameters contributing to petrogenesis of

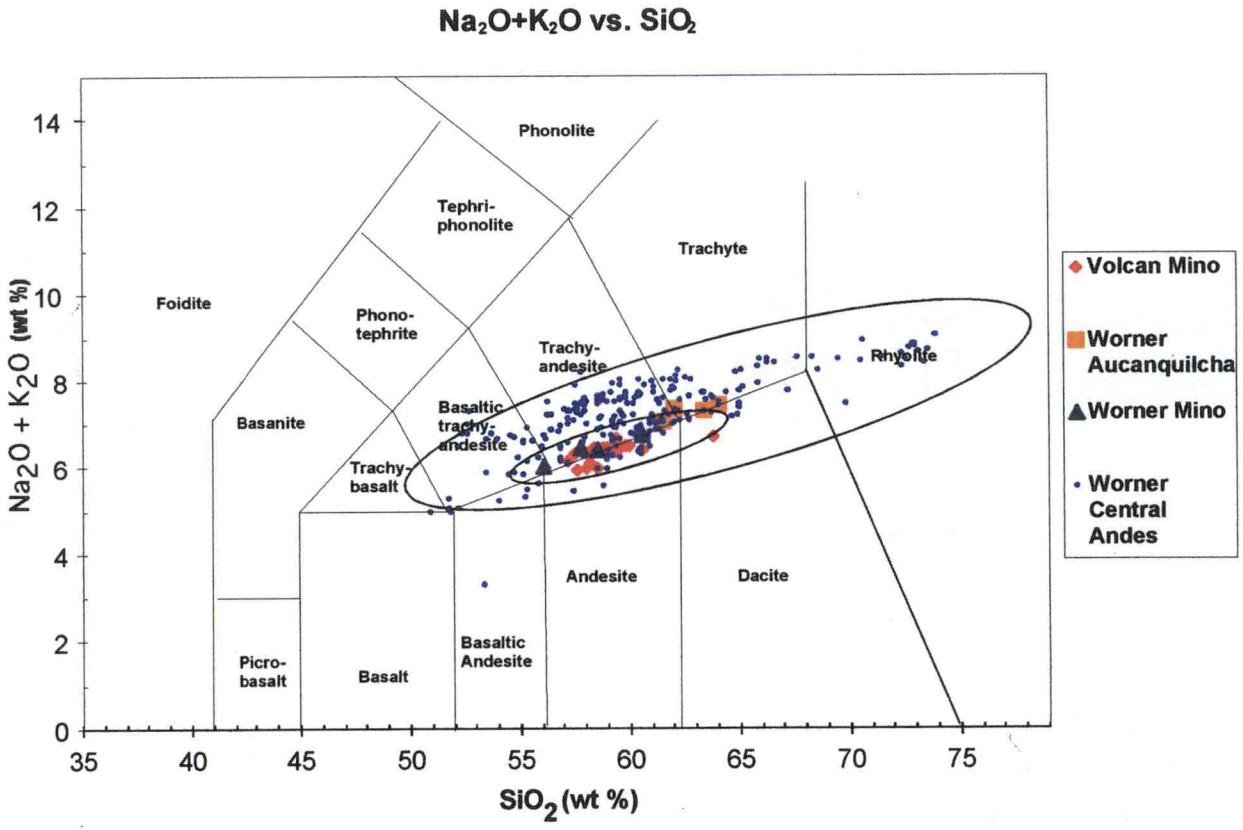


Figure 10. Total alkalies vs. SiO_2 for Volcán Miño lavas (McKee, unpublished). Wőrner (1988) data for Volcán Aucanquilcha, Volcán Miño, and the Central Andes also graphed for regional context.

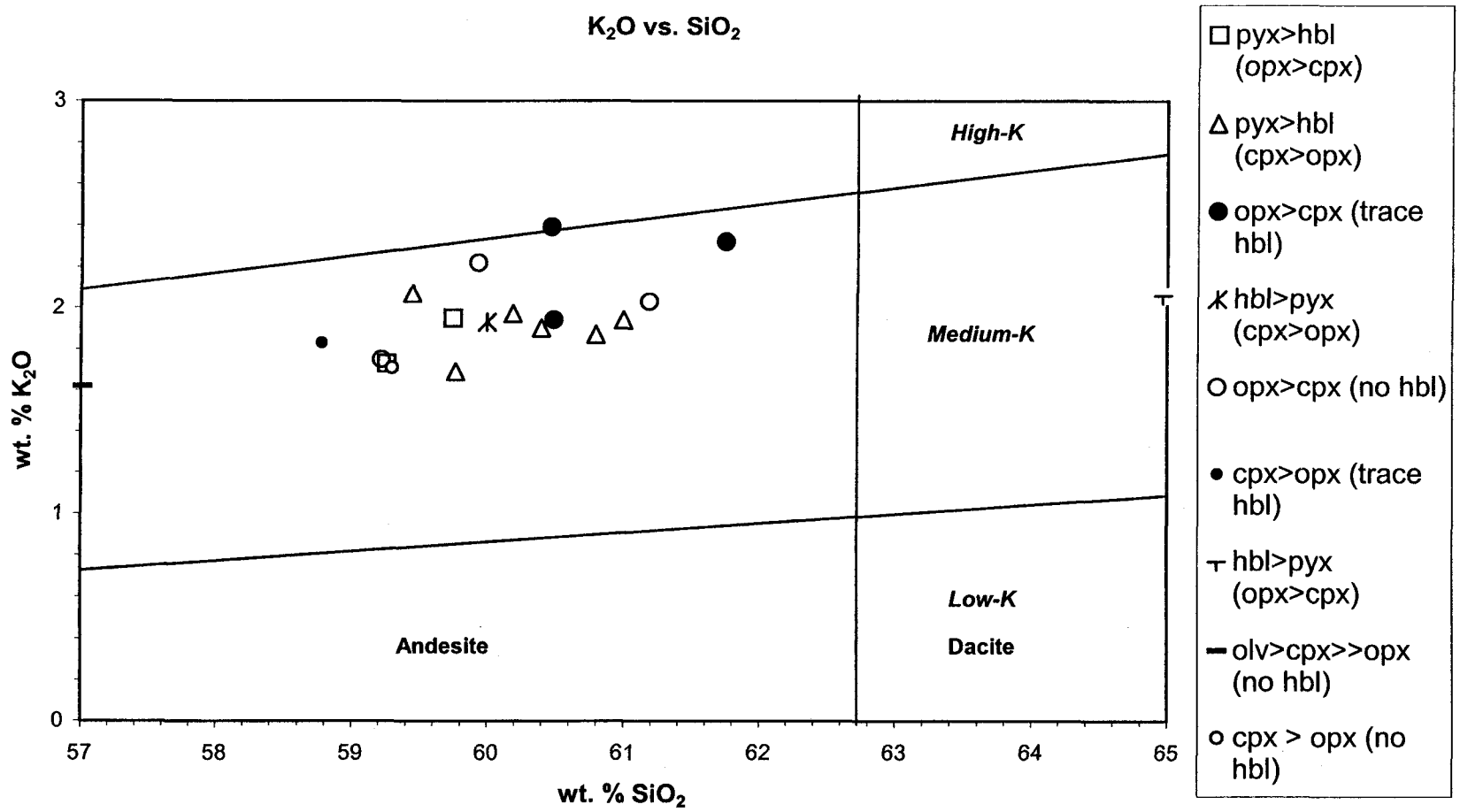


Figure 11. K_2O vs. SiO_2 for Volcán Miño lavas. Lavas are subdivided based on their dominant mafic mineral assemblage. Symbols illustrate the abundance of opx, orthopyroxene; cpx, clinopyroxene; hbl, hornblende; olv, olivine with respect to one another.

A

Figure 12A. Photomicrograph of a typical two-pyroxene andesite from Volcán Miño with glomerocryst of clinopyroxene, orthopyroxene, plagioclase, and Fe-Ti oxides; field of view is 3.3 mm. 12B. Photomicrograph of a olivine-phyric basaltic andesite. Olivine phenocrysts are iddingsitized and 0.5-1.0 mm in size. Plagioclase is slightly trachytic; field of view is 3.3 mm.

B

Volcán Miño lavas and will be addressed in more detail below. Detailed petrography for representative samples can be found in the Appendices. Two-pyroxene andesites (± amphibole) are the most common eruptive type at Volcán Miño (Figure 12). Amphibole-rich andesites and dacites define a second eruptive type. Rare olivine-phyric basaltic andesites characterize the third eruptive type. Basaltic andesites (Figure 12) are petrographically distinct from pyroxene and amphibole-rich andesites in that they are crystal poor, olivine phyric, and lack both amphibole phenocrysts and glomerocrystic clusters, which are commonly present in the more silicic lavas.

Phenocrystic crystallinities of all andesitic and dacitic lavas range from 20 to 30% by volume phenocrysts and <10% for the basaltic andesites. Plagioclase is the dominant phenocryst phase (15 to 20%), accounting for approximately 75% of the mode for most rocks. Orthopyroxene and clinopyroxene (2 to 5%) are common, and amphibole when present, is generally subordinate to pyroxene. All of Volcán Miño's lavas are glomerocrystic (1 to 2%). Glomerocrysts commonly occur as crystal clots of plagioclase+pyroxene+oxides, pyroxene+oxides, and clots of texturally complicated plagioclase. When amphibole is the dominant mafic constituent, glomerocrysts are often but not always composed of amphibole+pyroxene+plagioclase+oxides, amphibole+plagioclase, and amphibole+pyroxene+oxides. In all cases, with the exception of rare

xenocrystic clots, the glomerocrystic minerals are also represented in the rocks as phenocrysts and microphenocrysts. Particular attention is paid to glomerocrysts of plagioclase, clinopyroxene, orthopyroxene, and magnetite. Stewart (1975) proposed that plagioclase-two pyroxene-magnetite crystal clots, which are abundant in calc-alkaline lavas, represent the breakdown products of amphibole crystallized at high pressure. Volcán Miño's lavas contain some glomerocrysts that are interpreted to be the result of amphibole breakdown, and will be addressed in more detail below.

The groundmass of Volcán Miño lavas is dominantly aphyric and occassionally devitrified with minor secondary alteration. Most of the lavas have fresh and unweathered owing to the dry climate characteristic of the Central Andes and care taken during preferential sampling of lavas. Acicular laths of plagioclase and microlites of clinopyroxene, orthopyroxene, and Fe-Ti oxides represent common groundmass constituents.

Despite whole-rock chemical homogeneity, Volcán Miño lavas are texturally and mineralogically diverse. Disequilibrium textures have been identified in nearly all of Mino's lavas. Evidence for textural disequilibrium includes resorption along grain faces, the presence of strongly sieved plagioclase, clinopyroxene coronae surrounding quartz and orthopyroxene, the presence of olivine and quartz xenocrysts and rare magmatic inclusions, and evidence for amphibole breakdown reactions (Figures 14, 15, and 16).

5.1.1 Plagioclase

Plagioclase laths of varying sizes and textural types are abundant in all Volcán Miño lavas. Seven phenocryst populations have been identified in Miño lavas (Figure 13, Histogram A). In addition to abundant acicular groundmass microlites, more than one population of plagioclase is present in most lavas. Basaltic andesite lavas are dominated, however, by the presence of only one distinct population of plagioclase; coarsely sieved plagioclase phenocrysts with complex zoning patterns and clear glass and opaque inclusions. Plagioclase is seriate in all two-pyroxene andesites and occurs in multiple populations including (a) euhedral phenocrysts that are normally and reversely zoned (b) crystals that are coarsely sieved (with clear and/or brown glass inclusions) (c) complexly zoned plagioclase clusters and (d) an- to subhedral coarsely sieved, resorbed phenocrysts. Similar populations of plagioclase have been identified in amphibole-rich andesites and dacites. Silicic lavas lack the large and complicated plagioclase crystals and contain a greater population of coarsely sieved, anhedral phenocrysts (xenocrysts?). The hornblende-rich dacite contains only one additional population of plagioclase with a clean, unriddled core and a fine rim of brown glass inclusions in addition to the dominant clean-euhedral and anhedral-sieved varieties. Clean varieties of plagioclase are characterized by their lack of glass inclusions and resorption features.

5.1.2 Pyroxene

All Volcán Miño lavas contain both hypersthene and augite (Figure 13, Histogram B). In the basaltic andesites, augite is modally minor and occurs only as a groundmass microlite; hypersthene is xenocrystic and resorbed with clinopyroxene coronae. In the andesites, both pyroxenes occur as small crystals that are euhedral to subhedral owing to varying degrees of resorption. Minor orthopyroxene with clinopyroxene coronae have been identified in a majority of the two-pyroxene andesites. Hypersthene is subequal to or more abundant than augite in the more silicic and more potassic andesites and dacites (Figure 11). It occurs as both a groundmass microlite and as large euhedral phenocrysts.

5.1.3 Opaques

Opaques identified in Volcán Miño lavas are predominantly titanomagnetite and minor ilmenite. Most titanomagnetites are homogeneous, although a few have exsolution lamellae. In the basaltic andesites, Fe-Ti oxides are ubiquitous and occur only as microlites in a glass-dominated groundmass. Fe-Ti oxides are a common groundmass constituent in the two-pyroxene andesites and hornblende-andesites. Fe-Ti oxides are present as solitary euhedral microphenocrysts and as a common phase in glomerocrysts in both the andesites and dacites.

5.1.4 Olivine and Quartz

Primary olivine is present in two basaltic andesites (VM99-16, -17) occurring as groundmass microlites and as iddingsitized olivine microphenocrysts (Figure 13, Histogram C). Olivine xenocrysts with microcrystalline clinopyroxene reaction rims have been identified in eight lavas from Volcán Miño. Similarly, quartz xenocrysts with clinopyroxene coronae are sparse, but present throughout the suite of samples.

5.1.5 Amphibole

When present, amphibole represents between a trace to 5% of the rock mode. All amphibole demonstrates textural disequilibrium. Three textural types have been identified and amphibole often occurs in one or more textural types (Figure 13, Histogram D).

Two types of amphibole disequilibrium textures that result from amphibole dehydration reactions have been classified in the literature. The reaction products include a "black type" amphibole (Figure 14) in which the amphibole is either wholly or partially replaced by a fine aggregate of iron and pyroxene, and a "gabbroic type" amphibole (Figure 15) in which the amphibole is replaced by a microcrystalline reaction rim of clinopyroxene, orthopyroxene, plagioclase, and Fe-Ti oxides (Garcia and Jacobson, 1979). In addition to both the gabbroic and black type amphibole, a third amphibole disequilibrium texture has been identified in Volcán Miño lavas. The

"inverted gabbroic type" amphibole (Figure 16) is distinguished by a fine reaction rim of opaques, which coarsens inward to a cluster of microcrystalline pyroxene, plagioclase, and Fe-Ti oxides, rimming relict amphibole.

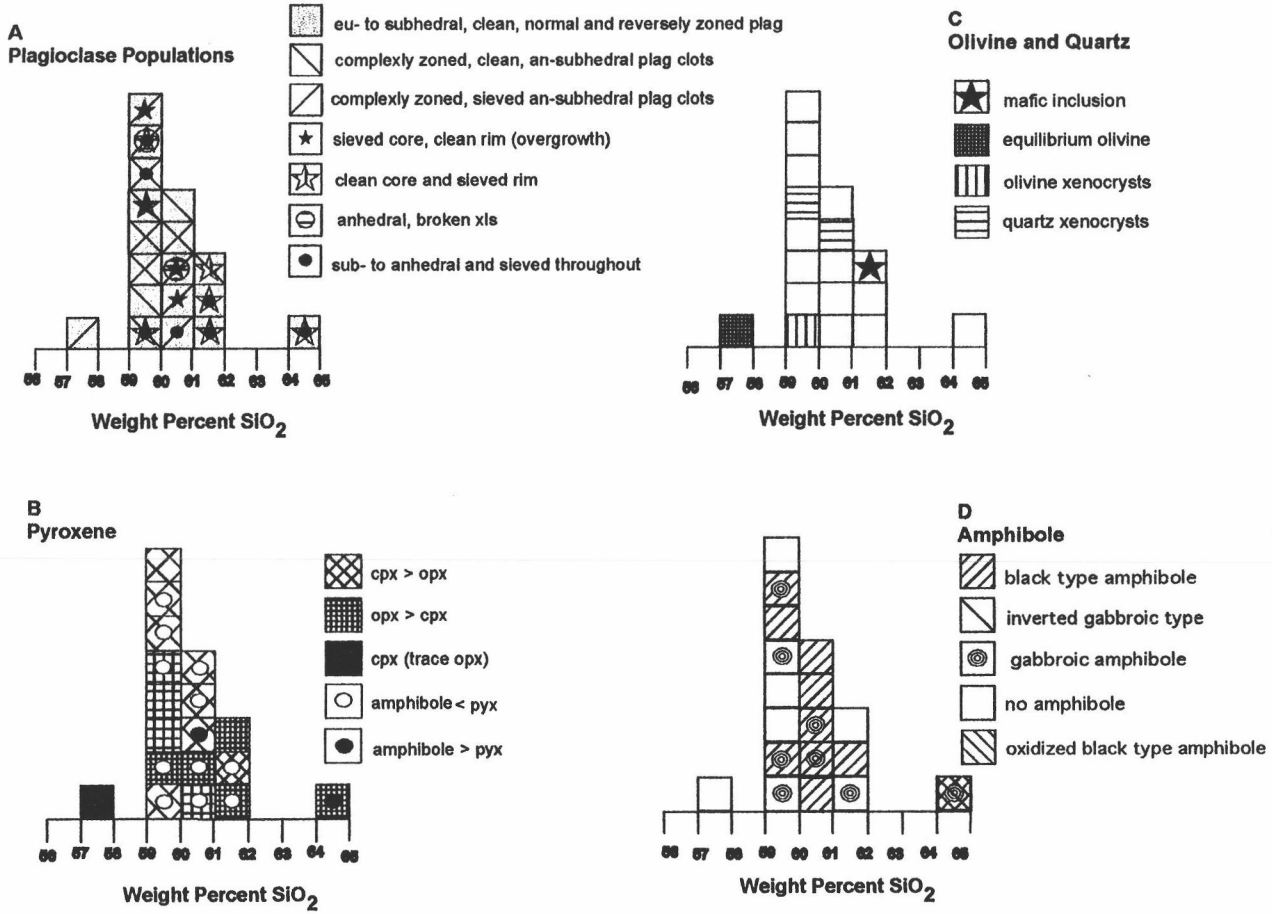
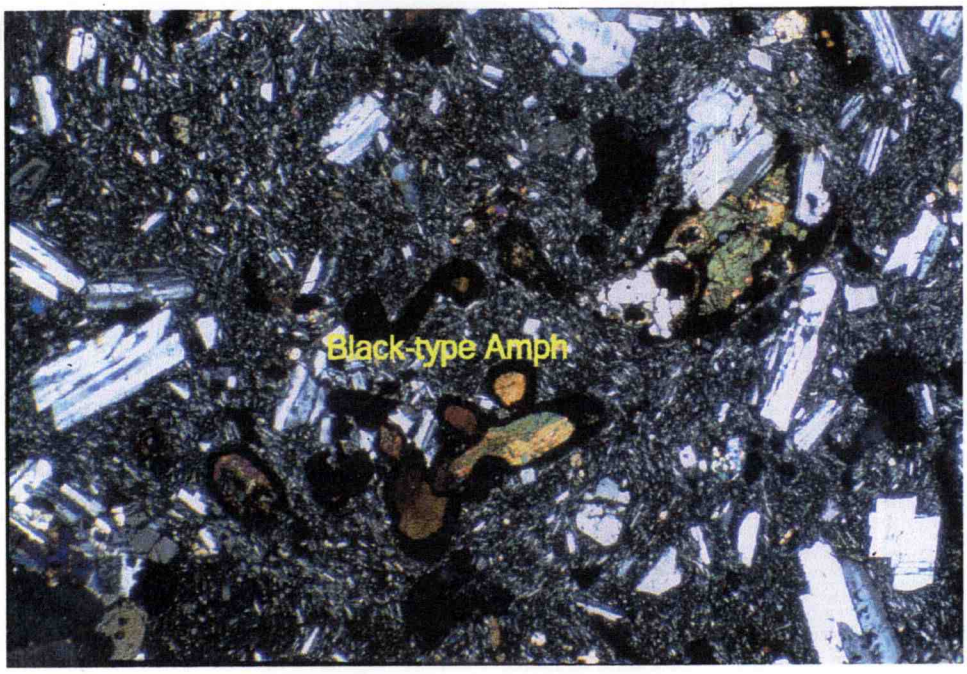


Figure 13. Histograms which illustrate mineralogic and textural variation of Volcán Miño andesites and dacites based on petrographic work. Minerals are all phenocrysts or xenocrysts, that is to say, not groundmass minerals. The relative position of samples are the same in each histogram. A. Plagioclase Populations, B. Pyroxenes, C. Olivine and Quartz, and D. Amphibole.

A



B

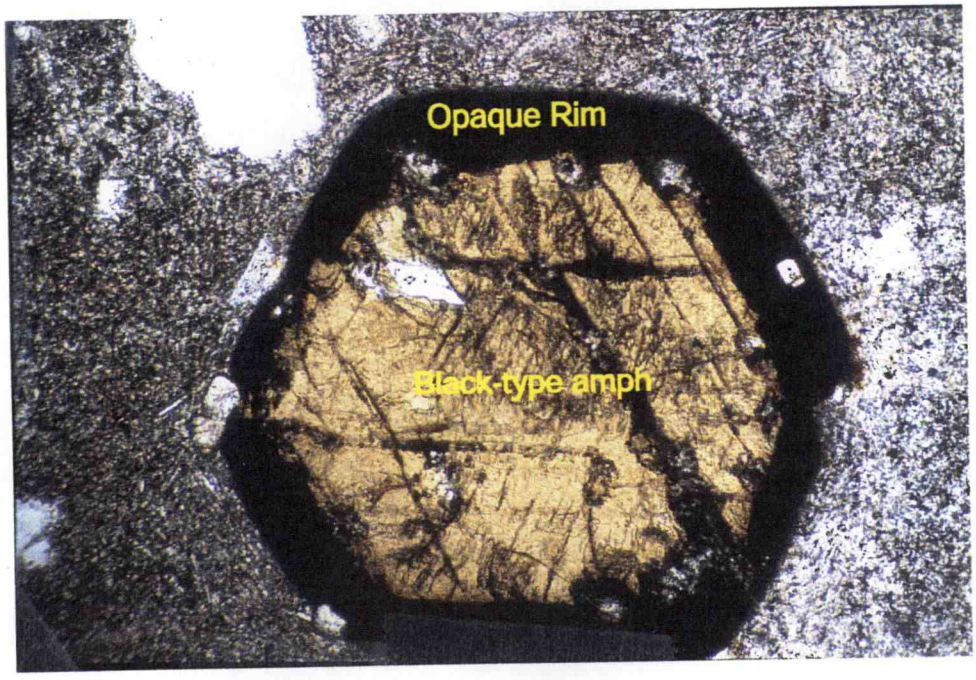


Figure 14 A. Photomicrograph of a hornblende-rich, two-pyroxene andesite; field of view 6.4 mm. Abundant black-type amphibole, plagioclase, and pyroxene phenocrysts typical of most Miño hornblende andesites and dacites. 14B. Photomicrograph of a black-type amphibole looking down the c-axis; field of view is 1.31 mm. Amphibole has a decompression-related breakdown reaction rim, with some oxidation effects (opacite) along rim and internally along cleavages and fractures.

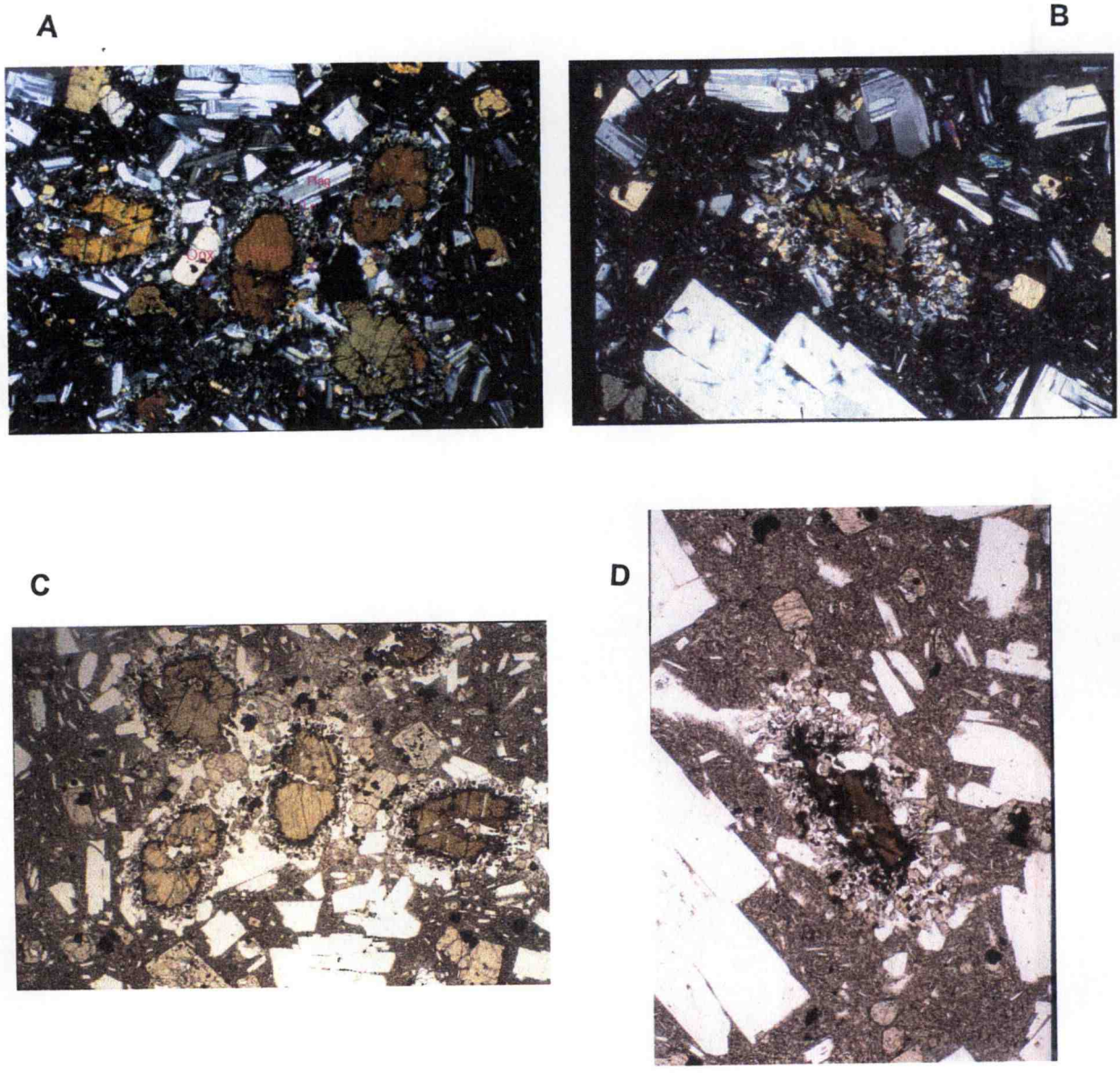


Figure 15 A and B. Photomicrograph of a gabbroic-type amphibole breakdown reaction in a hypersthene-augite andesite from Volcán Miño. Remnant cores of five amphibole crystals are mantled by plagioclase (light colored grains), pyroxene (gray colored grains), and magnetite (dark colored grains); field of view is 6.7 mm. A and B were taken under crossed-polars and plane light, respectively. 15 C and D; plane and crossed polars, respectively.

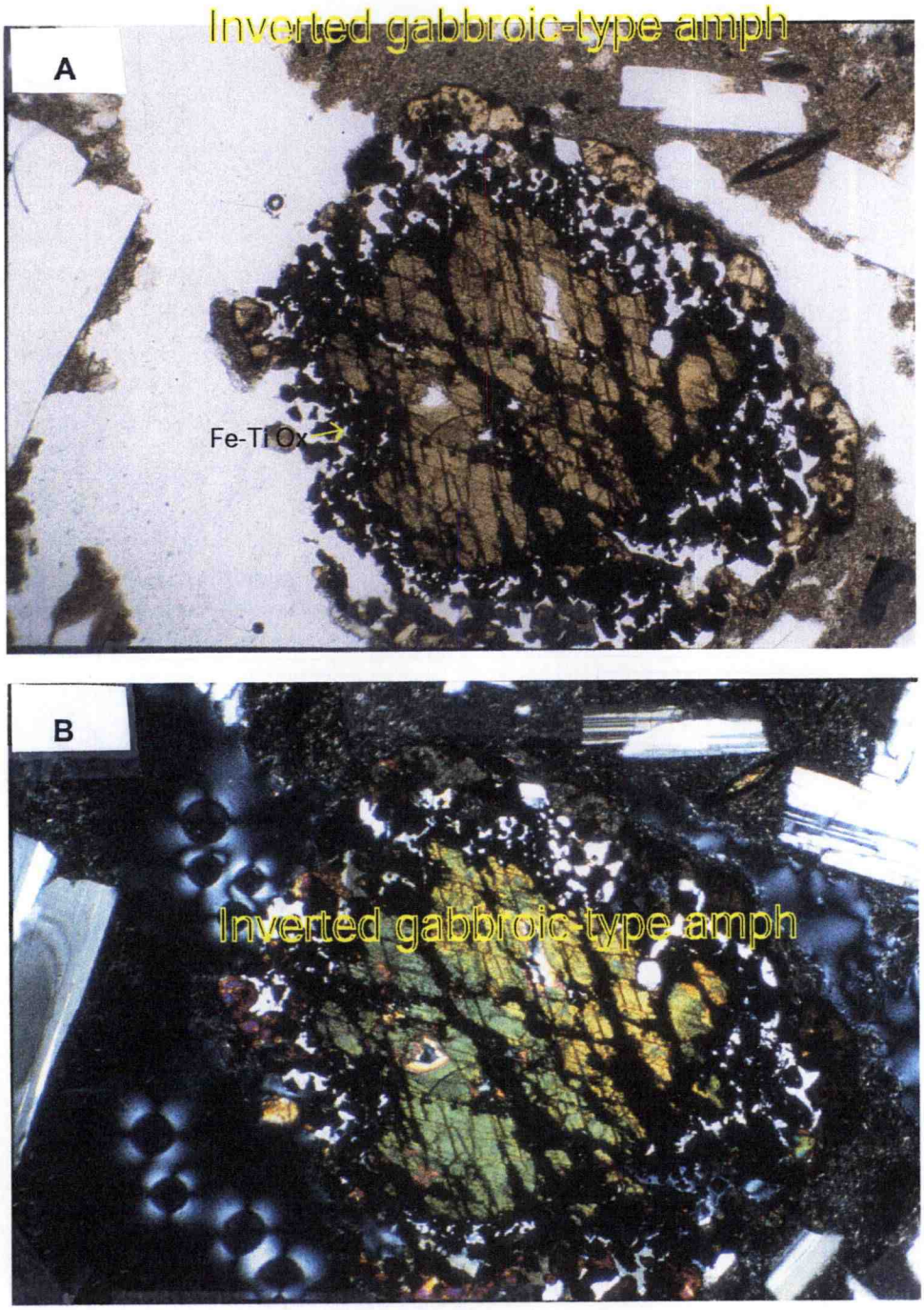


Figure 16 A and B. Photomicrograph of inverted gabbroic-type amphibole breakdown in a hornblende-dacite. Relict amphibole is reacted with a 0.5 mm thick microcrystalline reaction rim of plagioclase, Fe-Ti oxides, hypersthene, and augite; also reacted internally along cleavage planes and fractures; field of view is 3.3 mm.

5.2 Mineral Composition

5.2.1 Olivine

Olivine is present as a phenocryst phase in two, small-volume basaltic andesite flows and as rare resorbed xenocrysts in the intermediate lavas. Olivine phenocrysts in the basaltic andesite lavas have iddingsitized alteration and occur as subhedral phenocrysts and partially resorbed microphenocrysts <0.5 mm across. Large (>1mm) equant and euhedral crystals are sparse. The compositions of olivine phenocrysts range from Fo_{83}, Ni-rich cores to Fo_{64}, Ni-poor rims (Figure 17, Table 1). Compositions of olivine microphenocrysts resemble rim compositions of larger phenocrysts.

Olivine xenocrysts lie at the Mg-rich end-member of the range for phenocrysts, are also normally zoned, and have less compositional variability. Olivine included in an amphibolite xenocryst sampled at Volcán Miño exhibits nearly as large a range in chemical composition as the phenocrysts (Fo_{69} to Fo_{83}.) (Figure 17).

5.2.2 Pyroxene

Both orthopyroxene and clinopyroxene are present in Volcán Miño andesites and dacites and account for less than 10% of the rock mode.

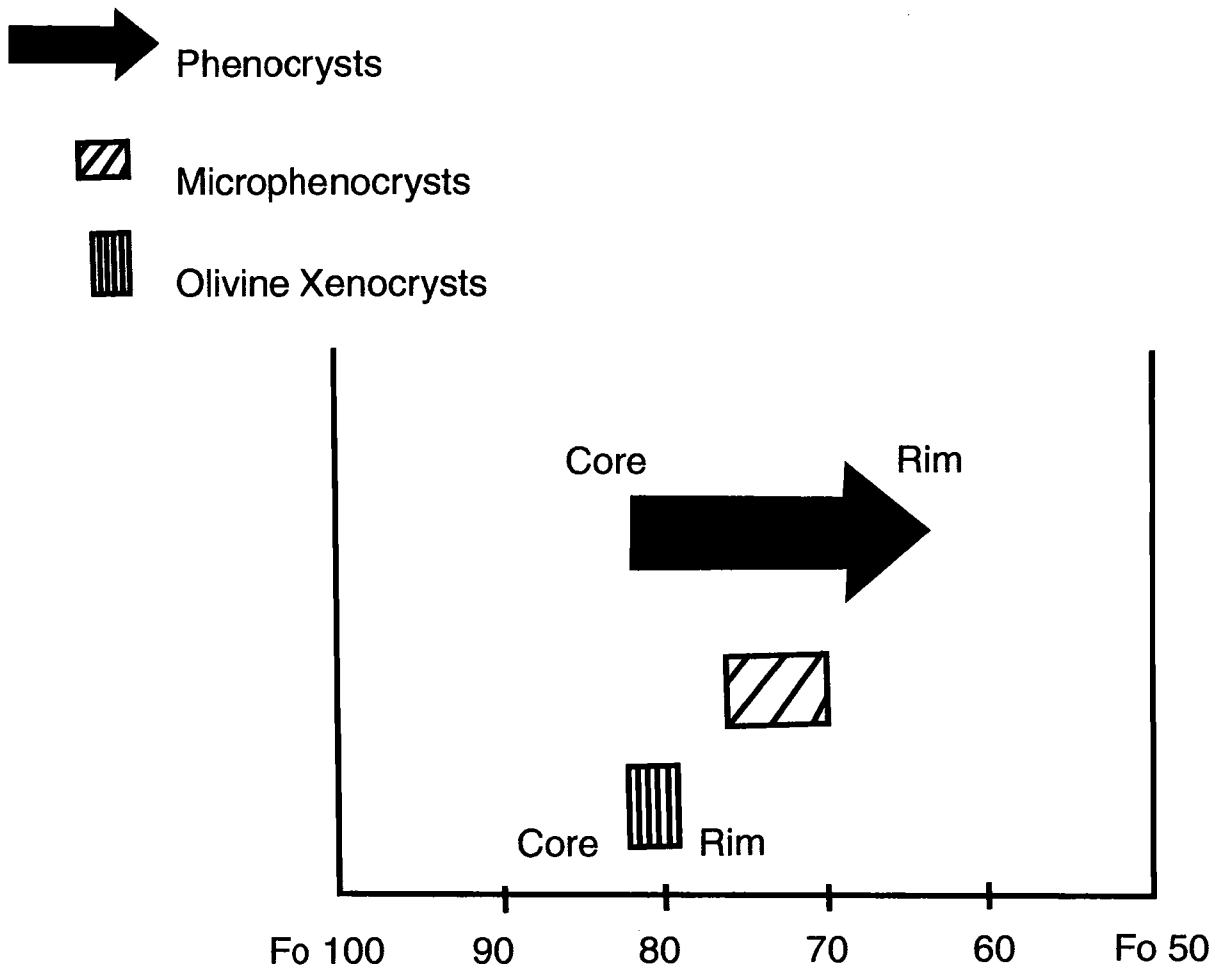


Figure 17. Range in forsterite content for olivine phenocrysts, microphenocrysts, and xenocrysts for Volcán Miño lavas.

Table 1
Selected analyses of olivine in Mino lavas

	VM99-16 *Basaltic Andesite Phenocrysts*								*VM99-25* *Andesite Xenocrysts*			
	core	mid	rim	rim	core	rim	core	rim	core	rim	core	rim
Na2O	0.00	0.01	0.00	0.00	0.01	0.00	0.03	0.02	0.01	0.02	0.01	0.00
MgO	39.91	40.04	38.88	37.70	43.20	42.32	36.97	34.44	43.44	43.25	43.20	42.32
Al2O3	0.02	0.02	0.01	0.00	0.00	0.03	0.02	0.03	0.03	0.03	0.00	0.03
SiO2	38.25	37.99	37.56	37.78	38.81	38.25	36.99	36.59	39.02	38.74	38.81	38.25
CaO	0.15	0.16	0.16	0.16	0.12	0.12	0.14	0.20	0.13	0.13	0.12	0.12
TiO2	0.02	0.03	0.03	0.02	0.00	0.01	0.02	0.04	0.01	0.00	0.00	0.01
Cr2O3	0.01	0.04	0.00	0.03	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.00
MnO	0.25	0.23	0.27	0.26	0.20	0.24	0.29	0.33	0.19	0.17	0.20	0.24
FeO	21.05	21.09	22.12	23.36	16.98	18.16	23.98	26.05	16.60	16.80	16.98	18.16
NiO	0.12	0.11	0.12	0.08	0.14	0.12	0.08	0.10	0.15	0.15	0.14	0.12
Total	**99.77**	**99.71**	**99.14**	**99.40**	**99.47**	**99.25**	**98.52**	**97.80**	**99.60**	**99.31**	**99.47**	**99.25**
Fa	15.3	14.7	6.3	5.3	0.8	22.1	18.7	24.3	17.3	15.4	0.8	22.1
Fo	84.7	85.3	93.7	94.7	99.2	77.9	81.3	75.7	82.7	84.6	99.2	77.9

Clinopyroxene is subordinate to or subequal to orthopyroxene in all but a few cases (Figure 11). Clinopyroxene exceeds orthopyroxene in abundance in the basaltic andesite lavas and mafic andesites. Orthopyroxene is present only as a xenocryst in the basaltic andesite lavas.

Clinopyroxene and orthopyroxene in many Volcán Miño lavas are both normally and reversely zoned. Orthopyroxene compositions range rom enstatite to hypersthene and clinopyroxene compositions are dominantly augite (Figure 19; Table 2) (Deer, Howie, and Zussman, 1992). TiO_2 and Al_2O_3 increase and FeO* decreases (Figure 18) with decreasing Mg-number values. TiO_2 and Al_2O_3 concentrations oscillate from core to rim in pyroxenes and are antithetic to one another. Clinopyroxene has a greater Mg# than orthopyroxene (Figures 18 and 19). Textural relationships combined with decreasing Mg# values in order of amphibole>clinopyroxene>orthopyroxene may be consistent with early crystallization of amphibole, followed by clino- and orthopyroxene for those lavas with amphibole present. There appears to be no significant difference in Mg# between the pyroxenes from the basaltic andesite lavas and the pyroxenes from Volcán Miño andesites and dacites.

Overall, pyroxene compositions change systematically with respect to whole-rock SiO_2. Clinopyroxene compositions cluster more tightly (Figure 19) with increasing SiO_2, but orthopyroxene compositions tend to

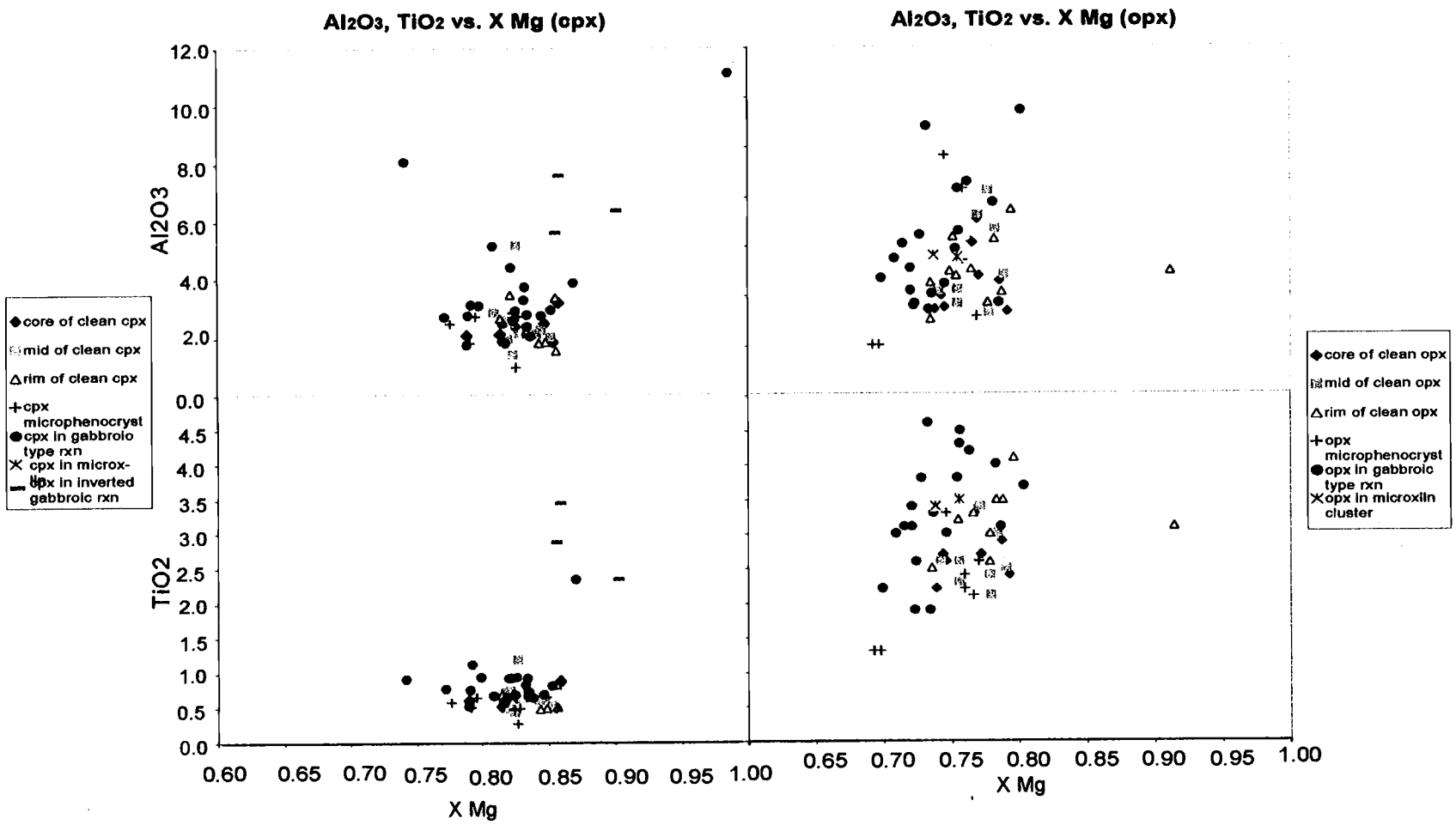


Figure 18. Al_2O_3 and TiO_2 vs. Mg for clinopyroxene and orthopyroxene. Each point represents one analysis. Closed circles represent clean opx and cpx compositions; diamonds, microphenocryst compositions; crosses, pyroxene in amphibole breakdown reactions; and stars, glomerocrystic pyroxene compositions. Each ternary illustrates all pyroxene analyses from one representative sample. Samples increase in SiO_2 content from 57-65 wt.% from left to right.

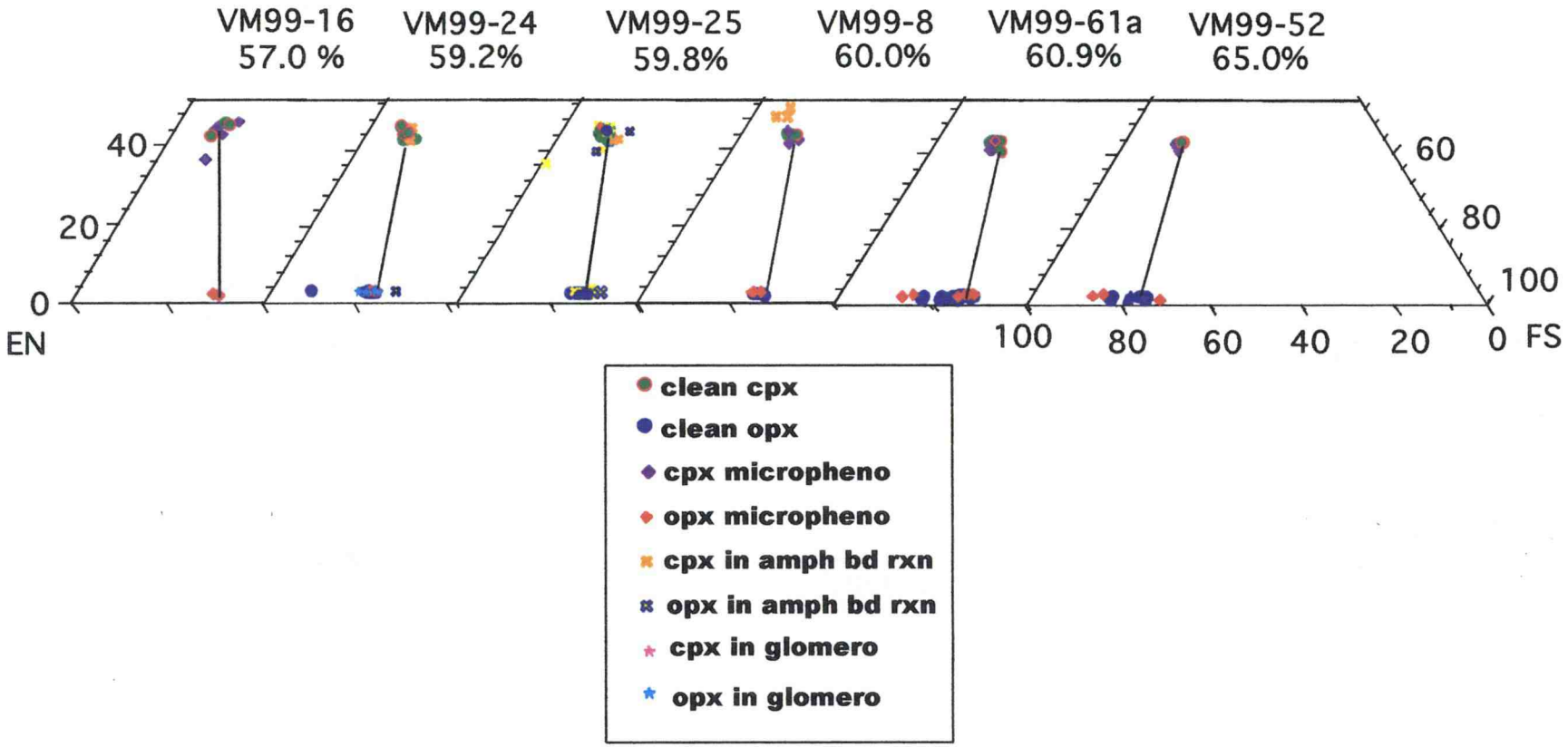


Figure 19 En-Wo-Fs ternary projections for Miño pyroxene. Each point represents one analysis. Crosses represent pyroxene included in plagioclase; diamond, plagioclase in amphibole breakdown reactions; triangle, oscillatory plagioclase; star, plagioclase microlite; closed circle, clean plagioclase; and open circle, spongey plagioclase. Each ternary illustrates all pyroxene analyses from one representative sample.

Table 2
Selected analyses of pyroxenes in Mino lavas

Clinopyroxene

	VM99-16 Basaltic Andesite (57 wt.% SiO2)			VM99-24 Andesite (59.2 wt.% SiO2)				VM99-25 Andesite (59.8 wt. % SiO2)				VM99-61a Andesite (60.9 wt. % SiO2)					VM99-52 Dacite (65 wt. % SiO2)		
	core	rim	gmass	core	rim	amph bd-	glomero	core	rim	gmass	amph bd-	core	rim	gmass	core	rim	Dl core	rim	gmass
SiO2	53.09	48.93	52.33	52.44	50.90	51.18	50.74	51.88	51.81	50.58	50.51	51.87	51.92	52.71	52.75	51.46	52.02	52.93	52.81
TiO2	0.26	1.04	0.54	0.50	0.83	0.69	0.70	0.52	0.66	0.70	0.94	0.50	0.53	0.53	0.45	0.78	0.60	0.37	0.51
Al2O3	0.98	4.85	2.04	1.86	3.36	2.78	3.26	2.12	2.29	2.76	2.94	1.61	1.71	1.97	1.53	3.40	2.34	1.57	1.82
Cr2O3	0.01	0.18	0.11	0.04	0.03	0.00	0.21	0.00	0.00	0.06	0.04	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00
Fe2O3(c)	2.32	1.88	3.33	4.23	4.44	3.91	4.24	3.70	3.99	5.12	4.49	1.73	2.38	1.03	1.53	1.28	1.10	0.88	0.17
FeO(c)	5.79	6.12	6.27	4.84	4.64	5.20	4.86	6.19	5.58	4.47	5.60	7.34	6.41	7.45	7.53	7.78	6.81	7.39	7.47
MnO	0.29	0.15	0.21	0.29	0.19	0.18	0.16	0.31	0.29	0.32	0.27	0.25	0.20	0.24	0.31	0.21	0.21	0.25	0.23
MgO	15.51	14.27	16.55	15.95	15.49	16.04	15.25	15.29	15.55	15.19	14.93	15.62	15.41	15.54	15.29	14.51	15.58	15.24	15.92
CaO	22.13	20.52	17.67	21.55	21.15	20.38	21.03	20.54	20.93	21.06	20.42	19.47	20.68	20.38	20.45	20.32	20.40	20.82	20.22
Na2O	0.34	0.29	0.19	0.42	0.45	0.38	0.46	0.52	0.46	0.49	0.56	0.46	0.43	0.43	0.47	0.51	0.38	0.46	0.35
K2O	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00			0.01	0.00	0.00	0.01	0.00	0.00
Total	100.74	98.25	101.24	102.13	101.48	100.74	100.93	101.08	101.58	100.75	100.70	98.84	99.66	100.30	100.32	100.25	99.45	99.91	99.51
Wo	45.89	45.45	36.54	45.35	45.67	43.59	45.68	44.04	44.61	46.11	44.82	41.49	43.88	42.82	42.96	43.63	43.05	43.56	41.96
En	44.74	43.98	53.35	46.70	46.52	47.74	46.08	45.61	46.11	46.26	45.59	46.29	45.50	45.22	44.70	43.34	45.74	44.37	45.94
Fs	9.38	10.58	10.12	7.95	7.81	8.67	8.25	10.35	9.28	7.64	9.59	12.21	10.61	12.17	12.34	13.03	11.22	12.07	12.10
XMg	0.83	0.81	0.84	0.86	0.86	0.85	0.85	0.82	0.83	0.86	0.83	0.79	0.81	0.79	0.78	0.77	0.80	0.79	0.79

Orthopyroxene

	VM99-16 Basaltic Andesite		VM99-24 Andesite					VM99-25 Andesite				VM99-61a Andesite					VM99-52		
	core	rim	core	rim	gmass	amph bd-	glomero	Al core	rim	gmass	amph bd-	Al core	rim	gmass	core(host)	rim(host)	Dl core	rim	gmass
SiO2	53.38	53.16	53.59	55.03	53.71	53.48	53.27	53.70	54.07	53.78	53.52	53.84	54.31	54.49	54.66	53.73	54.06	53.33	55.49
TiO2	0.13	0.17	0.34	0.26	0.27	0.34	0.36	0.33	0.30	0.25	0.33	0.35	0.26	0.26	0.26	0.20	0.31	0.25	0.25
Al2O3	0.51	0.51	1.77	0.93	1.05	1.28	2.13	1.53	1.25	0.79	1.02	1.31	0.96	0.60	0.77	1.89	1.30	0.70	1.12
Cr2O3	0.01	0.00	0.04	0.01	0.04	0.03	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.07
Fe2O3(c)	2.11	2.29	2.72	1.83	2.88	1.74	2.00	3.24	2.10	2.26	2.41	1.40	1.10	0.22	0.00	0.75	0.64	3.76	1.15
FeO(c)	18.67	18.73	14.25	14.16	13.84	17.12	14.15	14.39	15.68	15.43	16.29	16.23	16.81	17.28	17.29	16.84	15.88	13.50	10.14
MnO	0.69	0.73	0.34	0.33	0.39	0.48	0.35	0.41	0.46	0.50	0.50	0.44	0.43	0.49	0.48	0.44	0.41	0.58	0.48
MgO	24.19	24.08	26.83	27.80	26.98	24.85	26.56	26.63	26.32	26.15	25.57	25.78	25.82	25.57	25.54	25.48	26.27	27.41	30.31
CaO	0.97	0.99	1.36	1.47	1.51	1.42	1.66	1.56	1.36	1.49	1.40	1.42	1.30	1.44	1.36	1.24	1.24	0.78	1.39
Na2O	0.04	0.01	0.05	0.03	0.05	0.09	0.01	0.04	0.02	0.01	0.02	0.05	0.05	0.04	0.02	0.02	0.04	0.00	0.02
K2O	0.01	0.01	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.02	0.01
Total	100.70	100.68	101.29	101.86	100.72	100.87	100.50	101.85	101.57	100.67	101.10	100.84	101.06	100.38	100.37	100.61	100.16	100.33	100.44
Wo	1.98	2.01	2.73	2.88	3.02	2.88	3.33	3.14	2.71	2.99	2.82	2.84	2.58	2.85	2.69	2.48	2.47	1.58	2.70
En	68.41	68.21	74.94	75.54	75.30	70.05	74.42	74.33	72.92	72.88	71.59	71.79	71.35	70.45	70.53	71.14	72.83	77.11	81.93
Fs	29.61	29.78	22.33	21.59	21.68	27.07	22.24	22.54	24.37	24.13	25.59	25.36	26.07	26.71	26.78	26.38	24.70	21.31	15.38
XMg	0.70	0.70	0.77	0.78	0.78	0.72	0.77	0.77	0.75	0.75	0.74	0.74	0.73	0.73	0.73	0.73	0.75	0.78	0.84

Sample Types: core and rim apply to phenocrysts; gmass, groundmass microlite; amph bd, amphibole breakdown

exhibit a larger range with increasing SiO_2. Generally speaking, pyroxene microphenocrysts illustrate a greater compositional range when compared to their phenocrystic counterparts. Orthopyroxene microphenocrysts encompass the entire compositional spectrum of the existing phenocrysts. Compositions of clinopyroxene microphenocrysts are restricted to compositional clusters but are widely variable in the basaltic andesite. Compositions for pyroxenes involved in amphibole breakdown reactions are similar to phenocryst and microphenocryst compositions.

5.2.3 Opaques

Fe-Ti oxides in Volcán Miño lavas are predominately titanomagnetites (Table 3). Ilmenite grains are rare but occur in most samples as exsolution lamallae. Ilmenite commonly occurs in gabbroic-type breakdown product and plots away from the general trend for Miño lavas. Chromite inclusions in olivine phenocrysts were identified in basaltic andesite lavas.

Most Fe-Ti oxide phenocrysts in the intermediate lava flows are homogeneous and unexsolved however minor ilmenite is present as exsolution lamellae and as an amphibole breakdown product in a few lavas. Co-existing titanomagnetite-ilmenite pairs were difficult to identify (Figure 20). Most Fe-Ti oxides occur as sub- to euhedral phenocrysts and microphenocryst and as inclusions in all other phenocryst phases,

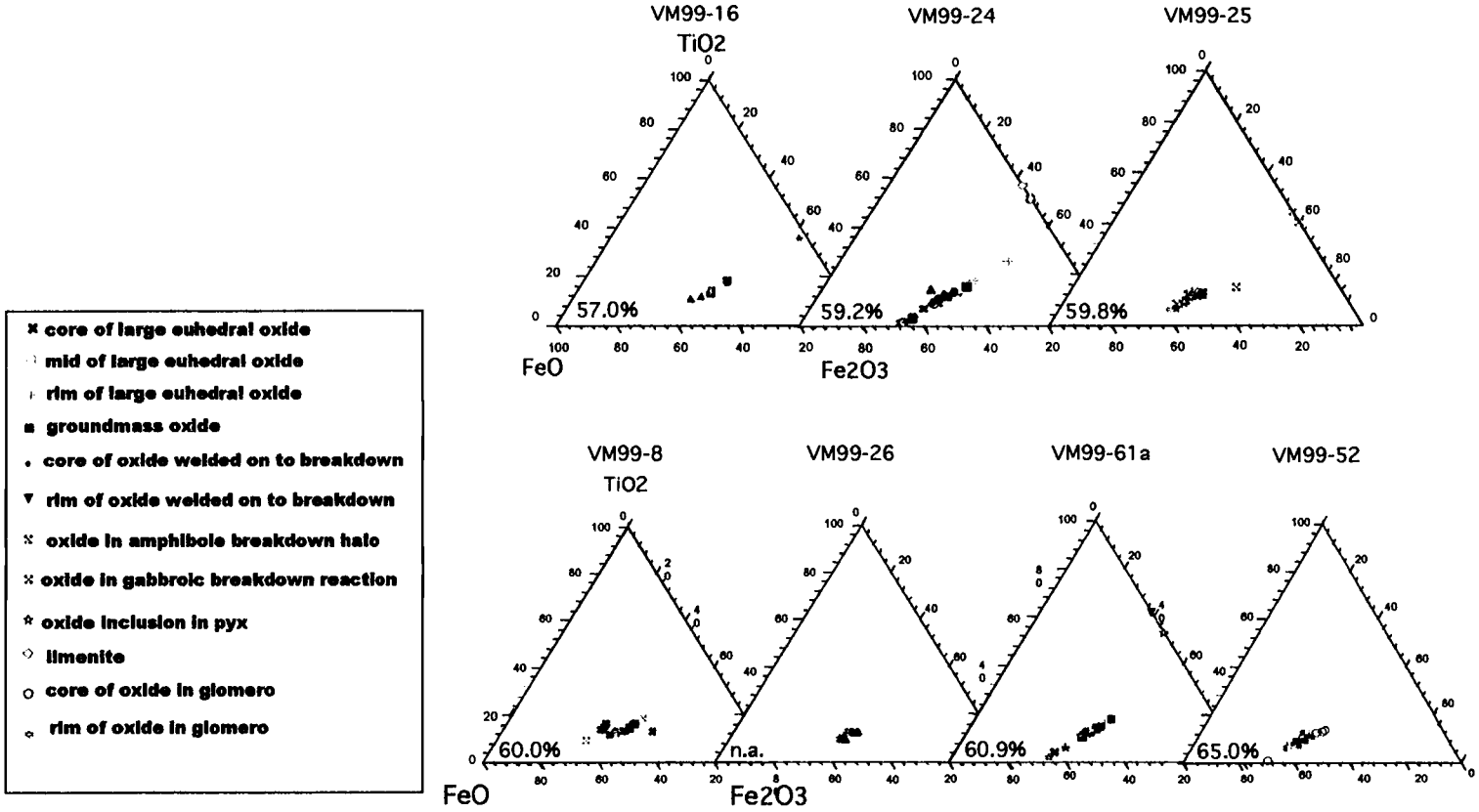


Figure 20. Fe_2O_3-TiO_2-FeO (molar) ternary projections for Miño Fe-Ti oxides. Each point represents one analysis. Each ternary illustrates all Fe-Ti oxide analyses from one representative sample. Samples increase in SiO_2 content from 57-65 wt.% from left to right.

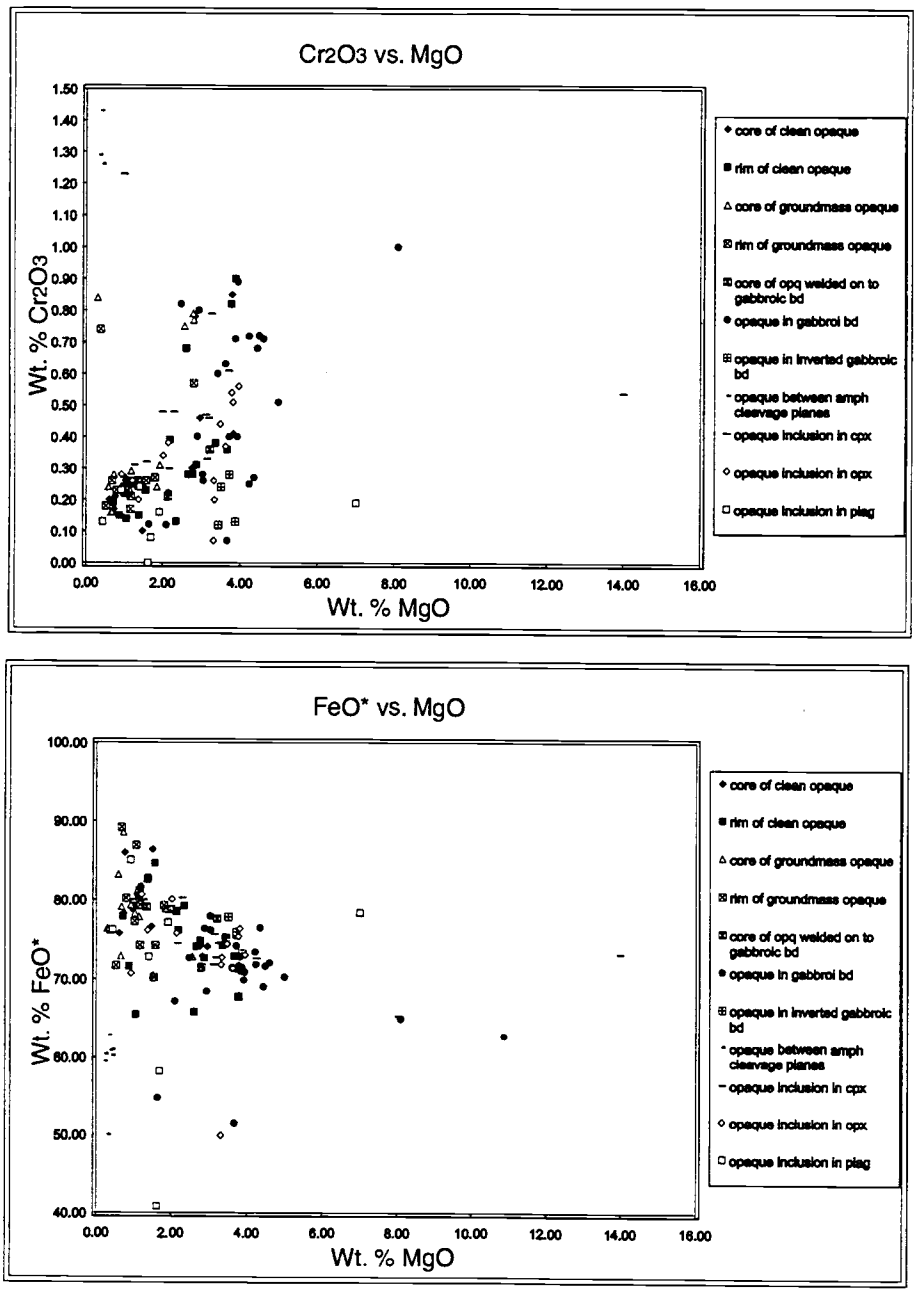


Figure 21. Cr_2O_3 and FeO* vs. MgO for Miño Fe-Ti oxides. Each point represents one analysis.

Table 3
Selected analyses of Fe-Ti oxides in Mino lavas

	VM99-16 Basaltic Andesite (57.0 wt.% SiO2)					VM99-24 Andesite (59.2 wt.% SiO2)				VM99-25 Andesite (59.8 wt.% SiO2)					
	gmass	core	olv incl	cpx incl	ilmenite	core	rim	gmass	cpx incl	core	rim	gmass	cpx incl	amph bd-	core
SiO2	0.01	0.05	0.39	0.05	0.05	0.10	0.09	0.07	0.04	0.04	0.07	0.12	0.04	0.06	0.07
TiO2	12.08	16.06	3.87	9.32	32.27	1.16	1.15	15.46	8.53	12.17	12.10	11.53	8.20	10.05	10.30
Al2O3	3.74	1.19	17.08	4.46	0.13	2.99	3.31	0.70	4.70	1.72	1.79	1.26	3.65	2.27	2.25
Cr2O3	6.36	3.98	17.05	0.28	0.08	0.24	0.23	0.13	0.61	0.17	0.19	0.26	0.48	0.22	0.21
Fe2O3(c)	35.08	31.23	25.03	44.54	2.18	62.62	61.29	36.75	46.51	42.00	41.64	42.57	48.23	46.38	46.11
FeO	36.30	41.86	25.46	34.49	56.18	30.01	29.51	43.74	33.33	40.49	40.47	39.92	35.79	36.78	37.08
V2O3	0.68	0.71	0.40	0.72	0.29	0.82	0.74	0.53	0.68	0.54	0.55	0.64	0.68	0.63	0.54
MnO	0.35	0.35	0.26	0.29	0.20	0.21	0.19	0.48	0.28	0.46	0.46	0.35	0.29	0.35	0.38
MgO	3.79	2.15	7.66	3.21	1.70	1.51	1.57	0.58	3.71	0.74	0.72	0.65	2.00	2.16	2.14
ZnO	0.11	0.09	0.08	0.06	0.00	0.23	0.21	0.08	0.06	0.18	0.09	0.09	0.04	0.13	0.11
Total	**98.49**	**97.66**	**97.28**	**97.43**	**93.07**	**99.90**	**98.30**	**98.52**	**98.43**	**98.50**	**98.08**	**97.39**	**99.39**	**99.04**	**99.18**
XCr	53.28	69.28	40.10	4.05	28.32	5.02	4.44	10.80	7.95	6.25	6.52	12.05	8.17	6.18	5.83
XFe2+	84.30	91.61	65.09	85.78	94.90	91.77	91.36	97.71	83.45	96.84	96.92	97.20	90.96	90.54	90.67
YFe3+	73.67	83.79	35.91	85.94	88.42	92.70	91.87	96.77	85.33	93.59	93.28	95.00	88.57	92.45	92.50

	VM99-61a Andesite (60.9 wt. % SiO2)						VM99-52 Dacite (65.0 wt.% SiO2)					
	core	rim	gmass	cpx incl	core	rim	ox phenos					
SiO2	0.03	0.01	0.03	0.03	0.04	0.28	0.06	0.05	0.06	0.07	0.04	0.04
TiO2	12.57	12.64	10.26	12.75	4.07	13.94	12.58	13.19	10.49	8.35	10.06	10.67
Al2O3	1.71	1.65	1.79	2.10	0.53	2.46	1.27	1.15	1.23	2.19	1.96	1.87
Cr2O3	0.30	0.27	0.29	0.32	0.21	0.18	0.12	0.16	0.15	0.21	0.24	0.30
Fe2O3(c)	41.64	41.72	46.86	39.10	59.06	34.02	0.05	0.04	0.04	0.08	0.02	0.00
FeO	39.74	39.83	38.59	38.94	32.84	40.44	76.90	76.58	77.88	75.54	76.21	76.07
V2O3	0.43	0.45	0.50	0.34	0.70	0.68	0.59	0.55	0.37	0.48	0.57	0.66
MnO	0.41	0.35	0.35	0.42	0.40	0.44	0.08	0.08	0.24	0.22	0.28	0.31
MgO	1.57	1.56	1.18	1.59	0.77	1.19	1.15	1.13	1.65	4.03	2.74	2.77
ZnO	0.01	0.09	0.21	0.21	0.18	0.23	0.00	0.02	0.10	0.07	0.07	0.06
Total	**98.42**	**98.60**	**100.07**	**95.81**	**98.79**	**93.86**	**92.80**	**92.97**	**92.21**	**91.23**	**92.21**	**92.76**
XCr	10.46	10.01	9.72	9.32	20.72	4.55						
XFe2+	93.41	93.46	94.83	93.22	96.00	95.02						
YFe3+	93.286	93.544	93.785	91.497	98.26	89.375						

Sample Type: olv incl, oxide inclusion in olivine; cpx incl, oxide inclusion in cpx; gmass, groundmass microlite; amph bd, amphibole breakdown

particularly clino- and orthopyroxene and rarely in plagioclase. Fe-Ti oxides commonly compose less than 2 to 3% of the rock mode.

There do not appear to be any systematic trends in Fe-Ti oxide composition with respect to differentiation (Figure 20) although weight % MgO and Cr_2O_3 generally decrease with increasing wt.% FeO* (Figure 21). Compositions of cores and rims of oxide phenocrysts and microlites encompass the entire range represented on Figure 19. The largest variation in Fe-Ti oxide composition occurs in samples, which have been obviously mixed or mingled (VM99-25, VM99-61a), and are enriched in both Fe_2O_3 and TiO_2.

Fe-Ti oxides from gabbroic-type amphibole breakdown, exhibit the largest range in wt. % Cr_2O_3 and TiO_2. Ilmenite commonly occurs as a gabbroic-type breakdown product plotting away from the general trend for Miño Fe-Ti oxides, 50 to 60 mole % on Figure 19.

5.2.4 Plagioclase

Representative data for plagioclase phenocrysts and microlites are listed in the Table 4 and illustrated in Figure 22. Plagioclase occurs in multiple populations in Volcán Miño lavas (1) as large and complex glomerocrystic clusters, (2) as grains that are coarsely embayed or finely sieved owing to a network of interconnected glass inclusions, (3) as clean euhedral phenocrysts and broken crystals, and (4) as reaction products in amphibole breakdown textures.

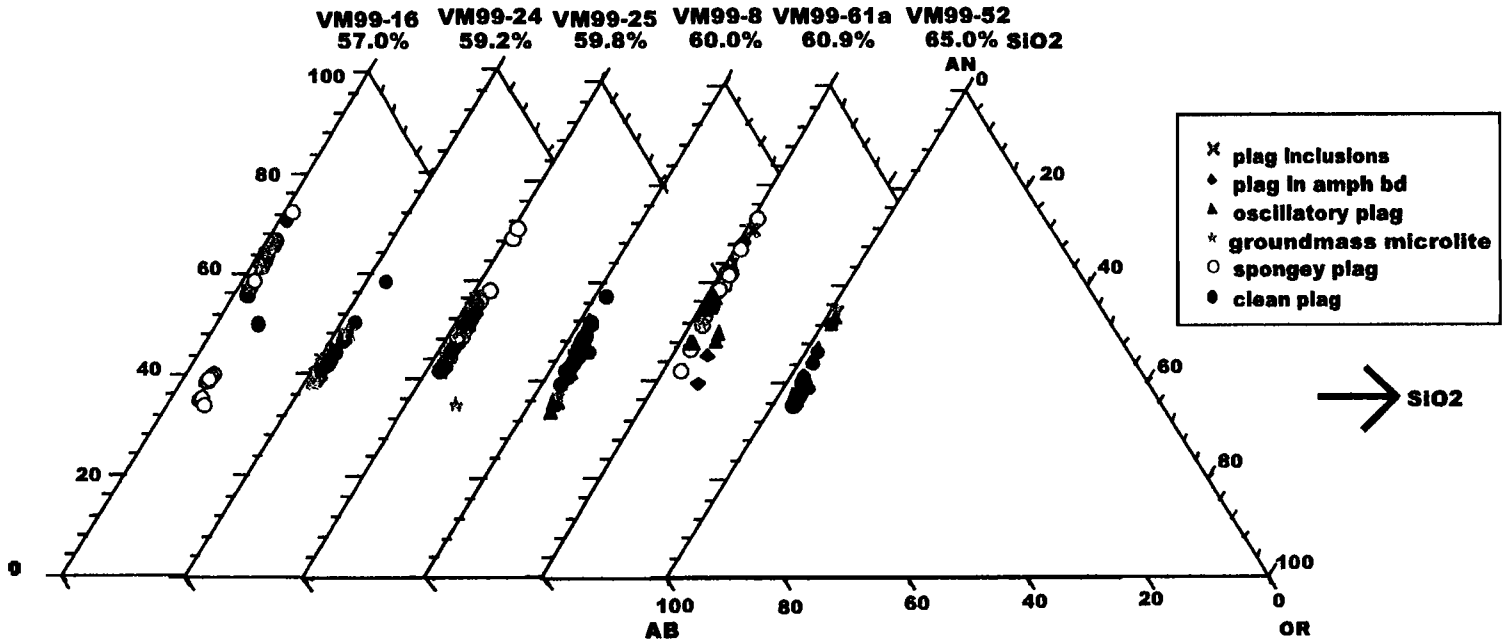


Figure 22. Ab-An-Or ternary projections for Miño plagioclase. Each point represents one analysis. Crosses represent plagioclase inclusions; closed diamonds are plagioclase in amphibole breakdown reactions; closed triangles represent oscillatory plagioclase; stars are groundmass microlites; open circles represent spongey, disequilibrium plagioclase, and closed circles are clean plagioclase phenocrysts.

Plagioclase compositions in Volcán Miño lavas range from An_{35} to An_{75} (andesine to bytownite). Overall, anorthite content in plagioclase decreases with increasing differentiation (Figure 22). In the least silicic sample, plagioclase exhibits two populations; a spongey albitic (xenocrystic) plagioclase (An_{34} to An_{42}) population and a population of phenocrysts and microphenocrysts (An_{56} to An_{74}) of equilibrium plagioclase. Many plagioclase grains from the basaltic andesite are xenocrysts and derived from mingling with a more silicic magma. Despite marked textural variability, plagioclase compositions for the rest of the suite cluster between An_{35} and An_{60}, that is, in the gap defined by the least silicic andesite.

As samples become increasingly silicic, the compositional range narrows (Figure 22). Plagioclase phenocryst and microlite analyses from the silicic end-member dacite are albitic An_{36} to An_{56}. Compositions of plagioclase microlites are calcic as opposed to the more sodic plagioclase phenocrystic compositions. Sample VM99-61a is particularly interesting because in contrast to other samples, plagioclase compositions overlap fields for both the most mafic and silicic end-members of the suite. Compositional complexity coupled with textural evidence (i.e. mafic inclusions and textural disequilibrium) suggests crystals are not as advanced in reequilibration to mixed compositions. Plagioclase inclusions in other phases and overgrowths on spongey plagioclase are generally

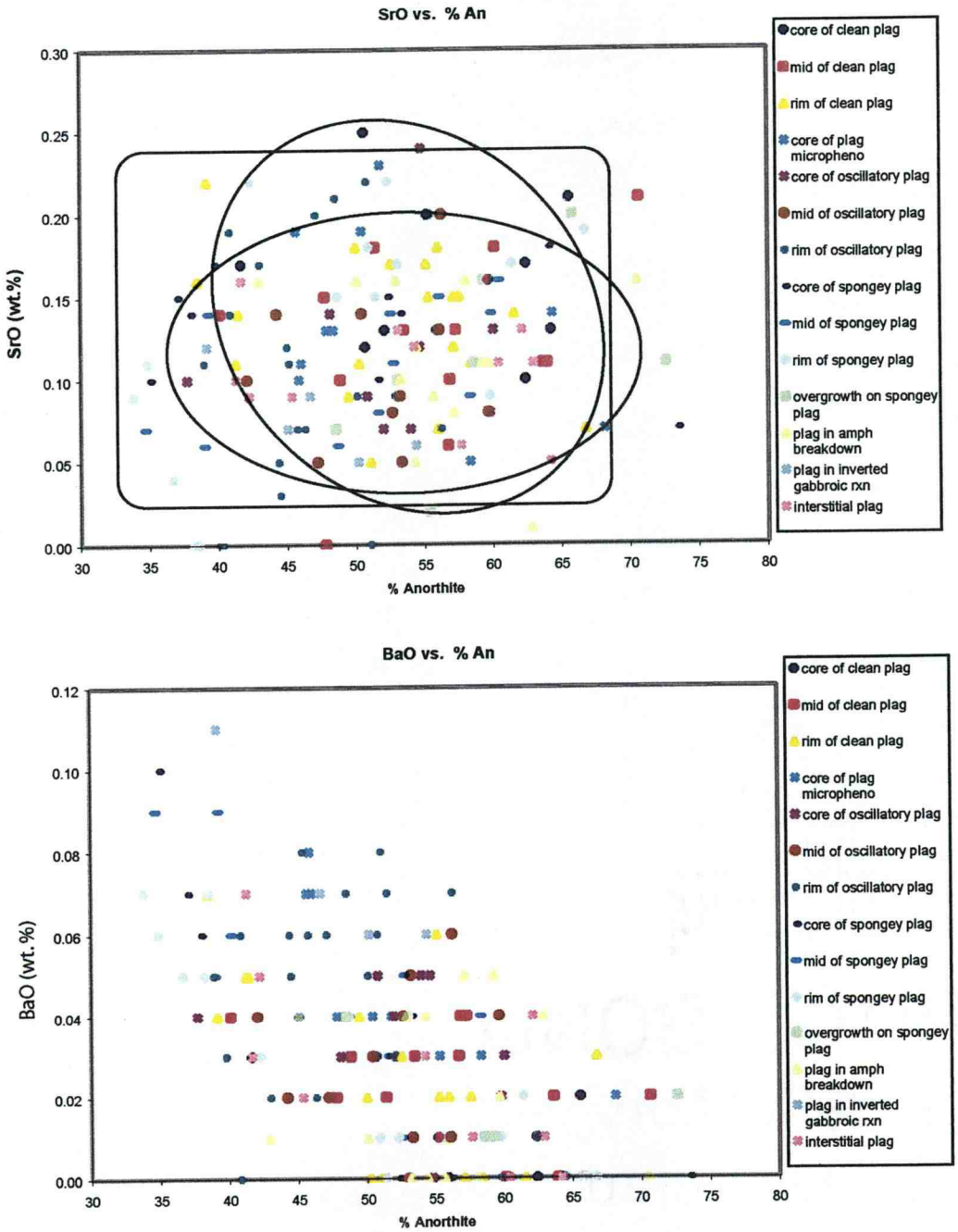


Figure 23. Variation in Sr and Ba contents vs. % Anorthite for plagioclase in Miño lavas. Outlines encompass the range in wt.% SrO for clean plagioclase crystals and microphenocrysts (circle), oscillatory and breakdown-related plagioclase (ellipse), and spongey plagioclase (rectangle). Wt.% BaO for Miño lavas exhibits no systematic trend.

Table 4
Selected microprobe analyses of plagioclase in Mino lavas

	VM99-16 Basaltic Andesite (57.0 wt.% SiO2)				
	core +	rim +	core	rim	gmass
SiO2	58.09	57.83	51.56	52.00	53.92
Al2O3	25.91	25.94	29.79	29.72	28.38
Fe2O3	0.40	0.40	0.82	0.89	1.16
MgO	0.02	0.01	0.11	0.08	0.04
CaO	7.84	7.85	12.67	12.74	10.89
SrO	0.14	0.00	0.17	0.14	0.10
BaO	0.06	0.05	0.00	0.00	0.02
Na2O	6.52	6.52	4.03	4.19	5.04
K2O	0.76	0.72	0.20	0.24	0.36
Total	**99.74**	**99.33**	**99.36**	**100.00**	**99.89**
Ab	57.20	57.48	35.95	36.66	44.49
An	37.98	38.25	62.40	61.55	53.14
Or	4.36	4.18	1.18	1.40	2.07

	VM99-24 Andesite (59.2 wt.% SiO2)			
	core	rim	gmass	incl
	52.41	54.78	54.26	59.00
	29.67	27.99	28.99	24.78
	0.60	0.51	0.74	0.83
	0.05	0.04	0.08	0.00
	12.41	10.28	11.29	6.39
	0.16	0.09	0.19	0.12
	0.04	0.04	0.02	0.12
	4.45	5.56	5.13	7.30
	0.19	0.32	0.26	1.02
	99.98	**99.61**	**100.98**	**99.57**
	38.73	48.41	44.21	63.11
	59.69	49.45	53.77	30.54
	1.09	1.83	1.48	5.81

	VM99-25 Andesite (59.8 wt.% SiO2)								
	core	rim	core*	rim*	core+	rim+	og+	gmass	amph bd-
	53.78	53.08	54.77	54.96	54.29	50.31	54.41	54.06	54.50
	28.57	28.96	28.21	27.83	28.33	31.34	28.58	28.42	28.34
	0.52	0.63	0.54	0.62	0.49	0.69	0.73	0.84	0.80
	0.05	0.07	0.04	0.05	0.05	0.03	0.02	0.05	0.02
	10.99	11.51	10.38	10.36	10.69	14.04	11.09	10.80	10.65
	0.09	0.18	0.09	0.12	0.15	0.12	0.10	0.14	0.07
	0.00	0.02	0.05	0.04	0.00	0.00	0.00	0.04	0.02
	5.21	4.77	5.32	5.31	5.17	3.43	5.19	5.04	5.31
	0.24	0.25	0.30	0.31	0.26	0.16	0.31	0.35	0.27
	99.45	**99.48**	**99.70**	**99.59**	**99.43**	**100.13**	**100.44**	**99.74**	**99.99**
	45.40	42.02	47.10	47.06	45.77	30.29	44.90	44.67	46.59
	52.97	55.99	50.80	50.77	52.30	68.48	53.04	52.88	51.62
	1.40	1.47	1.77	1.78	1.54	0.91	1.79	2.02	1.57

	VM99-61a Andesite (60.9 wt.% SiO2)				
	core	rim	core*	rim*	gmass
SiO2	56.80	57.42	55.09	56.16	57.19
Al2O3	27.20	26.75	28.36	27.64	26.79
Fe2O3	0.54	0.50	0.53	0.55	0.82
MgO	0.06	0.05	0.03	0.04	0.08
CaO	9.20	8.42	10.39	9.55	9.09
SrO					
BaO	0.04	0.09	0.07	0.07	0.06
Na2O	5.83	6.03	5.19	5.61	5.93
K2O	0.35	0.45	0.31	0.32	0.40
Total	**100.02**	**99.70**	**99.96**	**99.94**	**100.36**
Ab	52.26	54.84	46.56	50.49	52.79
An	45.58	42.32	51.49	47.49	44.73
Or	2.09	2.69	1.82	1.90	2.37

	VM99-52 Dacite (65 wt.% SiO2)					
	core	rim	core*	rim*	gmass core	gmass rim
	56.92	58.13	58.41	57.97	57.11	53.85
	27.50	26.13	26.42	26.81	27.12	29.11
	0.48	0.52	0.34	0.47	0.50	0.59
	0.03	0.02	0.02	0.02	0.01	0.05
	9.20	7.81	7.86	8.43	9.10	11.39
	0.18	0.07	0.10	0.07	0.17	0.11
	0.02	0.08	0.04	0.06	0.06	0.02
	6.17	6.69	6.88	6.43	6.13	5.01
	0.35	0.56	0.39	0.44	0.33	0.13
	100.84	**100.01**	**100.45**	**100.69**	**100.51**	**100.24**
	53.45	58.62	59.74	56.37	53.61	43.83
	44.07	37.82	37.73	40.85	43.96	55.11
	1.98	3.22	2.21	2.51	1.89	0.74

Sample Types: gmass, groundmass microlite; incl, inclusion in pyroxene
(+) spongey plag;og, overgrowth
(-) amphibole breakdown reaction
(*) oscillatory plag

more calcic. Oscillatory plagioclase and plagioclase crystals included in the inverted gabbroic reaction are more potassic than plagioclase from other Miño lavas.

Zoning patterns in plagioclase from Volcán Miño are diverse and complicated. Normal zoning patterns with occassional faint oscillatory zoning predominates, but examples of reverse zoning with patchy, irregular patterns are present in most samples. Disequilibrium plagioclase, specifically the spongey plagioclase population, is normally zoned. These sieved textured plagioclase crystals are probably xenocrysts with lower core anorthite contents (An_{36} to An_{42}) than the bulk population of plagioclase present. The spongey plagioclases are surrounded by more calcic overgrowths.

Plagioclase has high affinities for both Ba and Sr (Figure 23). BaO concentrations of >0.05 wt.% occur in cores and rims of prominently oscillatorily zoned plagioclase, plagioclase microphenocrysts, rims of clean plagioclase, and plagioclase in inverted gabbroic reactions on amphibole. Cores of clean plagioclase and core to rim transects across spongey plagioclase grains plot in the low Ba field. Unlike Ba, Sr appears to define no obvious trend with composition. There are no correlations between Ba and Sr compositions with respect to increasing whole-rock composition.

5.2.5 Amphibole

All amphibole in Volcán Miño andesites and dacites is pargasitic or tschermakitic ($NaCa_2(Mg, Fe)_4Al_2[Si_6Al_2O_{22}](OH)_2$; silica-poor and calcic (Ca>1.5 per 23 O). Volcán Miño amphiboles display abundant disequilbrium textures from black type amphibole to gabbroic type amphibole. Extracting information on amphibole paragenesis requires attention to basic petrographic observation. The textural character of amphibole coupled with its chemical composition records important information about the pre-eruptive conditions of magma chambers (ΔT, ΔP, ΔfO_2, ΔH_2O).

Two populations of amphibole have been identified in Volcán Miño andesites and dacites based on Al^{VI} versus Al^{IV} (Figure 24, Appendix H). Experimental studies by Helz (1973) and Hammerstrom and Zen (1986) have demonstrated that amphibole compositions increase in Al^{VI} relative to Al^{IV} with increasing pressure. An increase in (Na+K) relative to Al^{IV} is attributed to increasing crystallization temperature.

Accordingly, I assign one data cluster to a high pressure amphibole group (high Al^{VI}). This group includes (1.) cores, middle, and rims of black type amphibole, and (2.) cores and rims of gabbroic type amphibole. The low pressure amphibole group (low Al^{VI}) includes (1.) core and rim of relict amphibole inclusions, (2.) relict amphibole in inverted gabbroic breakdown, (3.) the fuzzy zone on black type amphibole. The core, middle, and rim of

black type amphibole generally fall within the low pressure field, but are associated with increasing Al^{VI} and therefore overlap with the high pressure field.

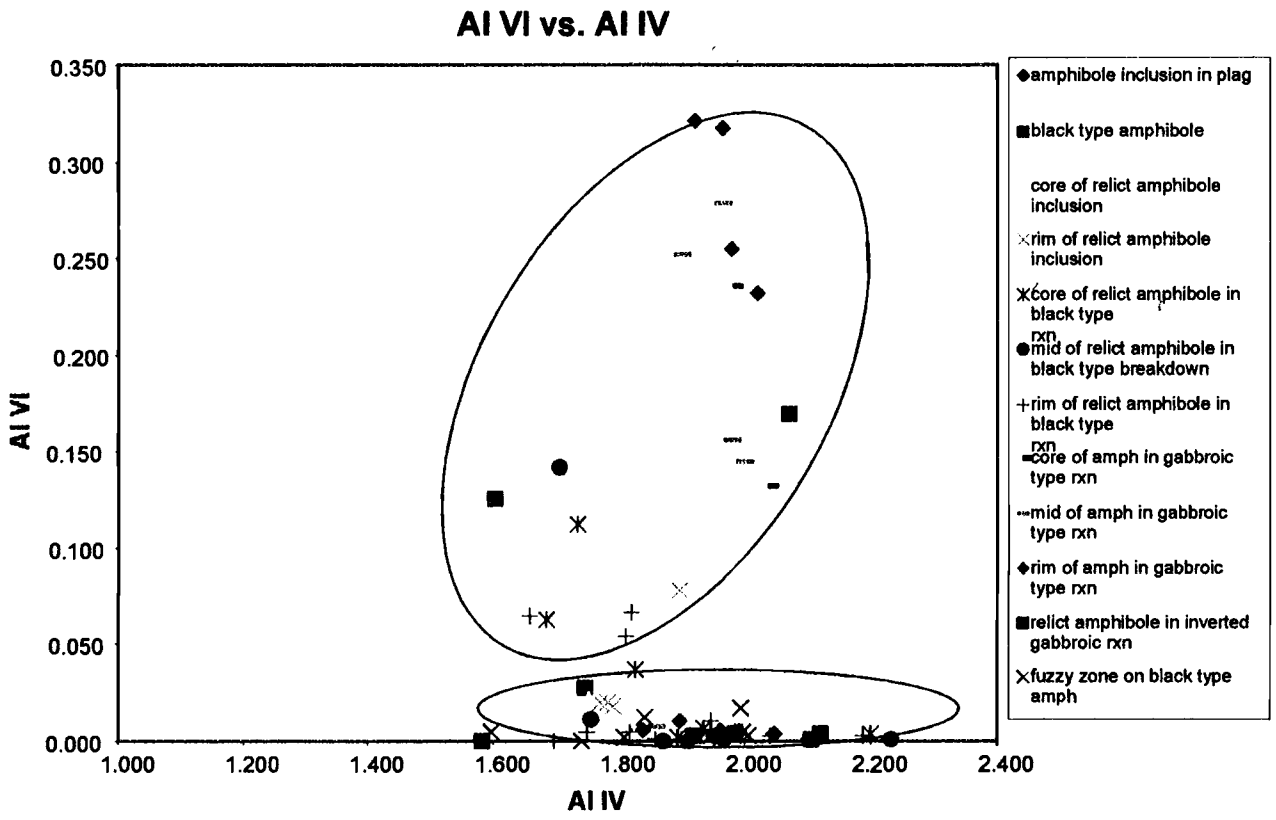


Figure 24. Graph of Al^{VI} vs. Al^{IV} in amphibole for Miño lavas.

Table 5
Selected analyses of Amphibole in Mino lavas

	VM99-25 Andesite Phenocrysts					VM99-52 Dacite Phenocrysts					VM99-61a Andesite Phenocrysts			VM99-8 Andesite Phenocrysts						
	Gabbroic type					Black type			Black type		Inv Gabbroic			Black type				Inverted Gabbroic type		
	core	mid	rim	core	rim	core	mid	rim	core	rim	core	core	plag incl	core	mid	rim	fuzzy zone	core	rim	fuzzy zone
SiO2	42.15	43.42	41.52	42.66	42.22	42.38	42.97	42.38	43.07	43.11	44.44	41.37	41.38	41.43	42.41	42.66	43.62	42.80	42.14	42.61
TiO2	2.34	2.18	2.24	2.41	2.37	2.41	2.26	2.36	1.82	2.95	3.12	3.02	3.60	2.71	3.00	3.46	3.52	2.57	2.59	2.69
Al2O3	13.18	13.00	13.28	12.95	13.29	10.85	10.71	11.00	10.78	9.93	9.37	12.38	12.17	12.67	11.78	11.34	13.01	13.00	13.05	11.94
Cr2O3	0.06	0.09	0.09	0.04	0.06	0.00	0.00	0.01	0.05	0.03	0.02	0.01	0.04	0.04	0.00	0.01	0.04	0.02	0.04	0.05
Fe2O3(c)	10.06	11.69	10.27	10.55	9.10	9.54	7.77	9.84	9.44	8.63	6.77	10.21	7.62	8.44	7.71	8.41	0.00	8.61	9.00	16.10
FeO(c)	1.49	0.00	1.28	1.13	2.66	4.18	6.29	4.04	3.94	4.48	6.02	3.74	5.77	4.54	4.92	4.14	16.68	3.39	3.45	0.00
MnO	0.13	0.18	0.14	0.08	0.14	0.25	0.20	0.23	0.12	0.19	0.13	0.20	0.17	0.17	0.12	0.18	0.17	0.12	0.09	0.22
MgO	15.19	15.54	15.05	15.26	14.77	14.34	13.54	14.14	14.56	14.93	15.18	13.92	13.67	14.09	14.34	14.59	7.68	14.79	14.67	18.41
CaO	11.16	10.66	10.98	10.83	10.70	11.19	10.42	11.10	11.28	11.21	11.27	10.61	10.70	11.15	11.15	10.97	11.99	11.17	11.23	9.17
Na2O	2.38	2.40	2.54	2.46	3.01	2.18	2.65	2.09	2.12	2.26	2.57	2.75	2.93	2.63	2.44	2.30	2.55	2.54	2.57	1.63
K2O	0.45	0.45	0.47	0.44	0.44	0.57	0.70	0.54	0.40	0.57	0.54	0.62	0.68	0.61	0.57	0.61	0.38	0.53	0.58	0.23
F	0.09	0.30	0.19	0.21	0.28	0.25	0.48	0.03	0.17	0.21	0.42		1.16	0.19	0.21	0.21	0.24	0.13	0.60	0.13
Cl	0.02	0.00	0.03	0.02	0.00	0.04	0.04	0.07	0.02	0.03	0.07		0.04	0.02	0.04	0.02	0.00	0.02	0.02	0.02
H2O(c)	2.05	1.99	1.99	2.01	1.97	1.93	1.81	2.02	1.97	1.98	1.87	1.23	1.51	1.97	1.97	1.98	1.93	2.04	1.81	2.12
O=F	0.04	0.12	0.08	0.09	0.11	0.10	0.20	0.01	0.07	0.09	0.18	0.74	0.49	0.08	0.09	0.09	0.10	0.06	0.25	0.06
O=Cl	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total	100.70	101.75	99.98	100.96	100.89	100.01	99.84	99.83	99.66	100.40	101.60	100.81	100.94	100.58	100.58	100.77	101.71	101.67	101.57	105.25
XMg	0.95	1.00	0.95	0.96	0.91	0.86	0.79	0.86	0.87	0.86		n.a.	0.87	0.85	0.84	0.86	0.45	n.a.	n.a.	n.a.
Si	6.02	6.10	5.98	6.06	6.04	6.17	6.29	6.18	6.27	6.25	6.37	5.98	6.01	6.00	6.13	6.14	6.40	6.08	6.01	5.84
Ti	0.25	0.23	0.24	0.26	0.25	0.26	0.25	0.26	0.20	0.32	0.34	0.33	0.39	0.30	0.33	0.37	0.39	0.27	0.28	0.28
Al IV	1.98	1.90	2.02	1.94	1.96	1.83	1.71	1.82	1.74	1.70	1.58	2.02	1.99	2.00	1.87	1.86	1.60	1.92	1.99	1.93
Al VI	0.24	0.25	0.23	0.23	0.28	0.04	0.14	0.07	0.11	0.00	0.00	0.09	0.09	0.17	0.14	0.06	0.65	0.25	0.21	0.00
Cr	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01
Fe3+	1.08	1.24	1.11	1.13	0.98	1.05	0.86	1.08	1.03	0.94	0.73	1.11	0.83	0.92	0.84	0.91	0.00	0.92	0.97	1.66
Fe2+	0.18	0.00	0.15	0.13	0.32	0.51	0.77	0.49	0.48	0.54	0.72	0.45	0.70	0.55	0.60	0.50	2.05	0.40	0.41	0.00
Mn2+	0.02	0.02	0.02	0.01	0.02	0.03	0.03	0.03	0.01	0.02	0.02	0.03	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.03
Mg	3.23	3.26	3.23	3.23	3.15	3.11	2.96	3.07	3.16	3.23	3.24	3.00	2.96	3.04	3.09	3.13	1.68	3.13	3.12	3.76
C#	1.71	1.61	1.69	1.65	1.64	1.75	1.64	1.73	1.76	1.74	1.73	1.64	1.66	1.73	1.73	1.69	1.89	1.70	1.72	1.35
Na	0.66	0.65	0.71	0.68	0.83	0.62	0.81	0.59	0.60	0.64	0.71	0.77	0.82	0.74	0.69	0.64	0.73	0.70	0.71	0.43
K	0.08	0.08	0.09	0.08	0.08	0.11	0.13	0.10	0.07	0.11	0.10	0.11	0.13	0.11	0.11	0.11	0.07	0.10	0.11	0.04
F	0.04	0.13	0.09	0.09	0.12	0.12	0.22	0.02	0.08	0.10	0.19	0.81	0.53	0.09	0.10	0.10	0.11	0.06	0.27	0.06
Cl	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
OH	1.96	1.87	1.91	1.90	1.88	1.88	1.77	1.97	1.92	1.90	1.79	1.18	1.46	1.91	1.90	1.90	1.89	1.94	1.73	1.94
Sum Cat#	17.45	17.34	17.49	17.41	17.55	17.47	17.57	17.42	17.43	17.48	17.54	17.53	17.61	17.58	17.52	17.45	17.48	17.50	17.53	17.32

5.3 Whole-rock major and trace element compositions

Volcán Miño lavas conform to medium- to high-K calc alkaline trends characteristic of late Cenozoic stratovolcanoes within the CVZ (e.g. Lascar: Matthews et al., 1994; Ollagüe: Feeley and Davidson, 1994). Representative major and trace element analyses for 19 Miño lavas are listed in Table 6. Chemical compositions of the dominantly andesitic suite form a restricted range between 57 and 65 wt.% SiO_2 (Figure 11). K_2O and Na_2O are sufficiently high to classify the lavas as trachyandesites (Figure 10).

Although lava compositions form loose clusters, CaO, TiO_2, FeO*, MgO, Sr, Ba, and Ni decrease and K_2O and Na_2O and Rb increase with increasing differentiation (Figures 25, 26). Al_2O_3 and P_2O_5 compositions decrease only slightly from the most mafic (57% SiO_2) sample to the most silicic (65% SiO_2).

While basaltic andesite and the most silicic dacite define the compositional extremes overall, they do not fall along the trends defined by the cluster of intermediate lavas in all cases. In particular, the basaltic andesite is depleted in Al, Sr, and Sc and enriched in Na relative to the most mafic andesite, and the dacite is depleted in K_2O and enriched in Rb relative to the most evolved dacite.

Table 6. Representative Major and Trace Element Analyses of Mino lavas

Majors Wt. %		VM99-1	**VM99-1**	VM99-2	**VM99-2**	VM99-7	VM99-8	**VM99-8**	**VM99-12**	VM99-16	VM99-18	**VM99-19**	VM99-20	VM99-24	**VM99-24**	VM99-30	VM99-30
		Volatile-free Normalized Results (Weight %):															
	SiO2	59.77	**59.75**	60.49	**60.41**	60.47	60.00	**60.10**	**61.75**	57.01	60.19	**59.26**	59.93	59.22	**59.23**	59.75	59.52
	Al2O3	17.55	**17.60**	16.83	**17.43**	16.74	17.67	**17.58**	**16.92**	17.37	17.68	**17.74**	17.36	18.06	**17.95**	17.46	17.53
	TiO2	0.77	**0.72**	0.83	**0.78**	0.84	0.82	**0.77**	**0.76**	1.05	0.78	**0.81**	0.94	0.90	**0.89**	0.97	0.94
	FeO*	5.98	**5.96**	5.91	**5.53**	5.85	5.65	**5.73**	**5.25**	7.08	5.58	**5.93**	5.51	5.74	**5.98**	5.63	5.91
	MnO	0.10	**0.10**	0.09	**0.09**	0.09	0.09	**0.10**	**0.09**	0.10	0.09	**0.10**	0.08	0.09	**0.09**	0.09	0.09
	CaO	6.24	**6.43**	5.66	**5.75**	5.74	6.10	**6.21**	**5.50**	6.97	5.90	**6.25**	6.05	6.29	**6.27**	6.01	6.13
	MgO	3.40	**3.47**	3.47	**3.45**	3.61	2.97	**3.15**	**3.04**	4.33	3.11	**3.66**	3.51	3.16	**3.28**	3.40	3.61
	K2O	1.69	**1.39**	1.94	**1.72**	2.39	1.93	**1.65**	**2.32**	1.62	1.97	**1.73**	2.22	1.75	**1.49**	1.95	1.58
	Na2O	4.30	**4.34**	4.54	**4.56**	4.04	4.53	**4.44**	**4.10**	4.23	4.48	**4.24**	4.17	4.57	**4.54**	4.49	4.41
	P2O5	0.20	**0.21**	0.24	**0.25**	0.23	0.24	**0.24**	**0.23**	0.24	0.23	**0.25**	0.24	0.23	**0.24**	0.24	0.25
PreNormalized	Total	99.76	**101.00**	99.91	**99.97**	98.49	99.43	**99.51**	**99.75**	99.58	99.51	**101.10**	99.21	100.01	**98.11**	99.57	100.28
Trace Elements (ppm)																	
	Sc	*8*		*8*			*8*			*10*				*6*		*8*	
	Cr	58		71		**75**	55			117	55		**86**	40		78	
	Co	*15*		*14*			*15*			*18*				*12*		*16*	
	Ni	26		28		29	24			26	24		28	19		29	
	Cu	40		53		58	74			55	54		67	53		60	
	Zn	74		79		81	76			97	76		92	88		93	
	Ga	20		19		19	22			22	19		20	19		20	
	Rb	38		41		41	45			31	46		39	36		33	
	Sr	617		601		604	694			639	670		643	688		647	
	Y	13		13		13	15			14	13		13	13		13	
	Zr	118		140		136	140			127	140		146	139		145	
	Nb	8		8		8	8			6	9		7	8		9	
	Cs	*0.58*		*0.58*			*0.78*			*0.90*				*0.53*		*0.71*	
	Ba	686		747		730	810			606	767		754	723		762	
	La	16		4		26	21			6	25		19	7		18	
	Ce	*31*		*40*			*47*			*40*				*37*		*51*	
	Nd	*16*		*20*			*22*			*23*				*17*		*26*	
	Sm	*4*		*5*			*5*			*6*				*6*		*6*	
	Eu	*0.99*		*1.13*			*1.19*			*1.4*				*1.09*		*1.45*	
	Tb	*0.41*		*0.43*			*0.44*			*0.52*				n.d.		*0.53*	
	Yb	*0.88*		*0.77*			*0.99*			*1*	0.98			*0.7*		*0.9*	
	Lu	*0.12*		*0.12*			*0.15*			*0.14*	0.14			*0.11*		*0.13*	
	Hf	*3*		*4*			*4*			*4*				*3*		*5*	
	Ta	*0.29*		*0.37*			*0.4*			*0.37*				*0.29*		*0.37*	
	Pb	3		10		8	11			9	8		9	7		8	

Plain Type=XRF from WSU
****Bold Type**= ICP from OSU
Italic Type =INAA from OSU

**ICP data were corrected to match XRF for $Na_2O_{xrf}=Na_2O_{icp}+0.11$ and $K_2O_{xrf}=K_2O_{icp}-0.143$
Trace element data are reported as best values on the basis of analytical precision and comparison to regional data.

Table 6. Representative Major and Trace Element Analyses of Mino lavas

	VM99-33	VM99-33	VM99-35	VM99-41	VM99-44	VM99-50	VM99-52	VM99-52	VM99-56	VM99-61	VM99-61	QG-86	QG-104	QG-105	QG-106	QG-107
				Volatile-free Normalized Results (Weight %):												
SiO2	60.80	60.91	59.78	59.45	61.00	61.19	64.97	64.98	59.30	60.40	60.87	58.36	58.79	60.61	59.61	60.59
Al2O3	17.44	17.22	17.45	17.36	17.21	17.01	16.88	17.04	17.38	17.12	17.25	17.66	17.16	16.97	17.67	16.92
TiO2	0.80	0.77	0.87	0.93	0.82	0.74	0.59	0.57	1.00	0.81	0.78	0.96	0.82	0.90	0.94	0.98
FeO*	5.05	5.58	5.70	6.02	5.31	5.36	3.99	3.99	6.25	5.80	5.38	6.32	6.40	5.76	5.84	5.92
MnO	0.08	0.08	0.09	0.09	0.09	0.09	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
CaO	5.83	5.63	6.19	6.30	5.69	5.56	4.43	4.54	6.16	5.82	5.91	6.56	6.77	5.51	5.96	5.87
MgO	3.35	3.45	3.38	3.48	3.17	3.36	2.18	2.19	3.27	3.28	3.36	3.68	3.86	3.30	3.25	3.07
K2O	1.87	1.50	1.83	2.07	1.94	2.03	2.06	1.77	1.71	1.90	1.47	2.00	1.87	2.39	1.96	1.91
Na2O	4.56	4.60	4.48	4.04	4.55	4.46	4.64	4.63	4.58	4.54	4.62	4.16	4.07	4.29	4.47	4.47
P2O5	0.23	0.23	0.23	0.25	0.23	0.20	0.19	0.20	0.25	0.23	0.24	0.21	0.17	0.19	0.21	0.19
Total	99.96	100.41	99.31	99.02	99.47	99.12	99.78	96.43	99.40	99.74	98.74	98.95	98.51	98.53	99.23	98.42
Sc	*8*				*9*		*6*			*9*		11	12	12	12	13
Cr	67		54	65	69	75	39		91	73		92	87	58	62	66
Co	*14*				*15*		*9*			*15*		20	24	14	21	24
Ni	26		28	23	27	27	17		33	27		32	30	22	26	24
Cu	49		49	42	56	44	37		53	57		61	61	60	64	71
Zn	76		81	88	78	80	62		97	80		94	94	83	85	87
Ga	20		21	16	19	17	19		21	21						
Rb	37		37	32	40	45	45		33	40		33	30	44	44	39
Sr	633		634	654	619	594	593		682	634		687	626	598	678	610
Y	13		14	13	15	12	11		13	15		12	12	13	13	13
Zr	129		139	134	135	135	133		140	138		127	107	139	134	136
Nb	8		7	8	8	8	8		7	7		5	5	5	5	5
Cs	*0.60*				*0.71*		*1.38*			*0.72*						
Ba	724		739	714	755	768	845		720	746		672	652	783	767	778
La	26		17	1?	14	11	23		22	12		17	16	20	22	19
Ce	*41*				*45*		*38*			*46*						
Nd	*21*				*24*		*18*			*23*						
Sm	*5*				*6*		*4*			*6*						
Eu	*1.17*				*1.28*		*0.97*			*1.33*						
Tb	*0.43*				*0.4*		*0.36*			*0.52*						
Yb	*0.96*				*1.12*		*0.87*			*1.17*						
Lu	*0.13*				*0.15*		*0.12*			*0.16*						
Hf	*4*				*4*		*4*			*4*						
Ta	*0.4*				*0.41*		*0.4*			*0.38*						
Pb	7		2	9	7	6	9		5	7		8	7	10	12	10

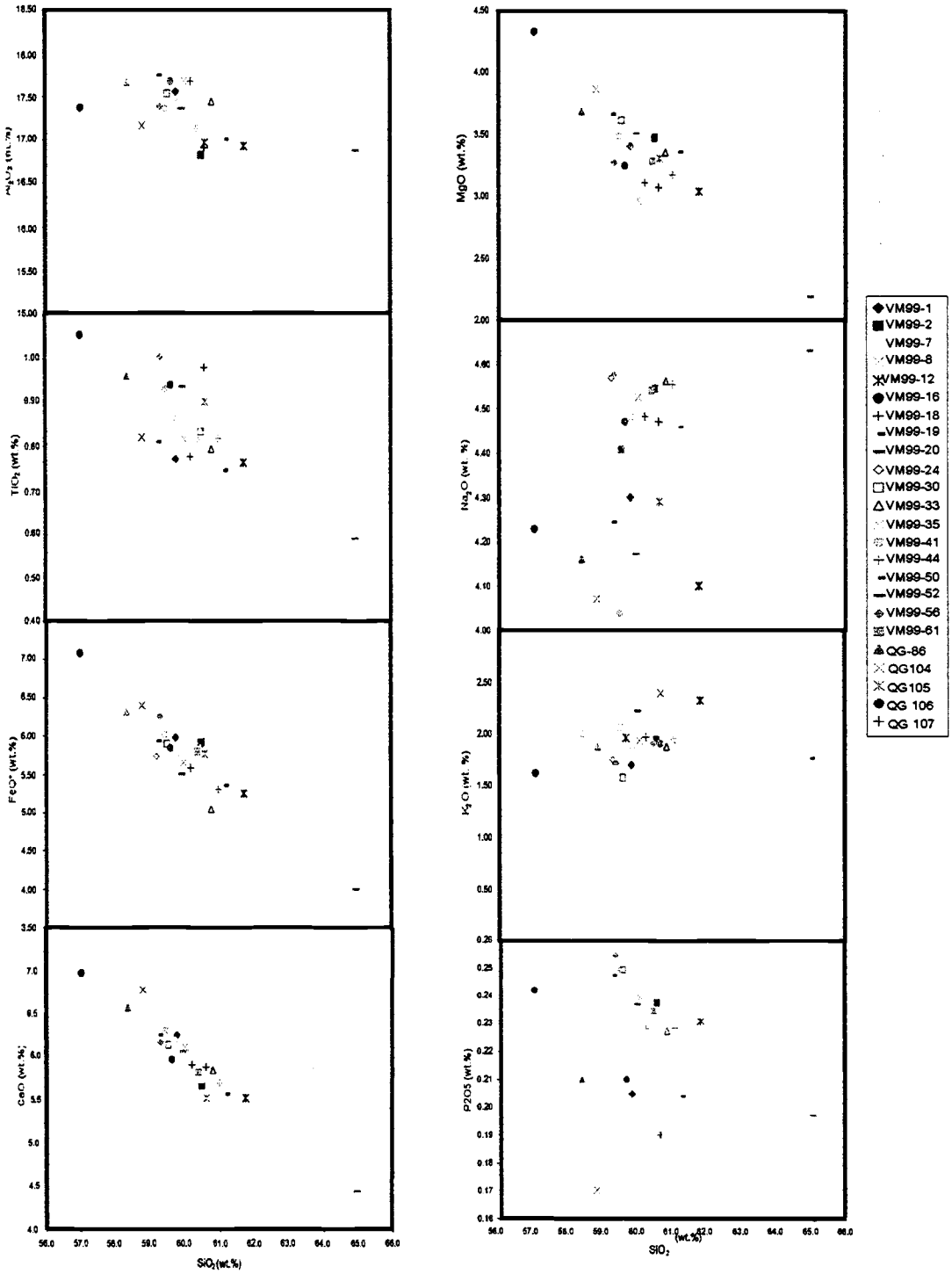


Figure 25. Major element Harker variation diagrams for Miño lavas.

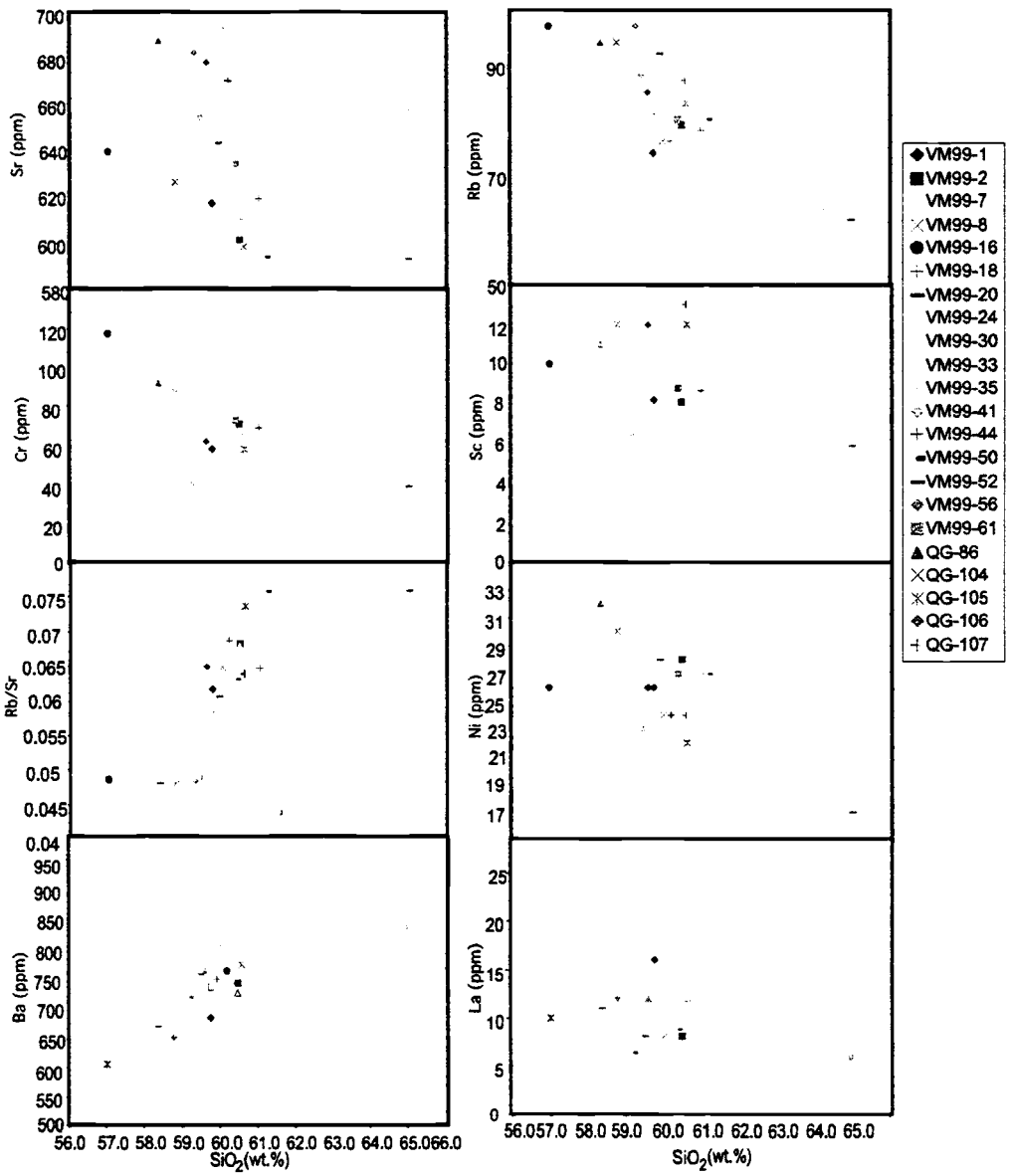


Figure 26. Trace element compositions versus SiO_2 for Miño lavas.

While the general trends are broadly consistent with crystal fractionation processes, the scatter of the data are evidence to the effects of other processes. Slightly sublinear trends for MgO, FeO*, Ni, and Cr solicit evidence for fractionation of pyroxene and olivine (Figures 25, 26) in the generation of mafic lavas. The constant values of Al_2O_3 and P_2O_5 with respect to differentiation suggests that neither plagioclase nor apatite fractionation has a significant affect on major element compositions of the andesitic and dacitic lavas at Miño. Likewise, a lack of any systematic decrease in K/Rb with respect to differentiation implies that hornblende fractionation was not significant in the generation of compositional variation of Miño lavas. In light of these observations, chemical trends could not have evolved by closed system fractionation alone. Chemical, petrographic, and mineralogic evidence indicates that Miño lavas formed under open-system conditions.

Trace element variations (Figure 26) for Volcán Miño lavas are difficult to interpret due to minor variations in mineralogy and major element compositions. Among the trace elements (Figures 26) Rb, Sr, Ba, Sc, Ni, Cr, and Zn are nearly linearly correlated with respect to differentiation indices. While this linear trend suggests magma mixing as a process, curvy nonlinear decrease of Ni, Sc, and Cr with increasing differentiation argue for fractional crystallization of mafic phases (i.e. olivine and cpx).

Volcán Miño trace elements exhibit characteristic subduction zone signatures. Volcanic rocks from Miño are large-ion lithophile (LIL; Ba, Sr, Rb) and light rare earth element (LREE; Ce_N/Yb_N 14 to 23) enriched, with high field strength element depletion (HFSE; Zr, Nb, Hf, Ta) relative to MORB (Figure 27). The trace element compositions show typical features of arc magmas, with low Nb and Ta contents (8 and <0.5 ppm respectively) and correspondingly high Ba/Ta and La/Ta ratios, as well as high concentrations of La, Rb, and Na. Pb is anonymously high, suggesting that crustal contamination and/or sedimentary contributions to the source magma are important.

All samples are characterized by high concentrations of REE and lack Eu anomalies, an indication that influence by plagioclase fractionation is minor or that conditions were sufficient to oxidize Eu to a (+3) valence state.

Lavas exhibit an increase in La concentration with differentiation owing to fractionation of trace phases, a characteristic trend of fractionation. REE patterns are neither concave nor significantly HREE depleted, arguing against strong influences of hornblende or garnet fractionation.

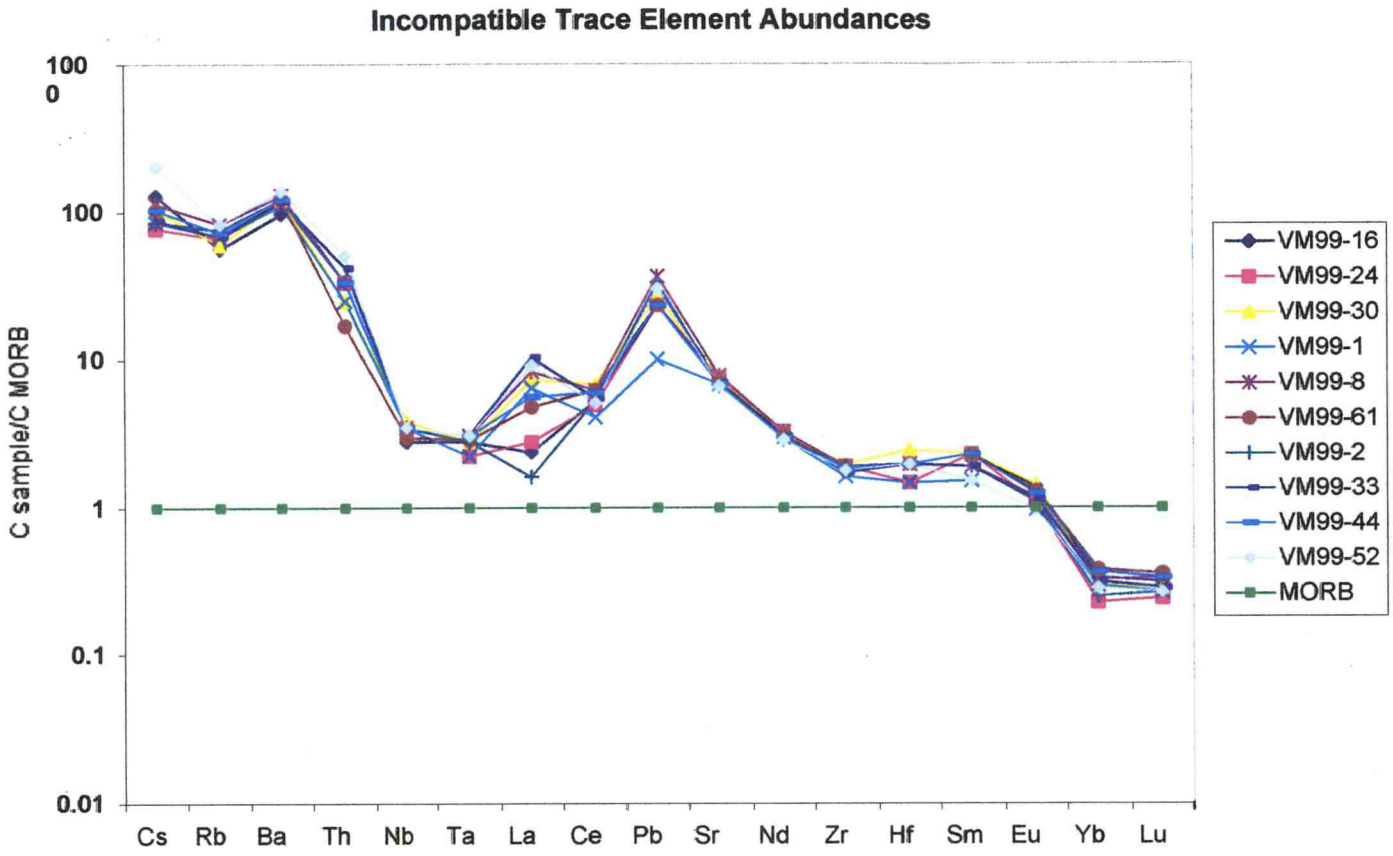


Figure 27. MORB normalized incompatible element spider diagram for Volcán Miño lavas. Representative samples are plotted in order of increasing differentiation. Sample VM99-16 is the most mafic sample in the suite (57% SiO_2), sample VM99-52 is the most silicic (65% SiO_2).

CHAPTER 6: DISCUSSION

6.1 Introduction

In this section I describe a simple model to explain the compositional homogeneity of magmas at Volcán Miño and constrain the processes taking place within the magmatic system. Interpretation of field relationships, mineral compositions, textures and modes, and the chemical compositions of lavas at Volcán Miño provide insight into the petrogenetic processes active beneath the volcano. Derivation of a magmatic model will help to elucidate mineralogic and textural heterogeneity in light of chemical homogeneity of Volcán Miño lavas. An emphasis is placed here on understanding what amphibole can tell us about the evolution of Volcán Miño and how these interpretations may serve as a point of reference for future studies in the CVZ and elsewhere.

6.2 Interpretation of whole-rock composition

Volcán Miño lavas exhibit a restricted range of whole-rock composition from 57–65 wt.% SiO_2, with a general trend toward slightly more evolved compositions in time. Crystal fractionation and magma mixing play important roles in deriving the compositional variation at Volcán Miño based on the elongation of the cluster of data with respect to major and trace elements combined with abundant textural evidence for mixing.

The evolution of Volcán Miño is marked by repeated eruptions of monotonous composition andesite, which suggests that the magma chamber achieved a climactic composition in time. While the focus here is on the compositional variation within the Miño suite, even the parental andesite has a protracted differentiation history as indicated by elevated incompatible element abundances and isotopic signatures. The parent, like other CVZ lavas, is strongly crustally contaminated (Davidson, 1991). Mass balance calculations for crystal fractionation and simple mixing suggest that the silicic daughter product was likely derived by fractionation of the most mafic and differentiated andesite.

Compositions of most magmas support a model for magma mixing as the dominant player in petrogenesis at Miño. Physical and chemical evidence for magma mingling at Volcán Miño, however, has also been identified. Magma mixing is the term derived for mixing of two or more miscible magmas to form a single homogeneous hybrid melt. Magma mingling is the term, which denotes the interaction of two or more melts with contrasting viscosities. These melts are effectively immiscible and mingling between them results in the formation of compositionally distinct blobs called melt inclusions. Textural disequilibrium in Miño lavas attests to relict mingling en route toward a true hybrid equilibrium magma. Textural evidence for mixing includes abundant amphibole breakdown reactions, the presence of quartz and olivine xenocrysts and gabbroic and dioritic

inclusions, as well as evidence for resorption of mafic minerals and the presence of strongly sieved plagioclase populations.

Mixing between mafic andesite and up to 50% of the most evolved dacite accounts for most of the compositional variation and linear fit of FeO, MgO, CaO, and Zn (Figures 25 and 26). Sublinear trends for TiO_2, Rb, Sc, and Na_2O support simple mixing in that, although a little scattered a mixing line bisects data distribution.

Crystal fractionation also played a role in Miño magmagenesis based on the displacement of the bulk compositional data with respect to differentiation. Al_2O_3, Sr, Cr, and Ni (Figure 28) have distributions, which fall increasingly below the mixing line with increasing differentiation, evidence that supports the effects of crystal fractionation on compositional variation. These effects are also evident with respect to trends for incompatible trace elements Ba and Rb (Figure 28), in which the data consistently fall above the mixing line with increasing differentiation.

Mass balance calculations for fractionation were done using the program XLFRAC for major elements, and using modes derived thereby in a Rayleigh fractionation model for trace elements (Stormer and Nicholls, 1978). A silica-poor andesite (QG-86) was selected to model the parent composition and the most evolved dacite (VM99-52) was the modeled daughter (Table 7). A successful model is defined as one in which the fractionating assemblage approximates modal proportions in the suite and

Table 7
Major element fractional crystallization models

	Parent QG-86	Daughter VM99-52	plagioclase	opx	cpx	fe-ti oxide	R	
SiO2	58.36	64.97	54.00	54.30	51.30	0.10	0.09	
Al2O3	17.66	16.88	28.80	1.30	2.60	2.40	-0.02	
TiO2	0.96	0.59	0.00	0.30	0.60	10.10	-0.24	
FeO*	6.32	3.99	0.50	15.00	8.30	86.20	0.08	
MnO	0.09	0.06						
CaO	6.56	4.43	11.30	1.50	20.90	0.00	0	
MgO	3.68	2.18	0.10	27.50	15.80	1.20	-0.07	
K2O	2.00	2.06	0.30	0.00	0.00	0.00	-0.66	
Na2O	4.16	4.64	5.10	0.00	0.40	0.00	-0.04	
P2O5	0.21	0.19	0.00	0.00	0.00	0.00	-0.09192	
Total	98.95	99.78	100.00	100.00	100.00	100.00		
		?(R^2)	*Phase percents (relative to initial magma)*					**Total Crystals**
		0.52305	-24.48	-5.24	-4.94	-3.09		37.75

	Parent VM99-16	Daughter VM99-52	plagioclase	opx	cpx	fe-ti oxide	R	
SiO2	57.01	64.97	51.94	54.31	50.69	0.05	0.31	
Al2O3	17.37	16.88	29.99	1.35	3.06	1.26	0.21	
TiO2	1.05	0.59	0.00	0.29	0.86	17.74	0.06	
FeO*	7.08	3.99	0.79	15.04	9.35	79.13	0.27	
MnO	0.10	0.06						
CaO	6.97	4.43	12.82	1.49	19.89	0.00	0.15	
MgO	4.33	2.18	0.07	27.49	15.81	1.82	0.04	
K2O	1.62	2.06	0.30	0.00	0.00	0.00	-0.38	
Na2O	4.23	4.64	4.08	0.03	0.34	0.00	-0.53	
P2O5	0.24	0.19	0.00	0.00	0.00	0.00	-0.13153	
Total	99.58	99.78	100.00	100.00	100.00	100.00		
		(R^2)	*Phase percents (relative to initial magma)*					**Total Crystals**
		0.6834	-25.56	-7.53	-6.14	-4.01		43.24

with $\Sigma r^2 < 1$. Although QG-86 is not the most mafic sample analyzed, it is one of the most mafic among the clustered data that characterize Volcán Miño. Sample VM99-16, although more mafic, has compositional affinities with nearby Cerro Paco Paco. VM99-16 consistenty demonstrates a different liquid line of descent when compared to Miño lavas. Low concentrations of Na_2O, K_2O, and compatible elements (Ni, Sc, and Sr) illustrate these compositional differences. Mineralogically, this aphanitic, olivine-phyric basaltic andesite is unique and unlike other Miño andesites. Likewise it lies low in the stratigraphic section and on trend with eruptive products from Cerro Paco Paco.

Major elements compositions were successfully modeled by fractionation of 24.5% plagioclase, 5.2% orthopyroxene, 5% clinopyroxene, and 3% Fe-Ti oxides using a parental composition equivalent to QG-86. Average equilibrium mineral compositions from the most mafic sample in the andesite suite were chosen to represent compositions of the fractionating phases (Table 7).

Modeling the most mafic end member compositions (VM99-16; 57% SiO_2) to yield the same dacite requires slightly more fractionation with 25% plagioclase, 7.5% orthopyroxene, 6% clinopyroxene, and 4% Fe-Ti oxides to successfully produce a liquid line of descent for the Miño lavas. Major element variation was similarly modeled through fractional crystallization of 23% plagioclase, 5% olivine, 7% clinopyroxene, and 3.7% Fe-Ti oxides for

the same parent and daughter pair. Despite the success of major element modeling, results from trace element modeling in each of these cases suggest that VM99-16 may not be an appropriate choice for a parental magma composition.

Trace elements illustrate compositional continuums consistent with mixing and fractionation. Using a model for Rayleigh crystal fractionation ($C_l/C_o=F^{\wedge (D-1)}$), trace element concentrations for fractionation-dominated petrogenesis of Miño lavas were determined. Using the range of trace element partition coefficients available in the literature (Table 8) and modal estimates from XLFRAC modeling, bulk distribution coefficients for Rb, Sr, Sc, Cr, Ni, Zn, and Ba were calculated. The concentration for each element was compared to the variations of Volcán Miño lavas. The fractionation from andesite to dacite produces a good fit between calculated and measured trace element contents for samples QG-86 and VM99-52. Results indicate that "real" data plot along the mixing line and within the fractionation envelope of end-members QG-86 and VM99-52 (Figure 28), consistent with mineralogic and textural evidence, which support differing degrees of mixing and fractionation.

I propose that large voluminous magma mixing events at Volcán Miño result in large-scale magma chamber re-homogenization events (Figure 29). In this case a silicic magma chamber is recharged with a large volume of mafic melt, mixing and hybridization result, and the "mixed"

Table 8
Trace Element Distribution Coefficients used for Rayleigh Models

	[1]		[2]				[3]		[4]	
Element	**Dhi plag**	**Dlow plag**	**Dhi cpx**	**Dlow cpx**	**Dhi olv**	**Dlow olv**	**Dhi mgt**	**Dlow mgt**	**Dhi opx**	**Dlow opx**
Rb	0.06	0.01	0.01	0.04	0.01	0.01	0.15	*0.15*	0.03	0.01
Sr	3.06	1.18	0.09	0.08	0.00	0.00	*0.11*	0.11	0.02	0.01
Sc	0.03	0.01	3.50	2.50	0.22	0.13	3.30	1.70	4.70	2.20
Cr	0.08	0.01	33.00	9.70	1.30	0.45	340.00	93.00	143.00	21.00
Cu	0.24	0.08	0.69	0.12	0.19	0.08	1.60	1.60	0.19	0.19
Ni	0.61	0.06	8.40	5.60	15.10	7.15	19.00	9.60	24.00	0.79
Zn	0.25	0.13	0.31	0.24	4.43	0.77	13.00	5.40	4.40	2.60
Ba	0.56	0.16	0.03	0.01	0.00	0.00	0.40	0.12	0.23	0.03

Whole-rock distribution coefficients were calculated using the fractionating mode in table 7 with QG-86 as parent.
The higher values for distribution coefficients were chosen to model fractionation envelopes illustrated in Figure 28.
D's for each fractionating phase were taken from GERM website (http://earthref.sdsc.edu) and the following references.

1 Luhr and Carmichael, 1980; Dunn and Sen, 1994; Drake and Weill, 1975; Bacon and Druitt, 1988; Ewart et al., 1973.
2 Reid, 1983; Ewart et al., 1973; Dostal et al., 1983
3 Burke et al., 1982; Beattie, 1993
4 Reid, 1983; Ewart et al., 1973; Dostal et al., 1983

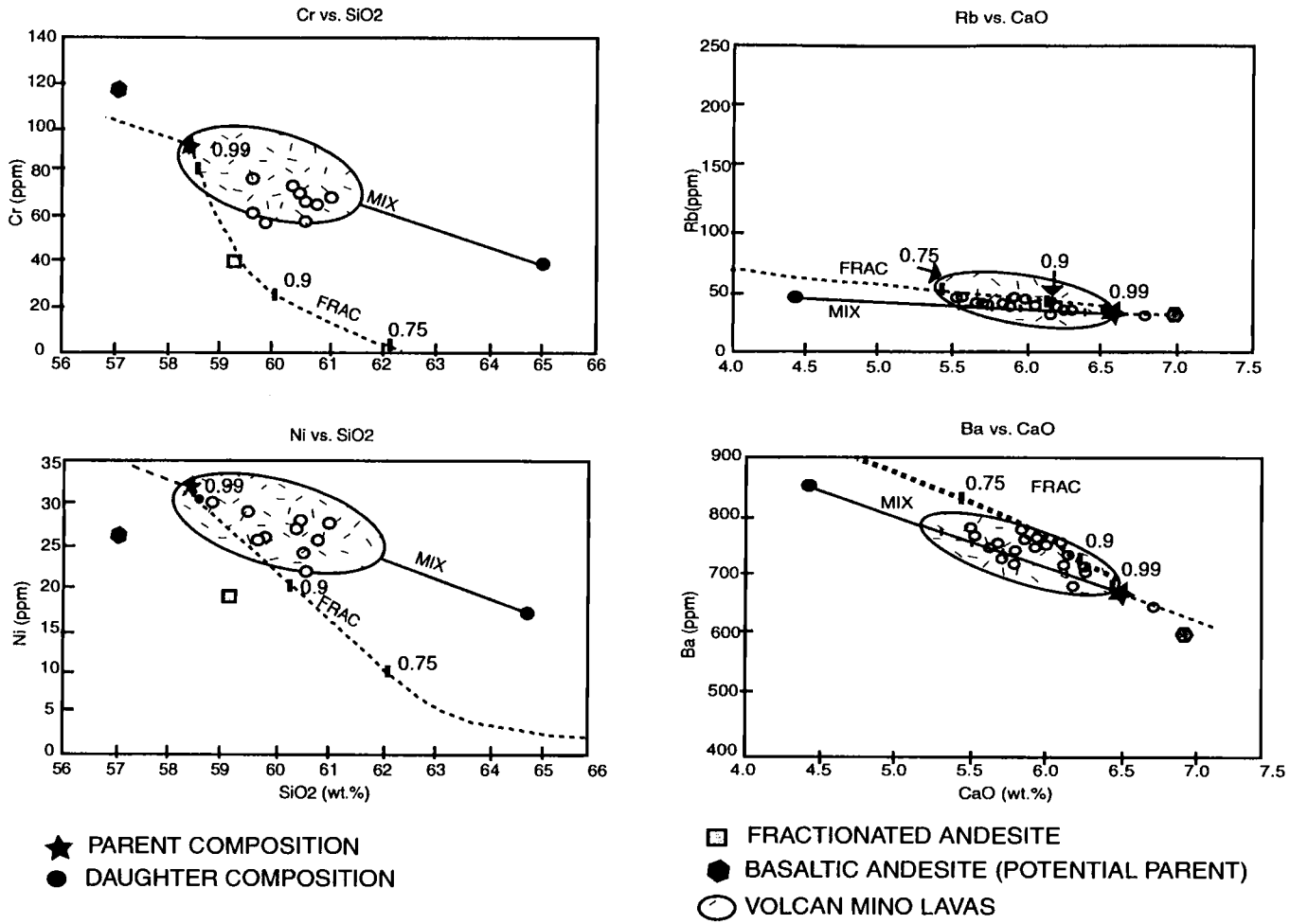


Figure 28. Cr and Ni vs. wt. % SiO_2 and Rb and Ba vs. wt. % CaO; MIX and FRAC models. Samples QG-86 and VM99-52 represent the parent and daughter end-members for the Volcán Miño mixing line. Most Miño lavas plot within error of the mixing line (hatched gray area). Fractionation trends were determined using the program XLFRAC (Stormer and Nicholls, 1978) combined with trace element calculations for Rayleigh crystal fractionation.

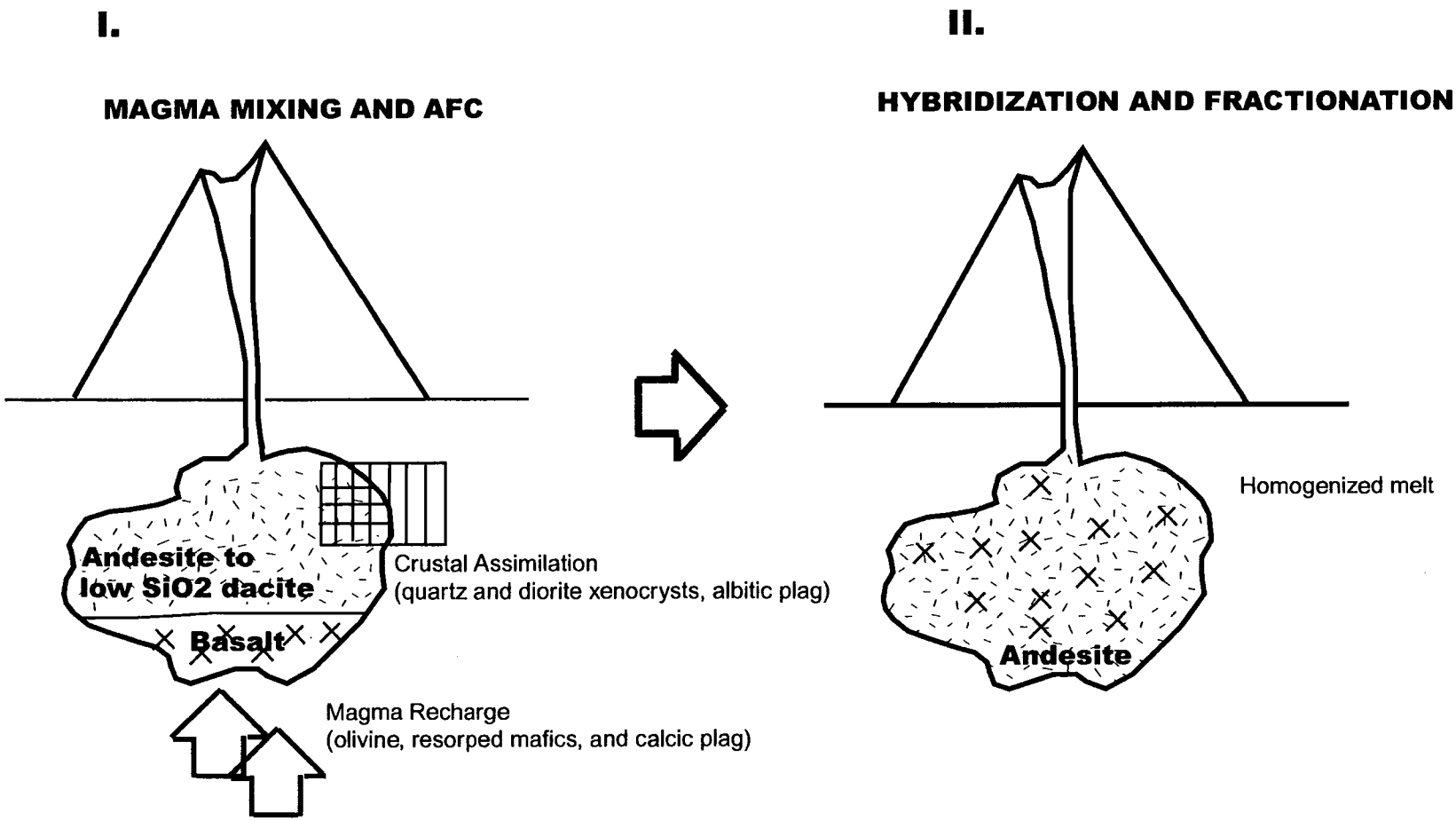


Figure 29. A model for magma mixing and AFC processes active at Volcán Miño. A differentiated magma chamber beneath Miño is periodically recharged with mafic magma. Crustal and mantle signatures are incorporated into the magma chamber during recharge and mass and heat exchange. 11. Magmas mix, hybridize, and fractionate. The resultant "mixed" andesite retains evidence of its relict past (disequilibrium phenocryst assemblages, normal and reverse zoning of plagioclase, xenocrysts, and amphibole breakdown textures).

magma fractionates, retaining evidence of its relict past (complex zoning patterns in plagioclase and pyroxene, the presence of xenocrysts, resorped phenocrysts, and amphibole disequilibrium textures). Mingling results when small volumes of mafic magmas are injected into cool, silicic magma chambers. The hotter mafic melt cools before hybridization is complete forming immiscible melt inclusions. Evidence for magma mingling is present in one case where an andesite is riddled with fine-grained mafic inclusions and marked by a large compositional range in mineral chemistry, plagioclase in particular (VM99-61a). In contrast to both the modeled behavior and petrographic evidence for magma mixing and mingling, fractionation derived magmas are characterized by their affinity to plot along curved element-element fractionation trends rather than a mixing line. In this case there is little or no evidence for magma mixing although it is important to not overlook the possibility that post-homogenization fractionation may overprint past evidence for mixing.

Simulation of major and trace element compositional variation for Volcán Miño lavas suggests that magma mixing and crystal fractionation were dominant processes, which served to buffer the composition of the magma in an open-system. The influence of these two petrologic processes may be inferred from whole-rock compositional modeling and petrographic examination of mineral textures and compositional variation. The presence of quartz and olivine xenocrysts, and gabbroic/dioritic

inclusions may track crustal, mantle, and magma chamber inputs respectively and amphibole may provide information about the pre-eruptive conditions and intensive parameters (P, T, f_{O2}, and f_{H2O}) of Volcán Miño's magma chamber.

6.3 Amphibole

Amphibole is present in most samples and may even dominate over pyroxenes. Amphibole is not a major contributor to the differentiation history. Nonetheless, amphibole plays an important part in the history of Volcán Miño. Because the variation in mafic mineral assemblage is not accompanied by a change in composition, other parameters like temperature, pressure, and water concentration must be the controlling factors, which govern the presence or absence of amphibole (Gill, 1981).

Extracting information on amphibole paragenesis requires attention to recent phase equilibria experiments and basic petrographic observation. Phase equilibria experiments distinguish the effects of P, T, f_{O2} and bulk composition on the composition and stability of amphibole. Knowledge of such parameters make it possible to determine the ways in which amphibole changes with respect to petrogenetic processes active within magma chambers. In this respect, experimental petrology has helped to constrain the pressure (depth), temperature, and volatile content of magma storage regions (Rutherford, 1993).

Interpretation of amphibole breakdown from phase equilibria experiments and petrographic observation of disequilibrium textures are used to constrain pre-eruptive events in the magma storage region prior to eruptions at Mount St. Helens in the Cascades in 1980 (Rutherford, 1993) and Soufriere Hills Volcano in the West Indies between 1995 to 1997 (Rutherford et al., 1988) and will be used as an analog here with respect to Volcán Miño.

Three types of amphibole breakdown textures have been identified in Volcán Miño lavas. Two of these reaction types have been previously defined in the literature. Garcia and Jacobson (1979) describe "black type" and "gabbroic type" breakdown reactions. Black type amphibole, which is the most common reaction type at Volcán Miño has been interpreted to reflect rapid reaction and dehydration of amphibole. Garcia and Jacobson (1979) interpret black type amphibole to form in response to oxidation by dehydrogenation during or after extrusion. This requires that the magma be water saturated. Rutherford and Devine (1988), Rutherford (1993), Rutherford et al. (1998) have interpreted some black type (opacite-rimmed) amphibole in dacites to form in response to dehydration during declining pressure accompanying rapid magma ascent. Oxidation induced black type amphibole can be distinguished from ascent induced black type amphibole based on the preferential alignment of opacite along cleavage planes and by the development of black rims on pyroxene. In most cases, black type

amphibole at Volcán Miño is of the simple type, and I interpret it to be formed during magma ascent. In only a three cases, syn- or post-eruption oxidation is the cause, based on accompanying oxidation of the groundmass and rims on pyroxene. In one instance, VM99-52, amphibole and pyroxene have thick oxidation rims and the groundmass is unaffected. I interpret this to reflect oxidation and dehydration of a water-saturated magma shortly prior to eruption.

Gabbroic and inverted gabbroic type amphiboles, as is the case for Mount St. Helens and Soufriere Hills amphibole, are thought mainly to be the product of thermal breakdown reactions. Reaction rims range from 0.5 to 2 mm in thickness and grain sizes of the reaction products range from 0.2 to 4 mm. Microcrystalline reaction rims of plagioclase, clino- and orthopyroxene, and Fe-Ti oxides represent byproducts of the interaction between a hot, mafic magma and a cooler, more evolved magma in an open system. Therefore, relict amphibole and its associated reaction rim are thought to represent xenocrysts from an earlier part of Volcán Miño's magmatic history. Compositional evidence for the increasing Al_{IV} and $(Na+K)_{A\text{-site}}$ in gabbroic type amphibole support the theory for a high temperature-related amphibole breakdown reaction. Comparison of compositions of amphibole breakdown products with groundmass phenocrysts suggest that re-equilibration of these "cognate" xenocrysts must have occurred over time. The inverted gabbroic type differs from

gabbroic type in that it has a black rim, which overprints a gabbroic type reaction rim. I interpret this to be the result of thermal breakdown followed by dehydration due to pre-eruption adiabatic ascent. It represents a hybrid of both reaction types and is an uncommon textural type in Volcán Miño lavas.

It is important to note that amphibole breakdown does not occur where the amphibole crystal is partially enclosed by or in contact with another crystalline phase (Rutherford and Hill, 1993). Rutherford and Hill (1993) describe amphibole breakdown textures for 1980-1986 Mount St. Helens dacites and observe that gabbroic rims occur only on amphiboles in contact with melt. In this case, the reaction proceeds inward from the crystal margin-melt contact as amphibole reacts with the melt as water solubility decreases. In contrast to this phenomena, black rims traverse through amphibole crystals suggesting that the reaction does not require the presence of melt. These observations apply to Volcán Miño amphibole as well.

An attempt was made to try and model the stoichiometry of the amphibole breakdown reaction using a mass balance petrologic mixing program. After numerous failed attempts, it became obvious that no combination of crystalline phases in the reaction rim would successfully reproduce the composition of the relict amphibole grain. It is possible that a prolonged residence time in the magma chamber (as is evidenced by past

magmatic heating events) may have caused gabbroic and inverted gabbroic type amphiboles to lose their melt component, which is necessary to balance the breakdown reaction. Similarly, it seems that the phenocryst compositions and gabbroic breakdown product compositions are closely related, suggesting that reaction re-equilibration between disequilibrium amphibole and the host melt must have occurred in time.

6.4 Estimation of magmatic intensive parameters

The pre-eruptive conditions of the magma storage region beneath Volcán Miño can be estimated based on comparison to experimental studies. Experiments by Rutherford and Hill (1993), Rutherford (1993), Rutherford et al. (1998), Naney (1983), and Lindsley (1983) make it possible to determine an approximate pressure (P), temperature (T), and volatile content (f_{H2O}, f_{CO2}) of the pre-eruption magma.

Experimental work on 1980-1986 Mount St. Helens dacites and 1995-1997 andesites from Soufriere Hills Volcano will serve as an analog for the pre-eruptive conditions at Miño. Soufriere Hills andesites fall within the tight compositional clustering (~59-60 wt% SiO_2) for Miño andesites. Unlike Miño lavas, however, Soufriere Hills andesites are enriched in CaO and Al_2O_3, and depleted in total alkalies (K_2O+Na_2O) and TiO_2. Due to the whole-rock compositional variation and the ubiquitous nature of quartz, the Soufriere Hills andesites are not an appropriate choice for comparison with

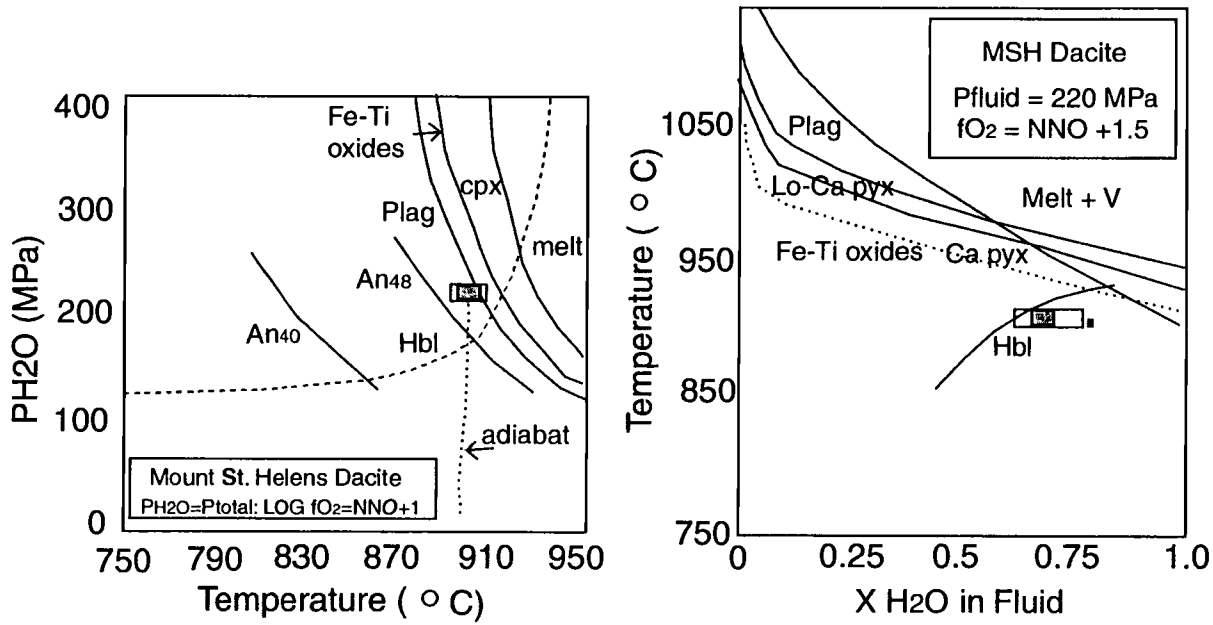


Figure 30. Schematic diagram showing the generalized stability field for amphibole in Mount St. Helens dacites. A. Pressure vs. Temperature and B. Temperature vs. XH_2O for experimentally produced natural phenocryst assemblages in 1980 St. Helens dacite. The stability field for amphibole in Miño andesites is outlined here by an open box.

regard to Miño's pre-eruptive conditions. The average bulk composition for the Mount St. Helens dacites is 63.1 ±1 wt% SiO_2. Mineralogically, all of the dacites contain phenocrysts of plagioclase, low-Ca pyroxene, amphibole, Fe-Ti oxides, high-Ca pyroxene, and glass. Magmas erupted from Volcán Miño are chemically and mineralogically more similar to the Mount St. Helens dacites, although slightly less evolved. Calcic amphibole from Mount St. Helens resembles amphibole composition in Volcán Miño lavas. Likewise, dacites exhibit both black type and gabbroic type amphibole breakdown textures.

6.4.1 Thermometry

Temperature estimates for Mount St. Helens dacites were derived from analyses of co-existing magnetite-ilmenite phenocrysts using the Anderson and Lindsely (1988) calibration of Fe-Ti oxide equilibria. Experiments yield temperatures for dacites at 1000° C for magmas at oxygen fugacities up to 1 log unit above the NNO buffer curve (Figure 30) (Rutherford, 1993). Fe-Ti oxide geothermometry, although a useful tool for St. Helens dacites, cannot be applied when estimating pre-eruptive temperatures at Volcán Miño. Titanomagnetite and ilmenite are both present in Miño lavas, however they co-exist as exsolution lamellae rather than as phenocrystic pairs. Temperature for Volcán Miño lavas can be approximated using two-pyroxene geothermometry (Figure 19) (Lindsley,

1983). Compositions of co-existing clinopyroxene and orthopyroxene with <10% nonquadrilateral components yield pre-eruptive temperatures from 800 to 1000°C at 1 atm according to the graphical solution by Lindsley (1983). It is important to take into consideration the fact that contributions by magma mixing may compromise temperature data for Miño lavas.

6.4.2 Pressure and Depth

Two useful methods for evaluating pre-eruptive pressures of magma chambers have been described in the literature. The first method is Al-in-Hornblende geobarometry (Johnson and Rutherford,1989). This method however requires the presence of a large phenocryst assemblage including quartz, plagioclase, alkali feldspar, biotite, magnetite, ilmenite, sphene and melt and is therefore not applicable to a Volcán Miño phenocryst assemblage. An alternative approach for phenocryst-bearing magmas is to conduct hydrothermal experiments over a range in pressure and fixed [H_2O]. Phenocryst phase assemblages and mineral compositions are sensitive to changes in P, T, and X_{H2O}. Using this method, Rutherford (1993) successfully defined a pre-eruption pressure of 220±30 MPa (depth of 8km) for the Mount St. Helens magma chamber prior to the 1980 eruption (Figure 30). Since the phenocryst phase assemblage and mineral compositions of the Mount St. Helens dacites are similar to those of Volcán

Miño andesites, we can use these estimates to approximate a depth and pressure for amphibole-bearing assemblages at Volcán Miño.

6.4.3 Water Content

Magmatic water concentrations can also be estimated by comparison to phase equilibria experiments, which successfully reproduce natural phenocryst phase assemblages for calc-alkaline rocks at variable X_{H2O}. Using the appropriate P-T conditions, Rutherford and Devine (1988) experimentally reproduced the natural Mount St. Helens phenocryst phase assemblage when the melt contained 4.6 wt. % H_2O or X_{H2O}=0.67 (Figure 30). Naney (1983) similarly suggests that the presence of hornblende in granodiorite requires a minimum of approximately 4 wt. % H_2O at 200 Mpa. The assemblage plagioclase + clinopyroxene + orthopyroxene + Fe-Ti oxides implies water contents of <5 wt. % for Volcán Miño andesites and dacites (Naney, 1983). The minimum wt. % H_2O required to stabilize hornblende in an intermediate calc-alkaline rock is 4 wt. % based on experimental phase relations addressed here.

Pressure is the single most limit to water solubility. With increasing pressure, water becomes more soluble in the melt. Therefore, andesite magmas in shallow magma chambers are often undersaturated. Most plagioclase phyric andesites are hydrated, but not extremely so, containing 1 to 5 wt. % H_2O before eruption. Evidence for the presence of

hornblende and associated disequilibrium breakdown reactions suggests that only rare Miño lavas are H_2O-saturated prior to eruption. Most lavas are undersaturated and therefore initial temperature estimates based on amphibole stabilities yield maximum temperatures. Two-pyroxene geothermometry for Miño lavas produce temperature estimates higher than the thermal stability limit for amphibole (950°C). Likewise, water-undersaturated conditions may produce pressure estimates, which represent a minimum pressure, due to declining solubility of water with decreasing pressure.

CHAPTER 7: COMPARISON WITH OTHER CVZ VOLCANOES

De Silva and Francis (1991) have identified more than 1100 late Cenozoic volcanic edifices and forty-four active volcanoes within the Central Andes. With the exception of San Pedro-San Pablo (22°53' S; Francis et al., 1974; Thorpe et al., 1982; and O'Callaghan and Francis, 1986), Parinacota (18°10' S; Wörner et al., 1988; Davidson et al., 1990), Tata Sabaya (19°08'S; de Silva et al., 1993) and Volcán Ollagüe (Feeley et al., 1993; Feeley, 1994) few of these volcanic centers have been studied in much detail. The lavas of Volcán Miño are typical of those erupted at other composite volcanoes and conform to the med-K calc alkaline trends characteristic of the CVZ. They are perhaps distinct in having slightly lower total alkalies than the CVZ overall (Figure 10), possibly reflecting the trenchward position of Miño with respect to the main axis of Quaternary centers in the CVZ; a relationship analogous to the alkali-poor concentrations of lavas erupted at Mount St. Helens compared to those of Mount Adams, situated east of St. Helens and along strike with the High Cascades of Washington. Miño lavas are two-pyroxene ± amphibole andesites and dacites. Lavas are mineralogically similar to eruptive products from other CVZ volcanoes. Unlike many centers, including Aucanquilcha and Ollagüe, they lack biotite. Although the mineralogy is broadly similar, little attention has been paid in the past to amphibole textural and compositional complexity and how we can use amphibole as a proxy for magma chamber processes.

Volcán Miño is distinctive with respect to other CVZ centers and is characterized by homogeneous lavas (~60% wt. % SiO_2) exhibiting marked mineralogic and textural variability. Major and trace element trends combined with petrographic observation support a model for magma mixing>fractionation dominated petrogenesis at Volcán Miño.

The temporal evolution of Volcán Miño is most similar to that of Tata Sabaya (de Silva et al., 1993). Tata Sabaya lavas exhibit a restricted range in composition from 60 to 62.5 % SiO2. The abundance of amphibole at Tata Sabaya is rare in Central Andean lavas, and is thought to be the product of low pressure, late-stage cooling in which pyroxenes react with a H_2O-rich melt (Gill, 1981). Temperature estimates for Tata Sabaya andesites yield liquidus temperatures (1021-996°C) higher than the experimentally determined thermal stability of hornblende (de Silva et al., 1993). General linear major and trace element trends resemble those observed for Volcán Miño lavas and elucidate a similar process of open-system magma mixing and homogenization active beneath Tata Sabaya. The lavas of Volcan Socompa (24°24'S) resemble those from Tata Sabaya and are likewise characterized by an abundance of hornblende. Socompa lavas trend toward more silicic compositions and are dominantly high-K hornblende dacites (Francis et al., 1985) compared to the andesites of Tata Sabaya and Volcán Miño. Magma mixing is the dominant petrologic process active at each of these volcanoes, whereas at other volcanic edifices within the CVZ it is considered to be subsidiary to crystal fractionation (Volcán Ollagüe, Feeley et al., 1993; and Parinacota, Wörner et al. 1988).

Volcán Miño lavas are genetically related in time and space to those lavas erupted within the Aucanquilcha Complex. Chemical and isotopic data from the Aucanquilcha Complex and on a larger-scale from the CVZ, allow me to place Volcán Miño in a regional context. The Aucanquilcha cluster conforms to regional compositional and isotopic patterns and is dominated by metaluminous medium- to high-K_2O calc-alkalic andesites and dacites, together with less abundant basaltic andesites. Chemical variations in the Aucanquilcha Complex are also in accordance with CVZ trends, and show decreasing FeO*, MgO, and TiO_2 and increasing alkalies with respect to increasing silica. Variations of particular interest are that both Na_2O and K_2O increase with increasing silica, and CaO and Al_2O_3 increase up to 57 wt. % SiO_2 and subsequently decrease at higher silica. LILE and HFSE increase from west to east across the CVZ and Dostal and others (1977) observe increasing K_2O, Rb, Ba, La, Ce and Zr at a given SiO_2 value across a transect of the Andes between 26° and 29° S. Feeley (1993) suggests the east to west increase in $^{87}Sr/^{86}Sr$, K, and Rb at fixed SiO_2 can be attributed to upper crustal contamination with regional ignimbrites. Miño lavas exhibit lower $^{87}Sr/^{86}Sr$, K, and Rb at fixed SiO_2 relative to the lavas from Volcán Ollagüe 40 km to the east-southeast. Lavas from Volcán Miño, Volcán Aucanquilcha, and other CVZ volcanoes have high Sr (>600 ppm) and low heavy rare-earth element (HREE) contents. Eastward decreases in Sr (at a given wt.% SiO_2) among the Quaternary lavas near Aucanquilcha indicate a more Sr-rich parental composition under the Western Cordillera as opposed to a Sr-poor parental composition east of the active arc

(Feeley, 1993). Feeley (1993) argues that rather than deep melting, decreases in Sr reflect a more mafic hybridized crust under the arc and consequently the decreased stability of plagioclase with respect to garnet. High (light) LREE/HREE ratios are is consistent with an origin as high-pressure partial melts of a source with residual garnet (Feeley and Hacker, 1995). Feeley and Hacker (1995) propose a model for trace element variation near Aucanquilcha where primary depleted mantle melts pond at the base of the crust and undergo contamination in a garnet-bearing crustal reservoir. Magmas ascend through the crust and pond in shallow upper-crustal reservoirs, where magmas consequently undergo further assimilation, fractionation, and crustal contamination. High $^{87}Sr/^{86}Sr$ (0.705 to 0.707), low $^{144}Nd/^{143}Nd$ (0.5121 to 0.5123) and high $^{206}Pb/^{204}Pb$ ratios of the volcanic rocks near Aucanquilcha indicate that all of the rocks have been extensively crustally contaminated (Davidson et al., 1990). Furthermore, Feeley et al. (1993) and Feeley (1993) have recently discussed evidence that suggests that basaltic andesite and andesite magmas were contaminated in the lower and upper crust, respectively. Evidence for upper crustal contamination, however, may be overprinted due lack of isotopic variability between upper crustal ignimbrites and CVZ lavas. The limited data from Volcán Miño are typical of other CVZ lavas, but fall at the low $^{87}Sr/^{86}Sr$ and high $^{144}Nd/^{143}Nd$ end of the array. Isotopic evidence from Miño further supports models, which have emphasized the importance of crustal contamination in the generation of CVZ lavas (Figure 31).

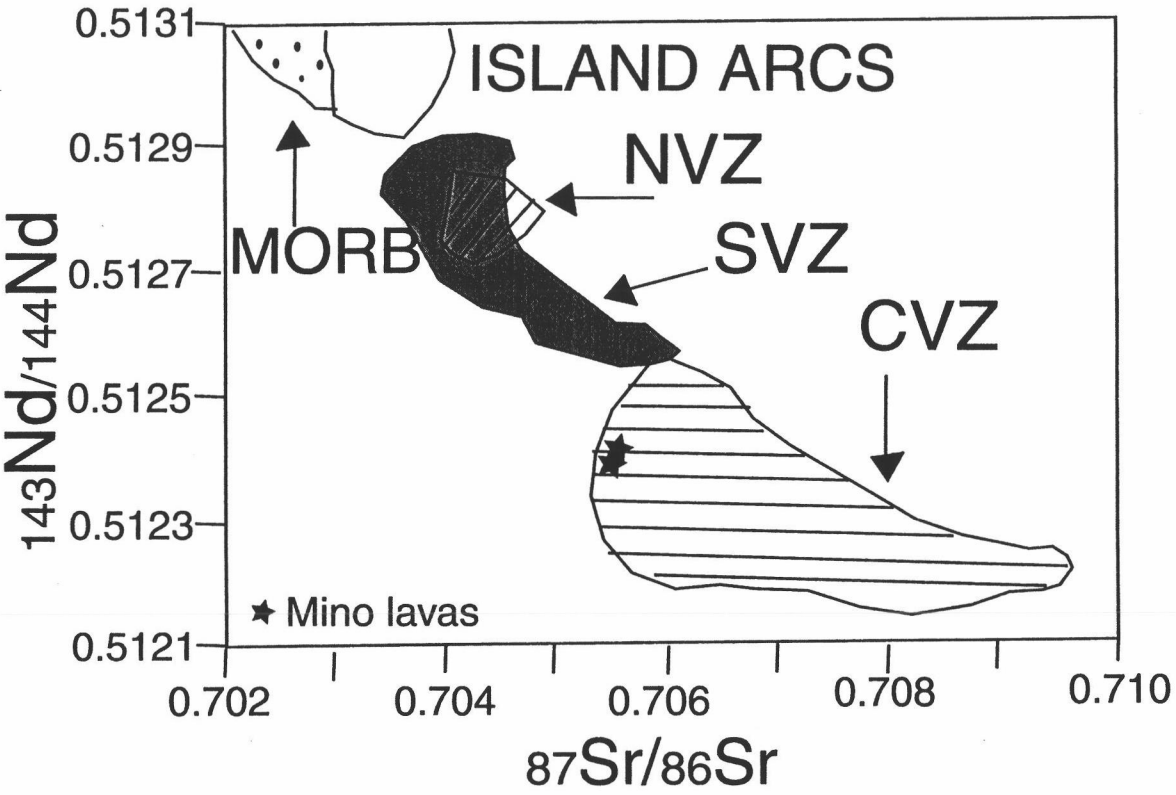


Figure 31. Isotope data for Volcán Miño lavas. Fields for the Northern, Southern, and Central Volcanic Zone lavas, Mid-Ocean Ridge Basalts, and Island Arc Basalts are shown here for $^{143}Nd/^{144}Nd$ plotted against $^{87}Sr/^{86}Sr$.

CHAPTER 8: CONCLUSION

Volcán Miño (21° 11' S; 5611 m) is a med- to high-K andesitic stratovolcano, which lies within the Western Cordillera of the Central Andes, northern Chile. Miño's activity commenced in the Pliocene (~3.3 Ma) and was characterized by eruptions of dominantly plag phyric, two-pyroxene ± amphibole andesites and lesser dacites. The compositional range of Volcán Miño lavas is similar to that of other volcanoes within the CVZ, however it is unique in that the range is quite restricted (60±2 wt.% SiO_2) and less potassic. The underlying question here is how is it possible to produce 22 km^3 of chemically homogeneous lava, while preserving mineralogic and textural complexity?

Volcán Miño lavas exhibit evidence for both thermal and chemical disequilibrium (mixed phenocryst populations, resorption of most phases, the presence of xenocrysts, amphibole disequilibrium, clinopyroxene coronae on orthopyroxene and rare quartz, and the presence of magmatic inclusions). Petrographic evidence suggests that these lavas have experienced complicated histories involving combined mixing, assimilation, magma storage, homogenization and crystal fractionation. It is proposed here that magma mixing is the dominant process, which serves to buffer the composition of lavas at Volcán Miño in time. Petrographic evidence is used to help elucidate the interaction between such processes active within the

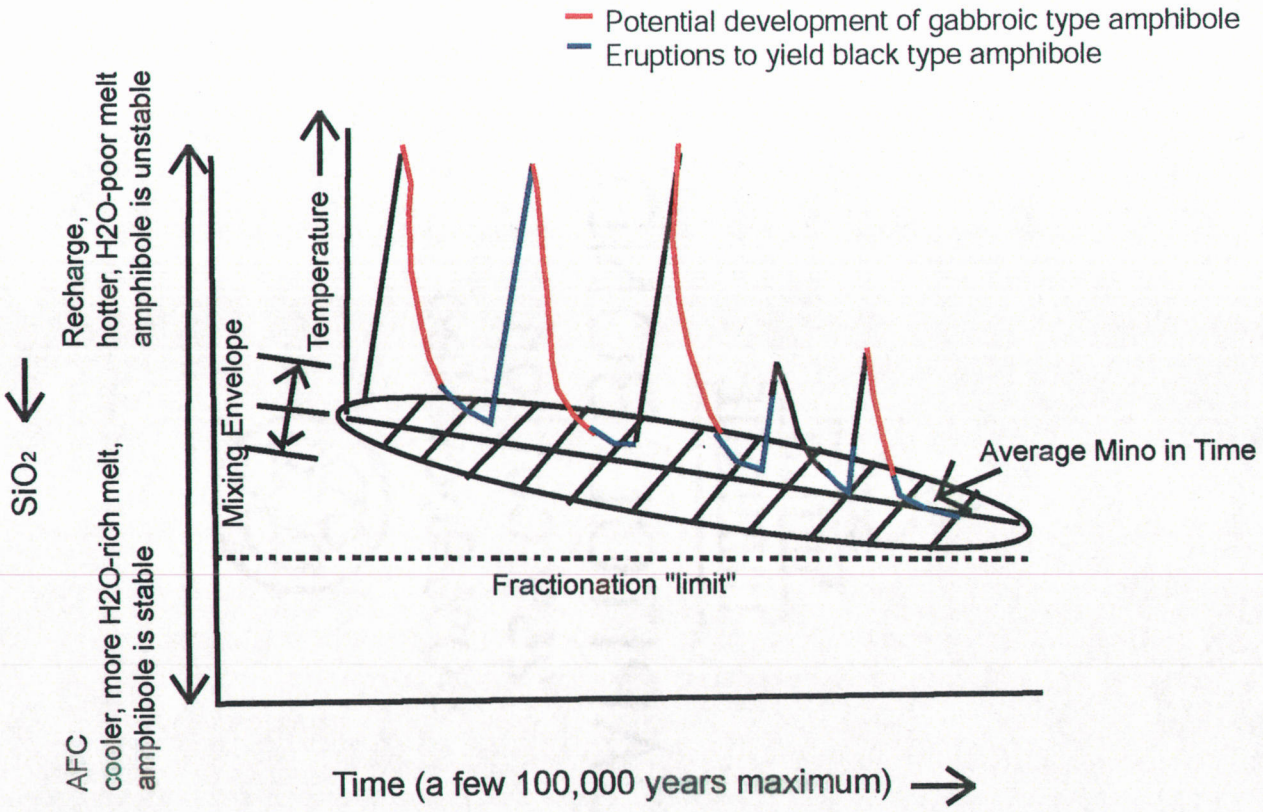


Figure 32. A schematic representation of petrologic processes active at Volcán Miño. Compositional buffering of the magmatic system results from repetitive nature of recharge, assimilation, magma mixing, and crystal fractionation events. A=assimilation; FC=fractional crystallization; amph=amphibole.

magma chamber. Specific emphasis is placed on the role of amphibole, and how it can be used to infer intensive parameters and evolution of the pre-eruptive magma chamber.

Figure 32 illustrates the evolution of Volcán Miño's magma chamber in time. Eruptions of monotonous composition andesitic magmas suggest that the shallow magma chamber (<8km deep) beneath Volcán Miño must have been periodically replenished with parental basaltic andesite magma; itself having been modified by crustal processes from a mantle derived composition. The addition of mafic magma (olivine xenocrysts, calcic plagioclase, resorped mafics) contributes to the heat budget required to assimilate crust (quartz xenocrysts, amphibolite xenocryst, gabbroic/dioritic inclusions). The basalt mixes with pre-existing melt in the magma storage region and in time, this new hybridized melt begins to cool and crystallize. As the temperature of the melt decreases, water solubility in the melt increases and amphibole becomes stable. Following the next recharge event, amphibole breaks down (gabbroic type) due to increasing temperature. Processes repeat themselves and a balance between the thermal contribution through mafic input and crystallization and thermal loss through assimilation and cooling yield a magma of climactic composition where complexities of the process are preserved in the relict textures.

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APPENDICES

Appendix A
Major and trace element analyses for representative samples.
All samples are lavas. Samples labeled MIN are from Gerhard Worner's CVZ data set;
Samples labeled QG are from the 1996 Sernageomin Quebrada Blanca Project.

Sample	XRF VM	ICP VM	XRF VM	ICP VM	XRF VM	XRF VM	ICP VM	ICP VM	XRF VM
	991	991	992	992	997	998	998	9912	9916
SiO2	59.62	60.35	60.43	60.39	59.56	59.66	59.80	61.59	56.77
Al2O3	17.51	17.78	16.81	17.42	16.49	17.57	17.49	16.88	17.30
TiO2	0.77	0.73	0.83	0.78	0.82	0.81	0.77	0.76	1.05
FeO*	5.96	6.02	5.91	5.53	5.76	5.62	5.71	5.24	7.05
MnO	0.10	0.10	0.09	0.09	0.09	0.09	0.10	0.09	0.10
CaO	6.22	6.49	5.65	5.75	5.65	6.07	6.18	5.49	6.94
MgO	3.39	3.50	3.47	3.45	3.56	2.95	3.13	3.03	4.31
K2O	1.69	1.55	1.94	1.86	2.35	1.92	1.78	2.46	1.61
Na2O	4.29	4.27	4.54	4.45	3.98	4.50	4.31	3.98	4.21
P2O5	0.20	0.21	0.24	0.25	0.23	0.24	0.24	0.23	0.24
LOI		0.55		0.80			0.70	1.15	
Total	99.76	101.55	99.91	100.76	98.49	99.43	100.21	100.90	99.58
				XRF Analyses					
Co	n.a.		n.a.		n.a.	n.a.			
Ni	26		28		29	24			26
Cr	58		71		75	55			117
high Sc	15		14		18	18			11
V	140		146		137	143			192
Ba	686		747		730	810			606
Rb	38		41		41	45			31
Sr	617		601		604	694			639
Zr	118		140		136	140			127
Y	13		13		13	15			14
Nb	8		8		8	8			6
Ga	20		19		19	22			22
Cu	40		53		58	74			55
Zn	74		79		81	76			97
Pb	3		10		8	11			9
La	16		4		26	21			6
Ce	35		31		35	37			31
Th	3		4		3	4			3
				INAA Analyses					
FeO (%)	*4.5*		*4.3*			*4.6*			*5.6*
Na_2O (%)	*3.0*		*3.5*			*3.5*			*3.4*
K_2O (%)	*1.4*		*1.2*			*1.8*			*1.4*
Sc	*8*		*8*		***n.a.***	*8*			*10*
low Cr	*2*		*2*			*2*			*4*
Co	*15*		*14*			*15*			*18*
Ni	*26*		*22*			*23*			*32*
Zn	*75*		*79*			*79*			*99*
Rb	*41*		*49*			*55*			*36*
Cs	*1*		*1*			*1*			*1*
Sr	*636*		*653*			*742*			*692*
Ba	*841*		*1023*			*1076*			*827*
La	*15*		*19*			*23*			*19*
Ce	*31*		*40*			*47*			*40*
Nd	*16*		*20*			*22*			*23*
Sm	*4*		*5*			*5*			*6*
Eu	*1*		*1*			*1*			*1*
Yb	*1*		*1*			*1*			*1*
Zr	*91*		*111*			*108*			*105*
Hf	*3*		*4*			*4*			
Th	*2*		*3*			*5*			*4*

Appendix A
Major and trac
All samples ar
Samples label

Sample	XRF VM	ICP VM	XRF VM	XRF VM	ICP VM	XRF VM	ICP VM	XRF VM
	9918	9919	9920	9924	9924	9930	9930	9933
SiO2	59.90	59.91	59.46	59.23	58.11	59.50	59.69	60.77
Al2O3	17.59	17.94	17.22	18.06	17.61	17.39	17.58	17.43
TiO2	0.77	0.82	0.93	0.90	0.87	0.97	0.94	0.80
FeO*	5.56	5.99	5.46	5.74	5.87	5.61	5.92	5.05
MnO	0.09	0.10	0.08	0.09	0.09	0.09	0.09	0.08
CaO	5.87	6.32	6.00	6.29	6.15	5.98	6.15	5.83
MgO	3.09	3.70	3.48	3.16	3.22	3.39	3.62	3.35
K2O	1.96	1.89	2.20	1.75	1.60	1.94	1.73	1.87
Na2O	4.46	4.18	4.14	4.57	4.35	4.47	4.31	4.56
P2O5	0.23	0.25	0.24	0.23	0.24	0.24	0.25	0.23
LOI		0.78			0.60		0.50	
Total	99.51	101.88	99.21	100.01	98.71	99.57	100.78	99.96
						XRF Analyses		
Co	n.a.		n.a.	n.a.		n.a.		n.a.
Ni	24		28	19		29		26
Cr	55		86	40		78		67
high Sc	20		13	18		17		18
V	140		153	143		164		139
Ba	767		754	723		762		724
Rb	46		39	36		33		37
Sr	670		643	688		647		633
Zr	140		146	139		145		129
Y	13		13	13		13		13
Nb	9		7	8		9		8
Ga	19		20	19		20		20
Cu	54		67	53		60		49
Zn	76		92	88		93		76
Pb	8		9	7		8		7
La	25		19	7		18		26
Ce	29		39	40		31		49
Th	4		1	4		3		5
						INAA Analyses		
FeO (%)				*3.9*		*5.0*		*4.4*
Na_2O (%)				*3.0*		*3.7*		*3.6*
K_2O (%)				*1.5*		*1.6*		*3.4*
Sc	***n.a.***		***n.a.***	*6*		*8*		*8*
low Cr				*1*		*3*		*2*
Co				*12*		*16*		*14*
Ni				*23*		*23*		*32*
Zn				*76*		*103*		*79*
Rb				*39*		*46*		*49*
Cs				*1*		*1*		*1*
Sr				*600*		*765*		*682*
Ba				*730*		*1015*		*954*
La				*17*		*23*		*19*
Ce				*37*		*51*		*41*
Nd				*17*		*26*		*21*
Sm				*4*		*6*		*5*
Eu				*1*		*1*		*1*
Yb				*1*		*1*		*1*
Zr				*92*		*113*		*105*
Hf				*3*		*5*		*4*
Th				*2*		*3*		*3*

Appendix A
Major and trac
All samples ar
Samples label

Sample	ICP VM	XRF VM	XRF VM	XRF VM	XRF VM	XRF VM	ICP VM	XRF VM
	9933	9935	9941	9944	9950	9952	**9952**	9956
SiO2	**61.16**	59.37	58.87	60.67	60.65	64.82	**62.66**	58.95
Al2O3	**17.29**	17.33	17.19	17.12	16.86	16.84	**16.43**	17.28
TiO2	**0.77**	0.86	0.92	0.81	0.74	0.59	**0.55**	1.00
FeO*	**5.61**	5.66	5.96	5.28	5.32	3.99	**3.85**	6.21
MnO	**0.08**	0.09	0.09	0.09	0.09	0.06	**0.06**	0.09
CaO	**5.65**	6.15	6.24	5.66	5.51	4.42	**4.38**	6.12
MgO	**3.46**	3.36	3.45	3.15	3.33	2.18	**2.11**	3.25
K2O	**1.65**	1.82	2.05	1.93	2.01	2.06	**1.84**	1.70
Na2O	**4.51**	4.45	4.00	4.53	4.42	4.63	**4.36**	4.55
P2O5	**0.23**	0.23	0.25	0.23	0.20	0.19	**0.19**	0.25
LOI	**0.34**						**1.24**	
Total	**100.74**	**99.31**	**99.02**	**99.47**	**99.12**	**99.78**	**97.67**	**99.40**
				XRF Analyses				
Co		n.a.	n.a.	n.a.	n.a.	n.a.		n.a.
Ni		28	23	27	27	17		33
Cr		54	65	69	75	39		91
high Sc		16	16	15	17	14		16
V		152	149	145	120	96		149
Ba		739	714	755	768	845		720
Rb		37	32	40	45	45		33
Sr		634	654	619	594	593		682
Zr		139	134	135	135	133		140
Y		14	13	15	12	11		13
Nb		7	8	8	8	8		7
Ga		21	16	19	17	19		21
Cu		49	42	56	44	37		53
Zn		81	88	78	80	62		97
Pb		2	9	7	6	9		5
La		17	1	14	11	23		22
Ce		38	46	38	31	55		37
Th		2	2	4	4	6		3
				INAA Analyses				
FeO (%)				*4.7*		*3.1*		
Na_2O (%)				*4.0*		*3.7*		
K_2O (%)				*1.8*		*1.9*		
Sc		***n.a.***	***n.a.***	*9*	***n.a.***	*6*		***n.a.***
low Cr				***2***		*1*		
Co				*15*		*9*		
Ni				*32*		*16*		
Zn				*90*		*66*		
Rb				*51*		*55*		
Cs				*1*		*1*		
Sr				*691*		*662*		
Ba				*1079*		*1144*		
La				*22*		*19*		
Ce				*45*		*39*		
Nd				*24*		*18*		
Sm				*6*		*4*		
Eu				*1*		*1*		
Yb				*1*		*1*		
Zr				*106*		*111*		
Hf				*4*		*4*		
Th				*3*		*4*		

Appendix A
Major and trac
All samples ar
Samples label

Sample	XRF VM 9961	ICP VM 9961		*MIN2	*MIN4	*MIN7	*MIN8
SiO2	60.24	60.10	SiO2	61.78	57.26	58.96	59.77
Al2O3	17.08	17.03	Al2O3	16.89	17.32	17.50	17.83
TiO2	0.81	0.77	TiO2	0.64	0.85	0.83	0.82
FeO*	5.78	5.31	Fe2O3	5.25	6.87	6.35	6.40
MnO	0.09	0.09	MnO	0.08	0.10	0.09	0.10
CaO	5.80	5.84	CaO	4.98	6.53	6.14	6.09
MgO	3.27	3.32	MgO	2.78	3.78	3.47	3.22
K2O	1.90	1.59	K2O	2.69	2.19	2.37	1.96
Na2O	4.53	4.45	Na2O	4.05	3.83	4.08	4.44
P2O5	0.23	0.24	P2O5	0.20	0.24	0.23	0.24
LOI		0.59	LOI	1.06	2.43	0.98	0.21
Total	99.74	99.33	Total	100.40	101.40	101.00	101.08

Co	n.a.
Ni	27
Cr	73
high Sc	18
V	138
Ba	746
Rb	40
Sr	634
Zr	138
Y	15
Nb	7
Ga	21
Cu	57
Zn	80
Pb	7
La	12
Ce	43
Th	2

INAA Analyses

FeO (%)	*4.7*				
Na_2O (%)	*3.7*				
K_2O (%)	*2.7*				
Sc	*9*				
low Cr	*3*	***55***	***53***	***54***	***57***
Co	*15*	*12*	*33*	*35*	*52*
Ni	*39*	*18*	*20*	*19*	*21*
Zn	*87*	*74*	*77*	*79*	*79*
Rb	*50*	*62*	*49*	*47*	*48*
Cs	*1*				
Sr	*740*	*596*	*662*	*684*	*700*
Ba	*1031*	*794*	*705*	*756*	*774*
La	*21*				
Ce	*46*				
Nd	*23*				
Sm	*6*				
Eu	*1*				
Yb	*1*				
Zr	*111*	*140*	*146*	*141*	*145*
Hf	*4*				
Th	*3*				

Appendix A
Major and trac
All samples ar
Samples label

Sample	QG-86	QG-104	QG-105	QG-106	QG-107
SiO2	58.36	58.79	60.61	59.61	60.59
Al2O3	17.66	17.16	16.97	17.67	16.92
TiO2	0.96	0.82	0.90	0.94	0.98
FeO*	6.32	6.40	5.76	5.84	5.92
MnO	0.09	0.09	0.09	0.09	0.09
CaO	6.56	6.77	5.51	5.96	5.87
MgO	3.68	3.86	3.30	3.25	3.07
K2O	2.00	1.87	2.39	1.96	1.91
Na2O	4.16	4.07	4.29	4.47	4.47
P2O5	0.21	0.17	0.19	0.21	0.19
LOI	0.66	0.56	0.56	0.22	0.54
Total	**99.02**	**99.07**	**99.09**	**99.45**	**98.96**
			XRF Analyses		
Co	20.00	24.00	14.00	21.00	24.00
Ni	32	30	22	26	24
Cr	92	87	58	62	66
high Sc	11	12	12	12	13
V	171	156	134	141	135
Ba	672	652	783	767	778
Rb	33	30	44	44	39
Sr	687	626	598	678	610
Zr	127	107	139	134	136
Y	12	12	13	13	13
Nb	5	5	5	5	5
Ga					
Cu	61	61	60	64	71
Zn	94	94	83	85	87
Pb	8	7	10	12	10
La	17	16	20	22	19
Ce	38	32	42	42	40
Th					

FeO (%)
Na_2O (%)
K_2O (%)
Sc
low Cr
Co
Ni
Zn
Rb
Cs
Sr
Ba
La
Ce
Nd
Sm
Eu
Yb
Zr
Hf
Th

Sample	XRF VM 991	ICP VM 991	XRF VM 992	ICP VM 992	XRF VM 997	XRF VM 998	ICP VM 998	ICP VM 9912	XRF VM 9916
				ICP Analysis					
Cr		66		82			57	55	
Sc		14		15			14	12	
V		150		153			144	123	
Ba		727		824			842	824	
Sr		712		712			754	682	
Zr		132		155			154	153	
Y		14		13			13	13	
Cu		40		63			89	52	
Zn		80		87			84	83	
La		24.00		18.00			34.00	24.00	

Sample	XRF VM 9918	ICP VM 9919	XRF VM 9920	XRF VM 9924	ICP VM 9924	XRF VM 9930	ICP VM 9930	XRF VM 9933
						ICP Analysis		
Cr		57			44		89	
Sc		15			14		14	
V		140			154		164	
Ba		812			845		847	
Sr		707			787		761	
Zr		158			161		169	
Y		16			14		13	
Cu		48			55		59	
Zn		83			96		98	
La								

Sample	ICP VM 9933	XRF VM 9935	XRF VM 9941	XRF VM 9944	XRF VM 9950	XRF VM 9952	ICP VM 9952	XRF VM 9956
				ICP Analysis				
Cr	84						43	
Sc	14						11	
V	156						93	
Ba	810						889	
Sr	710						657	
Zr	141						141	
Y	14						11	
Cu	51						32	
Zn	80						64	
La								

Sample	XRF VM 9961	ICP VM 9961	*MIN2	*MIN4	*MIN7	*MIN8
			ICP Analysis			
Cr		77				
Sc		14				
V		138				
Ba		787				
Sr		696				
Zr		144				
Y		16				
Cu		55				
Zn		79				
La						

Appendix B

Age dates for Volcán Miño lavas based on $^{40}Ar/^{39}Ar$ geochronology performed by Claire McKee at COAS, Oregon State University. Error is 2σ.

Sample	Plateau Age	MSWD	Isochron Age	Material
VM99-10	3.73 ± 0.32 Ma	2.8	3.00 ± 1.28 Ma	amphibole
VM99-10	3.35 ± 0.04 Ma	1.17	3.35 ± 0.06 Ma	groundmass
VM99-52	3.32 ± 0.09 Ma	0.09	3.31 ± 0.26 Ma	plagioclase

Age Dates for Volcán Miño lavas by $^{40}K/^{39}Ar$ geochronology evaluated by Andy Tomlinson, Servicio Nacional de Geologia Y Mineria, Chile.

Sample	Age	Material
QG-147	1.9 ± 0.3 Ma	whole-rock
QG-106	3.0 ± 0.3 Ma	whole-rock

Appendix C
Sample localities for all lavas.

Sample	UTMs North	UTMs East
VM99-1	7657750	537775
VM99-2	7659013	543738
VM99-3	7661420	542620
VM99-4	7661320	542800
VM99-5	7661180	542150
VM99-6	7661610	541640
VM99-7	7661560	541600
VM99-8	7660720	541670
VM99-9	7660810	541560
VM99-10	7661980	541860
VM99-11	7662080	541510
VM99-12	7662560	541610
VM99-13	7660700	540780
VM99-14	7660980	541140
VM99-15	7661740	540850
VM99-16	7662080	538080
VM99-17	7662160	538560
VM99-18	7660050	540240
VM99-19	7559890	539680
VM99-20	7559830	539250
VM99-21	7660550	538590
VM99-22	7658960	539640
VM99-23	7658780	540030
VM99-24	7658730	539900
VM99-25	7657750	537775
VM99-26	talus float	
VM99-27	7656470	538310
VM99-28	7656790	536880
VM99-29	7656930	537210
VM99-30	7656720	537230
VM99-31	7656710	536450
VM99-32	7656390	535590
VM99-33	7655300	541210
VM99-34	7655400	541070
VM99-35	7655610	541320
VM99-36	7655680	541470
VM99-37	7655750	541770
VM99-38	7655880	541780
VM99-39	7657540	534900
VM99-40	7659470	535660
VM99-41	7656640	535760
VM99-42	7657540	543100
VM99-43	7657950	543330
VM99-44	7656120	542590
VM99-45	7656970	542480
VM99-46	7655660	542360
VM99-47	7655880	539180
VM99-48	7655990	538810
VM99-49	7655780	538510
VM99-50	7657720	541070
VM99-51	7657570	541400
VM99-52	7657760	541380
VM99-53	7658770	541680
VM99-54	7654420	538030
VM99-55	7655710	541650
VM99-56	7655880	540430
VM99-57	7656040	540240
VM99-58	7660620	542370
VM99-59	7660850	542330
VM99-60	7661130	543350
VM99-61a	7657960	539580
VM99-61b	7657960	539580
VM99-62	7657930	539640
VM99-63	7658170	539700
VM99-64	7657520	539500
VM99-65	7668970	537220
VM99-66	7670130	537160

Appendix
Petrography of Representative Samples

Plagioclase is seriate and occurs in multiple populations in all samples.

VM99-1/25: 2-pyx andesite (+hornblende)
Plagioclase>>oxides cpx opx >>hbl> olivine (xenocrysts)

Mineral modes:
20-25% plagioclase
2% oxides
2% clinopyroxene (cpx)
1-2% orthopyroxene (opx)
<1% hornblende
trace olivine

Sample groundmass is aphanitic and trachytic with aligned plagioclase and fe-ti oxide microlites.

Sample is characterized by multiple populations of plagioclase including clean plagioclase phenocrysts, disequilibrium plagioclase with clean cores and sieved rims (calcic overgrowths), thoroughly resorped plagioclase, plagioclase microlites, and large glomerocrysts of oscillatory plagioclase.

Glomerocrystic clusters of plagioclase+pyroxene+fe-ti oxides are abundant. Clusters of cpx+opx+fe-ti oxides, opx+fe-ti oxides, and cpx+fe-ti oxides are also present.

Rare gabbroic-type amphibole clots are identified with microcrystalline reaction rims of plagioclase+cpx+opx+fe-ti oxides. Breakdown textures are attributed to mixing and temperature increase.

Few iddingsitized olivine xenocrysts are identified.
Orthopyroxene with clinopyroxene coronae are also present.

VM99-2: 2-pyroxene andesite
Plagioclase>opx>cpx Fe-Ti oxides

Mineral Modes:
10% plagioclase
3% orthopyroxene
1-2% clinopyroxene
1% Fe-Ti oxides

Groundmass is aphanitic, riddled with Fe-Ti oxides and plagioclase microlites, and partially devitrified.

Multiple populations of plagioclase including large phenocrysts with resorbed textures and spongey cores and rims are present in this sample. Plagioclase is generally less complicated although there are a few large oscillatory zoned crystals and glomerocrysts. Few crystals are anhedral and coarsely sieved throughout.

Several populations of pyroxene have also been identified. These include solitary, euhedral crystals, resorbed crystals, and orthopyroxene with clinopyroxene coronae.

Glomerocrysts are common and include clusters of plagioclase, plagioclase+2pyroxenes+Fe-Ti oxides, cpx+Fe-Ti oxides, and opx+Fe-Ti oxides.

There is no strong evidence for crystal clots related to amphibole breakdown reactions. There is evidence, however, for a few relict hornblende crystals, which are completely opaque.

VM99-7: 2-pyroxene andesite
Plagioclase>>orthopyroxene>clinopyroxene Fe-Ti oxides>>hornblende

Mineral modes:
12% plagioclase
3-4% orthopyroxene
2% clinopyroxene
1% Fe-Ti oxides
relict hornblende

The groundmass is aphanitic with abundant plagioclase microlites and Fe-Ti oxides.

Multiple populations of plagioclase have been identified including large phenocrysts with complex zoning patterns and resorption textures, a medium sized subhedral population with fritted margins, and euhedral microphenocrysts.

Relict hornblende is present with fuzzy black-type morphology and microcrystalline texture.

Glomerocrysts are common and composed of cpx+opx+plagioclase+Fe-Ti oxides, cpx+opx+plagioclase, opx+Fe-Ti oxides, cpx+Fe-Ti oxides, and opx+plagioclase+Fe-Ti oxides.

Clinopyroxene is reacted and resorbed and orthopyroxene occurs with clinopyroxene coronae. Multiple populations of clinopyroxene include highly resorbed crystals, subhedral crystals with microcrystalline reaction rims, and groundmass microlites.

VM99-8: hornblende-rich andesite
Plagioclase>hornblende>cpx opx> Fe-Ti oxides

Mineral modes:
15% plagioclase
5% hornblende
1-2% clinopyroxene
1% orthopyroxene
<1% oxides

Groundmass is aphanitic with felty appearance. Plagioclase microlites, Fe-ti oxides, and clinopyroxene and orthopyroxene microphenocrysts compose groundmass constituents.

Sample is characterized by multiple populations of plagioclase including clean plagioclase phenocrysts, a population of sub- to euhedral plagioclase with spongey (sieved) cores and clean overgrowths, and plagioclase microlites.

Abundant glomerocrystic clusters are present including amph+cpx+opx+fe-ti oxides, amph+plagioclase, cpx+opx+plag+fe-ti oxides, amph+opx+fe-ti oxides, cpx+opx+fe-ti oxides, plagioclase+cpx+fe-ti oxides.

Relict hornblende occurs as both black-type and inverted gabbroic-type. Black-type hornblende may be the result of increased oxidation state and dehydration due to decompression. Few phenocrysts are completely reacted and fuzzy in appearance. Degree of reaction is variable from grain to grain and not dependent on grain size necessarily although larger grains are less reacted as a general rule. Few phenocrysts look like they represent earlier magmatic histories at Mino, and are marked by thermal breakdown-related reaction rims of plagioclase+cpx+opx+fe-ti oxides.

VM99-16: olivine-cpx basaltic andesite
Plagioclase>olivine>cpx>opx(xenocrystic)>fe-ti oxides

Mineral Modes:

5% plagioclase
2% olivine
1% clinopyroxene
<1% orthopyroxene
<1% Fe-Ti oxides

Groundmass is aphanitic. Plagioclase is trachytic. Microlites in the groundmass include plagioclase+ fe-ti oxides+ cpx+ iddingsitized olivine.

Including sub- to euhedral plagioclase microlites in the groundmass, one other population of plagioclase occurs. Sparse plagioclase phenocrysts with spongey cores and sieved rims (overgrowths) are present.

Olivine is iddingsitized. This is the only sample (with the exception of VM99-17, maybe same flow?) where olivine is present as an equilibrium phase. Olivine microphenocrysts are present, with resorped and iddingsitized grain margins. Olivine microlites occur in the groundmass.

Few glomerocrysts occur and include opx+fe-ti oxides and cpx+plagioclase.

Sample is unique mineralogically and petrographically from all other samples: xl-poor, olivine-rich, and no amphibole present, finer grained, not as glomerocrystic, and definitely more mafic when compared to other samples.

VM99-18: 2-pyroxene hornblende andesite
Plagioclase>>cpx opx>hbl>Fe-Ti oxides; quartz xenocrysts

Multiple populations of plagioclase including crystals with complex zoning patterns, glomerocrysts with sieved resorption textures, and a clean and euhedral smaller sized population.

Quartz xenocrysts occur with clinopyroxene coronae.

Large relict hornblende grains occur with thick opaque reaction rims. They range in reaction type from completely reacted black-type (all opaque) to gabbroic type. Cpx and opx replace hornblende.

Glomerocrysts are common and are composed of plagioclase, plagioclase+cpx+opx+Fe-Ti oxides, cpx+opx+Fe-Ti oxides, and gabbroic breakdown clots.

VM99-19: 2-pyroxene hbl andesite
Plagioclase>>opx>cpx>hbl>Fe-Ti oxides

Mineral Mode:
15% plagioclase
3% orthopyroxene
2% clinopyroxene
<1% hornblende
1% Fe-Ti oxides

Multiple populations of plagioclase are present including microlites in the groundmass, a large population of medium-sized, subhedral plagioclase, and a minor population of resorbed plagioclase with sieved interiors and fritted margins.

Cpx and opx are generally subhedral and commonly occur as phases associated with glomerocrystic clusters (cpx+opx+plagioclase+Fe-Ti oxides).
Hornblende is seriate yet minor in modal abundance. As a general rule, the degree of reaction on an amphibole grain seems to be a function of size. Smaller crystals are completely reacted as opposed to larger crystals, which have thin opaque reaction rims.

The groundmass is devitrified and oxidized.

VM99-20: 2-pyroxene andesite
Plagioclase>opx cpx>Fe-Ti oxides

Mineral Mode:
20% plagioclase
4% orthopyroxene
2-3% clinopyroxene
1-2% Fe-Ti oxides

Plagioclase is seriate and occurs in multiple populations including plagioclase microlites, non-reacted clean plagioclase phenocrysts, and large plagioclase crystals with resorbed interiors and oscillatory zoned overgrowths.

Clinopyroxene and orthopyroxene are generally euhedral, although few exhibit resorbed faces. Clinopyroxene coronae occur on orthopyroxene in a few cases.

VM99-24: 2-pyroxene andesite (no hornblende)
Plagioclase>opx cpx>fe-ti oxides

Mineral Modes:
~20% plagioclase
3% orthopyroxene

2-3% clinopyroxene
~1% fe-ti oxides
trace quartz?

Groundmass is fine grained, with flow aligned plagioclase microlites (trachytic texture), and abundant fe-ti oxide microlites.

Three populations of plagioclase are evident including clean plagioclase phenocrysts, plagioclase phenocrysts with clean cores and sieved rims, and plagioclase microlites.

Glomeroporphyritic clusters include plagioclase+cpx+opx+fe-ti oxides, plagioclase+opx+fe-ti oxides, cpx+fe-ti oxides, cpx+opx+fe-ti oxides, and plagioclase clusters.

Pyroxenes are predominantly euhedral although they often are resorped when present as a phase in glomerocrysts.

Apatite is identified as a phase included in large complicated plagioclase clusters.

VM99-30: 2-pyx andesite
Plagioclase>opx>cpx>fe-ti oxides

Mineral Modes:
25% plagioclase
3% orthopyroxene
2% clinopyroxene
1-2% fe-ti oxides

Groundmass is aphanitic, oxidized, and partially devitrified. Plagioclase microlites and fe-ti oxides are abundant.

Multiple populations of plagioclase occur including glomerocrystic plagioclase, medium-sized population of clean plagioclase with fritted margins, plagioclase with spongey cores and clean rims, plagioclase with clean cores and spongey rims, and plagioclase microlites.

Glomerocrystic clusters are abundant and include cpx+opx+fe-ti oxides, plagioclase+cpx+opx+fe-ti oxides(microcrystalline hornblende breakdown?), cpx+fe-ti oxides, opx+plagioclase+fe-ti oxides, and cpx+plagioclase+fe-ti oxides.

Pyroxenes are generally euhedral and seriate. Groundmass microphenocrysts are partially resorped probably due to devitrification. Orthopyroxene is replaced by clinopyroxene in a few cases.

VM99-33: 2-pyroxene andesite
Plagioclase>>cpx opx>Fe-Ti oxides>>relict hbl; trace apatite

Mineral Mode:
15% plagioclase
3% clinopyroxene
2-3% orthopyroxene
2% Fe-Ti oxides

The groundmass is aphanitic, with abundant acicular laths of plagioclase and microlites of Fe-Ti oxides and orthopyroxene. Plagioclase is trachyitic.

Plagioclase is seriate. Most crystals are clean and euhedral, although a few are obviously xenocrysts with complexly zoned spongey interiors and oscillatory zoned overgrowths.

Pyroxene is generally euhedral. Orthopyroxene with clinopyroxene coronae are present.

Amphibole is modally minor, but present and occurs with black type reaction rims. Inverted gabbroic type amphibole is inconspicuous.

VM99-35: 2-pyroxene andesite
Plagioclase>>cpx>opx Fe-Ti oxides

The groundmass is aphanitic with acicular plagioclase laths, and microlites of Fe-Ti oxides and pyroxenes.

Plagioclase occurs in multiple populations and is seriate. Plagioclase microlites are eu- to subhedral. Complexly zoned plagioclase occurs with fritted grain faces. Large, oscillatory crystals are common and exhibit sieved interiors and overgrowths.

Pyroxene occurs as euhedral microphenocrysts. Orthopyroxene has clinopyroxene reaction rims in a few cases. Larger clinopyroxene phenocrysts have reacted and resorped crystal faces.

Glomerocrysts are common. Clusters include cpx+opx+plagioclase+Fe-Ti oxides, cpx+opx+Fe-Ti oxides, and opx+plag+Fe-Ti oxides.

One black type amphibole xenocryst was identified.

VM99-41: 2-pyroxene hbl andesite
Plagioclase>>cpx>opx>Fe-Ti oxides>hbl; minor apatite

~25% crystals

Multiple populations of plagioclase have been identified including (1.) large, complexly zoned, broken crystals, (2.) subhedral plagioclase with spongey cores and clean overgrowths and clean cores and spongey rims, (3.) anhedral plagioclase that is completely resorbed throughout, (4.) a clean, euhedral population, and (5.) plagioclase microlites.

Pyroxene is generally euhedral. Cpx coronae occur on opx.

Amphibole is present and occurs as (1.) fuzzy, black type amphibole and (2.) gabbroic type amphibole.

Glomerocrysts consist of combinations of amphibole+cpx+opx+Fe-Ti oxides, cpx+opx+Fe-Ti oxides, plagioclase+cpx, and cpx+Fe-Ti oxides.

VM99-44: 2-pyroxene hbl andesite
Plagioclase>opx>cpx hornblende>Fe-Ti oxides

Mineral Mode:
14% plagioclase
2-3% orthopyroxene
2% clinopyroxene
>1% hornblende
<1% Fe-Ti oxides

Plagioclase occurs as clean, euhedral, seriate crystals. A few oscillatory zoned crystals are present. Plagioclase with clean cores and sieved rims, and entirely sieved throughout are less common.

Pyroxene is likewise clean and euhedral. Orthopyroxene occurs with cpx coronae.

Amphibole is present as both black type and inverted gabbroic reaction types.

Glomerocrysts consist of cpx+opx+oxides, opx+oxides, plagioclase+opx+cpx+oxides, and opx+plag+oxides.

VM99-50: 2-pyroxene andesite
Plagioclase>opx>cpx>Fe-Ti oxides

~25-30% crystals

Groundmass is aphanitic and partially devitrified, with acicular laths of plagioclase and Fe-Ti oxide and orthopyroxene microlites.

Multiple populations of plagioclase are present including (1.) subhedral, clean equilibrium plagioclase, (2.) complexly zoned, sieved plagioclase with clean cores and spongey rims and vice versa, and (3.) plagioclase microlites and broken phenocrysts.

Pyroxene is subhedral. Clinopyroxene is sometimes resorbed. Opx occurs with clinopyroxene coronae. One large, resorbed orthopyroxene xenocrysts was identified.

Glomerocrystic clusters are composed of pyroxenes+Fe-Ti oxides, opx+Fe-Ti oxide, and plagioclase+cpx+opx+Fe-Ti oxides.

VM99-52: hornblende-rich dacite
Plagioclase>>hbl>opx>cpx>fe-ti oxides

Mineral Modes:
15-20% plagioclase
3-4% hornblende
2% opx
1-2% cpx
1% fe-ti oxides

Groundmass is aphanitic and oxidized. Evidence for increased f_{O2} includes opague rims around pyroxenes and hornblende. Groundmass constituents include plagioclase, amphibole, and Fe-ti oxides.

Plagioclase is seriate and occurs as microlites, large clean phenocrysts, plagioclase with clean cores and spongey rims, and an- to subhedral plagioclase that is sieved throughout.

Hornblende is seriate and always reacted. In general, the larger the grain, the less it is reacted. Small hornblende microlites are almost completely opague. Hornblende occurs as small, subhedral opague grains that are entirely reacted, relict hornblende with thin opacite reaction rims, a glomerocryst phase with plagioclase+opx+cpx+fe-ti oxides, inverted gabbroic type amphibole.

Glomerocrystic clusters include plagioclase+reacted hornblende, plagioclase+hbl+cpx+fe-ti oxides, and plagioclase+cpx+opx+fe-ti oxides+hbl.

VM99-61a: 2-pyroxene+hbl andesite (with mafic inclusions)

Mineral Modes:
Inclusion:
15% plagioclase
2-3% orthopyroxene
<1% clinopyroxene
1-2% fe-ti oxides
trace hornblende
Host:
50% plagioclase
7% clinopyroxene
4-5% orthopyroxene
5% fe-ti oxides
trace hornblende

Description for mafic inclusion:
Plagioclase>opx>cpx>fe-ti oxides>relict hbl

Groundmass is devitrified, slightly altered, and vesicular. Inclusions are porphyritic and included in coarse-grained andesite host.

Plagioclase is seriate and occurs as euhedral phenocryst, and oscillatory zoned plag.

Opx exceeds cpx in abundance; and occurs as a glomerocrystic phase with plagioclase and Fe-ti oxides.

Description for host rock:
Plagioclase>cpx opx>Fe-ti oxides
Groundmass is uncharacteristically coarse >70%, and partially devitrified.

Multiple populations of plagioclase are present including sub- to euhedral clean plagioclase phenocrysts, plagioclase microlites, and large complicated plagioclase glomerocrysts. Plagioclase has abundant inclusions of hornblende, apatite, cpx, and Fe-ti oxides.

Pyroxenes are subhedral, slightly resorped, and seriate. Cpx commonly replaces opx.

Needle-like pleochroic hornblende microphenocrysts are abundant throughout, mostly as inclusions in other phases. Apatite is also included in other phases.

Fe-ti oxides are abundant and occur as inclusions in plagioclase and pyroxene. Pyroxenes are included in plagioclase, and cpx is included in opx.

	A	B	C	D	E	F	G
1	**Appendix E**						
2	**Feldspar**		**14-Nov**				
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
4	sani1_1	standard	63.98	19.22	0.14	0.00	0.00
5	sani1_2	standard	63.63	19.40	0.12	0.00	0.00
6	sani1_3	standard	63.92	19.16	0.14	0.00	0.00
7							
8	kano.1_1	standard	66.42	20.22	0.12	0.00	0.51
9	kano.1_2	standard	65.75	20.01	0.10	0.00	0.52
10	kano.1_3	standard	66.26	20.02	0.07	0.00	0.55
11							
12	labr.1_1	standard	50.65	31.16	0.40	0.14	13.30
13	labr.1_2	standard	50.46	30.74	0.46	0.15	13.34
14	labr.1_3	standard	50.86	30.74	0.43	0.15	13.37
15							
16	VM99-24.Area A2.1	core of clean plag	52.41	29.67	0.60	0.05	12.41
17	VM99-24.Area A2.2	mid of clean plag	52.35	29.39	0.65	0.04	12.37
18	VM99-24.Area A2.3	rim of clean plag	54.78	27.99	0.51	0.04	10.28
19	VM99-24.Area A2.4	mid of clean plag	53.07	29.08	0.59	0.04	11.70
20	VM99-24.Area A2.5	rim of clean plag	52.47	29.29	0.57	0.05	12.00
21							
22	VM99-24.Area A3.1	core of clean plag	53.44	28.96	0.53	0.06	11.61
23	VM99-24.Area A3.2	mid of clean plag	53.09	29.27	0.53	0.07	11.98
24	VM99-24.Area A3.3	rim of clean plag	53.42	28.61	0.68	0.06	11.52
25	VM99-24.Area A3.4	mid of clean plag	52.97	28.81	0.59	0.06	11.57
26	VM99-24.Area A3.5	rim of clean plag	57.40	25.64	0.62	0.01	7.95
27							
28	VM99-24.Area C1.1	inclusion of plag?	54.41	28.94	0.58	0.09	11.20
29	VM99-24.Area C1.2		53.50	29.36	0.66	0.07	11.76
30	VM99-24.Area C1.3		53.78	29.23	0.62	0.08	11.40
31	VM99-24.Area C1.4		53.08	29.58	0.55	0.07	12.05
32	VM99-24.Area C1.5	core of oscillatory plag	52.75	29.70	0.66	0.07	12.48
33	VM99-24.Area C1.6	core of oscillatory plag	52.63	29.74	0.61	0.06	12.09
34	VM99-24.Area C1.7	rim of oscillatory plag	53.81	29.08	0.67	0.08	11.51
35	VM99-24.Area C1.8	mid of oscillatory plag	53.61	29.43	0.61	0.06	11.63
36	VM99-24.Area C1.9	rim of oscillatory plag	55.04	28.45	0.60	0.07	10.58
37							
38	VM99-24.Area D1.1	core of clean plag	55.36	28.45	0.55	0.06	10.65
39	VM99-24.Area D1.2	mid of clean plag	54.80	28.39	0.51	0.08	10.88
40	VM99-24.Area D1.3		52.87	29.88	0.61	0.07	12.52
41	VM99-24.Area D1.4	rim of clean plag	53.57	29.21	0.61	0.08	11.58
42	VM99-24.Area D1.5	mid of clean plag	54.62	28.79	0.57	0.07	11.21
43	VM99-24.Area D1.6	rim of clean plag	53.92	29.28	0.56	0.06	11.55
44							
45	VM99-24.Area D3.1	core of clean plag	54.21	29.13	0.53	0.06	11.51
46	VM99-24.Area D3.2	mid of clean plag	55.61	27.86	0.56	0.08	9.91
47	VM99-24.Area D3.3	rim of clean plag	54.85	28.41	0.50	0.06	10.42
48	VM99-24.Area D3.4	rim of clean plag	52.96	29.78	0.54	0.08	12.18
49	VM99-24.Area D3.5	groundmass plag	54.26	28.99	0.74	0.08	11.29
50	VM99-24.Area D3.6	groundmass plag	54.80	28.34	0.73	0.05	10.61
51							
52							
53	VM99-24.Area E2.1	core of plag micropheno	53.42	28.86	0.70	0.06	11.48
54	VM99-24.Area E2.2	rim of plag micropheno	53.90	28.44	0.68	0.07	11.04
55	VM99-24.Area E2.3	rim of plag micropheno	54.93	27.69	0.77	0.02	9.99
56							
57	VM99-24.Area F2.1	plag inclusion in pyx	59.00	24.78	0.83	0.00	6.39
58	VM99-24.Area F2.2	plag inclusion in pyx	53.90	28.94	0.60	0.01	11.12
59							
60	VM99-16.Area A1.1	core of spongey plag	58.09	25.91	0.40	0.02	7.84
61	VM99-16.Area A1.2	mid of spongey plag	57.88	26.05	0.42	0.02	8.26
62	VM99-16.Area A1.3	rim of spongey plag	57.83	25.94	0.40	0.01	7.85
63	VM99-16.Area A1.4		58.99	25.44	0.39	0.02	7.07
64							
65	VM99-16.Area A1.6	overgrowth on spongey plag	50.57	30.91	0.88	0.05	13.32
66							
67	VM99-16.Area B1.1	core of clean plag	51.56	29.79	0.82	0.11	12.67
68	VM99-16.Area B1.2	mid of clean plag	51.21	30.30	0.81	0.11	13.15

	A	H	I	J	K	L	M	N	O	P
1	**Appendix E**									
2	**Feldspar**									
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
4	sani1_1	0.08	0.98	2.91	12.11	**99.42**		2.96	1.05	0.00
5	sani1_2	0.09	1.01	2.89	12.01	**99.17**		2.95	1.06	0.00
6	sani1_3	0.16	0.95	2.90	12.26	**99.50**		2.96	1.05	0.00
7										
8	kano.1_1	0.18	0.06	9.64	2.31	**99.47**		2.95	1.06	0.00
9	kano.1_2	0.24	0.01	9.63	2.23	**98.49**		2.95	1.06	0.00
10	kano.1_3	0.12	0.05	9.54	2.28	**98.89**		2.96	1.05	0.00
11										
12	labr.1_1	0.02	0.00	3.68	0.09	**99.43**		2.32	1.68	0.00
13	labr.1_2	0.00	0.03	3.53	0.08	**98.79**		2.32	1.67	0.00
14	labr.1_3	0.00	0.00	3.80	0.09	**99.43**		2.33	1.66	0.00
15										
16	VM99-24.Area A2.1	0.16	0.04	4.45	0.19	**99.98**		2.38	1.59	0.00
17	VM99-24.Area A2.2	0.18	0.00	4.34	0.21	**99.53**		2.39	1.58	0.00
18	VM99-24.Area A2.3	0.09	0.04	5.56	0.32	**99.61**		2.49	1.50	0.00
19	VM99-24.Area A2.4	0.06	0.03	4.74	0.25	**99.56**		2.42	1.56	0.00
20	VM99-24.Area A2.5	0.15	0.02	4.67	0.26	**99.49**		2.40	1.58	0.00
21										
22	VM99-24.Area A3.1	0.13	0.00	4.89	0.21	**99.82**		2.43	1.55	0.00
23	VM99-24.Area A3.2	0.13	0.04	4.76	0.19	**100.05**		2.41	1.57	0.00
24	VM99-24.Area A3.3	0.17	0.06	4.92	0.29	**99.74**		2.43	1.54	0.00
25	VM99-24.Area A3.4	0.10	0.04	4.67	0.21	**99.01**		2.43	1.55	0.00
26	VM99-24.Area A3.5	0.16	0.07	6.63	0.48	**98.97**		2.61	1.37	0.00
27										
28	VM99-24.Area C1.1	0.15	0.03	5.19	0.23	**100.82**		2.45	1.53	0.00
29	VM99-24.Area C1.2	0.10	0.02	4.79	0.20	**100.46**		2.42	1.56	0.00
30	VM99-24.Area C1.3	0.19	0.00	4.83	0.22	**100.35**		2.43	1.56	0.00
31	VM99-24.Area C1.4	0.09	0.00	4.55	0.20	**100.17**		2.40	1.58	0.00
32	VM99-24.Area C1.5	0.13	0.03	4.42	0.20	**100.44**		2.39	1.59	0.00
33	VM99-24.Area C1.6	0.08	0.02	4.34	0.19	**99.75**		2.39	1.59	0.00
34	VM99-24.Area C1.7	0.21	0.07	4.70	0.25	**100.38**		2.43	1.55	0.00
35	VM99-24.Area C1.8	0.20	0.06	4.79	0.21	**100.59**		2.42	1.56	0.00
36	VM99-24.Area C1.9	0.17	0.02	5.38	0.26	**100.56**		2.47	1.51	0.00
37										
38	VM99-24.Area D1.1	0.25	0.03	5.48	0.28	**101.11**		2.48	1.50	0.00
39	VM99-24.Area D1.2	0.18	0.02	5.44	0.29	**100.59**		2.47	1.51	0.00
40	VM99-24.Area D1.3	0.11	0.02	4.52	0.20	**100.80**		2.39	1.59	0.00
41	VM99-24.Area D1.4	0.07	0.01	4.82	0.28	**100.22**		2.42	1.56	0.00
42	VM99-24.Area D1.5	0.13	0.03	5.18	0.24	**100.84**		2.45	1.52	0.00
43	VM99-24.Area D1.6	0.15	0.02	4.96	0.23	**100.73**		2.43	1.55	0.00
44										
45	VM99-24.Area D3.1	0.20	0.01	4.94	0.25	**100.85**		2.44	1.54	0.00
46	VM99-24.Area D3.2	0.15	0.02	5.76	0.29	**100.25**		2.50	1.48	0.00
47	VM99-24.Area D3.3	0.11	0.00	5.49	0.27	**100.11**		2.48	1.51	0.00
48	VM99-24.Area D3.4	0.11	0.00	4.62	0.22	**100.48**		2.39	1.59	0.00
49	VM99-24.Area D3.5	0.19	0.02	5.13	0.26	**100.98**		2.44	1.54	0.00
50	VM99-24.Area D3.6	0.22	0.01	5.43	0.33	**100.50**		2.47	1.51	0.00
51										
52										
53	VM99-24.Area E2.1	0.05	0.00	4.85	0.26	**99.67**		2.43	1.55	0.00
54	VM99-24.Area E2.2	0.09	0.03	5.07	0.29	**99.61**		2.45	1.52	0.00
55	VM99-24.Area E2.3	0.11	0.05	5.65	0.35	**99.55**		2.49	1.48	0.00
56										
57	VM99-24.Area F2.1	0.12	0.12	7.30	1.02	**99.57**		2.66	1.32	0.00
58	VM99-24.Area F2.2	0.11	0.00	5.09	0.26	**100.03**		2.44	1.54	0.00
59										
60	VM99-16.Area A1.1	0.14	0.06	6.52	0.76	**99.74**		2.61	1.37	0.00
61	VM99-16.Area A1.2	0.00	0.06	6.30	0.73	**99.72**		2.61	1.38	0.00
62	VM99-16.Area A1.3	0.00	0.05	6.52	0.72	**99.33**		2.61	1.38	0.00
63	VM99-16.Area A1.4	0.10	0.11	6.79	0.84	**99.74**		2.65	1.35	0.00
64										
65	VM99-16.Area A1.6	0.20	0.00	3.62	0.22	**99.77**		2.31	1.67	0.00
66										
67	VM99-16.Area B1.1	0.17	0.00	4.03	0.20	**99.36**		2.36	1.61	0.00
68	VM99-16.Area B1.2	0.11	0.02	3.98	0.20	**99.88**		2.34	1.63	0.00

	A	Q	R	S	T	U	V	W	X	Y	Z
1	**Appendix E**										
2	**Feldspar**										
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
4	sani1_1	0.01	0.00	0.00	0.00	0.02	0.26	0.71	5.00	26.21	0.00
5	sani1_2	0.00	0.00	0.00	0.00	0.02	0.26	0.71	5.00	26.24	0.01
6	sani1_3	0.01	0.00	0.00	0.00	0.02	0.26	0.72	5.01	25.89	0.00
7											
8	kano.1_1	0.00	0.00	0.02	0.01	0.00	0.83	0.13	5.00	83.76	2.46
9	kano.1_2	0.00	0.00	0.03	0.01	0.00	0.84	0.13	5.00	84.05	2.51
10	kano.1_3	0.00	0.00	0.03	0.00	0.00	0.83	0.13	5.00	83.74	2.67
11											
12	labr.1_1	0.01	0.01	0.65	0.00	0.00	0.33	0.01	5.00	33.19	66.20
13	labr.1_2	0.02	0.01	0.66	0.00	0.00	0.32	0.01	5.00	32.24	67.24
14	labr.1_3	0.02	0.01	0.66	0.00	0.00	0.34	0.01	5.01	33.78	65.72
15											
16	VM99-24.Area A2.1	0.02	0.00	0.61	0.00	0.00	0.39	0.01	5.01	38.73	59.69
17	VM99-24.Area A2.2	0.02	0.00	0.61	0.01	0.00	0.39	0.01	5.01	38.21	60.13
18	VM99-24.Area A2.3	0.02	0.00	0.50	0.00	0.00	0.49	0.02	5.01	48.41	49.45
19	VM99-24.Area A2.4	0.02	0.00	0.57	0.00	0.00	0.42	0.02	5.01	41.60	56.73
20	VM99-24.Area A2.5	0.02	0.00	0.59	0.00	0.00	0.41	0.02	5.02	40.52	57.57
21											
22	VM99-24.Area A3.1	0.02	0.00	0.57	0.00	0.00	0.43	0.01	5.01	42.59	55.90
23	VM99-24.Area A3.2	0.02	0.01	0.58	0.00	0.00	0.42	0.01	5.01	41.23	57.29
24	VM99-24.Area A3.3	0.02	0.00	0.56	0.00	0.00	0.44	0.02	5.01	42.66	55.14
25	VM99-24.Area A3.4	0.02	0.00	0.57	0.00	0.00	0.42	0.01	5.00	41.55	56.86
26	VM99-24.Area A3.5	0.02	0.00	0.39	0.00	0.00	0.58	0.03	5.00	58.15	38.51
27											
28	VM99-24.Area C1.1	0.02	0.01	0.54	0.00	0.00	0.45	0.01	5.01	44.80	53.44
29	VM99-24.Area C1.2	0.02	0.01	0.57	0.00	0.00	0.42	0.01	5.01	41.83	56.75
30	VM99-24.Area C1.3	0.02	0.01	0.55	0.01	0.00	0.42	0.01	5.00	42.60	55.60
31	VM99-24.Area C1.4	0.02	0.01	0.59	0.00	0.00	0.40	0.01	5.00	40.02	58.57
32	VM99-24.Area C1.5	0.02	0.01	0.61	0.00	0.00	0.39	0.01	5.01	38.44	60.03
33	VM99-24.Area C1.6	0.02	0.00	0.59	0.00	0.00	0.38	0.01	5.00	38.86	59.78
34	VM99-24.Area C1.7	0.02	0.01	0.56	0.01	0.00	0.41	0.01	5.00	41.61	56.26
35	VM99-24.Area C1.8	0.02	0.00	0.56	0.01	0.00	0.42	0.01	5.01	41.92	56.27
36	VM99-24.Area C1.9	0.02	0.01	0.51	0.00	0.00	0.47	0.02	5.00	46.97	51.06
37											
38	VM99-24.Area D1.1	0.02	0.00	0.51	0.01	0.00	0.48	0.02	5.01	47.11	50.60
39	VM99-24.Area D1.2	0.02	0.01	0.53	0.01	0.00	0.48	0.02	5.02	46.48	51.39
40	VM99-24.Area D1.3	0.02	0.01	0.61	0.00	0.00	0.40	0.01	5.01	38.92	59.61
41	VM99-24.Area D1.4	0.02	0.01	0.56	0.00	0.00	0.42	0.02	5.01	42.19	56.00
42	VM99-24.Area D1.5	0.02	0.01	0.54	0.00	0.00	0.45	0.01	5.01	44.77	53.49
43	VM99-24.Area D1.6	0.02	0.00	0.56	0.00	0.00	0.43	0.01	5.01	42.96	55.30
44											
45	VM99-24.Area D3.1	0.02	0.00	0.55	0.01	0.00	0.43	0.01	5.01	42.83	55.18
46	VM99-24.Area D3.2	0.02	0.01	0.48	0.00	0.00	0.50	0.02	5.01	50.14	47.72
47	VM99-24.Area D3.3	0.02	0.00	0.50	0.00	0.00	0.48	0.02	5.01	47.91	50.22
48	VM99-24.Area D3.4	0.02	0.01	0.59	0.00	0.00	0.41	0.01	5.01	40.07	58.40
49	VM99-24.Area D3.5	0.03	0.01	0.54	0.01	0.00	0.45	0.02	5.01	44.21	53.77
50	VM99-24.Area D3.6	0.03	0.00	0.51	0.01	0.00	0.48	0.02	5.01	46.93	50.64
51											
52											
53	VM99-24.Area E2.1	0.02	0.00	0.56	0.00	0.00	0.43	0.02	5.01	42.64	55.75
54	VM99-24.Area E2.2	0.02	0.01	0.54	0.00	0.00	0.45	0.02	5.01	44.48	53.56
55	VM99-24.Area E2.3	0.03	0.00	0.49	0.00	0.00	0.50	0.02	5.01	49.39	48.25
56											
57	VM99-24.Area F2.1	0.03	0.00	0.31	0.00	0.00	0.64	0.06	5.02	63.11	30.54
58	VM99-24.Area F2.2	0.02	0.00	0.54	0.00	0.00	0.45	0.02	5.01	44.51	53.71
59											
60	VM99-16.Area A1.1	0.01	0.00	0.38	0.00	0.00	0.57	0.04	5.00	57.20	37.98
61	VM99-16.Area A1.2	0.01	0.00	0.40	0.00	0.00	0.55	0.04	4.99	55.46	40.20
62	VM99-16.Area A1.3	0.01	0.00	0.38	0.00	0.00	0.57	0.04	5.00	57.48	38.25
63	VM99-16.Area A1.4	0.01	0.00	0.34	0.00	0.00	0.59	0.05	4.99	60.11	34.56
64											
65	VM99-16.Area A1.6	0.03	0.00	0.65	0.01	0.00	0.32	0.01	5.01	32.35	65.82
66											
67	VM99-16.Area B1.1	0.03	0.01	0.62	0.01	0.00	0.36	0.01	5.00	35.95	62.40
68	VM99-16.Area B1.2	0.03	0.01	0.64	0.00	0.00	0.35	0.01	5.02	34.90	63.63

	A	AA	AB	AC
1	**Appendix E**			
2	**Feldspar**			
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
4	sani1_1	71.77	1.79	0.22
5	sani1_2	71.64	1.85	0.25
6	sani1_3	71.96	1.71	0.44
7				
8	kano.1_1	13.22	0.10	0.47
9	kano.1_2	12.79	0.02	0.63
10	kano.1_3	13.19	0.08	0.33
11				
12	labr.1_1	0.56	0.00	0.05
13	labr.1_2	0.46	0.06	0.00
14	labr.1_3	0.50	0.00	0.00
15				
16	VM99-24.Area A2.1	1.09	0.07	0.42
17	VM99-24.Area A2.2	1.19	0.00	0.47
18	VM99-24.Area A2.3	1.83	0.08	0.24
19	VM99-24.Area A2.4	1.46	0.05	0.17
20	VM99-24.Area A2.5	1.49	0.03	0.40
21				
22	VM99-24.Area A3.1	1.19	0.01	0.33
23	VM99-24.Area A3.2	1.08	0.08	0.33
24	VM99-24.Area A3.3	1.67	0.10	0.43
25	VM99-24.Area A3.4	1.25	0.07	0.27
26	VM99-24.Area A3.5	2.79	0.13	0.43
27				
28	VM99-24.Area C1.1	1.32	0.05	0.40
29	VM99-24.Area C1.2	1.13	0.04	0.25
30	VM99-24.Area C1.3	1.29	0.00	0.51
31	VM99-24.Area C1.4	1.18	0.00	0.23
32	VM99-24.Area C1.5	1.15	0.05	0.33
33	VM99-24.Area C1.6	1.10	0.04	0.22
34	VM99-24.Area C1.7	1.43	0.13	0.56
35	VM99-24.Area C1.8	1.19	0.10	0.53
36	VM99-24.Area C1.9	1.49	0.04	0.43
37				
38	VM99-24.Area D1.1	1.60	0.05	0.63
39	VM99-24.Area D1.2	1.66	0.03	0.45
40	VM99-24.Area D1.3	1.14	0.04	0.30
41	VM99-24.Area D1.4	1.62	0.01	0.18
42	VM99-24.Area D1.5	1.35	0.05	0.34
43	VM99-24.Area D1.6	1.31	0.04	0.39
44				
45	VM99-24.Area D3.1	1.44	0.03	0.52
46	VM99-24.Area D3.2	1.69	0.04	0.40
47	VM99-24.Area D3.3	1.57	0.00	0.30
48	VM99-24.Area D3.4	1.24	0.00	0.28
49	VM99-24.Area D3.5	1.48	0.04	0.50
50	VM99-24.Area D3.6	1.86	0.01	0.56
51				
52				
53	VM99-24.Area E2.1	1.48	0.00	0.14
54	VM99-24.Area E2.2	1.67	0.05	0.24
55	VM99-24.Area E2.3	1.99	0.08	0.28
56				
57	VM99-24.Area F2.1	5.81	0.22	0.32
58	VM99-24.Area F2.2	1.49	0.00	0.28
59				
60	VM99-16.Area A1.1	4.36	0.11	0.36
61	VM99-16.Area A1.2	4.23	0.12	0.00
62	VM99-16.Area A1.3	4.18	0.10	0.00
63	VM99-16.Area A1.4	4.87	0.19	0.27
64				
65	VM99-16.Area A1.6	1.29	0.00	0.54
66				
67	VM99-16.Area B1.1	1.18	0.01	0.46
68	VM99-16.Area B1.2	1.13	0.03	0.30

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
69	VM99-16.Area B1.3	rim of clean plag	52.00	29.72	0.89	0.08	12.74
70	VM99-16.Area B1.4	rim of clean plag	53.26	28.75	0.99	0.06	11.66
71	VM99-16.Area B1.5	groundmass plag micropheno	54.48	27.69	1.14	0.05	10.50
72	VM99-16.Area B1.6	core of clean plag	51.88	30.04	0.94	0.04	12.87
73							
74	VM99-16.Area B2.1	core of clean plag	51.75	30.21	0.74	0.11	13.14
75	VM99-16.Area B2.2	mid of clean plag	51.72	30.38	0.63	0.10	13.34
76	VM99-16.Area B2.3	rim of clean plag	50.71	30.52	0.88	0.06	13.82
77							
78	VM99-16.Area B3.1	core of spongey plag	58.62	25.92	0.34	0.01	7.66
79	VM99-16.Area B3.3	mid of spongey plag	58.93	25.36	0.27	0.01	7.18
80	VM99-16.Area B3.2	rim of spongey plag	58.94	25.68	0.30	0.01	7.20
81							
82							
83	VM99-16.Area B3.7	spongey zone on plag	52.72	16.38	7.92	6.42	13.53
84	VM99-16.Area B3.8	overgrowth on spongey plag	52.15	29.69	0.96	0.05	12.29
85							
86	VM99-16.Area B4.1	core of clean plag	50.75	30.96	0.81	0.07	13.46
87	VM99-16.Area B4.2	mid of clean plag	49.75	31.67	0.84	0.03	14.48
88	VM99-16.Area B4.3	rim of clean plag	53.03	29.08	1.02	0.05	11.70
89	VM99-16.Area B4.4		53.54	28.69	1.05	0.05	11.44
90	VM99-16.Area B4.5	groundmass microlite	53.92	28.38	1.16	0.04	10.89
91							
92	VM99-16.Area D2.1	core of plag micropheno	51.15	30.33	0.94	0.06	13.44
93	VM99-16.Area D2.2	mid of plag micropheno	50.49	30.69	0.69	0.06	13.55
94	VM99-16.Area D2.3	rim of plag micropheno	51.08	30.33	0.89	0.04	13.27
95	VM99-16.Area D2.4	rim of plag micropheno	52.80	28.93	1.09	0.06	11.97
96	VM99-16.Area D2.5	core of plag micropheno	50.90	30.14	0.93	0.06	13.21
97	VM99-16.Area D2.6	rim of plag micropheno	52.08	29.52	1.09	0.05	12.52
98							
99	VM99-16.Area E1.1	plag micropheno	50.40	29.82	0.85	0.08	13.19
100							
101	VM99-16.Area F1.1	core of spongey plag	59.11	25.28	0.35	0.02	7.20
102	VM99-16.Area F1.2	mid of spongey plag	57.94	26.06	0.35	0.01	8.08
103	VM99-16.Area F1.3	rim of spongey plag	58.19	26.08	0.37	0.03	7.86
104	VM99-16.Area F1.4	spongey zone on plag	58.82	24.12	0.99	0.35	7.02
105	VM99-16.Area F1.5	overgrowth on spongey plag	49.23	31.71	0.83	0.04	14.78
106	VM99-16.Area F1.6	mid of spongey plag	57.98	25.91	0.43	0.03	8.10
107	VM99-16.Area F1.7	spongey zone on plag	53.13	29.13	0.89	0.05	12.07
108							
109	VM99-25. Area A1.1	plag inclusion? In amph breakdown	54.50	28.48	0.60	0.04	10.99
110	VM99-25. Area A1.2	plag inclusion? In amph breakdown	54.78	28.02	0.79	0.05	10.53
111	VM99-25. Area A1.3	plag in amphibole breakdown	54.23	28.43	0.88	0.05	10.81
112	VM99-25. Area A1.4	plag in amphibole breakdown	54.97	28.52	0.88	0.04	10.66
113	VM99-25. Area A1.5	plag in amphibole breakdown halo	55.01	28.29	0.88	0.06	10.52
114	VM99-25. Area A1.6	plag in amphibole breakdown halo	53.64	28.02	0.93	0.05	10.72
115	VM99-25. Area A1.7	groundmass microlite	53.75	28.20	0.88	0.06	10.56
116	VM99-25. Area A1.8	groundmass microlite	54.59	28.56	0.85	0.03	10.78
117	VM99-25. Area A1.9	groundmass microlite	58.08	24.89	1.24	0.14	6.96
118	VM99-25. Area A1.10	groundmass microlite	54.85	28.15	0.68	0.04	10.09
119							
120	VM99-25. Area A2.1	core of oscillatory zoned plag	53.59	28.94	0.58	0.04	11.21
121	VM99-25. Area A2.2	mid of oscillatory zoned plag	53.73	28.59	0.50	0.06	10.89
122	VM99-25. Area A2.3	rim of oscillatory zoned plag	54.25	27.86	0.58	0.05	10.06
123	VM99-25. Area A2.4	mid of oscillatory zoned plag	54.27	28.32	0.56	0.07	10.83
124	VM99-25. Area A2.5	rim of oscillatory zoned plag	54.39	28.64	0.62	0.05	10.68
125	VM99-25. Area A2.6	mid of oscillatory zoned plag	54.66	28.00	0.56	0.03	10.34
126	VM99-25. Area A2.7	rim of oscillatory zoned plag	56.03	26.95	0.71	0.05	9.49
127	VM99-25. Area A2.8	plag micropheno	54.06	28.42	0.84	0.05	10.80
128	VM99-25. Area A2.9	core of plag micropheno	53.86	28.78	0.52	0.04	11.04
129	VM99-25. Area A2.10	rim of plag micropheno	55.49	27.65	0.66	0.06	10.17
130							
131	VM99-25. Area A3.1	core of clean plag micropheno	55.22	27.91	0.63	0.06	10.35
132	VM99-25. Area A3.2		55.66	27.73	0.80	0.05	10.00
133							
134	VM99-25. Area A4.1	core of clean plag	53.78	28.57	0.52	0.05	10.99
135	VM99-25. Area A4.2	mid of clean plag	55.15	27.75	0.60	0.04	10.11

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
69	VM99-16.Area B1.3	0.14	0.00	4.19	0.24	**100.00**		2.37	1.60	0.00
70	VM99-16.Area B1.4	0.15	0.00	4.59	0.30	**99.78**		2.42	1.54	0.00
71	VM99-16.Area B1.5	0.13	0.00	4.99	1.16	**100.16**		2.47	1.48	0.00
72	VM99-16.Area B1.6	0.10	0.01	4.09	0.26	**100.23**		2.36	1.61	0.00
73										
74	VM99-16.Area B2.1	0.13	0.00	3.89	0.18	**100.15**		2.35	1.62	0.00
75	VM99-16.Area B2.2	0.11	0.00	4.00	0.18	**100.47**		2.35	1.62	0.00
76	VM99-16.Area B2.3	0.07	0.03	3.65	0.19	**99.92**		2.32	1.65	0.00
77										
78	VM99-16.Area B3.1	0.15	0.07	6.60	0.83	**100.19**		2.63	1.37	0.00
79	VM99-16.Area B3.3	0.07	0.09	6.78	0.97	**99.66**		2.65	1.34	0.00
80	VM99-16.Area B3.2	0.11	0.06	6.80	0.88	**99.97**		2.64	1.36	0.00
81										
82										
83	VM99-16.Area B3.7	0.01	0.02	2.69	0.23	**99.92**		2.48	0.91	0.00
84	VM99-16.Area B3.8	0.16	0.01	4.43	0.26	**100.01**		2.38	1.59	0.00
85										
86	VM99-16.Area B4.1	0.21	0.02	3.71	0.20	**100.18**		2.31	1.66	0.00
87	VM99-16.Area B4.2	0.21	0.02	3.16	0.15	**100.31**		2.27	1.70	0.00
88	VM99-16.Area B4.3	0.12	0.05	4.61	0.30	**99.96**		2.41	1.56	0.00
89	VM99-16.Area B4.4	0.06	0.06	4.74	0.32	**99.96**		2.43	1.54	0.00
90	VM99-16.Area B4.5	0.10	0.02	5.04	0.36	**99.89**		2.45	1.52	0.00
91										
92	VM99-16.Area D2.1	0.17	0.04	3.78	0.18	**100.11**		2.33	1.63	0.00
93	VM99-16.Area D2.2	0.15	0.01	3.58	0.20	**99.42**		2.32	1.66	0.00
94	VM99-16.Area D2.3	0.20	0.01	3.89	0.19	**99.92**		2.33	1.63	0.00
95	VM99-16.Area D2.4	0.18	0.00	4.66	0.28	**99.97**		2.40	1.55	0.00
96	VM99-16.Area D2.5	0.16	0.00	3.86	0.25	**99.50**		2.34	1.63	0.00
97	VM99-16.Area D2.6	0.13	0.01	4.13	0.29	**99.82**		2.38	1.59	0.00
98										
99	VM99-16.Area E1.1	0.14	0.02	3.78	0.20	**98.50**		2.34	1.63	0.00
100										
101	VM99-16.Area F1.1	0.10	0.10	6.76	0.87	**99.78**		2.65	1.34	0.00
102	VM99-16.Area F1.2	0.14	0.09	6.36	0.73	**99.75**		2.61	1.38	0.00
103	VM99-16.Area F1.3	0.00	0.07	6.45	0.71	**99.77**		2.61	1.38	0.00
104	VM99-16.Area F1.4	0.06	0.08	6.90	1.00	**99.34**		2.66	1.29	0.00
105	VM99-16.Area F1.5	0.11	0.02	2.94	0.16	**99.81**		2.26	1.72	0.00
106	VM99-16.Area F1.6	0.06	0.05	6.49	0.73	**99.78**		2.61	1.37	0.00
107	VM99-16.Area F1.7	0.09	0.02	4.45	0.32	**100.16**		2.41	1.56	0.00
108										
109	VM99-25. Area A1.1	0.04	0.02	5.23	0.44	**100.36**		2.46	1.52	0.00
110	VM99-25. Area A1.2	0.01	0.03	5.32	0.54	**100.08**		2.48	1.49	0.00
111	VM99-25. Area A1.3	0.13	0.06	5.29	0.41	**100.29**		2.45	1.52	0.00
112	VM99-25. Area A1.4	0.18	0.03	5.41	0.38	**101.07**		2.47	1.51	0.00
113	VM99-25. Area A1.5	0.11	0.06	5.37	0.28	**100.60**		2.47	1.50	0.00
114	VM99-25. Area A1.6	0.11	0.01	5.09	0.32	**98.89**		2.46	1.51	0.00
115	VM99-25. Area A1.7	0.11	0.04	5.00	0.36	**98.95**		2.46	1.52	0.00
116	VM99-25. Area A1.8	0.11	0.04	5.30	0.31	**100.58**		2.46	1.52	0.00
117	VM99-25. Area A1.9	0.12	0.08	6.29	1.41	**99.21**		2.64	1.33	0.00
118	VM99-25. Area A1.10	0.15	0.04	5.51	0.37	**99.89**		2.48	1.50	0.00
119										
120	VM99-25. Area A2.1	0.07	0.05	5.08	0.26	**99.81**		2.43	1.55	0.00
121	VM99-25. Area A2.2	0.05	0.01	5.09	0.25	**99.18**		2.45	1.54	0.00
122	VM99-25. Area A2.3	0.11	0.04	5.29	0.32	**98.55**		2.49	1.50	0.00
123	VM99-25. Area A2.4	0.08	0.04	5.17	0.27	**99.62**		2.46	1.52	0.00
124	VM99-25. Area A2.5	0.20	0.06	5.28	0.32	**100.24**		2.46	1.53	0.00
125	VM99-25. Area A2.6	0.14	0.03	5.39	0.28	**99.44**		2.48	1.50	0.00
126	VM99-25. Area A2.7	0.03	0.05	6.02	0.41	**99.73**		2.53	1.44	0.00
127	VM99-25. Area A2.8	0.14	0.04	5.04	0.35	**99.74**		2.46	1.52	0.00
128	VM99-25. Area A2.9	0.18	0.02	5.04	0.28	**99.75**		2.45	1.54	0.00
129	VM99-25. Area A2.10	0.06	0.04	5.46	0.39	**99.99**		2.51	1.47	0.00
130										
131	VM99-25. Area A3.1	0.11	0.04	5.58	0.34	**100.23**		2.49	1.48	0.00
132	VM99-25. Area A3.2	0.11	0.04	5.69	0.41	**100.50**		2.50	1.47	0.00
133										
134	VM99-25. Area A4.1	0.09	0.00	5.21	0.24	**99.45**		2.45	1.53	0.00
135	VM99-25. Area A4.2	0.10	0.03	5.63	0.28	**99.68**		2.50	1.48	0.00

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
69	VM99-16.Area B1.3	0.03	0.01	0.62	0.00	0.00	0.37	0.01	5.01	36.66	61.55
70	VM99-16.Area B1.4	0.03	0.00	0.57	0.00	0.00	0.41	0.02	5.00	40.72	57.12
71	VM99-16.Area B1.5	0.04	0.00	0.51	0.00	0.00	0.44	0.07	5.02	43.03	50.02
72	VM99-16.Area B1.6	0.03	0.00	0.63	0.00	0.00	0.36	0.02	5.01	35.85	62.37
73											
74	VM99-16.Area B2.1	0.03	0.01	0.64	0.00	0.00	0.34	0.01	5.00	34.40	64.22
75	VM99-16.Area B2.2	0.02	0.01	0.65	0.00	0.00	0.35	0.01	5.01	34.71	63.96
76	VM99-16.Area B2.3	0.03	0.00	0.68	0.00	0.00	0.32	0.01	5.01	31.92	66.77
77											
78	VM99-16.Area B3.1	0.01	0.00	0.37	0.00	0.00	0.57	0.05	5.00	57.71	37.03
79	VM99-16.Area B3.3	0.01	0.00	0.35	0.00	0.00	0.59	0.06	5.00	59.36	34.73
80	VM99-16.Area B3.2	0.01	0.00	0.35	0.00	0.00	0.59	0.05	5.00	59.67	34.88
81											
82											
83	VM99-16.Area B3.7	0.28	0.45	0.68	0.00	0.00	0.25	0.01	5.06	26.06	72.43
84	VM99-16.Area B3.8	0.03	0.00	0.60	0.00	0.00	0.39	0.02	5.02	38.72	59.35
85											
86	VM99-16.Area B4.1	0.03	0.01	0.66	0.01	0.00	0.33	0.01	5.01	32.71	65.57
87	VM99-16.Area B4.2	0.03	0.00	0.71	0.01	0.00	0.28	0.01	5.01	27.87	70.66
88	VM99-16.Area B4.3	0.04	0.00	0.57	0.00	0.00	0.41	0.02	5.01	40.74	57.13
89	VM99-16.Area B4.4	0.04	0.00	0.56	0.00	0.00	0.42	0.02	5.00	41.96	55.92
90	VM99-16.Area B4.5	0.04	0.00	0.53	0.00	0.00	0.44	0.02	5.01	44.49	53.14
91											
92	VM99-16.Area D2.1	0.03	0.00	0.66	0.00	0.00	0.34	0.01	5.01	33.22	65.21
93	VM99-16.Area D2.2	0.02	0.00	0.67	0.00	0.00	0.32	0.01	5.01	31.81	66.60
94	VM99-16.Area D2.3	0.03	0.00	0.65	0.01	0.00	0.35	0.01	5.01	34.10	64.24
95	VM99-16.Area D2.4	0.04	0.00	0.58	0.01	0.00	0.41	0.02	5.02	40.46	57.46
96	VM99-16.Area D2.5	0.03	0.00	0.65	0.00	0.00	0.34	0.01	5.01	33.95	64.21
97	VM99-16.Area D2.6	0.04	0.00	0.61	0.00	0.00	0.37	0.02	5.00	36.60	61.32
98											
99	VM99-16.Area E1.1	0.03	0.01	0.66	0.00	0.00	0.34	0.01	5.01	33.60	64.78
100											
101	VM99-16.Area F1.1	0.01	0.00	0.35	0.00	0.00	0.59	0.05	4.99	59.49	35.03
102	VM99-16.Area F1.2	0.01	0.00	0.39	0.00	0.00	0.56	0.04	4.99	55.95	39.29
103	VM99-16.Area F1.3	0.01	0.00	0.38	0.00	0.00	0.56	0.04	4.99	57.21	38.53
104	VM99-16.Area F1.4	0.03	0.02	0.34	0.00	0.00	0.61	0.06	5.01	60.14	33.80
105	VM99-16.Area F1.5	0.03	0.00	0.73	0.00	0.00	0.26	0.01	5.01	26.12	72.63
106	VM99-16.Area F1.6	0.01	0.00	0.39	0.00	0.00	0.57	0.04	5.00	56.57	39.02
107	VM99-16.Area F1.7	0.03	0.00	0.59	0.00	0.00	0.39	0.02	5.00	39.18	58.69
108											
109	VM99-25. Area A1.1	0.02	0.00	0.53	0.00	0.00	0.46	0.03	5.01	45.06	52.30
110	VM99-25. Area A1.2	0.03	0.00	0.51	0.00	0.00	0.47	0.03	5.01	46.25	50.58
111	VM99-25. Area A1.3	0.03	0.00	0.52	0.00	0.00	0.46	0.02	5.02	45.69	51.56
112	VM99-25. Area A1.4	0.03	0.00	0.51	0.01	0.00	0.47	0.02	5.01	46.58	50.74
113	VM99-25. Area A1.5	0.03	0.00	0.51	0.00	0.00	0.47	0.02	5.00	47.07	50.92
114	VM99-25. Area A1.6	0.03	0.00	0.53	0.00	0.00	0.45	0.02	5.01	45.17	52.63
115	VM99-25. Area A1.7	0.03	0.00	0.52	0.00	0.00	0.44	0.02	5.00	44.98	52.55
116	VM99-25. Area A1.8	0.03	0.00	0.52	0.00	0.00	0.46	0.02	5.01	46.07	51.79
117	VM99-25. Area A1.9	0.04	0.01	0.34	0.00	0.00	0.55	0.08	5.00	56.59	34.58
118	VM99-25. Area A1.10	0.02	0.00	0.49	0.00	0.00	0.48	0.02	5.01	48.39	49.00
119											
120	VM99-25. Area A2.1	0.02	0.00	0.55	0.00	0.00	0.45	0.02	5.01	44.28	53.99
121	VM99-25. Area A2.2	0.02	0.00	0.53	0.00	0.00	0.45	0.01	5.01	45.08	53.33
122	VM99-25. Area A2.3	0.02	0.00	0.49	0.00	0.00	0.47	0.02	5.00	47.65	50.09
123	VM99-25. Area A2.4	0.02	0.01	0.53	0.00	0.00	0.46	0.02	5.00	45.51	52.66
124	VM99-25. Area A2.5	0.02	0.00	0.52	0.01	0.00	0.46	0.02	5.01	46.07	51.48
125	VM99-25. Area A2.6	0.02	0.00	0.50	0.00	0.00	0.48	0.02	5.00	47.52	50.42
126	VM99-25. Area A2.7	0.02	0.00	0.46	0.00	0.00	0.53	0.02	5.01	52.10	45.37
127	VM99-25. Area A2.8	0.03	0.00	0.53	0.00	0.00	0.44	0.02	5.00	44.67	52.88
128	VM99-25. Area A2.9	0.02	0.00	0.54	0.01	0.00	0.44	0.02	5.01	44.29	53.58
129	VM99-25. Area A2.10	0.02	0.00	0.49	0.00	0.00	0.48	0.02	5.00	48.05	49.44
130											
131	VM99-25. Area A3.1	0.02	0.00	0.50	0.00	0.00	0.49	0.02	5.01	48.25	49.47
132	VM99-25. Area A3.2	0.03	0.00	0.48	0.00	0.00	0.50	0.02	5.01	49.33	47.96
133											
134	VM99-25. Area A4.1	0.02	0.00	0.54	0.00	0.00	0.46	0.01	5.01	45.40	52.97
135	VM99-25. Area A4.2	0.02	0.00	0.49	0.00	0.00	0.50	0.02	5.01	49.25	48.84

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
69	VM99-16.Area B1.3	1.40	0.01	0.38
70	VM99-16.Area B1.4	1.75	0.00	0.41
71	VM99-16.Area B1.5	6.60	0.01	0.34
72	VM99-16.Area B1.6	1.50	0.02	0.26
73				
74	VM99-16.Area B2.1	1.05	0.00	0.33
75	VM99-16.Area B2.2	1.03	0.00	0.30
76	VM99-16.Area B2.3	1.07	0.05	0.20
77				
78	VM99-16.Area B3.1	4.76	0.12	0.39
79	VM99-16.Area B3.3	5.56	0.15	0.19
80	VM99-16.Area B3.2	5.07	0.10	0.28
81				
82				
83	VM99-16.Area B3.7	1.44	0.04	0.03
84	VM99-16.Area B3.8	1.49	0.02	0.42
85				
86	VM99-16.Area B4.1	1.14	0.04	0.55
87	VM99-16.Area B4.2	0.88	0.04	0.55
88	VM99-16.Area B4.3	1.73	0.08	0.32
89	VM99-16.Area B4.4	1.85	0.11	0.17
90	VM99-16.Area B4.5	2.07	0.04	0.26
91				
92	VM99-16.Area D2.1	1.07	0.07	0.44
93	VM99-16.Area D2.2	1.17	0.02	0.40
94	VM99-16.Area D2.3	1.11	0.02	0.53
95	VM99-16.Area D2.4	1.62	0.00	0.46
96	VM99-16.Area D2.5	1.43	0.00	0.41
97	VM99-16.Area D2.6	1.70	0.02	0.35
98				
99	VM99-16.Area E1.1	1.19	0.04	0.38
100				
101	VM99-16.Area F1.1	5.06	0.17	0.25
102	VM99-16.Area F1.2	4.25	0.15	0.36
103	VM99-16.Area F1.3	4.14	0.13	0.00
104	VM99-16.Area F1.4	5.77	0.15	0.15
105	VM99-16.Area F1.5	0.93	0.03	0.29
106	VM99-16.Area F1.6	4.17	0.09	0.15
107	VM99-16.Area F1.7	1.85	0.04	0.24
108				
109	VM99-25. Area A1.1	2.50	0.04	0.10
110	VM99-25. Area A1.2	3.09	0.06	0.03
111	VM99-25. Area A1.3	2.32	0.10	0.34
112	VM99-25. Area A1.4	2.15	0.06	0.47
113	VM99-25. Area A1.5	1.60	0.11	0.30
114	VM99-25. Area A1.6	1.87	0.02	0.30
115	VM99-25. Area A1.7	2.10	0.06	0.31
116	VM99-25. Area A1.8	1.78	0.06	0.30
117	VM99-25. Area A1.9	8.37	0.14	0.32
118	VM99-25. Area A1.10	2.14	0.07	0.41
119				
120	VM99-25. Area A2.1	1.47	0.08	0.18
121	VM99-25. Area A2.2	1.44	0.03	0.14
122	VM99-25. Area A2.3	1.91	0.06	0.29
123	VM99-25. Area A2.4	1.55	0.07	0.21
124	VM99-25. Area A2.5	1.83	0.10	0.52
125	VM99-25. Area A2.6	1.65	0.06	0.36
126	VM99-25. Area A2.7	2.36	0.08	0.09
127	VM99-25. Area A2.8	2.02	0.07	0.36
128	VM99-25. Area A2.9	1.64	0.03	0.47
129	VM99-25. Area A2.10	2.28	0.06	0.17
130				
131	VM99-25. Area A3.1	1.91	0.06	0.30
132	VM99-25. Area A3.2	2.35	0.08	0.28
133				
134	VM99-25. Area A4.1	1.40	0.00	0.22
135	VM99-25. Area A4.2	1.61	0.05	0.25

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
136	VM99-25. Area A4.3	rim of clean plag	53.08	28.96	0.63	0.07	11.51
137	VM99-25. Area A4.4		53.31	28.88	0.72	0.04	11.22
138	VM99-25. Area A4.5	rim of clean plag	53.86	28.29	0.68	0.05	10.84
139							
140	VM99-25. Area B1.1	core of oscillatory zoned plag	54.77	28.21	0.54	0.04	10.38
141	VM99-25. Area B1.2	mid of oscillatory zoned plag	56.89	26.33	0.64	0.08	8.53
142	VM99-25. Area B1.4	rim of oscillatory zoned plag	54.96	27.83	0.62	0.05	10.36
143	VM99-25. Area B1.5		54.34	28.23	0.79	0.04	10.42
144							
145	VM99-25. Area C2.1	core of spongey plag	54.29	28.33	0.49	0.05	10.69
146	VM99-25. Area C2.2	mid of spongey plag	54.91	28.68	0.47	0.04	10.93
147	VM99-25. Area C2.3	spongey zone of plag	50.31	31.34	0.69	0.03	14.04
148	VM99-25. Area C2.4	overgrowth on spongey plag	54.41	28.58	0.73	0.02	11.09
149	VM99-25. Area C2.5	mid of spongey plag	55.87	27.98	0.59	0.05	10.11
150	VM99-25. Area C2.6	spongey zone of plag	50.16	31.82	0.65	0.03	14.60
151	VM99-25. Area C2.7	overgrowth on spongey plag	55.67	27.99	0.80	0.03	10.18
152							
153	VM99-25. Area C4.1	core of spongey plag	53.62	28.40	0.43	0.05	11.10
154	VM99-25. Area C4.2	mid of spongey plag	53.73	29.08	0.54	0.06	11.61
155	VM99-25. Area C4.3	rim of spongey plag	54.53	28.23	0.57	0.04	10.67
156	VM99-25. Area C4.4	overgrowth of spongey plag	53.07	29.06	0.68	0.05	11.51
157	VM99-25. Area C4.5		54.83	28.21	0.63	0.04	10.46
158	VM99-25. Area C4.6		53.05	28.85	0.69	0.02	11.57
159							
160	VM99-25. Area C6.1	core of clean plag	54.81	28.21	0.53	0.04	10.44
161	VM99-25. Area C6.2	mid of clean plag	55.63	27.43	0.47	0.03	9.98
162	VM99-25. Area C6.3	rim of clean plag	54.99	27.96	0.54	0.05	10.53
163	VM99-25. Area C6.4	rim of clean plag	54.54	27.71	0.76	0.10	10.34
164							
165	VM99-25. Area D1.1	plag in microxlln amph breakdown	54.50	28.34	0.80	0.02	10.65
166	VM99-25. Area D1.2	plag in microxlln amph breakdown	55.84	27.57	0.61	0.04	9.68
167	VM99-25. Area D1.3	plag in microxlln amph breakdown	53.65	28.95	0.59	0.03	11.39
168	VM99-25. Area D1.4	core of plag welded on to breakdown	53.87	28.58	0.63	0.07	11.06
169	VM99-25. Area D1.5	rim of plag welded on to breakdown	54.91	28.12	0.75	0.04	10.44
170	VM99-25. Area D1.6	core of plag welded on to breakdown	54.44	27.67	0.56	0.05	10.39
171	VM99-25. Area D1.7	rim of plag welded on to breakdown	55.16	27.74	0.56	0.05	10.12
172							
173	sani1	standard	64.09	19.22	0.17	0.00	0.00
174	labr.1	standard	51.34	31.18	0.45	0.14	13.71
175	kano.1	standard	66.24	20.49	0.14	0.00	0.53
176							
177	VM99-25. Area D3.1	plag microlite in cluster	55.31	28.23	0.80	0.05	10.34
178	VM99-25. Area D3.2	plag microlite in cluster	55.46	28.06	0.74	0.02	10.35
179	VM99-25. Area D3.3	plag microlite in cluster	55.80	28.01	0.60	0.04	10.18
180							
181	VM99-25. Area E3.1	core of spongey plag	55.10	28.60	0.59	0.05	10.55
182	VM99-25. Area E3.2	mid of spongey plag	54.28	28.82	0.59	0.05	10.92
183	VM99-25. Area E3.3	rim of spongey plag	55.44	28.47	0.63	0.05	10.13
184	VM99-25. Area E3.4	spongey zone	53.66	29.17	0.75	0.06	11.53
185	VM99-25. Area E3.5		54.51	29.23	0.55	0.05	11.19
186							
187	VM99-25. Area d1.1	plag inclusion in amphibole	57.12	27.03	0.76	0.04	8.82
188	VM99-25. Area d1.2	plag inclusion in amphibole	56.85	26.26	1.68	1.16	8.73
189	VM99-25. Area d1.3		56.53	27.61	0.85	0.04	9.42
190	VM99-25. Area d1.4	plag in microxlln amph breakdown	56.98	27.40	0.75	0.04	9.06
191	VM99-25. Area d1.5	plag in microxlln amph breakdown	57.50	27.09	0.87	0.03	8.67
192	VM99-25. Area d1.6	core of plag welded on to breakdown	55.72	27.85	0.55	0.05	10.14
193	VM99-25. Area d1.7	rim of plag welded on to breakdown	53.66	28.45	0.56	0.04	11.02
194	VM99-25. Area d1.8	plag in microxlln amph breakdown	53.88	28.71	1.39	0.16	11.23
195							
196	VM99-52. Area A4.1	core of plag micropheno	57.11	27.12	0.50	0.01	9.10
197	VM99-52. Area A4.2	rim of plag micropheno	53.85	29.11	0.59	0.05	11.39
198							
199	VM99-52. Area D1.1	core of oscillatory zoned plag	58.41	26.42	0.34	0.02	7.86
200	VM99-52. Area D1.2	rim of oscillatory zoned plag	57.61	26.94	0.41	0.02	8.25
201	VM99-52. Area D1.3	rim of oscillatory zoned plag	57.97	26.81	0.47	0.02	8.43
202							

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
136	VM99-25. Area A4.3	0.18	0.02	4.77	0.25	**99.48**		2.42	1.56	0.00
137	VM99-25. Area A4.4	0.10	0.00	4.86	0.26	**99.40**		2.43	1.55	0.00
138	VM99-25. Area A4.5	0.17	0.03	5.15	0.31	**99.38**		2.46	1.52	0.00
139										
140	VM99-25. Area B1.1	0.09	0.05	5.32	0.30	**99.70**		2.48	1.51	0.00
141	VM99-25. Area B1.2	0.10	0.04	6.19	0.39	**99.20**		2.58	1.41	0.00
142	VM99-25. Area B1.4	0.12	0.04	5.31	0.31	**99.59**		2.49	1.49	0.00
143	VM99-25. Area B1.5	0.04	0.04	5.28	0.33	**99.52**		2.47	1.51	0.00
144										
145	VM99-25. Area C2.1	0.15	0.00	5.17	0.26	**99.43**		2.47	1.52	0.00
146	VM99-25. Area C2.2	0.11	0.05	5.19	0.27	**100.65**		2.47	1.52	0.00
147	VM99-25. Area C2.3	0.12	0.00	3.43	0.16	**100.13**		2.30	1.69	0.00
148	VM99-25. Area C2.4	0.10	0.00	5.19	0.31	**100.44**		2.45	1.52	0.00
149	VM99-25. Area C2.5	0.06	0.04	5.66	0.31	**100.67**		2.50	1.48	0.00
150	VM99-25. Area C2.6	0.13	0.00	3.28	0.14	**100.79**		2.28	1.70	0.00
151	VM99-25. Area C2.7	0.07	0.04	5.68	0.39	**100.86**		2.50	1.48	0.00
152										
153	VM99-25. Area C4.1	0.14	0.04	5.14	0.30	**99.21**		2.45	1.53	0.00
154	VM99-25. Area C4.2	0.15	0.00	4.82	0.23	**100.22**		2.43	1.55	0.00
155	VM99-25. Area C4.3	0.18	0.01	5.41	0.33	**99.96**		2.47	1.51	0.00
156	VM99-25. Area C4.4	0.02	0.01	4.93	0.29	**99.60**		2.42	1.56	0.00
157	VM99-25. Area C4.5	0.13	0.07	5.45	0.35	**100.17**		2.48	1.50	0.00
158	VM99-25. Area C4.6	0.14	0.05	4.82	0.26	**99.45**		2.42	1.55	0.00
159										
160	VM99-25. Area C6.1	0.12	0.03	5.40	0.28	**99.86**		2.48	1.50	0.00
161	VM99-25. Area C6.2	0.00	0.02	5.80	0.34	**99.71**		2.52	1.46	0.00
162	VM99-25. Area C6.3	0.18	0.02	5.57	0.30	**100.13**		2.49	1.49	0.00
163	VM99-25. Area C6.4	0.05	0.00	5.27	0.30	**99.08**		2.49	1.49	0.00
164										
165	VM99-25. Area D1.1	0.07	0.02	5.31	0.27	**99.99**		2.47	1.51	0.00
166	VM99-25. Area D1.2	0.13	0.08	5.87	0.44	**100.26**		2.52	1.46	0.00
167	VM99-25. Area D1.3	0.19	0.04	4.97	0.25	**100.06**		2.43	1.55	0.00
168	VM99-25. Area D1.4	0.10	0.06	5.06	0.26	**99.69**		2.45	1.53	0.00
169	VM99-25. Area D1.5	0.14	0.01	5.63	0.34	**100.38**		2.48	1.50	0.00
170	VM99-25. Area D1.6	0.20	0.03	5.54	0.29	**99.16**		2.48	1.49	0.00
171	VM99-25. Area D1.7	0.05	0.01	5.67	0.34	**99.70**		2.50	1.48	0.00
172										
173	sani1	0.11	0.92	2.81	12.08	**99.39**		2.96	1.05	0.00
174	labr.1	0.03	0.02	3.79	0.08	**100.75**		2.32	1.66	0.00
175	kano.1	0.13	0.02	9.30	2.22	**99.09**		2.95	1.07	0.00
176										
177	VM99-25. Area D3.1	0.09	0.05	5.45	0.32	**100.64**		2.48	1.49	0.00
178	VM99-25. Area D3.2	0.17	0.03	5.44	0.37	**100.64**		2.49	1.49	0.00
179	VM99-25. Area D3.3	0.10	0.03	5.64	0.37	**100.78**		2.50	1.48	0.00
180										
181	VM99-25. Area E3.1	0.10	0.03	5.29	0.23	**100.55**		2.47	1.51	0.00
182	VM99-25. Area E3.2	0.14	0.01	5.25	0.24	**100.30**		2.45	1.53	0.00
183	VM99-25. Area E3.3	0.15	0.04	5.67	0.27	**100.86**		2.48	1.50	0.00
184	VM99-25. Area E3.4	0.10	0.03	4.35	0.38	**100.03**		2.43	1.56	0.00
185	VM99-25. Area E3.5	0.21	0.03	5.05	0.24	**101.06**		2.44	1.54	0.00
186										
187	VM99-25. Area d1.1	0.11	0.05	6.28	0.40	**100.62**		2.56	1.43	0.00
188	VM99-25. Area d1.2	0.10	0.02	5.72	0.39	**100.90**		2.54	1.38	0.00
189	VM99-25. Area d1.3	0.07	0.05	5.91	0.31	**100.78**		2.53	1.46	0.00
190	VM99-25. Area d1.4	0.10	0.03	6.09	0.35	**100.80**		2.54	1.44	0.00
191	VM99-25. Area d1.5	0.18	0.03	6.44	0.41	**101.22**		2.56	1.42	0.00
192	VM99-25. Area d1.6	0.04	0.06	5.51	0.27	**100.19**		2.51	1.48	0.00
193	VM99-25. Area d1.7	0.14	0.03	5.00	0.20	**99.11**		2.45	1.53	0.00
194	VM99-25. Area d1.8	0.18	0.01	4.69	0.21	**100.47**		2.43	1.53	0.00
195										
196	VM99-52. Area A4.1	0.17	0.06	6.13	0.33	**100.51**		2.56	1.43	0.00
197	VM99-52. Area A4.2	0.11	0.02	5.01	0.13	**100.24**		2.43	1.55	0.00
198										
199	VM99-52. Area D1.1	0.10	0.04	6.88	0.39	**100.45**		2.61	1.39	0.00
200	VM99-52. Area D1.2	0.07	0.02	6.54	0.50	**100.35**		2.58	1.42	0.00
201	VM99-52. Area D1.3	0.07	0.06	6.43	0.44	**100.69**		2.58	1.41	0.00
202										

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
136	VM99-25. Area A4.3	0.02	0.01	0.56	0.01	0.00	0.42	0.02	5.01	42.02	55.99
137	VM99-25. Area A4.4	0.03	0.00	0.55	0.00	0.00	0.43	0.02	5.00	43.17	55.04
138	VM99-25. Area A4.5	0.02	0.00	0.53	0.01	0.00	0.46	0.02	5.01	45.17	52.54
139											
140	VM99-25. Area B1.1	0.02	0.00	0.50	0.00	0.00	0.47	0.02	5.00	47.10	50.80
141	VM99-25. Area B1.2	0.02	0.01	0.41	0.00	0.00	0.54	0.02	4.99	55.28	42.09
142	VM99-25. Area B1.4	0.02	0.00	0.50	0.00	0.00	0.47	0.02	5.00	47.06	50.77
143	VM99-25. Area B1.5	0.03	0.00	0.51	0.00	0.00	0.47	0.02	5.00	46.83	51.09
144											
145	VM99-25. Area C2.1	0.02	0.00	0.52	0.00	0.00	0.46	0.02	5.00	45.77	52.30
146	VM99-25. Area C2.2	0.02	0.00	0.53	0.00	0.00	0.45	0.02	5.00	45.30	52.75
147	VM99-25. Area C2.3	0.02	0.00	0.69	0.00	0.00	0.30	0.01	5.01	30.29	68.48
148	VM99-25. Area C2.4	0.03	0.00	0.54	0.00	0.00	0.45	0.02	5.01	44.90	53.04
149	VM99-25. Area C2.5	0.02	0.00	0.49	0.00	0.00	0.49	0.02	5.00	49.32	48.69
150	VM99-25. Area C2.6	0.02	0.00	0.71	0.00	0.00	0.29	0.01	5.01	28.56	70.31
151	VM99-25. Area C2.7	0.03	0.00	0.49	0.00	0.00	0.49	0.02	5.01	49.01	48.53
152											
153	VM99-25. Area C4.1	0.02	0.00	0.54	0.00	0.00	0.46	0.02	5.02	44.62	53.23
154	VM99-25. Area C4.2	0.02	0.00	0.56	0.00	0.00	0.42	0.01	5.00	42.17	56.11
155	VM99-25. Area C4.3	0.02	0.00	0.52	0.01	0.00	0.48	0.02	5.02	46.73	50.91
156	VM99-25. Area C4.4	0.02	0.00	0.56	0.00	0.00	0.44	0.02	5.02	42.91	55.39
157	VM99-25. Area C4.5	0.02	0.00	0.51	0.00	0.00	0.48	0.02	5.01	47.35	50.20
158	VM99-25. Area C4.6	0.02	0.00	0.57	0.00	0.00	0.43	0.02	5.01	42.16	55.87
159											
160	VM99-25. Area C6.1	0.02	0.00	0.51	0.00	0.00	0.47	0.02	5.00	47.37	50.65
161	VM99-25. Area C6.2	0.02	0.00	0.48	0.00	0.00	0.51	0.02	5.01	50.24	47.77
162	VM99-25. Area C6.3	0.02	0.00	0.51	0.01	0.00	0.49	0.02	5.01	47.81	49.98
163	VM99-25. Area C6.4	0.03	0.01	0.51	0.00	0.00	0.47	0.02	5.00	47.07	51.05
164											
165	VM99-25. Area D1.1	0.03	0.00	0.52	0.00	0.00	0.47	0.02	5.01	46.59	51.62
166	VM99-25. Area D1.2	0.02	0.00	0.47	0.00	0.00	0.51	0.03	5.01	50.76	46.27
167	VM99-25. Area D1.3	0.02	0.00	0.55	0.01	0.00	0.44	0.02	5.01	43.26	54.74
168	VM99-25. Area D1.4	0.02	0.01	0.54	0.00	0.00	0.45	0.02	5.01	44.45	53.67
169	VM99-25. Area D1.5	0.03	0.00	0.51	0.00	0.00	0.49	0.02	5.02	48.23	49.47
170	VM99-25. Area D1.6	0.02	0.00	0.51	0.01	0.00	0.49	0.02	5.02	48.01	49.79
171	VM99-25. Area D1.7	0.02	0.00	0.49	0.00	0.00	0.50	0.02	5.01	49.30	48.63
172											
173	sani1	0.01	0.00	0.00	0.00	0.02	0.25	0.71	5.00	25.56	0.00
174	labr.1	0.02	0.01	0.66	0.00	0.00	0.33	0.00	5.01	33.18	66.26
175	kano.1	0.01	0.00	0.03	0.00	0.00	0.80	0.13	4.98	83.78	2.64
176											
177	VM99-25. Area D3.1	0.03	0.00	0.50	0.00	0.00	0.47	0.02	5.00	47.74	50.08
178	VM99-25. Area D3.2	0.03	0.00	0.50	0.00	0.00	0.47	0.02	5.00	47.45	49.93
179	VM99-25. Area D3.3	0.02	0.00	0.49	0.00	0.00	0.49	0.02	5.01	48.86	48.75
180											
181	VM99-25. Area E3.1	0.02	0.00	0.51	0.00	0.00	0.46	0.01	5.00	46.78	51.56
182	VM99-25. Area E3.2	0.02	0.00	0.53	0.00	0.00	0.46	0.01	5.01	45.72	52.53
183	VM99-25. Area E3.3	0.02	0.00	0.49	0.00	0.00	0.49	0.02	5.01	49.33	48.66
184	VM99-25. Area E3.4	0.03	0.00	0.56	0.00	0.00	0.38	0.02	4.98	39.51	57.91
185	VM99-25. Area E3.5	0.02	0.00	0.54	0.01	0.00	0.44	0.01	5.00	44.05	53.96
186											
187	VM99-25. Area d1.1	0.03	0.00	0.42	0.00	0.00	0.55	0.02	5.00	54.79	42.50
188	VM99-25. Area d1.2	0.06	0.08	0.42	0.00	0.00	0.50	0.02	5.00	52.83	44.52
189	VM99-25. Area d1.3	0.03	0.00	0.45	0.00	0.00	0.51	0.02	5.00	52.08	45.89
190	VM99-25. Area d1.4	0.03	0.00	0.43	0.00	0.00	0.53	0.02	5.00	53.59	44.04
191	VM99-25. Area d1.5	0.03	0.00	0.41	0.01	0.00	0.56	0.02	5.01	55.73	41.42
192	VM99-25. Area d1.6	0.02	0.00	0.49	0.00	0.00	0.48	0.02	4.99	48.70	49.49
193	VM99-25. Area d1.7	0.02	0.00	0.54	0.00	0.00	0.44	0.01	5.00	44.38	54.01
194	VM99-25. Area d1.8	0.05	0.01	0.54	0.01	0.00	0.41	0.01	4.99	42.31	55.95
195											
196	VM99-52. Area A4.1	0.02	0.00	0.44	0.00	0.00	0.53	0.02	5.00	53.61	43.96
197	VM99-52. Area A4.2	0.02	0.00	0.55	0.00	0.00	0.44	0.01	5.01	43.83	55.11
198											
199	VM99-52. Area D1.1	0.01	0.00	0.38	0.00	0.00	0.60	0.02	5.00	59.74	37.73
200	VM99-52. Area D1.2	0.01	0.00	0.40	0.00	0.00	0.57	0.03	5.01	57.11	39.81
201	VM99-52. Area D1.3	0.02	0.00	0.40	0.00	0.00	0.56	0.03	5.00	56.37	40.85
202											

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
136	VM99-25. Area A4.3	1.47	0.03	0.48
137	VM99-25. Area A4.4	1.51	0.00	0.27
138	VM99-25. Area A4.5	1.79	0.06	0.45
139				
140	VM99-25. Area B1.1	1.77	0.09	0.24
141	VM99-25. Area B1.2	2.30	0.08	0.26
142	VM99-25. Area B1.4	1.78	0.08	0.32
143	VM99-25. Area B1.5	1.91	0.07	0.11
144				
145	VM99-25. Area C2.1	1.54	0.00	0.39
146	VM99-25. Area C2.2	1.55	0.10	0.30
147	VM99-25. Area C2.3	0.91	0.00	0.32
148	VM99-25. Area C2.4	1.79	0.01	0.27
149	VM99-25. Area C2.5	1.76	0.07	0.16
150	VM99-25. Area C2.6	0.80	0.00	0.33
151	VM99-25. Area C2.7	2.21	0.06	0.19
152				
153	VM99-25. Area C4.1	1.74	0.06	0.36
154	VM99-25. Area C4.2	1.32	0.00	0.40
155	VM99-25. Area C4.3	1.89	0.01	0.46
156	VM99-25. Area C4.4	1.65	0.02	0.05
157	VM99-25. Area C4.5	1.99	0.12	0.34
158	VM99-25. Area C4.6	1.51	0.08	0.38
159				
160	VM99-25. Area C6.1	1.62	0.05	0.32
161	VM99-25. Area C6.2	1.95	0.03	0.00
162	VM99-25. Area C6.3	1.71	0.04	0.46
163	VM99-25. Area C6.4	1.74	0.01	0.14
164				
165	VM99-25. Area D1.1	1.57	0.03	0.20
166	VM99-25. Area D1.2	2.50	0.13	0.34
167	VM99-25. Area D1.3	1.44	0.07	0.49
168	VM99-25. Area D1.4	1.51	0.10	0.27
169	VM99-25. Area D1.5	1.92	0.02	0.37
170	VM99-25. Area D1.6	1.64	0.05	0.52
171	VM99-25. Area D1.7	1.94	0.01	0.12
172				
173	sani1	72.43	1.69	0.31
174	labr.1	0.44	0.03	0.09
175	kano.1	13.17	0.05	0.36
176				
177	VM99-25. Area D3.1	1.86	0.10	0.23
178	VM99-25. Area D3.2	2.13	0.05	0.43
179	VM99-25. Area D3.3	2.09	0.05	0.25
180				
181	VM99-25. Area E3.1	1.33	0.05	0.27
182	VM99-25. Area E3.2	1.37	0.02	0.36
183	VM99-25. Area E3.3	1.55	0.08	0.39
184	VM99-25. Area E3.4	2.26	0.06	0.27
185	VM99-25. Area E3.5	1.38	0.06	0.55
186				
187	VM99-25. Area d1.1	2.32	0.09	0.30
188	VM99-25. Area d1.2	2.35	0.04	0.27
189	VM99-25. Area d1.3	1.77	0.08	0.18
190	VM99-25. Area d1.4	2.03	0.06	0.27
191	VM99-25. Area d1.5	2.33	0.05	0.47
192	VM99-25. Area d1.6	1.59	0.12	0.11
193	VM99-25. Area d1.7	1.17	0.06	0.38
194	VM99-25. Area d1.8	1.22	0.03	0.50
195				
196	VM99-52. Area A4.1	1.89	0.10	0.45
197	VM99-52. Area A4.2	0.74	0.03	0.29
198				
199	VM99-52. Area D1.1	2.21	0.07	0.25
200	VM99-52. Area D1.2	2.86	0.04	0.18
201	VM99-52. Area D1.3	2.51	0.10	0.18
202				

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
203	VM99-52. Area E1.1	mid on clean plag	56.21	27.60	0.62	0.04	9.58
204	VM99-52. Area E1.2	rim on clean plag	59.29	26.30	0.50	0.02	7.87
205	VM99-52. Area E1.4	mid on clean plag	57.58	27.18	0.48	0.02	8.65
206	VM99-52. Area E1.5	rim on clean plag	59.12	26.07	0.41	0.02	7.40
207	VM99-52. Area E1.6	core on clean plag	56.92	27.50	0.48	0.03	9.20
208	VM99-52. Area E1.7	rim on clean plag	58.13	26.13	0.52	0.02	7.81
209							
210	VM99-52. Area E2.1	core on clean plag	57.63	27.16	0.50	0.04	8.52
211	VM99-52. Area E2.2	mid on clean plag	57.79	26.69	0.49	0.04	8.45
212	VM99-52. Area E2.3	rim on clean plag	58.74	26.15	0.46	0.03	7.79
213	VM99-52. Area E2.4	rim on clean plag	59.08	26.06	0.45	0.02	7.38
214							
215	VM99-52. Area E3.1	core of oscillatory zoned plag	54.79	28.76	0.57	0.06	10.83
216	VM99-52. Area E3.2	mid of oscillatory zoned plag	56.07	27.77	0.63	0.04	9.79
217	VM99-52. Area E3.3	rim of oscillatory zoned plag	57.45	26.82	0.53	0.05	8.40
218	VM99-52. Area E3.4	rim of oscillatory zoned plag	58.79	26.36	0.61	0.04	8.00
219	VM99-52. Area E3.5	mid of oscillatory zoned plag	54.85	28.62	0.65	0.03	10.85
220	VM99-52. Area E3.6	rim of oscillatory zoned plag	57.09	26.04	0.45	0.02	7.96
221	VM99-52. Area E3.7	rim of oscillatory zoned plag	57.92	26.88	0.51	0.02	8.53
222	VM99-52. Area E3.8	core of clean plag	57.48	27.17	0.51	0.02	8.70
223	VM99-52. Area E3.9	rim of clean plag	57.45	27.34	0.47	0.01	8.43
224							
225	VM99-52. Area F2.1	core of clean plag	53.99	28.10	0.59	0.03	10.33
226	VM99-52. Area F2.2	mid of clean plag	58.07	27.07	0.53	0.03	8.26
227	VM99-52. Area F2.3	rim of clean plag	58.42	26.63	0.48	0.01	8.08
228	VM99-52. Area F2.4	rim of clean plag	57.85	26.86	0.52	0.04	8.64
229							
230	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
231	**Feldspar**	**24-Feb**					
232	VM99-24.area A.1	groundmass plag	54.11	28.60	0.68	0.07	11.07
233	VM99-24.area A.2	groundmass plag	53.92	29.12	0.64	0.09	11.38
234							
235	VM99-24.area A.11	core of clean plag	53.27	29.26	0.64	0.09	11.40
236	VM99-24.area A.12	mid of clean plag	54.96	27.92	0.63	0.09	10.12
237	VM99-24.area A.13	rim of clean plag	54.69	28.32	0.83	0.06	10.49
238							
239							
240	VM99-24.area B.1	interstitial plag	57.17	27.13	0.74	0.03	8.81
241	VM99-24.area B.2	interstitial plag	57.43	26.63	0.63	0.02	8.41
242	VM99-24.area B.3	interstitial plag	57.99	26.32	0.75	0.02	8.08
243	VM99-24.area B.4	core of clean plag	54.51	28.66	0.62	0.06	10.80
244	VM99-24.area B.5	mid of clean plag	54.77	28.74	0.61	0.07	10.99
245	VM99-24.area B.6	rim of clean plag	53.17	29.29	0.62	0.06	11.71
246							
247							
248	VM99-24.area C.1	interstitial plag	59.01	22.32	4.73	0.14	4.71
249	VM99-24.area C.2	interstitial plag	61.92	22.85	2.49	0.06	4.44
250	VM99-24.area C.3	interstitial plag	60.46	24.35	1.01	0.05	5.95
251							
252	VM99-61a.area A.1	mid of clean plag	56.00	27.55	0.62	0.05	9.44
253	VM99-61a.area A.2	core of clean plag	56.80	27.20	0.54	0.06	9.20
254	VM99-61a.area A.3	mid of clean plag	56.20	27.32	0.56	0.06	9.33
255	VM99-61a.area A.4	rim of clean plag	57.42	26.75	0.50	0.05	8.42
256	VM99-61a.area A.5	interstitial plag	55.04	28.10	0.63	0.06	10.22
257	VM99-61a.area A.6	interstitial plag	54.42	28.21	0.65	0.06	10.49
258	VM99-61a.area A.7	interstitial plag	55.80	27.33	0.62	0.04	9.17
259	VM99-61a.area A.8	interstitial plag	56.30	26.99	0.46	0.05	9.02
260	VM99-61a.area A.9	interstitial plag	55.60	26.93	0.71	0.06	9.29
261							
262	VM99-61a.area C.1	core of oscillatory zoned plag	55.09	28.36	0.53	0.03	10.39
263	VM99-61a.area C.2	mid of oscillatory zoned plag	54.21	28.94	0.43	0.04	10.98
264	VM99-61a.area C.3	rim of oscillatory zoned plag	56.16	27.64	0.55	0.04	9.55
265	VM99-61a.area C.4	mid of oscillatory zoned plag	55.64	27.98	0.43	0.05	10.06
266	VM99-61a.area C.5	rim of oscillatory zoned plag	59.16	24.56	0.68	0.07	6.58
267	VM99-61a.area C.6	core of clean plag	53.58	29.34	0.47	0.04	11.61
268	VM99-61a.area C.7	mid of clean plag	54.22	29.21	0.43	0.05	11.38
269	VM99-61a.area C.8	rim of clean plag	56.55	27.13	0.56	0.05	9.25

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
203	VM99-52. Area E1.1	0.14	0.05	5.84	0.24	**100.31**		2.52	1.46	0.00
204	VM99-52. Area E1.2	0.13	0.09	6.38	0.63	**101.21**		2.62	1.37	0.00
205	VM99-52. Area E1.4	0.05	0.08	6.51	0.31	**100.87**		2.57	1.43	0.00
206	VM99-52. Area E1.5	0.23	0.06	7.06	0.55	**100.90**		2.63	1.37	0.00
207	VM99-52. Area E1.6	0.18	0.02	6.17	0.35	**100.84**		2.54	1.45	0.00
208	VM99-52. Area E1.7	0.07	0.08	6.69	0.56	**100.01**		2.61	1.38	0.00
209										
210	VM99-52. Area E2.1	0.10	0.07	6.41	0.32	**100.73**		2.57	1.43	0.00
211	VM99-52. Area E2.2	0.14	0.07	6.43	0.33	**100.43**		2.58	1.41	0.00
212	VM99-52. Area E2.3	0.18	0.08	6.86	0.58	**100.87**		2.61	1.37	0.00
213	VM99-52. Area E2.4	0.17	0.10	6.97	0.60	**100.82**		2.63	1.37	0.00
214										
215	VM99-52. Area E3.1	0.07	0.04	5.33	0.24	**100.69**		2.46	1.52	0.00
216	VM99-52. Area E3.2	0.05	0.02	5.85	0.28	**100.48**		2.52	1.47	0.00
217	VM99-52. Area E3.3	0.05	0.06	6.42	0.40	**100.17**		2.58	1.42	0.00
218	VM99-52. Area E3.4	0.07	0.07	6.52	0.57	**101.03**		2.61	1.38	0.00
219	VM99-52. Area E3.5	0.09	0.05	5.07	0.25	**100.46**		2.47	1.52	0.00
220	VM99-52. Area E3.6	0.00	0.08	6.36	0.45	**98.45**		2.60	1.40	0.00
221	VM99-52. Area E3.7	0.09	0.05	6.30	0.36	**100.66**		2.58	1.41	0.00
222	VM99-52. Area E3.8	0.17	0.03	6.47	0.31	**100.85**		2.56	1.43	0.00
223	VM99-52. Area E3.9	0.11	0.05	6.29	0.46	**100.60**		2.56	1.44	0.00
224										
225	VM99-52. Area F2.1	0.13	0.03	5.07	0.21	**98.47**		2.47	1.52	0.00
226	VM99-52. Area F2.2	0.14	0.04	6.53	0.35	**101.03**		2.58	1.42	0.00
227	VM99-52. Area F2.3	0.22	0.04	6.52	0.52	**100.93**		2.60	1.40	0.00
228	VM99-52. Area F2.4	0.14	0.05	6.49	0.33	**100.92**		2.58	1.41	0.00
229										
230	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**				
231	**Feldspar**									
232	VM99-24.area A.1		0.03	4.81	0.27	**99.64**				
233	VM99-24.area A.2		0.02	4.70	0.26	**100.13**				
234										
235	VM99-24.area A.11		0.00	4.65	0.24	**99.54**				
236	VM99-24.area A.12		0.00	5.30	0.30	**99.31**				
237	VM99-24.area A.13		0.08	5.33	0.35	**100.13**				
238										
239										
240	VM99-24.area B.1		0.09	5.93	0.44	**100.35**				
241	VM99-24.area B.2		0.03	6.29	0.47	**99.90**				
242	VM99-24.area B.3		0.03	6.46	0.53	**100.19**				
243	VM99-24.area B.4		0.03	5.12	0.29	**100.10**				
244	VM99-24.area B.5		0.04	4.77	0.27	**100.27**				
245	VM99-24.area B.6		0.04	4.52	0.24	**99.65**				
246										
247										
248	VM99-24.area C.1		0.32	7.35	0.93	**99.51**				
249	VM99-24.area C.2		0.34	7.77	1.10	**100.97**				
250	VM99-24.area C.3		0.20	7.22	1.10	**100.35**				
251										
252	VM99-61a.area A.1		0.04	5.79	0.41	**99.91**				
253	VM99-61a.area A.2		0.04	5.83	0.35	**100.02**				
254	VM99-61a.area A.3		0.07	5.74	0.37	**99.64**				
255	VM99-61a.area A.4		0.09	6.03	0.45	**99.70**				
256	VM99-61a.area A.5		0.07	5.25	0.31	**99.67**				
257	VM99-61a.area A.6		0.06	5.21	0.32	**99.41**				
258	VM99-61a.area A.7		0.03	5.96	0.41	**99.36**				
259	VM99-61a.area A.8		0.05	5.92	0.42	**99.22**				
260	VM99-61a.area A.9		0.04	5.69	0.43	**98.74**				
261										
262	VM99-61a.area C.1		0.07	5.19	0.31	**99.96**				
263	VM99-61a.area C.2		0.06	4.90	0.25	**99.82**				
264	VM99-61a.area C.3		0.07	5.61	0.32	**99.94**				
265	VM99-61a.area C.4		0.06	5.54	0.35	**100.11**				
266	VM99-61a.area C.5		0.08	6.38	1.22	**98.72**				
267	VM99-61a.area C.6		0.02	4.67	0.24	**99.95**				
268	VM99-61a.area C.7		0.02	4.78	0.27	**100.37**				
269	VM99-61a.area C.8		0.02	5.94	0.38	**99.89**				

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
203	VM99-52. Area E1.1	0.02	0.00	0.46	0.00	0.00	0.51	0.01	5.00	51.48	46.68
204	VM99-52. Area E1.2	0.02	0.00	0.37	0.00	0.00	0.55	0.04	4.97	56.98	38.81
205	VM99-52. Area E1.4	0.02	0.00	0.41	0.00	0.00	0.56	0.02	5.00	56.49	41.47
206	VM99-52. Area E1.5	0.01	0.00	0.35	0.01	0.00	0.61	0.03	5.00	60.93	35.27
207	VM99-52. Area E1.6	0.02	0.00	0.44	0.01	0.00	0.53	0.02	5.00	53.45	44.07
208	VM99-52. Area E1.7	0.02	0.00	0.38	0.00	0.00	0.58	0.03	5.00	58.62	37.82
209											
210	VM99-52. Area E2.1	0.02	0.00	0.41	0.00	0.00	0.55	0.02	5.00	56.35	41.40
211	VM99-52. Area E2.2	0.02	0.00	0.41	0.00	0.00	0.56	0.02	4.99	56.54	41.07
212	VM99-52. Area E2.3	0.02	0.00	0.37	0.01	0.00	0.59	0.03	5.01	59.03	37.07
213	VM99-52. Area E2.4	0.02	0.00	0.35	0.00	0.00	0.60	0.03	5.00	60.52	35.42
214											
215	VM99-52. Area E3.1	0.02	0.00	0.52	0.00	0.00	0.47	0.01	5.01	46.36	51.99
216	VM99-52. Area E3.2	0.02	0.00	0.47	0.00	0.00	0.51	0.02	5.00	51.04	47.22
217	VM99-52. Area E3.3	0.02	0.00	0.40	0.00	0.00	0.56	0.02	5.00	56.59	40.88
218	VM99-52. Area E3.4	0.02	0.00	0.38	0.00	0.00	0.56	0.03	4.99	57.46	38.95
219	VM99-52. Area E3.5	0.02	0.00	0.52	0.00	0.00	0.44	0.01	4.99	45.00	53.22
220	VM99-52. Area E3.6	0.02	0.00	0.39	0.00	0.00	0.56	0.03	4.99	57.44	39.74
221	VM99-52. Area E3.7	0.02	0.00	0.41	0.00	0.00	0.54	0.02	4.99	55.81	41.77
222	VM99-52. Area E3.8	0.02	0.00	0.42	0.00	0.00	0.56	0.02	5.00	56.07	41.65
223	VM99-52. Area E3.9	0.02	0.00	0.40	0.00	0.00	0.54	0.03	5.00	55.69	41.28
224											
225	VM99-52. Area F2.1	0.02	0.00	0.51	0.00	0.00	0.45	0.01	4.99	46.25	52.07
226	VM99-52. Area F2.2	0.02	0.00	0.39	0.00	0.00	0.56	0.02	5.00	57.37	40.13
227	VM99-52. Area F2.3	0.02	0.00	0.39	0.01	0.00	0.56	0.03	4.99	57.16	39.17
228	VM99-52. Area F2.4	0.02	0.00	0.41	0.00	0.00	0.56	0.02	5.00	56.26	41.43
229											
230	**Label**										
231	**Feldspar**										
232	VM99-24.area A.1										
233	VM99-24.area A.2										
234											
235	VM99-24.area A.11										
236	VM99-24.area A.12										
237	VM99-24.area A.13										
238											
239											
240	VM99-24.area B.1										
241	VM99-24.area B.2										
242	VM99-24.area B.3										
243	VM99-24.area B.4										
244	VM99-24.area B.5										
245	VM99-24.area B.6										
246											
247											
248	VM99-24.area C.1										
249	VM99-24.area C.2										
250	VM99-24.area C.3										
251											
252	VM99-61a.area A.1										
253	VM99-61a.area A.2										
254	VM99-61a.area A.3										
255	VM99-61a.area A.4										
256	VM99-61a.area A.5										
257	VM99-61a.area A.6										
258	VM99-61a.area A.7										
259	VM99-61a.area A.8										
260	VM99-61a.area A.9										
261											
262	VM99-61a.area C.1										
263	VM99-61a.area C.2										
264	VM99-61a.area C.3										
265	VM99-61a.area C.4										
266	VM99-61a.area C.5										
267	VM99-61a.area C.6										
268	VM99-61a.area C.7										
269	VM99-61a.area C.8										

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
203	VM99-52. Area E1.1	1.40	0.08	0.36
204	VM99-52. Area E1.2	3.72	0.16	0.33
205	VM99-52. Area E1.4	1.76	0.15	0.13
206	VM99-52. Area E1.5	3.11	0.10	0.59
207	VM99-52. Area E1.6	1.98	0.04	0.46
208	VM99-52. Area E1.7	3.22	0.14	0.19
209				
210	VM99-52. Area E2.1	1.85	0.12	0.27
211	VM99-52. Area E2.2	1.91	0.13	0.36
212	VM99-52. Area E2.3	3.30	0.15	0.46
213	VM99-52. Area E2.4	3.45	0.18	0.43
214				
215	VM99-52. Area E3.1	1.39	0.07	0.19
216	VM99-52. Area E3.2	1.59	0.03	0.12
217	VM99-52. Area E3.3	2.30	0.10	0.14
218	VM99-52. Area E3.4	3.28	0.13	0.18
219	VM99-52. Area E3.5	1.47	0.08	0.23
220	VM99-52. Area E3.6	2.66	0.15	0.00
221	VM99-52. Area E3.7	2.11	0.09	0.23
222	VM99-52. Area E3.8	1.77	0.05	0.44
223	VM99-52. Area E3.9	2.66	0.09	0.29
224				
225	VM99-52. Area F2.1	1.29	0.05	0.34
226	VM99-52. Area F2.2	2.05	0.08	0.38
227	VM99-52. Area F2.3	3.01	0.07	0.58
228	VM99-52. Area F2.4	1.86	0.08	0.37
229				
230	**Label**			
231	**Feldspar**			
232	VM99-24.area A.1			
233	VM99-24.area A.2			
234				
235	VM99-24.area A.11			
236	VM99-24.area A.12			
237	VM99-24.area A.13			
238				
239				
240	VM99-24.area B.1			
241	VM99-24.area B.2			
242	VM99-24.area B.3			
243	VM99-24.area B.4			
244	VM99-24.area B.5			
245	VM99-24.area B.6			
246				
247				
248	VM99-24.area C.1			
249	VM99-24.area C.2			
250	VM99-24.area C.3			
251				
252	VM99-61a.area A.1			
253	VM99-61a.area A.2			
254	VM99-61a.area A.3			
255	VM99-61a.area A.4			
256	VM99-61a.area A.5			
257	VM99-61a.area A.6			
258	VM99-61a.area A.7			
259	VM99-61a.area A.8			
260	VM99-61a.area A.9			
261				
262	VM99-61a.area C.1			
263	VM99-61a.area C.2			
264	VM99-61a.area C.3			
265	VM99-61a.area C.4			
266	VM99-61a.area C.5			
267	VM99-61a.area C.6			
268	VM99-61a.area C.7			
269	VM99-61a.area C.8			

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
270	VM99-61a.area C.9	rim of clean plag	55.59	27.76	0.59	0.04	9.92
271							
272	VM99-61a.area B.1	core of clean plag	55.43	28.03	0.58	0.07	10.20
273	VM99-61a.area B.2	mid of clean plag	53.90	27.45	0.61	0.08	9.99
274	VM99-61a.area B.3	rim of clean plag	57.48	26.94	0.49	0.04	8.92
275	VM99-61a.area B.4	mid of clean plag	56.91	27.35	0.49	0.04	9.11
276	VM99-61a.area B.5	core of clean plag	55.91	28.01	0.61	0.06	10.13
277	VM99-61a.area B.6	mid of clean plag	57.12	27.38	0.65	0.05	9.15
278	VM99-61a.area B.7	mid of clean plag	56.25	28.10	0.48	0.04	10.02
279	VM99-61a.area B.8	mid of clean plag	54.30	29.13	0.48	0.06	11.42
280							
281	VM99-30.area B.1	core of clean plag	54.95	27.97	0.71	0.09	10.33
282	VM99-30.area B.2	rim of clean plag	52.56	28.71	0.68	0.06	11.42
283	VM99-30.area B.3		55.00	28.61	0.62	0.08	10.73
284	VM99-30.area B.4	core of clean plag	53.68	28.65	0.86	0.25	11.13
285	VM99-30.area B.5	rim of clean plag	54.49	28.32	0.69	0.07	10.83
286							
287	VM99-30.area B.8	core of clean plag	55.77	27.41	0.82	0.10	9.91
288	VM99-30.area B.9	rim of clean plag	54.62	28.67	0.78	0.08	10.86
289							
290	VM99-30.area A.1	core of groundmass plag	55.77	27.80	0.74	0.07	10.05
291	VM99-30.area A.2	rim of groundmass plag	56.62	27.14	0.66	0.06	9.31
292	VM99-30.area A.3	rim of groundmass plag	56.66	27.33	0.66	0.08	9.61
293							
294	VM99-30.area A.7	core of groundmass plag	57.19	26.79	0.82	0.08	9.09
295	VM99-30.area A.8	rim of groundmass plag	55.31	28.10	0.81	0.10	10.39
296	VM99-30.area A.9	rim of groundmass plag	56.58	26.74	0.74	0.10	9.25
297	VM99-30.area A.10	interstitial plag	64.55	20.26	1.11	0.04	3.46
298	VM99-30.area A.11	core of groundmass plag	55.80	27.55	0.78	0.07	9.83
299	VM99-30.area A.12	mid of groundmass plag	55.91	27.56	0.75	0.08	9.84
300	VM99-30.area A.13	rim of groundmass plag	55.69	27.59	0.94	0.05	9.88
301							
302	VM99-30.area B2.1	core of plag welded on to pyx	54.75	28.07	0.75	0.06	10.55
303	VM99-30.area B2.2	rim of plag welded on to pyx	54.96	28.12	0.93	0.07	10.53
304	VM99-30.area B2.3		54.39	28.24	0.77	0.09	10.63
305	VM99-30.area B2.4	core of clean plag	54.46	27.58	0.87	0.09	10.16
306	VM99-30.area B2.5	mid of clean plag	54.33	28.71	0.83	0.07	10.91
307							
308	**Feldspar**	**12-Jan**					
309	Label	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
310	kano.1	standard	66.53	20.11	0.14	0.00	0.53
311	kano.2	standard	66.63	20.17	0.16	0.00	0.54
312	kano.3	standard	66.83	20.07	0.21	0.00	0.52
313							
314	labr.1	standard	51.09	30.87	0.47	0.14	13.51
315	labr.2	standard	51.41	30.97	0.42	0.16	13.45
316	labr.3	standard	51.35	31.00	0.46	0.16	13.53
317							
318	sani.1	standard	64.44	19.34	0.15	0.01	0.00
319	sani.2	standard	64.65	19.23	0.18	0.00	0.01
320	sani.3	standard	64.49	19.26	0.18	0.02	0.01
321							
322	VM99-25.area D.1	core of plagioclase welded on to gabbroic breakdowr	54.80	27.99	0.50	0.06	10.51
323	VM99-25.area D.2	rim of plagioclase welded on to gabbroic breakdown	54.54	28.16	0.61	0.05	10.71
324	VM99-25.area D.3	interstitial plagioclase in gabbroic breakdown	57.28	26.14	1.16	0.12	8.47
325	VM99-25.area D.4	interstitial plagioclase in gabbroic breakdown	56.39	27.31	0.74	0.04	9.23
326	VM99-25.area D.5	interstitial plagioclase in gabbroic breakdown	57.03	27.00	0.84	0.01	8.63
327	VM99-25.area D.6	interstitial plagioclase in gabbroic breakdown	57.58	26.61	0.53	0.02	8.52
328	VM99-25.area D.7	interstitial plagioclase in gabbroic breakdown	54.55	28.55	0.75	0.03	10.81
329	VM99-25.area D.8	core of plagioclase welded on to gabbroic breakdowr	55.19	27.83	0.54	0.05	10.04
330	VM99-25.area D.9	rim of plagioclase welded on to gabbroic breakdown	54.06	28.79	0.69	0.05	10.95
331							
332	VM99-61a. Area A1.1	core of plagioclase microphenocryst	57.21	27.23	0.73	0.04	9.37
333	VM99-61a. Area A1.2	rim of plagioclase microphenocryst	57.97	26.60	0.55	0.02	8.53
334	VM99-61a. Area A1.3	rim of plagioclase microphenocryst	57.50	26.54	0.56	0.02	8.73
335							
336	VM99-61a. Area A2.1	core of (osc?) clean plagioclase	55.73	28.27	0.54	0.04	10.27

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
270	VM99-61a.area C.9		0.03	5.47	0.33	**99.73**				
271										
272	VM99-61a.area B.1		0.02	5.26	0.28	**99.87**				
273	VM99-61a.area B.2		0.02	4.99	0.37	**97.40**				
274	VM99-61a.area B.3		0.07	6.03	0.45	**100.43**				
275	VM99-61a.area B.4		0.07	5.68	0.40	**100.05**				
276	VM99-61a.area B.5		0.04	5.51	0.32	**100.57**				
277	VM99-61a.area B.6		0.07	5.79	0.39	**100.61**				
278	VM99-61a.area B.7		0.02	5.44	0.32	**100.67**				
279	VM99-61a.area B.8		0.03	4.79	0.25	**100.44**				
280										
281	VM99-30.area B.1		0.03	5.09	0.31	**99.48**				
282	VM99-30.area B.2		0.03	4.49	0.24	**98.19**				
283	VM99-30.area B.3		0.03	4.95	0.30	**100.33**				
284	VM99-30.area B.4		0.03	4.52	0.29	**99.40**				
285	VM99-30.area B.5		0.06	5.00	0.30	**99.77**				
286										
287	VM99-30.area B.8		0.04	5.40	0.42	**99.87**				
288	VM99-30.area B.9		0.02	5.06	0.35	**100.45**				
289										
290	VM99-30.area A.1		0.01	5.24	0.38	**100.06**				
291	VM99-30.area A.2		0.03	5.64	0.40	**99.84**				
292	VM99-30.area A.3		0.02	5.37	0.41	**100.13**				
293										
294	VM99-30.area A.7		0.06	5.93	0.40	**100.36**				
295	VM99-30.area A.8		0.05	5.16	0.32	**100.23**				
296	VM99-30.area A.9		0.04	5.68	0.41	**99.55**				
297	VM99-30.area A.10		0.16	6.99	2.03	**98.59**				
298	VM99-30.area A.11		0.04	5.47	0.36	**99.89**				
299	VM99-30.area A.12		0.06	5.34	0.41	**99.94**				
300	VM99-30.area A.13		0.05	5.25	0.41	**99.86**				
301										
302	VM99-30.area B2.1		0.04	5.02	0.34	**99.59**				
303	VM99-30.area B2.2		0.03	5.22	0.34	**100.20**				
304	VM99-30.area B2.3		0.04	4.92	0.31	**99.40**				
305	VM99-30.area B2.4		0.03	4.87	0.36	**98.42**				
306	VM99-30.area B2.5		0.02	4.83	0.30	**100.01**				
307										
308	**Feldspar**									
309	Label	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
310	kano.1	0.13	0.05	9.46	2.38	**99.34**		2.96	1.05	0.00
311	kano.2	0.14	0.04	9.34	2.35	**99.37**		2.96	1.06	0.00
312	kano.3	0.20	0.02	9.28	2.36	**99.48**		2.96	1.05	0.00
313										
314	labr.1	0.08	0.02	3.58	0.09	**99.86**		2.33	1.66	0.00
315	labr.2	0.02	0.02	3.45	0.12	**100.03**		2.34	1.66	0.00
316	labr.3	0.00	0.00	3.51	0.14	**100.16**		2.33	1.66	0.00
317										
318	sani.1	0.16	1.09	2.67	11.94	**99.80**		2.96	1.05	0.00
319	sani.2	0.08	1.04	2.75	12.14	**100.09**		2.97	1.04	0.00
320	sani.3	0.09	1.01	2.73	11.95	**99.74**		2.97	1.04	0.00
321										
322	VM99-25.area D.1	0.11	0.03	5.32	0.31	**99.62**		2.49	1.50	0.00
323	VM99-25.area D.2	0.12	0.03	5.19	0.29	**99.70**		2.47	1.51	0.00
324	VM99-25.area D.3	0.16	0.03	6.15	0.53	**100.04**		2.58	1.39	0.00
325	VM99-25.area D.4	0.09	0.02	5.83	0.43	**100.09**		2.54	1.45	0.00
326	VM99-25.area D.5	0.09	0.05	6.15	0.50	**100.30**		2.56	1.43	0.00
327	VM99-25.area D.6	0.10	0.07	6.37	0.43	**100.24**		2.58	1.41	0.00
328	VM99-25.area D.7	0.13	0.04	4.97	0.41	**100.22**		2.46	1.52	0.00
329	VM99-25.area D.8	0.12	0.07	5.47	0.34	**99.65**		2.50	1.49	0.00
330	VM99-25.area D.9	0.08	0.02	5.05	0.31	**99.99**		2.45	1.54	0.00
331										
332	VM99-61a. Area A1.1	0.11	0.07	5.81	0.33	**100.89**		2.55	1.43	0.00
333	VM99-61a. Area A1.2	0.14	0.08	6.18	0.50	**100.56**		2.59	1.40	0.00
334	VM99-61a. Area A1.3	0.13	0.04	6.00	0.48	**99.99**		2.58	1.41	0.00
335										
336	VM99-61a. Area A2.1	0.12	0.03	5.41	0.28	**100.69**		2.50	1.49	0.00

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
270	VM99-61a.area C.9										
271											
272	VM99-61a.area B.1										
273	VM99-61a.area B.2										
274	VM99-61a.area B.3										
275	VM99-61a.area B.4										
276	VM99-61a.area B.5										
277	VM99-61a.area B.6										
278	VM99-61a.area B.7										
279	VM99-61a.area B.8										
280											
281	VM99-30.area B.1										
282	VM99-30.area B.2										
283	VM99-30.area B.3										
284	VM99-30.area B.4										
285	VM99-30.area B.5										
286											
287	VM99-30.area B.8										
288	VM99-30.area B.9										
289											
290	VM99-30.area A.1										
291	VM99-30.area A.2										
292	VM99-30.area A.3										
293											
294	VM99-30.area A.7										
295	VM99-30.area A.8										
296	VM99-30.area A.9										
297	VM99-30.area A.10										
298	VM99-30.area A.11										
299	VM99-30.area A.12										
300	VM99-30.area A.13										
301											
302	VM99-30.area B2.1										
303	VM99-30.area B2.2										
304	VM99-30.area B2.3										
305	VM99-30.area B2.4										
306	VM99-30.area B2.5										
307											
308	**Feldspar**										
309	Label	Fe3+	Mg	Ca	Sr	Ba	Na	K	Sum Cat#	Ab	An
310	kano.1	0.01	0.00	0.03	0.00	0.00	0.81	0.14	4.99	83.20	2.60
311	kano.2	0.01	0.00	0.03	0.00	0.00	0.80	0.13	4.98	83.13	2.64
312	kano.3	0.01	0.00	0.03	0.01	0.00	0.80	0.13	4.98	83.00	2.57
313											
314	labr.1	0.02	0.01	0.66	0.00	0.00	0.32	0.01	5.00	32.15	67.08
315	labr.2	0.02	0.01	0.66	0.00	0.00	0.30	0.01	4.99	31.45	67.72
316	labr.3	0.02	0.01	0.66	0.00	0.00	0.31	0.01	4.99	31.68	67.51
317											
318	sani.1	0.01	0.00	0.00	0.00	0.02	0.24	0.70	4.98	24.70	0.00
319	sani.2	0.01	0.00	0.00	0.00	0.02	0.24	0.71	4.99	25.02	0.05
320	sani.3	0.01	0.00	0.00	0.00	0.02	0.24	0.70	4.98	25.20	0.06
321											
322	VM99-25.area D.1	0.02	0.00	0.51	0.00	0.00	0.47	0.02	5.00	46.81	51.08
323	VM99-25.area D.2	0.02	0.00	0.52	0.00	0.00	0.46	0.02	5.00	45.77	52.15
324	VM99-25.area D.3	0.04	0.01	0.41	0.00	0.00	0.54	0.03	4.99	54.73	41.69
325	VM99-25.area D.4	0.03	0.00	0.45	0.00	0.00	0.51	0.03	4.99	51.81	45.36
326	VM99-25.area D.5	0.03	0.00	0.42	0.00	0.00	0.54	0.03	5.00	54.51	42.25
327	VM99-25.area D.6	0.02	0.00	0.41	0.00	0.00	0.55	0.03	5.00	55.84	41.28
328	VM99-25.area D.7	0.03	0.00	0.52	0.00	0.00	0.44	0.02	4.99	44.13	53.05
329	VM99-25.area D.8	0.02	0.00	0.49	0.00	0.00	0.48	0.02	5.00	48.41	49.17
330	VM99-25.area D.9	0.02	0.00	0.53	0.00	0.00	0.44	0.02	5.00	44.55	53.40
331											
332	VM99-61a. Area A1.1	0.02	0.00	0.45	0.00	0.00	0.50	0.02	4.98	51.64	46.02
333	VM99-61a. Area A1.2	0.02	0.00	0.41	0.00	0.00	0.54	0.03	4.99	54.81	41.77
334	VM99-61a. Area A1.3	0.02	0.00	0.42	0.00	0.00	0.52	0.03	4.98	53.63	43.14
335											
336	VM99-61a. Area A2.1	0.02	0.00	0.49	0.00	0.00	0.47	0.02	4.99	47.81	50.19

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
270	VM99-61a.area C.9			
271				
272	VM99-61a.area B.1			
273	VM99-61a.area B.2			
274	VM99-61a.area B.3			
275	VM99-61a.area B.4			
276	VM99-61a.area B.5			
277	VM99-61a.area B.6			
278	VM99-61a.area B.7			
279	VM99-61a.area B.8			
280				
281	VM99-30.area B.1			
282	VM99-30.area B.2			
283	VM99-30.area B.3			
284	VM99-30.area B.4			
285	VM99-30.area B.5			
286				
287	VM99-30.area B.8			
288	VM99-30.area B.9			
289				
290	VM99-30.area A.1			
291	VM99-30.area A.2			
292	VM99-30.area A.3			
293				
294	VM99-30.area A.7			
295	VM99-30.area A.8			
296	VM99-30.area A.9			
297	VM99-30.area A.10			
298	VM99-30.area A.11			
299	VM99-30.area A.12			
300	VM99-30.area A.13			
301				
302	VM99-30.area B2.1			
303	VM99-30.area B2.2			
304	VM99-30.area B2.3			
305	VM99-30.area B2.4			
306	VM99-30.area B2.5			
307				
308	**Feldspar**			
309	Label	**Or**	**Celsian**	**Sr-Feld**
310	kano.1	13.77	0.08	0.35
311	kano.2	13.78	0.07	0.39
312	kano.3	13.86	0.03	0.54
313				
314	labr.1	0.53	0.03	0.21
315	labr.2	0.72	0.04	0.06
316	labr.3	0.81	0.00	0.00
317				
318	sani.1	72.81	2.04	0.44
319	sani.2	72.79	1.92	0.22
320	sani.3	72.62	1.88	0.25
321				
322	VM99-25.area D.1	1.79	0.05	0.28
323	VM99-25.area D.2	1.71	0.06	0.32
324	VM99-25.area D.3	3.09	0.05	0.44
325	VM99-25.area D.4	2.54	0.04	0.25
326	VM99-25.area D.5	2.91	0.09	0.24
327	VM99-25.area D.6	2.48	0.12	0.27
328	VM99-25.area D.7	2.42	0.07	0.33
329	VM99-25.area D.8	1.99	0.12	0.32
330	VM99-25.area D.9	1.80	0.04	0.21
331				
332	VM99-61a. Area A1.1	1.92	0.13	0.29
333	VM99-61a. Area A1.2	2.92	0.14	0.37
334	VM99-61a. Area A1.3	2.81	0.07	0.34
335				
336	VM99-61a. Area A2.1	1.63	0.06	0.32

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
337	VM99-61a. Area A2.2	mid of (osc?) clean plagioclase	54.99	28.92	0.57	0.04	10.69
338	VM99-61a. Area A2.3	rim of (osc?) clean plagioclase	60.13	25.19	0.55	0.01	6.86
339	VM99-61a. Area A2.4	rim of (osc?) clean plagioclase	59.14	25.72	0.54	0.01	7.33
340							
341	VM99-61a. Area A4.1	core of plagioclase microphenocryst	56.92	27.19	0.70	0.04	9.32
342	VM99-61a. Area A4.2	rim of plagioclase microphenocryst	58.66	26.48	0.54	0.01	8.06
343	VM99-61a. Area A4.3	core of plagioclase microphenocryst	56.66	27.69	0.58	0.03	9.73
344	VM99-61a. Area A4.4	rim of plagioclase microphenocryst	59.46	25.85	0.56	0.01	7.51
345							
346	VM99-61a. Area B1.1	core of oscillatory zoned plagioclase	55.88	27.84	0.62	0.06	9.72
347	VM99-61a. Area B1.2	mid of oscillatory zoned plagioclase	56.58	27.09	0.64	0.09	8.94
348	VM99-61a. Area B1.3	rim of oscillatory zoned plagioclase	59.09	25.79	0.61	0.02	7.09
349	VM99-61a. Area B1.4	rim of oscillatory zoned plagioclase	57.84	27.16	0.56	0.02	8.27
350							
351	VM99-61a. Area C1.1	core of plagioclase at host/inclusion interface	54.66	28.44	0.48	0.05	10.21
352	VM99-61a. Area C1.2	mid of plagioclase at host/inclusion interface	55.77	27.67	0.56	0.04	9.61
353	VM99-61a. Area C1.3	rim of plagioclase at host/inclusion interface	56.74	27.16	0.64	0.03	9.45
354	VM99-61a. Area C1.4	rim of plagioclase at host/inclusion interface	56.57	27.24	0.57	0.03	9.49
355	VM99-61a. Area C1.5	plagioclase at host/inclusion interface	57.26	26.76	0.63	0.03	9.21
356							
357	VM99-61a. Area A4.5	core of clean plagioclase	58.09	26.54	0.54	0.03	8.55
358	VM99-61a. Area A4.6	mid of clean plagioclase	57.94	26.47	0.49	0.04	8.64
359	VM99-61a. Area A4.7	rim of clean plagioclase	58.72	26.16	0.52	0.03	7.99
360	VM99-61a. Area A4.8	rim of clean plagioclase	56.85	26.91	0.49	0.04	8.99
361							
362	VM99-61a. Area D1.1	core of host plagioclase	55.96	27.77	0.51	0.03	10.00
363	VM99-61a. Area D1.2	mid of host plagioclase	56.07	27.85	0.61	0.05	9.89
364	VM99-61a. Area D1.3	rim of host plagioclase	57.21	27.06	0.60	0.02	9.17
365	VM99-61a. Area D1.4	mid of host plagioclase	56.96	27.47	0.64	0.05	9.55
366	VM99-61a. Area D1.5	rim of host plagioclase	56.33	27.38	0.63	0.04	9.63
367							
368	VM99-61a. Area D2.1	core of host plagioclase	56.08	27.81	0.63	0.06	9.87
369	VM99-61a. Area D2.2	rim of host plagioclase	57.05	26.74	0.60	0.02	9.06
370	VM99-61a. Area D2.3	core of plagioclase microphenocryst	56.51	27.26	0.62	0.05	9.28
371	VM99-61a. Area D2.4	rim of plagioclase microphenocryst	57.87	26.31	0.53	0.01	8.30
372							
373	VM99-61a. Area D3.1	core of plagioclase microphenocryst	56.44	27.65	0.56	0.03	9.70
374	VM99-61a. Area D3.2	rim of plagioclase microphenocryst	56.81	27.05	0.65	0.05	9.39
375							
376	VM99-61a. Area D4.1	core of plagioclase microphenocryst	55.62	28.16	0.51	0.03	10.38
377	VM99-61a. Area D4.2	rim of plagioclase microphenocryst	56.74	27.38	0.56	0.04	9.47
378							
379	VM99-61a. Area D6.1	core of host plagioclase	56.71	27.60	0.58	0.03	9.72
380	VM99-61a. Area D6.2	mid of host plagioclase	56.53	27.59	0.55	0.04	9.89
381	VM99-61a. Area D6.3	rim of host plagioclase	57.13	27.39	0.56	0.03	9.21
382	VM99-61a. Area D6.4	rim of host plagioclase	57.09	27.50	0.59	0.05	9.49
383							
384	VM99-61a. Area E1.1	core of host plagioclase	54.88	28.21	0.56	0.06	10.83
385	VM99-61a. Area E1.2	mid of host plagioclase	53.61	29.24	0.48	0.04	11.71
386	VM99-61a. Area E1.3	rim of host plagioclase	56.60	27.08	0.56	0.03	9.30
387	VM99-61a. Area E1.4	rim of host plagioclase	56.98	27.04	0.67	0.03	9.31
388							
389	VM99-8. Area A1.1	plagioclase in "inverted gabbroic" type breakdown	57.11	27.20	0.87	0.05	9.12
390	VM99-8. Area A1.2	plagioclase in "inverted gabbroic" type breakdown	58.10	26.27	0.83	0.06	7.92
391	VM99-8. Area A1.3	core of plagioclase micropheno	54.84	28.18	0.61	0.06	10.30
392	VM99-8. Area A1.4	rim of plagioclase micropheno	54.51	29.06	0.59	0.05	11.05
393	VM99-8. Area A1.5	rim of plagioclase micropheno	55.15	28.50	0.69	0.03	10.73
394	VM99-8. Area A1.6	core of plagioclase micropheno	51.11	31.16	0.66	0.06	13.74
395	VM99-8. Area A1.7	rim of plagioclase micropheno	54.99	28.75	0.57	0.05	10.77
396							
397	VM99-8. Area A3.1	core of spongey plagioclase	49.66	31.90	0.55	0.04	14.58
398	VM99-8. Area A3.2	mid of spongey plagioclase	53.66	29.41	0.59	0.07	11.88
399	VM99-8. Area A3.3	rim of spongey plagioclase	55.34	28.73	0.68	0.04	10.60
400	VM99-8. Area A3.4	rim of spongey plagioclase	53.26	29.69	0.66	0.05	11.85
401	VM99-8. Area A3.5	core of plagioclase micropheno	54.48	29.03	0.60	0.05	11.17
402	VM99-8. Area A3.6	rim of plagioclase micropheno	57.44	26.33	0.64	0.04	8.41
403							

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
337	VM99-61a. Area A2.2	0.17	0.02	5.22	0.24	**100.88**		2.46	1.53	0.00
338	VM99-61a. Area A2.3	0.07	0.08	6.97	0.68	**100.53**		2.67	1.32	0.00
339	VM99-61a. Area A2.4	0.13	0.06	6.77	0.65	**100.35**		2.64	1.35	0.00
340										
341	VM99-61a. Area A4.1	0.19	0.07	5.81	0.37	**100.62**		2.55	1.43	0.00
342	VM99-61a. Area A4.2	0.12	0.05	6.50	0.55	**100.96**		2.61	1.39	0.00
343	VM99-61a. Area A4.3	0.13	0.04	5.49	0.31	**100.68**		2.53	1.46	0.00
344	VM99-61a. Area A4.4	0.11	0.03	6.66	0.61	**100.81**		2.64	1.35	0.00
345										
346	VM99-61a. Area B1.1	0.14	0.03	5.56	0.27	**100.13**		2.51	1.48	0.00
347	VM99-61a. Area B1.2	0.14	0.02	5.94	0.36	**99.80**		2.55	1.44	0.00
348	VM99-61a. Area B1.3	0.22	0.06	6.80	0.62	**100.30**		2.64	1.36	0.00
349	VM99-61a. Area B1.4	0.17	0.03	6.01	0.49	**100.56**		2.58	1.43	0.00
350										
351	VM99-61a. Area C1.1	0.10	0.02	5.11	0.26	**99.33**		2.48	1.52	0.00
352	VM99-61a. Area C1.2	0.13	0.06	5.54	0.33	**99.71**		2.52	1.47	0.00
353	VM99-61a. Area C1.3	0.17	0.03	5.68	0.43	**100.34**		2.55	1.44	0.00
354	VM99-61a. Area C1.4	0.16	0.08	5.57	0.39	**100.11**		2.54	1.44	0.00
355	VM99-61a. Area C1.5	0.15	0.04	5.53	0.68	**100.30**		2.57	1.42	0.00
356										
357	VM99-61a. Area A4.5	0.10	0.08	6.28	0.44	**100.65**		2.59	1.40	0.00
358	VM99-61a. Area A4.6	0.13	0.06	6.27	0.40	**100.44**		2.59	1.39	0.00
359	VM99-61a. Area A4.7	0.07	0.05	6.52	0.48	**100.53**		2.62	1.37	0.00
360	VM99-61a. Area A4.8	0.13	0.06	6.09	0.43	**100.00**		2.56	1.43	0.00
361										
362	VM99-61a. Area D1.1	0.15	0.04	5.44	0.28	**100.19**		2.52	1.47	0.00
363	VM99-61a. Area D1.2	0.13	0.02	5.43	0.30	**100.34**		2.52	1.47	0.00
364	VM99-61a. Area D1.3	0.11	0.10	5.80	0.46	**100.53**		2.56	1.43	0.00
365	VM99-61a. Area D1.4	0.14	0.02	5.83	0.32	**100.97**		2.54	1.44	0.00
366	VM99-61a. Area D1.5	0.19	0.05	5.68	0.35	**100.26**		2.53	1.45	0.00
367										
368	VM99-61a. Area D2.1	0.13	0.05	5.46	0.32	**100.40**		2.52	1.47	0.00
369	VM99-61a. Area D2.2	0.13	0.05	5.91	0.43	**99.99**		2.57	1.42	0.00
370	VM99-61a. Area D2.3	0.10	0.08	5.80	0.33	**100.03**		2.54	1.45	0.00
371	VM99-61a. Area D2.4	0.07	0.04	6.29	0.56	**99.99**		2.60	1.39	0.00
372										
373	VM99-61a. Area D3.1	0.13	0.04	5.56	0.36	**100.47**		2.53	1.46	0.00
374	VM99-61a. Area D3.2	0.12	0.08	5.81	0.40	**100.36**		2.55	1.43	0.00
375										
376	VM99-61a. Area D4.1	0.19	0.04	5.37	0.31	**100.62**		2.50	1.49	0.00
377	VM99-61a. Area D4.2	0.08	0.07	5.89	0.37	**100.61**		2.54	1.44	0.00
378										
379	VM99-61a. Area D6.1	0.19	0.04	5.64	0.33	**100.85**		2.53	1.45	0.00
380	VM99-61a. Area D6.2	0.11	0.02	5.68	0.30	**100.70**		2.53	1.45	0.00
381	VM99-61a. Area D6.3	0.13	0.05	5.88	0.44	**100.82**		2.55	1.44	0.00
382	VM99-61a. Area D6.4	0.09	0.03	5.81	0.36	**101.01**		2.54	1.44	0.00
383										
384	VM99-61a. Area E1.1	0.13	0.06	5.30	0.23	**100.27**		2.48	1.50	0.00
385	VM99-61a. Area E1.2	0.11	0.00	4.70	0.22	**100.10**		2.43	1.56	0.00
386	VM99-61a. Area E1.3	0.16	0.05	5.74	0.44	**99.96**		2.55	1.44	0.00
387	VM99-61a. Area E1.4	0.10	0.02	6.12	0.44	**100.71**		2.55	1.43	0.00
388										
389	VM99-8. Area A1.1	0.07	0.04	5.40	1.08	**100.95**		2.55	1.43	0.00
390	VM99-8. Area A1.2	0.12	0.11	5.92	1.25	**100.57**		2.60	1.39	0.00
391	VM99-8. Area A1.3	0.23	0.04	5.05	0.27	**99.57**		2.49	1.51	0.00
392	VM99-8. Area A1.4	0.16	0.04	4.82	0.24	**100.53**		2.45	1.54	0.00
393	VM99-8. Area A1.5	0.19	0.04	5.23	0.32	**100.89**		2.47	1.51	0.00
394	VM99-8. Area A1.6	0.07	0.02	3.43	0.15	**100.41**		2.32	1.67	0.00
395	VM99-8. Area A1.7	0.13	0.02	5.06	0.28	**100.63**		2.47	1.52	0.00
396										
397	VM99-8. Area A3.1	0.07	0.00	2.82	0.10	**99.74**		2.27	1.72	0.00
398	VM99-8. Area A3.2	0.09	0.04	4.54	0.18	**100.46**		2.42	1.56	0.00
399	VM99-8. Area A3.3	0.17	0.04	4.96	0.25	**100.81**		2.48	1.52	0.00
400	VM99-8. Area A3.4	0.09	0.01	4.23	0.22	**100.06**		2.41	1.58	0.00
401	VM99-8. Area A3.5	0.20	0.03	4.73	0.28	**100.57**		2.45	1.54	0.00
402	VM99-8. Area A3.6	0.19	0.03	6.03	0.51	**99.62**		2.59	1.40	0.00
403										

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
337	VM99-61a. Area A2.2	0.02	0.00	0.51	0.00	0.00	0.45	0.01	5.00	45.99	52.10
338	VM99-61a. Area A2.3	0.02	0.00	0.33	0.00	0.00	0.60	0.04	4.98	61.96	33.71
339	VM99-61a. Area A2.4	0.02	0.00	0.35	0.00	0.00	0.59	0.04	4.99	59.93	35.86
340											
341	VM99-61a. Area A4.1	0.02	0.00	0.45	0.01	0.00	0.50	0.02	4.99	51.53	45.66
342	VM99-61a. Area A4.2	0.02	0.00	0.38	0.00	0.00	0.56	0.03	4.99	57.19	39.21
343	VM99-61a. Area A4.3	0.02	0.00	0.47	0.00	0.00	0.48	0.02	4.98	49.38	48.34
344	VM99-61a. Area A4.4	0.02	0.00	0.36	0.00	0.00	0.57	0.04	4.98	59.19	36.89
345											
346	VM99-61a. Area B1.1	0.02	0.00	0.47	0.00	0.00	0.49	0.02	4.99	49.85	48.12
347	VM99-61a. Area B1.2	0.02	0.01	0.43	0.00	0.00	0.52	0.02	4.99	53.22	44.24
348	VM99-61a. Area B1.3	0.02	0.00	0.34	0.01	0.00	0.59	0.04	4.99	60.67	34.99
349	VM99-61a. Area B1.4	0.02	0.00	0.40	0.00	0.00	0.52	0.03	4.97	54.82	41.69
350											
351	VM99-61a. Area C1.1	0.02	0.00	0.50	0.00	0.00	0.45	0.02	4.98	46.65	51.50
352	VM99-61a. Area C1.2	0.02	0.00	0.47	0.00	0.00	0.49	0.02	4.99	49.86	47.75
353	VM99-61a. Area C1.3	0.02	0.00	0.45	0.00	0.00	0.50	0.02	4.98	50.55	46.44
354	VM99-61a. Area C1.4	0.02	0.00	0.46	0.00	0.00	0.49	0.02	4.98	50.03	47.09
355	VM99-61a. Area C1.5	0.02	0.00	0.44	0.00	0.00	0.48	0.04	4.97	49.71	45.80
356											
357	VM99-61a. Area A4.5	0.02	0.00	0.41	0.00	0.00	0.54	0.03	4.99	55.35	41.68
358	VM99-61a. Area A4.6	0.02	0.00	0.41	0.00	0.00	0.54	0.02	4.99	55.20	42.05
359	VM99-61a. Area A4.7	0.02	0.00	0.38	0.00	0.00	0.56	0.03	4.98	57.77	39.13
360	VM99-61a. Area A4.8	0.02	0.00	0.43	0.00	0.00	0.53	0.03	5.00	53.46	43.58
361											
362	VM99-61a. Area D1.1	0.02	0.00	0.48	0.00	0.00	0.47	0.02	4.98	48.54	49.35
363	VM99-61a. Area D1.2	0.02	0.00	0.48	0.00	0.00	0.47	0.02	4.98	48.77	49.07
364	VM99-61a. Area D1.3	0.02	0.00	0.44	0.00	0.00	0.50	0.03	4.98	51.69	45.15
365	VM99-61a. Area D1.4	0.02	0.00	0.46	0.00	0.00	0.50	0.02	4.99	51.28	46.45
366	VM99-61a. Area D1.5	0.02	0.00	0.46	0.01	0.00	0.50	0.02	4.99	50.30	47.09
367											
368	VM99-61a. Area D2.1	0.02	0.00	0.48	0.00	0.00	0.48	0.02	4.98	48.87	48.83
369	VM99-61a. Area D2.2	0.02	0.00	0.44	0.00	0.00	0.52	0.03	4.99	52.52	44.52
370	VM99-61a. Area D2.3	0.02	0.00	0.45	0.00	0.00	0.51	0.02	4.99	51.79	45.86
371	VM99-61a. Area D2.4	0.02	0.00	0.40	0.00	0.00	0.55	0.03	4.99	55.79	40.68
372											
373	VM99-61a. Area D3.1	0.02	0.00	0.47	0.00	0.00	0.48	0.02	4.98	49.64	47.85
374	VM99-61a. Area D3.2	0.02	0.00	0.45	0.00	0.00	0.51	0.02	4.99	51.37	45.86
375											
376	VM99-61a. Area D4.1	0.02	0.00	0.50	0.01	0.00	0.47	0.02	4.99	47.18	50.42
377	VM99-61a. Area D4.2	0.02	0.00	0.45	0.00	0.00	0.51	0.02	5.00	51.62	45.90
378											
379	VM99-61a. Area D6.1	0.02	0.00	0.47	0.01	0.00	0.49	0.02	4.99	49.96	47.56
380	VM99-61a. Area D6.2	0.02	0.00	0.47	0.00	0.00	0.49	0.02	4.99	49.89	48.05
381	VM99-61a. Area D6.3	0.02	0.00	0.44	0.00	0.00	0.51	0.03	4.99	52.00	45.00
382	VM99-61a. Area D6.4	0.02	0.00	0.45	0.00	0.00	0.50	0.02	4.99	51.29	46.32
383											
384	VM99-61a. Area E1.1	0.02	0.00	0.52	0.00	0.00	0.46	0.01	5.00	46.11	52.11
385	VM99-61a. Area E1.2	0.02	0.00	0.57	0.00	0.00	0.41	0.01	5.00	41.41	57.04
386	VM99-61a. Area E1.3	0.02	0.00	0.45	0.00	0.00	0.50	0.03	4.99	51.13	45.76
387	VM99-61a. Area E1.4	0.02	0.00	0.45	0.00	0.00	0.53	0.03	5.00	52.80	44.41
388											
389	VM99-8. Area A1.1	0.03	0.00	0.44	0.00	0.00	0.47	0.06	4.98	48.30	45.06
390	VM99-8. Area A1.2	0.03	0.00	0.38	0.00	0.00	0.51	0.07	4.99	52.96	39.16
391	VM99-8. Area A1.3	0.02	0.00	0.50	0.01	0.00	0.44	0.02	4.98	45.91	51.78
392	VM99-8. Area A1.4	0.02	0.00	0.53	0.00	0.00	0.42	0.01	4.99	43.27	54.79
393	VM99-8. Area A1.5	0.02	0.00	0.52	0.01	0.00	0.46	0.02	5.00	45.75	51.87
394	VM99-8. Area A1.6	0.02	0.00	0.67	0.00	0.00	0.30	0.01	4.99	30.74	68.13
395	VM99-8. Area A1.7	0.02	0.00	0.52	0.00	0.00	0.44	0.02	4.99	45.01	52.95
396											
397	VM99-8. Area A3.1	0.02	0.00	0.72	0.00	0.00	0.25	0.01	4.99	25.74	73.47
398	VM99-8. Area A3.2	0.02	0.01	0.57	0.00	0.00	0.40	0.01	4.99	40.30	58.33
399	VM99-8. Area A3.3	0.02	0.00	0.51	0.00	0.00	0.43	0.01	4.98	44.93	53.05
400	VM99-8. Area A3.4	0.02	0.00	0.57	0.00	0.00	0.37	0.01	4.98	38.66	59.78
401	VM99-8. Area A3.5	0.02	0.00	0.54	0.01	0.00	0.41	0.02	4.99	42.42	55.34
402	VM99-8. Area A3.6	0.02	0.00	0.41	0.01	0.00	0.53	0.03	4.98	54.43	41.97
403											

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
337	VM99-61a. Area A2.2	1.41	0.04	0.45
338	VM99-61a. Area A2.3	3.99	0.15	0.18
339	VM99-61a. Area A2.4	3.76	0.11	0.34
340				
341	VM99-61a. Area A4.1	2.18	0.12	0.51
342	VM99-61a. Area A4.2	3.21	0.09	0.31
343	VM99-61a. Area A4.3	1.86	0.07	0.36
344	VM99-61a. Area A4.4	3.58	0.06	0.28
345				
346	VM99-61a. Area B1.1	1.61	0.06	0.37
347	VM99-61a. Area B1.2	2.13	0.04	0.37
348	VM99-61a. Area B1.3	3.64	0.11	0.60
349	VM99-61a. Area B1.4	2.96	0.06	0.47
350				
351	VM99-61a. Area C1.1	1.55	0.04	0.27
352	VM99-61a. Area C1.2	1.93	0.12	0.35
353	VM99-61a. Area C1.3	2.50	0.06	0.45
354	VM99-61a. Area C1.4	2.31	0.14	0.44
355	VM99-61a. Area C1.5	4.00	0.08	0.41
356				
357	VM99-61a. Area A4.5	2.55	0.14	0.27
358	VM99-61a. Area A4.6	2.30	0.10	0.35
359	VM99-61a. Area A4.7	2.83	0.09	0.19
360	VM99-61a. Area A4.8	2.50	0.11	0.35
361				
362	VM99-61a. Area D1.1	1.63	0.08	0.41
363	VM99-61a. Area D1.2	1.78	0.04	0.35
364	VM99-61a. Area D1.3	2.68	0.18	0.30
365	VM99-61a. Area D1.4	1.87	0.03	0.38
366	VM99-61a. Area D1.5	2.04	0.08	0.49
367				
368	VM99-61a. Area D2.1	1.86	0.10	0.34
369	VM99-61a. Area D2.2	2.53	0.09	0.34
370	VM99-61a. Area D2.3	1.95	0.15	0.26
371	VM99-61a. Area D2.4	3.26	0.07	0.20
372				
373	VM99-61a. Area D3.1	2.09	0.07	0.35
374	VM99-61a. Area D3.2	2.31	0.14	0.32
375				
376	VM99-61a. Area D4.1	1.81	0.08	0.50
377	VM99-61a. Area D4.2	2.14	0.13	0.21
378				
379	VM99-61a. Area D6.1	1.92	0.06	0.50
380	VM99-61a. Area D6.2	1.74	0.03	0.29
381	VM99-61a. Area D6.3	2.55	0.10	0.35
382	VM99-61a. Area D6.4	2.10	0.05	0.25
383				
384	VM99-61a. Area E1.1	1.34	0.10	0.34
385	VM99-61a. Area E1.2	1.25	0.00	0.30
386	VM99-61a. Area E1.3	2.60	0.09	0.43
387	VM99-61a. Area E1.4	2.49	0.04	0.26
388				
389	VM99-8. Area A1.1	6.38	0.07	0.20
390	VM99-8. Area A1.2	7.37	0.20	0.31
391	VM99-8. Area A1.3	1.61	0.07	0.63
392	VM99-8. Area A1.4	1.44	0.07	0.43
393	VM99-8. Area A1.5	1.82	0.08	0.49
394	VM99-8. Area A1.6	0.91	0.04	0.19
395	VM99-8. Area A1.7	1.65	0.04	0.35
396				
397	VM99-8. Area A3.1	0.60	0.00	0.20
398	VM99-8. Area A3.2	1.06	0.07	0.25
399	VM99-8. Area A3.3	1.50	0.07	0.45
400	VM99-8. Area A3.4	1.31	0.01	0.24
401	VM99-8. Area A3.5	1.67	0.05	0.53
402	VM99-8. Area A3.6	3.02	0.06	0.52
403				

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
404	VM99-8. Area A4.1	core of spongey plagioclase	52.32	30.63	0.72	0.04	12.91
405	VM99-8. Area A4.2	mid of spongey plagioclase	52.90	30.26	0.52	0.07	12.12
406	VM99-8. Area A4.3	rim of spongey plagioclase	57.55	27.00	0.55	0.04	8.46
407	VM99-8. Area A4.4	rim of spongey plagioclase	55.00	28.41	0.62	0.02	10.12
408							
409	VM99-8. Area B1.1	core of plagioclase microphenocryst	51.41	30.39	0.62	0.06	12.57
410	VM99-8. Area B1.2	rim of plagioclase microphenocryst	53.49	29.50	0.72	0.03	11.31
411							
412	VM99-8. Area C1.1	core of oscillatory zoned plagioclase	54.25	28.85	0.50	0.05	11.02
413	VM99-8. Area C1.2	mid of oscillatory zoned plagioclase	53.25	29.72	0.52	0.05	11.92
414	VM99-8. Area C1.3	rim of oscillatory zoned plagioclase	53.97	29.20	0.61	0.06	11.59
415	VM99-8. Area C1.4	rim of oscillatory zoned plagioclase	53.85	29.51	0.60	0.06	12.23
416							
417	VM99-8. Area D1.1	plagioclase inclusion in black type amphibole	50.57	31.54	0.86	0.02	14.56
418	VM99-8. Area D1.2	plagioclase inclusion in black type amphibole	53.57	29.49	0.72	0.05	12.24
419							
420	VM99-8. Area D2.1	core of plagioclase microphenocryst	52.64	29.34	0.67	0.04	11.88
421	VM99-8. Area D2.2	rim of plagioclase microphenocryst	54.76	28.24	0.76	0.03	10.53
422							
423	VM99-8. Area E1.1	core of spongey plagioclase	52.47	30.36	0.51	0.05	12.67
424	VM99-8. Area E1.2	mid of spongey plagioclase	53.02	30.00	0.56	0.06	12.30
425	VM99-8. Area E1.3	rim of spongey plagioclase	52.25	30.18	0.54	0.07	12.68
426	VM99-8. Area E1.4	rim of spongey plagioclase	51.28	31.19	0.53	0.07	13.71
427	VM99-8. Area E1.5	overgrowth on spongey plagioclase	52.76	29.57	0.55	0.06	12.27
428							
429	VM99-8. Area E2.1	core of oscillatory zoned plagioclase	54.51	29.17	0.55	0.05	11.34
430	VM99-8. Area E2.2	mid of oscillatory zoned plagioclase	53.98	29.27	0.62	0.06	11.29
431	VM99-8. Area E2.3	rim of oscillatory zoned plagioclase	55.12	27.77	0.80	0.03	9.68
432	VM99-8. Area E2.4	overgrowth? On oscillatory zoned plagioclase	53.55	29.43	0.60	0.05	11.68
433	VM99-8. Area E2.5		55.92	27.73	0.72	0.11	9.80
434							
435	VM99-8. Area E6.1	plag microlite	53.62	29.47	0.70	0.05	11.66
436							
437	VM99-8. Area E8.1	plagioclase in "inverted gabbroic" amphibole breakdc	53.52	28.98	0.85	0.07	11.24
438	VM99-8. Area E8.2	plagioclase in "inverted gabbroic" amphibole breakdc	55.79	27.04	0.85	0.08	9.57
439	VM99-8. Area E8.3	plagioclase in "inverted gabbroic" amphibole breakdc	55.07	27.63	1.29	0.13	10.23
440							
441	**LOW TOTALS?**						
442	VM99-26. Area A1.1	plagioclase welded on to gabbroic amphibole breakd	54.07	27.31	0.87	0.08	10.23
443	VM99-26. Area A1.2	plagioclase in gabbroic amphibole breakdown	52.40	27.59	0.90	0.08	10.80
444	VM99-26. Area A1.3	plagioclase in gabbroic amphibole breakdown (close	51.93	29.58	1.02	0.07	12.06
445	VM99-26. Area A1.4	plagioclase in gabbroic amphibole breakdown	50.66	29.91	0.81	0.08	12.77
446	VM99-26. Area A1.5	plagioclase in gabbroic amphibole breakdown	52.71	28.61	0.93	0.09	11.08
447	VM99-26. Area A1.6	plagioclase in gabbroic amphibole breakdown (far frc	52.98	27.97	0.76	0.08	10.96
448	VM99-26. Area A1.7	core of amphibole welded on to amphibole breakdow	53.39	27.59	0.58	0.08	10.59
449							
450	VM99-26. Area A2.1	plagioclase in gabbroic amphibole breakdown (close	56.24	26.31	0.80	0.09	8.65
451	VM99-26. Area A2.2	plagioclase in gabbroic amphibole breakdown	52.12	28.41	0.87	0.07	11.04
452	VM99-26. Area A2.3	plagioclase in gabbroic amphibole breakdown	52.57	28.80	0.83	0.08	11.17
453	VM99-26. Area A2.4	plagioclase in gabbroic amphibole breakdown	54.06	27.67	0.67	0.07	9.80
454	VM99-26. Area A2.5	plagioclase in gabbroic amphibole breakdown (far frc	53.36	27.74	0.61	0.08	10.43
455							
456	VM99-26. Area A3.1	core of host oscillatory zoned plagioclase xl	52.80	27.86	0.54	0.07	10.51
457	VM99-26. Area A3.2	mid of host oscillatory zoned plagioclase xl	54.29	27.53	0.68	0.08	10.16
458	VM99-26. Area A3.3	rim of host oscillatory zoned plagioclase xl	55.09	26.86	0.69	0.08	9.36
459	VM99-26. Area A3.4	rim of host oscillatory zoned plagioclase xl	55.53	25.64	0.81	0.10	8.42
460							
461	VM99-26. Area B1.1	interstitial plagioclase along cleavage planes in ampl	49.10	28.87	0.56	0.07	11.96
462	VM99-26. Area B1.2	interstitial plagioclase along cleavage planes in ampl	48.79	29.36	0.59	0.09	12.32
463	VM99-26. Area B1.3	interstitial plagioclase along cleavage planes in ampl	49.42	28.96	0.52	0.12	11.94
464	VM99-26. Area B1.4	interstitial plagioclase along cleavage planes in ampl	49.71	28.22	0.75	0.12	11.51
465							
466	VM99-26. Area B2.1	interstitial plagioclase along cleavage planes in ampl	51.34	28.05	0.69	0.09	10.31
467	VM99-26. Area B2.2	interstitial plagioclase along cleavage planes in ampl	51.50	28.68	0.69	0.08	10.95
468							
469	VM99-26. Area D2.1	core of sponey plagioclase xl in host	53.92	28.11	0.63	0.09	10.32
470	VM99-26. Area D2.2	mid of spongey plagioclase xl in host	54.28	27.74	0.92	0.10	9.96

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
404	VM99-8. Area A4.1	0.18	0.00	3.83	0.18	**100.80**		2.36	1.63	0.00
405	VM99-8. Area A4.2	0.16	0.00	4.22	0.16	**100.40**		2.39	1.61	0.00
406	VM99-8. Area A4.3	0.22	0.03	6.02	0.42	**100.30**		2.58	1.42	0.00
407	VM99-8. Area A4.4	0.15	0.00	5.02	0.33	**99.65**		2.49	1.51	0.00
408										
409	VM99-8. Area B1.1	0.14	0.00	3.71	0.15	**99.05**		2.36	1.64	0.00
410	VM99-8. Area B1.2	0.11	0.01	4.54	0.25	**99.98**		2.42	1.57	0.00
411										
412	VM99-8. Area C1.1	0.12	0.05	4.90	0.18	**99.92**		2.45	1.54	0.00
413	VM99-8. Area C1.2	0.08	0.04	4.32	0.15	**100.05**		2.41	1.59	0.00
414	VM99-8. Area C1.3	0.19	0.00	4.78	0.25	**100.64**		2.43	1.55	0.00
415	VM99-8. Area C1.4	0.14	0.06	4.32	0.19	**100.96**		2.42	1.56	0.00
416										
417	VM99-8. Area D1.1	0.16	0.00	3.17	0.22	**101.10**		2.29	1.68	0.00
418	VM99-8. Area D1.2	0.11	0.05	4.36	0.37	**100.96**		2.41	1.56	0.00
419										
420	VM99-8. Area D2.1	0.05	0.03	4.47	0.29	**99.43**		2.40	1.58	0.00
421	VM99-8. Area D2.2	0.12	0.02	5.19	0.37	**100.02**		2.48	1.51	0.00
422										
423	VM99-8. Area E1.1	0.12	0.03	4.07	0.26	**100.55**		2.37	1.62	0.00
424	VM99-8. Area E1.2	0.14	0.00	4.34	0.26	**100.69**		2.39	1.59	0.00
425	VM99-8. Area E1.3	0.17	0.02	4.19	0.24	**100.35**		2.37	1.61	0.00
426	VM99-8. Area E1.4	0.19	0.00	3.61	0.16	**100.74**		2.32	1.66	0.00
427	VM99-8. Area E1.5	0.11	0.01	4.59	0.26	**100.17**		2.39	1.58	0.00
428										
429	VM99-8. Area E2.1	0.24	0.00	4.89	0.33	**101.08**		2.44	1.54	0.00
430	VM99-8. Area E2.2	0.13	0.01	4.71	0.20	**100.27**		2.44	1.56	0.00
431	VM99-8. Area E2.3	0.11	0.05	5.54	0.35	**99.47**		2.50	1.49	0.00
432	VM99-8. Area E2.4	0.11	0.00	4.65	0.24	**100.29**		2.42	1.57	0.00
433	VM99-8. Area E2.5	0.18	0.05	5.62	0.39	**100.53**		2.51	1.47	0.00
434										
435	VM99-8. Area E6.1	0.17	0.06	4.67	0.33	**100.73**		2.42	1.57	0.00
436										
437	VM99-8. Area E8.1	0.06	0.06	4.74	0.67	**100.20**		2.43	1.55	0.00
438	VM99-8. Area E8.2	0.09	0.07	5.38	0.96	**99.82**		2.53	1.44	0.00
439	VM99-8. Area E8.3	0.05	0.06	4.85	1.12	**100.43**		2.49	1.47	0.00
440										
441	**LOW TOTALS?**									
442	VM99-26. Area A1.1	0.10	0.00	4.74	0.30	**97.71**		2.50	1.49	0.00
443	VM99-26. Area A1.2	0.09	0.00	4.52	0.31	**96.70**		2.45	1.52	0.00
444	VM99-26. Area A1.3	0.11	0.02	4.28	0.29	**99.36**		2.38	1.60	0.00
445	VM99-26. Area A1.4	0.01	0.04	3.99	0.26	**98.53**		2.34	1.63	0.00
446	VM99-26. Area A1.5	0.05	0.04	4.93	0.30	**98.75**		2.42	1.55	0.00
447	VM99-26. Area A1.6	0.12	0.00	4.85	0.28	**97.99**		2.45	1.52	0.00
448	VM99-26. Area A1.7	0.13	0.01	4.96	0.33	**97.66**		2.47	1.51	0.00
449										
450	VM99-26. Area A2.1	0.16	0.01	5.98	0.49	**98.73**		2.56	1.41	0.00
451	VM99-26. Area A2.2	0.08	0.05	4.37	0.26	**97.27**		2.43	1.56	0.00
452	VM99-26. Area A2.3	0.16	0.00	4.26	0.25	**98.11**		2.43	1.57	0.00
453	VM99-26. Area A2.4	0.16	0.01	5.11	0.36	**97.90**		2.49	1.50	0.00
454	VM99-26. Area A2.5	0.16	0.04	4.90	0.27	**97.58**		2.47	1.51	0.00
455										
456	VM99-26. Area A3.1	0.17	0.04	5.03	0.28	**97.31**		2.46	1.53	0.00
457	VM99-26. Area A3.2	0.21	0.01	5.05	0.31	**98.31**		2.49	1.49	0.00
458	VM99-26. Area A3.3	0.08	0.01	5.22	0.38	**97.77**		2.53	1.46	0.00
459	VM99-26. Area A3.4	0.15	0.07	5.79	0.48	**97.00**		2.58	1.40	0.00
460										
461	VM99-26. Area B1.1	0.13	0.04	3.86	0.19	**94.78**		2.36	1.63	0.00
462	VM99-26. Area B1.2	0.05	0.00	3.65	0.20	**95.04**		2.34	1.66	0.00
463	VM99-26. Area B1.3	0.11	0.01	3.62	0.34	**95.04**		2.36	1.63	0.00
464	VM99-26. Area B1.4	0.11	0.00	4.00	0.21	**94.63**		2.39	1.60	0.00
465										
466	VM99-26. Area B2.1	0.12	0.03	4.58	0.27	**95.49**		2.43	1.57	0.00
467	VM99-26. Area B2.2	0.06	0.01	4.25	0.25	**96.47**		2.41	1.59	0.00
468										
469	VM99-26. Area D2.1	0.14	0.03	4.97	0.31	**98.50**		2.47	1.52	0.00
470	VM99-26. Area D2.2	0.08	0.03	4.92	0.31	**98.35**		2.49	1.50	0.00

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
404	VM99-8. Area A4.1	0.02	0.00	0.62	0.01	0.00	0.33	0.01	4.99	34.36	64.09
405	VM99-8. Area A4.2	0.02	0.01	0.59	0.00	0.00	0.37	0.01	4.99	38.15	60.47
406	VM99-8. Area A4.3	0.02	0.00	0.41	0.01	0.00	0.52	0.02	4.98	54.54	42.30
407	VM99-8. Area A4.4	0.02	0.00	0.49	0.00	0.00	0.44	0.02	4.98	46.19	51.40
408											
409	VM99-8. Area B1.1	0.02	0.00	0.62	0.00	0.00	0.33	0.01	4.98	34.37	64.34
410	VM99-8. Area B1.2	0.03	0.00	0.55	0.00	0.00	0.40	0.02	4.99	41.32	56.84
411											
412	VM99-8. Area C1.1	0.02	0.00	0.53	0.00	0.00	0.43	0.01	4.99	43.91	54.64
413	VM99-8. Area C1.2	0.02	0.00	0.58	0.00	0.00	0.38	0.01	4.98	39.12	59.68
414	VM99-8. Area C1.3	0.02	0.00	0.56	0.01	0.00	0.42	0.01	5.00	41.90	56.19
415	VM99-8. Area C1.4	0.02	0.00	0.59	0.00	0.00	0.38	0.01	4.98	38.38	60.02
416											
417	VM99-8. Area D1.1	0.03	0.00	0.71	0.00	0.00	0.28	0.01	5.00	27.79	70.53
418	VM99-8. Area D1.2	0.03	0.00	0.59	0.00	0.00	0.38	0.02	5.00	38.23	59.26
419											
420	VM99-8. Area D2.1	0.02	0.00	0.58	0.00	0.00	0.40	0.02	5.00	39.74	58.34
421	VM99-8. Area D2.2	0.03	0.00	0.51	0.00	0.00	0.46	0.02	5.00	45.95	51.55
422											
423	VM99-8. Area E1.1	0.02	0.00	0.61	0.00	0.00	0.36	0.02	5.00	36.08	62.03
424	VM99-8. Area E1.2	0.02	0.00	0.59	0.00	0.00	0.38	0.02	5.00	38.22	59.87
425	VM99-8. Area E1.3	0.02	0.01	0.62	0.00	0.00	0.37	0.01	5.01	36.74	61.41
426	VM99-8. Area E1.4	0.02	0.01	0.66	0.01	0.00	0.32	0.01	5.00	31.82	66.73
427	VM99-8. Area E1.5	0.02	0.00	0.60	0.00	0.00	0.40	0.02	5.02	39.67	58.59
428											
429	VM99-8. Area E2.1	0.02	0.00	0.55	0.01	0.00	0.43	0.02	5.00	42.71	54.78
430	VM99-8. Area E2.2	0.02	0.00	0.55	0.00	0.00	0.41	0.01	4.99	42.34	56.11
431	VM99-8. Area E2.3	0.03	0.00	0.47	0.00	0.00	0.49	0.02	5.00	49.62	47.90
432	VM99-8. Area E2.4	0.02	0.00	0.57	0.00	0.00	0.41	0.01	5.00	41.17	57.16
433	VM99-8. Area E2.5	0.02	0.01	0.47	0.01	0.00	0.49	0.02	5.00	49.49	47.67
434											
435	VM99-8. Area E6.1	0.02	0.00	0.56	0.00	0.00	0.41	0.02	5.00	40.98	56.57
436											
437	VM99-8. Area E8.1	0.03	0.01	0.55	0.00	0.00	0.42	0.04	5.01	41.50	54.39
438	VM99-8. Area E8.2	0.03	0.01	0.47	0.00	0.00	0.47	0.06	5.00	47.43	46.66
439	VM99-8. Area E8.3	0.04	0.01	0.50	0.00	0.00	0.43	0.07	5.00	43.05	50.17
440											
441	**LOW TOTALS?**										
442	VM99-26. Area A1.1	0.03	0.01	0.51	0.00	0.00	0.42	0.02	4.97	44.64	53.22
443	VM99-26. Area A1.2	0.03	0.01	0.54	0.00	0.00	0.41	0.02	4.99	42.16	55.65
444	VM99-26. Area A1.3	0.04	0.01	0.59	0.00	0.00	0.38	0.02	5.01	38.29	59.68
445	VM99-26. Area A1.4	0.03	0.01	0.63	0.00	0.00	0.36	0.02	5.01	35.54	62.84
446	VM99-26. Area A1.5	0.03	0.01	0.55	0.00	0.00	0.44	0.02	5.02	43.73	54.30
447	VM99-26. Area A1.6	0.03	0.01	0.54	0.00	0.00	0.44	0.02	5.00	43.57	54.42
448	VM99-26. Area A1.7	0.02	0.01	0.53	0.00	0.00	0.45	0.02	5.00	44.83	52.83
449											
450	VM99-26. Area A2.1	0.03	0.01	0.42	0.00	0.00	0.53	0.03	4.99	53.72	42.95
451	VM99-26. Area A2.2	0.03	0.01	0.55	0.00	0.00	0.39	0.02	4.98	40.92	57.14
452	VM99-26. Area A2.3	0.03	0.01	0.55	0.00	0.00	0.38	0.01	4.98	40.01	58.02
453	VM99-26. Area A2.4	0.02	0.01	0.48	0.00	0.00	0.46	0.02	4.99	47.27	50.07
454	VM99-26. Area A2.5	0.02	0.01	0.52	0.00	0.00	0.44	0.02	4.99	44.96	52.89
455											
456	VM99-26. Area A3.1	0.02	0.01	0.52	0.00	0.00	0.45	0.02	5.01	45.40	52.40
457	VM99-26. Area A3.2	0.02	0.01	0.50	0.01	0.00	0.45	0.02	4.98	46.20	51.36
458	VM99-26. Area A3.3	0.02	0.01	0.46	0.00	0.00	0.47	0.02	4.97	48.92	48.51
459	VM99-26. Area A3.4	0.03	0.01	0.42	0.00	0.00	0.52	0.03	4.99	53.53	43.02
460											
461	VM99-26. Area B1.1	0.02	0.01	0.62	0.00	0.00	0.36	0.01	5.00	36.26	62.14
462	VM99-26. Area B1.2	0.02	0.01	0.63	0.00	0.00	0.34	0.01	5.00	34.41	64.22
463	VM99-26. Area B1.3	0.02	0.01	0.61	0.00	0.00	0.34	0.02	4.99	34.58	62.95
464	VM99-26. Area B1.4	0.03	0.01	0.59	0.00	0.00	0.37	0.01	5.00	37.99	60.41
465											
466	VM99-26. Area B2.1	0.03	0.01	0.52	0.00	0.00	0.42	0.02	4.99	43.63	54.25
467	VM99-26. Area B2.2	0.02	0.01	0.55	0.00	0.00	0.39	0.02	4.98	40.55	57.69
468											
469	VM99-26. Area D2.1	0.02	0.01	0.51	0.00	0.00	0.44	0.02	4.99	45.48	52.25
470	VM99-26. Area D2.2	0.03	0.01	0.49	0.00	0.00	0.44	0.02	4.97	46.17	51.63

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
404	VM99-8. Area A4.1	1.08	0.00	0.48
405	VM99-8. Area A4.2	0.95	0.00	0.43
406	VM99-8. Area A4.3	2.49	0.06	0.60
407	VM99-8. Area A4.4	2.01	0.00	0.40
408				
409	VM99-8. Area B1.1	0.92	0.00	0.37
410	VM99-8. Area B1.2	1.52	0.02	0.30
411				
412	VM99-8. Area C1.1	1.05	0.09	0.32
413	VM99-8. Area C1.2	0.91	0.06	0.23
414	VM99-8. Area C1.3	1.42	0.01	0.49
415	VM99-8. Area C1.4	1.12	0.11	0.37
416				
417	VM99-8. Area D1.1	1.27	0.01	0.41
418	VM99-8. Area D1.2	2.13	0.09	0.29
419				
420	VM99-8. Area D2.1	1.71	0.06	0.15
421	VM99-8. Area D2.2	2.14	0.04	0.32
422				
423	VM99-8. Area E1.1	1.51	0.05	0.33
424	VM99-8. Area E1.2	1.53	0.01	0.37
425	VM99-8. Area E1.3	1.37	0.04	0.45
426	VM99-8. Area E1.4	0.95	0.00	0.50
427	VM99-8. Area E1.5	1.45	0.02	0.28
428				
429	VM99-8. Area E2.1	1.88	0.00	0.63
430	VM99-8. Area E2.2	1.18	0.02	0.36
431	VM99-8. Area E2.3	2.08	0.10	0.31
432	VM99-8. Area E2.4	1.38	0.00	0.30
433	VM99-8. Area E2.5	2.27	0.09	0.48
434				
435	VM99-8. Area E6.1	1.90	0.11	0.45
436				
437	VM99-8. Area E8.1	3.84	0.11	0.16
438	VM99-8. Area E8.2	5.55	0.13	0.23
439	VM99-8. Area E8.3	6.54	0.11	0.14
440				
441	**LOW TOTALS?**			
442	VM99-26. Area A1.1	1.87	0.00	0.27
443	VM99-26. Area A1.2	1.92	0.00	0.26
444	VM99-26. Area A1.3	1.70	0.04	0.30
445	VM99-26. Area A1.4	1.53	0.07	0.03
446	VM99-26. Area A1.5	1.75	0.06	0.15
447	VM99-26. Area A1.6	1.68	0.00	0.33
448	VM99-26. Area A1.7	1.97	0.02	0.35
449				
450	VM99-26. Area A2.1	2.89	0.02	0.42
451	VM99-26. Area A2.2	1.60	0.10	0.23
452	VM99-26. Area A2.3	1.52	0.00	0.44
453	VM99-26. Area A2.4	2.20	0.02	0.44
454	VM99-26. Area A2.5	1.65	0.07	0.44
455				
456	VM99-26. Area A3.1	1.67	0.08	0.45
457	VM99-26. Area A3.2	1.85	0.03	0.57
458	VM99-26. Area A3.3	2.32	0.02	0.23
459	VM99-26. Area A3.4	2.89	0.13	0.43
460				
461	VM99-26. Area B1.1	1.18	0.07	0.36
462	VM99-26. Area B1.2	1.23	0.00	0.14
463	VM99-26. Area B1.3	2.13	0.02	0.31
464	VM99-26. Area B1.4	1.29	0.00	0.31
465				
466	VM99-26. Area B2.1	1.70	0.07	0.35
467	VM99-26. Area B2.2	1.57	0.01	0.18
468				
469	VM99-26. Area D2.1	1.85	0.05	0.38
470	VM99-26. Area D2.2	1.93	0.06	0.23

	A	B	C	D	E	F	G
3	**Label**	**Analyses Type**	**SiO2**	**Al2O3**	**Fe2O3**	**MgO**	**CaO**
471	VM99-26. Area D2.3	rim of spongey plagioclase xl in host	53.72	28.15	0.75	0.07	9.70
472	VM99-26. Area D2.4	rim of spongey plagioclase xl in host	59.37	23.35	1.60	0.18	6.31
473							
474	VM99-26. Area D3.1		54.96	27.90	0.32	0.03	9.53
475	VM99-26. Area D3.2		53.34	28.40	0.35	0.05	10.51
476	VM99-26. Area D3.3		54.25	27.60	0.61	0.08	10.01
477	VM99-26. Area D3.4		54.83	27.67	0.32	0.03	9.73
478							
479							
480	VM99-52. Area E1.3		54.07	24.15	0.82	0.40	7.85
481	VM99-16.Area A1.5		63.14	20.72	1.32	0.12	3.69
482	VM99-16.Area B3.5		62.49	22.90	0.71	0.02	4.33
483	VM99-16.Area B3.6		59.72	23.95	1.26	0.08	7.30
484							
485	VM99-16.Area A1.7	spongey zone on plag	57.63	17.27	5.67	0.95	5.16
486	VM99-24.Area E1.1	groundmass plag	51.84	27.95	1.20	0.17	11.37
487	VM99-16.Area B1.7	core of clean plag	51.02	29.31	0.96	0.05	12.23
488	VM99-16.Area B3.4	rim of spongey plag	58.30	25.63	0.28	0.01	7.39
489	VM99-24.area A.14		53.26	28.53	0.66	0.05	10.81
490	VM99-30.area B.6	rim of clean plag	54.48	27.54	0.65	0.07	9.97
491	VM99-30.area B.7	mid of clean plag	54.25	27.75	0.69	0.08	10.42
492	VM99-24.area B.7	rim of clean plag	53.74	28.11	0.66	0.06	10.69
493	VM99-30.area A.4	core of groundmass plag	54.34	27.44	0.66	0.06	10.25
494	VM99-30.area A.5		54.89	27.29	0.74	0.05	9.89
495	VM99-30.area A.6	interstitial plag	65.14	17.83	4.49	0.11	3.26

	A	H	I	J	K	L	M	N	O	P
3	**Label**	**SrO**	**BaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Al/Al IV**	**Al VI**
471	VM99-26. Area D2.3	0.22	0.01	4.62	0.31	**97.56**		2.48	1.53	0.00
472	VM99-26. Area D2.4	0.09	0.07	6.10	1.04	**98.12**		2.71	1.25	0.00
473										
474	VM99-26. Area D3.1	0.09	0.05	5.39	0.28	**98.55**		2.51	1.50	0.00
475	VM99-26. Area D3.2	0.15	0.04	4.93	0.26	**98.03**		2.46	1.54	0.00
476	VM99-26. Area D3.3	0.11	0.04	5.20	0.33	**98.24**		2.49	1.49	0.00
477	VM99-26. Area D3.4	0.10	0.05	5.53	0.33	**98.60**		2.51	1.49	0.00
478										
479										
480	VM99-52. Area E1.3	0.22	0.02	5.83	0.36	**93.72**		2.59	1.37	0.00
481	VM99-16.Area A1.5	0.10	0.12	7.41	2.46	**99.08**		2.85	1.10	0.00
482	VM99-16.Area B3.5	0.03	0.11	7.58	1.70	**99.88**		2.79	1.20	0.00
483	VM99-16.Area B3.6	0.02	0.03	5.73	1.08	**99.20**		2.69	1.27	0.00
484										
485	VM99-16.Area A1.7	0.04	0.04	4.51	3.21	**94.48**		2.78	0.98	0.00
486	VM99-24.Area E1.1	0.07	0.03	4.54	0.25	**97.40**		2.42	1.54	0.00
487	VM99-16.Area B1.7	0.07	0.00	3.96	0.30	**97.91**		2.37	1.61	0.00
488	VM99-16.Area B3.4	0.04	0.05	6.56	0.70	**98.95**		2.64	1.37	0.00
489	VM99-24.area A.14		0.06	5.03	0.29	**98.68**				
490	VM99-30.area B.6		0.04	5.26	0.42	**98.43**				
491	VM99-30.area B.7		0.06	5.07	0.33	**98.65**				
492	VM99-24.area B.7		0.04	4.76	0.32	**98.38**				
493	VM99-30.area A.4		0.01	5.06	0.35	**98.17**				
494	VM99-30.area A.5		0.07	5.00	0.34	**98.26**				
495	VM99-30.area A.6		0.17	5.96	1.93	**98.88**				

	A	Q	R	S	T	U	V	W	X	Y	Z
3	**Label**	**Fe3+**	**Mg**	**Ca**	**Sr**	**Ba**	**Na**	**K**	**Sum Cat#**	**Ab**	**An**
471	VM99-26. Area D2.3	0.03	0.01	0.48	0.01	0.00	0.41	0.02	4.96	45.05	52.30
472	VM99-26. Area D2.4	0.06	0.01	0.31	0.00	0.00	0.54	0.06	4.94	59.14	33.81
473											
474	VM99-26. Area D3.1	0.01	0.00	0.47	0.00	0.00	0.48	0.02	4.98	49.52	48.42
475	VM99-26. Area D3.2	0.01	0.00	0.52	0.00	0.00	0.44	0.02	4.99	44.94	53.01
476	VM99-26. Area D3.3	0.02	0.01	0.49	0.00	0.00	0.46	0.02	4.99	47.33	50.31
477	VM99-26. Area D3.4	0.01	0.00	0.48	0.00	0.00	0.49	0.02	5.00	49.53	48.14
478											
479											
480	VM99-52. Area E1.3	0.03	0.03	0.40	0.01	0.00	0.54	0.02	4.99	55.66	41.41
481	VM99-16.Area A1.5	0.05	0.01	0.18	0.00	0.00	0.65	0.14	4.97	66.63	18.35
482	VM99-16.Area B3.5	0.02	0.00	0.21	0.00	0.00	0.66	0.10	4.98	68.17	21.51
483	VM99-16.Area B3.6	0.04	0.01	0.35	0.00	0.00	0.50	0.06	4.93	54.64	38.46
484											
485	VM99-16.Area A1.7	0.21	0.07	0.27	0.00	0.00	0.42	0.20	4.93	47.51	30.03
486	VM99-24.Area E1.1	0.04	0.01	0.57	0.00	0.00	0.41	0.02	5.01	41.20	57.09
487	VM99-16.Area B1.7	0.03	0.00	0.61	0.00	0.00	0.36	0.02	5.00	36.21	61.77
488	VM99-16.Area B3.4	0.01	0.00	0.36	0.00	0.00	0.57	0.04	4.99	58.94	36.70
489	VM99-24.area A.14										
490	VM99-30.area B.6										
491	VM99-30.area B.7										
492	VM99-24.area B.7										
493	VM99-30.area A.4										
494	VM99-30.area A.5										
495	VM99-30.area A.6										

	A	AA	AB	AC
3	**Label**	**Or**	**Celsian**	**Sr-Feld**
471	VM99-26. Area D2.3	1.98	0.02	0.64
472	VM99-26. Area D2.4	6.65	0.14	0.25
473				
474	VM99-26. Area D3.1	1.72	0.09	0.24
475	VM99-26. Area D3.2	1.58	0.07	0.40
476	VM99-26. Area D3.3	1.98	0.08	0.31
477	VM99-26. Area D3.4	1.97	0.10	0.27
478				
479				
480	VM99-52. Area E1.3	2.25	0.04	0.63
481	VM99-16.Area A1.5	14.55	0.22	0.26
482	VM99-16.Area B3.5	10.03	0.20	0.09
483	VM99-16.Area B3.6	6.78	0.06	0.06
484				
485	VM99-16.Area A1.7	22.24	0.09	0.14
486	VM99-24.Area E1.1	1.47	0.05	0.20
487	VM99-16.Area B1.7	1.82	0.00	0.20
488	VM99-16.Area B3.4	4.17	0.09	0.11
489	VM99-24.area A.14			
490	VM99-30.area B.6			
491	VM99-30.area B.7			
492	VM99-24.area B.7			
493	VM99-30.area A.4			
494	VM99-30.area A.5			
495	VM99-30.area A.6			

	A	B	C	D	E	F	G	H
1	**Appendix F**							
2	**Pyroxene**	**14-Nov**						
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
4	kaug.1_1	standard	50.20	0.78	8.63	0.15	1.30	5.01
5	kaug.1_2	standard	50.15	0.75	8.67	0.17	1.34	5.08
6	kaug.1_3	standard	50.22	0.76	8.68	0.16	1.38	5.06
7								
8	VM99-24.Area A.1	core of clean opx	54.48	0.27	1.20	0.00	2.04	14.39
9	VM99-24.Area A.2	mid of clean opx	53.74	0.24	2.05	0.12	2.79	13.82
10	VM99-24.Area A.3	rim of clean opx	53.84	0.35	1.57	0.00	2.90	13.55
11	VM99-24.Area A.4	rim of clean opx	54.29	0.31	1.25	0.00	0.00	4.33
12								
13	VM99-24.Area A2.1	core of clean opx	54.58	0.24	0.85	0.10	3.02	13.02
14	VM99-24.Area A2.2	mid of clean opx	54.05	0.30	1.67	0.11	2.87	13.52
15	VM99-24.Area A2.3	rim of clean opx	54.54	0.30	0.91	0.02	2.40	14.00
16	VM99-24.Area A2.4	rim of clean opx	53.74	0.41	1.87	0.00	3.44	12.66
17								
18	VM99-24.Area A4.1	core of clean opx	54.08	0.29	1.15	0.00	3.33	13.22
19	VM99-24.Area A4.2	mid of clean opx	54.37	0.25	1.21	0.01	2.53	13.14
20	VM99-24.Area A4.3	rim of clean opx	54.44	0.26	1.04	0.00	3.08	13.27
21	VM99-24.Area A4.4	mid of clean opx	55.00	0.21	0.83	0.00	1.57	14.07
22	VM99-24.Area A4.5	rim of clean opx	54.24	0.35	1.95	0.00	2.38	13.28
23								
24	VM99-24.Area D2.1	core of clean cpx	52.44	0.50	1.86	0.04	4.23	4.84
25	VM99-24.Area D2.2	mid of clean cpx	52.49	0.53	2.03	0.03	3.86	5.14
26	VM99-24.Area D2.3	rim of clean cpx	49.82	0.95	3.48	0.00	3.39	5.86
27	VM99-24.Area D2.4	mid of clean cpx	50.90	0.68	2.87	0.04	3.24	6.41
28	VM99-24.Area D2.5	rim of clean cpx	50.90	0.83	3.36	0.03	4.44	4.64
29	VM99-24.Area D2.6	core of clean opx	53.59	0.34	1.77	0.04	2.72	14.25
30	VM99-24.Area D2.7	mid of clean opx	53.30	0.34	1.81	0.00	2.96	14.11
31	VM99-24.Area D2.8	rim of clean opx	55.03	0.26	0.93	0.01	1.83	14.16
32	VM99-24.Area D2.9		53.95	0.34	1.91	0.03	2.78	13.14
33								
34	VM99-24.Area E1.1	groundmass opx	53.22	0.34	1.36	0.00	3.76	13.28
35	VM99-24.Area E1.2	groundmass opx	53.71	0.27	1.05	0.04	2.88	13.84
36								
37	VM99-24.Area E2.1	opx micropheno	53.29	0.21	1.25	0.00	0.88	14.68
38								
39	VM99-24.Area EF.1	core of opx micropheno	53.57	0.26	0.80	0.01	2.83	14.22
40	VM99-24.Area EF.2	rim of opx micropheno	54.61	0.24	0.95	0.00	1.50	14.45
41	VM99-24.Area EF.3	rim of opx micropheno	53.99	0.29	1.31	0.02	2.72	13.57
42	VM99-24.Area EF.4	opx micropheno	53.85	0.28	1.24	0.00	3.16	13.36
43	VM99-24.Area EF.5	opx micropheno	53.67	0.29	1.29	0.00	2.92	13.58
44								
45	VM99-24.Area D1.1	cpx in amph breakdown halo	52.80	0.59	1.89	0.00	2.61	6.50
46	VM99-24.Area D1.2	cpx in amph breakdown halo	52.09	0.66	2.41	0.00	3.57	5.58
47	VM99-24.Area D1.3	cpx in amph breakdown halo	51.80	0.69	2.61	0.01	3.82	6.02
48	VM99-24.Area D1.4	cpx in amph breakdown halo	51.98	0.58	2.51	0.00	3.62	6.33
49								
50	VM99-24.Area A4.6	cpx in amph breakdown	50.58	0.92	3.75	0.00	4.20	5.34
51	VM99-24.Area A4.7	cpx in amph breakdown	48.32	0.83	3.30	0.00	3.35	5.12
52	VM99-24.Area A4.8	cpx in amph breakdown	50.71	0.81	2.97	0.02	4.19	4.71
53	VM99-24.Area A4.9	cpx in amph breakdown	51.38	0.73	2.81	0.00	4.05	5.43
54	VM99-24.Area A4.10	cpx in amph breakdown	51.18	0.69	2.78	0.00	3.91	5.20
55	VM99-24.Area A4.11	opx in amph breakdown	53.48	0.34	1.28	0.03	1.74	17.12
56								
57	VM99-24.Area B1.1	core of large cpx in glom	50.74	0.70	3.26	0.21	4.24	4.86
58	VM99-24.Area B1.2	mid of large cpx in glom (opx includec	53.25	0.31	1.47	0.00	3.00	14.14
59	VM99-24.Area B1.3	rim of large cpx in glom	50.53	0.90	3.48	0.01	4.22	5.39
60	VM99-24.Area B1.4	mid of large cpx in glom	50.18	0.86	3.30	0.00	4.44	5.03
61	VM99-24.Area B1.5	rim of large cpx in glom	50.14	0.82	2.97	0.02	5.33	3.71
62	VM99-24.Area B1.6	core of opx in glom	53.27	0.36	2.13	0.01	2.00	14.15
63	VM99-24.Area B1.7	mid of opx in glom	53.91	0.27	1.70	0.01	2.98	12.18
64	VM99-24.Area B1.8	rim of opx in glom	53.60	0.27	1.16	0.01	1.40	14.66
65	VM99-24.Area B1.9	rim of opx in glom	53.46	0.33	1.96	0.01	3.12	13.18
66								
67	VM99-24.Area F2.1	core of large cpx	51.12	0.61	3.00	0.18	4.26	3.92
68	VM99-24.Area F2.2	mid of large cpx	51.69	0.67	2.44	0.13	3.77	4.33

	A	I	J	K	L	M	N	O	P	Q	R
1	**Appendix F**										
2	**Pyroxene**										
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
4	kaug.1_1	0.14	16.58	15.74	1.26	0.01	**99.80**		1.82	0.02	0.18
5	kaug.1_2	0.13	16.57	15.68	1.25	0.00	**99.81**		1.82	0.02	0.18
6	kaug.1_3	0.14	16.56	15.71	1.27	0.01	**99.94**		1.82	0.02	0.18
7											
8	VM99-24.Area A.1	0.38	27.28	1.44	0.03	0.00	**101.51**		1.94	0.01	0.05
9	VM99-24.Area A.2	0.50	27.12	1.33	0.02	0.00	**101.73**		1.91	0.01	0.09
10	VM99-24.Area A.3	0.38	27.40	1.43	0.01	0.01	**101.45**		1.92	0.01	0.07
11	VM99-24.Area A.4	0.01	25.74	1.41	0.02	0.01	**87.37**		2.11	0.01	0.00
12											
13	VM99-24.Area A2.1	0.37	27.98	1.57	0.04	0.01	**101.77**		1.94	0.01	0.04
14	VM99-24.Area A2.2	0.33	27.49	1.51	0.02	0.00	**101.87**		1.92	0.01	0.07
15	VM99-24.Area A2.3	0.40	27.58	1.45	0.01	0.00	**101.61**		1.94	0.01	0.04
16	VM99-24.Area A2.4	0.34	27.76	1.54	0.03	0.00	**101.80**		1.91	0.01	0.08
17											
18	VM99-24.Area A4.1	0.37	27.47	1.68	0.04	0.01	**101.65**		1.93	0.01	0.05
19	VM99-24.Area A4.2	0.38	27.80	1.56	0.03	0.01	**101.28**		1.94	0.01	0.05
20	VM99-24.Area A4.3	0.41	27.88	1.45	0.02	0.01	**101.85**		1.93	0.01	0.04
21	VM99-24.Area A4.4	0.32	27.86	1.40	0.02	0.00	**101.29**		1.96	0.01	0.04
22	VM99-24.Area A4.5	0.32	27.68	1.55	0.05	0.00	**101.82**		1.92	0.01	0.08
23											
24	VM99-24.Area D2.1	0.29	15.95	21.55	0.42	0.01	**102.13**		1.90	0.01	0.08
25	VM99-24.Area D2.2	0.23	16.75	20.67	0.33	0.00	**102.06**		1.90	0.02	0.09
26	VM99-24.Area D2.3	0.22	15.20	19.84	0.39	0.01	**99.16**		1.86	0.03	0.14
27	VM99-24.Area D2.4	0.28	15.29	19.89	0.42	0.03	**100.05**		1.89	0.02	0.11
28	VM99-24.Area D2.5	0.19	15.49	21.15	0.45	0.00	**101.48**		1.86	0.02	0.14
29	VM99-24.Area D2.6	0.34	26.83	1.36	0.05	0.00	**101.29**		1.92	0.01	0.08
30	VM99-24.Area D2.7	0.37	26.67	1.45	0.04	0.00	**101.05**		1.91	0.01	0.08
31	VM99-24.Area D2.8	0.33	27.80	1.47	0.03	0.00	**101.86**		1.95	0.01	0.04
32	VM99-24.Area D2.9	0.33	27.62	1.48	0.04	0.01	**101.64**		1.92	0.01	0.08
33											
34	VM99-24.Area E1.1	0.41	27.09	1.40	0.03	0.01	**100.90**		1.91	0.01	0.06
35	VM99-24.Area E1.2	0.39	26.98	1.51	0.05	0.00	**100.72**		1.93	0.01	0.05
36											
37	VM99-24.Area E2.1	0.35	26.28	1.42	0.05	0.00	**98.42**		1.96	0.01	0.04
38											
39	VM99-24.Area EF.1	0.39	26.77	1.48	0.01	0.01	**100.34**		1.94	0.01	0.03
40	VM99-24.Area EF.2	0.41	27.34	1.47	0.01	0.00	**100.98**		1.95	0.01	0.04
41	VM99-24.Area EF.3	0.37	27.31	1.51	0.05	0.01	**101.15**		1.93	0.01	0.06
42	VM99-24.Area EF.4	0.40	27.37	1.55	0.02	0.00	**101.25**		1.92	0.01	0.05
43	VM99-24.Area EF.5	0.34	27.07	1.60	0.04	0.01	**100.80**		1.93	0.01	0.06
44											
45	VM99-24.Area D1.1	0.26	16.33	20.46	0.34	0.00	**101.78**		1.92	0.02	0.08
46	VM99-24.Area D1.2	0.24	15.87	21.02	0.40	0.00	**101.85**		1.90	0.02	0.10
47	VM99-24.Area D1.3	0.25	15.97	20.21	0.41	0.00	**101.79**		1.89	0.02	0.11
48	VM99-24.Area D1.4	0.28	15.89	19.82	0.50	0.01	**101.54**		1.90	0.02	0.10
49											
50	VM99-24.Area A4.6	0.23	15.06	21.00	0.43	0.00	**101.51**		1.85	0.03	0.15
51	VM99-24.Area A4.7	0.18	14.31	20.26	0.38	0.00	**96.05**		1.87	0.02	0.13
52	VM99-24.Area A4.8	0.22	15.33	21.25	0.40	0.02	**100.62**		1.87	0.02	0.13
53	VM99-24.Area A4.9	0.24	15.45	20.87	0.47	0.00	**101.43**		1.88	0.02	0.12
54	VM99-24.Area A4.10	0.18	16.04	20.38	0.38	0.00	**100.74**		1.88	0.02	0.12
55	VM99-24.Area A4.11	0.48	24.85	1.42	0.09	0.03	**100.87**		1.94	0.01	0.06
56											
57	VM99-24.Area B1.1	0.16	15.25	21.03	0.46	0.00	**100.93**		1.87	0.02	0.14
58	VM99-24.Area B1.2	0.39	26.61	1.49	0.01	0.00	**100.69**		1.92	0.01	0.06
59	VM99-24.Area B1.3	0.26	15.15	20.61	0.47	0.00	**101.03**		1.86	0.03	0.14
60	VM99-24.Area B1.4	0.23	15.16	20.68	0.43	0.00	**100.31**		1.86	0.02	0.14
61	VM99-24.Area B1.5	0.18	15.68	21.13	0.38	0.01	**100.35**		1.85	0.02	0.13
62	VM99-24.Area B1.6	0.35	26.56	1.66	0.01	0.01	**100.50**		1.92	0.01	0.08
63	VM99-24.Area B1.7	0.31	28.15	1.49	0.03	0.00	**101.03**		1.92	0.01	0.07
64	VM99-24.Area B1.8	0.35	26.50	1.52	0.03	0.00	**99.49**		1.95	0.01	0.05
65	VM99-24.Area B1.9	0.36	27.31	1.47	0.02	0.00	**101.23**		1.91	0.01	0.08
66											
67	VM99-24.Area F2.1	0.17	15.82	21.48	0.40	0.00	**100.98**		1.87	0.02	0.13
68	VM99-24.Area F2.2	0.19	16.03	21.25	0.45	0.01	**100.96**		1.89	0.02	0.11

	A	S	T	U	V	W	X	Y	Z	AA	AB
1	**Appendix F**										
2	**Pyroxene**										
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
4	kaug.1_1	0.19	0.00	0.04	0.15	0.00	0.90	0.61	0.09	4.00	36.85
5	kaug.1_2	0.19	0.01	0.04	0.15	0.00	0.90	0.61	0.09	4.00	36.73
6	kaug.1_3	0.19	0.01	0.04	0.15	0.00	0.89	0.61	0.09	4.00	36.80
7											
8	VM99-24.Area A.1	0.00	0.00	0.06	0.43	0.01	1.45	0.06	0.00	4.00	2.85
9	VM99-24.Area A.2	0.00	0.00	0.08	0.41	0.02	1.44	0.05	0.00	4.00	2.66
10	VM99-24.Area A.3	0.00	0.00	0.08	0.40	0.01	1.46	0.06	0.00	4.00	2.85
11	VM99-24.Area A.4	0.06	0.00	0.00	0.14	0.00	1.49	0.06	0.00	3.86	3.47
12											
13	VM99-24.Area A2.1	0.00	0.00	0.08	0.39	0.01	1.48	0.06	0.00	4.00	3.10
14	VM99-24.Area A2.2	0.00	0.00	0.08	0.40	0.01	1.45	0.06	0.00	4.00	3.00
15	VM99-24.Area A2.3	0.00	0.00	0.06	0.42	0.01	1.46	0.06	0.00	4.00	2.85
16	VM99-24.Area A2.4	0.00	0.00	0.09	0.38	0.01	1.47	0.06	0.00	4.00	3.09
17											
18	VM99-24.Area A4.1	0.00	0.00	0.09	0.39	0.01	1.46	0.06	0.00	4.00	3.34
19	VM99-24.Area A4.2	0.00	0.00	0.07	0.39	0.01	1.48	0.06	0.00	4.00	3.09
20	VM99-24.Area A4.3	0.00	0.00	0.08	0.39	0.01	1.47	0.06	0.00	4.00	2.87
21	VM99-24.Area A4.4	0.00	0.00	0.04	0.42	0.01	1.48	0.05	0.00	4.00	2.75
22	VM99-24.Area A4.5	0.00	0.00	0.06	0.39	0.01	1.46	0.06	0.00	4.00	3.07
23											
24	VM99-24.Area D2.1	0.00	0.00	0.12	0.15	0.01	0.86	0.84	0.03	4.00	45.35
25	VM99-24.Area D2.2	0.00	0.00	0.11	0.16	0.01	0.90	0.80	0.02	4.00	43.08
26	VM99-24.Area D2.3	0.02	0.00	0.10	0.18	0.01	0.85	0.80	0.03	4.00	43.55
27	VM99-24.Area D2.4	0.01	0.00	0.09	0.20	0.01	0.85	0.79	0.03	4.00	43.09
28	VM99-24.Area D2.5	0.00	0.00	0.12	0.14	0.01	0.84	0.83	0.03	4.00	45.67
29	VM99-24.Area D2.6	0.00	0.00	0.07	0.43	0.01	1.43	0.05	0.00	4.00	2.73
30	VM99-24.Area D2.7	0.00	0.00	0.08	0.42	0.01	1.43	0.06	0.00	4.00	2.93
31	VM99-24.Area D2.8	0.00	0.00	0.05	0.42	0.01	1.47	0.06	0.00	4.00	2.88
32	VM99-24.Area D2.9	0.00	0.00	0.07	0.39	0.01	1.46	0.06	0.00	4.00	2.95
33											
34	VM99-24.Area E1.1	0.00	0.00	0.10	0.40	0.01	1.45	0.05	0.00	4.00	2.83
35	VM99-24.Area E1.2	0.00	0.00	0.08	0.42	0.01	1.45	0.06	0.00	4.00	3.02
36											
37	VM99-24.Area E2.1	0.01	0.00	0.02	0.45	0.01	1.44	0.06	0.00	4.00	2.87
38											
39	VM99-24.Area EF.1	0.00	0.00	0.08	0.43	0.01	1.44	0.06	0.00	4.00	2.97
40	VM99-24.Area EF.2	0.00	0.00	0.04	0.43	0.01	1.46	0.06	0.00	4.00	2.89
41	VM99-24.Area EF.3	0.00	0.00	0.07	0.41	0.01	1.46	0.06	0.00	4.00	3.01
42	VM99-24.Area EF.4	0.00	0.00	0.09	0.40	0.01	1.46	0.06	0.00	4.00	3.10
43	VM99-24.Area EF.5	0.00	0.00	0.08	0.41	0.01	1.45	0.06	0.00	4.00	3.20
44											
45	VM99-24.Area D1.1	0.00	0.00	0.07	0.20	0.01	0.89	0.80	0.02	4.00	42.40
46	VM99-24.Area D1.2	0.00	0.00	0.10	0.17	0.01	0.86	0.82	0.03	4.00	44.30
47	VM99-24.Area D1.3	0.00	0.00	0.11	0.18	0.01	0.87	0.79	0.03	4.00	42.88
48	VM99-24.Area D1.4	0.01	0.00	0.10	0.19	0.01	0.87	0.78	0.04	4.00	42.29
49											
50	VM99-24.Area A4.6	0.01	0.00	0.12	0.16	0.01	0.82	0.82	0.03	4.00	45.53
51	VM99-24.Area A4.7	0.02	0.00	0.10	0.17	0.01	0.82	0.84	0.03	4.00	45.88
52	VM99-24.Area A4.8	0.00	0.00	0.12	0.15	0.01	0.84	0.84	0.03	4.00	45.95
53	VM99-24.Area A4.9	0.00	0.00	0.11	0.17	0.01	0.84	0.82	0.03	4.00	44.80
54	VM99-24.Area A4.10	0.00	0.00	0.11	0.16	0.01	0.88	0.80	0.03	4.00	43.59
55	VM99-24.Area A4.11	0.00	0.00	0.05	0.52	0.02	1.35	0.06	0.01	4.00	2.88
56											
57	VM99-24.Area B1.1	0.01	0.01	0.12	0.15	0.01	0.84	0.83	0.03	4.00	45.68
58	VM99-24.Area B1.2	0.00	0.00	0.08	0.43	0.01	1.43	0.06	0.00	4.00	3.01
59	VM99-24.Area B1.3	0.01	0.00	0.12	0.17	0.01	0.83	0.81	0.03	4.00	44.91
60	VM99-24.Area B1.4	0.00	0.00	0.12	0.16	0.01	0.84	0.82	0.03	4.00	45.26
61	VM99-24.Area B1.5	0.00	0.00	0.15	0.12	0.01	0.86	0.84	0.03	4.00	46.10
62	VM99-24.Area B1.6	0.01	0.00	0.05	0.43	0.01	1.43	0.06	0.00	4.00	3.33
63	VM99-24.Area B1.7	0.00	0.00	0.08	0.36	0.01	1.49	0.06	0.00	4.00	2.96
64	VM99-24.Area B1.8	0.00	0.00	0.04	0.45	0.01	1.44	0.06	0.00	4.00	3.05
65	VM99-24.Area B1.9	0.00	0.00	0.08	0.39	0.01	1.45	0.06	0.00	4.00	2.95
66											
67	VM99-24.Area F2.1	0.00	0.01	0.12	0.12	0.01	0.86	0.84	0.03	4.00	46.15
68	VM99-24.Area F2.2	0.00	0.00	0.10	0.13	0.01	0.87	0.83	0.03	4.00	45.28

	A	AC	AD	AE
1	**Appendix F**			
2	**Pyroxene**			
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
4	kaug.1_1	53.99	9.16	0.86
5	kaug.1_2	53.98	9.29	0.85
6	kaug.1_3	53.95	9.25	0.85
7				
8	VM99-24.Area A.1	74.97	22.19	0.77
9	VM99-24.Area A.2	75.69	21.65	0.78
10	VM99-24.Area A.3	76.05	21.10	0.78
11	VM99-24.Area A.4	88.20	8.33	0.91
12				
13	VM99-24.Area A2.1	76.84	20.06	0.79
14	VM99-24.Area A2.2	76.03	20.98	0.78
15	VM99-24.Area A2.3	75.61	21.54	0.78
16	VM99-24.Area A2.4	77.17	19.75	0.80
17				
18	VM99-24.Area A4.1	76.11	20.55	0.79
19	VM99-24.Area A4.2	76.60	20.31	0.79
20	VM99-24.Area A4.3	76.67	20.47	0.79
21	VM99-24.Area A4.4	75.78	21.47	0.78
22	VM99-24.Area A4.5	76.38	20.56	0.79
23				
24	VM99-24.Area D2.1	46.70	7.95	0.86
25	VM99-24.Area D2.2	48.57	8.36	0.85
26	VM99-24.Area D2.3	46.41	10.04	0.82
27	VM99-24.Area D2.4	46.08	10.83	0.81
28	VM99-24.Area D2.5	46.52	7.81	0.86
29	VM99-24.Area D2.6	74.94	22.33	0.77
30	VM99-24.Area D2.7	74.85	22.22	0.77
31	VM99-24.Area D2.8	75.54	21.59	0.78
32	VM99-24.Area D2.9	76.60	20.45	0.79
33				
34	VM99-24.Area E1.1	76.22	20.96	0.78
35	VM99-24.Area E1.2	75.30	21.68	0.78
36				
37	VM99-24.Area E2.1	73.96	23.17	0.76
38				
39	VM99-24.Area EF.1	74.76	22.27	0.77
40	VM99-24.Area EF.2	74.90	22.22	0.77
41	VM99-24.Area EF.3	75.85	21.14	0.78
42	VM99-24.Area EF.4	76.06	20.83	0.79
43	VM99-24.Area EF.5	75.54	21.27	0.78
44				
45	VM99-24.Area D1.1	47.08	10.52	0.82
46	VM99-24.Area D1.2	46.52	9.18	0.84
47	VM99-24.Area D1.3	47.15	9.97	0.83
48	VM99-24.Area D1.4	47.16	10.55	0.82
49				
50	VM99-24.Area A4.6	45.43	9.04	0.83
51	VM99-24.Area A4.7	45.06	9.06	0.83
52	VM99-24.Area A4.8	46.11	7.94	0.85
53	VM99-24.Area A4.9	46.11	9.09	0.84
54	VM99-24.Area A4.10	47.74	8.67	0.85
55	VM99-24.Area A4.11	70.05	27.07	0.72
56				
57	VM99-24.Area B1.1	46.08	8.25	0.85
58	VM99-24.Area B1.2	74.71	22.27	0.77
59	VM99-24.Area B1.3	45.93	9.17	0.83
60	VM99-24.Area B1.4	46.14	8.59	0.84
61	VM99-24.Area B1.5	47.58	6.32	0.88
62	VM99-24.Area B1.6	74.42	22.24	0.77
63	VM99-24.Area B1.7	78.08	18.96	0.81
64	VM99-24.Area B1.8	73.99	22.96	0.76
65	VM99-24.Area B1.9	76.37	20.68	0.79
66				
67	VM99-24.Area F2.1	47.28	6.57	0.88
68	VM99-24.Area F2.2	47.52	7.20	0.87

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
69	VM99-24.Area F2.3	mid of large cpx	50.89	0.63	3.27	0.13	4.09	3.91
70	VM99-24.Area F2.4	rim of large cpx	51.58	0.64	2.44	0.00	4.79	4.55
71	VM99-24.Area F2.5	mid of large cpx	53.29	0.18	1.06	0.08	3.46	3.79
72	VM99-24.Area F2.6	rim of large cpx	50.45	0.76	3.09	0.01	4.46	5.15
73								
74	VM99-16.Area B2.1	cpx micropheno	52.33	0.54	2.04	0.11	3.33	6.27
75								
76	VM99-16.Area C2.1	cpx micropheno	47.74	1.60	5.40	0.11	4.61	6.92
77	VM99-16.Area C2.2	cpx micropheno	50.35	0.96	3.46	0.00	3.88	6.17
78								
79	VM99-16.Area C3.2	cpx micropheno	52.28	0.42	1.44	0.00	3.76	5.01
80								
81	VM99-16.Area D1.1	core of opx micropheno	53.38	0.13	0.51	0.01	2.11	18.67
82	VM99-16.Area D1.2	mid of opx micropheno	53.26	0.15	0.55	0.00	1.83	18.60
83	VM99-16.Area D1.3	cpx micropheno	50.28	0.76	2.94	0.09	3.50	5.12
84	VM99-16.Area D1.4	core of opx micropheno	53.32	0.13	0.51	0.02	1.69	19.03
85	VM99-16.Area D1.5	rim of opx micropheno	53.16	0.17	0.51	0.00	2.29	18.73
86	VM99-16.Area D1.6	rim of opx micropheno	54.52	0.16	0.47	0.01	0.51	18.54
87								
88	VM99-16.Area D2.1	core of cpx micropheno	53.09	0.26	0.98	0.01	2.32	5.79
89	VM99-16.Area D2.2	mid of cpx micropheno	52.57	0.49	1.82	0.10	2.60	4.84
90	VM99-16.Area D2.3	rim of cpx micropheno	48.93	1.04	4.85	0.18	1.88	6.12
91								
92	VM99-25.Area A1.1	cpx in microxlln amph breakdown	49.46	2.35	3.88	0.06	4.63	4.00
93	VM99-25.Area A1.2	opx in microxlln amph breakdown	53.84	0.19	0.90	0.01	2.30	17.05
94	VM99-25.Area A1.3	cpx in microxlln amph breakdown	52.11	0.65	1.81	0.09	3.22	6.61
95	VM99-25.Area A1.4	cpx in microxlln amph breakdown	52.83	0.64	2.04	0.02	2.96	6.01
96	VM99-25.Area A1.5	cpx in microxlln amph breakdown	52.01	0.91	8.07	0.07	0.00	7.72
97	VM99-25.Area A1.6	opx in microxlln amph breakdown	53.56	0.45	1.65	0.05	2.16	15.06
98								
99	VM99-25.Area A3.1	core of clean opx	51.24	0.26	0.88	0.00	2.07	15.05
100	VM99-25.Area A3.2	mid of clean opx	54.60	0.26	0.92	0.00	2.27	15.45
101	VM99-25.Area A3.3	rim of clean opx	53.88	0.34	1.59	0.00	2.79	15.40
102	VM99-25.Area A3.4	rim of clean opx	53.76	0.36	1.46	0.00	2.70	15.17
103								
104	VM99-25.Area A4.1	core of clean opx	53.70	0.33	1.53	0.00	3.24	14.39
105	VM99-25.Area A4.2	mid of clean opx	53.94	0.26	1.04	0.01	2.24	16.10
106	VM99-25.Area A4.3	rim of clean opx	54.07	0.30	1.25	0.00	2.10	15.68
107	VM99-25.Area A4.4	mid of clean opx	53.71	0.23	1.06	0.01	2.70	15.21
108								
109	VM99-25.Area A5.1	core of clean cpx	51.88	0.52	2.12	0.00	3.70	6.19
110	VM99-25.Area A5.2	mid of clean cpx	52.90	0.44	1.40	0.00	2.72	6.04
111	VM99-25.Area A5.3	rim of clean cpx	51.81	0.66	2.29	0.00	3.99	5.58
112	VM99-25.Area A5.4	rim of clean cpx	52.23	0.50	1.54	0.00	3.95	4.85
113	VM99-25.Area A5.5	mid of clean cpx	51.67	0.65	2.17	0.00	3.78	5.64
114								
115	VM99-25. Area C1.1	core of clean opx	54.64	0.27	1.00	0.01	1.71	16.16
116	VM99-25. Area C1.2	rim of clean opx	53.64	0.32	1.20	0.00	2.81	15.17
117								
118	VM99-25. Area C1.3	rim of clean opx	53.46	0.33	1.27	0.03	3.53	14.45
119	VM99-25. Area C2.1	core of clean cpx	52.48	0.65	2.38	0.00	3.18	5.93
120	VM99-25. Area C2.2	mid of clean cpx	51.98	0.72	2.61	0.02	3.41	6.13
121	VM99-25. Area C2.3	rim of clean cpx	52.13	0.69	2.66	0.00	3.08	6.24
122	VM99-25. Area C2.4	mid clean cpx	52.27	0.49	1.97	0.00	3.48	6.20
123								
124	VM99-25. Area C3.1	core of clean cpx	51.22	0.67	2.48	0.03	3.89	4.93
125	VM99-25. Area C3.2	mid of clean cpx	51.33	0.64	2.25	0.04	4.43	5.14
126	VM99-25. Area C3.3	rim of clean cpx	51.60	0.49	1.87	0.00	4.26	5.03
127	VM99-25. Area C3.4	mid of clean cpx	48.31	1.19	5.18	0.00	5.14	5.22
128	VM99-25. Area C3.5	rim of clean cpx	50.37	0.73	2.90	0.01	4.46	4.73
129	VM99-25. Area C3.6	core of clean cpx	50.26	0.89	3.21	0.01	4.43	4.54
130	VM99-25. Area C3.7	mid of clean cpx	51.27	0.60	2.15	0.03	4.32	5.12
131	VM99-25. Area C3.8	rim of clean cpx	51.57	0.48	1.82	0.00	3.91	5.25
132	VM99-25. Area C3.9	mid of clean cpx	50.74	0.74	2.51	0.05	4.33	5.98
133								
134	VM99-25. Area C4.1	cpx micropheno	50.58	0.70	2.76	0.06	5.12	4.47
135	VM99-25. Area C4.2	opx micropheno	53.78	0.25	0.79	0.00	2.26	15.43

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
69	VM99-24.Area F2.3	0.14	15.79	21.48	0.36	0.00	**100.69**		1.87	0.02	0.13
70	VM99-24.Area F2.4	0.25	16.10	20.80	0.45	0.01	**101.62**		1.88	0.02	0.11
71	VM99-24.Area F2.5	0.16	16.45	22.50	0.39	0.00	**101.34**		1.94	0.01	0.05
72	VM99-24.Area F2.6	0.22	15.33	20.37	0.48	0.00	**100.31**		1.87	0.02	0.13
73											
74	VM99-16.Area B2.1	0.21	18.55	17.67	0.19	0.00	**101.24**		1.90	0.02	0.09
75											
76	VM99-16.Area C2.1	0.23	13.05	20.14	0.50	0.00	**100.31**		1.79	0.05	0.21
77	VM99-16.Area C2.2	0.23	15.55	19.77	0.35	0.00	**100.71**		1.86	0.03	0.14
78											
79	VM99-16.Area C3.2	0.33	16.35	20.89	0.35	0.00	**100.84**		1.92	0.01	0.06
80											
81	VM99-16.Area D1.1	0.69	24.19	0.97	0.04	0.01	**100.70**		1.96	0.00	0.02
82	VM99-16.Area D1.2	0.69	24.21	1.03	0.01	0.00	**100.33**		1.96	0.00	0.02
83	VM99-16.Area D1.3	0.18	15.37	20.79	0.32	0.00	**99.34**		1.88	0.02	0.13
84	VM99-16.Area D1.4	0.64	24.07	0.96	0.01	0.00	**100.39**		1.96	0.00	0.02
85	VM99-16.Area D1.5	0.73	24.08	0.99	0.01	0.01	**100.68**		1.95	0.01	0.02
86	VM99-16.Area D1.6	0.56	25.02	1.17	0.03	0.00	**100.98**		1.98	0.00	0.02
87											
88	VM99-16.Area D2.1	0.29	15.51	22.13	0.34	0.01	**100.74**		1.95	0.01	0.04
89	VM99-16.Area D2.2	0.15	17.26	20.79	0.20	0.00	**100.81**		1.92	0.01	0.08
90	VM99-16.Area D2.3	0.15	14.27	20.52	0.29	0.04	**98.25**		1.85	0.03	0.16
91											
92	VM99-25.Area A1.1	0.20	15.03	20.92	0.74	0.01	**101.29**		1.81	0.07	0.17
93	VM99-25.Area A1.2	0.40	24.94	1.91	0.04	0.01	**101.59**		1.95	0.01	0.04
94	VM99-25.Area A1.3	0.35	16.75	19.18	0.32	0.00	**101.09**		1.91	0.02	0.08
95	VM99-25.Area A1.4	0.29	17.44	19.15	0.38	0.02	**101.77**		1.91	0.02	0.09
96	VM99-25.Area A1.5	0.20	12.43	19.07	1.13	0.04	**101.63**		1.88	0.03	0.13
97	VM99-25.Area A1.6	0.46	26.33	1.45	0.03	0.00	**101.21**		1.92	0.01	0.07
98											
99	VM99-25.Area A3.1	0.46	24.79	1.39	0.00	0.00	**96.15**		1.94	0.01	0.04
100	VM99-25.Area A3.2	0.45	26.78	1.43	0.01	0.00	**102.17**		1.94	0.01	0.04
101	VM99-25.Area A3.3	0.49	26.32	1.42	0.02	0.01	**102.27**		1.92	0.01	0.07
102	VM99-25.Area A3.4	0.49	26.20	1.55	0.05	0.00	**101.75**		1.93	0.01	0.06
103											
104	VM99-25.Area A4.1	0.41	26.63	1.56	0.04	0.01	**101.85**		1.92	0.01	0.06
105	VM99-25.Area A4.2	0.53	25.91	1.25	0.05	0.02	**101.35**		1.94	0.01	0.04
106	VM99-25.Area A4.3	0.46	26.32	1.36	0.02	0.00	**101.57**		1.94	0.01	0.05
107	VM99-25.Area A4.4	0.46	26.37	1.22	0.04	0.01	**101.02**		1.94	0.01	0.05
108											
109	VM99-25.Area A5.1	0.31	15.29	20.54	0.52	0.01	**101.08**		1.91	0.01	0.09
110	VM99-25.Area A5.2	0.31	16.03	21.18	0.34	0.00	**101.36**		1.93	0.01	0.06
111	VM99-25.Area A5.3	0.29	15.55	20.93	0.46	0.01	**101.58**		1.89	0.02	0.10
112	VM99-25.Area A5.4	0.30	16.30	21.19	0.33	0.01	**101.19**		1.91	0.01	0.07
113	VM99-25.Area A5.5	0.26	15.49	21.01	0.41	0.01	**101.11**		1.90	0.02	0.09
114											
115	VM99-25. Area C1.1	0.51	26.35	1.39	0.03	0.00	**102.08**		1.95	0.01	0.04
116	VM99-25. Area C1.2	0.49	26.24	1.41	0.04	0.01	**101.31**		1.93	0.01	0.05
117											
118	VM99-25. Area C1.3	0.49	26.51	1.38	0.05	0.01	**101.51**		1.92	0.01	0.05
119	VM99-25. Area C2.1	0.30	15.77	21.00	0.45	0.00	**102.13**		1.90	0.02	0.10
120	VM99-25. Area C2.2	0.30	15.48	20.79	0.46	0.00	**101.89**		1.89	0.02	0.11
121	VM99-25. Area C2.3	0.27	15.40	20.99	0.45	0.00	**101.93**		1.90	0.02	0.10
122	VM99-25. Area C2.4	0.30	15.90	20.53	0.39	0.00	**101.52**		1.91	0.01	0.09
123											
124	VM99-25. Area C3.1	0.24	15.40	21.34	0.41	0.00	**100.61**		1.89	0.02	0.11
125	VM99-25. Area C3.2	0.27	15.85	20.41	0.46	0.01	**100.82**		1.89	0.02	0.10
126	VM99-25. Area C3.3	0.29	15.93	20.67	0.41	0.02	**100.58**		1.90	0.01	0.08
127	VM99-25. Area C3.4	0.20	14.00	20.02	0.60	0.00	**99.87**		1.80	0.03	0.20
128	VM99-25. Area C3.5	0.27	15.02	20.96	0.49	0.00	**99.95**		1.87	0.02	0.13
129	VM99-25. Area C3.6	0.22	15.49	20.89	0.38	0.00	**100.33**		1.86	0.03	0.14
130	VM99-25. Area C3.7	0.28	15.36	20.97	0.47	0.00	**100.57**		1.89	0.02	0.09
131	VM99-25. Area C3.8	0.26	15.94	20.55	0.40	0.00	**100.18**		1.91	0.01	0.08
132	VM99-25. Area C3.9	0.23	15.50	19.73	0.48	0.00	**100.27**		1.88	0.02	0.11
133											
134	VM99-25. Area C4.1	0.32	15.19	21.06	0.49	0.00	**100.75**		1.87	0.02	0.12
135	VM99-25. Area C4.2	0.50	26.15	1.49	0.01	0.00	**100.67**		1.95	0.01	0.03

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
69	VM99-24.Area F2.3	0.01	0.00	0.11	0.12	0.00	0.86	0.84	0.03	4.00	46.20
70	VM99-24.Area F2.4	0.00	0.00	0.13	0.14	0.01	0.88	0.81	0.03	4.00	44.49
71	VM99-24.Area F2.5	0.00	0.00	0.10	0.12	0.01	0.89	0.88	0.03	4.00	46.54
72	VM99-24.Area F2.6	0.00	0.00	0.12	0.16	0.01	0.85	0.81	0.03	4.00	44.56
73											
74	VM99-16.Area B2.1	0.00	0.00	0.09	0.19	0.01	1.01	0.69	0.01	4.00	36.54
75											
76	VM99-16.Area C2.1	0.03	0.00	0.13	0.22	0.01	0.73	0.81	0.04	4.00	46.09
77	VM99-16.Area C2.2	0.01	0.00	0.11	0.19	0.01	0.86	0.78	0.03	4.00	42.77
78											
79	VM99-16.Area C3.2	0.00	0.00	0.10	0.15	0.01	0.89	0.82	0.03	4.00	43.93
80											
81	VM99-16.Area D1.1	0.00	0.00	0.06	0.57	0.02	1.32	0.04	0.00	4.00	1.98
82	VM99-16.Area D1.2	0.00	0.00	0.05	0.57	0.02	1.33	0.04	0.00	4.00	2.09
83	VM99-16.Area D1.3	0.00	0.00	0.10	0.16	0.01	0.85	0.83	0.02	4.00	45.03
84	VM99-16.Area D1.4	0.00	0.00	0.05	0.59	0.02	1.32	0.04	0.00	4.00	1.94
85	VM99-16.Area D1.5	0.00	0.00	0.06	0.58	0.02	1.32	0.04	0.00	4.00	2.01
86	VM99-16.Area D1.6	0.00	0.00	0.01	0.56	0.02	1.35	0.05	0.00	4.00	2.32
87											
88	VM99-16.Area D2.1	0.00	0.00	0.06	0.18	0.01	0.85	0.87	0.03	4.00	45.89
89	VM99-16.Area D2.2	0.00	0.00	0.07	0.15	0.01	0.94	0.81	0.01	4.00	42.80
90	VM99-16.Area D2.3	0.06	0.01	0.05	0.19	0.01	0.80	0.83	0.02	4.00	45.45
91											
92	VM99-25.Area A1.1	0.00	0.00	0.13	0.12	0.01	0.82	0.82	0.05	4.00	46.53
93	VM99-25.Area A1.2	0.00	0.00	0.06	0.52	0.01	1.34	0.07	0.00	4.00	3.83
94	VM99-25.Area A1.3	0.00	0.00	0.09	0.20	0.01	0.92	0.75	0.02	4.00	40.27
95	VM99-25.Area A1.4	0.00	0.00	0.08	0.18	0.01	0.94	0.74	0.03	4.00	39.81
96	VM99-25.Area A1.5	0.22	0.00	0.00	0.23	0.01	0.67	0.74	0.08	3.97	44.98
97	VM99-25.Area A1.6	0.00	0.00	0.06	0.45	0.01	1.41	0.06	0.00	4.00	2.91
98											
99	VM99-25.Area A3.1	0.00	0.00	0.06	0.48	0.02	1.40	0.06	0.00	4.00	2.92
100	VM99-25.Area A3.2	0.00	0.00	0.06	0.46	0.01	1.42	0.06	0.00	4.00	2.83
101	VM99-25.Area A3.3	0.00	0.00	0.08	0.46	0.02	1.40	0.05	0.00	4.00	2.83
102	VM99-25.Area A3.4	0.00	0.00	0.07	0.45	0.02	1.40	0.06	0.00	4.00	3.11
103											
104	VM99-25.Area A4.1	0.00	0.00	0.09	0.43	0.01	1.42	0.06	0.00	4.00	3.14
105	VM99-25.Area A4.2	0.00	0.00	0.06	0.49	0.02	1.39	0.05	0.00	4.00	2.52
106	VM99-25.Area A4.3	0.00	0.00	0.06	0.47	0.01	1.41	0.05	0.00	4.00	2.71
107	VM99-25.Area A4.4	0.00	0.00	0.07	0.46	0.01	1.42	0.05	0.00	4.00	2.45
108											
109	VM99-25.Area A5.1	0.00	0.00	0.10	0.19	0.01	0.84	0.81	0.04	4.00	44.04
110	VM99-25.Area A5.2	0.00	0.00	0.08	0.19	0.01	0.87	0.83	0.02	4.00	43.94
111	VM99-25.Area A5.3	0.00	0.00	0.11	0.17	0.01	0.85	0.82	0.03	4.00	44.61
112	VM99-25.Area A5.4	0.00	0.00	0.11	0.15	0.01	0.89	0.83	0.02	4.00	44.46
113	VM99-25.Area A5.5	0.00	0.00	0.10	0.17	0.01	0.85	0.83	0.03	4.00	44.74
114											
115	VM99-25. Area C1.1	0.00	0.00	0.05	0.48	0.02	1.40	0.05	0.00	4.00	2.74
116	VM99-25. Area C1.2	0.00	0.00	0.08	0.46	0.02	1.41	0.05	0.00	4.00	2.83
117											
118	VM99-25. Area C1.3	0.00	0.00	0.10	0.43	0.02	1.42	0.05	0.00	4.00	2.78
119	VM99-25. Area C2.1	0.01	0.00	0.09	0.18	0.01	0.85	0.82	0.03	4.00	44.14
120	VM99-25. Area C2.2	0.01	0.00	0.09	0.19	0.01	0.84	0.81	0.03	4.00	44.14
121	VM99-25. Area C2.3	0.01	0.00	0.08	0.19	0.01	0.84	0.82	0.03	4.00	44.39
122	VM99-25. Area C2.4	0.00	0.00	0.10	0.19	0.01	0.87	0.80	0.03	4.00	43.24
123											
124	VM99-25. Area C3.1	0.00	0.00	0.11	0.15	0.01	0.85	0.84	0.03	4.00	45.79
125	VM99-25. Area C3.2	0.00	0.00	0.12	0.16	0.01	0.87	0.80	0.03	4.00	43.92
126	VM99-25. Area C3.3	0.00	0.00	0.12	0.16	0.01	0.88	0.82	0.03	4.00	44.21
127	VM99-25. Area C3.4	0.03	0.00	0.14	0.16	0.01	0.78	0.80	0.04	4.00	45.95
128	VM99-25. Area C3.5	0.00	0.00	0.13	0.15	0.01	0.83	0.83	0.04	4.00	46.02
129	VM99-25. Area C3.6	0.00	0.00	0.12	0.14	0.01	0.85	0.83	0.03	4.00	45.43
130	VM99-25. Area C3.7	0.00	0.00	0.12	0.16	0.01	0.85	0.83	0.03	4.00	45.26
131	VM99-25. Area C3.8	0.00	0.00	0.11	0.16	0.01	0.88	0.81	0.03	4.00	43.88
132	VM99-25. Area C3.9	0.00	0.00	0.12	0.19	0.01	0.86	0.78	0.03	4.00	42.94
133											
134	VM99-25. Area C4.1	0.00	0.00	0.14	0.14	0.01	0.84	0.83	0.04	4.00	46.11
135	VM99-25. Area C4.2	0.00	0.00	0.06	0.47	0.02	1.41	0.06	0.00	4.00	2.99

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
69	VM99-24.Area F2.3	47.24	6.56	0.88
70	VM99-24.Area F2.4	47.91	7.60	0.86
71	VM99-24.Area F2.5	47.34	6.12	0.89
72	VM99-24.Area F2.6	46.65	8.79	0.84
73				
74	VM99-16.Area B2.1	53.35	10.12	0.84
75				
76	VM99-16.Area C2.1	41.55	12.36	0.77
77	VM99-16.Area C2.2	46.81	10.42	0.82
78				
79	VM99-16.Area C3.2	47.84	8.23	0.85
80				
81	VM99-16.Area D1.1	68.41	29.61	0.70
82	VM99-16.Area D1.2	68.42	29.49	0.70
83	VM99-16.Area D1.3	46.32	8.66	0.84
84	VM99-16.Area D1.4	67.93	30.13	0.69
85	VM99-16.Area D1.5	68.21	29.78	0.70
86	VM99-16.Area D1.6	69.00	28.69	0.71
87				
88	VM99-16.Area D2.1	44.74	9.38	0.83
89	VM99-16.Area D2.2	49.43	7.77	0.86
90	VM99-16.Area D2.3	43.98	10.58	0.81
91				
92	VM99-25.Area A1.1	46.53	6.94	0.87
93	VM99-25.Area A1.2	69.51	26.66	0.72
94	VM99-25.Area A1.3	48.91	10.82	0.82
95	VM99-25.Area A1.4	50.43	9.76	0.84
96	VM99-25.Area A1.5	40.81	14.21	0.74
97	VM99-25.Area A1.6	73.50	23.59	0.76
98				
99	VM99-25.Area A3.1	72.42	24.66	0.75
100	VM99-25.Area A3.2	73.41	23.76	0.76
101	VM99-25.Area A3.3	73.16	24.01	0.75
102	VM99-25.Area A3.4	73.13	23.76	0.76
103				
104	VM99-25.Area A4.1	74.33	22.54	0.77
105	VM99-25.Area A4.2	72.29	25.20	0.74
106	VM99-25.Area A4.3	72.92	24.37	0.75
107	VM99-25.Area A4.4	73.71	23.85	0.76
108				
109	VM99-25.Area A5.1	45.61	10.35	0.82
110	VM99-25.Area A5.2	46.27	9.79	0.83
111	VM99-25.Area A5.3	46.11	9.28	0.83
112	VM99-25.Area A5.4	47.59	7.95	0.86
113	VM99-25.Area A5.5	45.89	9.38	0.83
114				
115	VM99-25. Area C1.1	72.36	24.90	0.74
116	VM99-25. Area C1.2	73.37	23.81	0.76
117				
118	VM99-25. Area C1.3	74.46	22.77	0.77
119	VM99-25. Area C2.1	46.13	9.73	0.83
120	VM99-25. Area C2.2	45.71	10.15	0.82
121	VM99-25. Area C2.3	45.31	10.30	0.82
122	VM99-25. Area C2.4	46.58	10.19	0.82
123				
124	VM99-25. Area C3.1	45.96	8.25	0.85
125	VM99-25. Area C3.2	47.45	8.63	0.85
126	VM99-25. Area C3.3	47.39	8.40	0.85
127	VM99-25. Area C3.4	44.69	9.36	0.83
128	VM99-25. Area C3.5	45.87	8.11	0.85
129	VM99-25. Area C3.6	46.86	7.71	0.86
130	VM99-25. Area C3.7	46.12	8.62	0.84
131	VM99-25. Area C3.8	47.37	8.75	0.84
132	VM99-25. Area C3.9	46.91	10.15	0.82
133				
134	VM99-25. Area C4.1	46.26	7.64	0.86
135	VM99-25. Area C4.2	72.88	24.13	0.75

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
136								
137	VM99-25. Area D1.1	cpx in microxlln amph breakdown	50.51	0.94	2.94	0.04	4.49	5.60
138	VM99-25. Area D1.2	cpx in microxlln amph breakdown	41.94	4.38	11.12	0.11	12.68	0.34
139	VM99-25. Area D1.3	opx in microxlln amph breakdown	53.52	0.33	1.02	0.02	2.41	16.29
140	VM99-25. Area D1.4	cpx in microxlln amph breakdown	49.45	0.93	4.42	0.00	4.80	5.49
141	VM99-25. Area D1.5	opx in microxlln amph breakdown	53.83	0.30	1.12	0.00	2.27	15.78
142								
143	VM99-25. Area D1.7	opx welded on to amph breakdown	53.13	0.28	1.91	0.00	2.62	15.40
144	VM99-25. Area D1.8	cpx welded on to amph breakdown	50.08	0.80	2.91	0.07	4.76	5.26
145								
146	kaug.1		51.28	0.85	8.73	0.18	0.45	5.80
147								
148	VM99-25. Area D3.1	opx in microxlln cluster	54.80	0.35	1.39	0.05	1.10	15.38
149	VM99-25. Area D3.2	opx in microxlln cluster	54.59	0.34	1.41	0.06	0.54	16.54
150								
151	VM99-25. Area D3.4	cpx in microxlln cluster	53.86	0.50	1.49	0.05	1.90	7.09
152								
153	VM99-25. Area E1.1	core of clean opx	55.54	0.22	0.87	0.02	1.00	16.69
154	VM99-25. Area E1.2	rim of clean opx	55.51	0.25	0.77	0.00	0.65	16.92
155	VM99-25. Area E1.3	rim of clean opx	55.50	0.33	1.13	0.04	0.45	17.00
156								
157	C	opx in microxlln amph breakdown	54.81	0.26	0.92	0.04	0.57	17.46
158	VM99-25. Area d1.2	opx in microxlln amph breakdown	54.49	0.30	1.38	0.03	0.30	18.32
159	VM99-25. Area d1.4	opx in microxlln amph breakdown	54.37	0.31	1.52	0.07	0.53	17.95
160								
161	**Pyroxene**	**24-Feb**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
162	VM99-24.area A.1	core of clean opx	52.78	0.36	1.44	0.00	2.24	13.82
163	VM99-24.area A.2	mid of clean opx	52.45	0.28	1.76	0.01	3.72	11.82
164	VM99-24.area A.3	rim of clean opx	52.21	0.36	1.82	0.00	2.89	13.19
165								
166	VM99-24.area A.4	groundmass opx	52.47	0.35	0.94	0.00	3.05	13.65
167	VM99-24.area A.5	bad point?	62.31	1.83	7.28	0.00	0.00	11.73
168								
169	VM99-24.area A.6	groundmass opx	51.87	0.41	1.01	0.00	2.82	15.54
170	VM99-24.area A.7	groundmass opx	53.60	0.24	0.79	0.01	2.24	13.68
171	VM99-24.area A.8	groundmass opx	53.62	0.25	1.01	0.00	2.41	13.38
172								
173	V7M99-24.area A.9	core of clean cpx	49.11	0.94	4.43	0.18	3.35	5.72
174	V7M99-24.area A.10	mid of clean cpx	50.36	0.78	2.88	0.02	2.58	5.95
175	V7M99-24.area A.11	rim of clean cpx	49.10	0.97	4.25	0.00	3.65	6.00
176	V7M99-24.area A.12	mid of clean cpx	49.81	0.84	3.42	0.03	3.95	5.70
177	V7M99-24.area A.13	rim of clean cpx	49.91	0.76	2.66	0.00	2.29	6.46
178								
179	V7M99-24.area A.14	core of clean cpx	50.23	0.53	2.30	0.01	3.70	6.15
180	V7M99-24.area A.15	mid of clean cpx	50.52	0.60	2.26	0.00	3.47	5.50
181	V7M99-24.area A.16	rim of clean cpx	50.11	0.68	2.31	0.00	3.85	5.54
182	V7M99-24.area A.17	mid of clean cpx	50.37	0.62	2.75	0.02	3.53	5.71
183	V7M99-24.area A.18	rim of clean cpx	50.70	0.61	2.21	0.00	3.51	5.23
184								
185	V7M99-24.area A.19	core of clean opx	53.33	0.26	0.95	0.00	2.91	13.32
186	V7M99-24.area A.20	mid of clean opx	52.75	0.31	1.41	0.01	3.32	13.57
187	V7M99-24.area A.21	rim of clean opx	52.42	0.32	1.31	0.00	3.44	13.13
188	V7M99-24.area A.22	rim of clean opx	52.69	0.30	1.63	0.00	3.11	12.92
189	V7M99-24.area A.23	rim of clean opx	53.14	0.26	1.13	0.00	2.84	13.66
190	V7M99-24.area A.24	rim of clean cpx	49.02	0.74	3.03	0.01	3.76	5.00
191								
192	V7M99-24.area B.1	core of clean cpx	50.79	0.56	2.76	0.19	2.06	6.02
193	V7M99-24.area B.2	mid of clean cpx	51.09	0.50	2.42	0.03	3.40	5.16
194	V7M99-24.area B.3	rim of clean cpx	51.72	0.54	1.68	0.00	2.76	6.10
195	V7M99-24.area B.4	mid of clean cpx	51.15	0.54	1.90	0.06	2.51	6.16
196								
197	V7M99-24.area B.5	core of clean cpx	50.83	0.57	2.40	0.00	3.65	5.16
198	V7M99-24.area B.6	mid of clean cpx	49.89	0.67	3.27	0.04	3.58	4.89
199	V7M99-24.area B.7	rim of clean cpx	52.03	0.28	1.01	0.00	2.53	7.15
200	V7M99-24.area B.8	rim of clean cpx	51.22	0.51	2.57	0.09	2.78	5.07
201								
202	V7M99-24.area B.9	rim of clean opx	52.10	0.62	2.50	0.13	2.42	5.10

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
136											
137	VM99-25. Area D1.1	0.27	14.93	20.42	0.56	0.00	**100.70**		1.87	0.03	0.13
138	VM99-25. Area D1.2	0.17	13.90	11.27	2.73	0.56	**99.19**		1.57	0.12	0.44
139	VM99-25. Area D1.3	0.50	25.57	1.40	0.02	0.01	**101.10**		1.94	0.01	0.04
140	VM99-25. Area D1.4	0.31	14.27	20.52	0.53	0.00	**100.72**		1.83	0.03	0.17
141	VM99-25. Area D1.5	0.43	26.04	1.44	0.03	0.00	**101.24**		1.94	0.01	0.05
142											
143	VM99-25. Area D1.7	0.54	25.72	1.40	0.04	0.01	**101.04**		1.92	0.01	0.08
144	VM99-25. Area D1.8	0.30	14.72	20.55	0.53	0.00	**99.98**		1.87	0.02	0.13
145											
146	kaug.1	0.11	16.70	16.00	1.27	0.01	**101.39**		1.83	0.02	0.17
147											
148	VM99-25. Area D3.1	0.43	26.80	1.53	0.06	0.01	**101.90**		1.95	0.01	0.05
149	VM99-25. Area D3.2	0.50	26.11	1.46	0.03	0.00	**101.56**		1.95	0.01	0.05
150											
151	VM99-25. Area D3.4	0.29	16.41	20.76	0.34	0.01	**102.71**		1.94	0.01	0.06
152											
153	VM99-25. Area E1.1	0.49	26.52	1.45	0.05	0.02	**102.86**		1.97	0.01	0.04
154	VM99-25. Area E1.2	0.45	26.40	1.41	0.08	0.00	**102.43**		1.97	0.01	0.03
155	VM99-25. Area E1.3	0.41	26.56	1.36	0.04	0.00	**102.80**		1.96	0.01	0.04
156											
157	C	0.53	25.74	1.35	0.04	0.00	**101.72**		1.97	0.01	0.03
158	VM99-25. Area d1.2	0.47	25.08	1.30	0.05	0.01	**101.74**		1.96	0.01	0.04
159	VM99-25. Area d1.4	0.51	25.30	1.27	0.02	0.00	**101.84**		1.95	0.01	0.05
160											
161	**Pyroxene**	**MnO**	**MgO**	**CaO**	**Na2O**		**Sum Ox%**				
162	VM99-24.area A.1	0.34	26.63	1.36	0.01		**99.00**				
163	VM99-24.area A.2	0.25	27.69	1.20	0.00		**99.18**				
164	VM99-24.area A.3	0.25	26.56	1.46	0.02		**98.77**				
165											
166	VM99-24.area A.4	0.47	25.88	2.18	0.01		**98.99**				
167	VM99-24.area A.5	0.11	8.09	2.70	2.41		**96.45**				
168											
169	VM99-24.area A.6	0.44	23.98	2.83	0.01		**98.90**				
170	VM99-24.area A.7	0.33	27.19	1.40	0.01		**99.50**				
171	VM99-24.area A.8	0.31	27.45	1.30	0.01		**99.73**				
172											
173	V7M99-24.area A.9	0.16	14.32	20.13	0.51		**98.84**				
174	V7M99-24.area A.10	0.15	15.36	20.23	0.33		**98.64**				
175	V7M99-24.area A.11	0.12	14.51	19.64	0.52		**98.77**				
176	V7M99-24.area A.12	0.15	14.83	20.24	0.45		**99.41**				
177	V7M99-24.area A.13	0.23	15.02	19.53	0.40		**97.25**				
178											
179	V7M99-24.area A.14	0.19	16.01	18.64	0.38		**98.13**				
180	V7M99-24.area A.15	0.17	16.02	19.61	0.35		**98.49**				
181	V7M99-24.area A.16	0.25	15.21	20.01	0.43		**98.38**				
182	V7M99-24.area A.17	0.19	15.48	19.84	0.41		**98.91**				
183	V7M99-24.area A.18	0.23	15.65	20.34	0.38		**98.85**				
184											
185	V7M99-24.area A.19	0.33	27.20	1.44	0.00		**99.73**				
186	V7M99-24.area A.20	0.32	26.70	1.44	0.00		**99.85**				
187	V7M99-24.area A.21	0.33	26.82	1.32	0.00		**99.09**				
188	V7M99-24.area A.22	0.24	26.92	1.59	0.02		**99.42**				
189	V7M99-24.area A.23	0.32	26.93	1.35	0.02		**99.63**				
190	V7M99-24.area A.24	0.16	15.13	19.84	0.37		**97.07**				
191											
192	V7M99-24.area B.1	0.14	15.36	20.38	0.34		**98.61**				
193	V7M99-24.area B.2	0.14	16.02	20.33	0.35		**99.43**				
194	V7M99-24.area B.3	0.19	16.00	20.31	0.33		**99.62**				
195	V7M99-24.area B.4	0.23	15.27	20.38	0.42		**98.61**				
196											
197	V7M99-24.area B.5	0.19	15.84	20.38	0.34		**99.37**				
198	V7M99-24.area B.6	0.15	15.29	20.48	0.37		**98.63**				
199	V7M99-24.area B.7	0.28	14.95	20.61	0.43		**99.26**				
200	V7M99-24.area B.8	0.12	16.12	20.52	0.33		**99.31**				
201											
202	V7M99-24.area B.9	0.11	15.71	20.94	0.61		**100.24**				

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
136											
137	VM99-25. Area D1.1	0.00	0.00	0.13	0.17	0.01	0.82	0.81	0.04	4.00	44.82
138	VM99-25. Area D1.2	0.05	0.00	0.36	0.01	0.01	0.77	0.45	0.20	4.00	36.50
139	VM99-25. Area D1.3	0.00	0.00	0.07	0.49	0.02	1.38	0.05	0.00	4.00	2.82
140	VM99-25. Area D1.4	0.02	0.00	0.13	0.17	0.01	0.79	0.81	0.04	4.00	45.95
141	VM99-25. Area D1.5	0.00	0.00	0.06	0.48	0.01	1.40	0.06	0.00	4.00	2.89
142											
143	VM99-25. Area D1.7	0.00	0.00	0.07	0.47	0.02	1.38	0.05	0.00	4.00	2.84
144	VM99-25. Area D1.8	0.00	0.00	0.13	0.16	0.01	0.82	0.82	0.04	4.00	45.54
145											
146	kaug.1	0.20	0.01	0.01	0.17	0.00	0.89	0.61	0.09	4.00	36.57
147											
148	VM99-25. Area D3.1	0.01	0.00	0.03	0.46	0.01	1.42	0.06	0.00	4.00	3.01
149	VM99-25. Area D3.2	0.01	0.00	0.01	0.50	0.02	1.39	0.06	0.00	4.00	2.88
150											
151	VM99-25. Area D3.4	0.00	0.00	0.05	0.21	0.01	0.88	0.80	0.02	4.00	42.26
152											
153	VM99-25. Area E1.1	0.00	0.00	0.03	0.49	0.02	1.40	0.06	0.00	4.00	2.82
154	VM99-25. Area E1.2	0.00	0.00	0.02	0.50	0.01	1.40	0.05	0.01	4.00	2.75
155	VM99-25. Area E1.3	0.01	0.00	0.01	0.50	0.01	1.40	0.05	0.00	4.00	2.64
156											
157	C	0.01	0.00	0.02	0.52	0.02	1.38	0.05	0.00	4.00	2.66
158	VM99-25. Area d1.2	0.02	0.00	0.01	0.55	0.01	1.34	0.05	0.00	4.00	2.58
159	VM99-25. Area d1.4	0.02	0.00	0.01	0.54	0.02	1.35	0.05	0.00	4.00	2.51
160											
161	**Pyroxene**										
162	VM99-24.area A.1										
163	VM99-24.area A.2										
164	VM99-24.area A.3										
165											
166	VM99-24.area A.4										
167	VM99-24.area A.5										
168											
169	VM99-24.area A.6										
170	VM99-24.area A.7										
171	VM99-24.area A.8										
172											
173	V7M99-24.area A.9										
174	V7M99-24.area A.10										
175	V7M99-24.area A.11										
176	V7M99-24.area A.12										
177	V7M99-24.area A.13										
178											
179	V7M99-24.area A.14										
180	V7M99-24.area A.15										
181	V7M99-24.area A.16										
182	V7M99-24.area A.17										
183	V7M99-24.area A.18										
184											
185	V7M99-24.area A.19										
186	V7M99-24.area A.20										
187	V7M99-24.area A.21										
188	V7M99-24.area A.22										
189	V7M99-24.area A.23										
190	V7M99-24.area A.24										
191											
192	V7M99-24.area B.1										
193	V7M99-24.area B.2										
194	V7M99-24.area B.3										
195	V7M99-24.area B.4										
196											
197	V7M99-24.area B.5										
198	V7M99-24.area B.6										
199	V7M99-24.area B.7										
200	V7M99-24.area B.8										
201											
202	V7M99-24.area B.9										

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
136				
137	VM99-25. Area D1.1	45.59	9.59	0.83
138	VM99-25. Area D1.2	62.63	0.87	0.99
139	VM99-25. Area D1.3	71.59	25.59	0.74
140	VM99-25. Area D1.4	44.46	9.59	0.82
141	VM99-25. Area D1.5	72.48	24.63	0.75
142				
143	VM99-25. Area D1.7	72.73	24.43	0.75
144	VM99-25. Area D1.8	45.36	9.10	0.83
145				
146	kaug.1	53.09	10.34	0.84
147				
148	VM99-25. Area D3.1	73.37	23.63	0.76
149	VM99-25. Area D3.2	71.66	25.46	0.74
150				
151	VM99-25. Area D3.4	46.47	11.27	0.81
152				
153	VM99-25. Area E1.1	71.81	25.36	0.74
154	VM99-25. Area E1.2	71.53	25.72	0.74
155	VM99-25. Area E1.3	71.63	25.73	0.74
156				
157	C	70.51	26.83	0.72
158	VM99-25. Area d1.2	69.10	28.32	0.71
159	VM99-25. Area d1.4	69.74	27.76	0.72
160				
161	**Pyroxene**			
162	VM99-24.area A.1			
163	VM99-24.area A.2			
164	VM99-24.area A.3			
165				
166	VM99-24.area A.4			
167	VM99-24.area A.5			
168				
169	VM99-24.area A.6			
170	VM99-24.area A.7			
171	VM99-24.area A.8			
172				
173	V7M99-24.area A.9			
174	V7M99-24.area A.10			
175	V7M99-24.area A.11			
176	V7M99-24.area A.12			
177	V7M99-24.area A.13			
178				
179	V7M99-24.area A.14			
180	V7M99-24.area A.15			
181	V7M99-24.area A.16			
182	V7M99-24.area A.17			
183	V7M99-24.area A.18			
184				
185	V7M99-24.area A.19			
186	V7M99-24.area A.20			
187	V7M99-24.area A.21			
188	V7M99-24.area A.22			
189	V7M99-24.area A.23			
190	V7M99-24.area A.24			
191				
192	V7M99-24.area B.1			
193	V7M99-24.area B.2			
194	V7M99-24.area B.3			
195	V7M99-24.area B.4			
196				
197	V7M99-24.area B.5			
198	V7M99-24.area B.6			
199	V7M99-24.area B.7			
200	V7M99-24.area B.8			
201				
202	V7M99-24.area B.9			

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
203	V7M99-24.area B.10	mid of clean opx	51.54	0.64	1.96	0.09	2.93	4.99
204	V7M99-24.area B.11	core of clean opx	50.54	0.63	3.00	0.24	3.33	5.00
205	V7M99-24.area B.12	mid of clean opx	52.01	0.63	1.72	0.12	3.01	4.84
206	V7M99-24.area B.13	rim of clean opx	51.45	0.56	2.60	0.04	2.09	6.32
207								
208	VM99-24.area C.1	core of clean opx	54.23	0.25	1.05	0.00	1.83	14.44
209	VM99-24.area C.2	mid of clean opx	54.76	0.23	1.03	0.01	1.19	14.40
210	VM99-24.area C.3	rim of clean opx	54.83	0.25	1.00	0.00	1.09	15.40
211	VM99-24.area C.4	rim of clean opx	54.24	0.33	1.40	0.00	2.05	14.65
212								
213	VM99-24.area C.5	core of clean cpx	51.09	0.63	2.39	0.00	3.32	5.57
214	VM99-24.area C.6	mid of clean cpx	50.76	0.76	2.93	0.00	3.44	5.60
215	VM99-24.area C.7	rim of clean cpx	50.91	0.71	2.72	0.01	3.37	5.28
216	VM99-24.area C.8	rim of clean cpx	50.15	0.84	3.38	0.00	3.29	5.96
217								
218	VM99-24.area C.9	core of clean opx	54.48	0.26	1.18	0.01	1.90	14.18
219	VM99-24.area C.10	mid of clean opx	53.54	0.31	1.97	0.00	2.51	13.70
220	VM99-24.area C.11	rim of clean opx	53.54	0.35	1.73	0.02	2.80	14.34
221	VM99-24.area C.12	rim of clean opx	53.70	0.34	1.74	0.01	2.22	13.77
222								
223	VM99-24.area C.13	core of clean opx	53.30	0.32	1.57	0.00	3.33	12.85
224	VM99-24.area C.14	mid of clean opx	53.56	0.28	0.84	0.03	3.36	13.43
225	VM99-24.area C.15	rim of clean opx	52.66	0.32	1.74	0.00	3.69	13.33
226	VM99-24.area C.16	rim of clean opx	53.39	0.32	1.52	0.00	2.95	13.38
227	VM99-24.area C.17	groundmass opx	52.92	0.29	1.78	0.00	3.15	14.23
228								
229	VM99-61a.area A.1	groundmass opx	51.78	0.26	1.80	0.00	3.27	15.71
230								
231	VM99-61a.area A.2	rim of clean opx	50.21	0.71	2.30	0.00	3.64	6.15
232	VM99-61a.area A.3	core of clean opx	51.94	0.34	0.99	0.00	3.24	14.61
233	VM99-61a.area A.4	rim of clean opx	52.68	0.25	1.05	0.00	2.54	16.34
234								
235	VM99-61a.area A.5	core of clean cpx	47.81	0.74	2.56	0.00	5.50	3.44
236	VM99-61a.area A.6	rim of clean cpx	48.21	0.59	2.34	0.03	2.61	6.08
237	VM99-61a.area A.7	rim of clean cpx	50.13	0.86	3.15	0.01	3.57	5.95
238								
239	VM99-61a.area A.8	core of clean cpx	50.63	0.60	2.29	0.00	3.29	6.54
240	VM99-61a.area A.9	mid of clean cpx	49.66	0.71	2.60	0.00	3.45	6.53
241	VM99-61a.area A.10	rim of clean cpx	50.86	0.57	2.21	0.01	2.96	6.03
242	VM99-61a.area A.11	interstitial pyx	51.26	0.50	1.73	0.00	2.43	6.93
243	VM99-61a.area A.12	interstitial pyx	49.57	0.72	2.67	0.00	3.41	6.97
244								
245	VM99-61a.area A.13	rim of clean cpx	50.31	0.60	2.00	0.01	1.98	7.31
246	VM99-61a.area A.14	core of clean cpx	51.87	0.50	1.61	0.00	1.73	7.34
247	VM99-61a.area A.15	rim of clean cpx	51.92	0.53	1.71	0.00	2.38	6.41
248								
249	VM99-61a.area C.1	core of groundmass opx	53.09	0.34	1.59	0.00	2.50	15.15
250	VM99-61a.area C.2	mid of groundmass opx	53.26	0.34	1.38	0.01	2.18	15.58
251	VM99-61a.area C.3	rim of groundmass opx	53.46	0.21	0.55	0.00	2.03	16.91
252								
253	VM99-61a.area C.4	core of groundmass opx	53.43	0.18	0.97	0.06	2.45	15.07
254	VM99-61a.area C.5	rim of groundmass opx	51.96	0.30	2.06	0.11	3.65	13.90
255	VM99-61a.area C.6	core of groundmass opx	52.97	0.29	0.97	0.00	3.18	14.38
256	VM99-61a.area C.7	rim of groundmass opx	53.62	0.33	1.18	0.00	1.94	15.42
257	VM99-61a.area C.8		53.12	0.30	1.01	0.00	2.81	14.63
258								
259	VM99-61a.area B.1	core of clean opx	50.60	0.28	2.53	0.02	0.30	16.20
260	VM99-61a.area B.2	mid of clean opx	54.35	0.15	1.23	0.00	1.04	15.79
261	VM99-61a.area B.3	rim of clean opx	54.60	0.24	0.99	0.00	0.39	16.49
262	VM99-61a.area B.4	rim of clean opx	52.30	0.34	1.66	0.00	3.31	13.59
263								
264	VM99-61a.area B.5	rim of groundmass opx	48.28	0.26	1.59	0.01	8.45	9.04
265	VM99-61a.area B.6	core of groundmass opx	52.39	0.15	1.29	0.02	3.57	14.07
266	VM99-61a.area B.7		52.87	0.15	1.12	0.01	2.76	14.87
267	VM99-61a.area B.8	core of clean opx	46.03	0.17	1.93	0.00	0.00	15.15
268	VM99-61a.area B.9	mid of clean opx	51.42	0.28	2.50	0.02	3.78	14.57
269	VM99-61a.area B.10	mid of clean opx	52.26	0.17	1.49	0.00	3.32	15.37

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
203	V7M99-24.area B.10	0.16	15.98	20.84	0.41		**99.53**				
204	V7M99-24.area B.11	0.15	15.35	20.56	0.46		**99.25**				
205	V7M99-24.area B.12	0.13	16.25	20.94	0.43		**100.07**				
206	V7M99-24.area B.13	0.18	15.98	20.09	0.28		**99.59**				
207											
208	VM99-24.area C.1	0.36	27.21	1.36	0.00		**100.76**				
209	VM99-24.area C.2	0.25	27.58	1.45	0.00		**100.92**				
210	VM99-24.area C.3	0.32	27.12	1.34	0.00		**101.35**				
211	VM99-24.area C.4	0.30	27.14	1.40	0.01		**101.51**				
212											
213	VM99-24.area C.5	0.18	15.47	20.73	0.38		**99.75**				
214	VM99-24.area C.6	0.19	15.81	20.02	0.38		**99.87**				
215	VM99-24.area C.7	0.14	15.94	20.34	0.35		**99.78**				
216	VM99-24.area C.8	0.23	15.14	19.97	0.42		**99.39**				
217											
218	VM99-24.area C.9	0.35	27.51	1.39	0.01		**101.28**				
219	VM99-24.area C.10	0.28	27.20	1.38	0.02		**100.91**				
220	VM99-24.area C.11	0.34	26.86	1.36	0.01		**101.34**				
221	VM99-24.area C.12	0.29	27.21	1.52	0.01		**100.82**				
222											
223	VM99-24.area C.13	0.29	27.42	1.53	0.01		**100.61**				
224	VM99-24.area C.14	0.39	27.17	1.52	0.02		**100.61**				
225	VM99-24.area C.15	0.30	26.70	1.54	0.01		**100.29**				
226	VM99-24.area C.16	0.34	27.20	1.46	0.01		**100.56**				
227	VM99-24.area C.17	0.31	26.49	1.33	0.01		**100.52**				
228											
229	VM99-61a.area A.1	0.39	24.84	1.26	0.03		**99.34**				
230											
231	VM99-61a.area A.2	0.22	14.86	20.07	0.45		**98.60**				
232	VM99-61a.area A.3	0.36	25.56	1.40	0.02		**98.46**				
233	VM99-61a.area A.4	0.41	25.16	1.19	0.02		**99.65**				
234											
235	VM99-61a.area A.5	0.21	14.46	20.64	0.42		**95.78**				
236	VM99-61a.area A.6	0.16	14.22	19.22	0.43		**93.89**				
237	VM99-61a.area A.7	0.17	15.23	19.87	0.43		**99.36**				
238											
239	VM99-61a.area A.8	0.22	15.35	19.34	0.47		**98.73**				
240	VM99-61a.area A.9	0.17	14.63	19.51	0.49		**97.75**				
241	VM99-61a.area A.10	0.22	15.09	20.43	0.43		**98.82**				
242	VM99-61a.area A.11	0.28	15.42	19.46	0.46		**98.46**				
243	VM99-61a.area A.12	0.20	14.44	19.11	0.54		**97.64**				
244											
245	VM99-61a.area A.13	0.18	14.91	19.20	0.44		**96.94**				
246	VM99-61a.area A.14	0.25	15.62	19.47	0.46		**98.84**				
247	VM99-61a.area A.15	0.20	15.41	20.68	0.43		**99.66**				
248											
249	VM99-61a.area C.1	0.34	26.17	1.29	0.00		**100.47**				
250	VM99-61a.area C.2	0.42	25.83	1.50	0.01		**100.51**				
251	VM99-61a.area C.3	0.52	25.23	1.30	0.01		**100.22**				
252											
253	VM99-61a.area C.4	0.36	26.23	1.41	0.01		**100.17**				
254	VM99-61a.area C.5	0.31	25.92	1.50	0.01		**99.74**				
255	VM99-61a.area C.6	0.43	25.77	2.19	0.01		**100.18**				
256	VM99-61a.area C.7	0.37	26.20	1.51	0.00		**100.55**				
257	VM99-61a.area C.8	0.40	25.75	2.20	0.01		**100.22**				
258											
259	VM99-61a.area B.1	0.35	23.53	1.55	0.06		**95.42**				
260	VM99-61a.area B.2	0.40	26.37	1.43	0.02		**100.79**				
261	VM99-61a.area B.3	0.39	26.37	1.24	0.01		**100.73**				
262	VM99-61a.area B.4	0.45	26.41	1.32	0.01		**99.40**				
263											
264	VM99-61a.area B.5	0.37	23.67	4.79	0.04		**96.51**				
265	VM99-61a.area B.6	0.41	26.15	1.26	0.02		**99.31**				
266	VM99-61a.area B.7	0.44	26.01	1.27	0.01		**99.50**				
267	VM99-61a.area B.8	0.34	21.28	1.20	0.02		**86.11**				
268	VM99-61a.area B.9	0.42	25.24	1.29	0.02		**99.54**				
269	VM99-61a.area B.10	0.46	25.33	1.22	0.02		**99.64**				

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
203	V7M99-24.area B.10										
204	V7M99-24.area B.11										
205	V7M99-24.area B.12										
206	V7M99-24.area B.13										
207											
208	VM99-24.area C.1										
209	VM99-24.area C.2										
210	VM99-24.area C.3										
211	VM99-24.area C.4										
212											
213	VM99-24.area C.5										
214	VM99-24.area C.6										
215	VM99-24.area C.7										
216	VM99-24.area C.8										
217											
218	VM99-24.area C.9										
219	VM99-24.area C.10										
220	VM99-24.area C.11										
221	VM99-24.area C.12										
222											
223	VM99-24.area C.13										
224	VM99-24.area C.14										
225	VM99-24.area C.15										
226	VM99-24.area C.16										
227	VM99-24.area C.17										
228											
229	VM99-61a.area A.1										
230											
231	VM99-61a.area A.2										
232	VM99-61a.area A.3										
233	VM99-61a.area A.4										
234											
235	VM99-61a.area A.5										
236	VM99-61a.area A.6										
237	VM99-61a.area A.7										
238											
239	VM99-61a.area A.8										
240	VM99-61a.area A.9										
241	VM99-61a.area A.10										
242	VM99-61a.area A.11										
243	VM99-61a.area A.12										
244											
245	VM99-61a.area A.13										
246	VM99-61a.area A.14										
247	VM99-61a.area A.15										
248											
249	VM99-61a.area C.1										
250	VM99-61a.area C.2										
251	VM99-61a.area C.3										
252											
253	VM99-61a.area C.4										
254	VM99-61a.area C.5										
255	VM99-61a.area C.6										
256	VM99-61a.area C.7										
257	VM99-61a.area C.8										
258											
259	VM99-61a.area B.1										
260	VM99-61a.area B.2										
261	VM99-61a.area B.3										
262	VM99-61a.area B.4										
263											
264	VM99-61a.area B.5										
265	VM99-61a.area B.6										
266	VM99-61a.area B.7										
267	VM99-61a.area B.8										
268	VM99-61a.area B.9										
269	VM99-61a.area B.10										

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
203	V7M99-24.area B.10			
204	V7M99-24.area B.11			
205	V7M99-24.area B.12			
206	V7M99-24.area B.13			
207				
208	VM99-24.area C.1			
209	VM99-24.area C.2			
210	VM99-24.area C.3			
211	VM99-24.area C.4			
212				
213	VM99-24.area C.5			
214	VM99-24.area C.6			
215	VM99-24.area C.7			
216	VM99-24.area C.8			
217				
218	VM99-24.area C.9			
219	VM99-24.area C.10			
220	VM99-24.area C.11			
221	VM99-24.area C.12			
222				
223	VM99-24.area C.13			
224	VM99-24.area C.14			
225	VM99-24.area C.15			
226	VM99-24.area C.16			
227	VM99-24.area C.17			
228				
229	VM99-61a.area A.1			
230				
231	VM99-61a.area A.2			
232	VM99-61a.area A.3			
233	VM99-61a.area A.4			
234				
235	VM99-61a.area A.5			
236	VM99-61a.area A.6			
237	VM99-61a.area A.7			
238				
239	VM99-61a.area A.8			
240	VM99-61a.area A.9			
241	VM99-61a.area A.10			
242	VM99-61a.area A.11			
243	VM99-61a.area A.12			
244				
245	VM99-61a.area A.13			
246	VM99-61a.area A.14			
247	VM99-61a.area A.15			
248				
249	VM99-61a.area C.1			
250	VM99-61a.area C.2			
251	VM99-61a.area C.3			
252				
253	VM99-61a.area C.4			
254	VM99-61a.area C.5			
255	VM99-61a.area C.6			
256	VM99-61a.area C.7			
257	VM99-61a.area C.8			
258				
259	VM99-61a.area B.1			
260	VM99-61a.area B.2			
261	VM99-61a.area B.3			
262	VM99-61a.area B.4			
263				
264	VM99-61a.area B.5			
265	VM99-61a.area B.6			
266	VM99-61a.area B.7			
267	VM99-61a.area B.8			
268	VM99-61a.area B.9			
269	VM99-61a.area B.10			

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
270	VM99-61a.area B.11	rim of groundmass opx	52.79	0.23	0.91	0.00	2.08	16.49
271								
272	VM99-61a.area B.12		52.83	0.24	2.76	0.02	2.00	15.65
273	VM99-61a.area B.13	core of groundmass cpx	51.24	0.74	2.82	0.00	2.30	6.78
274	VM99-61a.area B.14	mid of groundmass cpx	50.15	0.48	1.78	0.00	0.39	7.93
275	VM99-61a.area B.15	rim of groundmass cpx	51.88	0.62	2.33	0.00	1.81	7.13
276	VM99-61a.area B.16	core of groundmass cpx	52.07	0.62	2.27	0.01	1.87	6.97
277	VM99-61a.area B.17	rim of groundmass cpx	53.03	0.33	1.49	0.00	1.85	16.65
278								
279	VM99-30.area B.1	core of cpx inclusion in opx	49.01	0.86	4.84	0.15	3.46	5.36
280	VM99-30.area B.2	rim of cpx inclusion in opx	50.24	0.77	3.90	0.09	2.92	5.76
281	VM99-30.area B.3	rim of cpx inclusion in opx	50.83	0.72	2.92	0.00	2.62	7.27
282	VM99-30.area B.4	core of clean opx	50.59	0.86	2.93	0.00	2.90	7.29
283	VM99-30.area B.5	mid of clean opx	50.60	0.85	3.04	0.02	3.13	6.42
284	VM99-30.area B.6	rim of clean opx	52.35	0.40	1.74	0.00	3.42	13.49
285	VM99-30.area B.7	rim of clean opx	52.46	0.39	1.74	0.00	2.81	14.13
286	VM99-30.area B.8	core of clean opx	52.69	0.37	1.67	0.02	2.91	14.00
287								
288	VM99-30.area A.1	core of clean cpx	51.03	0.39	1.65	0.03	3.37	6.45
289	VM99-30.area A.2	mid of clean cpx	49.59	0.45	1.77	0.00	2.80	6.43
290	VM99-30.area A.3	rim of clean cpx	51.16	0.66	2.25	0.00	2.73	7.00
291	VM99-30.area A.4	rim of clean cpx	50.63	0.64	2.20	0.01	2.77	5.94
292	VM99-30.area A.5	mid of clean cpx	50.60	0.51	2.37	0.00	3.32	5.74
293								
294	VM99-30.area A.6	core of clean opx	51.43	0.27	1.29	0.00	2.51	16.16
295	VM99-30.area A.7	mid of clean opx	52.19	0.31	1.50	0.00	2.76	16.27
296	VM99-30.area A.8	rim of clean opx	52.56	0.26	1.33	0.00	3.42	15.16
297	VM99-30.area A.9	rim of clean opx	52.48	0.32	1.39	0.03	2.84	16.79
298								
299	VM99-30.area A.10	core of clean cpx	49.51	0.56	2.20	0.04	2.37	5.62
300	VM99-30.area A.11	rim of clean cpx	50.41	0.71	2.48	0.01	3.28	5.93
301	VM99-30.area A.12	mid of clean cpx	50.01	0.71	2.72	0.00	3.13	6.67
302	VM99-30.area A.13	rim of clean cpx	50.62	0.59	2.33	0.01	2.60	6.89
303	VM99-30.area A.14	mid of clean cpx	50.55	0.65	2.33	0.00	2.64	5.98
304	VM99-30.area A.15	mid of clean cpx	50.59	0.63	2.11	0.00	2.54	6.65
305								
306	VM99-30.area A.16	core of clean opx	53.45	0.30	1.26	0.00	1.71	14.91
307	VM99-30.area A.17	mid of clean opx	53.12	0.32	1.23	0.00	1.50	15.91
308	VM99-30.area A.18	rim of clean opx	53.28	0.27	1.02	0.00	1.28	15.63
309	VM99-30.area A.19	rim of clean opx	53.52	0.39	1.55	0.00	2.04	15.11
310	VM99-30.area A.20	rim of clean opx	53.07	0.27	1.20	0.00	1.84	15.66
311								
312	VM99-30.area A.21	core of clean opx	52.64	0.28	1.63	0.01	1.52	16.45
313	VM99-30.area A.22	rim of clean opx	53.23	0.36	1.70	0.02	1.73	15.65
314								
315	VM99-30.area B2.1	core of clean cpx	52.82	0.24	1.21	0.03	2.83	13.99
316	VM99-30.area B2.2	mid of clean cpx	52.97	0.23	1.00	0.00	2.54	14.08
317	VM99-30.area B2.3	mid of clean cpx	52.00	0.38	1.70	0.00	2.83	14.23
318	VM99-30.area B2.4	rim of clean cpx	52.83	0.29	1.13	0.00	3.09	13.68
319	VM99-30.area B2.5		52.85	0.27	0.90	0.00	3.13	13.63
320	VM99-30.area B2.6	core of opx inclusion in cpx	53.02	0.30	1.14	0.00	3.01	14.36
321	VM99-30.area B2.7	mid of opx inclusion in cpx	52.59	0.39	1.65	0.00	3.39	13.38
322	VM99-30.area B2.8	rim of opx inclusion in cpx	48.56	0.98	4.33	0.06	3.76	7.00
323	VM99-30.area B2.9		49.53	0.85	3.50	0.06	4.10	6.26
324	VM99-30.area B2.10		50.59	0.65	2.21	0.01	3.11	6.63
325	VM99-30.area B2.11		50.13	0.81	2.83	0.03	3.05	6.24
326								
327	**Pyroxene**	**12-Jan**						
328	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
329	kaug.1	standard	50.38	0.82	8.65	0.13	0.81	5.59
330	kaug.2	standard	50.63	0.83	8.69	0.17	0.52	5.77
331	kaug.3	standard	50.57	0.85	8.78	0.19	0.64	5.69
332								
333	VM99-25.Area D.1	cpx in gabbroic amphibole breakdown	52.33	0.52	1.76	0.06	1.37	7.34
334	VM99-25.Area D.2	cpx in gabbroic amphibole breakdown	51.36	0.77	2.74	0.04	1.64	7.76
335	VM99-25.Area D.3	core of opx welded on to gabbroic bre	53.85	0.29	1.30	0.00	0.40	17.19
336	VM99-25.Area D.4	rim of opx welded on to gabbroic brea	51.05	0.25	0.99	0.03	0.00	15.86

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
270	VM99-61a.area B.11	0.46	25.13	1.21	0.01		**99.31**				
271											
272	VM99-61a.area B.12	0.37	25.51	1.39	0.02		100.80				
273	VM99-61a.area B.13	0.24	15.01	20.16	0.50		**99.80**				
274	VM99-61a.area B.14	0.23	14.38	19.31	0.40		**95.05**				
275	VM99-61a.area B.15	0.25	15.57	19.74	0.47		**99.80**				
276	VM99-61a.area B.16	0.22	15.29	20.53	0.45		100.30				
277	VM99-61a.area B.17	0.45	25.24	1.23	0.01		**100.28**				
278											
279	VM99-30.area B.1	0.14	14.24	20.37	0.51		**98.95**				
280	VM99-30.area B.2	0.15	15.36	19.90	0.43		**99.53**				
281	VM99-30.area B.3	0.17	15.07	19.31	0.52		**99.42**				
282	VM99-30.area B.4	0.16	15.42	19.04	0.42		**99.60**				
283	VM99-30.area B.5	0.21	15.23	19.80	0.46		**99.76**				
284	VM99-30.area B.6	0.40	26.22	1.71	0.03		**99.75**				
285	VM99-30.area B.7	0.31	25.98	1.69	0.04		**99.55**				
286	VM99-30.area B.8	0.30	26.36	1.53	0.02		**99.87**				
287											
288	VM99-30.area A.1	0.28	14.78	20.59	0.41		**98.99**				
289	VM99-30.area A.2	0.22	14.56	19.89	0.35		**96.07**				
290	VM99-30.area A.3	0.17	15.74	19.26	0.40		**99.38**				
291	VM99-30.area A.4	0.22	15.56	19.95	0.36		**98.28**				
292	VM99-30.area A.5	0.17	15.12	20.55	0.38		**98.77**				
293											
294	VM99-30.area A.6	0.38	24.42	1.27	0.01		**97.73**				
295	VM99-30.area A.7	0.32	24.83	1.42	0.00		**99.60**				
296	VM99-30.area A.8	0.41	25.67	1.33	0.01		**100.16**				
297	VM99-30.area A.9	0.44	24.65	1.35	0.03		**100.33**				
298											
299	VM99-30.area A.10	0.18	15.06	19.91	0.34		**95.79**				
300	VM99-30.area A.11	0.14	15.42	19.93	0.39		**98.71**				
301	VM99-30.area A.12	0.16	14.86	19.41	0.48		**98.16**				
302	VM99-30.area A.13	0.21	14.89	19.93	0.41		**98.48**				
303	VM99-30.area A.14	0.14	15.40	20.07	0.38		**98.14**				
304	VM99-30.area A.15	0.19	15.63	19.15	0.39		**97.87**				
305											
306	VM99-30.area A.16	0.30	26.46	1.37	0.01		**99.77**				
307	VM99-30.area A.17	0.35	25.43	1.56	0.05		**99.47**				
308	VM99-30.area A.18	0.29	25.81	1.53	0.02		**99.11**				
309	VM99-30.area A.19	0.27	26.33	1.57	0.01		100.79				
310	VM99-30.area A.20	0.32	25.68	1.49	0.01		**99.54**				
311											
312	VM99-30.area A.21	0.34	25.14	1.21	0.01		**99.23**				
313	VM99-30.area A.22	0.30	25.80	1.51	0.02		100.31				
314											
315	VM99-30.area B2.1	0.30	26.34	1.61	0.01		**99.38**				
316	VM99-30.area B2.2	0.28	26.44	1.55	0.02		**99.12**				
317	VM99-30.area B2.3	0.34	25.57	1.74	0.03		**98.82**				
318	VM99-30.area B2.4	0.28	26.56	1.53	0.04		**99.42**				
319	VM99-30.area B2.5	0.28	26.63	1.52	0.03		**99.22**				
320	VM99-30.area B2.6	0.33	26.28	1.53	0.04		100.01				
321	VM99-30.area B2.7	0.35	26.53	1.63	0.03		**99.93**				
322	VM99-30.area B2.8	0.16	13.82	18.89	0.64		**98.19**				
323	VM99-30.area B2.9	0.17	14.82	19.31	0.52		**99.12**				
324	VM99-30.area B2.10	0.17	15.79	19.12	0.35		**98.63**				
325	VM99-30.area B2.11	0.15	15.36	19.57	0.40		**98.56**				
326											
327	**Pyroxene**										
328	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
329	kaug.1	0.13	16.57	15.65	1.22	0.00	**99.96**		1.82	0.02	0.18
330	kaug.2	0.15	16.57	15.66	1.24	0.01	**100.23**		1.83	0.02	0.17
331	kaug.3	0.16	16.60	15.53	1.27	0.00	**100.27**		1.82	0.02	0.18
332											
333	VM99-25.Area D.1	0.30	15.45	20.06	0.46	0.01	**99.67**		1.94	0.02	0.06
334	VM99-25.Area D.2	0.25	14.75	19.89	0.50	0.00	**99.70**		1.91	0.02	0.09
335	VM99-25.Area D.3	0.50	25.33	1.30	0.03	0.00	100.18		1.96	0.01	0.04
336	VM99-25.Area D.4	0.45	23.94	1.31	0.02	0.00	**93.90**		1.98	0.01	0.02

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
270	VM99-61a.area B.11										
271											
272	VM99-61a.area B.12										
273	VM99-61a.area B.13										
274	VM99-61a.area B.14										
275	VM99-61a.area B.15										
276	VM99-61a.area B.16										
277	VM99-61a.area B.17										
278											
279	VM99-30.area B.1										
280	VM99-30.area B.2										
281	VM99-30.area B.3										
282	VM99-30.area B.4										
283	VM99-30.area B.5										
284	VM99-30.area B.6										
285	VM99-30.area B.7										
286	VM99-30.area B.8										
287											
288	VM99-30.area A.1										
289	VM99-30.area A.2										
290	VM99-30.area A.3										
291	VM99-30.area A.4										
292	VM99-30.area A.5										
293											
294	VM99-30.area A.6										
295	VM99-30.area A.7										
296	VM99-30.area A.8										
297	VM99-30.area A.9										
298											
299	VM99-30.area A.10										
300	VM99-30.area A.11										
301	VM99-30.area A.12										
302	VM99-30.area A.13										
303	VM99-30.area A.14										
304	VM99-30.area A.15										
305											
306	VM99-30.area A.16										
307	VM99-30.area A.17										
308	VM99-30.area A.18										
309	VM99-30.area A.19										
310	VM99-30.area A.20										
311											
312	VM99-30.area A.21										
313	VM99-30.area A.22										
314											
315	VM99-30.area B2.1										
316	VM99-30.area B2.2										
317	VM99-30.area B2.3										
318	VM99-30.area B2.4										
319	VM99-30.area B2.5										
320	VM99-30.area B2.6										
321	VM99-30.area B2.7										
322	VM99-30.area B2.8										
323	VM99-30.area B2.9										
324	VM99-30.area B2.10										
325	VM99-30.area B2.11										
326											
327	**Pyroxene**										
328	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
329	kaug.1	0.19	0.00	0.02	0.17	0.00	0.89	0.61	0.09	4.00	36.34
330	kaug.2	0.20	0.01	0.01	0.17	0.01	0.89	0.61	0.09	4.00	36.24
331	kaug.3	0.20	0.01	0.02	0.17	0.01	0.89	0.60	0.09	4.00	36.07
332											
333	VM99-25.Area D.1	0.02	0.00	0.04	0.23	0.01	0.86	0.80	0.03	4.00	42.42
334	VM99-25.Area D.2	0.03	0.00	0.05	0.24	0.01	0.82	0.79	0.04	4.00	42.81
335	VM99-25.Area D.3	0.02	0.00	0.01	0.52	0.02	1.37	0.05	0.00	4.00	2.60
336	VM99-25.Area D.4	0.02	0.00	0.00	0.51	0.02	1.38	0.05	0.00	4.00	2.79

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
270	VM99-61a.area B.11			
271				
272	VM99-61a.area B.12			
273	VM99-61a.area B.13			
274	VM99-61a.area B.14			
275	VM99-61a.area B.15			
276	VM99-61a.area B.16			
277	VM99-61a.area B.17			
278				
279	VM99-30.area B.1			
280	VM99-30.area B.2			
281	VM99-30.area B.3			
282	VM99-30.area B.4			
283	VM99-30.area B.5			
284	VM99-30.area B.6			
285	VM99-30.area B.7			
286	VM99-30.area B.8			
287				
288	VM99-30.area A.1			
289	VM99-30.area A.2			
290	VM99-30.area A.3			
291	VM99-30.area A.4			
292	VM99-30.area A.5			
293				
294	VM99-30.area A.6			
295	VM99-30.area A.7			
296	VM99-30.area A.8			
297	VM99-30.area A.9			
298				
299	VM99-30.area A.10			
300	VM99-30.area A.11			
301	VM99-30.area A.12			
302	VM99-30.area A.13			
303	VM99-30.area A.14			
304	VM99-30.area A.15			
305				
306	VM99-30.area A.16			
307	VM99-30.area A.17			
308	VM99-30.area A.18			
309	VM99-30.area A.19			
310	VM99-30.area A.20			
311				
312	VM99-30.area A.21			
313	VM99-30.area A.22			
314				
315	VM99-30.area B2.1			
316	VM99-30.area B2.2			
317	VM99-30.area B2.3			
318	VM99-30.area B2.4			
319	VM99-30.area B2.5			
320	VM99-30.area B2.6			
321	VM99-30.area B2.7			
322	VM99-30.area B2.8			
323	VM99-30.area B2.9			
324	VM99-30.area B2.10			
325	VM99-30.area B2.11			
326				
327	**Pyroxene**			
328	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
329	kaug.1	53.52	10.13	0.84
330	kaug.2	53.35	10.42	0.84
331	kaug.3	53.62	10.32	0.84
332				
333	VM99-25.Area D.1	45.46	12.12	0.79
334	VM99-25.Area D.2	44.15	13.04	0.77
335	VM99-25.Area D.3	70.54	26.86	0.72
336	VM99-25.Area D.4	70.87	26.34	0.73

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
337	VM99-25.Area D.5	opx in gabbroic breakdown rxn	53.47	0.31	1.05	0.02	1.10	17.30
338	VM99-25.Area D.6	opx in gabbroic breakdown rxn	53.12	0.22	1.18	0.03	0.72	18.41
339	VM99-25.Area D.7	opx in gabbroic breakdown rxn	54.26	0.19	0.87	0.01	0.27	16.72
340	VM99-25.Area D.8	core of opx welded on to gabbroic bre	53.93	0.20	0.90	0.00	0.91	15.98
341	VM99-25.Area D.9	rim of opx welded on to gabbroic brea	54.37	0.23	0.89	0.01	0.05	16.73
342	VM99-25.Area D.10	opx in gabbroic breakdown rxn	53.18	0.38	1.61	0.03	0.87	16.75
343	VM99-25.Area D.11		53.40	0.31	1.47	0.04	0.22	16.82
344								
345	VM99-52. Area A2.2	mid of clinopyroxene phenocryst	52.78	0.55	2.01	0.02	0.88	7.26
346	VM99-52. Area A2.3	rim of clinopyroxene phenocryst	52.35	0.56	1.97	0.00	1.33	7.01
347	VM99-52. Area A2.4	rim of clinopyroxene phenocryst	52.06	0.64	2.22	0.03	1.50	6.97
348								
349	VM99-52. Area B1.1	core of orthopyroxene phenocryst	54.76	0.23	1.56	0.00	0.00	14.91
350	VM99-52. Area B1.2	mid of orthopyroxene phenocryst	54.41	0.12	0.89	0.00	0.87	15.30
351	VM99-52. Area B1.3	rim of orthopyroxene phenocryst (ox)	54.75	0.23	0.92	0.00	1.60	11.37
352	VM99-52. Area B1.4	rim of orthopyroxene phenocryst (ox)	53.70	0.28	1.12	0.00	3.38	11.21
353								
354	VM99-52. Area B3.1	core of orthopyroxene phenocryst	54.06	0.31	1.30	0.00	0.64	15.88
355	VM99-52. Area B3.2	mid of orthopyroxene phenocryst	54.33	0.24	1.19	0.02	0.37	16.40
356	VM99-52. Area B3.3	rim of orthopyroxene phenocryst (ox)	53.33	0.25	0.70	0.02	3.76	13.50
357	VM99-52. Area B3.4	rim of orthopyroxene phenocryst (ox)	54.49	0.30	1.37	0.02	1.18	13.78
358								
359	VM99-52. Area C1.1	opx microphenocryst	55.49	0.25	1.12	0.07	1.15	10.14
360								
361	VM99-52. Area C1.3	opx microphenocryst	55.56	0.19	0.46	0.02	2.79	8.60
362	VM99-52. Area C2.1	core of clinopyroxene phenocryst	52.02	0.60	2.34	0.00	1.10	6.81
363	VM99-52. Area C2.2	mid of clinopyroxene phenocryst	52.19	0.62	2.34	0.01	1.08	6.94
364	VM99-52. Area C2.3	rim of clinopyroxene phenocryst	52.93	0.37	1.57	0.00	0.88	7.39
365	VM99-52. Area C2.4	rim of clinopyroxene phenocryst	52.83	0.44	1.59	0.00	0.34	7.51
366	VM99-52. Area C2.5	opx microphenocryst	57.41	0.26	1.22	0.01	0.00	15.99
367								
368	VM99-52. Area D1.1	core of cpx microphenocryst	52.81	0.51	1.82	0.00	0.17	7.47
369	VM99-52. Area D1.2	rim of cpx microphenocryst	52.62	0.50	1.64	0.00	0.00	7.89
370	VM99-52. Area D1.3	rim of cpx microphenocryst	51.68	0.63	2.54	0.02	1.24	6.83
371								
372	VM99-52. Area A2.5	core of orthopyroxene phenocryst	54.66	0.25	1.04	0.00	0.38	16.35
373	VM99-52. Area A2.6	rim of orthopyroxene phenocryst (ox)	57.32	0.27	0.69	0.04	0.00	15.94
374	VM99-52. Area A2.7	rim of orthopyroxene phenocryst (ox)	54.31	0.34	1.29	0.04	1.09	15.10
375	VM99-52. Area A2.8	cpx phenocryst	51.91	0.68	2.92	0.21	1.58	7.15
376	**Inclusion**							
377	VM99-61a. Area A1.1	orthopyroxene microphenocryst	54.03	0.34	1.10	0.00	0.22	17.90
378	VM99-61a. Area A1.2	orthopyroxene microphenocryst	53.67	0.39	1.84	0.00	1.21	15.66
379	VM99-61a. Area A1.3	core of orthopyroxene phenocryst	53.91	0.31	1.29	0.00	1.24	16.86
380	VM99-61a. Area A1.4	mid of orthopyroxene phenocryst	54.77	0.14	0.54	0.00	0.40	17.80
381	VM99-61a. Area A1.5	rim of orthopyroxene phenocryst	53.85	0.25	0.97	0.00	0.58	17.78
382	VM99-61a. Area A1.6	rim of orthopyroxene phenocryst	53.41	0.33	2.11	0.02	1.42	16.31
383								
384	VM99-61a. Area A3.1	core of orthopyroxene phenocryst	53.84	0.35	1.31	0.01	1.40	16.23
385	VM99-61a. Area A3.2	mid of orthopyroxene phenocryst	54.53	0.31	1.06	0.00	0.87	16.54
386	VM99-61a. Area A3.3	rim of orthopyroxene phenocryst	54.31	0.26	0.96	0.00	1.10	16.81
387	VM99-61a. Area A3.4	rim of orthopyroxene phenocryst	53.88	0.30	1.20	0.02	0.97	16.68
388								
389	VM99-61a. Area A4.1	core of orthopyroxene micro	54.48	0.29	0.91	0.02	0.00	17.63
390	VM99-61a. Area A4.2	rim of orthopyroxene micro	54.65	0.21	0.67	0.03	0.00	18.08
391	VM99-61a. Area A4.3	core of clinopyroxene micro	53.51	0.18	0.95	0.01	1.01	7.24
392	VM99-61a. Area A4.4	rim of clinopyroxene micro	52.71	0.53	1.97	0.01	1.03	7.45
393	VM99-61a. Area A4.5	orthopyroxene microphenocryst	53.48	0.38	1.87	0.01	1.41	15.77
394								
395	VM99-61a. Area C1.1	core of opx microphenocryst at incl/h	53.49	0.34	1.79	0.00	0.00	16.60
396	VM99-61a. Area C1.2	rim of opx microphenocryst at incl/hos	54.49	0.26	0.60	0.00	0.22	17.28
397	VM99-61a. Area C1.3	core of opx microphenocryst at incl/h	53.92	0.30	1.26	0.00	0.00	17.55
398	VM99-61a. Area C1.4	core of cpx microphenocryst at incl/h	52.45	0.59	2.06	0.00	0.87	7.94
399	VM99-61a. Area C1.5	rim of opx microphenocryst at incl/hos	52.22	0.51	1.80	0.00	1.52	7.23
400	VM99-61a. Area C1.6	cpx microphenocryst?	52.84	0.48	1.62	0.00	0.55	7.70
401	VM99-61a. Area C1.7	cpx microphenocryst?	51.25	0.67	3.02	0.01	1.38	7.72
402	**host**							
403	VM99-61a. Area D1.1	cpx inclusion in plagioclase	51.71	0.53	2.33	0.01	2.18	6.55

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
337	VM99-25.Area D.5	0.49	25.08	1.22	0.03	0.00	**100.07**		1.96	0.01	0.05
338	VM99-25.Area D.6	0.53	24.02	1.36	0.04	0.00	**99.63**		1.96	0.01	0.04
339	VM99-25.Area D.7	0.44	25.94	1.19	0.03	0.00	**99.92**		1.97	0.01	0.03
340	VM99-25.Area D.8	0.49	26.10	1.19	0.03	0.00	**99.72**		1.96	0.01	0.04
341	VM99-25.Area D.9	0.50	25.89	1.32	0.03	0.00	**100.01**		1.98	0.01	0.03
342	VM99-25.Area D.10	0.48	25.12	1.37	0.03	0.00	**99.83**		1.94	0.01	0.06
343	VM99-25.Area D.11	0.52	25.21	1.29	0.04	0.00	**99.32**		1.96	0.01	0.04
344											
345	VM99-52. Area A2.2	0.31	15.54	20.63	0.41	0.00	**100.38**		1.94	0.02	0.06
346	VM99-52. Area A2.3	0.25	15.59	20.41	0.41	0.00	**99.89**		1.94	0.02	0.06
347	VM99-52. Area A2.4	0.22	15.39	20.42	0.44	0.01	**99.91**		1.93	0.02	0.07
348											
349	VM99-52. Area B1.1	0.45	27.24	1.15	0.01	0.01	**100.32**		1.96	0.01	0.04
350	VM99-52. Area B1.2	0.47	26.73	1.19	0.04	0.01	**100.04**		1.97	0.00	0.03
351	VM99-52. Area B1.3	0.54	29.27	1.19	0.01	0.00	**99.88**		1.95	0.01	0.04
352	VM99-52. Area B1.4	0.49	29.00	0.75	0.02	0.00	**99.95**		1.92	0.01	0.05
353											
354	VM99-52. Area B3.1	0.41	26.27	1.24	0.04	0.00	**100.16**		1.96	0.01	0.04
355	VM99-52. Area B3.2	0.41	26.25	1.22	0.01	0.00	**100.42**		1.96	0.01	0.04
356	VM99-52. Area B3.3	0.58	27.41	0.78	0.00	0.02	**100.33**		1.93	0.01	0.03
357	VM99-52. Area B3.4	0.44	27.70	1.33	0.03	0.00	**100.63**		1.95	0.01	0.05
358											
359	VM99-52. Area C1.1	0.48	30.31	1.39	0.02	0.01	**100.44**		1.96	0.01	0.05
360											
361	VM99-52. Area C1.3	0.57	31.27	1.26	0.02	0.00	**100.75**		1.95	0.01	0.02
362	VM99-52. Area C2.1	0.21	15.58	20.40	0.38	0.01	**99.45**		1.93	0.02	0.07
363	VM99-52. Area C2.2	0.23	15.60	20.34	0.42	0.00	**99.76**		1.93	0.02	0.07
364	VM99-52. Area C2.3	0.25	15.24	20.82	0.46	0.00	**99.91**		1.96	0.01	0.04
365	VM99-52. Area C2.4	0.30	15.25	20.86	0.40	0.00	**99.51**		1.96	0.01	0.04
366	VM99-52. Area C2.5	0.48	22.21	0.64	0.06	0.06	**98.35**		2.09	0.01	0.00
367											
368	VM99-52. Area D1.1	0.23	15.92	20.22	0.35	0.00	**99.51**		1.96	0.01	0.04
369	VM99-52. Area D1.2	0.27	15.92	19.63	0.31	0.00	**98.78**		1.96	0.01	0.04
370	VM99-52. Area D1.3	0.22	15.51	20.11	0.41	0.00	**99.18**		1.92	0.02	0.08
371											
372	VM99-52. Area A2.5	0.45	26.43	1.15	0.04	0.00	**100.77**		1.97	0.01	0.03
373	VM99-52. Area A2.6	0.69	26.28	0.81	0.02	0.00	**102.06**		2.02	0.01	0.00
374	VM99-52. Area A2.7	0.42	26.86	1.32	0.03	0.00	**100.81**		1.95	0.01	0.05
375	VM99-52. Area A2.8	0.22	15.06	20.47	0.48	0.00	**100.68**		1.91	0.02	0.09
376	**Inclusion**										
377	VM99-61a. Area A1.1	0.46	25.14	1.26	0.02	0.01	**100.47**		1.97	0.01	0.04
378	VM99-61a. Area A1.2	0.43	25.97	1.52	0.04	0.01	**100.74**		1.94	0.01	0.07
379	VM99-61a. Area A1.3	0.50	25.43	1.43	0.04	0.01	**101.02**		1.95	0.01	0.05
380	VM99-61a. Area A1.4	0.45	25.69	1.09	0.04	0.01	**100.92**		1.98	0.00	0.02
381	VM99-61a. Area A1.5	0.55	24.96	1.24	0.03	0.02	**100.24**		1.97	0.01	0.03
382	VM99-61a. Area A1.6	0.45	25.59	1.18	0.05	0.01	**100.89**		1.93	0.01	0.07
383											
384	VM99-61a. Area A3.1	0.44	25.78	1.42	0.05	0.00	**100.84**		1.95	0.01	0.06
385	VM99-61a. Area A3.2	0.41	26.09	1.39	0.05	0.00	**101.26**		1.96	0.01	0.04
386	VM99-61a. Area A3.3	0.43	25.82	1.30	0.05	0.01	**101.06**		1.96	0.01	0.04
387	VM99-61a. Area A3.4	0.46	25.65	1.34	0.02	0.01	**100.53**		1.95	0.01	0.05
388											
389	VM99-61a. Area A4.1	0.47	25.27	1.38	0.06	0.00	**100.53**		1.98	0.01	0.02
390	VM99-61a. Area A4.2	0.55	25.11	1.17	0.04	0.01	**100.52**		1.99	0.01	0.02
391	VM99-61a. Area A4.3	0.35	15.20	21.20	0.49	0.00	**100.15**		1.98	0.01	0.02
392	VM99-61a. Area A4.4	0.24	15.54	20.38	0.43	0.01	**100.30**		1.94	0.02	0.06
393	VM99-61a. Area A4.5	0.40	25.96	1.35	0.02	0.00	**100.66**		1.93	0.01	0.07
394											
395	VM99-61a. Area C1.1	0.44	25.36	1.44	0.04	0.00	**99.51**		1.95	0.01	0.05
396	VM99-61a. Area C1.2	0.49	25.57	1.44	0.04	0.00	**100.38**		1.98	0.01	0.02
397	VM99-61a. Area C1.3	0.49	24.94	1.50	0.02	0.01	**99.99**		1.97	0.01	0.03
398	VM99-61a. Area C1.4	0.25	15.41	19.90	0.45	0.00	**99.92**		1.94	0.02	0.06
399	VM99-61a. Area C1.5	0.28	15.19	20.31	0.49	0.00	**99.56**		1.94	0.01	0.06
400	VM99-61a. Area C1.6	0.31	15.34	20.68	0.38	0.00	**99.90**		1.96	0.01	0.04
401	VM99-61a. Area C1.7	0.24	14.80	19.51	0.54	0.01	**99.15**		1.92	0.02	0.09
402	**host**										
403	VM99-61a. Area D1.1	0.21	15.02	20.66	0.48	0.02	**99.71**		1.92	0.02	0.08

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
337	VM99-25.Area D.5	0.00	0.00	0.03	0.53	0.02	1.37	0.05	0.00	4.00	2.46
338	VM99-25.Area D.6	0.01	0.00	0.02	0.57	0.02	1.32	0.05	0.00	4.00	2.78
339	VM99-25.Area D.7	0.01	0.00	0.01	0.51	0.01	1.41	0.05	0.00	4.00	2.37
340	VM99-25.Area D.8	0.00	0.00	0.03	0.49	0.02	1.42	0.05	0.00	4.00	2.38
341	VM99-25.Area D.9	0.01	0.00	0.00	0.51	0.02	1.40	0.05	0.00	4.00	2.62
342	VM99-25.Area D.10	0.01	0.00	0.02	0.51	0.02	1.37	0.05	0.00	4.00	2.78
343	VM99-25.Area D.11	0.02	0.00	0.01	0.52	0.02	1.38	0.05	0.00	4.00	2.60
344											
345	VM99-52. Area A2.2	0.03	0.00	0.02	0.22	0.01	0.85	0.81	0.03	4.00	43.05
346	VM99-52. Area A2.3	0.02	0.00	0.04	0.22	0.01	0.86	0.81	0.03	4.00	42.90
347	VM99-52. Area A2.4	0.03	0.00	0.04	0.22	0.01	0.85	0.81	0.03	4.00	43.20
348											
349	VM99-52. Area B1.1	0.03	0.00	0.00	0.45	0.01	1.46	0.04	0.00	4.00	2.26
350	VM99-52. Area B1.2	0.01	0.00	0.02	0.46	0.01	1.44	0.05	0.00	4.00	2.37
351	VM99-52. Area B1.3	0.00	0.00	0.04	0.34	0.02	1.56	0.05	0.00	4.00	2.35
352	VM99-52. Area B1.4	0.00	0.00	0.09	0.34	0.02	1.55	0.03	0.00	4.00	1.50
353											
354	VM99-52. Area B3.1	0.01	0.00	0.02	0.48	0.01	1.42	0.05	0.00	4.00	2.47
355	VM99-52. Area B3.2	0.01	0.00	0.01	0.50	0.01	1.41	0.05	0.00	4.00	2.41
356	VM99-52. Area B3.3	0.00	0.00	0.10	0.41	0.02	1.48	0.03	0.00	4.00	1.58
357	VM99-52. Area B3.4	0.01	0.00	0.03	0.41	0.01	1.48	0.05	0.00	4.00	2.63
358											
359	VM99-52. Area C1.1	0.00	0.00	0.03	0.30	0.01	1.59	0.05	0.00	4.00	2.70
360											
361	VM99-52. Area C1.3	0.00	0.00	0.07	0.25	0.02	1.64	0.05	0.00	4.00	2.45
362	VM99-52. Area C2.1	0.03	0.00	0.03	0.21	0.01	0.86	0.81	0.03	4.00	43.05
363	VM99-52. Area C2.2	0.03	0.00	0.03	0.22	0.01	0.86	0.81	0.03	4.00	42.87
364	VM99-52. Area C2.3	0.03	0.00	0.03	0.23	0.01	0.84	0.83	0.03	4.00	43.56
365	VM99-52. Area C2.4	0.03	0.00	0.01	0.23	0.01	0.85	0.83	0.03	4.00	43.51
366	VM99-52. Area C2.5	0.05	0.00	0.00	0.49	0.02	1.20	0.03	0.00	3.88	1.45
367											
368	VM99-52. Area D1.1	0.04	0.00	0.01	0.23	0.01	0.88	0.80	0.03	4.00	41.96
369	VM99-52. Area D1.2	0.04	0.00	0.00	0.25	0.01	0.89	0.79	0.02	4.00	40.95
370	VM99-52. Area D1.3	0.04	0.00	0.04	0.21	0.01	0.86	0.80	0.03	4.00	42.77
371											
372	VM99-52. Area A2.5	0.01	0.00	0.01	0.49	0.01	1.42	0.04	0.00	4.00	2.27
373	VM99-52. Area A2.6	0.03	0.00	0.00	0.47	0.02	1.38	0.03	0.00	3.96	1.63
374	VM99-52. Area A2.7	0.00	0.00	0.03	0.45	0.01	1.44	0.05	0.00	4.00	2.61
375	VM99-52. Area A2.8	0.04	0.01	0.04	0.22	0.01	0.83	0.81	0.03	4.00	43.55
376	**Inclusion**										
377	VM99-61a. Area A1.1	0.01	0.00	0.01	0.54	0.01	1.36	0.05	0.00	4.00	2.50
378	VM99-61a. Area A1.2	0.01	0.00	0.03	0.47	0.01	1.40	0.06	0.00	4.00	3.05
379	VM99-61a. Area A1.3	0.00	0.00	0.03	0.51	0.02	1.37	0.06	0.00	4.00	2.86
380	VM99-61a. Area A1.4	0.00	0.00	0.01	0.54	0.01	1.39	0.04	0.00	4.00	2.16
381	VM99-61a. Area A1.5	0.01	0.00	0.02	0.54	0.02	1.36	0.05	0.00	4.00	2.48
382	VM99-61a. Area A1.6	0.02	0.00	0.04	0.49	0.01	1.38	0.05	0.00	4.00	2.39
383											
384	VM99-61a. Area A3.1	0.00	0.00	0.04	0.49	0.01	1.39	0.06	0.00	4.00	2.84
385	VM99-61a. Area A3.2	0.00	0.00	0.02	0.50	0.01	1.40	0.05	0.00	4.00	2.75
386	VM99-61a. Area A3.3	0.00	0.00	0.03	0.51	0.01	1.39	0.05	0.00	4.00	2.58
387	VM99-61a. Area A3.4	0.01	0.00	0.03	0.51	0.01	1.39	0.05	0.00	4.00	2.67
388											
389	VM99-61a. Area A4.1	0.02	0.00	0.00	0.54	0.01	1.37	0.05	0.00	4.00	2.75
390	VM99-61a. Area A4.2	0.01	0.00	0.00	0.55	0.02	1.36	0.05	0.00	4.00	2.33
391	VM99-61a. Area A4.3	0.02	0.00	0.03	0.22	0.01	0.84	0.84	0.04	4.00	44.17
392	VM99-61a. Area A4.4	0.03	0.00	0.03	0.23	0.01	0.85	0.81	0.03	4.00	42.62
393	VM99-61a. Area A4.5	0.01	0.00	0.04	0.48	0.01	1.40	0.05	0.00	4.00	2.72
394											
395	VM99-61a. Area C1.1	0.03	0.00	0.00	0.51	0.01	1.38	0.06	0.00	4.00	2.90
396	VM99-61a. Area C1.2	0.00	0.00	0.01	0.53	0.02	1.38	0.06	0.00	4.00	2.85
397	VM99-61a. Area C1.3	0.02	0.00	0.00	0.54	0.02	1.36	0.06	0.00	4.00	3.01
398	VM99-61a. Area C1.4	0.03	0.00	0.02	0.25	0.01	0.85	0.79	0.03	4.00	41.86
399	VM99-61a. Area C1.5	0.02	0.00	0.04	0.23	0.01	0.84	0.81	0.04	4.00	43.13
400	VM99-61a. Area C1.6	0.03	0.00	0.02	0.24	0.01	0.85	0.82	0.03	4.00	43.07
401	VM99-61a. Area C1.7	0.05	0.00	0.04	0.24	0.01	0.83	0.78	0.04	4.00	42.29
402	**host**										
403	VM99-61a. Area D1.1	0.02	0.00	0.06	0.20	0.01	0.83	0.82	0.04	4.00	44.27

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
337	VM99-25.Area D.5	70.32	27.22	0.72
338	VM99-25.Area D.6	67.99	29.24	0.70
339	VM99-25.Area D.7	71.70	25.94	0.73
340	VM99-25.Area D.8	72.66	24.96	0.74
341	VM99-25.Area D.9	71.46	25.92	0.73
342	VM99-25.Area D.10	70.76	26.46	0.73
343	VM99-25.Area D.11	70.87	26.53	0.73
344				
345	VM99-52. Area A2.2	45.12	11.82	0.79
346	VM99-52. Area A2.3	45.60	11.51	0.80
347	VM99-52. Area A2.4	45.29	11.51	0.80
348				
349	VM99-52. Area B1.1	74.78	22.96	0.77
350	VM99-52. Area B1.2	73.90	23.73	0.76
351	VM99-52. Area B1.3	80.18	17.48	0.82
352	VM99-52. Area B1.4	80.94	17.56	0.82
353				
354	VM99-52. Area B3.1	72.83	24.70	0.75
355	VM99-52. Area B3.2	72.26	25.33	0.74
356	VM99-52. Area B3.3	77.11	21.31	0.78
357	VM99-52. Area B3.4	76.12	21.25	0.78
358				
359	VM99-52. Area C1.1	81.93	15.38	0.84
360				
361	VM99-52. Area C1.3	84.50	13.04	0.87
362	VM99-52. Area C2.1	45.74	11.22	0.80
363	VM99-52. Area C2.2	45.72	11.41	0.80
364	VM99-52. Area C2.3	44.37	12.07	0.79
365	VM99-52. Area C2.4	44.26	12.22	0.78
366	VM99-52. Area C2.5	70.19	28.35	0.71
367				
368	VM99-52. Area D1.1	45.94	12.10	0.79
369	VM99-52. Area D1.2	46.21	12.84	0.78
370	VM99-52. Area D1.3	45.89	11.34	0.80
371				
372	VM99-52. Area A2.5	72.55	25.19	0.74
373	VM99-52. Area A2.6	73.40	24.98	0.75
374	VM99-52. Area A2.7	74.03	23.36	0.76
375	VM99-52. Area A2.8	44.58	11.87	0.79
376	**Inclusion**			
377	VM99-61a. Area A1.1	69.67	27.83	0.72
378	VM99-61a. Area A1.2	72.45	24.51	0.75
379	VM99-61a. Area A1.3	70.80	26.34	0.73
380	VM99-61a. Area A1.4	70.45	27.39	0.72
381	VM99-61a. Area A1.5	69.67	27.85	0.71
382	VM99-61a. Area A1.6	71.90	25.71	0.74
383				
384	VM99-61a. Area A3.1	71.79	25.36	0.74
385	VM99-61a. Area A3.2	71.74	25.52	0.74
386	VM99-61a. Area A3.3	71.35	26.07	0.73
387	VM99-61a. Area A3.4	71.32	26.01	0.73
388				
389	VM99-61a. Area A4.1	69.90	27.36	0.72
390	VM99-61a. Area A4.2	69.57	28.10	0.71
391	VM99-61a. Area A4.3	44.05	11.78	0.79
392	VM99-61a. Area A4.4	45.22	12.17	0.79
393	VM99-61a. Area A4.5	72.55	24.73	0.75
394				
395	VM99-61a. Area C1.1	71.01	26.09	0.73
396	VM99-61a. Area C1.2	70.45	26.71	0.73
397	VM99-61a. Area C1.3	69.53	27.46	0.72
398	VM99-61a. Area C1.4	45.09	13.04	0.78
399	VM99-61a. Area C1.5	44.88	11.99	0.79
400	VM99-61a. Area C1.6	44.42	12.51	0.78
401	VM99-61a. Area C1.7	44.64	13.06	0.77
402	**host**			
403	VM99-61a. Area D1.1	44.78	10.95	0.80

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
404	VM99-61a. Area D1.2	core of opx phenocryst	53.66	0.33	1.69	0.00	0.76	16.17
405	VM99-61a. Area D1.3	rim of opx phenocryst	53.80	0.36	1.58	0.00	0.85	15.73
406								
407	VM99-61a. Area D2.1	opx phenocryst	54.09	0.37	1.96	0.00	0.41	14.93
408	VM99-61a. Area D2.2	cpx phenocryst?	57.76	0.10	23.77	0.00	0.00	1.86
409								
410	VM99-61a. Area D3.1	core of opx phenocryst	54.66	0.26	0.77	0.00	0.00	17.29
411	VM99-61a. Area D3.2	rim of opx phenocryst	53.73	0.20	1.89	0.02	0.75	16.84
412	VM99-61a. Area D3.3	rim of opx phenocryst	54.53	0.34	1.62	0.00	0.02	16.43
413								
414	VM99-61a. Area D4.1	core of cpx phenocryst	52.75	0.45	1.53	0.02	1.53	7.53
415	VM99-61a. Area D4.2	rim of cpx phenocryst	51.46	0.78	3.40	0.00	1.28	7.78
416								
417	VM99-61a. Area D5.1	core of opx phenocryst	54.72	0.21	0.84	0.00	0.36	17.12
418	VM99-61a. Area D5.2	rim of opx phenocryst?	53.23	0.36	2.32	0.00	0.98	16.82
419	VM99-61a. Area D5.3	rim of opx phenocryst?	53.04	0.32	2.43	0.01	1.68	16.21
420								
421	VM99-61a. Area E1.1	core of clinopyroxene phenocryst	50.72	0.60	4.28	0.02	1.64	8.48
422	VM99-61a. Area E1.2	rim of clinopyroxene phenocryst	52.55	0.60	2.07	0.03	0.53	7.74
423	VM99-61a. Area E1.3	rim of clinopyroxene phenocryst	50.95	0.64	3.65	0.01	2.37	6.97
424	VM99-61a. Area E1.4		52.29	0.51	2.02	0.09	1.58	7.14
425	VM99-61a. Area E1.5	cpx microphenocryst	51.57	0.57	2.35	0.11	1.75	7.26
426	VM99-61a. Area E1.6	opx microphenocryst	53.64	0.29	1.43	0.03	1.05	16.46
427	VM99-61a. Area E1.7	cpx microphenocryst	51.91	0.67	2.35	0.06	1.42	7.45
428								
429	VM99-61a. Area E3.1	core of cpx phenocryst	52.05	0.61	2.50	0.07	1.74	6.81
430	VM99-61a. Area E3.2	rim of cpx phenocryst	51.68	0.79	2.64	0.00	1.77	6.93
431								
432	VM99-8. Area A1.1	core of opx microphenocryst	54.37	0.22	2.07	0.01	0.63	15.16
433	VM99-8. Area A1.2	rim of opx microphenocryst	54.09	0.25	1.84	0.02	0.91	15.19
434								
435	VM99-8. Area A3.1	core of opx microphenocryst	52.87	0.33	2.41	0.04	0.66	15.54
436	VM99-8. Area A3.2	rim of opx microphenocryst	54.87	0.21	1.29	0.02	0.00	15.64
437								
438	VM99-8. Area B1.1	core of cpx microphenocryst	52.04	0.57	2.51	0.00	1.18	7.74
439	VM99-8. Area B1.2	rim of cpx microphenocryst	51.89	0.57	2.80	0.02	0.95	7.19
440								
441	VM99-8. Area C2.1	core of opx phenocryst	54.79	0.26	1.15	0.00	0.09	16.27
442	VM99-8. Area C2.2	rim of opx phenocryst	54.56	0.18	1.77	0.00	0.54	15.65
443	VM99-8. Area C2.3	rim of opx phenocryst	55.12	0.17	1.17	0.00	0.53	15.18
444	VM99-8. Area C2.4	core of cpx microphenocryst	51.90	0.65	2.72	0.00	1.46	7.12
445	VM99-8. Area C2.5	rim of cpx microphenocryst	52.17	0.60	2.64	0.00	0.89	7.31
446								
447	VM99-8. Area D2.1	core of opx microphenocryst	54.09	0.21	1.54	0.00	1.31	14.65
448	VM99-8. Area D2.2	rim of opx microphenocryst	55.01	0.18	0.69	0.00	0.69	15.21
449	VM99-8. Area D2.3	core of cpx microphenocryst	51.53	0.49	2.72	0.01	2.80	5.66
450	VM99-8. Area D2.4	rim of cpx microphenocryst	51.85	0.51	2.70	0.04	1.82	7.09
451								
452	VM99-8. Area E4.1	core of cpx phenocryst	52.01	0.54	2.88	0.02	2.32	5.83
453	VM99-8. Area E4.2	rim of cpx phenocryst	52.09	0.55	2.81	0.00	1.69	6.54
454								
455	VM99-8. Area E5.1	core of opx phenocryst	53.57	0.24	1.91	0.01	1.27	16.27
456	VM99-8. Area E5.2	rim of opx phenocryst	54.11	0.23	1.30	0.00	1.36	16.08
457								
458	VM99-8. Area E6.1	core of cpx phenocryst	52.14	0.68	2.49	0.03	2.19	6.09
459	VM99-8. Area E6.2	rim of cpx phenocryst	51.25	0.47	2.36	0.03	3.06	5.58
460								
461	VM99-8. Area E8.1	cpx in "inverted gabbroic" breakdown	45.97	3.45	7.58	0.07	4.02	3.78
462	VM99-8. Area E8.2	cpx in "inverted gabbroic" breakdown	47.82	2.88	5.64	0.00	3.37	4.17
463	VM99-8. Area E8.3	cpx in "inverted gabbroic" breakdown	48.42	2.34	6.38	0.02	3.54	2.87
464								
465	VM99-8. Area F1.1	core of cpx microphenocryst	51.87	0.48	2.88	0.00	2.59	5.85
466	VM99-8. Area F1.2	rim of cpx microphenocryst	52.47	0.51	1.98	0.00	1.68	6.95
467	VM99-8. Area F1.3	core of opx microphenocryst	54.32	0.24	1.36	0.02	1.26	15.10
468	VM99-8. Area F1.4	rim of cpx microphenocryst	54.10	0.32	1.68	0.01	0.94	15.86
469								
470	VM99-26. Area A1.1	opx in gabbroic breakdown rxn (close	52.76	0.37	2.86	0.07	1.67	12.03

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
404	VM99-61a. Area D1.2	0.50	25.60	1.50	0.05	0.00	**100.26**		1.95	0.01	0.05
405	VM99-61a. Area D1.3	0.40	26.24	1.26	0.03	0.00	**100.24**		1.95	0.01	0.05
406											
407	VM99-61a. Area D2.1	0.26	26.81	1.46	0.04	0.00	**100.32**		1.94	0.01	0.06
408	VM99-61a. Area D2.2	0.02	2.42	8.42	5.07	0.25	**99.66**		1.96	0.00	0.04
409											
410	VM99-61a. Area D3.1	0.48	25.54	1.36	0.02	0.00	**100.37**		1.98	0.01	0.02
411	VM99-61a. Area D3.2	0.44	25.48	1.24	0.02	0.01	**100.61**		1.95	0.01	0.06
412	VM99-61a. Area D3.3	0.43	26.38	1.17	0.03	0.00	**100.95**		1.96	0.01	0.04
413											
414	VM99-61a. Area D4.1	0.31	15.29	20.45	0.47	0.00	**100.32**		1.95	0.01	0.05
415	VM99-61a. Area D4.2	0.21	14.51	20.32	0.51	0.00	**100.25**		1.90	0.02	0.10
416											
417	VM99-61a. Area D5.1	0.38	26.03	1.21	0.03	0.00	**100.91**		1.97	0.01	0.03
418	VM99-61a. Area D5.2	0.42	25.02	1.50	0.05	0.00	**100.70**		1.93	0.01	0.07
419	VM99-61a. Area D5.3	0.35	25.50	1.10	0.06	0.01	**100.71**		1.92	0.01	0.08
420											
421	VM99-61a. Area E1.1	0.28	14.49	18.48	0.63	0.00	**99.63**		1.89	0.02	0.11
422	VM99-61a. Area E1.2	0.26	15.38	20.22	0.44	0.00	**99.81**		1.95	0.02	0.05
423	VM99-61a. Area E1.3	0.25	14.58	19.80	0.62	0.01	**99.86**		1.89	0.02	0.11
424	VM99-61a. Area E1.4	0.24	15.26	20.49	0.46	0.00	**100.08**		1.94	0.01	0.07
425	VM99-61a. Area E1.5	0.28	14.84	20.20	0.50	0.00	**99.42**		1.92	0.02	0.08
426	VM99-61a. Area E1.6	0.42	25.64	1.18	0.06	0.01	**100.21**		1.95	0.01	0.05
427	VM99-61a. Area E1.7	0.31	15.79	19.41	0.41	0.00	**99.79**		1.92	0.02	0.08
428											
429	VM99-61a. Area E3.1	0.23	15.23	20.42	0.52	0.01	**100.18**		1.92	0.02	0.08
430	VM99-61a. Area E3.2	0.26	15.09	20.43	0.48	0.01	**100.08**		1.91	0.02	0.09
431											
432	VM99-8. Area A1.1	0.34	26.98	1.14	0.04	0.00	**100.96**		1.94	0.01	0.06
433	VM99-8. Area A1.2	0.37	26.67	1.27	0.04	0.00	**100.66**		1.94	0.01	0.06
434											
435	VM99-8. Area A3.1	0.40	25.61	1.41	0.02	0.00	**99.30**		1.93	0.01	0.07
436	VM99-8. Area A3.2	0.38	26.94	1.22	0.02	0.01	**100.60**		1.97	0.01	0.03
437											
438	VM99-8. Area B1.1	0.26	15.16	20.08	0.42	0.01	**99.97**		1.93	0.02	0.07
439	VM99-8. Area B1.2	0.19	15.30	20.41	0.38	0.00	**99.68**		1.92	0.02	0.08
440											
441	VM99-8. Area C2.1	0.49	26.57	1.19	0.02	0.00	**100.84**		1.97	0.01	0.03
442	VM99-8. Area C2.2	0.39	26.78	1.13	0.04	0.00	**101.04**		1.95	0.01	0.05
443	VM99-8. Area C2.3	0.37	27.42	1.20	0.02	0.00	**101.18**		1.97	0.01	0.04
444	VM99-8. Area C2.4	0.27	15.56	20.29	0.32	0.00	**100.30**		1.91	0.02	0.09
445	VM99-8. Area C2.5	0.28	15.35	20.51	0.36	0.00	**100.12**		1.93	0.02	0.07
446											
447	VM99-8. Area D2.1	0.40	26.97	1.24	0.03	0.00	**100.45**		1.95	0.01	0.06
448	VM99-8. Area D2.2	0.45	27.15	1.37	0.02	0.01	**100.78**		1.97	0.01	0.03
449	VM99-8. Area D2.3	0.22	15.37	21.01	0.40	0.00	**100.21**		1.90	0.01	0.10
450	VM99-8. Area D2.4	0.24	15.37	20.15	0.41	0.01	**100.18**		1.92	0.01	0.08
451											
452	VM99-8. Area E4.1	0.22	15.65	21.17	0.34	0.00	**100.99**		1.90	0.02	0.10
453	VM99-8. Area E4.2	0.23	15.45	20.70	0.42	0.00	**100.47**		1.92	0.02	0.08
454											
455	VM99-8. Area E5.1	0.59	25.85	0.88	0.04	0.00	**100.63**		1.94	0.01	0.06
456	VM99-8. Area E5.2	0.49	26.15	1.24	0.03	0.00	**100.99**		1.95	0.01	0.05
457											
458	VM99-8. Area E6.1	0.20	15.80	20.91	0.37	0.00	**100.88**		1.91	0.02	0.09
459	VM99-8. Area E6.2	0.23	15.33	20.79	0.42	0.00	**99.50**		1.91	0.01	0.09
460											
461	VM99-8. Area E8.1	0.10	12.88	21.65	0.73	0.04	**100.27**		1.71	0.10	0.29
462	VM99-8. Area E8.2	0.15	13.88	21.29	0.71	0.05	**99.96**		1.78	0.08	0.22
463	VM99-8. Area E8.3	0.12	14.84	21.72	0.59	0.00	**100.84**		1.77	0.06	0.23
464											
465	VM99-8. Area F1.1	0.23	15.49	21.09	0.38	0.00	**100.86**		1.90	0.01	0.10
466	VM99-8. Area F1.2	0.29	16.23	19.83	0.35	0.00	**100.30**		1.93	0.01	0.07
467	VM99-8. Area F1.3	0.41	26.85	1.33	0.02	0.00	**100.90**		1.95	0.01	0.05
468	VM99-8. Area F1.4	0.40	26.22	1.37	0.05	0.01	**100.94**		1.95	0.01	0.06
469											
470	VM99-26. Area A1.1	0.26	27.49	1.50	0.05	0.00	**99.06**		1.91	0.01	0.09

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	Label	Al VI	Cr	Fe3+	Fe2+	Mn2+	Mg	Ca	Na	Sum Cat#	Wo(Ca)
404	VM99-61a. Area D1.2	0.02	0.00	0.02	0.49	0.02	1.38	0.06	0.00	4.00	3.02
405	VM99-61a. Area D1.3	0.01	0.00	0.02	0.48	0.01	1.42	0.05	0.00	4.00	2.52
406											
407	VM99-61a. Area D2.1	0.03	0.00	0.01	0.45	0.01	1.44	0.06	0.00	4.00	2.89
408	VM99-61a. Area D2.2	0.91	0.00	0.00	0.05	0.00	0.12	0.31	0.33	3.74	63.62
409											
410	VM99-61a. Area D3.1	0.02	0.00	0.00	0.52	0.02	1.38	0.05	0.00	4.00	2.69
411	VM99-61a. Area D3.2	0.03	0.00	0.02	0.51	0.01	1.38	0.05	0.00	4.00	2.48
412	VM99-61a. Area D3.3	0.03	0.00	0.00	0.49	0.01	1.41	0.05	0.00	4.00	2.30
413											
414	VM99-61a. Area D4.1	0.02	0.00	0.04	0.23	0.01	0.84	0.81	0.03	4.00	42.96
415	VM99-61a. Area D4.2	0.05	0.00	0.04	0.24	0.01	0.80	0.81	0.04	4.00	43.63
416											
417	VM99-61a. Area D5.1	0.01	0.00	0.01	0.52	0.01	1.40	0.05	0.00	4.00	2.39
418	VM99-61a. Area D5.2	0.03	0.00	0.03	0.51	0.01	1.35	0.06	0.00	4.00	3.04
419	VM99-61a. Area D5.3	0.02	0.00	0.05	0.49	0.01	1.38	0.04	0.00	4.00	2.23
420											
421	VM99-61a. Area E1.1	0.08	0.00	0.05	0.26	0.01	0.80	0.74	0.05	4.00	40.83
422	VM99-61a. Area E1.2	0.04	0.00	0.02	0.24	0.01	0.85	0.80	0.03	4.00	42.44
423	VM99-61a. Area E1.3	0.05	0.00	0.07	0.22	0.01	0.81	0.79	0.05	4.00	43.50
424	VM99-61a. Area E1.4	0.02	0.00	0.04	0.22	0.01	0.84	0.81	0.03	4.00	43.33
425	VM99-61a. Area E1.5	0.03	0.00	0.05	0.23	0.01	0.83	0.81	0.04	4.00	43.43
426	VM99-61a. Area E1.6	0.01	0.00	0.03	0.50	0.01	1.39	0.05	0.00	4.00	2.37
427	VM99-61a. Area E1.7	0.03	0.00	0.04	0.23	0.01	0.87	0.77	0.03	4.00	41.13
428											
429	VM99-61a. Area E3.1	0.03	0.00	0.05	0.21	0.01	0.84	0.81	0.04	4.00	43.52
430	VM99-61a. Area E3.2	0.03	0.00	0.05	0.22	0.01	0.83	0.81	0.03	4.00	43.62
431											
432	VM99-8. Area A1.1	0.03	0.00	0.02	0.45	0.01	1.44	0.04	0.00	4.00	2.26
433	VM99-8. Area A1.2	0.02	0.00	0.03	0.46	0.01	1.43	0.05	0.00	4.00	2.54
434											
435	VM99-8. Area A3.1	0.03	0.00	0.02	0.48	0.01	1.39	0.06	0.00	4.00	2.86
436	VM99-8. Area A3.2	0.02	0.00	0.00	0.47	0.01	1.44	0.05	0.00	4.00	2.40
437											
438	VM99-8. Area B1.1	0.04	0.00	0.03	0.24	0.01	0.84	0.80	0.03	4.00	42.54
439	VM99-8. Area B1.2	0.05	0.00	0.03	0.22	0.01	0.85	0.81	0.03	4.00	43.15
440											
441	VM99-8. Area C2.1	0.02	0.00	0.00	0.49	0.02	1.42	0.05	0.00	4.00	2.34
442	VM99-8. Area C2.2	0.03	0.00	0.02	0.47	0.01	1.43	0.04	0.00	4.00	2.23
443	VM99-8. Area C2.3	0.01	0.00	0.01	0.45	0.01	1.46	0.05	0.00	4.00	2.34
444	VM99-8. Area C2.4	0.03	0.00	0.04	0.22	0.01	0.86	0.80	0.02	4.00	42.72
445	VM99-8. Area C2.5	0.04	0.00	0.03	0.23	0.01	0.85	0.81	0.03	4.00	43.12
446											
447	VM99-8. Area D2.1	0.01	0.00	0.04	0.44	0.01	1.45	0.05	0.00	4.00	2.46
448	VM99-8. Area D2.2	0.00	0.00	0.02	0.46	0.01	1.45	0.05	0.00	4.00	2.69
449	VM99-8. Area D2.3	0.02	0.00	0.08	0.18	0.01	0.85	0.83	0.03	4.00	44.88
450	VM99-8. Area D2.4	0.03	0.00	0.05	0.22	0.01	0.85	0.80	0.03	4.00	42.82
451											
452	VM99-8. Area E4.1	0.03	0.00	0.06	0.18	0.01	0.85	0.83	0.02	4.00	44.57
453	VM99-8. Area E4.2	0.04	0.00	0.05	0.20	0.01	0.85	0.82	0.03	4.00	43.77
454											
455	VM99-8. Area E5.1	0.02	0.00	0.04	0.49	0.02	1.39	0.03	0.00	4.00	1.78
456	VM99-8. Area E5.2	0.00	0.00	0.04	0.48	0.02	1.40	0.05	0.00	4.00	2.47
457											
458	VM99-8. Area E6.1	0.02	0.00	0.06	0.19	0.01	0.86	0.82	0.03	4.00	43.89
459	VM99-8. Area E6.2	0.01	0.00	0.09	0.17	0.01	0.85	0.83	0.03	4.00	44.74
460											
461	VM99-8. Area E8.1	0.04	0.00	0.11	0.12	0.00	0.71	0.86	0.05	4.00	50.92
462	VM99-8. Area E8.2	0.02	0.00	0.09	0.13	0.01	0.77	0.85	0.05	4.00	48.55
463	VM99-8. Area E8.3	0.05	0.00	0.10	0.09	0.00	0.81	0.85	0.04	4.00	48.71
464											
465	VM99-8. Area F1.1	0.03	0.00	0.07	0.18	0.01	0.85	0.83	0.03	4.00	44.67
466	VM99-8. Area F1.2	0.02	0.00	0.05	0.21	0.01	0.89	0.78	0.03	4.00	41.45
467	VM99-8. Area F1.3	0.01	0.00	0.03	0.45	0.01	1.44	0.05	0.00	4.00	2.63
468	VM99-8. Area F1.4	0.02	0.00	0.03	0.48	0.01	1.41	0.05	0.00	4.00	2.72
469											
470	VM99-26. Area A1.1	0.03	0.00	0.05	0.36	0.01	1.48	0.06	0.00	4.00	3.06

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
404	VM99-61a. Area D1.2	71.60	25.38	0.74
405	VM99-61a. Area D1.3	72.95	24.54	0.75
406				
407	VM99-61a. Area D2.1	73.98	23.13	0.76
408	VM99-61a. Area D2.2	25.42	10.96	0.70
409				
410	VM99-61a. Area D3.1	70.53	26.78	0.73
411	VM99-61a. Area D3.2	71.14	26.38	0.73
412	VM99-61a. Area D3.3	72.40	25.30	0.74
413				
414	VM99-61a. Area D4.1	44.70	12.34	0.78
415	VM99-61a. Area D4.2	43.34	13.03	0.77
416				
417	VM99-61a. Area D5.1	71.30	26.31	0.73
418	VM99-61a. Area D5.2	70.40	26.56	0.73
419	VM99-61a. Area D5.3	72.07	25.70	0.74
420				
421	VM99-61a. Area E1.1	44.54	14.63	0.75
422	VM99-61a. Area E1.2	44.88	12.68	0.78
423	VM99-61a. Area E1.3	44.55	11.95	0.79
424	VM99-61a. Area E1.4	44.89	11.78	0.79
425	VM99-61a. Area E1.5	44.39	12.18	0.79
426	VM99-61a. Area E1.6	71.78	25.85	0.74
427	VM99-61a. Area E1.7	46.55	12.32	0.79
428				
429	VM99-61a. Area E3.1	45.15	11.34	0.80
430	VM99-61a. Area E3.2	44.83	11.55	0.80
431				
432	VM99-8. Area A1.1	74.30	23.44	0.76
433	VM99-8. Area A1.2	73.86	23.60	0.76
434				
435	VM99-8. Area A3.1	72.47	24.67	0.75
436	VM99-8. Area A3.2	73.62	23.99	0.75
437				
438	VM99-8. Area B1.1	44.67	12.79	0.78
439	VM99-8. Area B1.2	45.00	11.86	0.79
440				
441	VM99-8. Area C2.1	72.68	24.98	0.74
442	VM99-8. Area C2.2	73.63	24.15	0.75
443	VM99-8. Area C2.3	74.51	23.14	0.76
444	VM99-8. Area C2.4	45.58	11.70	0.80
445	VM99-8. Area C2.5	44.89	12.00	0.79
446				
447	VM99-8. Area D2.1	74.76	22.78	0.77
448	VM99-8. Area D2.2	74.03	23.28	0.76
449	VM99-8. Area D2.3	45.69	9.44	0.83
450	VM99-8. Area D2.4	45.43	11.76	0.79
451				
452	VM99-8. Area E4.1	45.85	9.58	0.83
453	VM99-8. Area E4.2	45.44	10.79	0.81
454				
455	VM99-8. Area E5.1	72.59	25.63	0.74
456	VM99-8. Area E5.2	72.51	25.02	0.74
457				
458	VM99-8. Area E6.1	46.14	9.98	0.82
459	VM99-8. Area E6.2	45.89	9.37	0.83
460				
461	VM99-8. Area E8.1	42.14	6.94	0.86
462	VM99-8. Area E8.2	44.03	7.42	0.86
463	VM99-8. Area E8.3	46.28	5.02	0.90
464				
465	VM99-8. Area F1.1	45.66	9.67	0.83
466	VM99-8. Area F1.2	47.21	11.34	0.81
467	VM99-8. Area F1.3	74.01	23.35	0.76
468	VM99-8. Area F1.4	72.63	24.65	0.75
469				
470	VM99-26. Area A1.1	77.83	19.11	0.80

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
471								
472	VM99-26. Area D1.2		53.26	0.37	1.45	0.02	1.18	15.63
473	VM99-26. Area D1.3	core of orthopyroxene	53.37	0.41	1.59	0.01	0.86	14.95
474	VM99-26. Area D1.4	rim of orthopyroxene	54.15	0.31	1.06	0.00	1.03	15.08
475	VM99-26. Area D1.5	core of orthopyroxene	53.61	0.32	1.14	0.01	0.38	15.67
476	VM99-26. Area D1.6	rim of orthopyroxene	53.93	0.36	1.29	0.00	0.18	15.78
477								
478	VM99-26. Area D2.1	core of clinopyroxene phenocryst	50.31	0.90	3.25	0.00	2.55	6.61
479	VM99-26. Area D2.2	mid of clinopyroxene phenocryst	50.67	0.86	3.02	0.00	2.25	6.64
480	VM99-26. Area D2.3	rim of clinopyroxene phenocryst	50.44	0.88	3.11	0.03	2.33	6.72
481	VM99-26. Area D2.4	orthopyroxene	52.78	0.36	2.21	0.08	1.11	15.08
482	VM99-26. Area D2.5	core of clinopyroxene phenocryst	50.86	0.83	2.70	0.05	1.84	6.95
483	VM99-26. Area D2.6	rim of clinopyroxene phenocryst	52.04	0.59	1.66	0.03	1.08	8.50
484	VM99-26. Area D2.7		53.06	0.38	1.46	0.02	1.75	14.27
485								
486			**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
487	VM99-52. Area A2.5	core of orthopyroxene phenocryst	54.66	0.25	1.04	0.00	0.38	16.35
488	VM99-52. Area A2.6	rim of orthopyroxene phenocryst (ox)	57.32	0.27	0.69	0.04	0.00	15.94
489	VM99-52. Area A2.7	rim of orthopyroxene phenocryst (ox)	54.31	0.34	1.29	0.04	1.09	15.10
490	VM99-52. Area A2.8	cpx phenocryst	51.91	0.68	2.92	0.21	1.58	7.15
491	VM99-52. Area A2.2	mid of clinopyroxene phenocryst	52.78	0.55	2.01	0.02	0.88	7.26
492	VM99-52. Area A2.3	rim of clinopyroxene phenocryst	52.35	0.56	1.97	0.00	1.33	7.01
493	VM99-52. Area A2.4	rim of clinopyroxene phenocryst	52.06	0.64	2.22	0.03	1.50	6.97
494								
495	VM99-52. Area B1.1	core of orthopyroxene phenocryst	54.76	0.23	1.56	0.00	0.00	14.91
496	VM99-52. Area B1.2	mid of orthopyroxene phenocryst	54.41	0.12	0.89	0.00	0.87	15.30
497	VM99-52. Area B1.3	rim of orthopyroxene phenocryst (ox)	54.75	0.23	0.92	0.00	1.60	11.37
498	VM99-52. Area B1.4	rim of orthopyroxene phenocryst (ox)	53.70	0.28	1.12	0.00	3.38	11.21
499								
500	VM99-52. Area B3.1	core of orthopyroxene phenocryst	54.06	0.31	1.30	0.00	0.64	15.88
501	VM99-52. Area B3.2	mid of orthopyroxene phenocryst	54.33	0.24	1.19	0.02	0.37	16.40
502	VM99-52. Area B3.3	rim of orthopyroxene phenocryst (ox)	53.33	0.25	0.70	0.02	3.76	13.50
503	VM99-52. Area B3.4	rim of orthopyroxene phenocryst (ox)	54.49	0.30	1.37	0.02	1.18	13.78
504								
505	VM99-52. Area C1.1	opx microphenocryst	55.49	0.25	1.12	0.07	1.15	10.14
506	VM99-52. Area C1.3	opx microphenocryst	55.56	0.19	0.46	0.02	2.79	8.60
507								
508	VM99-52. Area C2.1	core of clinopyroxene phenocryst	52.02	0.60	2.34	0.00	1.10	6.81
509	VM99-52. Area C2.2	mid of clinopyroxene phenocryst	52.19	0.62	2.34	0.01	1.08	6.94
510	VM99-52. Area C2.3	rim of clinopyroxene phenocryst	52.93	0.37	1.57	0.00	0.88	7.39
511	VM99-52. Area C2.4	rim of clinopyroxene phenocryst	52.83	0.44	1.59	0.00	0.34	7.51
512	VM99-52. Area C2.5	opx microphenocryst	57.41	0.26	1.22	0.01	0.00	15.99
513								
514	VM99-52. Area D1.1	core of cpx microphenocryst	52.81	0.51	1.82	0.00	0.17	7.47
515	VM99-52. Area D1.2	rim of cpx microphenocryst	52.62	0.50	1.64	0.00	0.00	7.89
516	VM99-52. Area D1.3	rim of cpx microphenocryst	51.68	0.63	2.54	0.02	1.24	6.83
517								
518	**BAD TOTALS**							
519	VM99-52. Area A2.1	core of clinopyroxene phenocryst	48.86	0.54	2.06	0.01	1.28	6.50
520								
521	VM99-52. Area C1.2	???	61.48	0.13	0.62	0.03	0.00	29.16
522								
523	VM99-26. Area A1.2	opx in gabbroic breakdown rxn (close	53.41	0.40	1.94	0.02	0.02	13.48
524	VM99-26. Area A1.3	opx in gabbroic breakdown rxn (close	52.93	0.46	2.70	0.04	0.00	15.51
525	VM99-26. Area A1.4	cpx in gabbroic breakdown rxn (furthe	50.03	0.94	3.10	0.17	1.69	6.72
526	VM99-26. Area A1.5	opx in gabbroic breakdown rxn (farthe	52.95	0.38	1.47	0.00	0.36	15.08
527								
528	VM99-26. Area A2.1	opx in gabbroic breakdown rxn (close	53.91	0.31	0.93	0.00	0.51	13.35
529	VM99-26. Area A2.2	opx in gabbroic breakdown rxn (close	52.02	0.42	2.14	0.05	1.35	14.24
530	VM99-26. Area A2.3	cpx in gabbroic breakdown rxn (far fro	49.63	1.13	3.13	0.08	1.93	7.07
531	VM99-26. Area A2.4	cpx in gabbroic breakdown rxn (far fro	49.04	0.68	5.16	0.03	2.06	6.20
532	VM99-26. Area A2.5	cpx in gabbroic breakdown rxn (far fro	50.72	0.76	2.75	0.10	1.15	7.40
533	VM99-26. Area A2.6	opx in gabbroic breakdown rxn (far fro	52.26	0.43	2.07	0.19	1.20	14.76
534								
535	VM99-26. Area B1.1	???	36.42	0.29	0.76	0.03	24.23	0.00
536								
537	VM99-26. Area B2.1	core of cpx xl between amphibole bre	48.70	0.79	3.45	0.08	2.15	4.97

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
471											
472	VM99-26. Area D1.2	0.29	25.67	1.57	0.07	0.01	**99.52**		1.95	0.01	0.06
473	VM99-26. Area D1.3	0.32	26.08	1.71	0.05	0.00	**99.36**		1.94	0.01	0.06
474	VM99-26. Area D1.4	0.28	26.69	1.57	0.02	0.01	**100.19**		1.96	0.01	0.04
475	VM99-26. Area D1.5	0.32	25.50	1.55	0.13	0.12	**98.75**		1.97	0.01	0.03
476	VM99-26. Area D1.6	0.34	25.97	1.73	0.03	0.01	**99.63**		1.96	0.01	0.04
477											
478	VM99-26. Area D2.1	0.17	14.77	19.61	0.57	0.04	**98.77**		1.89	0.03	0.11
479	VM99-26. Area D2.2	0.18	15.12	19.66	0.51	0.01	**98.92**		1.90	0.02	0.10
480	VM99-26. Area D2.3	0.18	15.03	19.54	0.49	0.03	**98.78**		1.89	0.03	0.11
481	VM99-26. Area D2.4	0.27	25.77	1.39	0.08	0.00	**99.12**		1.93	0.01	0.07
482	VM99-26. Area D2.5	0.15	15.25	19.72	0.43	0.00	**98.79**		1.91	0.02	0.09
483	VM99-26. Area D2.6	0.22	16.28	18.25	0.34	0.02	**99.02**		1.94	0.02	0.06
484	VM99-26. Area D2.7	0.34	26.09	1.46	0.15	0.03	**99.01**		1.94	0.01	0.06
485											
486		**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
487	VM99-52. Area A2.5	0.45	26.43	1.15	0.04	0.00	**100.77**		1.97	0.01	0.03
488	VM99-52. Area A2.6	0.69	26.28	0.81	0.02	0.00	**102.06**		2.02	0.01	0.00
489	VM99-52. Area A2.7	0.42	26.86	1.32	0.03	0.00	**100.81**		1.95	0.01	0.05
490	VM99-52. Area A2.8	0.22	15.06	20.47	0.48	0.00	**100.68**		1.91	0.02	0.09
491	VM99-52. Area A2.2	0.31	15.54	20.63	0.41	0.00	**100.38**		1.94	0.02	0.06
492	VM99-52. Area A2.3	0.25	15.59	20.41	0.41	0.00	**99.89**		1.94	0.02	0.06
493	VM99-52. Area A2.4	0.22	15.39	20.42	0.44	0.01	**99.91**		1.93	0.02	0.07
494											
495	VM99-52. Area B1.1	0.45	27.24	1.15	0.01	0.01	**100.32**		1.96	0.01	0.04
496	VM99-52. Area B1.2	0.47	26.73	1.19	0.04	0.01	**100.04**		1.97	0.00	0.03
497	VM99-52. Area B1.3	0.54	29.27	1.19	0.01	0.00	**99.88**		1.95	0.01	0.04
498	VM99-52. Area B1.4	0.49	29.00	0.75	0.02	0.00	**99.95**		1.92	0.01	0.05
499											
500	VM99-52. Area B3.1	0.41	26.27	1.24	0.04	0.00	**100.16**		1.96	0.01	0.04
501	VM99-52. Area B3.2	0.41	26.25	1.22	0.01	0.00	**100.42**		1.96	0.01	0.04
502	VM99-52. Area B3.3	0.58	27.41	0.78	0.00	0.02	**100.33**		1.93	0.01	0.03
503	VM99-52. Area B3.4	0.44	27.70	1.33	0.03	0.00	**100.63**		1.95	0.01	0.05
504											
505	VM99-52. Area C1.1	0.48	30.31	1.39	0.02	0.01	**100.44**		1.96	0.01	0.05
506	VM99-52. Area C1.3	0.57	31.27	1.26	0.02	0.00	**100.75**		1.95	0.01	0.02
507											
508	VM99-52. Area C2.1	0.21	15.58	20.40	0.38	0.01	**99.45**		1.93	0.02	0.07
509	VM99-52. Area C2.2	0.23	15.60	20.34	0.42	0.00	**99.76**		1.93	0.02	0.07
510	VM99-52. Area C2.3	0.25	15.24	20.82	0.46	0.00	**99.91**		1.96	0.01	0.04
511	VM99-52. Area C2.4	0.30	15.25	20.86	0.40	0.00	**99.51**		1.96	0.01	0.04
512	VM99-52. Area C2.5	0.48	22.21	0.64	0.06	0.06	**98.35**		2.09	0.01	0.00
513											
514	VM99-52. Area D1.1	0.23	15.92	20.22	0.35	0.00	**99.51**		1.96	0.01	0.04
515	VM99-52. Area D1.2	0.27	15.92	19.63	0.31	0.00	**98.78**		1.96	0.01	0.04
516	VM99-52. Area D1.3	0.22	15.51	20.11	0.41	0.00	**99.18**		1.92	0.02	0.08
517											
518	**BAD TOTALS**										
519	VM99-52. Area A2.1	0.19	14.28	19.42	0.41	0.00	**93.54**		1.93	0.02	0.07
520											
521	VM99-52. Area C1.2	0.22	2.10	1.52	0.00	0.02	**95.30**		2.40	0.00	0.00
522											
523	VM99-26. Area A1.2	0.26	27.20	1.42	0.02	0.02	**98.21**		1.95	0.01	0.05
524	VM99-26. Area A1.3	0.25	23.95	1.49	0.04	0.02	**97.39**		1.96	0.01	0.04
525	VM99-26. Area A1.4	0.14	14.98	19.38	0.48	0.01	**97.64**		1.90	0.03	0.10
526	VM99-26. Area A1.5	0.29	26.00	1.44	0.02	0.01	**98.00**		1.95	0.01	0.05
527											
528	VM99-26. Area A2.1	0.26	27.51	1.52	0.03	0.00	**98.33**		1.97	0.01	0.03
529	VM99-26. Area A2.2	0.27	25.79	1.44	0.05	0.00	**97.78**		1.92	0.01	0.08
530	VM99-26. Area A2.3	0.18	15.20	18.59	0.47	0.00	**97.43**		1.89	0.03	0.11
531	VM99-26. Area A2.4	0.14	14.72	19.29	0.42	0.00	**97.76**		1.85	0.02	0.15
532	VM99-26. Area A2.5	0.20	15.72	18.64	0.40	0.00	**97.82**		1.91	0.02	0.09
533	VM99-26. Area A2.6	0.27	25.67	1.43	0.06	0.00	**98.35**		1.93	0.01	0.07
534											
535	VM99-26. Area B1.1	0.20	27.85	0.25	0.04	0.01	**90.08**		1.52	0.01	0.04
536											
537	VM99-26. Area B2.1	0.16	15.30	19.08	0.45	0.00	**95.13**		1.88	0.02	0.12

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
471											
472	VM99-26. Area D1.2	0.01	0.00	0.03	0.48	0.01	1.40	0.06	0.01	4.00	3.18
473	VM99-26. Area D1.3	0.01	0.00	0.02	0.46	0.01	1.42	0.07	0.00	4.00	3.45
474	VM99-26. Area D1.4	0.00	0.00	0.03	0.46	0.01	1.44	0.06	0.00	4.00	3.11
475	VM99-26. Area D1.5	0.02	0.00	0.01	0.48	0.01	1.40	0.06	0.01	4.00	3.15
476	VM99-26. Area D1.6	0.02	0.00	0.01	0.48	0.01	1.41	0.07	0.00	4.00	3.44
477											
478	VM99-26. Area D2.1	0.03	0.00	0.07	0.21	0.01	0.83	0.79	0.04	4.00	43.27
479	VM99-26. Area D2.2	0.03	0.00	0.06	0.21	0.01	0.84	0.79	0.04	4.00	42.85
480	VM99-26. Area D2.3	0.03	0.00	0.07	0.21	0.01	0.84	0.79	0.04	4.00	42.77
481	VM99-26. Area D2.4	0.02	0.00	0.03	0.46	0.01	1.40	0.06	0.01	4.00	2.85
482	VM99-26. Area D2.5	0.03	0.00	0.05	0.22	0.01	0.85	0.79	0.03	4.00	42.54
483	VM99-26. Area D2.6	0.02	0.00	0.03	0.27	0.01	0.91	0.73	0.03	4.00	38.39
484	VM99-26. Area D2.7	0.00	0.00	0.05	0.44	0.01	1.42	0.06	0.01	4.00	3.00
485											
486		**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
487	VM99-52. Area A2.5	0.01	0.00	0.01	0.49	0.01	1.42	0.04	0.00	4.00	2.27
488	VM99-52. Area A2.6	0.03	0.00	0.00	0.47	0.02	1.38	0.03	0.00	3.96	1.63
489	VM99-52. Area A2.7	0.00	0.00	0.03	0.45	0.01	1.44	0.05	0.00	4.00	2.61
490	VM99-52. Area A2.8	0.04	0.01	0.04	0.22	0.01	0.83	0.81	0.03	4.00	43.55
491	VM99-52. Area A2.2	0.03	0.00	0.02	0.22	0.01	0.85	0.81	0.03	4.00	43.05
492	VM99-52. Area A2.3	0.02	0.00	0.04	0.22	0.01	0.86	0.81	0.03	4.00	42.90
493	VM99-52. Area A2.4	0.03	0.00	0.04	0.22	0.01	0.85	0.81	0.03	4.00	43.20
494											
495	VM99-52. Area B1.1	0.03	0.00	0.00	0.45	0.01	1.46	0.04	0.00	4.00	2.26
496	VM99-52. Area B1.2	0.01	0.00	0.02	0.46	0.01	1.44	0.05	0.00	4.00	2.37
497	VM99-52. Area B1.3	0.00	0.00	0.04	0.34	0.02	1.56	0.05	0.00	4.00	2.35
498	VM99-52. Area B1.4	0.00	0.00	0.09	0.34	0.02	1.55	0.03	0.00	4.00	1.50
499											
500	VM99-52. Area B3.1	0.01	0.00	0.02	0.48	0.01	1.42	0.05	0.00	4.00	2.47
501	VM99-52. Area B3.2	0.01	0.00	0.01	0.50	0.01	1.41	0.05	0.00	4.00	2.41
502	VM99-52. Area B3.3	0.00	0.00	0.10	0.41	0.02	1.48	0.03	0.00	4.00	1.58
503	VM99-52. Area B3.4	0.01	0.00	0.03	0.41	0.01	1.48	0.05	0.00	4.00	2.63
504											
505	VM99-52. Area C1.1	0.00	0.00	0.03	0.30	0.01	1.59	0.05	0.00	4.00	2.70
506	VM99-52. Area C1.3	0.00	0.00	0.07	0.25	0.02	1.64	0.05	0.00	4.00	2.45
507											
508	VM99-52. Area C2.1	0.03	0.00	0.03	0.21	0.01	0.86	0.81	0.03	4.00	43.05
509	VM99-52. Area C2.2	0.03	0.00	0.03	0.22	0.01	0.86	0.81	0.03	4.00	42.87
510	VM99-52. Area C2.3	0.03	0.00	0.03	0.23	0.01	0.84	0.83	0.03	4.00	43.56
511	VM99-52. Area C2.4	0.03	0.00	0.01	0.23	0.01	0.85	0.83	0.03	4.00	43.51
512	VM99-52. Area C2.5	0.05	0.00	0.00	0.49	0.02	1.20	0.03	0.00	3.88	1.45
513											
514	VM99-52. Area D1.1	0.04	0.00	0.01	0.23	0.01	0.88	0.80	0.03	4.00	41.96
515	VM99-52. Area D1.2	0.04	0.00	0.00	0.25	0.01	0.89	0.79	0.02	4.00	40.95
516	VM99-52. Area D1.3	0.04	0.00	0.04	0.21	0.01	0.86	0.80	0.03	4.00	42.77
517											
518	**BAD TOTALS**										
519	VM99-52. Area A2.1	0.03	0.00	0.04	0.22	0.01	0.84	0.82	0.03	4.00	43.78
520											
521	VM99-52. Area C1.2	0.03	0.00	0.00	0.95	0.01	0.12	0.06	0.00	3.58	5.60
522											
523	VM99-26. Area A1.2	0.03	0.00	0.00	0.41	0.01	1.48	0.06	0.00	4.00	2.86
524	VM99-26. Area A1.3	0.08	0.00	0.00	0.48	0.01	1.32	0.06	0.00	3.97	3.17
525	VM99-26. Area A1.4	0.03	0.01	0.05	0.21	0.01	0.85	0.79	0.04	4.00	42.63
526	VM99-26. Area A1.5	0.02	0.00	0.01	0.47	0.01	1.43	0.06	0.00	4.00	2.92
527											
528	VM99-26. Area A2.1	0.01	0.00	0.01	0.41	0.01	1.50	0.06	0.00	4.00	3.02
529	VM99-26. Area A2.2	0.02	0.00	0.04	0.44	0.01	1.42	0.06	0.00	4.00	2.98
530	VM99-26. Area A2.3	0.03	0.00	0.06	0.23	0.01	0.86	0.76	0.04	4.00	41.08
531	VM99-26. Area A2.4	0.08	0.00	0.06	0.20	0.01	0.83	0.78	0.03	4.00	43.24
532	VM99-26. Area A2.5	0.04	0.00	0.03	0.23	0.01	0.88	0.75	0.03	4.00	40.27
533	VM99-26. Area A2.6	0.02	0.01	0.03	0.46	0.01	1.41	0.06	0.00	4.00	2.94
534											
535	VM99-26. Area B1.1	0.00	0.00	0.76	0.00	0.01	1.73	0.01	0.00	4.08	0.64
536											
537	VM99-26. Area B2.1	0.04	0.00	0.06	0.16	0.01	0.88	0.79	0.03	4.00	43.13

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
471				
472	VM99-26. Area D1.2	72.16	24.66	0.75
473	VM99-26. Area D1.3	73.05	23.50	0.76
474	VM99-26. Area D1.4	73.57	23.33	0.76
475	VM99-26. Area D1.5	72.02	24.83	0.74
476	VM99-26. Area D1.6	72.01	24.55	0.75
477				
478	VM99-26. Area D2.1	45.34	11.39	0.80
479	VM99-26. Area D2.2	45.85	11.30	0.80
480	VM99-26. Area D2.3	45.75	11.48	0.80
481	VM99-26. Area D2.4	73.15	24.01	0.75
482	VM99-26. Area D2.5	45.77	11.70	0.80
483	VM99-26. Area D2.6	47.65	13.96	0.77
484	VM99-26. Area D2.7	74.22	22.78	0.77
485				
486		**En(Mg)**	**Fs(Fe2+)**	**XMg**
487	VM99-52. Area A2.5	72.55	25.19	0.74
488	VM99-52. Area A2.6	73.40	24.98	0.75
489	VM99-52. Area A2.7	74.03	23.36	0.76
490	VM99-52. Area A2.8	44.58	11.87	0.79
491	VM99-52. Area A2.2	45.12	11.82	0.79
492	VM99-52. Area A2.3	45.60	11.51	0.80
493	VM99-52. Area A2.4	45.29	11.51	0.80
494				
495	VM99-52. Area B1.1	74.78	22.96	0.77
496	VM99-52. Area B1.2	73.90	23.73	0.76
497	VM99-52. Area B1.3	80.18	17.48	0.82
498	VM99-52. Area B1.4	80.94	17.56	0.82
499				
500	VM99-52. Area B3.1	72.83	24.70	0.75
501	VM99-52. Area B3.2	72.26	25.33	0.74
502	VM99-52. Area B3.3	77.11	21.31	0.78
503	VM99-52. Area B3.4	76.12	21.25	0.78
504				
505	VM99-52. Area C1.1	81.93	15.38	0.84
506	VM99-52. Area C1.3	84.50	13.04	0.87
507				
508	VM99-52. Area C2.1	45.74	11.22	0.80
509	VM99-52. Area C2.2	45.72	11.41	0.80
510	VM99-52. Area C2.3	44.37	12.07	0.79
511	VM99-52. Area C2.4	44.26	12.22	0.78
512	VM99-52. Area C2.5	70.19	28.35	0.71
513				
514	VM99-52. Area D1.1	45.94	12.10	0.79
515	VM99-52. Area D1.2	46.21	12.84	0.78
516	VM99-52. Area D1.3	45.89	11.34	0.80
517				
518	**BAD TOTALS**			
519	VM99-52. Area A2.1	44.78	11.44	0.80
520				
521	VM99-52. Area C1.2	10.74	83.66	0.11
522				
523	VM99-26. Area A1.2	76.01	21.13	0.78
524	VM99-26. Area A1.3	71.02	25.81	0.73
525	VM99-26. Area A1.4	45.84	11.54	0.80
526	VM99-26. Area A1.5	73.24	23.84	0.75
527				
528	VM99-26. Area A2.1	76.23	20.75	0.79
529	VM99-26. Area A2.2	74.07	22.95	0.76
530	VM99-26. Area A2.3	46.73	12.19	0.79
531	VM99-26. Area A2.4	45.91	10.85	0.81
532	VM99-26. Area A2.5	47.25	12.48	0.79
533	VM99-26. Area A2.6	73.38	23.68	0.76
534				
535	VM99-26. Area B1.1	99.36	0.00	1.00
536				
537	VM99-26. Area B2.1	48.11	8.77	0.85

	A	B	C	D	E	F	G	H
3	**Label**	**Anaylses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
538	VM99-26. Area B2.2	rim of cpx xl between amphibole brea	49.26	0.72	3.16	0.03	1.37	5.40
539	VM99-26. Area B2.3	core of opx xl between amph breakdc	51.33	0.21	2.50	0.06	0.47	12.71
540	VM99-26. Area B2.4	rim of opx xl between amph breakdov	51.28	0.23	2.66	0.06	1.08	11.48
541								
542	VM99-26. Area D1.1	clinopyroxene	51.69	0.60	2.10	0.03	1.21	7.61
543								
544	**BAD TOTALS!!!**							
545								
546	VM99-25. Area d1.5		0.00	0.00	1.19	0.06	0.00	0.00
547	VM99-25. Area d1.6		12.30	0.57	2.97	0.00	0.00	0.00
548	VM99-25. Area d1.3		25.77	0.03	3.09	0.00	0.00	0.00
549	VM99-25. Area d1.7		17.44	0.01	8.11	0.00	0.00	0.00
550	VM99-25. Area d1.8		19.42	0.04	5.60	0.02	0.00	0.00
551								
552	VM99-52. Area A2.1		15.79	0.09	1.00	0.02	0.00	0.00
553	VM99-52. Area A2.2		14.54	0.11	0.70	0.03	0.00	0.00
554	VM99-52. Area A4.1		21.22	0.11	4.41	0.00	0.00	0.00
555	VM99-52. Area A4.2		23.04	0.04	4.53	0.00	0.00	0.00
556	VM99-52. Area A4.3		22.70	0.04	4.44	0.00	0.00	0.00
557	VM99-52. Area A4.4		17.85	0.02	7.85	0.01	0.00	0.00
558	VM99-52. Area A4.5		17.34	0.09	5.00	0.00	0.00	0.00
559	VM99-52. Area A4.6		23.02	0.04	4.26	0.00	0.00	0.00
560	VM99-52. Area A4.7		23.55	0.03	4.16	0.01	0.00	0.00
561	VM99-52. Area A4.8		19.84	0.03	5.84	0.03	0.00	0.00
562								
563	VM99-52. Area B1.1		16.75	0.00	0.96	0.00	0.00	0.00
564	VM99-52. Area B1.2		16.89	0.08	5.12	0.00	0.00	0.00
565	VM99-52. Area B1.3		14.83	0.04	0.33	0.00	0.00	0.00
566	VM99-52. Area B1.4		20.96	0.23	3.93	0.00	0.00	0.00
567	VM99-52. Area B1.5		19.56	0.08	4.61	0.02	0.00	0.00
568	VM99-52. Area B1.6		22.36	0.08	3.88	0.02	0.00	0.00
569	VM99-52. Area B1.7		18.01	0.01	7.31	0.02	0.00	0.00
570								
571	VM99-52. Area D2.1		17.97	0.01	7.96	0.00	0.00	0.00
572								
573	VM99-52. Area D3.1		23.05	0.04	3.35	0.00	0.00	0.00
574	VM99-52. Area D3.2		22.41	0.11	3.60	0.01	0.00	0.00
575	VM99-52. Area D3.3		22.64	0.14	4.08	0.00	0.00	0.00
576	VM99-52. Area D3.4		22.48	0.29	3.64	0.00	0.00	0.00
577								
578	VM99-52. Area D4.1		23.57	0.06	3.60	0.00	0.00	0.00
579	VM99-52. Area D4.2		23.33	0.06	4.27	0.01	0.00	0.00
580	VM99-52. Area D4.3		21.06	0.03	5.85	0.00	0.00	0.00
581								
582	VM99-52. Area E1.1		19.61	0.07	4.16	0.03	0.00	0.00
583	VM99-52. Area E1.2		19.78	0.03	4.57	0.00	0.00	0.00
584	VM99-52. Area E1.3		21.40	0.08	4.54	0.01	0.00	0.00
585								
586	VM99-52. Area E2.1		21.63	0.03	5.43	0.00	0.00	0.00
587	VM99-52. Area E2.2		21.85	0.05	4.83	0.00	0.00	0.00
588								
589	VM99-52. Area E3.1		20.10	0.14	3.71	0.01	0.00	0.00
590	VM99-52. Area E3.2		20.76	0.06	4.56	0.00	0.00	0.00
591	VM99-52. Area E3.3		21.36	0.04	3.88	0.00	0.00	0.00
592	VM99-52. Area E3.4		21.92	0.06	4.85	0.01	0.00	0.00
593								
594	VM99-52. Area F1.1		22.68	0.04	4.55	0.01	0.00	0.00
595	VM99-52. Area F1.2		16.89	0.03	1.02	0.00	0.00	0.00
596								
597	VM99-52. Area A2.3		17.55	0.01	7.74	0.00	0.00	0.00
598	VM99-52. Area A2.4		17.22	0.02	7.38	0.00	0.00	0.00
599								
600	VM99-16.Area C3.1		36.67	0.03	0.35	0.00	32.26	0.00
601	VM99-25.Area A1.7		63.35	0.11	21.88	0.00	0.00	1.42
602	VM99-25.Area A1.8		65.69	0.11	22.58	0.00	0.00	1.45
603	VM99-25. Area D1.6		56.83	0.07	26.21	0.00	0.00	1.30
604	VM99-25. Area D3.3		56.40	0.12	24.38	0.00	0.00	4.55

	A	I	J	K	L	M	N	O	P	Q	R
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
538	VM99-26. Area B2.2	0.16	15.37	19.30	0.40	0.00	**95.18**		1.90	0.02	0.10
539	VM99-26. Area B2.3	0.25	26.35	1.16	0.03	0.00	**95.06**		1.93	0.01	0.07
540	VM99-26. Area B2.4	0.25	27.04	1.13	0.03	0.00	**95.25**		1.92	0.01	0.08
541											
542	VM99-26. Area D1.1	0.20	16.07	18.79	0.39	0.01	**98.70**		1.93	0.02	0.07
543											
544	**BAD TOTALS!!!**										
545											
546	VM99-25. Area d1.5	0.00	0.00	0.00	0.07	0.05	**1.37**		0.00	0.00	2.00
547	VM99-25. Area d1.6	0.00	0.14	3.25	0.00	0.15	**19.39**		2.14	0.07	0.00
548	VM99-25. Area d1.3	0.00	0.00	0.01	0.00	0.89	**29.79**		2.68	0.00	0.00
549	VM99-25. Area d1.7	0.00	0.06	2.75	0.00	0.09	**28.46**		2.00	0.00	0.00
550	VM99-25. Area d1.8	0.00	0.01	0.79	0.00	0.92	**26.80**		2.32	0.00	0.00
551											
552	VM99-52. Area A2.1	0.00	0.14	4.30	0.00	0.10	**21.44**		2.47	0.01	0.00
553	VM99-52. Area A2.2	0.00	0.18	5.89	0.00	0.00	**21.44**		2.35	0.01	0.00
554	VM99-52. Area A4.1	0.00	0.01	0.49	0.00	0.60	**26.84**		2.48	0.01	0.00
555	VM99-52. Area A4.2	0.00	0.00	0.44	0.00	0.68	**28.73**		2.51	0.00	0.00
556	VM99-52. Area A4.3	0.00	0.00	0.44	0.00	0.72	**28.34**		2.51	0.00	0.00
557	VM99-52. Area A4.4	0.00	0.06	2.49	0.00	0.10	**28.39**		2.04	0.00	0.00
558	VM99-52. Area A4.5	0.00	0.00	0.19	0.00	0.73	**23.35**		2.35	0.01	0.00
559	VM99-52. Area A4.6	0.00	0.00	0.31	0.00	0.93	**28.55**		2.53	0.00	0.00
560	VM99-52. Area A4.7	0.00	0.01	0.33	0.00	0.80	**28.88**		2.55	0.00	0.00
561	VM99-52. Area A4.8	0.00	0.00	0.60	0.00	0.68	**27.02**		2.33	0.00	0.00
562											
563	VM99-52. Area B1.1	0.00	0.05	0.79	0.00	0.03	**18.58**		2.78	0.00	0.00
564	VM99-52. Area B1.2	0.00	0.02	0.59	0.00	0.74	**23.44**		2.30	0.01	0.00
565	VM99-52. Area B1.3	0.02	0.08	0.32	0.00	0.01	**15.63**		2.89	0.01	0.00
566	VM99-52. Area B1.4	0.00	0.01	0.37	0.00	0.59	**26.09**		2.52	0.02	0.00
567	VM99-52. Area B1.5	0.00	0.05	0.68	0.00	0.61	**25.61**		2.42	0.01	0.00
568	VM99-52. Area B1.6	0.00	0.02	0.46	0.00	0.58	**27.39**		2.55	0.01	0.00
569	VM99-52. Area B1.7	0.00	0.06	2.23	0.00	0.13	**27.76**		2.10	0.00	0.00
570											
571	VM99-52. Area D2.1	0.00	0.07	2.34	0.00	0.07	**28.42**		2.05	0.00	0.00
572											
573	VM99-52. Area D3.1	0.00	0.00	0.30	0.00	0.47	**27.21**		2.62	0.00	0.00
574	VM99-52. Area D3.2	0.00	0.00	0.40	0.00	0.82	**27.35**		2.57	0.01	0.00
575	VM99-52. Area D3.3	0.00	0.00	0.26	0.00	0.62	**27.74**		2.55	0.01	0.00
576	VM99-52. Area D3.4	0.00	0.00	0.19	0.00	0.64	**27.25**		2.57	0.03	0.00
577											
578	VM99-52. Area D4.1	0.00	0.00	0.20	0.00	0.83	**28.26**		2.60	0.01	0.00
579	VM99-52. Area D4.2	0.00	0.00	0.29	0.00	0.76	**28.73**		2.54	0.01	0.00
580	VM99-52. Area D4.3	0.00	0.02	0.94	0.00	0.41	**28.32**		2.35	0.00	0.00
581											
582	VM99-52. Area E1.1	0.00	0.01	0.22	0.00	0.73	**24.83**		2.48	0.01	0.00
583	VM99-52. Area E1.2	0.00	0.00	0.43	0.00	0.73	**25.53**		2.44	0.00	0.00
584	VM99-52. Area E1.3	0.00	0.01	0.50	0.00	0.60	**27.14**		2.47	0.01	0.00
585											
586	VM99-52. Area E2.1	0.00	0.04	0.87	0.00	0.39	**28.39**		2.40	0.00	0.00
587	VM99-52. Area E2.2	0.00	0.00	0.29	0.00	0.72	**27.74**		2.47	0.00	0.00
588											
589	VM99-52. Area E3.1	0.00	0.00	0.39	0.00	0.69	**25.04**		2.52	0.01	0.00
590	VM99-52. Area E3.2	0.00	0.00	0.54	0.00	0.53	**26.45**		2.46	0.01	0.00
591	VM99-52. Area E3.3	0.00	0.01	0.22	0.00	0.65	**26.17**		2.55	0.00	0.00
592	VM99-52. Area E3.4	0.00	0.02	0.57	0.00	0.52	**27.94**		2.46	0.01	0.00
593											
594	VM99-52. Area F1.1	0.00	0.00	0.47	0.00	0.68	**28.44**		2.50	0.00	0.00
595	VM99-52. Area F1.2	0.00	0.05	0.21	0.00	0.11	**18.31**		2.82	0.00	0.00
596											
597	VM99-52. Area A2.3	0.00	0.06	2.52	0.00	0.07	**27.96**		2.04	0.00	0.00
598	VM99-52. Area A2.4	0.00	0.05	2.40	0.00	0.06	**27.13**		2.06	0.00	0.00
599											
600	VM99-16.Area C3.1	0.33	30.48	0.41	0.02	0.01	**100.58**		1.41	0.00	0.02
601	VM99-25.Area A1.7	0.02	0.52	4.04	7.69	1.08	**100.10**		2.11	0.00	0.00
602	VM99-25.Area A1.8	0.01	0.51	4.15	3.95	1.03	**99.48**		2.16	0.00	0.00
603	VM99-25. Area D1.6	0.00	0.22	8.64	5.84	0.40	**99.52**		1.93	0.00	0.07
604	VM99-25. Area D3.3	0.04	2.91	8.83	4.29	0.25	**101.75**		1.90	0.00	0.10

	A	S	T	U	V	W	X	Y	Z	AA	AB
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**Sum Cat#**	**Wo(Ca)**
538	VM99-26. Area B2.2	0.05	0.00	0.04	0.17	0.01	0.89	0.80	0.03	4.00	42.99
539	VM99-26. Area B2.3	0.04	0.00	0.01	0.40	0.01	1.48	0.05	0.00	4.00	2.43
540	VM99-26. Area B2.4	0.04	0.00	0.03	0.36	0.01	1.51	0.05	0.00	4.00	2.38
541											
542	VM99-26. Area D1.1	0.03	0.00	0.03	0.24	0.01	0.90	0.75	0.03	4.00	39.90
543											
544	**BAD TOTALS!!!**										
545											
546	VM99-25. Area d1.5	1.69	0.13	0.00	0.00	0.00	0.00	0.00	0.36	4.35	32.06
547	VM99-25. Area d1.6	0.61	0.00	0.00	0.00	0.00	0.04	0.61	0.00	3.50	94.38
548	VM99-25. Area d1.3	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18	92.95
549	VM99-25. Area d1.7	1.10	0.00	0.00	0.00	0.00	0.01	0.34	0.00	3.46	96.83
550	VM99-25. Area d1.8	0.79	0.00	0.00	0.00	0.00	0.00	0.10	0.00	3.35	98.21
551											
552	VM99-52. Area A2.1	0.19	0.00	0.00	0.00	0.00	0.03	0.72	0.00	3.44	95.76
553	VM99-52. Area A2.2	0.13	0.00	0.00	0.00	0.00	0.04	1.02	0.00	3.57	96.00
554	VM99-52. Area A4.1	0.61	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.25	95.91
555	VM99-52. Area A4.2	0.58	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.24	99.18
556	VM99-52. Area A4.3	0.58	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.25	99.90
557	VM99-52. Area A4.4	1.06	0.00	0.00	0.00	0.00	0.01	0.31	0.00	3.43	96.61
558	VM99-52. Area A4.5	0.80	0.00	0.00	0.00	0.00	0.00	0.03	0.00	3.31	99.77
559	VM99-52. Area A4.6	0.55	0.00	0.00	0.00	0.00	0.00	0.04	0.00	3.25	99.85
560	VM99-52. Area A4.7	0.53	0.00	0.00	0.00	0.00	0.00	0.04	0.00	3.24	97.54
561	VM99-52. Area A4.8	0.81	0.00	0.00	0.00	0.00	0.00	0.08	0.00	3.32	99.92
562											
563	VM99-52. Area B1.1	0.19	0.00	0.00	0.00	0.00	0.01	0.14	0.00	3.13	92.12
564	VM99-52. Area B1.2	0.82	0.00	0.00	0.00	0.00	0.00	0.09	0.00	3.35	95.48
565	VM99-52. Area B1.3	0.08	0.00	0.00	0.00	0.00	0.02	0.07	0.00	3.07	73.60
566	VM99-52. Area B1.4	0.56	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.23	96.80
567	VM99-52. Area B1.5	0.67	0.00	0.00	0.00	0.00	0.01	0.09	0.00	3.29	91.49
568	VM99-52. Area B1.6	0.52	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.22	94.53
569	VM99-52. Area B1.7	1.00	0.00	0.00	0.00	0.00	0.01	0.28	0.00	3.41	96.61
570											
571	VM99-52. Area D2.1	1.07	0.00	0.00	0.00	0.00	0.01	0.29	0.00	3.42	96.01
572											
573	VM99-52. Area D3.1	0.45	0.00	0.00	0.00	0.00	0.00	0.04	0.00	3.18	99.85
574	VM99-52. Area D3.2	0.49	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.24	99.89
575	VM99-52. Area D3.3	0.54	0.00	0.00	0.00	0.00	0.00	0.03	0.00	3.22	99.83
576	VM99-52. Area D3.4	0.49	0.00	0.00	0.00	0.00	0.00	0.02	0.00	3.21	98.10
577											
578	VM99-52. Area D4.1	0.47	0.00	0.00	0.00	0.00	0.00	0.02	0.00	3.22	99.77
579	VM99-52. Area D4.2	0.55	0.00	0.00	0.00	0.00	0.00	0.03	0.00	3.23	99.84
580	VM99-52. Area D4.3	0.77	0.00	0.00	0.00	0.00	0.00	0.11	0.00	3.29	97.00
581											
582	VM99-52. Area E1.1	0.62	0.00	0.00	0.00	0.00	0.00	0.03	0.00	3.26	93.57
583	VM99-52. Area E1.2	0.66	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.28	99.49
584	VM99-52. Area E1.3	0.62	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.25	97.44
585											
586	VM99-52. Area E2.1	0.71	0.00	0.00	0.00	0.00	0.01	0.10	0.00	3.27	94.63
587	VM99-52. Area E2.2	0.64	0.00	0.00	0.00	0.00	0.00	0.04	0.00	3.26	97.96
588											
589	VM99-52. Area E3.1	0.55	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.25	98.57
590	VM99-52. Area E3.2	0.64	0.00	0.00	0.00	0.00	0.00	0.07	0.00	3.25	99.03
591	VM99-52. Area E3.3	0.55	0.00	0.00	0.00	0.00	0.00	0.03	0.00	3.23	91.96
592	VM99-52. Area E3.4	0.64	0.00	0.00	0.00	0.00	0.00	0.07	0.00	3.25	96.08
593											
594	VM99-52. Area F1.1	0.59	0.00	0.00	0.00	0.00	0.00	0.06	0.00	3.25	99.03
595	VM99-52. Area F1.2	0.20	0.00	0.00	0.00	0.00	0.01	0.04	0.00	3.09	76.05
596											
597	VM99-52. Area A2.3	1.06	0.00	0.00	0.00	0.00	0.01	0.31	0.00	3.44	96.60
598	VM99-52. Area A2.4	1.04	0.00	0.00	0.00	0.00	0.01	0.31	0.00	3.43	96.95
599											
600	VM99-16.Area C3.1	0.00	0.00	0.93	0.00	0.01	1.74	0.02	0.00	4.12	0.97
601	VM99-25.Area A1.7	0.86	0.00	0.00	0.04	0.00	0.03	0.14	0.50	3.73	68.84
602	VM99-25.Area A1.8	0.88	0.00	0.00	0.04	0.00	0.03	0.15	0.25	3.55	69.21
603	VM99-25. Area D1.6	0.98	0.00	0.00	0.04	0.00	0.01	0.31	0.39	3.75	86.67
604	VM99-25. Area D3.3	0.87	0.00	0.00	0.13	0.00	0.15	0.32	0.28	3.76	53.75

	A	AC	AD	AE
3	**Label**	**En(Mg)**	**Fs(Fe2+)**	**XMg**
538	VM99-26. Area B2.2	47.62	9.39	0.84
539	VM99-26. Area B2.3	76.79	20.79	0.79
540	VM99-26. Area B2.4	78.84	18.78	0.81
541				
542	VM99-26. Area D1.1	47.49	12.61	0.79
543				
544	**BAD TOTALS!!!**			
545				
546	VM99-25. Area d1.5	67.94	0.00	1.00
547	VM99-25. Area d1.6	5.62	0.00	1.00
548	VM99-25. Area d1.3	5.14	1.91	0.73
549	VM99-25. Area d1.7	3.16	0.00	1.00
550	VM99-25. Area d1.8	1.77	0.02	0.99
551				
552	VM99-52. Area A2.1	4.24	0.00	1.00
553	VM99-52. Area A2.2	4.00	0.00	1.00
554	VM99-52. Area A4.1	4.06	0.03	0.99
555	VM99-52. Area A4.2	0.79	0.03	0.97
556	VM99-52. Area A4.3	0.08	0.03	0.73
557	VM99-52. Area A4.4	3.39	0.01	1.00
558	VM99-52. Area A4.5	0.17	0.06	0.73
559	VM99-52. Area A4.6	0.11	0.04	0.73
560	VM99-52. Area A4.7	2.43	0.04	0.99
561	VM99-52. Area A4.8	0.06	0.02	0.73
562				
563	VM99-52. Area B1.1	7.87	0.01	1.00
564	VM99-52. Area B1.2	4.51	0.02	1.00
565	VM99-52. Area B1.3	26.37	0.03	1.00
566	VM99-52. Area B1.4	3.17	0.03	0.99
567	VM99-52. Area B1.5	8.49	0.02	1.00
568	VM99-52. Area B1.6	5.44	0.03	1.00
569	VM99-52. Area B1.7	3.38	0.01	1.00
570				
571	VM99-52. Area D2.1	3.99	0.01	1.00
572				
573	VM99-52. Area D3.1	0.11	0.04	0.73
574	VM99-52. Area D3.2	0.08	0.03	0.73
575	VM99-52. Area D3.3	0.13	0.05	0.73
576	VM99-52. Area D3.4	1.83	0.07	0.97
577				
578	VM99-52. Area D4.1	0.17	0.06	0.73
579	VM99-52. Area D4.2	0.11	0.04	0.73
580	VM99-52. Area D4.3	2.99	0.01	1.00
581				
582	VM99-52. Area E1.1	6.38	0.05	0.99
583	VM99-52. Area E1.2	0.48	0.03	0.94
584	VM99-52. Area E1.3	2.54	0.02	0.99
585				
586	VM99-52. Area E2.1	5.36	0.01	1.00
587	VM99-52. Area E2.2	2.00	0.04	0.98
588				
589	VM99-52. Area E3.1	1.40	0.03	0.98
590	VM99-52. Area E3.2	0.95	0.02	0.98
591	VM99-52. Area E3.3	7.99	0.05	0.99
592	VM99-52. Area E3.4	3.90	0.02	1.00
593				
594	VM99-52. Area F1.1	0.94	0.03	0.97
595	VM99-52. Area F1.2	23.90	0.05	1.00
596				
597	VM99-52. Area A2.3	3.40	0.01	1.00
598	VM99-52. Area A2.4	3.04	0.01	1.00
599				
600	VM99-16.Area C3.1	99.03	0.00	1.00
601	VM99-25.Area A1.7	12.27	18.90	0.39
602	VM99-25.Area A1.8	11.86	18.94	0.39
603	VM99-25. Area D1.6	3.13	10.20	0.24
604	VM99-25. Area D3.3	24.64	21.61	0.53

	A	B	C	D	E	F	G	H
1	**Appendix G**							
2	**Fe-Ti oxides**	**14-Nov**						
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
4	ruti.1_1	standard	0.00	97.73	0.00	0.12	0.00	0.80
5	ruti.1_2	standard	0.01	99.05	0.01	0.10	0.00	0.69
6	ruti.1_3	standard	0.01	97.46	0.01	0.12	0.00	1.00
7								
8	crom.1_1	standard	0.05	0.00	9.84	60.53	3.14	9.94
9	crom.1_2	standard	0.00	0.00	9.86	59.95	3.62	9.77
10	crom.1_3	standard	0.00	0.16	9.75	60.31	3.07	10.08
11								
12	magt.1_1	standard	0.08	0.14	0.03	0.25	67.09	30.69
13	magt.1_2	standard	0.10	0.13	0.08	0.25	66.88	30.61
14	magt.1_3	standard	0.10	0.14	0.04	0.20	66.67	30.43
15								
16	VM99-24.Area A.1	oxide inclusion in opx	0.10	10.83	3.90	0.20	41.64	35.23
17								
18	VM99-24.Area A2.1	oxide inclusion in pyx	0.04	9.48	4.22	0.35	44.98	34.44
19	VM99-24.Area A2.2	oxide inclusion in pyx	0.04	11.06	4.27	0.20	41.99	37.21
20	VM99-24.Area A2.3	core of large euhedral oxide	0.10	1.16	2.99	0.24	62.62	30.01
21	VM99-24.Area A2.4	mid of large euhedral oxide	0.08	1.38	2.77	0.22	61.81	30.08
22	VM99-24.Area A2.5	rim of large euhedral oxide	0.09	1.15	3.31	0.23	61.29	29.51
23	VM99-24.Area A2.6	rim of large euhedral oxide	0.06	3.62	2.16	0.24	56.98	31.31
24								
25	VM99-24.Area D2.1	oxide inclusion in cpx	0.04	12.44	3.03	0.30	39.95	38.57
26	VM99-24.Area D2.2	oxide inclusion in cpx	0.04	8.53	4.70	0.61	46.51	33.33
27	VM99-24.Area D2.3	oxide inclusion in opx	0.06	9.32	4.37	0.44	44.82	34.09
28	VM99-24.Area D2.4	oxide inclusion in opx	0.06	10.07	4.45	0.54	44.78	35.07
29								
30	VM99-24.Area D1.1	core of groundmass oxide	0.09	3.24	1.96	0.28	60.80	33.85
31	VM99-24.Area D1.2	rim of groundmass oxide	0.06	1.77	1.74	0.26	63.30	32.24
32								
33	VM99-24.Area E1.1	groundmass oxide	0.07	15.46	0.70	0.13	36.75	43.74
34	VM99-24.Area E1.2	core of groundmass oxide	0.10	9.58	1.21	0.22	47.95	37.94
35	VM99-24.Area E1.3	rim of groundmass oxide	0.05	2.37	0.54	0.26	62.31	30.86
36	VM99-24.Area E1.4	groundmass oxide	0.08	11.24	2.57	0.17	43.48	38.37
37								
38	VM99-24.Area E2.1	core of large euhedral oxide	0.09	12.80	1.54	0.20	38.97	40.69
39	VM99-24.Area E2.2	mid of large euhedral oxide	0.09	13.54	1.53	0.22	37.41	41.13
40	VM99-24.Area E2.3	rim of large euhedral oxide	0.12	23.58	0.98	0.14	17.94	49.34
41	VM99-24.Area E2.4	rim of large euhedral oxide	0.06	16.50	1.88	0.15	31.11	43.61
42	VM99-24.Area E2.5	exsolved area	0.08	48.01	0.06	0.02	0.00	45.55
43								
44	VM99-24.Area A4.1		0.08	8.22	3.57	0.13	47.78	33.56
45	VM99-24.Area A4.2		0.03	9.42	4.03	0.27	44.57	34.01
46								
47	VM99-24.Area B1.1		0.70	6.47	4.86	0.40	47.31	32.74
48	VM99-24.Area B1.2		0.06	3.04	5.72	1.50	53.69	30.40
49								
50	VM99-24.Area F2.1	oxide inclusion in cpx	0.07	9.78	2.80	3.21	43.70	33.28
51								
52	VM99-16.Area B3.2	core of groundmass oxide	0.49	11.76	0.82	0.84	39.62	40.71
53	VM99-16.Area B3.3	rim of groundmass oxide	0.12	12.69	0.61	0.74	39.38	40.77
54								
55	VM99-16.Area B4.1	core of groundmass oxide	0.01	12.08	3.74	6.36	35.08	36.30
56	VM99-16.Area B4.2	rim of groundmass oxide	0.05	11.89	3.78	6.28	35.19	36.11
57								
58	VM99-16.Area C1.1	spinel inclusion in olivine	0.02	2.40	13.45	28.96	20.52	23.64
59	VM99-16.Area C3.1	groundmass oxide	0.07	15.54	1.01	1.19	34.92	43.51
60								
61	VM99-16.Area D1.1	oxide inclusion in pyx	0.13	10.71	3.95	0.12	41.58	37.37
62	VM99-16.Area D1.2	oxide inclusion in pyx	0.05	9.32	4.46	0.28	44.54	34.49
63								
64	VM99-16.Area D2.1	core of groundmass oxide	0.03	15.75	1.16	4.00	31.34	42.30
65	VM99-16.Area D2.2	rim of groundmass oxide	0.06	15.93	1.17	3.94	30.84	42.43
66								
67	VM99-16.Area E1.1	spinel inclusion in olivine	0.39	3.87	17.08	17.05	25.03	25.46
68	VM99-16.Area E1.2	large euhedral oxide	0.05	16.06	1.19	3.98	31.23	41.86

	A	I	J	K	L	M	N	O	P	Q
1	**Appendix G**									
2	**Fe-Ti oxides**									
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
4	ruti.1_1	0.59	0.00	0.02	0.00	**99.26**		0.00	1.98	0.00
5	ruti.1_2	0.65	0.00	0.00	0.00	**100.52**		0.00	1.98	0.00
6	ruti.1_3	0.66	0.00	0.02	0.02	**99.30**		0.00	1.98	0.00
7										
8	crom.1_1	0.08	0.25	15.07	0.06	**98.95**		0.00	0.00	0.00
9	crom.1_2	0.07	0.23	15.09	0.05	**98.65**		0.00	0.00	0.00
10	crom.1_3	0.11	0.26	14.99	0.05	**98.78**		0.00	0.00	0.00
11										
12	magt.1_1	0.37	0.12	0.00	0.14	**98.90**		0.00	0.00	0.00
13	magt.1_2	0.35	0.16	0.00	0.15	**98.71**		0.00	0.00	0.00
14	magt.1_3	0.35	0.15	0.00	0.24	**98.32**		0.00	0.00	0.00
15										
16	VM99-24.Area A.1	0.62	0.30	3.34	0.10	**96.26**		0.00	0.31	0.00
17										
18	VM99-24.Area A2.1	0.58	0.28	3.33	0.14	**97.84**		0.00	0.26	0.00
19	VM99-24.Area A2.2	0.58	0.31	2.58	0.17	**98.42**		0.00	0.31	0.00
20	VM99-24.Area A2.3	0.82	0.21	1.51	0.23	**99.90**		0.00	0.03	0.00
21	VM99-24.Area A2.4	0.76	0.19	1.38	0.19	**98.86**		0.00	0.04	0.00
22	VM99-24.Area A2.5	0.74	0.19	1.57	0.21	**98.30**		0.00	0.03	0.00
23	VM99-24.Area A2.6	0.60	0.29	1.38	0.15	**96.79**		0.00	0.11	0.00
24										
25	VM99-24.Area D2.1	0.54	0.40	2.18	0.14	**97.60**		0.00	0.35	0.00
26	VM99-24.Area D2.2	0.68	0.28	3.71	0.06	**98.43**		0.00	0.24	0.00
27	VM99-24.Area D2.3	0.64	0.29	3.48	0.09	**97.60**		0.00	0.26	0.00
28	VM99-24.Area D2.4	0.62	0.24	3.77	0.06	**99.64**		0.00	0.28	0.00
29										
30	VM99-24.Area D1.1	0.80	0.12	0.73	0.04	**101.91**		0.00	0.09	0.00
31	VM99-24.Area D1.2	0.85	0.10	0.68	0.00	**100.99**		0.00	0.05	0.00
32										
33	VM99-24.Area E1.1	0.53	0.48	0.58	0.08	**98.52**		0.00	0.44	0.00
34	VM99-24.Area E1.2	0.62	0.33	1.09	0.07	**99.11**		0.00	0.27	0.00
35	VM99-24.Area E1.3	0.59	0.42	1.07	0.00	**98.47**		0.00	0.07	0.00
36	VM99-24.Area E1.4	0.65	0.40	1.88	0.05	**98.88**		0.00	0.32	0.00
37										
38	VM99-24.Area E2.1	0.65	0.36	0.62	0.11	**96.01**		0.00	0.38	0.00
39	VM99-24.Area E2.2	0.60	0.41	0.68	0.11	**95.72**		0.00	0.40	0.00
40	VM99-24.Area E2.3	0.38	0.47	1.06	0.00	**94.01**		0.01	0.70	0.00
41	VM99-24.Area E2.4	0.71	0.36	0.88	0.02	**95.28**		0.00	0.48	0.00
42	VM99-24.Area E2.5	0.00	0.60	1.90	0.00	**96.23**		0.00	1.27	0.00
43										
44	VM99-24.Area A4.1	0.61	0.32	3.07	0.00	**97.33**		0.00	0.23	0.00
45	VM99-24.Area A4.2	0.51	0.30	3.35	0.01	**96.51**		0.00	0.27	0.00
46										
47	VM99-24.Area B1.1	0.67	0.30	3.07	0.00	**96.50**		0.03	0.18	0.00
48	VM99-24.Area B1.2	0.71	0.24	2.33	0.06	**97.76**		0.00	0.09	0.00
49										
50	VM99-24.Area F2.1	0.76	0.25	4.26	0.18	**98.29**		0.00	0.27	0.00
51										
52	VM99-16.Area B3.2	0.76	0.19	0.30	0.04	**95.54**		0.02	0.35	0.00
53	VM99-16.Area B3.3	0.77	0.41	0.38	0.11	**95.99**		0.01	0.38	0.00
54										
55	VM99-16.Area B4.1	0.68	0.35	3.79	0.11	**98.49**		0.00	0.33	0.00
56	VM99-16.Area B4.2	0.66	0.29	3.78	0.15	**98.18**		0.00	0.33	0.00
57										
58	VM99-16.Area C1.1	0.32	0.27	7.25	0.09	**96.91**		0.00	0.06	0.00
59	VM99-16.Area C3.1	0.71	0.35	0.79	0.15	**98.24**		0.00	0.45	0.00
60										
61	VM99-16.Area D1.1	0.74	0.26	2.09	0.11	**97.05**		0.01	0.30	0.00
62	VM99-16.Area D1.2	0.72	0.29	3.21	0.06	**97.43**		0.00	0.26	0.00
63										
64	VM99-16.Area D2.1	0.70	0.40	1.52	0.15	**97.35**		0.00	0.45	0.00
65	VM99-16.Area D2.2	0.71	0.42	1.54	0.10	**97.15**		0.00	0.46	0.00
66										
67	VM99-16.Area E1.1	0.40	0.26	7.66	0.08	**97.28**		0.01	0.10	0.00
68	VM99-16.Area E1.2	0.71	0.35	2.15	0.09	**97.66**		0.00	0.46	0.00

	A	R	S	T	U	V	W	X	Y	Z	AA
1	**Appendix G**										
2	**Fe-Ti oxides**										
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
4	ruti.1_1	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	2.01	94.36
5	ruti.1_2	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	2.01	85.02
6	ruti.1_3	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	2.02	89.48
7											
8	crom.1_1	0.37	1.55	0.08	0.27	0.00	0.01	0.73	0.00	3.00	80.50
9	crom.1_2	0.38	1.53	0.09	0.26	0.00	0.01	0.73	0.00	3.00	80.32
10	crom.1_3	0.37	1.54	0.08	0.27	0.00	0.01	0.72	0.00	3.00	80.59
11											
12	magt.1_1	0.00	0.01	1.97	1.00	0.01	0.00	0.00	0.00	3.00	83.10
13	magt.1_2	0.00	0.01	1.96	1.00	0.01	0.01	0.00	0.00	3.00	67.75
14	magt.1_3	0.00	0.01	1.96	1.00	0.01	0.01	0.00	0.01	3.00	75.02
15											
16	VM99-24.Area A.1	0.17	0.01	1.18	1.11	0.02	0.01	0.19	0.00	3.00	3.26
17											
18	VM99-24.Area A2.1	0.19	0.01	1.26	1.07	0.02	0.01	0.18	0.00	3.00	5.27
19	VM99-24.Area A2.2	0.19	0.01	1.17	1.15	0.02	0.01	0.14	0.01	3.00	3.03
20	VM99-24.Area A2.3	0.13	0.01	1.76	0.94	0.03	0.01	0.08	0.01	3.00	5.02
21	VM99-24.Area A2.4	0.12	0.01	1.76	0.95	0.02	0.01	0.08	0.01	3.00	5.06
22	VM99-24.Area A2.5	0.15	0.01	1.75	0.94	0.02	0.01	0.09	0.01	3.00	4.44
23	VM99-24.Area A2.6	0.10	0.01	1.66	1.01	0.02	0.01	0.08	0.00	3.00	6.90
24											
25	VM99-24.Area D2.1	0.13	0.01	1.13	1.22	0.02	0.01	0.12	0.00	3.00	6.24
26	VM99-24.Area D2.2	0.20	0.02	1.29	1.02	0.02	0.01	0.20	0.00	3.00	7.95
27	VM99-24.Area D2.3	0.19	0.01	1.25	1.06	0.02	0.01	0.19	0.00	3.00	6.39
28	VM99-24.Area D2.4	0.19	0.02	1.22	1.06	0.02	0.01	0.20	0.00	3.00	7.51
29											
30	VM99-24.Area D1.1	0.09	0.01	1.70	1.05	0.02	0.00	0.04	0.00	3.00	8.70
31	VM99-24.Area D1.2	0.08	0.01	1.79	1.01	0.03	0.00	0.04	0.00	3.00	9.01
32											
33	VM99-24.Area E1.1	0.03	0.00	1.06	1.40	0.02	0.02	0.03	0.00	3.00	10.80
34	VM99-24.Area E1.2	0.05	0.01	1.37	1.20	0.02	0.01	0.06	0.00	3.00	10.98
35	VM99-24.Area E1.3	0.03	0.01	1.81	1.00	0.02	0.01	0.06	0.00	3.00	24.23
36	VM99-24.Area E1.4	0.11	0.01	1.22	1.20	0.02	0.01	0.11	0.00	3.00	4.26
37											
38	VM99-24.Area E2.1	0.07	0.01	1.15	1.33	0.02	0.01	0.04	0.00	3.00	8.00
39	VM99-24.Area E2.2	0.07	0.01	1.10	1.35	0.02	0.01	0.04	0.00	3.00	8.84
40	VM99-24.Area E2.3	0.05	0.00	0.53	1.63	0.01	0.02	0.06	0.00	3.00	8.99
41	VM99-24.Area E2.4	0.09	0.01	0.91	1.42	0.02	0.01	0.05	0.00	3.00	5.18
42	VM99-24.Area E2.5	0.00	0.00	0.00	1.34	0.00	0.02	0.10	0.00	2.73	13.92
43											
44	VM99-24.Area A4.1	0.16	0.00	1.35	1.05	0.02	0.01	0.17	0.00	3.00	2.43
45	VM99-24.Area A4.2	0.18	0.01	1.26	1.07	0.02	0.01	0.19	0.00	3.00	4.26
46											
47	VM99-24.Area B1.1	0.22	0.01	1.34	1.03	0.02	0.01	0.17	0.00	3.00	5.22
48	VM99-24.Area B1.2	0.25	0.04	1.51	0.95	0.02	0.01	0.13	0.00	3.00	14.98
49											
50	VM99-24.Area F2.1	0.12	0.09	1.21	1.03	0.02	0.01	0.23	0.01	3.00	43.45
51											
52	VM99-16.Area B3.2	0.04	0.03	1.18	1.34	0.02	0.01	0.02	0.00	3.00	40.79
53	VM99-16.Area B3.3	0.03	0.02	1.17	1.34	0.02	0.01	0.02	0.00	3.00	45.09
54											
55	VM99-16.Area B4.1	0.16	0.18	0.97	1.11	0.02	0.01	0.21	0.00	3.00	53.28
56	VM99-16.Area B4.2	0.16	0.18	0.97	1.11	0.02	0.01	0.21	0.00	3.00	52.72
57											
58	VM99-16.Area C1.1	0.55	0.79	0.53	0.68	0.01	0.01	0.37	0.00	3.00	59.09
59	VM99-16.Area C3.1	0.05	0.04	1.00	1.39	0.02	0.01	0.05	0.00	3.00	44.16
60											
61	VM99-16.Area D1.1	0.18	0.00	1.18	1.18	0.02	0.01	0.12	0.00	3.00	1.93
62	VM99-16.Area D1.2	0.20	0.01	1.25	1.07	0.02	0.01	0.18	0.00	3.00	4.05
63											
64	VM99-16.Area D2.1	0.05	0.12	0.90	1.35	0.02	0.01	0.09	0.00	3.00	69.88
65	VM99-16.Area D2.2	0.05	0.12	0.89	1.36	0.02	0.01	0.09	0.00	3.00	69.31
66											
67	VM99-16.Area E1.1	0.68	0.45	0.63	0.72	0.01	0.01	0.39	0.00	3.00	40.10
68	VM99-16.Area E1.2	0.05	0.12	0.89	1.32	0.02	0.01	0.12	0.00	3.00	69.28

	A	AB	AC
1	**Appendix G**		
2	**Fe-Ti oxides**		
3	**Label**	**XFe2+**	**YFe3+**
4	ruti.1_1	95.86	0.00
5	ruti.1_2	99.75	0.00
6	ruti.1_3	96.80	0.00
7			
8	crom.1_1	27.03	3.82
9	crom.1_2	26.64	4.42
10	crom.1_3	27.39	3.76
11			
12	magt.1_1	100.00	99.53
13	magt.1_2	100.00	99.42
14	magt.1_3	100.00	99.59
15			
16	VM99-24.Area A.1	85.55	86.83
17			
18	VM99-24.Area A2.1	85.29	86.56
19	VM99-24.Area A2.2	89.00	85.88
20	VM99-24.Area A2.3	91.77	92.70
21	VM99-24.Area A2.4	92.43	93.12
22	VM99-24.Area A2.5	91.36	91.87
23	VM99-24.Area A2.6	92.72	94.00
24			
25	VM99-24.Area D2.1	90.83	88.76
26	VM99-24.Area D2.2	83.45	85.33
27	VM99-24.Area D2.3	84.60	85.97
28	VM99-24.Area D2.4	83.91	85.60
29			
30	VM99-24.Area D1.1	96.31	94.77
31	VM99-24.Area D1.2	96.37	95.48
32			
33	VM99-24.Area E1.1	97.71	96.77
34	VM99-24.Area E1.2	95.12	95.75
35	VM99-24.Area E1.3	94.19	98.24
36	VM99-24.Area E1.4	91.95	91.19
37			
38	VM99-24.Area E2.1	97.38	93.71
39	VM99-24.Area E2.2	97.13	93.45
40	VM99-24.Area E2.3	96.30	91.43
41	VM99-24.Area E2.4	96.55	90.94
42	VM99-24.Area E2.5	93.07	0.00
43			
44	VM99-24.Area A4.1	86.00	89.30
45	VM99-24.Area A4.2	85.08	87.12
46			
47	VM99-24.Area B1.1	85.68	85.50
48	VM99-24.Area B1.2	87.99	83.59
49			
50	VM99-24.Area F2.1	81.44	84.91
51			
52	VM99-16.Area B3.2	98.69	94.83
53	VM99-16.Area B3.3	98.35	95.79
54			
55	VM99-16.Area B4.1	84.30	73.67
56	VM99-16.Area B4.2	84.26	73.77
57			
58	VM99-16.Area C1.1	64.66	28.49
59	VM99-16.Area C3.1	96.85	92.53
60			
61	VM99-16.Area D1.1	90.93	86.82
62	VM99-16.Area D1.2	85.78	85.94
63			
64	VM99-16.Area D2.1	93.98	83.91
65	VM99-16.Area D2.2	93.93	83.77
66			
67	VM99-16.Area E1.1	65.09	35.91
68	VM99-16.Area E1.2	91.61	83.79

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
69	VM99-16.Area E1.3	large euhedral oxide	0.03	16.20	1.11	4.02	30.38	41.59
70								
71	VM99-16.Area F1.1	oxide inclusion in plag	0.05	32.27	0.13	0.08	2.18	56.18
72								
73	VM99-25. Area A1.1	oxide in amphibole breakdown hal	0.12	37.33	0.29	0.12	0.00	54.74
74	VM99-25. Area A1.2	oxide in amphibole breakdown hal	0.10	41.03	0.65	0.07	0.00	51.37
75	VM99-25. Area A1.3	oxide in amphibole breakdown hal	5.08	12.16	1.34	0.12	26.80	43.05
76								
77	VM99-25. Area A3.1	oxide inclusion in pyx	0.05	9.86	3.23	0.20	44.87	36.35
78	VM99-25. Area A3.2	oxide welded on to pyx	0.07	11.73	2.15	0.17	43.06	39.73
79								
80	VM99-25. Area A4.1	groundmass oxide	0.12	11.53	1.26	0.26	42.57	39.92
81								
82	VM99-25. Area B1.1	core of large euhedral oxide	0.04	12.17	1.72	0.17	42.00	40.49
83	VM99-25. Area B1.2	rim of large euhedral oxide	0.07	12.10	1.79	0.19	41.64	40.47
84								
85	VM99-25. Area C1.1	oxide inclusion in pyx	0.07	10.17	2.92	0.19	45.26	36.64
86								
87	VM99-25. Area C2.1	core of large euhedral oxide	0.07	10.76	2.42	0.24	44.01	39.26
88								
89	VM99-25. Area C2.2	rim of large euhedral oxide	0.07	10.84	2.33	0.22	44.28	39.38
90	VM99-25. Area C2.3	oxide inclusion in pyx	0.06	6.13	3.42	0.23	52.41	35.02
91								
92	VM99-25. Area C3.1	oxide inclusion in cpx	0.04	8.20	3.65	0.48	48.23	35.79
93	VM99-25. Area C3.2	oxide inclusion in cpx	0.04	5.33	3.80	1.23	51.00	34.14
94								
95	VM99-25. Area D1.1	oxide in amphibole breakdown hal	0.03	8.72	2.14	0.26	48.37	36.94
96	VM99-25. Area D1.2	oxide in amphibole breakdown hal	0.07	7.20	6.05	0.72	46.87	31.25
97	VM99-25. Area D1.3	oxide in amphibole breakdown hal	0.04	10.79	3.02	0.40	43.83	34.76
98	VM99-25. Area D1.4	oxide in amphibole breakdown hal	0.06	8.18	1.35	0.26	50.33	36.35
99	VM99-25. Area D1.5	core of oxide welded on to breakd	0.05	7.80	1.33	0.25	50.51	35.73
100	VM99-25. Area D1.6	exsolved area	0.02	47.20	0.08	0.04	0.00	45.63
101	VM99-25. Area D1.7	oxide in amphibole breakdown hal	0.05	10.37	2.74	0.26	45.11	35.58
102	VM99-25. Area D1.8	oxide in amphibole breakdown hal	0.02	10.39	2.77	0.28	46.51	36.11
103	VM99-25. Area D1.9	oxide in amphibole breakdown hal	0.06	10.05	2.27	0.22	46.38	36.78
104	VM99-25. Area D1.10	core of oxide welded on to breakd	0.07	10.30	2.25	0.21	46.11	37.08
105	VM99-25. Area D1.11	rim of oxide welded on to breakdo	0.04	10.35	2.28	0.19	44.36	36.54
106								
107	**Fe-Ti oxides**	**24-Feb**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
108	VM99-24.area A.1	rim of oxide in glomero	0.06	2.52	7.49	0.14	52.42	30.84
109	VM99-24.area A.2	rim of oxide in glomero	0.04	1.62	3.09	0.13	58.71	29.93
110	VM99-24.area A.3	core of oxide in glomero	0.10	8.48	1.38	0.21	47.59	35.16
111	VM99-24.area A.4	rim of oxide in glomero	0.06	3.41	3.44	0.19	53.31	30.42
112	VM99-24.area A.5	exsolved area	0.03	3.34	1.62	0.21	56.53	31.49
113								
114	VM99-24.area A.6	core of clean oxide	0.05	5.92	5.17	0.46	47.96	30.98
115	VM99-24.area A.7	exsolved area	0.43	4.40	5.31	0.61	47.41	29.90
116								
117	VM99-24.area A.8	core of oxide in glomero	0.08	1.59	2.82	0.32	57.12	28.38
118	VM99-24.area A.9	rim of oxide in glomero	0.03	3.71	10.34	0.32	48.26	28.20
119	VM99-24.area A.10	exsolved?	0.08	19.88	2.53	0.33	26.09	42.24
120								
121	VM99-24.area B.1	core of oxide	0.09	1.16	2.20	0.14	62.19	30.49
122	VM99-24.area B.2	rim of oxide	0.08	2.33	3.32	0.15	58.01	30.52
123	VM99-24.area B.3	rim of oxide	0.05	1.31	6.95	0.13	56.29	28.60
124								
125	VM99-24.area B.4	oxide inclusion in cpx	0.07	11.90	2.39	2.72	40.83	28.56
126	VM99-24.area B.5	core of clean oxide	0.04	8.56	3.49	0.10	45.47	35.71
127								
128	VM99-24.area C.1	oxide inclusion in opx	0.16	10.24	4.38	0.26	41.27	34.66
129	VM99-24.area C.2	oxide inclusion in opx	0.02	11.15	3.73	0.37	40.66	34.72
130	VM99-24.area C.3	core of exsolved oxide	0.05	14.70	1.93	0.16	36.52	41.21
131	VM99-24.area C.4	rim of exsolved oxide	0.06	1.88	5.97	0.17	56.08	27.72
132	VM99-24.area C.5	ilmenite	0.10	52.11	1.15	0.09	0.00	39.33
133								
134	VM99-61a.area A.1	oxide inclusion in plag	0.07	5.24	0.99	0.13	49.32	31.84
135	VM99-61a.area A.2	oxide inclusion in plag	0.05	46.88	0.12	0.00	0.00	40.83

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
69	VM99-16.Area E1.3	0.80	0.40	2.16	0.12	**96.81**		0.00	0.47	0.00
70										
71	VM99-16.Area F1.1	0.29	0.20	1.70	0.00	**93.07**		0.00	0.96	0.00
72										
73	VM99-25. Area A1.1	0.22	0.62	1.65	0.04	**95.13**		0.01	1.06	0.00
74	VM99-25. Area A1.2	0.06	0.69	3.66	0.07	**97.70**		0.00	1.10	0.00
75	VM99-25. Area A1.3	0.89	0.45	2.10	0.28	**92.27**		0.20	0.36	0.00
76										
77	VM99-25. Area A3.1	0.55	0.32	2.19	0.13	**97.75**		0.00	0.28	0.00
78	VM99-25. Area A3.2	0.62	0.40	1.27	0.14	**99.34**		0.00	0.33	0.00
79										
80	VM99-25. Area A4.1	0.64	0.35	0.65	0.09	**97.39**		0.01	0.34	0.00
81										
82	VM99-25. Area B1.1	0.54	0.46	0.74	0.18	**98.50**		0.00	0.35	0.00
83	VM99-25. Area B1.2	0.55	0.46	0.72	0.09	**98.08**		0.00	0.35	0.00
84										
85	VM99-25. Area C1.1	0.54	0.38	2.32	0.07	**98.56**		0.00	0.29	0.00
86										
87	VM99-25. Area C2.1	0.65	0.38	0.97	0.10	**98.85**		0.00	0.31	0.00
88										
89	VM99-25. Area C2.2	0.60	0.38	1.01	0.08	**99.18**		0.00	0.31	0.00
90	VM99-25. Area C2.3	0.63	0.35	1.21	0.05	**99.51**		0.00	0.17	0.00
91										
92	VM99-25. Area C3.1	0.68	0.29	2.00	0.04	**99.39**		0.00	0.23	0.00
93	VM99-25. Area C3.2	0.87	0.24	1.00	0.14	**97.80**		0.00	0.15	0.00
94										
95	VM99-25. Area D1.1	0.65	0.38	1.12	0.18	**98.80**		0.00	0.25	0.00
96	VM99-25. Area D1.2	0.73	0.37	4.22	0.02	**97.49**		0.00	0.20	0.00
97	VM99-25. Area D1.3	0.59	0.39	3.72	0.05	**97.59**		0.00	0.30	0.00
98	VM99-25. Area D1.4	0.74	0.38	1.20	0.08	**98.93**		0.00	0.23	0.00
99	VM99-25. Area D1.5	0.69	0.35	1.16	0.11	**97.97**		0.00	0.23	0.00
100	VM99-25. Area D1.6	0.00	0.70	3.19	0.00	**96.86**		0.00	1.24	0.00
101	VM99-25. Area D1.7	0.57	0.35	3.05	0.03	**98.10**		0.00	0.29	0.00
102	VM99-25. Area D1.8	0.59	0.35	3.04	0.18	**100.23**		0.00	0.29	0.00
103	VM99-25. Area D1.9	0.63	0.35	2.16	0.13	**99.04**		0.00	0.28	0.00
104	VM99-25. Area D1.10	0.54	0.38	2.14	0.11	**99.18**		0.00	0.29	0.00
105	VM99-25. Area D1.11	0.55	0.37	2.05	0.04	**96.77**		0.00	0.30	0.00
106										
107	**Fe-Ti oxides**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**				
108	VM99-24.area A.1	0.85	0.10	1.65	0.14	**96.21**				
109	VM99-24.area A.2	0.77	0.08	1.10	0.03	**95.50**				
110	VM99-24.area A.3	0.75	0.20	1.65	0.00	**95.52**				
111	VM99-24.area A.4	0.78	0.16	1.44	0.00	**93.21**				
112	VM99-24.area A.5	0.71	0.13	0.79	0.08	**94.94**				
113										
114	VM99-24.area A.6	0.75	0.24	2.96	0.07	**94.55**				
115	VM99-24.area A.7	0.80	0.21	2.52	0.07	**91.67**				
116										
117	VM99-24.area A.8	0.81	0.06	1.54	0.10	**92.81**				
118	VM99-24.area A.9	0.69	0.09	4.27	0.39	**96.30**				
119	VM99-24.area A.10	0.53	0.49	3.99	0.04	**96.21**				
120										
121	VM99-24.area B.1	0.87	0.07	0.94	0.09	**98.24**				
122	VM99-24.area B.2	0.74	0.11	1.39	0.14	**96.79**				
123	VM99-24.area B.3	0.72	0.09	2.35	0.26	**96.73**				
124										
125	VM99-24.area B.4	0.77	0.35	8.04	0.03	**95.66**				
126	VM99-24.area B.5	0.77	0.31	1.48	0.17	**96.12**				
127										
128	VM99-24.area C.1	0.68	0.22	3.32	0.11	**95.31**				
129	VM99-24.area C.2	0.71	0.27	3.62	0.12	**95.36**				
130	VM99-24.area C.3	0.75	0.38	1.74	0.09	**97.53**				
131	VM99-24.area C.4	0.74	0.24	2.92	0.26	**96.04**				
132	VM99-24.area C.5	0.49	0.34	1.52	0.05	**95.19**				
133										
134	VM99-61a.area A.1	0.74	0.12	0.44	0.15	**89.05**				
135	VM99-61a.area A.2	0.01	0.48	1.63	0.06	**90.05**				

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
69	VM99-16.Area E1.3	0.05	0.12	0.87	1.33	0.03	0.01	0.12	0.00	3.00	70.75
70											
71	VM99-16.Area F1.1	0.01	0.00	0.07	1.85	0.01	0.01	0.10	0.00	3.00	28.32
72											
73	VM99-25. Area A1.1	0.01	0.00	0.00	1.73	0.01	0.02	0.09	0.00	2.93	21.51
74	VM99-25. Area A1.2	0.03	0.00	0.00	1.53	0.00	0.02	0.20	0.00	2.88	6.61
75	VM99-25. Area A1.3	0.06	0.00	0.79	1.41	0.03	0.02	0.12	0.01	3.00	5.80
76											
77	VM99-25. Area A3.1	0.14	0.01	1.27	1.15	0.02	0.01	0.12	0.00	3.00	4.02
78	VM99-25. Area A3.2	0.10	0.01	1.22	1.25	0.02	0.01	0.07	0.00	3.00	5.02
79											
80	VM99-25. Area A4.1	0.06	0.01	1.24	1.29	0.02	0.01	0.04	0.00	3.00	12.05
81											
82	VM99-25. Area B1.1	0.08	0.01	1.20	1.29	0.02	0.02	0.04	0.01	3.00	6.25
83	VM99-25. Area B1.2	0.08	0.01	1.20	1.29	0.02	0.02	0.04	0.00	3.00	6.52
84											
85	VM99-25. Area C1.1	0.13	0.01	1.27	1.15	0.02	0.01	0.13	0.00	3.00	4.24
86											
87	VM99-25. Area C2.1	0.11	0.01	1.25	1.24	0.02	0.01	0.05	0.00	3.00	6.11
88											
89	VM99-25. Area C2.2	0.10	0.01	1.25	1.24	0.02	0.01	0.06	0.00	3.00	6.07
90	VM99-25. Area C2.3	0.15	0.01	1.47	1.10	0.02	0.01	0.07	0.00	3.00	4.23
91											
92	VM99-25. Area C3.1	0.16	0.01	1.35	1.11	0.02	0.01	0.11	0.00	3.00	8.17
93	VM99-25. Area C3.2	0.17	0.04	1.46	1.09	0.03	0.01	0.06	0.00	3.00	17.84
94											
95	VM99-25. Area D1.1	0.10	0.01	1.38	1.17	0.02	0.01	0.06	0.01	3.00	7.65
96	VM99-25. Area D1.2	0.26	0.02	1.29	0.96	0.02	0.01	0.23	0.00	3.00	7.39
97	VM99-25. Area D1.3	0.13	0.01	1.23	1.08	0.02	0.01	0.21	0.00	3.00	8.23
98	VM99-25. Area D1.4	0.06	0.01	1.44	1.15	0.02	0.01	0.07	0.00	3.00	11.50
99	VM99-25. Area D1.5	0.06	0.01	1.46	1.15	0.02	0.01	0.07	0.00	3.00	11.40
100	VM99-25. Area D1.6	0.00	0.00	0.00	1.33	0.00	0.02	0.17	0.00	2.76	23.71
101	VM99-25. Area D1.7	0.12	0.01	1.27	1.11	0.02	0.01	0.17	0.00	3.00	5.93
102	VM99-25. Area D1.8	0.12	0.01	1.28	1.11	0.02	0.01	0.17	0.01	3.00	6.26
103	VM99-25. Area D1.9	0.10	0.01	1.31	1.15	0.02	0.01	0.12	0.00	3.00	6.18
104	VM99-25. Area D1.10	0.10	0.01	1.30	1.16	0.02	0.01	0.12	0.00	3.00	5.83
105	VM99-25. Area D1.11	0.10	0.01	1.28	1.17	0.02	0.01	0.12	0.00	3.00	5.27
106											
107	**Fe-Ti oxides**										
108	VM99-24.area A.1										
109	VM99-24.area A.2										
110	VM99-24.area A.3										
111	VM99-24.area A.4										
112	VM99-24.area A.5										
113											
114	VM99-24.area A.6										
115	VM99-24.area A.7										
116											
117	VM99-24.area A.8										
118	VM99-24.area A.9										
119	VM99-24.area A.10										
120											
121	VM99-24.area B.1										
122	VM99-24.area B.2										
123	VM99-24.area B.3										
124											
125	VM99-24.area B.4										
126	VM99-24.area B.5										
127											
128	VM99-24.area C.1										
129	VM99-24.area C.2										
130	VM99-24.area C.3										
131	VM99-24.area C.4										
132	VM99-24.area C.5										
133											
134	VM99-61a.area A.1										
135	VM99-61a.area A.2										

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
69	VM99-16.Area E1.3	91.52	83.59
70			
71	VM99-16.Area F1.1	94.90	88.42
72			
73	VM99-25. Area A1.1	94.90	0.00
74	VM99-25. Area A1.2	88.72	0.00
75	VM99-25. Area A1.3	92.00	92.34
76			
77	VM99-25. Area A3.1	90.32	89.48
78	VM99-25. Area A3.2	94.62	92.41
79			
80	VM99-25. Area A4.1	97.20	95.00
81			
82	VM99-25. Area B1.1	96.84	93.59
83	VM99-25. Area B1.2	96.92	93.28
84			
85	VM99-25. Area C1.1	89.85	90.45
86			
87	VM99-25. Area C2.1	95.79	91.59
88			
89	VM99-25. Area C2.2	95.65	91.93
90	VM99-25. Area C2.3	94.20	90.37
91			
92	VM99-25. Area C3.1	90.96	88.57
93	VM99-25. Area C3.2	95.02	87.56
94			
95	VM99-25. Area D1.1	94.88	93.03
96	VM99-25. Area D1.2	80.62	82.07
97	VM99-25. Area D1.3	83.99	89.49
98	VM99-25. Area D1.4	94.44	95.47
99	VM99-25. Area D1.5	94.51	95.56
100	VM99-25. Area D1.6	88.91	0.00
101	VM99-25. Area D1.7	86.75	90.81
102	VM99-25. Area D1.8	86.97	90.97
103	VM99-25. Area D1.9	90.54	92.45
104	VM99-25. Area D1.10	90.67	92.50
105	VM99-25. Area D1.11	90.90	92.17
106			
107	**Fe-Ti oxides**		
108	VM99-24.area A.1		
109	VM99-24.area A.2		
110	VM99-24.area A.3		
111	VM99-24.area A.4		
112	VM99-24.area A.5		
113			
114	VM99-24.area A.6		
115	VM99-24.area A.7		
116			
117	VM99-24.area A.8		
118	VM99-24.area A.9		
119	VM99-24.area A.10		
120			
121	VM99-24.area B.1		
122	VM99-24.area B.2		
123	VM99-24.area B.3		
124			
125	VM99-24.area B.4		
126	VM99-24.area B.5		
127			
128	VM99-24.area C.1		
129	VM99-24.area C.2		
130	VM99-24.area C.3		
131	VM99-24.area C.4		
132	VM99-24.area C.5		
133			
134	VM99-61a.area A.1		
135	VM99-61a.area A.2		

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
136	VM99-61a.area A.4	oxide inclusion in plag	0.04	12.07	1.18	0.24	39.50	37.26
137	VM99-61a.area A.5	core of exsolved oxide	0.05	13.02	1.77	0.29	35.10	38.39
138	VM99-61a.area A.6	rim of exsolved oxide	0.03	51.28	0.15	0.00	0.00	36.92
139								
140	VM99-61a.area A.7	core of oxide inclusion in opx	0.10	42.21	0.14	0.00	0.00	48.73
141	VM99-61a.area A.8	rim of oxide inclusion in opx	0.01	42.66	0.14	0.00	0.00	49.29
142	VM99-61a.area A.9	oxide inclusion in cpx	0.00	3.87	0.93	0.48	57.77	28.30
143								
144	VM99-61a.area C.1	core of groundmass oxide	0.09	12.13	0.52	0.16	38.43	38.32
145	VM99-61a.area C.2	rim of groundmass oxide	0.08	11.84	0.57	0.18	37.62	37.84
146	VM99-61a.area C.3	bad point	8.24	2.86	3.43	0.00	34.26	42.55
147								
148	VM99-61a.area C.4	core of groundmass oxide	0.05	1.80	0.53	0.24	59.70	29.52
149	VM99-61a.area C.5	core of groundmass oxide	0.07	7.02	0.31	0.16	50.02	34.13
150	VM99-61a.area C.6	rim of groundmass oxide	0.05	8.53	2.87	0.17	44.15	34.54
151	VM99-61a.area C.7	exsolved area	0.07	56.90	0.10	0.00	0.00	35.18
152								
153	VM99-61a.area B.1	exsolved oxide	0.09	23.99	0.73	0.22	15.69	49.89
154	VM99-61a.area B.2	exsolved oxide	0.09	14.71	1.00	0.16	30.97	39.95
155	VM99-61a.area B.3	bad point	0.02	71.48	0.07	0.00	0.00	24.14
156	VM99-61a.area B.4	core of clean oxide	0.04	4.07	0.53	0.21	59.06	32.84
157	VM99-61a.area B.5	rim of clean oxide	0.28	13.94	2.46	0.18	34.02	40.44
158	VM99-61a.area B.6	oxide inclusion in plag	0.04	9.94	2.27	0.16	45.35	36.36
159								
160	VM99-30.area B.1	core of oxide	0.06	11.06	3.00	0.85	41.42	34.47
161	VM99-30.area B.2	rim of oxide	0.05	10.70	2.97	0.82	41.60	33.83
162	VM99-30.area B.3	rim of oxide	0.08	10.81	2.95	0.90	41.35	33.80
163	VM99-30.area B.4	oxide inclusion in cpx	0.06	8.66	4.34	0.46	43.97	33.16
164	VM99-30.area B.5	oxide inclusion in cpx	0.08	8.24	4.67	0.47	43.58	32.59
165								
166	VM99-30.area A.1	core of oxide	0.06	8.84	3.13	0.29	45.10	33.68
167	VM99-30.area A.2	rim of oxide	0.05	8.89	3.17	0.31	43.91	33.13
168	VM99-30.area A.3	???	8.00	6.42	3.02	0.20	25.28	37.81
169	VM99-30.area A.4	exsolved?	3.01	26.29	3.17	0.27	3.80	54.18
170								
171	VM99-30.area A.5	core of oxide	0.04	8.49	3.21	0.30	45.89	33.44
172	VM99-30.area A.6	rim of oxide	0.18	8.79	2.96	0.28	45.47	33.92
173	VM99-30.area A.7	rim of oxide	0.06	8.70	3.04	0.28	45.06	33.56
174	VM99-30.area A.8	exsolved area	0.05	9.10	2.59	0.41	46.04	35.29
175	VM99-30.area A.9	rim of oxide	0.08	8.80	2.51	0.39	46.09	34.70
176								
177	VM99-30.area A.10	core of oxide	0.07	11.10	3.37	0.41	42.07	34.85
178	VM99-30.area A.11	rim of oxide	0.03	9.77	3.55	0.38	44.46	34.27
179	VM99-30.area A.12	rim of oxide	0.04	10.70	3.34	0.36	42.70	34.46
180	VM99-30.area A.13	oxide welded on to pyx	0.06	7.78	2.21	0.63	47.11	33.80
181								
182	VM99-30.area B2.1	core of oxide included in pyx	0.09	8.81	1.34	0.47	45.20	35.56
183	VM99-30.area B2.2	rim of oxide included in pyx	0.06	11.35	1.96	0.68	39.14	37.16
184	VM99-30.area B2.3	rim of oxide included in pyx	0.08	11.06	1.97	0.71	39.79	36.98
185								
186	**Fe-Ti oxides**	**12-Jan**						
187	**Label**	**What?**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
188								
189	magt.1	standard	0.09	0.25	0.08	0.12	66.55	30.49
190	magt.2	standard	0.06	0.13	0.08	0.20	67.26	30.65
191								
192	crom.1	standard	0.00	0.10	10.18	60.37	3.43	9.89
193	crom.2	standard	0.00	0.11	10.09	60.65	3.06	10.13
194								
195	VM99-25.Area D.1	core of oxide welded on to gabbro	0.28	7.80	2.37	0.26	48.19	35.74
196	VM99-25.Area D.2	rim of oxide welded on to gabbroic	0.05	8.57	2.42	0.23	47.02	36.16
197	VM99-25.Area D.3	core of oxide welded on to gabbro	0.04	5.84	3.71	0.36	51.75	31.06
198	VM99-25.Area D.4	rim of oxide welded on to gabbroic	0.05	6.37	3.61	0.40	51.53	32.32
199	VM99-25.Area D.5	oxide in gabbroic breakdown react	0.03	5.39	5.84	0.27	52.04	29.66
200	VM99-25.Area D.6	oxide in gabbroic breakdown react	0.04	11.59	4.94	0.25	40.84	35.08
201	VM99-25.Area D.7	oxide in gabbroic breakdown react	0.07	10.31	6.27	0.51	41.57	32.85
202	VM99-25.Area D.8	oxide in gabbroic breakdown react	0.03	10.64	4.46	0.72	42.30	33.55

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
136	VM99-61a.area A.4	0.70	0.87	1.41	0.22	**93.50**				
137	VM99-61a.area A.5	0.68	0.22	1.24	0.23	**90.97**				
138	VM99-61a.area A.6	0.05	0.36	3.47	0.00	**92.25**				
139										
140	VM99-61a.area A.7	0.16	0.34	2.84	0.03	**94.55**				
141	VM99-61a.area A.8	0.24	0.26	2.78	0.01	**95.38**				
142	VM99-61a.area A.9	0.66	1.55	2.30	0.21	**96.08**				
143										
144	VM99-61a.area C.1	0.53	0.38	0.66	0.15	**91.37**				
145	VM99-61a.area C.2	0.59	0.29	0.53	0.12	**89.67**				
146	VM99-61a.area C.3	0.12	0.07	0.07	0.00	**91.60**				
147										
148	VM99-61a.area C.4	0.60	0.36	0.59	0.04	**93.44**				
149	VM99-61a.area C.5	0.57	0.44	0.68	0.06	**93.47**				
150	VM99-61a.area C.6	0.58	0.48	1.17	0.66	**93.19**				
151	VM99-61a.area C.7	0.08	0.17	0.54	0.04	**93.08**				
152										
153	VM99-61a.area B.1	0.55	0.32	0.47	0.27	**92.23**				
154	VM99-61a.area B.2	0.66	0.29	0.71	0.23	**88.76**				
155	VM99-61a.area B.3	0.20	0.14	0.48	0.00	**96.54**				
156	VM99-61a.area B.4	0.70	0.40	0.77	0.18	**98.79**				
157	VM99-61a.area B.5	0.68	0.44	1.19	0.23	**93.86**				
158	VM99-61a.area B.6	0.65	0.35	1.92	0.25	**97.29**				
159										
160	VM99-30.area B.1	0.79	0.25	3.78	0.09	**95.76**				
161	VM99-30.area B.2	0.77	0.24	3.77	0.15	**94.90**				
162	VM99-30.area B.3	0.77	0.25	3.87	0.16	**94.94**				
163	VM99-30.area B.4	0.83	0.20	3.19	0.12	**94.99**				
164	VM99-30.area B.5	0.81	0.23	3.12	0.15	**93.94**				
165										
166	VM99-30.area A.1	0.81	0.30	2.78	0.16	**95.16**				
167	VM99-30.area A.2	0.84	0.24	2.87	0.18	**93.60**				
168	VM99-30.area A.3	0.53	0.26	3.55	0.15	**85.24**				
169	VM99-30.area A.4	0.81	0.16	2.55	0.07	**94.31**				
170										
171	VM99-30.area A.5	0.87	0.33	2.76	0.13	**95.47**				
172	VM99-30.area A.6	0.83	0.30	2.77	0.17	**95.66**				
173	VM99-30.area A.7	0.79	0.28	2.67	0.13	**94.56**				
174	VM99-30.area A.8	0.81	0.30	2.13	0.26	**96.98**				
175	VM99-30.area A.9	0.81	0.31	2.19	0.19	**96.07**				
176										
177	VM99-30.area A.10	0.67	0.22	3.82	0.08	**96.66**				
178	VM99-30.area A.11	0.71	0.25	3.36	0.17	**96.93**				
179	VM99-30.area A.12	0.67	0.26	3.66	0.17	**96.36**				
180	VM99-30.area A.13	0.90	0.31	1.90	0.15	**94.86**				
181										
182	VM99-30.area B2.1	0.88	0.35	1.09	0.13	**93.91**				
183	VM99-30.area B2.2	0.77	0.34	1.49	0.08	**93.03**				
184	VM99-30.area B2.3	0.77	0.40	1.44	0.15	**93.35**				
185										
186	**Fe-Ti oxides**									
187	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
188										
189	magt.1	0.27	0.11	0.13	0.00	**98.08**		0.00	0.01	0.00
190	magt.2	0.24	0.12	0.09	0.00	**98.82**		0.00	0.00	0.00
191										
192	crom.1	0.05	0.19	15.36	0.00	**99.56**		0.00	0.00	0.00
193	crom.2	0.04	0.17	15.18	0.00	**99.43**		0.00	0.00	0.00
194										
195	VM99-25.Area D.1	0.68	0.35	1.35	0.00	**97.02**		0.01	0.23	0.00
196	VM99-25.Area D.2	0.59	0.35	1.25	0.04	**96.68**		0.00	0.25	0.00
197	VM99-25.Area D.3	0.90	0.32	3.21	0.00	**97.19**		0.00	0.17	0.00
198	VM99-25.Area D.4	0.84	0.27	2.97	0.02	**98.36**		0.00	0.18	0.00
199	VM99-25.Area D.5	0.61	0.28	4.36	0.01	**98.50**		0.00	0.15	0.00
200	VM99-25.Area D.6	0.60	0.42	4.24	0.18	**98.19**		0.00	0.32	0.00
201	VM99-25.Area D.7	0.51	0.42	4.99	0.14	**97.64**		0.00	0.28	0.00
202	VM99-25.Area D.8	0.72	0.36	4.49	0.19	**97.47**		0.00	0.30	0.00

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
136	VM99-61a.area A.4										
137	VM99-61a.area A.5										
138	VM99-61a.area A.6										
139											
140	VM99-61a.area A.7										
141	VM99-61a.area A.8										
142	VM99-61a.area A.9										
143											
144	VM99-61a.area C.1										
145	VM99-61a.area C.2										
146	VM99-61a.area C.3										
147											
148	VM99-61a.area C.4										
149	VM99-61a.area C.5										
150	VM99-61a.area C.6										
151	VM99-61a.area C.7										
152											
153	VM99-61a.area B.1										
154	VM99-61a.area B.2										
155	VM99-61a.area B.3										
156	VM99-61a.area B.4										
157	VM99-61a.area B.5										
158	VM99-61a.area B.6										
159											
160	VM99-30.area B.1										
161	VM99-30.area B.2										
162	VM99-30.area B.3										
163	VM99-30.area B.4										
164	VM99-30.area B.5										
165											
166	VM99-30.area A.1										
167	VM99-30.area A.2										
168	VM99-30.area A.3										
169	VM99-30.area A.4										
170											
171	VM99-30.area A.5										
172	VM99-30.area A.6										
173	VM99-30.area A.7										
174	VM99-30.area A.8										
175	VM99-30.area A.9										
176											
177	VM99-30.area A.10										
178	VM99-30.area A.11										
179	VM99-30.area A.12										
180	VM99-30.area A.13										
181											
182	VM99-30.area B2.1										
183	VM99-30.area B2.2										
184	VM99-30.area B2.3										
185											
186	**Fe-Ti oxides**										
187	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
188											
189	magt.1	0.00	0.00	1.96	1.00	0.01	0.00	0.01	0.00	3.00	49.41
190	magt.2	0.00	0.01	1.97	1.00	0.01	0.00	0.01	0.00	3.00	63.17
191											
192	crom.1	0.38	1.53	0.08	0.27	0.00	0.01	0.73	0.00	3.00	79.91
193	crom.2	0.38	1.54	0.07	0.27	0.00	0.01	0.73	0.00	3.00	80.13
194											
195	VM99-25.Area D.1	0.11	0.01	1.39	1.15	0.02	0.01	0.08	0.00	3.00	6.80
196	VM99-25.Area D.2	0.11	0.01	1.36	1.17	0.02	0.01	0.07	0.00	3.00	5.93
197	VM99-25.Area D.3	0.16	0.01	1.46	0.98	0.03	0.01	0.18	0.00	3.00	6.12
198	VM99-25.Area D.4	0.16	0.01	1.44	1.01	0.03	0.01	0.17	0.00	3.00	6.91
199	VM99-25.Area D.5	0.25	0.01	1.43	0.90	0.02	0.01	0.24	0.00	3.00	3.05
200	VM99-25.Area D.6	0.21	0.01	1.12	1.07	0.02	0.01	0.23	0.01	3.00	3.32
201	VM99-25.Area D.7	0.27	0.02	1.14	1.00	0.02	0.01	0.27	0.00	3.00	5.17
202	VM99-25.Area D.8	0.19	0.02	1.17	1.03	0.02	0.01	0.25	0.01	3.00	9.79

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
136	VM99-61a.area A.4		
137	VM99-61a.area A.5		
138	VM99-61a.area A.6		
139			
140	VM99-61a.area A.7		
141	VM99-61a.area A.8		
142	VM99-61a.area A.9		
143			
144	VM99-61a.area C.1		
145	VM99-61a.area C.2		
146	VM99-61a.area C.3		
147			
148	VM99-61a.area C.4		
149	VM99-61a.area C.5		
150	VM99-61a.area C.6		
151	VM99-61a.area C.7		
152			
153	VM99-61a.area B.1		
154	VM99-61a.area B.2		
155	VM99-61a.area B.3		
156	VM99-61a.area B.4		
157	VM99-61a.area B.5		
158	VM99-61a.area B.6		
159			
160	VM99-30.area B.1		
161	VM99-30.area B.2		
162	VM99-30.area B.3		
163	VM99-30.area B.4		
164	VM99-30.area B.5		
165			
166	VM99-30.area A.1		
167	VM99-30.area A.2		
168	VM99-30.area A.3		
169	VM99-30.area A.4		
170			
171	VM99-30.area A.5		
172	VM99-30.area A.6		
173	VM99-30.area A.7		
174	VM99-30.area A.8		
175	VM99-30.area A.9		
176			
177	VM99-30.area A.10		
178	VM99-30.area A.11		
179	VM99-30.area A.12		
180	VM99-30.area A.13		
181			
182	VM99-30.area B2.1		
183	VM99-30.area B2.2		
184	VM99-30.area B2.3		
185			
186	**Fe-Ti oxides**		
187	**Label**	**XFe2+**	**YFe3+**
188			
189	magt.1	99.24	99.62
190	magt.2	99.50	99.52
191			
192	crom.1	26.54	4.14
193	crom.2	27.24	3.70
194			
195	VM99-25.Area D.1	93.71	92.35
196	VM99-25.Area D.2	94.19	92.10
197	VM99-25.Area D.3	84.45	89.32
198	VM99-25.Area D.4	85.94	89.44
199	VM99-25.Area D.5	79.22	84.66
200	VM99-25.Area D.6	82.28	83.60
201	VM99-25.Area D.7	78.68	80.05
202	VM99-25.Area D.8	80.74	84.52

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
203	VM99-25.Area D.9	oxide in gabbroic breakdown react	0.02	10.46	4.40	0.71	43.04	33.33
204	VM99-25.Area D.10	oxide in gabbroic breakdown react	0.08	9.75	2.98	0.60	45.54	34.33
205	VM99-25.Area D.11	oxide in gabbroic breakdown react	0.06	8.73	2.86	0.40	47.17	33.94
206	**Inclusion**							
207	VM99-61a. Area A2.1	core of oxide pheno (oxide pair)	0.03	12.57	1.71	0.30	41.64	39.74
208	VM99-61a. Area A2.2	rim of oxide pheno	0.01	12.64	1.65	0.27	41.72	39.83
209	VM99-61a. Area A2.3	core of oxide pheno	0.04	12.15	1.78	0.28	42.58	39.34
210	VM99-61a. Area A2.4	rim of oxide pheno	0.03	11.61	1.85	0.24	42.32	39.12
211								
212	VM99-61a. Area A1.1	oxide inclusion in opx	0.02	10.58	3.10	0.38	43.20	36.92
213								
214	VM99-61a. Area A3.1	oxide inclusion in opx	0.00	8.76	4.10	0.51	47.75	33.39
215	VM99-61a. Area A3.2	core of groundmass oxide	0.03	10.26	1.79	0.29	46.86	38.59
216	VM99-61a. Area A3.3	rim of groundmass oxide	0.06	16.79	1.46	0.26	33.98	43.70
217	VM99-61a. Area A3.4	oxide inclusion in opx	0.03	7.83	3.82	0.34	49.48	35.56
218								
219	VM99-61a. Area A4.1	core of oxide	0.04	11.60	1.33	0.22	44.97	39.80
220	VM99-61a. Area A4.2	ilmenite?	0.00	45.44	0.13	0.03	0.00	48.67
221								
222	VM99-61a. Area C1.1	oxide inclusion in cpx	0.03	12.75	2.10	0.32	39.10	38.94
223	VM99-61a. Area C1.2	groundmass oxide (inclusion)	0.09	9.60	1.06	0.27	45.84	36.96
224	VM99-61a. Area C1.3	oxide inclusion in opx	0.01	40.23	0.45	0.07	0.00	49.97
225	VM99-61a. Area C1.4	oxide at host/inclusion interface	0.05	18.14	2.16	0.30	30.30	45.56
226	VM99-61a. Area C1.5	oxide at host/inclusion interface	0.06	14.99	0.76	0.29	35.39	42.16
227								
228	VM99-61a. Area D1.1	groundmass oxide (host)	0.07	11.27	1.06	0.23	39.87	36.77
229								
230	VM99-61a. Area D2.1	oxide inclusion in cpx	0.01	11.84	2.46	0.33	43.21	36.79
231	VM99-61a. Area D2.2	oxide inclusion in cpx	0.02	11.04	3.06	0.79	43.05	35.80
232	VM99-61a. Area D2.3	oxide inclusion in plag	0.01	2.05	2.46	0.23	60.04	31.01
233								
234	VM99-61a. Area D3.1	oxide inclusion in pyx	0.05	13.38	0.80	0.31	37.91	40.68
235	VM99-61a. Area D3.2	groundmass oxide (host)	0.00	50.54	0.22	0.03	0.00	40.37
236								
237	VM99-61a. Area D4.1	oxide inclusion in cpx	0.06	9.35	2.21	0.31	47.27	37.46
238	VM99-61a. Area D4.2	core of oxide in host	0.04	13.10	1.69	0.20	38.58	39.81
239	VM99-61a. Area D4.3	rim of oxide in host	0.05	12.64	1.58	0.15	42.22	40.46
240								
241	VM99-61a. Area D5.1	oxide inclusion in opx	0.05	16.42	2.06	0.28	30.72	43.06
242	VM99-61a. Area D5.2	oxide inclusion in opx	0.04	6.44	2.65	0.26	51.54	34.31
243								
244	VM99-61a. Area D6.1	oxide inclusion in plagioclase	0.04	10.30	2.23	0.19	46.19	36.86
245								
246	VM99-8. Area A1.1	oxide in "inverted gabbroic" breakc	0.00	6.57	4.30	0.24	51.22	31.76
247	VM99-8. Area A1.2	oxide in "inverted gabbroic" breakc	0.00	7.67	4.43	0.28	48.66	32.16
248	VM99-8. Area A1.3	oxide welded on to "inverted gabbı	0.13	11.13	0.93	0.10	42.06	39.18
249	VM99-8. Area A1.4	oxide welded on to "inverted gabbı	0.03	10.71	5.46	0.34	43.23	33.20
250	VM99-8. Area A1.5	oxide welded on to "black type" an	0.00	12.35	5.04	0.32	40.22	35.10
251								
252	VM99-8. Area A3.1	core of groundmass oxide	0.03	13.06	1.31	0.27	41.45	41.03
253	VM99-8. Area A3.2	rim of groundmass oxide	0.05	12.86	1.30	0.22	40.94	40.46
254	VM99-8. Area A3.3	core of groundmass oxide	0.04	9.93	2.76	0.31	46.25	37.16
255	VM99-8. Area A3.4	oxide inclusion in opx	0.89	10.18	2.32	0.20	42.00	38.38
256								
257	VM99-8. Area B1.1	oxide included in "black type" amp	0.01	12.17	4.25	0.68	37.43	38.69
258	VM99-8. Area B1.2		0.00	6.80	5.26	0.14	50.36	28.87
259								
260	VM99-8. Area C1.1	oxide inclusion in oscillatory zonec	0.09	5.76	2.70	0.03	52.82	33.27
261	VM99-8. Area C1.2	core of groundmass oxide	0.06	11.62	1.15	0.24	44.01	39.75
262	VM99-8. Area C1.3	rim of groundmass oxide	0.06	9.49	1.29	0.23	47.14	37.80
263								
264	VM99-8. Area C4.1		0.00	3.15	8.20	0.68	55.47	23.67
265								
266	VM99-8. Area E6.1	oxide inclusion in orthopyroxene	0.07	6.86	4.13	0.10	50.17	32.34
267								
268	VM99-8. Area E7.1	core of groundmass oxide	0.08	11.67	1.86	0.23	42.69	39.46
269	VM99-8. Area E7.2	rim of groundmass oxide	0.07	11.51	1.77	0.21	44.12	39.64

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
203	VM99-25.Area D.9	0.70	0.37	4.60	0.10	**97.73**		0.00	0.29	0.00
204	VM99-25.Area D.10	0.67	0.35	3.42	0.15	**97.86**		0.00	0.27	0.00
205	VM99-25.Area D.11	0.47	0.33	2.89	0.09	**96.96**		0.00	0.25	0.00
206	**Inclusion**									
207	VM99-61a. Area A2.1	0.43	0.41	1.57	0.01	**98.42**		0.00	0.36	0.00
208	VM99-61a. Area A2.2	0.45	0.35	1.56	0.09	**98.60**		0.00	0.36	0.00
209	VM99-61a. Area A2.3	0.45	0.39	1.59	0.14	**98.74**		0.00	0.34	0.00
210	VM99-61a. Area A2.4	0.55	0.32	1.24	0.04	**97.32**		0.00	0.34	0.00
211										
212	VM99-61a. Area A1.1	0.48	0.28	2.15	0.07	**97.16**		0.00	0.30	0.00
213										
214	VM99-61a. Area A3.1	0.40	0.26	3.81	0.14	**99.13**		0.00	0.24	0.00
215	VM99-61a. Area A3.2	0.50	0.35	1.18	0.21	**100.07**		0.00	0.29	0.00
216	VM99-61a. Area A3.3	0.41	0.35	1.58	0.10	**98.69**		0.00	0.48	0.00
217	VM99-61a. Area A3.4	0.60	0.24	2.02	0.16	**100.07**		0.00	0.22	0.00
218										
219	VM99-61a. Area A4.1	0.42	0.45	1.16	0.12	**100.11**		0.00	0.33	0.00
220	VM99-61a. Area A4.2	0.00	0.65	2.37	0.06	**97.35**		0.00	1.21	0.00
221										
222	VM99-61a. Area C1.1	0.34	0.42	1.59	0.21	**95.81**		0.00	0.37	0.00
223	VM99-61a. Area C1.2	0.43	0.40	0.93	0.18	**95.76**		0.00	0.28	0.00
224	VM99-61a. Area C1.3	0.06	0.32	3.31	0.00	**94.41**		0.00	1.12	0.00
225	VM99-61a. Area C1.4	0.46	0.41	1.16	0.25	**98.78**		0.00	0.51	0.00
226	VM99-61a. Area C1.5	0.42	0.42	0.73	0.00	**95.22**		0.00	0.44	0.00
227										
228	VM99-61a. Area D1.1	0.43	0.55	1.10	0.18	**91.54**		0.00	0.35	0.00
229										
230	VM99-61a. Area D2.1	0.50	0.38	3.15	0.11	**98.78**		0.00	0.33	0.00
231	VM99-61a. Area D2.2	0.53	0.34	3.26	0.12	**98.02**		0.00	0.31	0.00
232	VM99-61a. Area D2.3	0.65	0.08	0.92	0.15	**97.60**		0.00	0.06	0.00
233										
234	VM99-61a. Area D3.1	0.53	0.38	0.61	0.04	**94.68**		0.00	0.40	0.00
235	VM99-61a. Area D3.2	0.00	0.42	1.08	0.00	**92.67**		0.00	1.36	0.00
236										
237	VM99-61a. Area D4.1	0.54	0.32	1.28	0.16	**98.97**		0.00	0.27	0.00
238	VM99-61a. Area D4.2	0.43	0.58	1.01	0.35	**95.80**		0.00	0.38	0.00
239	VM99-61a. Area D4.3	0.40	0.60	1.04	0.34	**99.47**		0.00	0.36	0.00
240										
241	VM99-61a. Area D5.1	0.52	0.39	0.93	0.22	**94.63**		0.00	0.48	0.00
242	VM99-61a. Area D5.2	0.60	0.47	1.22	0.20	**97.74**		0.00	0.19	0.00
243										
244	VM99-61a. Area D6.1	0.52	0.37	2.20	0.18	**99.07**		0.00	0.29	0.00
245										
246	VM99-8. Area A1.1	0.71	0.33	3.51	0.00	**98.64**		0.00	0.18	0.00
247	VM99-8. Area A1.2	0.61	0.38	3.72	0.07	**97.99**		0.00	0.21	0.00
248	VM99-8. Area A1.3	0.50	0.24	0.31	0.23	**94.82**		0.01	0.33	0.00
249	VM99-8. Area A1.4	0.51	0.37	5.26	0.07	**99.17**		0.00	0.29	0.00
250	VM99-8. Area A1.5	0.48	0.42	4.81	0.15	**98.88**		0.00	0.34	0.00
251										
252	VM99-8. Area A3.1	0.62	0.44	1.04	0.26	**99.49**		0.00	0.37	0.00
253	VM99-8. Area A3.2	0.56	0.40	1.03	0.28	**98.10**		0.00	0.37	0.00
254	VM99-8. Area A3.3	0.53	0.37	1.93	0.13	**99.40**		0.00	0.28	0.00
255	VM99-8. Area A3.4	0.52	0.39	1.38	0.10	**96.36**		0.03	0.29	0.00
256										
257	VM99-8. Area B1.1	0.56	0.19	1.92	0.06	**95.96**		0.00	0.35	0.00
258	VM99-8. Area B1.2	0.39	0.37	5.36	0.06	**97.62**		0.00	0.19	0.00
259										
260	VM99-8. Area C1.1	0.30	0.21	1.57	0.13	**96.88**		0.00	0.17	0.00
261	VM99-8. Area C1.2	0.55	0.45	0.93	0.18	**98.96**		0.00	0.33	0.00
262	VM99-8. Area C1.3	0.71	0.39	0.80	0.17	**98.07**		0.00	0.27	0.00
263										
264	VM99-8. Area C4.1	0.57	0.32	7.29	0.00	**99.36**		0.00	0.08	0.00
265										
266	VM99-8. Area E6.1	0.56	0.29	3.11	0.14	**97.77**		0.00	0.19	0.00
267										
268	VM99-8. Area E7.1	0.61	0.43	1.15	0.15	**98.34**		0.00	0.33	0.00
269	VM99-8. Area E7.2	0.62	0.45	1.18	0.18	**99.77**		0.00	0.32	0.00

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
203	VM99-25.Area D.9	0.19	0.02	1.19	1.02	0.02	0.01	0.25	0.00	3.00	9.73
204	VM99-25.Area D.10	0.13	0.02	1.28	1.07	0.02	0.01	0.19	0.00	3.00	11.81
205	VM99-25.Area D.11	0.13	0.01	1.34	1.08	0.01	0.01	0.16	0.00	3.00	8.52
206	**Inclusion**										
207	VM99-61a. Area A2.1	0.08	0.01	1.19	1.26	0.01	0.01	0.09	0.00	3.00	10.46
208	VM99-61a. Area A2.2	0.07	0.01	1.19	1.26	0.01	0.01	0.09	0.00	3.00	10.01
209	VM99-61a. Area A2.3	0.08	0.01	1.21	1.24	0.01	0.01	0.09	0.00	3.00	9.63
210	VM99-61a. Area A2.4	0.08	0.01	1.22	1.25	0.02	0.01	0.07	0.00	3.00	7.86
211											
212	VM99-61a. Area A1.1	0.14	0.01	1.23	1.17	0.01	0.01	0.12	0.00	3.00	7.56
213											
214	VM99-61a. Area A3.1	0.18	0.02	1.31	1.02	0.01	0.01	0.21	0.00	3.00	7.72
215	VM99-61a. Area A3.2	0.08	0.01	1.32	1.21	0.02	0.01	0.07	0.01	3.00	9.72
216	VM99-61a. Area A3.3	0.07	0.01	0.96	1.37	0.01	0.01	0.09	0.00	3.00	10.51
217	VM99-61a. Area A3.4	0.17	0.01	1.37	1.10	0.02	0.01	0.11	0.00	3.00	5.62
218											
219	VM99-61a. Area A4.1	0.06	0.01	1.27	1.25	0.01	0.01	0.07	0.00	3.00	9.97
220	VM99-61a. Area A4.2	0.01	0.00	0.00	1.44	0.00	0.02	0.13	0.00	2.79	12.76
221											
222	VM99-61a. Area C1.1	0.10	0.01	1.14	1.26	0.01	0.01	0.09	0.01	3.00	9.32
223	VM99-61a. Area C1.2	0.05	0.01	1.36	1.21	0.01	0.01	0.05	0.01	3.00	14.74
224	VM99-61a. Area C1.3	0.02	0.00	0.00	1.54	0.00	0.01	0.18	0.00	2.87	9.12
225	VM99-61a. Area C1.4	0.10	0.01	0.86	1.43	0.01	0.01	0.07	0.01	3.00	8.48
226	VM99-61a. Area C1.5	0.04	0.01	1.05	1.39	0.01	0.01	0.04	0.00	3.00	20.60
227											
228	VM99-61a. Area D1.1	0.05	0.01	1.23	1.26	0.01	0.02	0.07	0.01	3.00	12.72
229											
230	VM99-61a. Area D2.1	0.11	0.01	1.21	1.14	0.02	0.01	0.17	0.00	3.00	8.26
231	VM99-61a. Area D2.2	0.13	0.02	1.21	1.12	0.02	0.01	0.18	0.00	3.00	14.83
232	VM99-61a. Area D2.3	0.11	0.01	1.74	1.00	0.02	0.00	0.05	0.00	3.00	6.01
233											
234	VM99-61a. Area D3.1	0.04	0.01	1.13	1.35	0.02	0.01	0.04	0.00	3.00	20.43
235	VM99-61a. Area D3.2	0.01	0.00	0.00	1.20	0.00	0.01	0.06	0.00	2.64	9.61
236											
237	VM99-61a. Area D4.1	0.10	0.01	1.34	1.18	0.02	0.01	0.07	0.00	3.00	8.70
238	VM99-61a. Area D4.2	0.08	0.01	1.13	1.30	0.01	0.02	0.06	0.01	3.00	7.52
239	VM99-61a. Area D4.3	0.07	0.00	1.20	1.27	0.01	0.02	0.06	0.01	3.00	5.87
240											
241	VM99-61a. Area D5.1	0.10	0.01	0.91	1.41	0.02	0.01	0.05	0.01	3.00	8.25
242	VM99-61a. Area D5.2	0.12	0.01	1.48	1.10	0.02	0.02	0.07	0.01	3.00	6.13
243											
244	VM99-61a. Area D6.1	0.10	0.01	1.30	1.15	0.02	0.01	0.12	0.01	3.00	5.46
245											
246	VM99-8. Area A1.1	0.19	0.01	1.42	0.98	0.02	0.01	0.19	0.00	3.00	3.54
247	VM99-8. Area A1.2	0.19	0.01	1.35	0.99	0.02	0.01	0.21	0.00	3.00	4.08
248	VM99-8. Area A1.3	0.04	0.00	1.26	1.31	0.02	0.01	0.02	0.01	3.00	6.45
249	VM99-8. Area A1.4	0.23	0.01	1.17	1.00	0.02	0.01	0.28	0.00	3.00	3.98
250	VM99-8. Area A1.5	0.21	0.01	1.09	1.06	0.01	0.01	0.26	0.00	3.00	4.05
251											
252	VM99-8. Area A3.1	0.06	0.01	1.17	1.29	0.02	0.01	0.06	0.01	3.00	12.08
253	VM99-8. Area A3.2	0.06	0.01	1.18	1.29	0.02	0.01	0.06	0.01	3.00	10.31
254	VM99-8. Area A3.3	0.12	0.01	1.30	1.16	0.02	0.01	0.11	0.00	3.00	7.05
255	VM99-8. Area A3.4	0.11	0.01	1.22	1.23	0.02	0.01	0.08	0.00	3.00	5.49
256											
257	VM99-8. Area B1.1	0.19	0.02	1.07	1.23	0.02	0.01	0.11	0.00	3.00	9.67
258	VM99-8. Area B1.2	0.23	0.00	1.38	0.88	0.01	0.01	0.29	0.00	3.00	1.76
259											
260	VM99-8. Area C1.1	0.12	0.00	1.53	1.07	0.01	0.01	0.09	0.00	3.00	0.76
261	VM99-8. Area C1.2	0.05	0.01	1.26	1.26	0.02	0.02	0.05	0.01	3.00	12.44
262	VM99-8. Area C1.3	0.06	0.01	1.36	1.21	0.02	0.01	0.05	0.01	3.00	10.48
263											
264	VM99-8. Area C4.1	0.34	0.02	1.46	0.69	0.02	0.01	0.38	0.00	3.00	5.30
265											
266	VM99-8. Area E6.1	0.18	0.00	1.41	1.01	0.02	0.01	0.17	0.00	3.00	1.64
267											
268	VM99-8. Area E7.1	0.08	0.01	1.22	1.25	0.02	0.01	0.07	0.00	3.00	7.81
269	VM99-8. Area E7.2	0.08	0.01	1.24	1.24	0.02	0.01	0.07	0.01	3.00	7.51

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
203	VM99-25.Area D.9	80.25	84.95
204	VM99-25.Area D.10	84.93	89.58
205	VM99-25.Area D.11	86.83	90.58
206	**Inclusion**		
207	VM99-61a. Area A2.1	93.41	93.29
208	VM99-61a. Area A2.2	93.46	93.54
209	VM99-61a. Area A2.3	93.27	93.23
210	VM99-61a. Area A2.4	94.63	93.08
211			
212	VM99-61a. Area A1.1	90.61	89.17
213			
214	VM99-61a. Area A3.1	83.12	87.29
215	VM99-61a. Area A3.2	94.83	93.79
216	VM99-61a. Area A3.3	93.94	92.99
217	VM99-61a. Area A3.4	90.82	88.64
218			
219	VM99-61a. Area A4.1	95.05	95.11
220	VM99-61a. Area A4.2	92.01	0.00
221			
222	VM99-61a. Area C1.1	93.22	91.50
223	VM99-61a. Area C1.2	95.71	95.91
224	VM99-61a. Area C1.3	89.43	0.00
225	VM99-61a. Area C1.4	95.67	89.12
226	VM99-61a. Area C1.5	96.99	95.95
227			
228	VM99-61a. Area D1.1	94.96	95.45
229			
230	VM99-61a. Area D2.1	86.76	91.13
231	VM99-61a. Area D2.2	86.03	88.44
232	VM99-61a. Area D2.3	94.97	93.60
233			
234	VM99-61a. Area D3.1	97.38	95.99
235	VM99-61a. Area D3.2	95.43	0.00
236			
237	VM99-61a. Area D4.1	94.28	92.56
238	VM99-61a. Area D4.2	95.68	93.11
239	VM99-61a. Area D4.3	95.61	94.13
240			
241	VM99-61a. Area D5.1	96.31	89.75
242	VM99-61a. Area D5.2	94.03	92.09
243			
244	VM99-61a. Area D6.1	90.40	92.60
245			
246	VM99-8. Area A1.1	83.55	88.00
247	VM99-8. Area A1.2	82.92	87.05
248	VM99-8. Area A1.3	98.60	96.42
249	VM99-8. Area A1.4	77.99	82.91
250	VM99-8. Area A1.5	80.36	83.03
251			
252	VM99-8. Area A3.1	95.69	94.66
253	VM99-8. Area A3.2	95.66	94.74
254	VM99-8. Area A3.3	91.51	90.88
255	VM99-8. Area A3.4	93.98	91.61
256			
257	VM99-8. Area B1.1	91.88	83.57
258	VM99-8. Area B1.2	75.13	85.72
259			
260	VM99-8. Area C1.1	92.24	92.55
261	VM99-8. Area C1.2	96.00	95.52
262	VM99-8. Area C1.3	96.34	95.43
263			
264	VM99-8. Area C4.1	64.55	80.36
265			
266	VM99-8. Area E6.1	85.39	88.41
267			
268	VM99-8. Area E7.1	95.05	93.11
269	VM99-8. Area E7.2	94.96	93.63

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
270	VM99-8. Area E7.3	oxide inclusion in pyroxene	0.09	8.16	3.15	0.24	48.80	33.06
271								
272	VM99-8. Area E8.1	oxide in "inverted gabbroic" type b	0.05	11.24	4.14	0.13	42.43	35.08
273	VM99-8. Area E8.2	oxide in "inverted gabbroic" type b	0.07	8.10	5.13	0.12	46.83	33.04
274								
275	VM99-8. Area F1.1	core of groundmass oxide	0.07	9.40	3.35	0.24	46.58	36.95
276	VM99-8. Area F1.2	rim of groundmass oxide	0.06	9.25	3.18	0.27	47.17	36.87
277								
278	VM99-26. Area A1.1	oxide in gabbroic breakdown react	1.32	7.01	8.79	1.64	44.18	23.01
279	VM99-26. Area A1.2	oxide in gabbroic breakdown react	0.17	10.97	5.63	1.00	40.76	28.30
280	VM99-26. Area A1.3	oxide in gabbroic breakdown react	0.11	11.15	3.93	0.71	40.69	34.83
281	VM99-26. Area A1.4	oxide in gabbroic breakdown react	0.10	16.43	2.66	0.80	30.95	40.60
282	VM99-26. Area A1.5	oxide in gabbroic breakdown react	0.11	11.53	2.67	0.82	39.84	36.82
283	VM99-26. Area A1.6		0.12	11.52	3.76	0.86	39.27	34.29
284								
285	VM99-26. Area A2.1	oxide welded on to gabbroic break	1.54	11.23	4.27	1.00	35.71	38.13
286	VM99-26. Area A2.2	oxide in gabbroic breakdown react	0.10	10.76	3.78	0.89	40.93	34.00
287	VM99-26. Area A2.3	oxide in gabbroic breakdown react	0.12	11.65	3.45	0.63	39.95	35.46
288	VM99-26. Area A2.4	oxide in gabbroic breakdown react	0.14	11.47	4.18	0.40	39.14	34.64
289	VM99-26. Area A2.5	oxide in gabbroic breakdown react	0.15	11.24	4.15	0.68	39.44	33.49
290								
291	VM99-26. Area B2.1	oxide between reacted amph grair	0.03	10.52	5.45	1.43	39.31	25.44
292	VM99-26. Area B2.2	oxide between reacted amph grair	0.08	10.52	4.47	1.55	38.87	25.93
293	VM99-26. Area B2.3	oxide between reacted amph grair	0.07	11.38	5.49	1.26	37.99	26.03
294	VM99-26. Area B2.4	oxide between reacted amph grair	0.06	8.68	4.67	1.29	43.26	23.91
295								
296	VM99-26. Area D1.1	core of groundmass oxide	0.10	14.72	2.34	0.77	35.65	39.55
297	VM99-26. Area D1.2	core of groundmass oxide	0.10	13.48	2.42	0.75	37.84	38.75
298	VM99-26. Area D1.3	core of groundmass oxide	0.09	15.01	2.36	0.79	35.06	39.83
299	VM99-26. Area D1.4	rim of groundmass oxide	0.12	14.82	2.26	0.57	35.52	39.54
300								
301	VM99-26. Area D2.1	oxide inclusion in opx	0.12	10.71	3.83	0.56	42.72	34.61
302	VM99-26. Area D2.2	core of oxide	0.11	14.06	2.61	0.78	37.32	39.31
303	VM99-26. Area D2.3	rim of oxide	3.90	13.18	3.42	0.68	25.76	42.63
304	VM99-26. Area D2.4	oxide inclusion in cpx	0.11	11.13	3.35	0.54	42.88	34.61
305								
306	**BAD TOTALS/REPEATS**							
307	VM99-24.Area A.2	hole	0.17	0.00	3.39	0.00	0.00	0.20
308	VM99-24.Area A.3	hole	0.16	0.00	2.37	0.00	0.10	0.00
309	VM99-24.Area A.4	hole	0.13	0.00	3.57	0.00	0.00	0.06
310	VM99-24.Area A.5	hole	0.12	0.00	2.41	0.00	0.00	0.53
311								
312	VM99-16.Area B3.1		49.89	0.60	0.87	0.00	0.00	13.40
313								
314	VM99-24.Area A.2		0.16	0.00	2.35	0.00	0.00	0.21
315	VM99-24.Area A.3		0.19	0.00	1.51	0.00	0.06	0.00
316	VM99-24.Area A.4		0.14	0.00	3.04	0.00	0.00	0.07
317	VM99-24.Area A.5		0.17	0.00	2.14	0.00	0.00	0.48
318								
319	VM99-16.Area B3.1		50.06	0.62	0.88	0.00	0.00	13.53
320	VM99-16.Area A1.1		52.07	0.09	0.47	0.00	0.00	19.81
321	VM99-16.Area F1.2		47.36	1.07	0.98	0.00	0.00	19.04
322								
323	VM99-24.Area A.1		0.10	10.70	3.88	0.22	43.58	35.89
324								
325	VM99-24.Area A2.1		0.05	9.75	4.23	0.34	45.59	35.42
326	VM99-24.Area A2.2		0.07	10.77	4.36	0.18	43.25	37.39
327	VM99-24.Area A2.3		0.08	1.02	2.71	0.20	65.04	30.69
328	VM99-24.Area A2.4		0.09	1.21	0.73	0.22	65.29	31.18
329	VM99-24.Area A2.5		0.07	0.95	2.87	0.22	64.20	30.30
330	VM99-24.Area A2.6		0.06	1.47	3.83	0.22	62.82	30.61
331								
332	VM99-24.Area D2.1		0.08	12.52	3.08	0.22	41.42	39.85
333	VM99-24.Area D2.2		0.04	8.24	4.79	0.59	48.21	33.73
334	VM99-24.Area D2.3		0.05	9.21	4.30	0.43	46.50	34.72
335	VM99-24.Area D2.4		0.10	9.87	4.53	0.53	45.87	35.26
336								

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
270	VM99-8. Area E7.3	0.51	0.36	3.30	0.14	**97.80**		0.00	0.23	0.00
271										
272	VM99-8. Area E8.1	0.50	0.50	3.87	0.19	**98.14**		0.00	0.31	0.00
273	VM99-8. Area E8.2	0.56	0.45	3.44	0.12	**97.84**		0.00	0.23	0.00
274										
275	VM99-8. Area F1.1	0.57	0.31	1.86	0.21	**99.54**		0.00	0.26	0.00
276	VM99-8. Area F1.2	0.54	0.36	1.81	0.18	**99.68**		0.00	0.26	0.00
277										
278	VM99-26. Area A1.1	0.33	0.36	10.88	0.00	**97.53**		0.05	0.18	0.00
279	VM99-26. Area A1.2	0.43	0.28	8.10	0.12	**95.76**		0.01	0.30	0.00
280	VM99-26. Area A1.3	0.60	0.26	3.87	0.04	**96.19**		0.00	0.32	0.00
281	VM99-26. Area A1.4	0.89	0.36	2.93	0.23	**95.96**		0.00	0.47	0.00
282	VM99-26. Area A1.5	0.69	0.24	2.48	0.05	**95.25**		0.00	0.33	0.00
283	VM99-26. Area A1.6	0.63	0.30	4.13	0.09	**94.97**		0.01	0.33	0.00
284										
285	VM99-26. Area A2.1	0.68	0.27	2.92	0.17	**95.93**		0.06	0.32	0.00
286	VM99-26. Area A2.2	0.61	0.26	3.94	0.11	**95.36**		0.00	0.31	0.00
287	VM99-26. Area A2.3	0.65	0.27	3.61	0.09	**95.89**		0.00	0.33	0.00
288	VM99-26. Area A2.4	0.56	0.28	3.92	0.09	**94.83**		0.01	0.33	0.00
289	VM99-26. Area A2.5	0.69	0.31	4.44	0.19	**94.78**		0.01	0.32	0.00
290										
291	VM99-26. Area B2.1	0.45	0.38	8.69	0.10	**91.81**		0.00	0.30	0.00
292	VM99-26. Area B2.2	0.34	0.43	8.00	0.02	**90.22**		0.00	0.30	0.00
293	VM99-26. Area B2.3	0.43	0.43	8.91	0.07	**92.06**		0.00	0.32	0.00
294	VM99-26. Area B2.4	0.39	0.34	8.40	0.08	**91.11**		0.00	0.25	0.00
295										
296	VM99-26. Area D1.1	0.72	0.37	2.80	0.21	**97.21**		0.00	0.42	0.00
297	VM99-26. Area D1.2	0.71	0.41	2.56	0.22	**97.24**		0.00	0.38	0.00
298	VM99-26. Area D1.3	0.68	0.40	2.78	0.17	**97.18**		0.00	0.43	0.00
299	VM99-26. Area D1.4	0.70	0.43	2.80	0.18	**96.93**		0.01	0.42	0.00
300										
301	VM99-26. Area D2.1	0.55	0.27	3.95	0.11	**97.43**		0.01	0.30	0.00
302	VM99-26. Area D2.2	0.69	0.35	2.83	0.16	**98.23**		0.00	0.39	0.00
303	VM99-26. Area D2.3	0.58	0.33	2.61	0.01	**93.09**		0.15	0.38	0.00
304	VM99-26. Area D2.4	0.62	0.30	4.20	0.10	**97.84**		0.00	0.31	0.00
305										
306	**BAD TOTALS/REPEAT**									
307	VM99-24.Area A.2	0.00	0.00	1.05	0.00	**4.81**		0.08	0.00	0.00
308	VM99-24.Area A.3	0.00	0.00	2.68	0.00	**5.32**		0.08	0.00	0.00
309	VM99-24.Area A.4	0.00	0.00	1.29	0.00	**5.05**		0.06	0.00	0.00
310	VM99-24.Area A.5	0.00	0.00	0.78	0.00	**3.84**		0.08	0.00	0.00
311										
312	VM99-16.Area B3.1	0.00	0.26	13.07	0.00	**78.10**		1.50	0.01	0.00
313										
314	VM99-24.Area A.2	0.00	0.00	0.61	0.00	**3.33**		0.12	0.00	0.00
315	VM99-24.Area A.3	0.00	0.00	3.68	0.00	**5.43**		0.09	0.00	0.00
316	VM99-24.Area A.4	0.00	0.00	1.00	0.00	**4.24**		0.08	0.00	0.00
317	VM99-24.Area A.5	0.00	0.00	0.70	0.00	**3.49**		0.12	0.00	0.00
318										
319	VM99-16.Area B3.1	0.00	0.23	13.15	0.00	**78.47**		1.50	0.01	0.00
320	VM99-16.Area A1.1	0.00	0.47	24.20	0.00	**97.11**		1.32	0.00	0.00
321	VM99-16.Area F1.2	0.00	0.48	5.96	0.00	**74.88**		1.54	0.03	0.00
322										
323	VM99-24.Area A.1	0.61	0.27	3.37	0.06	**98.69**		0.00	0.30	0.00
324										
325	VM99-24.Area A2.1	0.61	0.26	3.26	0.13	**99.64**		0.00	0.27	0.00
326	VM99-24.Area A2.2	0.56	0.29	2.60	0.11	**99.57**		0.00	0.30	0.00
327	VM99-24.Area A2.3	0.80	0.18	1.52	0.10	**102.33**		0.00	0.03	0.00
328	VM99-24.Area A2.4	0.80	0.14	0.78	0.07	**100.52**		0.00	0.03	0.00
329	VM99-24.Area A2.5	0.76	0.13	1.48	0.18	**101.15**		0.00	0.03	0.00
330	VM99-24.Area A2.6	0.62	0.20	1.83	0.09	**101.74**		0.00	0.04	0.00
331										
332	VM99-24.Area D2.1	0.61	0.36	2.04	0.07	**100.26**		0.00	0.35	0.00
333	VM99-24.Area D2.2	0.65	0.23	3.71	0.00	**100.18**		0.00	0.22	0.00
334	VM99-24.Area D2.3	0.63	0.27	3.44	0.02	**99.57**		0.00	0.25	0.00
335	VM99-24.Area D2.4	0.67	0.26	3.83	0.04	**100.95**		0.00	0.27	0.00
336										

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
270	VM99-8. Area E7.3	0.14	0.01	1.37	1.03	0.02	0.01	0.18	0.00	3.00	4.80
271											
272	VM99-8. Area E8.1	0.18	0.00	1.18	1.08	0.02	0.02	0.21	0.01	3.00	2.11
273	VM99-8. Area E8.2	0.22	0.00	1.30	1.02	0.02	0.01	0.19	0.00	3.00	1.55
274											
275	VM99-8. Area F1.1	0.15	0.01	1.30	1.15	0.02	0.01	0.10	0.01	3.00	4.54
276	VM99-8. Area F1.2	0.14	0.01	1.32	1.14	0.02	0.01	0.10	0.01	3.00	5.35
277											
278	VM99-26. Area A1.1	0.36	0.04	1.14	0.66	0.01	0.01	0.56	0.00	3.00	11.13
279	VM99-26. Area A1.2	0.24	0.03	1.11	0.86	0.01	0.01	0.44	0.00	3.00	10.66
280	VM99-26. Area A1.3	0.17	0.02	1.15	1.09	0.02	0.01	0.22	0.00	3.00	10.74
281	VM99-26. Area A1.4	0.12	0.02	0.88	1.29	0.03	0.01	0.17	0.01	3.00	16.80
282	VM99-26. Area A1.5	0.12	0.03	1.16	1.19	0.02	0.01	0.14	0.00	3.00	17.05
283	VM99-26. Area A1.6	0.17	0.03	1.12	1.09	0.02	0.01	0.23	0.00	3.00	13.31
284											
285	VM99-26. Area A2.1	0.19	0.03	1.01	1.20	0.02	0.01	0.16	0.01	3.00	13.60
286	VM99-26. Area A2.2	0.17	0.03	1.17	1.08	0.02	0.01	0.22	0.00	3.00	13.60
287	VM99-26. Area A2.3	0.15	0.02	1.14	1.12	0.02	0.01	0.20	0.00	3.00	10.97
288	VM99-26. Area A2.4	0.19	0.01	1.12	1.10	0.02	0.01	0.22	0.00	3.00	6.05
289	VM99-26. Area A2.5	0.19	0.02	1.12	1.06	0.02	0.01	0.25	0.01	3.00	9.91
290											
291	VM99-26. Area B2.1	0.24	0.04	1.11	0.80	0.01	0.01	0.49	0.00	3.00	14.95
292	VM99-26. Area B2.2	0.20	0.05	1.13	0.83	0.01	0.01	0.46	0.00	3.00	18.88
293	VM99-26. Area B2.3	0.24	0.04	1.07	0.81	0.01	0.01	0.50	0.00	3.00	13.35
294	VM99-26. Area B2.4	0.21	0.04	1.24	0.76	0.01	0.01	0.48	0.00	3.00	15.65
295											
296	VM99-26. Area D1.1	0.10	0.02	1.01	1.25	0.02	0.01	0.16	0.01	3.00	18.09
297	VM99-26. Area D1.2	0.11	0.02	1.08	1.22	0.02	0.01	0.14	0.01	3.00	17.27
298	VM99-26. Area D1.3	0.11	0.02	0.99	1.26	0.02	0.01	0.16	0.01	3.00	18.27
299	VM99-26. Area D1.4	0.10	0.02	1.01	1.25	0.02	0.01	0.16	0.01	3.00	14.47
300											
301	VM99-26. Area D2.1	0.17	0.02	1.19	1.07	0.02	0.01	0.22	0.00	3.00	8.99
302	VM99-26. Area D2.2	0.11	0.02	1.05	1.23	0.02	0.01	0.16	0.00	3.00	16.74
303	VM99-26. Area D2.3	0.16	0.02	0.75	1.37	0.02	0.01	0.15	0.00	3.00	11.74
304	VM99-26. Area D2.4	0.15	0.02	1.19	1.07	0.02	0.01	0.23	0.00	3.00	9.74
305											
306	**BAD TOTALS/REPEAT**										
307	VM99-24.Area A.2	1.98	0.00	0.00	0.08	0.00	0.00	0.78	0.00	2.93	0.00
308	VM99-24.Area A.3	1.30	0.00	0.04	0.00	0.00	0.00	1.85	0.00	3.26	0.01
309	VM99-24.Area A.4	1.97	0.00	0.00	0.02	0.00	0.00	0.90	0.00	2.95	0.00
310	VM99-24.Area A.5	1.86	0.00	0.00	0.29	0.00	0.00	0.77	0.00	2.99	0.01
311											
312	VM99-16.Area B3.1	0.03	0.00	0.00	0.34	0.00	0.01	0.59	0.00	2.47	0.01
313											
314	VM99-24.Area A.2	1.99	0.00	0.00	0.13	0.00	0.00	0.66	0.00	2.89	0.01
315	VM99-24.Area A.3	0.83	0.00	0.02	0.00	0.00	0.00	2.56	0.00	3.49	0.01
316	VM99-24.Area A.4	1.99	0.00	0.00	0.03	0.00	0.00	0.83	0.00	2.93	0.00
317	VM99-24.Area A.5	1.81	0.00	0.00	0.29	0.00	0.00	0.75	0.00	2.97	0.01
318											
319	VM99-16.Area B3.1	0.03	0.00	0.00	0.34	0.00	0.01	0.59	0.00	2.47	0.01
320	VM99-16.Area A1.1	0.01	0.00	0.00	0.42	0.00	0.01	0.91	0.00	2.67	0.02
321	VM99-16.Area F1.2	0.04	0.00	0.00	0.52	0.00	0.01	0.29	0.00	2.42	0.01
322											
323	VM99-24.Area A.1	0.17	0.01	1.21	1.11	0.02	0.01	0.19	0.00	3.00	3.67
324											
325	VM99-24.Area A2.1	0.18	0.01	1.25	1.08	0.02	0.01	0.18	0.00	3.00	5.09
326	VM99-24.Area A2.2	0.19	0.01	1.19	1.15	0.02	0.01	0.14	0.00	3.00	2.65
327	VM99-24.Area A2.3	0.12	0.01	1.79	0.94	0.02	0.01	0.08	0.00	3.00	4.74
328	VM99-24.Area A2.4	0.03	0.01	1.86	0.99	0.02	0.01	0.04	0.00	3.00	17.08
329	VM99-24.Area A2.5	0.13	0.01	1.79	0.94	0.02	0.00	0.08	0.01	3.00	4.93
330	VM99-24.Area A2.6	0.17	0.01	1.73	0.93	0.02	0.01	0.10	0.00	3.00	3.78
331											
332	VM99-24.Area D2.1	0.13	0.01	1.15	1.22	0.02	0.01	0.11	0.00	3.00	4.65
333	VM99-24.Area D2.2	0.20	0.02	1.31	1.02	0.02	0.01	0.20	0.00	3.00	7.58
334	VM99-24.Area D2.3	0.19	0.01	1.28	1.06	0.02	0.01	0.19	0.00	3.00	6.27
335	VM99-24.Area D2.4	0.19	0.02	1.24	1.06	0.02	0.01	0.21	0.00	3.00	7.25
336											

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
270	VM99-8. Area E7.3	84.91	90.39
271			
272	VM99-8. Area E8.1	83.56	86.49
273	VM99-8. Area E8.2	84.36	85.16
274			
275	VM99-8. Area F1.1	91.75	89.44
276	VM99-8. Area F1.2	91.95	89.97
277			
278	VM99-26. Area A1.1	54.26	74.04
279	VM99-26. Area A1.2	66.22	80.51
280	VM99-26. Area A1.3	83.46	85.50
281	VM99-26. Area A1.4	88.59	86.07
282	VM99-26. Area A1.5	89.28	88.75
283	VM99-26. Area A1.6	82.33	85.26
284			
285	VM99-26. Area A2.1	87.98	82.18
286	VM99-26. Area A2.2	82.90	85.64
287	VM99-26. Area A2.3	84.63	86.82
288	VM99-26. Area A2.4	83.22	84.88
289	VM99-26. Area A2.5	80.88	84.53
290			
291	VM99-26. Area B2.1	62.15	79.66
292	VM99-26. Area B2.2	64.51	81.82
293	VM99-26. Area B2.3	62.11	79.30
294	VM99-26. Area B2.4	61.48	83.30
295			
296	VM99-26. Area D1.1	88.80	88.85
297	VM99-26. Area D1.2	89.47	89.21
298	VM99-26. Area D1.3	88.92	88.59
299	VM99-26. Area D1.4	88.80	89.59
300			
301	VM99-26. Area D2.1	83.10	86.65
302	VM99-26. Area D2.2	88.61	88.39
303	VM99-26. Area D2.3	90.16	80.94
304	VM99-26. Area D2.4	82.22	88.06
305			
306	**BAD TOTALS/REPEAT**		
307	VM99-24.Area A.2	9.68	0.00
308	VM99-24.Area A.3	0.00	2.65
309	VM99-24.Area A.4	2.43	0.00
310	VM99-24.Area A.5	27.36	0.00
311			
312	VM99-16.Area B3.1	36.51	0.00
313			
314	VM99-24.Area A.2	15.99	0.00
315	VM99-24.Area A.3	0.00	2.30
316	VM99-24.Area A.4	3.63	0.00
317	VM99-24.Area A.5	27.91	0.00
318			
319	VM99-16.Area B3.1	36.60	0.00
320	VM99-16.Area A1.1	31.47	0.00
321	VM99-16.Area F1.2	64.19	0.00
322			
323	VM99-24.Area A.1	85.65	87.34
324			
325	VM99-24.Area A2.1	85.91	86.73
326	VM99-24.Area A2.2	88.98	86.05
327	VM99-24.Area A2.3	91.90	93.60
328	VM99-24.Area A2.4	95.73	97.93
329	VM99-24.Area A2.5	91.97	93.15
330	VM99-24.Area A2.6	90.37	90.98
331			
332	VM99-24.Area D2.1	91.62	89.13
333	VM99-24.Area D2.2	83.62	85.58
334	VM99-24.Area D2.3	84.98	86.62
335	VM99-24.Area D2.4	83.77	85.70
336			

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
337	VM99-24.Area D1.1		0.08	2.04	1.79	0.23	63.88	32.87
338	VM99-24.Area D1.2		0.08	1.50	1.69	0.19	63.96	32.05
339								
340	VM99-24.Area E1.1		0.07	15.38	0.65	0.10	37.15	43.73
341	VM99-24.Area E1.2		0.11	22.45	1.43	0.19	22.03	49.98
342	VM99-24.Area E1.3		0.05	1.65	0.29	0.26	64.86	30.71
343	VM99-24.Area E1.4		0.09	11.41	2.60	0.15	43.26	38.75
344								
345	VM99-24.Area E2.1		0.09	12.23	1.59	0.20	41.69	40.77
346	VM99-24.Area E2.2		0.08	13.35	1.55	0.17	39.39	41.73
347	VM99-24.Area E2.3		0.15	22.67	1.13	0.17	22.01	49.93
348	VM99-24.Area E2.4		0.09	6.48	2.64	0.16	50.55	36.04
349	VM99-24.Area E2.5		0.11	48.39	0.07	0.00	0.00	45.64
350								
351	VM99-24.Area A4.1		0.03	8.26	3.55	0.16	49.62	34.10
352	VM99-24.Area A4.2		0.05	9.54	4.12	0.31	46.06	34.85
353								
354	VM99-24.Area B1.1		1.29	6.42	4.98	0.40	46.64	33.47
355	VM99-24.Area B1.2		0.16	3.15	5.86	1.51	53.60	30.86
356								
357	VM99-24.Area F2.1		0.07	9.78	2.89	3.29	43.92	33.54
358								
359	VM99-16.Area A1.1		51.59	0.17	0.48	0.00	0.00	20.25
360								
361	VM99-16.Area B3.2		0.21	12.38	0.79	0.78	40.08	41.39
362	VM99-16.Area B3.3		0.13	12.59	0.59	0.74	40.31	40.94
363								
364	VM99-16.Area B4.1		0.04	12.57	3.82	6.45	34.83	37.32
365	VM99-16.Area B4.2		0.07	11.86	3.71	6.23	35.80	36.56
366								
367	VM99-16.Area C1.1		0.02	2.62	13.64	29.35	20.64	24.43
368	VM99-16.Area C3.1		0.07	12.64	1.05	1.08	40.33	41.17
369								
370	VM99-16.Area D1.1		0.12	10.78	3.99	0.10	42.37	38.00
371	VM99-16.Area D1.2		0.09	8.95	4.57	0.32	45.97	34.99
372								
373	VM99-16.Area D2.1		0.04	16.39	1.18	3.79	31.64	43.54
374	VM99-16.Area D2.2		0.06	16.05	1.15	3.87	32.12	43.30
375								
376	VM99-16.Area E1.1		0.00	3.91	17.10	17.01	26.87	25.27
377	VM99-16.Area E1.2		0.04	15.64	1.20	4.03	32.57	41.71
378	VM99-16.Area E1.3		0.05	16.43	1.21	4.14	30.80	42.34
379								
380	VM99-16.Area F1.1		0.04	32.46	0.14	0.04	3.10	56.88
381	VM99-16.Area F1.2		47.31	1.20	1.06	0.00	0.00	18.75
382								
383	VM99-25. Area A1.1		0.13	35.11	0.38	0.18	0.00	57.55
384	VM99-25. Area A1.2		0.09	43.58	0.53	0.03	0.00	48.93
385	VM99-25. Area A1.3		7.87	12.06	1.59	0.14	23.30	46.66
386								
387	VM99-25. Area A3.1		0.07	9.59	3.32	0.19	46.86	36.91
388	VM99-25. Area A3.2		0.06	11.55	2.10	0.20	43.97	39.88
389								
390	VM99-25. Area A4.1		0.09	11.81	1.23	0.25	43.27	40.55
391								
392	VM99-25. Area B1.1		0.07	12.12	1.74	0.17	43.21	41.01
393	VM99-25. Area B1.2		0.06	12.14	1.71	0.20	43.26	41.23
394								
395	VM99-25. Area C1.1		0.08	10.25	3.07	0.19	46.21	37.50
396	VM99-25. Area C2.1		0.08	10.13	2.45	0.25	46.44	39.20
397	VM99-25. Area C2.2		0.08	10.74	2.32	0.23	45.53	39.72
398	VM99-25. Area C2.3		0.05	6.35	3.46	0.20	52.39	35.39
399								
400	VM99-25. Area C3.1		0.05	8.24	3.57	0.47	49.33	36.23
401	VM99-25. Area C3.2		0.04	5.32	3.78	1.15	52.12	34.62
402								
403	VM99-25. Area D1.1		0.05	8.40	2.07	0.23	50.04	37.17

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
337	VM99-24.Area D1.1	0.86	0.08	0.74	0.14	**102.70**		0.00	0.06	0.00
338	VM99-24.Area D1.2	0.97	0.07	0.64	0.15	**101.29**		0.00	0.04	0.00
339										
340	VM99-24.Area E1.1	0.54	0.45	0.53	0.19	**98.81**		0.00	0.44	0.00
341	VM99-24.Area E1.2	0.59	0.26	0.93	0.03	**98.01**		0.00	0.64	0.00
342	VM99-24.Area E1.3	0.65	0.48	0.96	0.00	**99.92**		0.00	0.05	0.00
343	VM99-24.Area E1.4	0.62	0.37	1.77	0.13	**99.14**		0.00	0.32	0.00
344										
345	VM99-24.Area E2.1	0.68	0.36	0.68	0.20	**98.48**		0.00	0.35	0.00
346	VM99-24.Area E2.2	0.68	0.37	0.66	0.15	**98.13**		0.00	0.38	0.00
347	VM99-24.Area E2.3	0.49	0.38	1.00	0.05	**97.99**		0.01	0.65	0.00
348	VM99-24.Area E2.4	1.05	0.27	0.32	0.17	**97.76**		0.00	0.19	0.00
349	VM99-24.Area E2.5	0.00	0.56	1.88	0.12	**96.77**		0.00	1.27	0.00
350										
351	VM99-24.Area A4.1	0.66	0.33	3.07	0.28	**100.06**		0.00	0.23	0.00
352	VM99-24.Area A4.2	0.55	0.27	3.39	0.17	**99.31**		0.00	0.26	0.00
353										
354	VM99-24.Area B1.1	0.64	0.25	3.21	0.18	**97.49**		0.05	0.18	0.00
355	VM99-24.Area B1.2	0.69	0.25	2.30	0.15	**98.52**		0.01	0.09	0.00
356										
357	VM99-24.Area F2.1	0.86	0.30	4.24	0.14	**99.03**		0.00	0.27	0.00
358										
359	VM99-16.Area A1.1	0.00	0.55	24.26	0.00	**97.31**		1.31	0.00	0.00
360										
361	VM99-16.Area B3.2	0.87	0.17	0.26	0.10	**97.02**		0.01	0.36	0.00
362	VM99-16.Area B3.3	0.82	0.36	0.41	0.25	**97.15**		0.01	0.37	0.00
363										
364	VM99-16.Area B4.1	0.79	0.32	3.82	0.04	**99.99**		0.00	0.34	0.00
365	VM99-16.Area B4.2	0.74	0.30	3.71	0.05	**99.04**		0.00	0.33	0.00
366										
367	VM99-16.Area C1.1	0.37	0.27	7.23	0.14	**98.70**		0.00	0.07	0.00
368	VM99-16.Area C3.1	0.81	0.34	0.62	0.09	**98.21**		0.00	0.36	0.00
369										
370	VM99-16.Area D1.1	0.84	0.28	2.01	0.16	**98.65**		0.01	0.30	0.00
371	VM99-16.Area D1.2	0.81	0.26	3.07	0.04	**99.08**		0.00	0.25	0.00
372										
373	VM99-16.Area D2.1	0.75	0.40	1.52	0.17	**99.42**		0.00	0.46	0.00
374	VM99-16.Area D2.2	0.84	0.36	1.48	0.19	**99.43**		0.00	0.45	0.00
375										
376	VM99-16.Area E1.1	0.48	0.23	7.73	0.17	**98.76**		0.00	0.10	0.00
377	VM99-16.Area E1.2	0.85	0.33	2.16	0.16	**98.70**		0.00	0.44	0.00
378	VM99-16.Area E1.3	0.82	0.37	2.19	0.10	**98.44**		0.00	0.46	0.00
379										
380	VM99-16.Area F1.1	0.27	0.19	1.71	0.00	**94.84**		0.00	0.95	0.00
381	VM99-16.Area F1.2	0.00	0.47	6.28	0.00	**75.09**		1.53	0.03	0.00
382										
383	VM99-25. Area A1.1	0.25	0.64	1.65	0.04	**95.93**		0.01	1.00	0.00
384	VM99-25. Area A1.2	0.05	0.68	3.84	0.00	**97.73**		0.00	1.15	0.00
385	VM99-25. Area A1.3	0.85	0.40	2.97	0.26	**96.09**		0.29	0.34	0.00
386										
387	VM99-25. Area A3.1	0.57	0.35	2.15	0.12	**100.15**		0.00	0.27	0.00
388	VM99-25. Area A3.2	0.65	0.43	1.20	0.14	**100.19**		0.00	0.32	0.00
389										
390	VM99-25. Area A4.1	0.67	0.34	0.61	0.26	**99.08**		0.00	0.34	0.00
391										
392	VM99-25. Area B1.1	0.62	0.48	0.78	0.13	**100.33**		0.00	0.34	0.00
393	VM99-25. Area B1.2	0.61	0.44	0.71	0.10	**100.47**		0.00	0.34	0.00
394										
395	VM99-25. Area C1.1	0.59	0.35	2.27	0.05	**100.56**		0.00	0.28	0.00
396	VM99-25. Area C2.1	0.69	0.41	0.98	0.14	**100.77**		0.00	0.28	0.00
397	VM99-25. Area C2.2	0.68	0.38	1.03	0.13	**100.84**		0.00	0.30	0.00
398	VM99-25. Area C2.3	0.73	0.32	1.26	0.04	**100.19**		0.00	0.18	0.00
399										
400	VM99-25. Area C3.1	0.72	0.30	1.99	0.17	**101.07**		0.00	0.23	0.00
401	VM99-25. Area C3.2	0.93	0.24	1.02	0.11	**99.33**		0.00	0.15	0.00
402										
403	VM99-25. Area D1.1	0.68	0.35	1.16	0.06	**100.23**		0.00	0.24	0.00

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
337	VM99-24.Area D1.1	0.08	0.01	1.77	1.01	0.03	0.00	0.04	0.00	3.00	7.96
338	VM99-24.Area D1.2	0.07	0.01	1.80	1.00	0.03	0.00	0.04	0.00	3.00	6.93
339											
340	VM99-24.Area E1.1	0.03	0.00	1.07	1.39	0.02	0.02	0.03	0.01	3.00	9.73
341	VM99-24.Area E1.2	0.06	0.01	0.63	1.58	0.02	0.01	0.05	0.00	3.00	8.36
342	VM99-24.Area E1.3	0.01	0.01	1.86	0.98	0.02	0.02	0.06	0.00	3.00	37.54
343	VM99-24.Area E1.4	0.12	0.00	1.22	1.21	0.02	0.01	0.10	0.00	3.00	3.69
344											
345	VM99-24.Area E2.1	0.07	0.01	1.20	1.30	0.02	0.01	0.04	0.01	3.00	7.83
346	VM99-24.Area E2.2	0.07	0.01	1.13	1.33	0.02	0.01	0.04	0.00	3.00	7.03
347	VM99-24.Area E2.3	0.05	0.01	0.63	1.58	0.02	0.01	0.06	0.00	3.00	9.39
348	VM99-24.Area E2.4	0.12	0.01	1.46	1.16	0.03	0.01	0.02	0.01	3.00	3.85
349	VM99-24.Area E2.5	0.00	0.00	0.00	1.33	0.00	0.02	0.10	0.00	2.73	0.16
350											
351	VM99-24.Area A4.1	0.15	0.01	1.37	1.04	0.02	0.01	0.17	0.01	3.00	2.94
352	VM99-24.Area A4.2	0.18	0.01	1.27	1.07	0.02	0.01	0.19	0.00	3.00	4.81
353											
354	VM99-24.Area B1.1	0.22	0.01	1.30	1.04	0.02	0.01	0.18	0.01	3.00	5.06
355	VM99-24.Area B1.2	0.26	0.04	1.49	0.96	0.02	0.01	0.13	0.00	3.00	14.72
356											
357	VM99-24.Area F2.1	0.13	0.10	1.21	1.03	0.03	0.01	0.23	0.00	3.00	43.38
358											
359	VM99-16.Area A1.1	0.01	0.00	0.00	0.43	0.00	0.01	0.92	0.00	2.68	0.02
360											
361	VM99-16.Area B3.2	0.04	0.02	1.17	1.35	0.03	0.01	0.02	0.00	3.00	39.88
362	VM99-16.Area B3.3	0.03	0.02	1.18	1.33	0.03	0.01	0.02	0.01	3.00	45.64
363											
364	VM99-16.Area B4.1	0.16	0.18	0.95	1.13	0.02	0.01	0.21	0.00	3.00	53.12
365	VM99-16.Area B4.2	0.16	0.18	0.98	1.12	0.02	0.01	0.20	0.00	3.00	52.96
366											
367	VM99-16.Area C1.1	0.54	0.79	0.53	0.69	0.01	0.01	0.37	0.00	3.00	59.08
368	VM99-16.Area C3.1	0.05	0.03	1.16	1.32	0.03	0.01	0.04	0.00	3.00	40.79
369											
370	VM99-16.Area D1.1	0.18	0.00	1.19	1.18	0.03	0.01	0.11	0.00	3.00	1.70
371	VM99-16.Area D1.2	0.20	0.01	1.27	1.07	0.02	0.01	0.17	0.00	3.00	4.47
372											
373	VM99-16.Area D2.1	0.05	0.11	0.89	1.36	0.02	0.01	0.08	0.01	3.00	68.22
374	VM99-16.Area D2.2	0.05	0.11	0.90	1.35	0.03	0.01	0.08	0.01	3.00	69.37
375											
376	VM99-16.Area E1.1	0.67	0.45	0.67	0.70	0.01	0.01	0.38	0.00	3.00	40.03
377	VM99-16.Area E1.2	0.05	0.12	0.92	1.31	0.03	0.01	0.12	0.01	3.00	69.18
378	VM99-16.Area E1.3	0.05	0.12	0.87	1.33	0.03	0.01	0.12	0.00	3.00	69.59
379											
380	VM99-16.Area F1.1	0.01	0.00	0.09	1.84	0.01	0.01	0.10	0.00	3.00	16.30
381	VM99-16.Area F1.2	0.04	0.00	0.00	0.51	0.00	0.01	0.30	0.00	2.42	0.01
382											
383	VM99-25. Area A1.1	0.02	0.01	0.00	1.83	0.01	0.02	0.09	0.00	2.98	23.68
384	VM99-25. Area A1.2	0.02	0.00	0.00	1.44	0.00	0.02	0.20	0.00	2.84	3.65
385	VM99-25. Area A1.3	0.07	0.00	0.65	1.44	0.03	0.01	0.16	0.01	3.00	5.76
386											
387	VM99-25. Area A3.1	0.14	0.01	1.30	1.14	0.02	0.01	0.12	0.00	3.00	3.74
388	VM99-25. Area A3.2	0.09	0.01	1.23	1.24	0.02	0.01	0.07	0.00	3.00	6.13
389											
390	VM99-25. Area A4.1	0.06	0.01	1.24	1.29	0.02	0.01	0.04	0.01	3.00	11.94
391											
392	VM99-25. Area B1.1	0.08	0.01	1.21	1.28	0.02	0.02	0.04	0.00	3.00	6.30
393	VM99-25. Area B1.2	0.08	0.01	1.22	1.29	0.02	0.01	0.04	0.00	3.00	7.37
394											
395	VM99-25. Area C1.1	0.13	0.01	1.27	1.15	0.02	0.01	0.12	0.00	3.00	3.98
396	VM99-25. Area C2.1	0.11	0.01	1.30	1.21	0.02	0.01	0.05	0.00	3.00	6.51
397	VM99-25. Area C2.2	0.10	0.01	1.27	1.23	0.02	0.01	0.06	0.00	3.00	6.18
398	VM99-25. Area C2.3	0.15	0.01	1.46	1.10	0.02	0.01	0.07	0.00	3.00	3.80
399											
400	VM99-25. Area C3.1	0.15	0.01	1.36	1.11	0.02	0.01	0.11	0.01	3.00	8.17
401	VM99-25. Area C3.2	0.17	0.03	1.47	1.08	0.03	0.01	0.06	0.00	3.00	16.97
402											
403	VM99-25. Area D1.1	0.09	0.01	1.41	1.16	0.02	0.01	0.07	0.00	3.00	7.03

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
337	VM99-24.Area D1.1	96.14	95.46
338	VM99-24.Area D1.2	96.56	95.75
339			
340	VM99-24.Area E1.1	97.87	97.04
341	VM99-24.Area E1.2	96.79	90.00
342	VM99-24.Area E1.3	94.71	98.91
343	VM99-24.Area E1.4	92.46	91.09
344			
345	VM99-24.Area E2.1	97.13	93.91
346	VM99-24.Area E2.2	97.26	93.79
347	VM99-24.Area E2.3	96.54	91.85
348	VM99-24.Area E2.4	98.44	92.17
349	VM99-24.Area E2.5	93.16	0.00
350			
351	VM99-24.Area A4.1	86.19	89.65
352	VM99-24.Area A4.2	85.21	87.17
353			
354	VM99-24.Area B1.1	85.40	85.01
355	VM99-24.Area B1.2	88.28	83.29
356			
357	VM99-24.Area F2.1	81.62	84.62
358			
359	VM99-16.Area A1.1	31.89	0.00
360			
361	VM99-16.Area B3.2	98.88	95.14
362	VM99-16.Area B3.3	98.25	95.96
363			
364	VM99-16.Area B4.1	84.57	73.20
365	VM99-16.Area B4.2	84.67	74.33
366			
367	VM99-16.Area C1.1	65.46	28.34
368	VM99-16.Area C3.1	97.40	93.54
369			
370	VM99-16.Area D1.1	91.40	86.95
371	VM99-16.Area D1.2	86.48	85.98
372			
373	VM99-16.Area D2.1	94.16	84.43
374	VM99-16.Area D2.2	94.25	84.57
375			
376	VM99-16.Area E1.1	64.70	37.56
377	VM99-16.Area E1.2	91.54	84.19
378	VM99-16.Area E1.3	91.55	83.14
379			
380	VM99-16.Area F1.1	94.93	92.06
381	VM99-16.Area F1.2	62.61	0.00
382			
383	VM99-25. Area A1.1	95.13	0.00
384	VM99-25. Area A1.2	87.72	0.00
385	VM99-25. Area A1.3	89.81	89.83
386			
387	VM99-25. Area A3.1	90.58	89.66
388	VM99-25. Area A3.2	94.90	92.62
389			
390	VM99-25. Area A4.1	97.38	95.20
391			
392	VM99-25. Area B1.1	96.72	93.70
393	VM99-25. Area B1.2	97.01	93.73
394			
395	VM99-25. Area C1.1	90.26	90.21
396	VM99-25. Area C2.1	95.72	91.89
397	VM99-25. Area C2.2	95.57	92.16
398	VM99-25. Area C2.3	94.06	90.28
399			
400	VM99-25. Area C3.1	91.07	89.01
401	VM99-25. Area C3.2	95.02	87.97
402			
403	VM99-25. Area D1.1	94.71	93.48

	A	B	C	D	E	F	G	H
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO**
404	VM99-25. Area D1.2		0.07	6.89	5.99	0.67	48.21	31.28
405	VM99-25. Area D1.3		0.05	10.59	2.92	0.36	45.14	35.06
406	VM99-25. Area D1.4		0.07	8.18	1.37	0.22	51.49	36.90
407	VM99-25. Area D1.5		0.06	8.19	1.37	0.24	52.07	37.17
408	VM99-25. Area D1.6		0.02	47.00	0.07	0.03	0.00	46.42
409	VM99-25. Area D1.7		0.08	9.97	2.76	0.29	46.53	35.53
410	VM99-25. Area D1.8		0.05	10.50	2.71	0.25	45.72	36.16
411	VM99-25. Area D1.9		0.07	10.10	2.24	0.23	47.05	37.23
412	VM99-25. Area D1.10		0.09	9.99	2.25	0.22	46.97	37.13
413	VM99-25. Area D1.11		0.09	10.46	2.22	0.21	45.33	37.24
414								
415	VM99-26. Area B1.1	oxide between reacted amph grair	0.11	9.89	7.27	2.82	32.50	31.15
416	VM99-26. Area B1.2	oxide between reacted amph grair	0.04	8.47	5.94	2.38	35.88	27.23
417	VM99-26. Area B1.3	oxide between reacted amph grair	0.04	10.63	5.75	1.80	31.30	21.85
418	VM99-26. Area B1.4		3.37	8.47	8.81	2.11	22.56	34.06

	A	I	J	K	L	M	N	O	P	Q
3	**Label**	**V2O3**	**MnO**	**MgO**	**ZnO**	**Sum Ox%**		**Si**	**Ti**	**Al/Al IV**
404	VM99-25. Area D1.2	0.74	0.35	4.19	0.03	**98.41**		0.00	0.19	0.00
405	VM99-25. Area D1.3	0.65	0.35	3.68	0.08	**98.89**		0.00	0.29	0.00
406	VM99-25. Area D1.4	0.80	0.37	1.18	0.13	**100.69**		0.00	0.23	0.00
407	VM99-25. Area D1.5	0.74	0.35	1.19	0.08	**101.44**		0.00	0.23	0.00
408	VM99-25. Area D1.6	0.00	0.67	3.29	0.00	**97.50**		0.00	1.23	0.00
409	VM99-25. Area D1.7	0.55	0.35	3.02	0.15	**99.23**		0.00	0.28	0.00
410	VM99-25. Area D1.8	0.56	0.33	2.96	0.10	**99.34**		0.00	0.29	0.00
411	VM99-25. Area D1.9	0.61	0.34	2.11	0.16	**100.15**		0.00	0.28	0.00
412	VM99-25. Area D1.10	0.60	0.36	2.10	0.06	**99.77**		0.00	0.28	0.00
413	VM99-25. Area D1.11	0.60	0.35	2.08	0.08	**98.67**		0.00	0.30	0.00
414										
415	VM99-26. Area B1.1	0.50	0.25	4.47	0.00	**88.96**		0.00	0.29	0.00
416	VM99-26. Area B1.2	0.39	0.23	5.34	0.00	**85.90**		0.00	0.26	0.00
417	VM99-26. Area B1.3	0.33	0.31	9.08	0.00	**81.09**		0.00	0.33	0.00
418	VM99-26. Area B1.4	0.47	0.24	3.67	0.04	**83.80**		0.14	0.26	0.00

	A	R	S	T	U	V	W	X	Y	Z	AA
3	**Label**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**V**	**Mn2+**	**Mg**	**Zn**	**Sum Cat#**	**XCr**
404	VM99-25. Area D1.2	0.26	0.02	1.32	0.95	0.02	0.01	0.23	0.00	3.00	6.94
405	VM99-25. Area D1.3	0.13	0.01	1.25	1.08	0.02	0.01	0.20	0.00	3.00	7.70
406	VM99-25. Area D1.4	0.06	0.01	1.45	1.15	0.02	0.01	0.07	0.00	3.00	9.73
407	VM99-25. Area D1.5	0.06	0.01	1.45	1.15	0.02	0.01	0.07	0.00	3.00	10.73
408	VM99-25. Area D1.6	0.00	0.00	0.00	1.35	0.00	0.02	0.17	0.00	2.77	21.30
409	VM99-25. Area D1.7	0.12	0.01	1.30	1.10	0.02	0.01	0.17	0.00	3.00	6.55
410	VM99-25. Area D1.8	0.12	0.01	1.27	1.12	0.02	0.01	0.16	0.00	3.00	5.88
411	VM99-25. Area D1.9	0.10	0.01	1.31	1.15	0.02	0.01	0.12	0.00	3.00	6.44
412	VM99-25. Area D1.10	0.10	0.01	1.31	1.15	0.02	0.01	0.12	0.00	3.00	6.14
413	VM99-25. Area D1.11	0.10	0.01	1.28	1.17	0.02	0.01	0.12	0.00	3.00	6.01
414											
415	VM99-26. Area B1.1	0.34	0.09	0.96	1.03	0.02	0.01	0.26	0.00	3.00	20.67
416	VM99-26. Area B1.2	0.29	0.08	1.10	0.93	0.01	0.01	0.33	0.00	3.00	21.21
417	VM99-26. Area B1.3	0.28	0.06	0.98	0.76	0.01	0.01	0.56	0.00	3.00	17.33
418	VM99-26. Area B1.4	0.43	0.07	0.70	1.17	0.02	0.01	0.22	0.00	3.00	13.88

	A	AB	AC
3	**Label**	**XFe2+**	**YFe3+**
404	VM99-25. Area D1.2	80.72	82.71
405	VM99-25. Area D1.3	84.26	90.10
406	VM99-25. Area D1.4	94.61	95.60
407	VM99-25. Area D1.5	94.58	95.60
408	VM99-25. Area D1.6	88.79	0.00
409	VM99-25. Area D1.7	86.83	90.97
410	VM99-25. Area D1.8	87.25	91.03
411	VM99-25. Area D1.9	90.81	92.62
412	VM99-25. Area D1.10	90.86	92.60
413	VM99-25. Area D1.11	90.94	92.46
414			
415	VM99-26. Area B1.1	79.62	69.35
416	VM99-26. Area B1.2	74.11	75.24
417	VM99-26. Area B1.3	57.44	74.19
418	VM99-26. Area B1.4	83.88	58.49

	A	B	C	D	E	F	G	H
1	**Appendix H**							
2	**Amphibole**	**14-Nov**						
3	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
4	kaug.1_1	standard	50.32	0.85	8.52	0.16	0.00	6.24
5	kaug.1_2	standard	50.65	0.82	8.58	0.18	0.00	6.21
6	kaug.1_3	standard	50.74	0.84	8.49	0.16	0.00	6.11
7								
8	VM99-25. Area A1.1		41.88	2.36	13.47	0.05	11.50	1.37
9	VM99-25. Area A1.2		42.18	2.18	13.28	0.10	9.64	2.57
10	VM99-25. Area A1.3		42.01	2.11	13.70	0.01	11.40	1.97
11								
12								
13	VM99-25. Area D1.1	core of amph in gabbroic type breakdown	42.15	2.34	13.18	0.06	10.06	1.49
14	VM99-25. Area D1.2	mid of amph in gabbroic type breakdown	43.42	2.16	13.00	0.09	11.69	0.00
15	VM99-25. Area D1.3		41.47	2.42	13.62	0.14	9.75	2.22
16	VM99-25. Area D1.4	rim of amph in gabbroic type breakdown	41.52	2.24	13.28	0.09	10.27	1.28
17	VM99-25. Area D1.5	mid of amph in gabbroic type breakdown	42.22	2.41	13.33	0.08	9.88	1.71
18	VM99-25. Area D1.6	rim of amph in gabbroic type breakdown	42.20	2.47	13.28	0.07	9.37	2.50
19	VM99-25. Area D1.7	rim of amph in gabbroic type breakdown	42.11	2.23	13.17	0.17	7.72	3.30
20	VM99-25. Area D1.8	mid of amph in gabbroic type breakdown	42.72	2.37	12.86	0.06	12.31	0.00
21	VM99-25. Area D1.9	rim of amph in gabbroic type breakdown	42.03	2.64	13.50	0.02	7.93	4.30
22								
23	kaug.1	standard	49.51	0.88	8.62	0.18	0.00	6.24
24								
25	VM99-25. Area d1.1	core of amph in gabbroic type breakdown	41.07	2.53	12.69	0.04	9.99	2.05
26	VM99-25. Area d1.2	mid of amph in gabbroic type breakdown	41.64	2.38	12.62	0.15	10.09	1.60
27	VM99-25. Area d1.3	rim of amph in gabbroic type breakdown	42.27	2.57	12.41	0.07	0.00	15.18
28	VM99-25. Area d1.4	mid of amph in gabbroic type breakdown	39.56	2.63	13.71	0.05	12.62	0.87
29								
30	VM99-25. Area d1.6	rim of amph in gabbroic type breakdown	43.49	2.02	14.23	0.09	0.00	9.11
31	VM99-25. Area d1.7	black rim in gabbroic type breakdown	40.84	2.53	13.10	0.06	9.69	2.51
32	VM99-25. Area d1.8	rim of amph in gabbroic type breakdown	41.40	3.77	11.00	0.08	6.56	5.65
33	VM99-25. Area d1.9	black type amph	43.11	1.65	18.44	0.01	8.24	5.26
34								
35	VM99-52. Area A1.1	relict amph black type breakdown	42.59	2.36	10.88	0.00	8.79	4.13
36	VM99-52. Area A1.2	relict amph black type breakdown	42.61	1.65	10.75	0.00	9.21	3.55
37								
38	VM99-52. Area A2.1	relict amph black type breakdown	42.68	2.07	10.45	0.03	9.07	3.41
39								
40	VM99-52. Area A3.1	core of relict amph in black type breakdown	42.38	2.41	10.85	0.00	9.54	4.18
41	VM99-52. Area A3.2	mid of relict amph in black type breakdown	42.97	2.26	10.71	0.00	7.77	6.29
42	VM99-52. Area A3.4	black amph	43.01	2.13	10.37	0.01	10.31	3.50
43	VM99-52. Area A3.5	rim of relict amph in black type breakdown	42.38	2.36	11.00	0.01	9.84	4.04
44	VM99-52. Area A3.6	rim of relict amph in black type breakdown	42.90	2.50	10.98	0.00	9.80	3.91
45	VM99-52. Area A3.9	relict amph in black type breakdown	43.28	2.66	9.03	0.00	11.56	3.37
46								
47	VM99-52. Area D1.1	relict amph black type breakdown	43.24	1.89	9.95	0.13	2.55	8.29
48	VM99-52. Area D1.2	black type amph rim	43.88	1.34	10.06	0.27	5.12	5.63
49								
50	VM99-52. Area D1.4	black type amph micropheno	64.26	0.23	17.50	0.00	0.00	1.84
51	VM99-52. Area D1.5	black type amph micropheno	51.15	0.37	1.17	0.01	20.84	0.00
52								
53	VM99-52. Area D2.1	core of relict amph in black type breakdown	44.35	2.28	10.42	0.01	9.09	2.99
54	VM99-52. Area D2.2	rim of relict amph in black type breakdown	44.68	2.13	10.31	0.03	8.84	3.28
55								
56	VM99-52. Area D4.1	relict amph in inverted gabbroic type breakd	44.44	3.12	9.37	0.02	6.77	6.02
57	VM99-52. Area D4.2	black type amph rim	43.34	5.78	14.87	0.00	0.00	15.40
58								
59	VM99-52. Area E2.1	core of relict amph in black type breakdown	43.07	1.82	10.78	0.05	9.44	3.94
60	VM99-52. Area E2.2	rim of relict amph in black type breakdown	43.11	2.95	9.93	0.03	8.63	4.48
61								
62	**Label**	**Analyses Type**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
63	**Amphibole**	**24-Feb**						
64	VM99-61a.area B.1	amph in coarse grained host with inclusion	41.37	3.02	12.38	0.01	10.21	3.74
65	VM99-61a.area B.2	amph in coarse grained host with inclusion	40.86	3.09	12.18	0.00	5.32	6.32
66	VM99-61a.area B.5	amph in coarse grained host with inclusion	41.14	3.02	13.11	0.02	9.86	3.91
67								
68	**Amphibole**	**12-Jan**						
69	**Label**	**What?**	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**Fe2O3(c)**	**FeO(c)**
70	VM99-25. Area D.2	core of amphibole in gabbroic breakdown	42.66	2.41	12.95	0.04	10.55	1.13
71	VM99-25. Area D.3	rim of amphibole in gabbroic breakdown	42.22	2.37	13.29	0.06	9.10	2.68
72	VM99-25. Area D.4	rim of amphibole in gabbroic breakdown	42.53	2.73	11.98	0.05	6.47	5.17
73	VM99-25. Area D.5	mid of amphibole in gabbroic breakdown	42.35	2.93	11.81	0.07	6.87	5.13

	A	I	J	K	L	M	N	O	P	Q	R	S	T
1	**Appendix H**												
2	**Amphibole**												
3	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**H2O(**	**O=F**	**O=Cl**	**Sum Ox%**	**Si**
4	kaug.1_1	0.10	16.63	15.77	1.23	0.00	0.17	0.00	2.08	0.07	0.00	**102.01**	7.00
5	kaug.1_2	0.16	16.62	15.80	1.29	0.01	0.00	0.00	2.17	0.00	0.00	**102.48**	7.01
6	kaug.1_3	0.15	16.59	15.87	1.31	0.00	0.00	0.01	2.16	0.00	0.00	**102.43**	7.02
7													
8	VM99-25. Area A1.1	0.13	15.03	11.01	2.72	0.48	0.35	0.00	1.95	0.15	0.00	**102.16**	5.93
9	VM99-25. Area A1.2	0.13	14.75	11.13	2.54	0.54	0.43	0.02	1.89	0.18	0.00	**101.19**	6.02
10	VM99-25. Area A1.3	0.08	14.46	10.83	2.63	0.55	0.86	0.03	1.70	0.36	0.01	**101.96**	5.96
11													
12													
13	VM99-25. Area D1.1	0.13	15.19	11.16	2.38	0.45	0.09	0.02	2.05	0.04	0.00	**100.70**	6.02
14	VM99-25. Area D1.2	0.18	15.54	10.66	2.40	0.45	0.30	0.00	1.99	0.12	0.00	**101.75**	6.10
15	VM99-25. Area D1.3	0.11	14.65	11.05	2.56	0.49	0.24	0.02	1.97	0.10	0.01	**100.60**	5.95
16	VM99-25. Area D1.4	0.14	15.05	10.98	2.54	0.47	0.19	0.03	1.99	0.08	0.01	**99.98**	5.98
17	VM99-25. Area D1.5	0.14	14.88	10.93	2.42	0.45	0.22	0.02	1.99	0.09	0.00	**100.57**	6.03
18	VM99-25. Area D1.6	0.14	14.82	11.04	2.61	0.45	0.21	0.03	1.99	0.09	0.01	**101.08**	6.02
19	VM99-25. Area D1.7	0.12	14.72	11.07	2.65	0.49	0.34	0.03	1.91	0.14	0.01	**99.88**	6.08
20	VM99-25. Area D1.8	0.11	15.65	10.88	2.22	0.45	0.21	0.00	2.03	0.09	0.00	**101.78**	6.02
21	VM99-25. Area D1.9	0.16	14.03	10.99	2.70	0.46	0.31	0.01	1.94	0.13	0.00	**100.89**	6.03
22													
23	kaug.1	0.11	16.42	15.85	1.25	0.00	0.05	0.00	2.11	0.02	0.00	**101.21**	6.95
24													
25	VM99-25. Area d1.1	0.08	14.96	10.97	2.70	0.48	0.33	0.03	1.90	0.14	0.01	**99.69**	5.96
26	VM99-25. Area d1.2	0.07	15.30	10.97	2.69	0.49	0.37	0.02	1.90	0.16	0.00	**100.11**	6.00
27	VM99-25. Area d1.3	0.14	10.54	13.36	2.07	0.12	0.42	0.01	1.82	0.18	0.00	**100.80**	6.26
28	VM99-25. Area d1.4	0.12	14.53	10.94	2.69	0.46	0.44	0.03	1.85	0.19	0.01	**100.32**	5.73
29													
30	VM99-25. Area d1.6	0.13	12.67	11.43	2.84	0.50	1.30	0.02	1.43	0.55	0.00	**98.70**	6.36
31	VM99-25. Area d1.7	0.12	14.66	11.21	2.55	0.43	0.21	0.03	1.96	0.09	0.01	**99.80**	5.93
32	VM99-25. Area d1.8	0.13	14.39	11.04	2.69	0.65	0.29	0.07	1.88	0.12	0.02	**99.46**	6.08
33	VM99-25. Area d1.9	0.11	10.34	8.82	3.07	0.27	0.17	0.03	2.04	0.07	0.01	**101.49**	6.08
34													
35	VM99-52. Area A1.1	0.15	14.70	11.30	2.26	0.48	0.26	0.03	1.93	0.11	0.01	**99.74**	6.20
36	VM99-52. Area A1.2	0.13	14.96	11.43	2.24	0.42	0.68	0.01	1.72	0.29	0.00	**99.06**	6.24
37													
38	VM99-52. Area A2.1	0.10	15.52	11.24	2.80	0.38	0.66	0.03	1.74	0.28	0.01	**99.91**	6.20
39													
40	VM99-52. Area A3.1	0.25	14.34	11.19	2.18	0.57	0.25	0.04	1.93	0.10	0.01	**100.01**	6.17
41	VM99-52. Area A3.2	0.20	13.54	10.42	2.85	0.70	0.48	0.04	1.81	0.20	0.01	**99.84**	6.29
42	VM99-52. Area A3.4	0.24	14.57	10.99	2.16	0.51	0.17	0.04	1.97	0.07	0.01	**99.88**	6.25
43	VM99-52. Area A3.5	0.23	14.14	11.10	2.09	0.54	0.03	0.07	2.02	0.01	0.02	**99.83**	6.18
44	VM99-52. Area A3.6	0.24	14.46	11.07	2.27	0.53	0.21	0.04	1.97	0.09	0.01	**100.77**	6.19
45	VM99-52. Area A3.9	0.28	14.87	10.42	2.79	0.46	0.67	0.02	1.75	0.28	0.01	**100.88**	6.26
46													
47	VM99-52. Area D1.1	0.11	14.65	12.31	2.22	0.41	0.26	0.02	1.88	0.11	0.00	**97.81**	6.44
48	VM99-52. Area D1.2	0.16	15.77	11.46	3.34	0.35	0.54	0.02	1.79	0.23	0.00	**99.52**	6.40
49													
50	VM99-52. Area D1.4	0.01	0.00	0.18	5.01	8.93	0.00	0.00	2.24	0.00	0.00	**100.20**	8.59
51	VM99-52. Area D1.5	0.50	24.93	0.90	0.14	0.09	0.12	0.00	2.12	0.05	0.00	**102.31**	7.04
52													
53	VM99-52. Area D2.1	0.18	15.74	11.44	2.12	0.46	0.20	0.04	2.00	0.08	0.01	**101.23**	6.31
54	VM99-52. Area D2.2	0.15	15.85	11.42	2.32	0.44	0.51	0.04	1.86	0.22	0.01	**101.65**	6.34
55													
56	VM99-52. Area D4.1	0.13	15.18	11.27	2.57	0.54	0.42	0.07	1.87	0.18	0.02	**101.60**	6.37
57	VM99-52. Area D4.2	0.07	1.99	2.67	4.22	1.61	0.30	0.01	1.75	0.13	0.00	**91.90**	6.85
58													
59	VM99-52. Area E2.1	0.12	14.56	11.28	2.12	0.40	0.17	0.02	1.97	0.07	0.00	**99.66**	6.27
60	VM99-52. Area E2.2	0.19	14.93	11.21	2.26	0.57	0.21	0.03	1.96	0.09	0.01	**100.40**	6.25
61													
62	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**H2O(**	**O=F**	**O=Cl**	**Sum Ox%**	
63	**Amphibole**												
64	VM99-61a.area B.1	0.20	13.92	10.61	2.75	0.62			1.23	0.74	0.01	**100.81**	
65	VM99-61a.area B.2	0.12	13.01	10.21	2.81	0.58			1.67	0.27	0.01	**96.45**	
66	VM99-61a.area B.5	0.12	13.39	10.47	2.57	0.61			1.61	0.39	0.01	**100.23**	
67													
68	**Amphibole**												
69	**Label**	**MnO**	**MgO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**H2O(**	**O=F**	**O=Cl**	**Sum Ox%**	
70	VM99-25. Area D.2	0.08	15.26	10.83	2.46	0.44	0.21	0.02	2.01	0.09	0.01	**100.96**	
71	VM99-25. Area D.3	0.14	14.77	10.70	3.01	0.44	0.26	0.00	1.97	0.11	0.00	**100.89**	
72	VM99-25. Area D.4	0.13	14.55	10.84	2.98	0.67	0.35	0.05	1.89	0.15	0.01	**100.24**	
73	VM99-25. Area D.5	0.12	14.47	10.81	2.90	0.70	0.40	0.07	1.86	0.17	0.02	**100.32**	

	A	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1	**Appendix H**												
2	**Amphibole**												
3	**Label**	**Ti**	**Al/Al IV**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**K**	**F**
4	kaug.1_1	0.09	1.00	0.40	0.02	0.00	0.73	0.01	3.45	2.35	0.33	0.00	0.07
5	kaug.1_2	0.09	0.99	0.41	0.02	0.00	0.72	0.02	3.43	2.34	0.35	0.00	0.00
6	kaug.1_3	0.09	0.98	0.41	0.02	0.00	0.71	0.02	3.42	2.35	0.35	0.00	0.00
7													
8	VM99-25. Area A1.1	0.25	2.08	0.17	0.01	1.23	0.16	0.02	3.17	1.67	0.75	0.09	0.16
9	VM99-25. Area A1.2	0.23	1.98	0.26	0.01	1.04	0.31	0.02	3.14	1.70	0.70	0.10	0.19
10	VM99-25. Area A1.3	0.23	2.04	0.25	0.00	1.22	0.23	0.01	3.06	1.65	0.72	0.10	0.39
11													
12													
13	VM99-25. Area D1.1	0.25	1.98	0.24	0.01	1.08	0.18	0.02	3.23	1.71	0.66	0.08	0.04
14	VM99-25. Area D1.2	0.23	1.90	0.25	0.01	1.24	0.00	0.02	3.26	1.61	0.65	0.08	0.13
15	VM99-25. Area D1.3	0.26	2.05	0.26	0.02	1.05	0.27	0.01	3.14	1.70	0.71	0.09	0.11
16	VM99-25. Area D1.4	0.24	2.02	0.23	0.01	1.11	0.15	0.02	3.23	1.69	0.71	0.09	0.09
17	VM99-25. Area D1.5	0.26	1.97	0.28	0.01	1.06	0.20	0.02	3.17	1.67	0.67	0.08	0.10
18	VM99-25. Area D1.6	0.27	1.98	0.26	0.01	1.01	0.30	0.02	3.15	1.69	0.72	0.08	0.10
19	VM99-25. Area D1.7	0.24	1.92	0.32	0.02	0.84	0.40	0.01	3.17	1.71	0.74	0.09	0.16
20	VM99-25. Area D1.8	0.25	1.98	0.16	0.01	1.31	0.00	0.01	3.29	1.64	0.61	0.08	0.10
21	VM99-25. Area D1.9	0.29	1.97	0.32	0.00	0.86	0.52	0.02	3.00	1.69	0.75	0.08	0.14
22													
23	kaug.1	0.09	1.05	0.38	0.02	0.00	0.73	0.01	3.44	2.39	0.34	0.00	0.02
24													
25	VM99-25. Area d1.1	0.28	2.04	0.13	0.01	1.09	0.25	0.01	3.24	1.71	0.76	0.09	0.15
26	VM99-25. Area d1.2	0.26	2.00	0.15	0.02	1.09	0.19	0.01	3.29	1.69	0.75	0.09	0.17
27	VM99-25. Area d1.3	0.29	1.74	0.42	0.01	0.00	1.88	0.02	2.33	2.12	0.59	0.02	0.20
28	VM99-25. Area d1.4	0.29	2.27	0.07	0.01	1.38	0.11	0.01	3.14	1.70	0.76	0.09	0.20
29													
30	VM99-25. Area d1.6	0.22	1.64	0.82	0.01	0.00	1.12	0.02	2.76	1.79	0.81	0.09	0.60
31	VM99-25. Area d1.7	0.28	2.07	0.17	0.01	1.06	0.30	0.02	3.17	1.74	0.72	0.08	0.10
32	VM99-25. Area d1.8	0.42	1.91	0.00	0.01	0.73	0.69	0.02	3.15	1.74	0.77	0.12	0.14
33	VM99-25. Area d1.9	0.18	1.92	1.14	0.00	0.87	0.62	0.01	2.17	1.33	0.84	0.05	0.08
34													
35	VM99-52. Area A1.1	0.26	1.80	0.07	0.00	0.96	0.50	0.02	3.19	1.76	0.64	0.09	0.12
36	VM99-52. Area A1.2	0.18	1.76	0.09	0.00	1.02	0.43	0.02	3.26	1.79	0.63	0.08	0.32
37													
38	VM99-52. Area A2.1	0.23	1.79	0.00	0.00	0.99	0.41	0.01	3.36	1.75	0.79	0.07	0.30
39													
40	VM99-52. Area A3.1	0.26	1.83	0.04	0.00	1.05	0.51	0.03	3.11	1.75	0.62	0.11	0.12
41	VM99-52. Area A3.2	0.25	1.71	0.14	0.00	0.86	0.77	0.03	2.96	1.64	0.81	0.13	0.22
42	VM99-52. Area A3.4	0.23	1.75	0.03	0.00	1.13	0.43	0.03	3.16	1.71	0.61	0.10	0.08
43	VM99-52. Area A3.5	0.26	1.82	0.07	0.00	1.08	0.49	0.03	3.07	1.73	0.59	0.10	0.02
44	VM99-52. Area A3.6	0.27	1.81	0.05	0.00	1.06	0.47	0.03	3.11	1.71	0.63	0.10	0.10
45	VM99-52. Area A3.9	0.29	1.54	0.00	0.00	1.26	0.41	0.03	3.21	1.62	0.78	0.09	0.31
46													
47	VM99-52. Area D1.1	0.21	1.56	0.19	0.02	0.29	1.03	0.01	3.25	1.96	0.64	0.08	0.12
48	VM99-52. Area D1.2	0.15	1.60	0.13	0.03	0.56	0.69	0.02	3.43	1.79	0.94	0.07	0.25
49													
50	VM99-52. Area D1.4	0.02	0.00	2.76	0.00	0.00	0.21	0.00	0.00	0.03	1.30	1.52	0.00
51	VM99-52. Area D1.5	0.04	0.19	0.00	0.00	2.16	0.00	0.06	5.11	0.13	0.04	0.02	0.05
52													
53	VM99-52. Area D2.1	0.24	1.69	0.06	0.00	0.97	0.36	0.02	3.34	1.75	0.58	0.08	0.09
54	VM99-52. Area D2.2	0.23	1.66	0.07	0.00	0.94	0.39	0.02	3.35	1.74	0.64	0.08	0.23
55													
56	VM99-52. Area D4.1	0.34	1.58	0.00	0.00	0.73	0.72	0.02	3.24	1.73	0.71	0.10	0.19
57	VM99-52. Area D4.2	0.69	1.15	1.62	0.00	0.00	2.04	0.01	0.47	0.45	1.29	0.33	0.15
58													
59	VM99-52. Area E2.1	0.20	1.74	0.11	0.01	1.03	0.48	0.01	3.16	1.76	0.60	0.07	0.08
60	VM99-52. Area E2.2	0.32	1.70	0.00	0.00	0.94	0.54	0.02	3.23	1.74	0.64	0.11	0.10
61													
62	**Label**	**Si**	**Ti**	**Al/Al IV**	**Al VI**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**K**
63	**Amphibole**												
64	VM99-61a.area B.1	**5.98**	0.33	2.02	0.09	0.00	1.11	0.45	0.03	3.00	1.64	0.77	0.11
65	VM99-61a.area B.2	**6.15**	0.35	1.85	0.32	0.00	0.60	0.80	0.02	2.92	1.65	0.82	0.11
66	VM99-61a.area B.5	**5.97**	0.33	2.03	0.21	0.00	1.08	0.48	0.02	2.90	1.63	0.72	0.11
67													
68	**Amphibole**												
69	**Label**	**Si**	**Ti**	**Al/Al IV**	**Cr**	**Fe3+**	**Fe2+**	**Mn2+**	**Mg**	**Ca**	**Na**	**K**	**F**
70	VM99-25. Area D.2	6.06	0.26	1.94	0.01	1.13	0.13	0.01	3.23	1.65	0.68	0.08	0.09
71	VM99-25. Area D.3	6.04	0.25	1.96	0.01	0.98	0.32	0.02	3.15	1.64	0.83	0.08	0.12
72	VM99-25. Area D.4	6.16	0.30	1.84	0.01	0.71	0.63	0.02	3.14	1.68	0.84	0.12	0.16
73	VM99-25. Area D.5	6.14	0.32	1.86	0.01	0.75	0.62	0.02	3.13	1.68	0.82	0.13	0.19

	A	AG	AH	AI	AJ	AK	AL	AM	AN
1	**Appendix H**								
2	**Amphibole**								
3	**Label**	**Cl**	**OH**	**Sum Cat#**	**XMg**	**Na+K**	**Na+K-(2-Ca)**	**Fe/Fe+Mg**	**Mg/Fe2++Mg**
4	kaug.1_1	0.00	1.93	17.37	0.83	0.33	0.68	4.90	0.83
5	kaug.1_2	0.00	2.00	17.37	0.83	0.35	0.69	4.87	0.83
6	kaug.1_3	0.00	2.00	17.36	0.83	0.35	0.70	4.84	0.83
7									
8	VM99-25. Area A1.1	0.00	1.84	17.50	0.95	0.83	0.50	3.49	0.95
9	VM99-25. Area A1.2	0.01	1.80	17.50	0.91	0.80	0.50	3.75	0.91
10	VM99-25. Area A1.3	0.01	1.61	17.47	0.93	0.82	0.47	3.53	0.93
11									
12									
13	VM99-25. Area D1.1	0.00	1.96	17.45	0.95	0.74	0.45	3.59	0.95
14	VM99-25. Area D1.2	0.00	1.87	17.34	1.00	0.73	0.34	3.26	1.00
15	VM99-25. Area D1.3	0.01	1.88	17.50	0.92	0.80	0.50	3.67	0.92
16	VM99-25. Area D1.4	0.01	1.91	17.49	0.95	0.80	0.49	3.54	0.95
17	VM99-25. Area D1.5	0.00	1.90	17.42	0.94	0.75	0.42	3.58	0.94
18	VM99-25. Area D1.6	0.01	1.90	17.49	0.91	0.80	0.49	3.75	0.91
19	VM99-25. Area D1.7	0.01	1.84	17.55	0.89	0.83	0.54	3.96	0.89
20	VM99-25. Area D1.8	0.00	1.91	17.35	1.00	0.69	0.33	3.29	1.00
21	VM99-25. Area D1.9	0.00	1.86	17.53	0.85	0.84	0.53	4.04	0.85
22									
23	kaug.1	0.00	1.98	17.40	0.82	0.34	0.73	4.90	0.82
24									
25	VM99-25. Area d1.1	0.01	1.84	17.55	0.93	0.85	0.55	3.73	0.93
26	VM99-25. Area d1.2	0.00	1.83	17.54	0.95	0.84	0.54	3.67	0.94
27	VM99-25. Area d1.3	0.00	1.80	17.68	0.55	0.62	0.74	6.09	0.55
28	VM99-25. Area d1.4	0.01	1.79	17.54	0.97	0.84	0.54	3.35	0.97
29									
30	VM99-25. Area d1.6	0.01	1.39	17.63	0.71	0.90	0.69	4.99	0.71
31	VM99-25. Area d1.7	0.01	1.90	17.54	0.91	0.80	0.54	3.78	0.91
32	VM99-25. Area d1.8	0.02	1.85	17.63	0.82	0.89	0.63	4.54	0.82
33	VM99-25. Area d1.9	0.01	1.92	17.22	0.78	0.89	0.22	3.41	0.78
34									
35	VM99-52. Area A1.1	0.01	1.87	17.49	0.86	0.73	0.49	4.20	0.86
36	VM99-52. Area A1.2	0.00	1.68	17.51	0.88	0.71	0.51	4.13	0.88
37									
38	VM99-52. Area A2.1	0.01	1.69	17.61	0.89	0.86	0.61	4.19	0.89
39									
40	VM99-52. Area A3.1	0.01	1.88	17.47	0.86	0.72	0.47	4.13	0.86
41	VM99-52. Area A3.2	0.01	1.77	17.57	0.79	0.94	0.57	4.50	0.79
42	VM99-52. Area A3.4	0.01	1.91	17.41	0.88	0.70	0.41	4.01	0.88
43	VM99-52. Area A3.5	0.02	1.97	17.42	0.86	0.69	0.42	4.06	0.86
44	VM99-52. Area A3.6	0.01	1.89	17.44	0.87	0.73	0.44	4.05	0.87
45	VM99-52. Area A3.9	0.01	1.69	17.48	0.89	0.87	0.48	4.02	0.89
46									
47	VM99-52. Area D1.1	0.01	1.87	17.68	0.76	0.72	0.68	5.32	0.76
48	VM99-52. Area D1.2	0.00	1.75	17.80	0.83	1.01	0.80	4.80	0.83
49									
50	VM99-52. Area D1.4	0.00	2.00	16.42	0.00	2.82	0.85	0.41	0.00
51	VM99-52. Area D1.5	0.00	1.95	16.78	1.00	0.05		5.11	1.00
52									
53	VM99-52. Area D2.1	0.01	1.90	17.41	0.90	0.67	0.41	4.05	0.90
54	VM99-52. Area D2.2	0.01	1.76	17.46	0.90	0.72	0.46	4.13	0.90
55						0.00		0.00	
56	VM99-52. Area D4.1	0.02	1.79	17.54	0.82	0.81	0.54	4.69	0.82
57	VM99-52. Area D4.2	0.00	1.85	16.89	0.19	1.62	0.07	4.54	0.19
58									
59	VM99-52. Area E2.1	0.01	1.92	17.43	0.87	0.67	0.43	4.11	0.87
60	VM99-52. Area E2.2	0.01	1.90	17.48	0.86	0.74	0.48	4.31	0.86
61									
62	**Label**	**F**	**Cl**	**OH**	**Sum Cat#**				
63	**Amphibole**								
64	VM99-61a.area B.1	-	0.01	1.18	17.53				
65	VM99-61a.area B.2	-	0.01	1.68	17.58				
66	VM99-61a.area B.5	-	0.01	1.56	17.46				
67									
68	**Amphibole**								
69	**Label**	**Cl**	**OH**	**Sum Cat#**	**XMg**				
70	VM99-25. Area D.2	0.01	1.90	17.41	0.96				
71	VM99-25. Area D.3	0.00	1.88	17.55	0.91				
72	VM99-25. Area D.4	0.01	1.82	17.64	0.83				
73	VM99-25. Area D.5	0.02	1.80	17.62	0.83				

	A	B	C	D	E	F	G	H
74	VM99-25. Area D.6	mid of amphibole in gabbroic breakdown	42.16	2.34	13.16	0.08	10.53	1.44
75	VM99-25. Area D.7	rim of amphibole in gabbroic breakdown	42.84	2.30	12.57	0.09	10.09	1.86
76								
77	VM99-61a. Area E2.1	amphibole inclusion in plag	41.38	3.60	12.17	0.04	7.62	5.77
78	VM99-61a. Area E2.2	amphibole inclusion in plag	41.12	3.18	13.36	0.04	7.97	4.88
79	VM99-61a. Area E2.3	amphibole inclusion in plag	42.07	3.50	11.36	0.00	8.29	5.14
80								
81	VM99-61a. Area E3.1	amphibole inclusion in plag	41.12	3.16	13.63	0.00	9.84	3.50
82								
83	VM99-8. Area B1.1	core of relict black type amphibole reaction	41.43	2.71	12.67	0.04	8.44	4.54
84	VM99-8. Area B1.2	mid of relict black type amphibole breakdow	42.41	3.00	11.78	0.00	7.71	4.92
85	VM99-8. Area B1.3	rim of relict black type amphibole breakdowr	42.66	3.46	11.34	0.01	8.41	4.14
86	VM99-8. Area B1.4	fuzzy zone of black type amphibole	43.62	3.52	13.01	0.04	0.00	16.68
87								
88	VM99-8. Area C4.1	core of relict black type amphibole reaction	41.70	3.66	12.36	0.01	7.28	5.61
89	VM99-8. Area C4.2	mid of relict black type amphibole breakdow	41.84	3.70	12.38	0.02	7.07	5.50
90	VM99-8. Area C4.3	rim of relict black type amphibole breakdowr	42.38	2.97	11.48	0.01	9.91	3.02
91	VM99-8. Area C4.4	fuzzy zone of black type amphibole	42.58	3.07	12.71	0.01	2.43	13.44
92	VM99-8. Area C4.5	fuzzy zone of black type amphibole	41.94	3.71	11.92	0.03	7.99	5.41
93								
94	VM99-8. Area D1.1	core of relict black type amphibole breakdow	42.78	2.42	12.26	0.02	9.32	3.63
95	VM99-8. Area D1.2	mid of relict black type amphibole breakdow	42.25	2.37	12.85	0.01	10.08	2.56
96	VM99-8. Area D1.3	rim of relict black type amphibole breakdowr	41.27	3.40	12.51	0.03	8.99	4.48
97	VM99-8. Area D1.4	fuzzy zone of black type amphibole	41.59	3.05	13.46	0.10	0.00	15.08
98								
99	VM99-8. Area E8.1	relict amphibole in "inverted gabbroic" type b	42.80	2.57	13.00	0.02	8.61	3.39
100	VM99-8. Area E8.2	relict amphibole in "inverted gabbroic" type b	42.14	2.59	13.05	0.04	9.00	3.45
101	VM99-8. Area E8.3	fuzzy zone in "inverted gabbroic" type breaku	42.61	2.69	11.94	0.05	16.10	0.00
102								
103	VM99-8. Area F1.1	fuzzy zone of black type amphibole	39.71	4.37	12.22	0.16	21.41	0.00
104	VM99-8. Area F1.2	fuzzy zone of black type amphibole	43.91	2.48	13.22	0.03	14.64	0.00
105								
106	VM99-26. Area A1.1	close to core of relict amphibole (inclusion)	43.68	2.06	11.58	0.20	8.57	1.83
107	VM99-26. Area A1.2	close to rim of relict amphibole (inclusion) at	43.54	2.08	11.79	0.18	9.25	1.53
108	VM99-26. Area A1.3	close to core of relict amphibole (inclusion)	43.96	2.16	12.02	0.12	8.75	1.66
109	VM99-26. Area A1.4	close to rim of relict amphibole (inclusion) at	43.42	2.27	11.87	0.16	8.67	1.97
110	VM99-26. Area A1.5	close to rim of relict amphibole (inclusion) at	43.40	2.28	11.85	0.18	9.07	1.91
111								
112	VM99-26. Area A2.1	core of relict amphibole (inclusion)	42.17	2.54	12.82	0.06	9.64	1.51
113	VM99-26. Area A2.2	mid of relict amphibole (inclusion)	43.62	2.44	13.35	0.10	6.01	4.41
114	VM99-26. Area A2.3	rim of relict amphibole (inclusion)	42.04	2.54	12.82	0.08	9.38	1.99
115	VM99-26. Area A2.4	rim of relict amphibole (inclusion)	43.78	2.47	13.39	0.04	6.00	4.13
116								
117	VM99-26. Area B1.1	close to core of relict amphibole (inclusion)	40.64	2.95	12.75	0.32	7.97	1.03
118	VM99-26. Area B1.2	close to rim of relict amphibole (inclusion)	40.92	2.73	12.12	0.66	7.03	1.78
119								
120	**BAD TOTALS**	**14-Nov**						
121	VM99-25. Area A1.4		41.15	2.54	14.66	0.07	16.19	0.00
122	VM99-25. Area A1.5		42.65	1.42	14.14	0.03	16.82	0.00
123	VM99-52. Area A1.3		41.11	2.86	12.88	0.04	3.10	11.00
124	VM99-25. Area d1.5		52.71	0.26	10.51	0.02	11.40	0.00
125								
126	VM99-52. Area A3.3		43.95	1.23	16.40	0.00	0.00	4.81
127								
128	VM99-52. Area A3.7		51.13	2.00	17.98	0.01	0.00	11.66
129	VM99-52. Area A3.8		52.96	2.24	14.03	0.00	0.00	12.51
130								
131	VM99-52. Area D1.3		38.95	3.91	10.77	0.01	19.47	0.00
132								
133	VM99-52. Area D2.3		44.88	4.29	12.33	0.00	2.87	16.18
134								
135	VM99-52. Area E1.1		53.99	0.35	1.56	0.00	15.49	0.00
136	VM99-52. Area E1.2		54.34	0.30	0.87	0.04	15.65	0.00
137	VM99-52. Area E1.3		40.66	0.65	7.06	0.02	0.00	5.15
138								
139	VM99-52. Area E2.3		43.91	3.44	17.35	0.00	0.12	16.00
140	VM99-52. Area E2.4		44.58	4.20	14.26	0.02	3.45	15.17
141	**BAD TOTALS**	**12-Jan**						
142	VM99-61a. Area D5.1	apatite?	0.20	0.00	0.03	0.00	0.00	0.84
143	VM99-61a. Area D5.2	apatite?	0.30	0.03	0.04	0.00	0.00	1.87
144								
145	VM99-61a. Area E1.1	apatite?	0.23	0.00	0.05	0.00	0.00	0.17
146	VM99-61a. Area E1.2	apatite?	0.21	0.01	0.01	0.00	0.00	0.29

	A	I	J	K	L	M	N	O	P	Q	R	S	T
74	VM99-25. Area D.6	0.13	14.97	10.84	2.52	0.48	0.31	0.01	1.95	0.13	0.00	**100.81**	
75	VM99-25. Area D.7	0.17	15.11	10.78	2.63	0.46	0.43	0.02	1.90	0.18	0.00	**101.04**	
76													
77	VM99-81a. Area E2.1	0.17	13.67	10.70	2.93	0.68	1.16	0.04	1.51	0.49	0.01	**100.94**	
78	VM99-81a. Area E2.2	0.13	13.64	10.79	2.84	0.58	0.85	0.03	1.66	0.36	0.01	**100.71**	
79	VM99-81a. Area E2.3	0.15	14.13	10.56	2.94	0.64	1.50	0.04	1.35	0.63	0.01	**101.03**	
80													
81	VM99-81a. Area E3.1	0.12	13.85	10.63	2.86	0.52	1.01	0.01	1.61	0.42	0.00	**101.44**	
82													
83	VM99-8. Area B1.1	0.17	14.09	11.15	2.63	0.61	0.19	0.02	1.97	0.08	0.00	**100.58**	
84	VM99-8. Area B1.2	0.12	14.34	11.15	2.44	0.57	0.21	0.04	1.97	0.09	0.01	**100.58**	
85	VM99-8. Area B1.3	0.18	14.59	10.97	2.30	0.61	0.21	0.02	1.98	0.09	0.00	**100.77**	
86	VM99-8. Area B1.4	0.17	7.68	11.99	2.55	0.38	0.24	0.00	1.93	0.10	0.00	**101.71**	
87													
88	VM99-8. Area C4.1	0.15	13.72	10.90	2.57	0.63	0.38	0.02	1.89	0.16	0.00	**100.70**	
89	VM99-8. Area C4.2	0.10	13.89	10.89	2.60	0.65	0.11	0.01	2.02	0.04	0.00	**100.74**	
90	VM99-8. Area C4.3	0.15	14.80	10.79	2.55	0.52	0.35	0.02	1.91	0.15	0.00	**100.73**	
91	VM99-8. Area C4.4	0.23	10.91	12.95	1.59	0.09	0.14	0.00	1.99	0.06	0.00	**102.10**	
92	VM99-8. Area C4.5	0.18	13.81	10.98	2.45	0.60	0.24	0.03	1.96	0.10	0.01	**101.13**	
93													
94	VM99-8. Area D1.1	0.11	14.68	11.19	2.43	0.60	0.25	0.02	1.97	0.11	0.01	**101.59**	
95	VM99-8. Area D1.2	0.14	14.77	11.08	2.53	0.48	0.19	0.03	2.00	0.08	0.01	**101.26**	
96	VM99-8. Area D1.3	0.12	13.96	10.94	2.62	0.60	0.19	0.03	1.98	0.08	0.01	**101.04**	
97	VM99-8. Area D1.4	0.17	9.31	14.20	1.77	0.12	0.04	0.00	2.01	0.02	0.00	**100.87**	
98													
99	VM99-8. Area E8.1	0.12	14.79	11.17	2.54	0.53	0.13	0.02	2.04	0.06	0.00	**101.67**	
100	VM99-8. Area E8.2	0.09	14.67	11.23	2.57	0.58	0.60	0.02	1.81	0.25	0.00	**101.57**	
101	VM99-8. Area E8.3	0.22	18.41	9.17	1.63	0.23	0.13	0.02	2.12	0.06	0.00	**105.25**	
102													
103	VM99-8. Area F1.1	0.20	15.36	8.46	1.99	0.06	0.00	0.01	2.16	0.00	0.00	**106.11**	
104	VM99-8. Area F1.2	0.15	16.04	10.13	2.05	0.20	0.12	0.02	2.13	0.05	0.00	**105.07**	
105													
106	VM99-26. Area A1.1	0.07	15.98	11.00	2.57	0.44	0.21	0.02	1.99	0.09	0.00	**100.10**	
107	VM99-26. Area A1.2	0.10	15.71	10.99	2.33	0.43	0.30	0.01	1.95	0.13	0.00	**100.07**	
108	VM99-26. Area A1.3	0.07	15.53	10.69	2.34	0.46	0.22	0.03	1.99	0.09	0.01	**99.91**	
109	VM99-26. Area A1.4	0.08	15.74	11.06	2.42	0.48	0.09	0.01	2.05	0.04	0.00	**100.25**	
110	VM99-26. Area A1.5	0.06	15.47	10.83	2.38	0.49	0.59	0.02	1.81	0.25	0.00	**100.08**	
111													
112	VM99-26. Area A2.1	0.09	15.14	10.95	2.28	0.48	0.25	0.02	1.96	0.11	0.00	**99.79**	
113	VM99-26. Area A2.2	0.08	14.29	10.71	2.51	0.53	0.19	0.00	2.00	0.08	0.00	**100.17**	
114	VM99-26. Area A2.3	0.07	15.01	10.95	2.42	0.48	0.40	0.00	1.89	0.17	0.00	**99.91**	
115	VM99-26. Area A2.4	0.10	14.46	10.66	2.54	0.57	0.29	0.03	1.96	0.12	0.01	**100.29**	
116													
117	VM99-26. Area B1.1	0.04	15.18	10.53	2.43	0.47	0.14	0.00	1.96	0.06	0.00	**96.35**	
118	VM99-26. Area B1.2	0.04	15.13	10.61	2.45	0.43	0.20	0.02	1.91	0.08	0.00	**95.95**	
119													
120	**BAD TOTALS**												
121	VM99-25. Area A1.4	0.13	14.72	10.35	1.97	0.55	0.71	0.01	1.82	0.30	0.00	**104.56**	
122	VM99-25. Area A1.5	0.17	17.89	8.10	1.94	0.21	0.52	0.00	1.96	0.22	0.00	**105.62**	
123	VM99-52. Area A1.3	0.22	8.01	7.55	2.86	0.44	0.15	0.01	1.82	0.06	0.00	**92.00**	
124	VM99-25. Area d1.5	0.28	19.70	3.92	1.40	0.12	0.03	0.01	2.23	0.01	0.00	**102.59**	
125													
126	VM99-52. Area A3.3	0.04	3.55	7.50	2.62	0.36	0.57	0.04	1.53	0.24	0.01	**82.34**	
127													
128	VM99-52. Area A3.7	0.11	1.55	3.57	4.60	1.07	0.56	0.01	1.79	0.24	0.00	**95.81**	
129	VM99-52. Area A3.8	0.09	2.47	3.84	2.59	0.45	0.92	0.10	1.56	0.39	0.02	**93.33**	
130													
131	VM99-52. Area D1.3	0.21	9.78	5.25	2.89	0.37	0.15	0.04	1.85	0.06	0.01	**93.59**	
132													
133	VM99-52. Area D2.3	0.21	2.94	2.80	3.42	1.55	0.33	0.03	1.75	0.14	0.01	**93.44**	
134													
135	VM99-52. Area E1.1	0.42	29.67	0.83	0.05	0.07	0.16	0.00	2.20	0.07	0.00	**104.73**	
136	VM99-52. Area E1.2	0.42	27.90	1.44	0.07	0.04	0.09	0.01	2.20	0.04	0.00	**103.33**	
137	VM99-52. Area E1.3	0.15	12.50	12.83	1.23	0.10	0.00	0.03	1.73	0.00	0.01	**82.09**	
138													
139	VM99-52. Area E2.3	0.14	2.56	3.41	4.07	0.82	1.00	0.01	1.47	0.42	0.00	**93.87**	
140	VM99-52. Area E2.4	0.19	2.42	2.23	3.64	1.48	0.90	0.04	1.49	0.38	0.01	**93.68**	
141	**BAD TOTALS**												
142	VM99-81a. Area D5.1	0.07	0.25	51.85	0.12	0.01	0.00	0.48	0.62	0.00	0.11	**54.36**	
143	VM99-81a. Area D5.2	0.06	0.14	50.34	0.25	0.06	2.25	0.05	-0.34	0.95	0.01	**54.10**	
144													
145	VM99-81a. Area E1.1	0.09	0.30	52.04	0.13	0.02	2.13	0.40	-0.37	0.90	0.09	**54.20**	
146	VM99-81a. Area E1.2	0.03	0.29	52.86	0.07	0.00	1.42	0.40	-0.02	0.60	0.09	**54.87**	

	A	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
74	VM99-25. Area D.6	6.02	0.25	1.98	0.01	1.13	0.17	0.02	3.19	1.66	0.70	0.09	0.14
75	VM99-25. Area D.7	6.10	0.25	1.90	0.01	1.08	0.22	0.02	3.21	1.65	0.73	0.08	0.19
76													
77	VM99-61a. Area E2.1	6.01	0.39	1.99	0.01	0.83	0.70	0.02	2.96	1.66	0.82	0.13	0.53
78	VM99-61a. Area E2.2	5.95	0.35	2.05	0.00	0.87	0.59	0.02	2.94	1.67	0.80	0.11	0.39
79	VM99-61a. Area E2.3	6.09	0.38	1.91	0.00	0.90	0.62	0.02	3.05	1.64	0.83	0.12	0.69
80													
81	VM99-61a. Area E3.1	5.90	0.34	2.10	0.00	1.06	0.42	0.01	2.96	1.63	0.79	0.10	0.46
82													
83	VM99-8. Area B1.1	6.00	0.30	2.00	0.01	0.92	0.55	0.02	3.04	1.73	0.74	0.11	0.09
84	VM99-8. Area B1.2	6.13	0.33	1.87	0.00	0.84	0.60	0.01	3.09	1.73	0.69	0.11	0.10
85	VM99-8. Area B1.3	6.14	0.37	1.86	0.00	0.91	0.50	0.02	3.13	1.69	0.64	0.11	0.10
86	VM99-8. Area B1.4	6.40	0.39	1.60	0.01	0.00	2.05	0.02	1.68	1.89	0.73	0.07	0.11
87													
88	VM99-8. Area C4.1	6.04	0.40	1.96	0.00	0.79	0.68	0.02	2.96	1.69	0.72	0.12	0.17
89	VM99-8. Area C4.2	6.05	0.40	1.95	0.00	0.77	0.67	0.01	2.99	1.69	0.73	0.12	0.05
90	VM99-8. Area C4.3	6.10	0.32	1.90	0.00	1.07	0.36	0.02	3.17	1.66	0.71	0.10	0.16
91	VM99-8. Area C4.4	6.19	0.34	1.81	0.00	0.27	1.63	0.03	2.36	2.02	0.45	0.02	0.06
92	VM99-8. Area C4.5	6.05	0.40	1.95	0.00	0.87	0.65	0.02	2.97	1.70	0.69	0.11	0.11
93													
94	VM99-8. Area D1.1	6.11	0.26	1.89	0.00	1.00	0.43	0.01	3.12	1.71	0.67	0.11	0.12
95	VM99-8. Area D1.2	6.03	0.25	1.97	0.00	1.08	0.31	0.02	3.14	1.70	0.70	0.09	0.08
96	VM99-8. Area D1.3	5.96	0.37	2.04	0.00	0.98	0.54	0.01	3.01	1.69	0.73	0.11	0.09
97	VM99-8. Area D1.4	6.16	0.34	1.84	0.01	0.00	1.87	0.02	2.06	2.25	0.51	0.02	0.02
98													
99	VM99-8. Area E8.1	6.08	0.27	1.92	0.00	0.92	0.40	0.02	3.13	1.70	0.70	0.10	0.06
100	VM99-8. Area E8.2	6.01	0.28	1.99	0.00	0.97	0.41	0.01	3.12	1.72	0.71	0.11	0.27
101	VM99-8. Area E8.3	5.84	0.28	1.93	0.01	1.66	0.00	0.03	3.76	1.35	0.43	0.04	0.06
102													
103	VM99-8. Area F1.1	5.50	0.46	1.99	0.02	2.23	0.00	0.02	3.17	1.26	0.54	0.01	0.00
104	VM99-8. Area F1.2	5.99	0.25	2.01	0.00	1.50	0.00	0.02	3.26	1.48	0.54	0.04	0.05
105													
106	VM99-26. Area A1.1	6.25	0.22	1.75	0.02	0.92	0.22	0.01	3.41	1.69	0.71	0.08	0.10
107	VM99-26. Area A1.2	6.23	0.22	1.77	0.02	1.00	0.18	0.01	3.35	1.68	0.65	0.08	0.14
108	VM99-26. Area A1.3	6.28	0.23	1.72	0.01	0.94	0.20	0.01	3.31	1.64	0.65	0.09	0.10
109	VM99-26. Area A1.4	6.21	0.24	1.79	0.02	0.93	0.24	0.01	3.35	1.70	0.67	0.09	0.04
110	VM99-26. Area A1.5	6.22	0.25	1.78	0.02	0.98	0.23	0.01	3.30	1.66	0.66	0.09	0.27
111													
112	VM99-26. Area A2.1	6.07	0.27	1.94	0.01	1.04	0.18	0.01	3.25	1.69	0.64	0.09	0.11
113	VM99-26. Area A2.2	6.24	0.26	1.76	0.01	0.65	0.53	0.01	3.05	1.64	0.70	0.10	0.09
114	VM99-26. Area A2.3	6.05	0.28	1.95	0.01	1.02	0.24	0.01	3.22	1.69	0.68	0.09	0.18
115	VM99-26. Area A2.4	6.25	0.27	1.75	0.01	0.64	0.49	0.01	3.08	1.63	0.70	0.10	0.13
116													
117	VM99-26. Area B1.1	6.03	0.33	1.97	0.04	0.89	0.13	0.01	3.36	1.67	0.70	0.09	0.06
118	VM99-26. Area B1.2	6.10	0.31	1.90	0.08	0.79	0.22	0.01	3.36	1.70	0.71	0.08	0.09
119													
120	**BAD TOTALS**												
121	VM99-25. Area A1.4	5.71	0.27	2.29	0.11	0.01	1.69	0.00	0.02	3.05	1.54	0.53	0.10
122	VM99-25. Area A1.5	5.81	0.15	2.19	0.08	0.00	1.72	0.00	0.02	3.63	1.18	0.51	0.04
123	VM99-52. Area A1.3	6.51	0.34	1.49	0.91	0.01	0.37	1.46	0.03	1.89	1.28	0.88	0.09
124	VM99-25. Area d1.5	7.03	0.03	0.97	0.68	0.00	1.14	0.00	0.03	3.91	0.56	0.36	0.02
125													
126	VM99-52. Area A3.3	7.28	0.15	0.72	2.48	0.00	0.00	0.67	0.01	0.88	1.33	0.84	0.08
127													
128	VM99-52. Area A3.7	7.43	0.22	0.57	2.51	0.00	0.00	1.42	0.01	0.34	0.56	1.30	0.20
129	VM99-52. Area A3.8	7.85	0.25	0.15	2.30	0.00	0.00	1.55	0.01	0.55	0.61	0.74	0.09
130													
131	VM99-52. Area D1.3	6.04	0.46	1.96	0.01	0.00	2.27	0.00	0.03	2.26	0.87	0.87	0.07
132													
133	VM99-52. Area D2.3	7.04	0.51	0.96	1.32	0.00	0.34	2.12	0.03	0.69	0.47	1.04	0.31
134													
135	VM99-52. Area E1.1	7.12	0.04	0.24	0.00	0.00	1.54	0.00	0.05	5.84	0.12	0.01	0.01
136	VM99-52. Area E1.2	7.27	0.03	0.14	0.00	0.00	1.58	0.00	0.05	5.56	0.21	0.02	0.01
137	VM99-52. Area E1.3	7.04	0.09	0.96	0.48	0.00	0.00	0.75	0.02	3.22	2.38	0.41	0.02
138													
139	VM99-52. Area E2.3	6.77	0.40	1.23	1.92	0.00	0.01	2.06	0.02	0.59	0.56	1.22	0.16
140	VM99-52. Area E2.4	6.93	0.49	1.07	1.55	0.00	0.40	1.97	0.03	0.56	0.37	1.10	0.29
141	**BAD TOTALS**												
142	VM99-61a. Area D5.1	0.08	0.00	0.02	0.00	0.00	0.28	0.02	0.15	22.31	0.10	0.00	0.00
143	VM99-61a. Area D5.2	0.12	0.01	0.02	0.00	0.00	0.64	0.02	0.09	21.85	0.20	0.03	2.88
144													
145	VM99-61a. Area E1.1	0.09	0.00	0.03	0.00	0.00	0.06	0.03	0.18	22.46	0.10	0.01	2.72
146	VM99-61a. Area E1.2	0.08	0.00	0.00	0.00	0.00	0.10	0.01	0.17	22.52	0.05	0.00	1.79

	A	AG	AH	AI	AJ	AK	AL	AM	AN
74	VM99-25. Area D.6	0.00	1.86	17.45	0.95				
75	VM99-25. Area D.7	0.00	1.81	17.46	0.94				
76									
77	VM99-81a. Area E2.1	0.01	1.46	17.61	0.81				
78	VM99-61a. Area E2.2	0.01	1.60	17.58	0.83				
79	VM99-61a. Area E2.3	0.01	1.30	17.58	0.83				
80									
81	VM99-61a. Area E3.1	0.00	1.54	17.52	0.88				
82									
83	VM99-8. Area B1.1	0.01	1.91	17.58	0.85				
84	VM99-8. Area B1.2	0.01	1.90	17.52	0.84				
85	VM99-8. Area B1.3	0.00	1.90	17.45	0.86				
86	VM99-8. Area B1.4	0.00	1.89	17.48	0.45				
87									
88	VM99-8. Area C4.1	0.00	1.82	17.53	0.81				
89	VM99-8. Area C4.2	0.00	1.95	17.54	0.82				
90	VM99-8. Area C4.3	0.00	1.84	17.47	0.90				
91	VM99-8. Area C4.4	0.00	1.94	17.48	0.59				
92	VM99-8. Area C4.5	0.01	1.88	17.49	0.82				
93									
94	VM99-8. Area D1.1	0.01	1.88	17.49	0.88				
95	VM99-8. Area D1.2	0.01	1.91	17.48	0.91				
96	VM99-8. Area D1.3	0.01	1.91	17.54	0.85				
97	VM99-8. Area D1.4	0.00	1.98	17.59	0.52				
98									
99	VM99-8. Area E8.1	0.00	1.94	17.50	0.89				
100	VM99-8. Area E8.2	0.00	1.73	17.53	0.88				
101	VM99-8. Area E8.3	0.00	1.94	17.32	1.00				
102									
103	VM99-8. Area F1.1	0.00	2.00	17.20	1.00				
104	VM99-8. Area F1.2	0.00	1.94	17.22	1.00				
105									
106	VM99-26. Area A1.1	0.01	1.90	17.48	0.94				
107	VM99-26. Area A1.2	0.00	1.86	17.41	0.95				
108	VM99-26. Area A1.3	0.01	1.90	17.37	0.94				
109	VM99-26. Area A1.4	0.00	1.96	17.45	0.93				
110	VM99-26. Area A1.5	0.00	1.73	17.41	0.94				
111									
112	VM99-26. Area A2.1	0.00	1.88	17.41	0.95				
113	VM99-26. Area A2.2	0.00	1.91	17.44	0.85				
114	VM99-26. Area A2.3	0.00	1.82	17.45	0.93				
115	VM99-26. Area A2.4	0.01	1.87	17.44	0.86				
116									
117	VM99-26. Area B1.1	0.00	1.93	17.46	0.96				
118	VM99-26. Area B1.2	0.01	1.90	17.49	0.94				
119									
120	**BAD TOTALS**								
121	VM99-25. Area A1.4	0.31	1.69	17.29	1.00				
122	VM99-25. Area A1.5	0.22	1.78	17.33	1.00				
123	VM99-52. Area A1.3	0.08	1.92	17.25	0.57				
124	VM99-25. Area d1.5	0.01	1.98	16.74	1.00				
125									
126	VM99-52. Area A3.3	0.30	1.69	16.43	0.57				
127									
128	VM99-52. Area A3.7	0.26	1.74	16.55	0.19				
129	VM99-52. Area A3.8	0.43	1.54	16.09	0.26				
130									
131	VM99-52. Area D1.3	0.07	1.92	16.85	1.00				
132									
133	VM99-52. Area D2.3	0.16	1.83	16.82	0.24				
134									
135	VM99-52. Area E1.1	0.07	1.93	16.96	1.00				
136	VM99-52. Area E1.2	0.04	1.96	16.86	1.00				
137	VM99-52. Area E1.3	0.00	1.99	17.37	0.81				
138									
139	VM99-52. Area E2.3	0.49	1.51	16.94	0.22				
140	VM99-52. Area E2.4	0.44	1.55	16.76	0.22				
141	**BAD TOTALS**								
142	VM99-61a. Area D5.1	0.33	1.67	24.96	0.35				
143	VM99-61a. Area D5.2	0.04	-0.92	24.97	0.12				
144									
145	VM99-61a. Area E1.1	0.27	-0.99	24.95	0.76				
146	VM99-61a. Area E1.2	0.27	-0.06	24.94	0.64				

	A	B	C	D	E	F	G	H
147								
148	VM99-8. Area A1.1	relict amphibole in "inverted gabbroic" type b	41.53	2.90	13.11	0.01	13.19	1.44
149	VM99-8. Area A1.2	relict amphibole in "inverted gabbroic" type b	42.50	2.21	13.25	0.03	14.96	0.00
150	VM99-8. Area A1.3	relict amphibole in "inverted gabbroic" type b	49.72	1.93	4.64	0.01	0.00	5.50
151	VM99-8. Area A1.4	core of black type amphibole, actually a pyrc	57.28	0.14	26.52	0.00	0.00	0.71
152	VM99-8. Area A1.5	rim of black type amphibole (fuzzy zone)	43.96	2.87	14.37	0.04	10.32	6.42
153								
154	VM99-8. Area B1.5	fuzzy zone of black type amphibole	44.79	1.77	13.18	0.00	10.53	2.55
155								
156	VM99-8. Area E5.1	core of black type amphibole (fuzzy)	41.58	2.88	13.45	0.03	16.63	0.00
157	VM99-8. Area E5.2	mid of black type amphibole (fuzzy)	41.49	2.73	13.67	0.01	18.95	0.00
158	VM99-8. Area E5.3	rim of black type amphibole (fuzzy)	41.98	3.84	13.56	0.02	18.05	0.00

	A	I	J	K	L	M	N	O	P	Q	R	S	T
147													
148	VM99-8. Area A1.1	0.17	14.18	11.54	1.54	0.28	0.16	0.02	2.03	0.07	0.00	**102.03**	
149	VM99-8. Area A1.2	0.23	17.43	9.12	1.59	0.16	0.25	0.01	2.05	0.11	0.00	**103.68**	
150	VM99-8. Area A1.3	0.12	15.60	21.83	0.54	0.00	0.01	0.00	2.11	0.00	0.00	**102.02**	
151	VM99-8. Area A1.4	0.03	0.14	8.62	5.32	1.29	0.00	0.00	2.32	0.00	0.00	**102.38**	
152	VM99-8. Area A1.5	0.22	10.76	9.73	2.09	0.28	0.19	0.02	2.03	0.08	0.00	**103.22**	
153													
154	VM99-8. Area B1.5	0.18	14.19	10.71	2.12	0.27	0.08	0.03	2.10	0.03	0.01	**102.46**	
155													
156	VM99-8. Area E5.1	0.22	14.62	11.25	1.50	0.14	0.31	0.01	2.01	0.13	0.00	**104.49**	
157	VM99-8. Area E5.2	0.30	13.77	10.14	1.82	0.10	0.39	0.01	1.98	0.16	0.00	**105.18**	
158	VM99-8. Area E5.3	0.19	15.92	7.32	2.19	0.09	0.37	0.00	2.02	0.15	0.00	**105.40**	

	A	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
147													
148	VM99-8. Area A1.1	5.90	0.31	2.11	0.00	1.41	0.17	0.02	3.00	1.76	0.43	0.05	0.07
149	VM99-8. Area A1.2	5.88	0.23	2.12	0.00	1.56	0.00	0.03	3.59	1.35	0.43	0.03	0.11
150	VM99-8. Area A1.3	7.04	0.21	0.78	0.00	0.00	0.65	0.01	3.29	3.31	0.15	0.00	0.00
151	VM99-8. Area A1.4	7.41	0.01	0.59	0.00	0.00	0.08	0.00	0.03	1.20	1.34	0.21	0.00
152	VM99-8. Area A1.5	6.18	0.30	1.82	0.01	1.09	0.76	0.03	2.26	1.47	0.57	0.05	0.09
153													
154	VM99-8. Area B1.5	6.26	0.19	1.74	0.00	1.11	0.30	0.02	2.96	1.60	0.57	0.05	0.03
155													
156	VM99-8. Area E5.1	5.77	0.30	2.20	0.00	1.74	0.00	0.03	3.03	1.67	0.40	0.03	0.14
157	VM99-8. Area E5.2	5.75	0.28	2.23	0.00	1.97	0.00	0.04	2.84	1.50	0.49	0.02	0.17
158	VM99-8. Area E5.3	5.75	0.40	2.19	0.00	1.86	0.00	0.02	3.25	1.07	0.58	0.02	0.16

	A	AG	AH	AI	AJ	AK	AL	AM	AN
147									
148	VM99-8. Area A1.1	0.01	1.92	17.23	0.95				
149	VM99-8. Area A1.2	0.00	1.89	17.26	1.00				
150	VM99-8. Area A1.3	0.00	2.00	17.44	0.84				
151	VM99-8. Area A1.4	0.00	2.00	16.32	0.25				
152	VM99-8. Area A1.5	0.01	1.91	17.09	0.75				
153									
154	VM99-8. Area B1.5	0.01	1.96	17.23	0.91				
155									
156	VM99-8. Area E5.1	0.00	1.86	17.17	1.00				
157	VM99-8. Area E5.2	0.00	1.83	17.12	1.00				
158	VM99-8. Area E5.3	0.00	1.84	17.13	1.00				

	A	B	C	D	E	F	G	H	I
1	**Appendix I**								
2	**Olivine**								
3	**Label**	**Ox%(Na)**	**Ox%(Mg)**	**Ox%(Al)**	**Ox%(Si)**	**Ox%(Ca)**	**Ox%(Ti)**	**Ox%(Cr)**	**Ox%(Mn)**
4	fo83.1_1	0.01	43.62	0.01	39.07	0.00	0.00	0.06	0.30
5	fo83.1_2	0.01	43.68	0.02	38.71	0.00	0.01	0.03	0.29
6	fo83.1_3	0.00	43.52	0.01	39.12	0.00	0.00	0.01	0.27
7	VM99-16.Area B4.1	0.00	39.91	0.02	38.25	0.15	0.02	0.01	0.25
8	VM99-16.Area B4.2	0.01	40.04	0.02	37.99	0.16	0.03	0.04	0.23
9	VM99-16.Area B4.3	0.00	38.88	0.01	37.56	0.16	0.03	0.00	0.27
10	VM99-16.Area B4.4	0.01	29.66	0.50	36.93	0.52	0.06	0.02	0.26
11	VM99-16.Area B4.5	0.00	37.70	0.00	37.78	0.16	0.02	0.03	0.26
12	VM99-16.Area C1.1	0.00	41.88	0.00	38.08	0.12	0.01	0.00	0.22
13	VM99-16.Area C1.2	0.01	42.41	0.02	38.44	0.12	0.01	0.03	0.16
14	VM99-16.Area C1.3	0.01	41.59	0.00	37.88	0.13	0.01	0.04	0.18
15	VM99-16.Area C1.4	0.00	40.36	0.01	37.93	0.12	0.01	0.03	0.22
16	VM99-16.Area C2.1	0.03	36.97	0.02	36.99	0.14	0.02	0.00	0.29
17	VM99-16.Area C2.2	0.02	34.44	0.03	36.59	0.20	0.04	0.00	0.33
18	VM99-16.Area C2.3	0.01	30.61	0.01	35.66	0.20	0.05	0.00	0.44
19	VM99-16.Area C2.4	0.00	32.39	0.01	36.01	0.15	0.05	0.01	0.37
20	VM99-16.Area C3.1	0.01	35.81	0.00	36.56	0.16	0.04	0.09	0.32
21	VM99-16.Area C3.2	0.02	38.42	0.00	36.97	0.14	0.01	0.00	0.21
22	VM99-16.Area E1.1	0.00	42.54	0.01	38.26	0.11	0.01	0.02	0.17
23	VM99-16.Area E1.2	0.02	42.14	0.02	38.13	0.20	0.01	0.12	0.17
24	VM99-16.Area E1.3	0.02	38.48	0.01	37.22	0.14	0.02	0.03	0.24
25	VM99-16.Area E1.4	0.00	42.01	0.02	38.15	0.12	0.01	0.04	0.19
26	VM99-16.Area E1.5	0.00	40.08	0.01	37.69	0.12	0.04	0.00	0.23
27	VM99-25.Area C5.1	0.01	43.44	0.03	39.02	0.13	0.01	0.03	0.19
28	VM99-25.Area C5.2	0.02	43.25	0.03	38.74	0.13	0.00	0.00	0.17
29	VM99-25.Area C5.3	0.01	43.20	0.00	38.81	0.12	0.00	0.01	0.20
30	VM99-25.Area C5.4	0.00	42.32	0.03	38.25	0.12	0.01	0.00	0.24
31	**14-Nov**								
32	**Label**	**Ox%(Na)**	**Ox%(Mg)**	**Ox%(Al)**	**Ox%(Si)**	**Ox%(Ca)**	**Ox%(Ti)**	**Ox%(Cr)**	**Ox%(Mn)**
33	fo83.1_1	0.01	43.62	0.01	39.07	0.00	0.00	0.06	0.30
34	fo83.1_2	0.01	43.68	0.02	38.71	0.00	0.01	0.03	0.29
35	fo83.1_3	0.00	43.52	0.01	39.12	0.00	0.00	0.01	0.27
36	VM99-16.Area B4.1	0.00	39.91	0.02	38.25	0.15	0.02	0.01	0.25
37	VM99-16.Area B4.2	0.01	40.04	0.02	37.99	0.16	0.03	0.04	0.23
38	VM99-16.Area B4.3	0.00	38.88	0.01	37.56	0.16	0.03	0.00	0.27
39	VM99-16.Area B4.4	0.01	29.66	0.50	36.93	0.52	0.06	0.02	0.26
40	VM99-16.Area B4.5	0.00	37.70	0.00	37.78	0.16	0.02	0.03	0.26
41	VM99-16.Area C1.1	0.00	41.88	0.00	38.08	0.12	0.01	0.00	0.22
42	VM99-16.Area C1.2	0.01	42.41	0.02	38.44	0.12	0.01	0.03	0.16
43	VM99-16.Area C1.3	0.01	41.59	0.00	37.88	0.13	0.01	0.04	0.18
44	VM99-16.Area C1.4	0.00	40.36	0.01	37.93	0.12	0.01	0.03	0.22
45	VM99-16.Area C2.1	0.03	36.97	0.02	36.99	0.14	0.02	0.00	0.29
46	VM99-16.Area C2.2	0.02	34.44	0.03	36.59	0.20	0.04	0.00	0.33
47	VM99-16.Area C2.3	0.01	30.61	0.01	35.66	0.20	0.05	0.00	0.44
48	VM99-16.Area C2.4	0.00	32.39	0.01	36.01	0.15	0.05	0.01	0.37
49	VM99-16.Area C3.1	0.01	35.81	0.00	36.56	0.16	0.04	0.09	0.32
50	VM99-16.Area C3.2	0.02	38.42	0.00	36.97	0.14	0.01	0.00	0.21
51	VM99-16.Area E1.1	0.00	42.54	0.01	38.26	0.11	0.01	0.02	0.17
52	VM99-16.Area E1.2	0.02	42.14	0.02	38.13	0.20	0.01	0.12	0.17
53	VM99-16.Area E1.3	0.02	38.48	0.01	37.22	0.14	0.02	0.03	0.24
54	VM99-16.Area E1.4	0.00	42.01	0.02	38.15	0.12	0.01	0.04	0.19
55	VM99-16.Area E1.5	0.00	40.08	0.01	37.69	0.12	0.04	0.00	0.23
56	VM99-25.Area C5.1	0.01	43.44	0.03	39.02	0.13	0.01	0.03	0.19
57	VM99-25.Area C5.2	0.02	43.25	0.03	38.74	0.13	0.00	0.00	0.17
58	VM99-25.Area C5.3	0.01	43.20	0.00	38.81	0.12	0.00	0.01	0.20
59	VM99-25.Area C5.4	0.00	42.32	0.03	38.25	0.12	0.01	0.00	0.24
60	fo83.1	0.01	43.73	0.00	39.74	0.01	0.01	0.04	0.29
61	VM99-25. Area D5.1	0.02	43.44	0.04	39.42	0.12	0.00	0.02	0.23
62	VM99-25. Area D5.2	0.03	43.24	0.02	39.34	0.13	0.03	0.02	0.24
63	VM99-25. Area D5.3	0.03	42.92	0.04	39.49	0.14	0.02	0.04	0.26
64	**12-Jan**								
65	**Label**	**Ox%(Na)**	**Ox%(Mg)**	**Ox%(Al)**	**Ox%(Si)**	**Ox%(Ca)**	**Ox%(Ti)**	**Ox%(Cr)**	**Ox%(Mn)**
66	fo83.1	0.01	43.49	0.02	38.83	0.01	0.00	0.03	0.32
67	fo83.2	0.01	43.50	0.00	38.71	0.00	0.00	0.00	0.28
68	fo83.3	0.00	43.53	0.02	38.77	0.00	0.00	0.05	0.29

	A	J	K	L	M	N	O	P
1	**Appendix I**							
2	**Olivine**							
3	**Label**	**Ox%(Fe)**	**Ox%(Ni)**	**NbCat(O)**	**NbCat(Na)**	**NbCat(Mg)**	**NbCat(Al)**	**NbCat(Si)**
4	fo83.1_1	16.54	0.00	99.62	0.0006	1.6527	0.0003	0.9933
5	fo83.1_2	16.62	0.00	99.37	0.0004	1.6612	0.0005	0.9878
6	fo83.1_3	16.62	0.01	99.56	0	1.6498	0.0002	0.995
7	VM99-16.Area B4.1	21.05	0.12	99.77	0	1.5439	0.0007	0.9927
8	VM99-16.Area B4.2	21.09	0.11	99.71	0.0003	1.5513	0.0006	0.9875
9	VM99-16.Area B4.3	22.12	0.12	99.14	0	1.524	0.0002	0.9876
10	VM99-16.Area B4.4	26.85	0.08	94.88	0.0003	1.2422	0.0167	1.0375
11	VM99-16.Area B4.5	23.36	0.08	99.40	0	1.4804	0.0001	0.9955
12	VM99-16.Area C1.1	17.98	0.15	98.44	0	1.6205	0	0.9886
13	VM99-16.Area C1.2	17.01	0.16	98.38	0.0007	1.6333	0.0005	0.9931
14	VM99-16.Area C1.3	18.31	0.13	98.25	0.0003	1.6153	0	0.9871
15	VM99-16.Area C1.4	19.36	0.13	98.18	0.0002	1.5758	0.0004	0.9935
16	VM99-16.Area C2.1	23.98	0.08	98.52	0.0018	1.4726	0.0006	0.9884
17	VM99-16.Area C2.2	26.05	0.10	97.80	0.0011	1.3967	0.001	0.9956
18	VM99-16.Area C2.3	30.76	0.06	97.81	0.0008	1.2725	0.0003	0.9946
19	VM99-16.Area C2.4	28.66	0.06	97.73	0	1.3327	0.0004	0.994
20	VM99-16.Area C3.1	25.12	0.09	98.21	0.0007	1.4406	0.0001	0.9868
21	VM99-16.Area C3.2	21.66	0.09	97.52	0.0009	1.5297	0	0.9875
22	VM99-16.Area E1.1	17.05	0.13	98.30	0.0001	1.6403	0.0003	0.9899
23	VM99-16.Area E1.2	17.45	0.13	98.39	0.0009	1.6279	0.0006	0.9883
24	VM99-16.Area E1.3	21.60	0.10	97.87	0.001	1.5254	0.0004	0.9898
25	VM99-16.Area E1.4	17.45	0.16	98.16	0.0001	1.626	0.0006	0.9906
26	VM99-16.Area E1.5	20.18	0.12	98.49	0.0002	1.5668	0.0004	0.9886
27	VM99-25.Area C5.1	16.60	0.15	99.60	0.0003	1.6476	0.0009	0.9929
28	VM99-25.Area C5.2	16.80	0.15	99.31	0.0012	1.6479	0.0008	0.9902
29	VM99-25.Area C5.3	16.98	0.14	99.47	0.0003	1.6443	0	0.991
30	VM99-25.Area C5.4	18.16	0.12	99.25	0	1.6252	0.0011	0.9855
31	**14-Nov**							
32	**Label**	**Ox%(Fe)**	**Ox%(Ni)**	**total**	**NbCat(Na)**	**NbCat(Mg)**	**NbCat(Al)**	**NbCat(Si)**
33	fo83.1_1	16.54	0.00	99.62	0.0006	1.6527	0.0003	0.9933
34	fo83.1_2	16.62	0.00	99.37	0.0004	1.6612	0.0005	0.9878
35	fo83.1_3	16.62	0.01	99.56	0	1.6498	0.0002	0.995
36	VM99-16.Area B4.1	21.05	0.12	99.77	0	1.5439	0.0007	0.9927
37	VM99-16.Area B4.2	21.09	0.11	99.71	0.0003	1.5513	0.0006	0.9875
38	VM99-16.Area B4.3	22.12	0.12	99.14	0	1.524	0.0002	0.9876
39	VM99-16.Area B4.4	26.85	0.08	94.88	0.0003	1.2422	0.0167	1.0375
40	VM99-16.Area B4.5	23.36	0.08	99.40	0	1.4804	0.0001	0.9955
41	VM99-16.Area C1.1	17.98	0.15	98.44	0	1.6205	0	0.9886
42	VM99-16.Area C1.2	17.01	0.16	98.38	0.0007	1.6333	0.0005	0.9931
43	VM99-16.Area C1.3	18.31	0.13	98.25	0.0003	1.6153	0	0.9871
44	VM99-16.Area C1.4	19.36	0.13	98.18	0.0002	1.5758	0.0004	0.9935
45	VM99-16.Area C2.1	23.98	0.08	98.52	0.0018	1.4726	0.0006	0.9884
46	VM99-16.Area C2.2	26.05	0.10	97.80	0.0011	1.3967	0.001	0.9956
47	VM99-16.Area C2.3	30.76	0.06	97.81	0.0008	1.2725	0.0003	0.9946
48	VM99-16.Area C2.4	28.66	0.06	97.73	0	1.3327	0.0004	0.994
49	VM99-16.Area C3.1	25.12	0.09	98.21	0.0007	1.4406	0.0001	0.9868
50	VM99-16.Area C3.2	21.66	0.09	97.52	0.0009	1.5297	0	0.9875
51	VM99-16.Area E1.1	17.05	0.13	98.30	0.0001	1.6403	0.0003	0.9899
52	VM99-16.Area E1.2	17.45	0.13	98.39	0.0009	1.6279	0.0006	0.9883
53	VM99-16.Area E1.3	21.60	0.10	97.87	0.001	1.5254	0.0004	0.9898
54	VM99-16.Area E1.4	17.45	0.16	98.16	0.0001	1.626	0.0006	0.9906
55	VM99-16.Area E1.5	20.18	0.12	98.49	0.0002	1.5668	0.0004	0.9886
56	VM99-25.Area C5.1	16.60	0.15	99.60	0.0003	1.6476	0.0009	0.9929
57	VM99-25.Area C5.2	16.80	0.15	99.31	0.0012	1.6479	0.0008	0.9902
58	VM99-25.Area C5.3	16.98	0.14	99.47	0.0003	1.6443	0	0.991
59	VM99-25.Area C5.4	18.16	0.12	99.25	0	1.6252	0.0011	0.9855
60	fo83.1	16.57	0.01	100.41	0.0003	1.6414	0	1.0007
61	VM99-25. Area D5.1	16.77	0.16	100.22	0.0008	1.6374	0.0012	0.9968
62	VM99-25. Area D5.2	17.06	0.15	100.26	0.0014	1.6316	0.0007	0.996
63	VM99-25. Area D5.3	16.95	0.17	100.04	0.0015	1.6217	0.0011	1.0011
64	**12-Jan**							
65	**Label**	**Ox%(Fe)**	**Ox%(Ni)**	**total**	**NbCat(Na)**	**NbCat(Mg)**	**NbCat(Al)**	**NbCat(Si)**
66	fo83.1	16.73	0.00	99.43	0.0004	1.6533	0.0005	0.9904
67	fo83.2	16.58	0.00	99.08	0.0006	1.6585	0	0.9902
68	fo83.3	16.53	0.00	99.19	0	1.6575	0.0006	0.9903

	A	Q	R	S	T	U	V
1	**Appendix I**						
2	**Olivine**						
3	**Label**	**NbCat(Ca)**	**NbCat(Ti)**	**NbCat(Cr)**	**NbCat(Mn)**	**NbCat(Fe)**	**NbCat(Ni)**
4	fo83.1_1	0	0	0.0013	0.0064	0.3517	0
5	fo83.1_2	0	0.0002	0.0006	0.0063	0.3546	0.0001
6	fo83.1_3	0	0	0.0001	0.0058	0.3535	0.0002
7	VM99-16.Area B4.1	0.004	0.0003	0.0001	0.0054	0.4569	0.0025
8	VM99-16.Area B4.2	0.0043	0.0005	0.0009	0.0051	0.4585	0.0024
9	VM99-16.Area B4.3	0.0045	0.0005	0.0001	0.006	0.4864	0.0025
10	VM99-16.Area B4.4	0.0156	0.0012	0.0005	0.0062	0.6308	0.0019
11	VM99-16.Area B4.5	0.0045	0.0003	0.0007	0.0059	0.5148	0.0018
12	VM99-16.Area C1.1	0.0033	0.0003	0.0001	0.0048	0.3903	0.0032
13	VM99-16.Area C1.2	0.0034	0.0003	0.0007	0.0035	0.3675	0.0034
14	VM99-16.Area C1.3	0.0036	0.0001	0.0007	0.0039	0.399	0.0027
15	VM99-16.Area C1.4	0.0034	0.0002	0.0005	0.0049	0.4242	0.0026
16	VM99-16.Area C2.1	0.004	0.0004	0.0001	0.0065	0.5358	0.0018
17	VM99-16.Area C2.2	0.0059	0.0009	0	0.0075	0.5927	0.0022
18	VM99-16.Area C2.3	0.0061	0.001	0	0.0104	0.7175	0.0014
19	VM99-16.Area C2.4	0.0046	0.0011	0.0002	0.0088	0.6615	0.0013
20	VM99-16.Area C3.1	0.0047	0.0009	0.0019	0.0073	0.5669	0.0019
21	VM99-16.Area C3.2	0.0039	0.0001	0	0.0048	0.4839	0.002
22	VM99-16.Area E1.1	0.0032	0.0002	0.0003	0.0038	0.3688	0.0027
23	VM99-16.Area E1.2	0.0055	0.0003	0.0024	0.0037	0.3782	0.0027
24	VM99-16.Area E1.3	0.0041	0.0003	0.0007	0.0055	0.4804	0.0022
25	VM99-16.Area E1.4	0.0034	0.0003	0.0009	0.0041	0.379	0.0033
26	VM99-16.Area E1.5	0.0035	0.0008	0	0.0052	0.4426	0.0025
27	VM99-25.Area C5.1	0.0035	0.0001	0.0005	0.004	0.3533	0.003
28	VM99-25.Area C5.2	0.0035	0.0001	0	0.0037	0.3592	0.0031
29	VM99-25.Area C5.3	0.0034	0	0.0002	0.0044	0.3626	0.0028
30	VM99-25.Area C5.4	0.0032	0.0001	0	0.0051	0.3912	0.0025
31	**14-Nov**						
32	**Label**	**NbCat(Ca)**	**NbCat(Ti)**	**NbCat(Cr)**	**NbCat(Mn)**	**NbCat(Fe)**	**NbCat(Ni)**
33	fo83.1_1	0	0	0.0013	0.0064	0.3517	0
34	fo83.1_2	0	0.0002	0.0006	0.0063	0.3546	0.0001
35	fo83.1_3	0	0	0.0001	0.0058	0.3535	0.0002
36	VM99-16.Area B4.1	0.004	0.0003	0.0001	0.0054	0.4569	0.0025
37	VM99-16.Area B4.2	0.0043	0.0005	0.0009	0.0051	0.4585	0.0024
38	VM99-16.Area B4.3	0.0045	0.0005	0.0001	0.006	0.4864	0.0025
39	VM99-16.Area B4.4	0.0156	0.0012	0.0005	0.0062	0.6308	0.0019
40	VM99-16.Area B4.5	0.0045	0.0003	0.0007	0.0059	0.5148	0.0018
41	VM99-16.Area C1.1	0.0033	0.0003	0.0001	0.0048	0.3903	0.0032
42	VM99-16.Area C1.2	0.0034	0.0003	0.0007	0.0035	0.3675	0.0034
43	VM99-16.Area C1.3	0.0036	0.0001	0.0007	0.0039	0.399	0.0027
44	VM99-16.Area C1.4	0.0034	0.0002	0.0005	0.0049	0.4242	0.0026
45	VM99-16.Area C2.1	0.004	0.0004	0.0001	0.0065	0.5358	0.0018
46	VM99-16.Area C2.2	0.0059	0.0009	0	0.0075	0.5927	0.0022
47	VM99-16.Area C2.3	0.0061	0.001	0	0.0104	0.7175	0.0014
48	VM99-16.Area C2.4	0.0046	0.0011	0.0002	0.0088	0.6615	0.0013
49	VM99-16.Area C3.1	0.0047	0.0009	0.0019	0.0073	0.5669	0.0019
50	VM99-16.Area C3.2	0.0039	0.0001	0	0.0048	0.4839	0.002
51	VM99-16.Area E1.1	0.0032	0.0002	0.0003	0.0038	0.3688	0.0027
52	VM99-16.Area E1.2	0.0055	0.0003	0.0024	0.0037	0.3782	0.0027
53	VM99-16.Area E1.3	0.0041	0.0003	0.0007	0.0055	0.4804	0.0022
54	VM99-16.Area E1.4	0.0034	0.0003	0.0009	0.0041	0.379	0.0033
55	VM99-16.Area E1.5	0.0035	0.0008	0	0.0052	0.4426	0.0025
56	VM99-25.Area C5.1	0.0035	0.0001	0.0005	0.004	0.3533	0.003
57	VM99-25.Area C5.2	0.0035	0.0001	0	0.0037	0.3592	0.0031
58	VM99-25.Area C5.3	0.0034	0	0.0002	0.0044	0.3626	0.0028
59	VM99-25.Area C5.4	0.0032	0.0001	0	0.0051	0.3912	0.0025
60	fo83.1	0.0002	0.0001	0.0009	0.0063	0.3489	0.0002
61	VM99-25. Area D5.1	0.0033	0	0.0004	0.005	0.3546	0.0033
62	VM99-25. Area D5.2	0.0036	0.0005	0.0004	0.0051	0.3613	0.003
63	VM99-25. Area D5.3	0.0037	0.0003	0.0008	0.0055	0.3593	0.0035
64	**12-Jan**						
65	**Label**	**NbCat(Ca)**	**NbCat(Ti)**	**NbCat(Cr)**	**NbCat(Mn)**	**NbCat(Fe)**	**NbCat(Ni)**
66	fo83.1	0.0002	0	0.0007	0.007	0.3568	0
67	fo83.2	0	0	0	0.006	0.3546	0
68	fo83.3	0	0	0.0009	0.0063	0.3532	0

	A	B	C	D	E	F	G	H	I
2	**Olivine**								
3	**Label**	**Ox%(Na)**	**Ox%(Mg)**	**Ox%(Al)**	**Ox%(Si)**	**Ox%(Ca)**	**Ox%(Ti)**	**Ox%(Cr)**	**Ox%(Mn)**
69	VM99-26. Area B1.1	0.03	26.93	0.60	33.62	0.20	0.19	0.01	0.23
70	VM99-26. Area B1.2	0.00	39.65	0.02	35.09	0.10	0.00	0.01	0.23
71	VM99-26. Area B1.3	0.04	32.42	0.79	32.74	0.29	0.07	0.00	0.26
72	VM99-26. Area B1.4	0.00	38.21	0.34	35.65	0.14	0.05	0.00	0.22
73	VM99-26. Area B1.5	0.01	32.17	0.65	35.02	0.17	0.01	0.01	0.23

	A	J	K	L	M	N	O	P
2	**Olivine**							
3	**Label**	**Ox%(Fe)**	**Ox%(Ni)**	**NbCat(O)**	**NbCat(Na)**	**NbCat(Mg)**	**NbCat(Al)**	**NbCat(Si)**
69	VM99-26. Area B1.1	21.69	0.07	83.57	0.002	1.2607	0.0221	1.0559
70	VM99-26. Area B1.2	13.80	0.05	88.96	0	1.6738	0.0007	0.994
71	VM99-26. Area B1.3	16.54	0.09	83.24	0.0024	1.4895	0.0286	1.0091
72	VM99-26. Area B1.4	16.70	0.08	91.39	0	1.5899	0.0113	0.995
73	VM99-26. Area B1.5	18.86	0.07	87.20	0.0007	1.4166	0.0228	1.0347

	A	Q	R	S	T	U	V
2	**Olivine**						
3	**Label**	**NbCat(Ca)**	**NbCat(Ti)**	**NbCat(Cr)**	**NbCat(Mn)**	**NbCat(Fe)**	**NbCat(Ni)**
69	VM99-26. Area B1.1	0.0067	0.0045	0.0002	0.0061	0.5696	0.0018
70	VM99-26. Area B1.2	0.0032	0	0.0002	0.0056	0.327	0.0011
71	VM99-26. Area B1.3	0.0096	0.0017	0	0.0068	0.4264	0.0021
72	VM99-26. Area B1.4	0.0043	0.001	0	0.0051	0.3898	0.0018
73	VM99-26. Area B1.5	0.0054	0.0002	0.0002	0.0056	0.466	0.0016