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GEOLOGIC MAP OF THE EAST PART OF THE SAN FRANCISCO VOLCANIC FIELD, NORTH-CENTRAL ARIZONA

By

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INTRODUCTION

The geologic map of the east part of the San Francisco volcanic field (called the East map area) is one of five adjoining geologic maps (fig. 1) prepared under the Geothermal Research Program of the U.S. Geological Survey as a basis for interpreting the history of magmatic activity in the volcanic field. This map is a revision of an earlier one (Moore and Wolfe, 1976). Detail of pyroclastic and alluvial deposits has been reduced for clarity on this uncolored version, and eolian deposits, represented by numerous active dunes of basaltic ash, have been completely omitted. Small cinder cones developed over rootless vents on the basalt flow (Qbb) of vent 2019 have also been omitted. In addition, a few changes have been made in correlations of flows and vents. The stratigraphic classification has been modified because magnetic-polarity determinations and new K-Ar ages indicate that the physiographically defined Tappan and Woodhouse age groups (Moore and others, 1976) overlap significantly in age, and the rocks of those age groups are now assigned to the Brunhes or Matuyama Polarity Chronozones (Mankinen and Dalrymple, 1979).

The San Francisco field, which is largely Pliocene and Pleistocene in age, is in northern Arizona, just north of the broad transition zone between the Colorado Plateau and the Basin and Range province. It is one of several dominantly basaltic volcanic fields of late Cenozoic age situated near the southern margin of the Colorado Plateau. The East map area encompasses approximately 1,220 km^2.

The volcanic field contains rocks ranging in composition from basalt to rhyolite--the products of eruption through Precambrian basement rocks and approximately a kilometer of overlying, nearly horizontal, Paleozoic and Mesozoic sedimentary rocks. About 500 km^3 of erupted rocks cover about 5,000 km^2 of predominantly Permian and locally preserved Triassic sedimentary rocks that form the erosionally stripped surface of the Colorado Plateau in northern Arizona.

In the East map area, basalt, basaltic andesite and locally associated small dacite domes, and, in a few cases, andesite were extruded from numerous individual vents, each of which presumably erupted briefly and then became inactive. Such short-lived vents, represented mainly by cinder cones or tuff rings, are widely distributed over the map area, and their flows cover much of its surface. However, repeated eruption of andesite, dacite, and rhyolite domes and flows formed the O'Leary Peak eruptive center in the northwest part of the map area, and flows of andesite (Qa_1 and Qa_2) from the San Francisco Mountain stratovolcano entered the East map area from the west.

A northeastward progression of volcanism during the past 15 m.y., from central Arizona into the San Francisco volcanic field, is shown by the compilation of Luedke and Smith (1978). Although complicated in detail, a general northeastward to eastward progression of volcanic activity is also apparent within the San Francisco volcanic field. Thus, much of the eruptive activity of the East map area occurred late in the development of the San Francisco field, and the East map area includes the youngest volcanic rocks of the field. These youngest rocks were formed during the Sunset Crater eruption, which occurred within the past 1,000 years (Smiley, 1958).

A northeast-trending, faulted monocline occurs near Doney Mountain in the north-central part of the East map area, and a broad north- to northwest-trending anticline occurs at the east edge of the map area. Nearby volcanic rocks are not folded or faulted by either structure.

Northwest-trending normal faults of small throw occur in the southern and northwestern parts of the map area. The faults in the northwestern part transect basalt flows of Matuyama and Brunhes ages (Tmb, Qmb, and Qbb). The volcanic rocks are not faulted elsewhere in the East map area. However, local northwestward elongation and alignment of vent deposits, as shown for example by the fissure deposits of the Sunset Crater eruption (Qbsbf), indicate the presence of a northwest-trending fracture system that apparently localized some of the eruptive feeders.

MAPPING AND MAP CONVENTIONS

Boundaries of all rock units, including individually mapped lava flows and vent deposits, were traced in the field. Strict attention was paid to details of lithology as well as morphology in delimiting the units. Airfall pyroclastic sheet deposits and alluvial deposits are shown mainly where they obscure contact relationships or completely bury the underlying volcanic units making them unmappable. Wherever intermittent exposure and morphologic expression permit recognition of the underlying unit, that unit is shown instead of the pyroclastic or alluvial deposit. Additional detail on the distribution of pyroclastic and alluvial deposits is given by Moore and Wolfe (1976).

The geologic map (Map A) departs from conventional U.S. Geological Survey format in several ways in order to portray the extensive stratigraphic, chronologic, and lithologic information in a more readable manner. Individually mapped basalt, basaltic andesite, and andesite flows, vent deposits, and other pyroclastic units (the products of brief local eruptions) have been grouped into map units delimited on the bases of superposition and physiographic relationships supplemented by magnetic-polarity and absolute-age determinations. These map units are chronostratigraphic or polarity-chronostratigraphic units as defined by the North American Commission on Stratigraphic Nomenclature (1983). Within these chronostratigraphic units, boundaries are shown between adjacent flows because their individual lithologic characteristics and field relationships are important in interpreting the magmatic history of the individual vents and of the field as a whole. Except for these chronologically grouped flows, vent deposits, and other pyroclastic units, the map units are lithostratigraphic units.

Map B shows the basalt types, magnetic-polarity designations and sample localities, and the localities for all analyzed rock samples listed in tables 1-5.

The "Correlation of Map Units" is constructed using an absolute time scale for the volcanic units that combines the radiometric and paleomagnetic age data with the stratigraphic relations. The extrusive rocks exclusive of the major eruptive centers are portrayed together in the left-hand part of the correlation diagram. These units, including the chronostratigraphically grouped basalt, basaltic andesite and locally associated dacite, and the locally erupted isolated andesite, are described together in general order of increasing age. Extrusive rock units of the O'Leary Peak eruptive center as well as those originating to the west from the San Francisco Mountain stratovolcano are grouped by eruptive center and shown in the right-hand part of the correlation diagram. The descriptions of these map units in the "Description of Map Units" are also grouped by eruptive center.

Identification numbers assigned to vents (Map A) and to analyzed samples (Map B and tables 1-5) are based on the locations of vents and sample localities within the township and range system. The numbers consist of four digits that uniquely identify the section in which the sample or vent is located. If more than one sample or vent occurs within the section, the letters A, B, C, and so on are added as a suffix. The first digit of a sample or vent number designates the township by its second integer (that is, a sample or vent in Township 24 would have "4" as its first digit). The second digit designates the range. The third and fourth digits represent the section number, ranging from 01 to 36. Thus a vent or analyzed sample in T. 24 N., R. 9 E., sec. 6, would have an identification number of 4906. If two or more vents or samples occur in that same section, the second one in both cases is designated 4906A, the third 4906B, and so on. For R. 10 E., the second digit of the identification number is 0, and for R. 11 E. and R. 12 E., the letters A and B, respectively, are used for the second character in the identification.

AGE AND MAGNETIC-POLARITY DETERMINATIONS

K-Ar ages were determined from samples collected by P. E. Damon and associates (Laboratory of Isotope Geochemistry, University of Arizona), and many of the results have been given by Damon and others (1974). All ages have been corrected for the revised decay constants recommended by Steiger and Jäger (1977). In a few instances, a K-Ar age is inconsistent, within the range of one standard deviation, with accepted ages for other units in an established stratigraphic sequence; the inconsistent K-Ar age is not shown on the geologic map.

Paleomagnetic sampling in the East map area, unlike that for the rest of the volcanic field, where magnetic polarity was comprehensively surveyed, was limited to a small number of units selected largely to explore the relationship in time of basaltic rocks of Woodhouse age (Moore and Wolfe, 1976) to the Brunhes-Matuyama boundary. Polarity was determined by T. Onstott and others (K. L. Tanaka, written commun., 1979) from core samples obtained from flows and from oxidized agglutinate on cinder cones. Detailed paleomagnetic study of Holocene units related to the Sunset Crater eruption was undertaken by E. M. Shoemaker and D. E. Champion (D. E. Champion, written commun., 1985).

CLASSIFICATION OF BASALTS

The basalts of the San Francisco volcanic field have been divided according to a

semiquantitative scheme, utilizing thin sections, hand specimens, and outcrop characteristics, into eleven petrographic types, ten of which occur in the East map area. The classification is based on mineralogy and abundance of phenocrysts (1 mm or more in maximum diameter) and, in part, on the dominant mineralogy of the groundmass. Porphyritic basalts have generally one or more volume percent phenocrysts. Those classed as slightly porphyritic have generally less than one volume percent phenocrysts. Aphyric basalts contain essentially no phenocrysts. The basalt types of the San Francisco field are chemically intergradational and include basanitoid, picritic basalt, alkali-olivine basalt, hawaiite, and rare mugearite.

In some instances, a single eruption produced more than one basalt type or produced both basalt and basaltic andesite. Normally in these cases, the multiple types are intergradational within a single flow and were not mapped separately. However, in a few cases, as for example in the flow from vent 3920 (Qbab and Qbb), distinct petrographic boundaries were recognized in the field and were mapped within a single flow. We have attempted to document the lithologic variety of the basalts by using symbols on Map B for each basaltic map unit (multiple letters indicate composite units) and by showing locations of chemically analyzed samples; the analyses are listed in tables 1-5.

BASALT TYPES OF THE EAST MAP AREA

The following descriptions refer to the basalt types found in the East map area of the San Francisco volcanic field. Type k does not occur in this map area; it is reserved for use and described on the map of the southwest part of the volcanic field.

Picritic basalt (type a)--Basalt containing 12-22 percent subhedral to euhedral olivine phenocrysts. Clinopyroxene phenocrysts are common. Picritic basalt generally has a microcrystalline to intersertal groundmass of clinopyroxene, olivine, plagioclase, opaque oxides, and glass. Where associated with clinopyroxene-rich (type j) basalt, the picritic basalt has a mafic, pyroxene-rich groundmass. The group includes the most magnesian basalts of the San Francisco field. The average MgO content is 13.5 percent, and the average normative-olivine content is 24.3 percent.

Clinopyroxene-olivine-phyric basalt (type b)--Basalt containing about 1-35 percent phenocrysts of clinopyroxene and olivine. Pyroxene abundance is greater than or equal to olivine abundance. Plagioclase phenocrysts are normally absent or sparse, but a few basalts in this group contain common plagioclase phenocrysts. Groundmass is generally microcrystalline to intersertal in texture and contains plagioclase, clinopyroxene, olivine, opaque oxides, and glass. The clinopyroxene-olivine-phyric basalt is predominantly of alkali-olivine basalt composition.

Clinopyroxene-phyric basalt (type c)--Basalt containing about 1-20 percent clinopyroxene phenocrysts. Scattered olivine phenocrysts occur in some units. Plagioclase phenocrysts are normally rare or absent. Groundmass is microcrystalline, intersertal, or intergranular in texture and contains plagioclase, clinopyroxene, olivine, opaque oxides, and glass. Basalt with clinopyroxene phenocrysts is not included in this group when it has the distinctive granular, clinopyroxene-rich groundmass that distinguishes the clinopyroxene-rich basalt (type j). The clinopyroxene-phyric basalt is predominantly of alkali-olivine basalt composition.

Olivine-phyric basalt (type d)--Basalt containing about 1-12 percent subhedral to euhedral olivine phenocrysts. Scattered clinopyroxene phenocrysts are common. Plagioclase phenocrysts are normally rare although they are common in some olivine-phyric basalts. Groundmass contains variable amounts of plagioclase, clinopyroxene, olivine, opaque oxides, and glass; textures include microcrystalline, intersertal, intergranular, and subophitic. The olivine-phyric basalt is predominantly of alkali-olivine basalt composition.

Plagioclase-phyric basalt (type e)--Basalt containing about 1-25 percent plagioclase phenocrysts; groundmass and phenocryst plagioclase are commonly seriate. Scattered olivine and clinopyroxene phenocrysts may be present. Groundmass consists mostly of intersertal to intergranular aggregates of plagioclase, clinopyroxene, olivine, opaque oxides, and glass; plagioclase is commonly dominant. Range of compositions of the plagioclase-phyric basalt is similar to that of the aphyric (type h) basalt. The plagioclase-phyric basalt is predominantly of hawaiite composition.

Quartz basalt (type f)--Basalt containing ubiquitous (generally about 0.5 percent) quartz. Many basalts contain rare, commonly polycrystalline quartz grains, but those basalts are not included in this group. In quartz basalt, the quartz occurs as single crystals that range from spherical, rounded (detrital?) grains to irregular, angular fragments to nearly euhedral crystals. The quartz typically has a reaction rim composed of very fine grained clinopyroxene. Plagioclase phenocrysts are commonly intensely corroded or sieved. Otherwise the quartz basalt is similar to other basalt types and probably represents a contaminated counterpart of them. Quartz basalt is slightly enriched in SiO_2; normative quartz averages 0.5 percent and ranges to as much 3.3 percent.

Microporphyritic olivine basalt (type g)--Basalt containing about 1-10 percent olivine microphenocrysts (less than or equal to 1 mm) in

an intersertal to intergranular groundmass of plagioclase, clinopyroxene, olivine, opaque oxides, and glass. The composition coincides in part with the compositions of the mafic porphyritic basalt types (b, c, d); however, those types have slightly higher average values of CaO or MgO or both than does the microporphyritic olivine basalt. The microporphyritic olivine basalt is predominantly of alkali-olivine basalt composition.

Aphyric basalt (type h)--Intersertal to subophitic basalt composed of plagioclase, clinopyroxene, olivine, and opaque oxides, with or without glass; plagioclase is commonly dominant. Some of the most plagioclase-rich are trachytic in texture. Compositional range is nearly identical to that of the plagioclase-phyric basalt (type e). The aphyric basalt is predominantly of hawaiite composition.

Slightly porphyritic basalt (type i)--Basalt containing less than 1 percent phenocrysts of olivine, clinopyroxene, and (or) plagioclase in an intersertal to intergranular groundmass of plagioclase, clinopyroxene, olivine, and opaque oxides, with or without glass. Slightly porphyritic basalt includes both alkali-olivine basalt and hawaiite compositions.

Clinopyroxene-rich basalt (type j)--Basalt distinguished by a granular clinopyroxene-rich groundmass in which clinopyroxene greatly exceeds plagioclase in volume, opaque oxides and olivine are subordinate, and glass is minor. Texture ranges from aphyric to porphyritic; most of the clinopyroxene-rich basalts contain phenocrysts or microphenocrysts of clinopyroxene and olivine. Pyroxene phenocrysts are commonly green and arranged in distinctive crude rosette-like clusters. Clinopyroxene-rich basalts are low in Al_2O_3 (average is approximately 14.5 percent), and include the most SiO_2-poor (average approximately 46.4 percent) and the most CaO-rich (average approximately 12.8 percent) basalts in the San Francisco field. Many of these basalts are basanitoids. Average normative nepheline content is 5.5 percent; maximum value is 12.3 percent.

DESCRIPTION OF MAP UNITS

[Basalt types described in "Basalt Types" section. K-Ar ages have been corrected for the revised decay constants recommended by Steiger and Jäger (1977). Ma, mega-annum (10^6 years). Compositional analyses are given in tables 1-5, and all cited major-oxide values are from adjusted analyses (table 3)]

SURFICIAL DEPOSITS OF QUATERNARY AGE

Qal ALLUVIAL AND COLLUVIAL DEPOSITS (HOLOCENE AND PLEISTOCENE)--Sand, silt, gravel, and boulders; consists predominantly of reworked cinders over most of map area. In western part of map area, the unit includes glacial outwash, the Pleistocene Sinagua Formation of Updike and Péwé (1970), and dissected alluvial fan deposits on north side of O'Leary Peak. In northern part, it includes local dissected gravel deposits composed largely of intermediate and silicic volcanic rock fragments

EXTRUSIVE ROCKS OF QUATERNARY AND TERTIARY AGE EXCLUSIVE OF MAJOR ERUPTIVE CENTERS

BASALT OF LATEST HOLOCENE (YOUNGEST BRUNHES) AGE

Basaltic rocks of the Sunset Crater eruption

Qbsbf Fissure deposits--Red and black cinders and spatter that mark a line of vents extending about 10 km east-southeast from Sunset Crater through vent 2902. Unit overlies all or most of the pyroclastic sheet deposit of Sunset Crater eruption (Qbsbp). Paleomagnetic studies indicate that deposits at vents 2902 and 3929 were formed about 1100 A.D. (D. E. Champion, written commun., 1985). Deposits adjacent to the southeast flank of Sunset Crater (vent 3824) are among the youngest products of the Sunset Crater eruption (Holm and Moore, in press) and probably formed about 1180 A.D. or later

Qbsb Flows and cinder cone--Flows, fresh, dark-gray aa and slab pahoehoe erupted from vent 3824 (Sunset Crater) and an additional flow erupted from vent 2902, which is about 10 km southeast of Sunset Crater; flows are 2-8 m thick at their margins. Sunset Crater cone is steep, undissected, composed mostly of fresh, dark-gray, scoriaceous cinders and scattered

bombs, but upper part consists of yellow to red altered and cemented cinders. Unit consists of microporphyritic olivine basalt (type g).

The vent 2902 flow largely or entirely underlies the pyroclastic sheet deposit (Qbsbp), and any vent deposits formed at time flow was erupted have been buried by the pyroclastic sheet deposit and the younger fissure deposit (Qbsbf) of vent 2902. The Kana a flow is both overlain and underlain by airfall cinders of the pyroclastic sheet deposit (Qbsbp), and the Bonito flow is largely younger, although black airfall cinders as well as oxidized scoria mantle it locally. Tree-ring dating indicates that eruptions related to Sunset Crater began between 1064 and 1065 A.D. (Smiley, 1958). Detailed paleomagnetic studies by E. M. Shoemaker and D. E. Champion (D. E. Champion, written commun., 1985) suggest that eruptive activity continued until at least approximately 1180 A.D. They infer approximate dates of 1065 A.D. for eruption of the Kana a flow, 1180 A.D. for the Bonito flow, and 1220 A.D. for eruption--or perhaps for the final stages of formation of hematite by fumarolic alteration--of the red cinders at the crest of Sunset Crater

Qbsbp Pyroclastic sheet deposit--Airfall ash and lapilli from the eruption of Sunset Crater form an extensive blanket of stratified, fresh, black and subordinate red cinders that mantles preexisting landscape. Near Sunset Crater, blanket may be 10 m or more thick. It has not been dissected by running water but, locally, it has been partly eroded or completely removed by wind. Deposit contains local ultramafic, gabbroic, granulitic, and sedimentary xenoliths. It overlies the 2902 flow and is largely older than the Kana a flow. However, younger cinders that bury the proximal part of the Kana a flow near Sunset Crater are included with the pyroclastic sheet. Where discontinuous exposures permit mapping of the underlying units, the pyroclastic sheet is not shown. Unlike all older pyroclastic deposits of the San Francisco volcanic field, this one has no significant oxidized soil zone

EXTRUSIVE ROCKS OF HOLOCENE(?) AND YOUNGER PLEISTOCENE (YOUNGER BRUNHES) AGE

Qbyb Basalt flows and vent deposits--Flows, dark-gray, fresh, 2-12 m thick at edges, mostly aa with rough surfaces on which much of the original microrelief is preserved; vent deposits, mostly steep-sided, undissected, sharp-rimmed cinder cones composed of dark-gray to red, bedded cinders, and some bombs and blocks; deposit of vent 5914 includes yellowish-brown basaltic tuff; cone surfaces are underlain by a distinct oxidized soil zone and are yellowish brown, brown, or reddish brown. Unit includes porphyritic and microporphyritic basalt types (b, c, d, e, i, g); scattered ultramafic xenoliths occur locally.

Flows and vent deposits of vents 3034, 3036 (Merriam Crater), 3036A, and 3036B are composed of similar microporphyritic olivine basalt (type g) and probably represent a closely related series of eruptive events. All flows from vents 3034 and 3036 are at least partly mantled by the local pyroclastic sheet deposit (Qbybp); only the two flows of vent 3036B completely overlie the deposit. Vent deposits at vents 3034 and 3036B are unique. Deposit of vent 3034 consists of dark-gray, bedded spatter that forms an elongate, outward-dipping spatter rampart or, locally, nested ramparts; where weathered, spatter is yellowish brown to dark brown and, in places, delicate driblet textures are preserved. Deposit of vent 3036B consists of a series of thin, approximately horizontal basalt layers and thin scoria interbeds that form a steep-sided, flat-topped mound 30-40 m high; adjacent flows to northeast and southwest were supplied

through lava channels that now terminate upstream at the base of the mound suggesting that they had been fed by an overflowing lava pond located where the mound now stands.

K-Ar age of a flow from vent 3034 or 3036 (Merriam Crater) is 0.15±0.03 Ma; flow dammed the Little Colorado River and extended 24 km down the canyon

Qbybp Basalt pyroclastic sheet deposits--Airfall ash and lapilli, usually black, locally red, as much as several meters thick; undissected by running water although locally eroded by wind; forms broad, smooth-surfaced deposits over large areas and also occurs in the lee of some mesas and lava-flow edges. Upper part is usually brown due to soil formation, but a lag of black or, locally, red cinders is common on the surface. Unit was erupted from vents related to Merriam Crater (vents 3036 and 3036A), vent 3006, vents 5914 and 5923, and possibly vent 2008. Pyroclastic deposit is not shown where discontinuous exposures are sufficient for delineation of underlying units

Qbyab Basaltic andesite flows and cones--Flows of vents 2929 (O'Neill Crater) and 4920 (Strawberry Crater), dark-gray, blocky, rough, undissected, 3-30 m thick at margins; cones, composed of dark-gray to red spatter and cinders, steep, sharp-rimmed, crescentic in plan with deep breach through which flow exited. Basaltic andesite contains phenocrysts of plagioclase (commonly sieved or corroded), olivine, clinopyroxene, and hypersthene in a groundmass of the same minerals plus opaque oxides, rare apatite, and brown glass. Scattered granulite, gabbro, and ultramafic xenoliths occur locally, and the spatter of the cones contains rare inclusions of dacite vitrophyre identical in appearance to that of the dacite domes (Qbyd).

O'Neill Crater basaltic andesite (analyses 1904B, 2929B, -D, -J, -L, 2933A) shows chemical inhomogeneity; SiO_2 ranges from about 54 to 59 percent. The basalt flow from the west flank of O'Neill Crater (Qbyb, analysis 2929G) has approximately 52 percent SiO_2 and is transitional from basalt to basaltic andesite. It contains scattered phenocrysts and microphenocrysts of olivine and clinopyroxene and rare sieved plagioclase.

In addition to basaltic andesite, spatter at both O'Neill and Strawberry Craters consists locally of relatively mafic basalt (analyses 2929, 2929K, 4920C) of clinopyroxene-rich (j) and clinopyroxene-phyric (c) types. Each cone also contains a small central dome of dacite (Qbyd) erupted after the cones were built and the lava flows were extruded.

K-Ar ages for spatter from O'Neill Crater (vent 2929) and the flow from Strawberry Crater (vent 4920) are 0.055±0.014 and 0.051±0.046 Ma, respectively

Qbyd Dacite domes--Small domes of dacite vitrophyre extruded within the breached cones of O'Neill Crater (vent 2929) and Strawberry Crater (vent 4920) after eruption of the basaltic andesite (Qyab). Dacite contains phenocrysts of corroded plagioclase, orthopyroxene, and minor clinopyroxene in a matrix of the same minerals plus alkali feldspar and opaque oxides set in clear to brown glass. Composition of Strawberry Crater dome is represented by analysis 4920A. O'Neill Crater dome (analysis 2929E) and related airfall dacite fragments (analyses 2929H, -I) show compositional range (SiO_2 approximately 64.5 to 68 percent). Inclusions of basaltic andesite spatter occur in the dacite domes. Occurrence of vitrophyre inclusions in the earlier erupted basaltic andesite spatter indicates that the vitrophyre may have existed as a segregation in the magma chamber during eruption of the basaltic andesite. A large partially melted granulite

xenolith (analysis 4920B) was collected from the dacite at Strawberry Crater

EXTRUSIVE ROCKS OF YOUNGER PLEISTOCENE (OLDER BRUNHES) AGE

Qbb Basalt flows and cinder cones--Flows, medium- to dark-gray, locally grayish-red to red, yellowish- to dark-brown where weathered, 1-60 m thick, undissected, surfaces smoothed by weathering and by mantling of surface irregularities by alluvial, eolian, and pyroclastic materials; erosion has not exposed rocks directly underlying the flows except near the Little Colorado River in northeastern part of map area, where the flows rest on easily eroded siltstone and sandstone of the Moenkopi Formation (included in unit PPs). Cones consist predominantly of cinders but commonly include bombs and agglutinated spatter; color is mostly dark gray to red where fresh, yellowish brown where weathered. Yellow-brown palagonitic tuff or hydrothermally altered cinders and ash occur locally in the cinder cones of vents 2019, 2A18, and 3018. Although most cones are not significantly dissected except for local gullying, they are generally more rounded than their younger counterparts of units Qbyb and Qbsb and are commonly bordered by distinct aprons of colluvium. Unit contains basalt of all lithologic types (a-j); ultramafic, gabbroic, granulitic, and sedimentary xenoliths occur locally.

Correlation of these rocks with the older Brunhes is based on limited polarity data and on morphologic, physiographic, and stratigraphic evidence of relative age in combination with K-Ar ages that range from 0.59±0.09 Ma (3809A flow) to 0.17±0.06 Ma (2019 flow)

Qbbp Basalt pyroclastic sheet deposits--Local deposits of scoriaceous ash and lapilli, commonly red, hummocky, as much as several meters thick, usually associated with nearby cinder cones; may include some scoriaceous flow tops

Qbbt Basaltic tuff--Tuff, yellowish-orange, crudely sorted, well-bedded, commonly with planar beds and low-angle crossbedding suggestive of surge deposition, locally forms outward-dipping rings or partial rings that are generally of low relief (for example vent 3027). Tuff contains fine quartz grains possibly derived from the Coconino Sandstone, crystals or fragments of plagioclase, clinopyroxene, and olivine, basalt cinders, basalt fragments, and fragments of silicified Kaibab Formation and, locally, sandstone of the Moenkopi Formation, all in a palagonitic matrix. Where age relations can be determined, the tuff deposits are younger than basalt of older Pleistocene (Matuyama) age (Qmb). Some rings have been invaded or overlapped by basalt flows of younger Pleistocene (older Brunhes) age (Qbb)

Qbab Basaltic andesite flows and cinder cones--Flows, blocky, 10-50 m thick, and cinder cones (vents 2905, 3835, 3920, 3931) in southwestern part of map area, all largely covered by the pyroclastic sheet deposit of the Sunset Crater eruption (Qbsbp). Basaltic andesite contains phenocrysts of sieved or corroded plagioclase, clinopyroxene, hypersthene, and olivine in a groundmass of the same minerals plus opaque oxides and brown glass. Quartz xenocrysts with reaction rims of clinopyroxene occur rarely. Xenoliths of pyroxenite, gabbro, and granulite are common in the cone and flow of vent 3920. Basalt and basaltic andesite were both erupted from vent 3920 and may be coeval. K-Ar age, flow from vent 3835, 0.55±0.12 Ma

Qba Andesite cinder cones and dome and flow of vent 3922--Cinder cones of vents 2805 and 3935 and dome and related flow erupted at basalt (Qbb) vent 3922, all in southwestern part of map area.

Cinder cone of vent 2805 consists of cinders of fine-grained andesite with quartz xenocrysts and scattered, small

phenocrysts of sieved plagioclase in a glass-rich groundmass containing plagioclase, olivine, hypersthene, opaque oxides, and rare hornblende. For composition see analysis 2805.

Cinders of vent 3935 and andesite dome and flow of vent 3922 contain phenocrysts of sieved plagioclase, hypersthene, clinopyroxene, hornblende, and, in the rocks from vent 3922, apatite, biotite, and olivine, in glass-rich to microcrystalline matrices containing plagioclase, pyroxene, olivine, and opaque oxides. Compositions of vent 3935 andesite (analysis 3935) and vent 3922 andesite (analyses 3915, 3915A) are nearly identical

BASALT OF OLDER PLEISTOCENE (MATUYAMA) AGE

Qmb Basalt flows--Flows, dark-gray, yellowish-brown to brown on weathered surfaces, mostly massive, approximately 2-30 m thick, but mostly <15 m thick at margins. Flows extend out from beneath the younger volcanic rocks, which have apparently buried the vents. Upper surfaces are smooth and commonly nearly flat. Flows cap prominent mesas formed by erosion of the underlying Moenkopi Formation near east and north edges of map area. Slightly porphyritic basalt (type i) is predominant; plagioclase-phyric, microporphyritic, and aphyric basalts (types e, g, and h) also occur. Polarity, where determined, is reversed, except for two normally polarized flows capping high mesas east of Woodhouse Mesa. K-Ar age of one of these is 0.85±0.12 Ma; other K-Ar ages are 1.07±0.15 and 1.51±0.28 Ma

BASALT OF PLIOCENE (MATUYAMA) AGE

Tmb Basalt flow--Flow, dark-gray, brown on weathered surfaces, mostly massive, smooth-surfaced, 5-20 m thick, exposed in northwestern part of map area where it caps low mesas formed by erosion of underlying sedimentary rocks (Ps). Basalt is plagioclase-phyric (type e); for composition, see analyses 5801A, -D (SP Mountain map area). Outcrop in northwesternmost corner of map area represents a lobe of the same flow; the lobe continues northeast and, near its terminus, caps a mesa approximately 200 m above the nearby bed of the Little Colorado River; K-Ar age of lobe is 2.43±0.32 Ma

EXTRUSIVE ROCKS OF QUATERNARY AGE OF MAJOR ERUPTIVE CENTERS

O'Leary Peak

DOMES, FLOWS, AND PYROCLASTIC DEPOSITS OF YOUNGER PLEISTOCENE (OLDER BRUNHES) AGE

Qdmd Dacite flow of Deadman Mesa--Flow, dark-gray to dark-brown, broad, flat-topped, ≤90 m thick at margins; contains plagioclase, hypersthene, and rare apatite microphenocrysts in a glassy to cryptocrystalline matrix with abundant plagioclase microlites. Flow is younger than dacite obsidian flow north of O'Leary Peak (Qodo) and andesite flow of O'Leary Peak (Qoaf), and is overlain by basaltic andesite erupted from Strawberry Crater (vent 4920, Qbyab). K-Ar age 0.17±0.04 Ma

Qdmdv Vent facies of dacite flow of Deadman Mesa--Ridge of oxidized dacite trending approximately north at west margin of dacite flow of Deadman Mesa (Qdmd). Interpreted as lava erupted along a fissure from which the lava flow (Qdmd) was fed

Qodo Dacite obsidian flow north of O'Leary Peak--Flow, broad, ≤90 m thick at margins, composed of flow-banded obsidian that is partly devitrified; flow top is pumiceous, slopes steeply northeastward toward flow terminus. Dacite contains scattered microphenocrysts of plagioclase and hypersthene, and rare amphibole and biotite(?), which are largely altered to opaque oxide, in a glassy to cryptocrystalline groundmass with scattered fayalitic olivine and abundant aligned plagioclase microlites. For composition see analyses 3802C, 3803D, and

4836C. Flow overlies dacite dome of O'Leary Peak (Qodd) and is probably older than dacite of Deadman Mesa (Qdmd)

Qodov Vent facies of dacite obsidian flow north of O'Leary Peak--Oxidized dacite that forms a high-standing ridge along west edge of the dacite obsidian flow (Qodo). In part, unit probably coincides with a fissure along which lava flow (Qodo) was fed

Qorr Rhyolite dome of Robinson Crater--Dome of flow-banded obsidian and cryptocrystalline rhyolite; contains scattered microphenocrysts of plagioclase, biotite, and fayalitic olivine in a hyalopilitic to cryptocrystalline groundmass with abundant feldspar microlites. Dome is largely mantled by pyroclastic material consisting of angular fragments of obsidian, pumice, and flow-banded rhyolite of Robinson Crater as well as fragments of dacite dome of O'Leary Peak (Qodd). For composition of rhyolite see analysis 3809B. Rhyolite is younger than andesite flow of O'Leary Peak (Qoaf) and dacite dome of O'Leary Peak (Qodd)

Qoap Andesite pyroclastic deposits of O'Leary Peak--Scoria, red, crudely bedded, on south and west flanks of O'Leary Peak; includes abundant fragments of dacite dome of O'Leary Peak (Qodd) and scattered fragments of andesite flow of O'Leary Peak (Qoap) as well as xenoliths of microdiorite composed of intergrown plagioclase laths and acicular amphibole. The andesite scoria contains abundant phenocrysts and microphenocrysts of plagioclase and amphibole, scattered phenocrysts of hypersthene and olivine, and scattered quartz xenocrysts in a glassy groundmass with plagioclase microlites; for composition see analyses 3810B, -C, -F

Qod Dacite flow north of O'Leary Peak--Flow, poorly exposed, of small areal extent, adjacent to west flank of vent facies of dacite obsidian flow (Qodov); contains abundant plagioclase phenocrysts and scattered phenocrysts of quartz, hypersthene, and amphibole (largely altered to opaque oxide) in a glassy to cryptocrystalline groundmass with abundant plagioclase microlites and opaque oxides, scattered hypersthene, and rare apatite. For composition see analysis 4834. Flow is probably older than dacite obsidian flow (Qodo) and its vent facies (Qodov)

Qodd Dacite domes of O'Leary Peak--Two adjacent domes of dacite porphyry, light-gray, locally yellowish-brown to reddish-brown, massive; contains phenocrysts and microphenocrysts of sanidine (occasionally mantled with plagioclase), plagioclase, altered amphibole, quartz, hypersthene, biotite, and rare allanite in a light-gray to light-brown felsitic groundmass of similar mineralogy plus opaque oxides. For composition see analysis 3810D.

Dacite contains rare xenoliths of andesite flow of O'Leary Peak (Qoaf) and abundant red or gray microdiorite xenoliths (analyses 3810E, 3811C) with scattered plagioclase and rare clinopyroxene phenocrysts in a mesh of plagioclase and acicular amphibole.

Northwest dome is deeply gullied on its north slope, where the dacite porphyry is unusually decomposed, possibly because of hydrothermal alteration. Elsewhere the domes are undissected.

K-Ar age, northwest dome, 0.25±0.04 Ma

Qobc Breccia collar of O'Leary Peak--Breccia or megabreccia composed of rocks older than dacite dome of O'Leary Peak (Qodd) that were apparently pushed aside by and spilled from the dacite dome during its emplacement. Unit is poorly exposed; includes fragments of Mississippian Redwall Limestone, Lower Permian and Pennsylvanian Supai Formation, Lower Permian Coconino Sandstone and Kaibab Formation, and Cenozoic basalt. Fragments of various types are mixed with each other and with

fragments of dacite porphyry (Qodd). However, fragments of older rocks (Redwall Limestone) tend to be concentrated nearer the dome and fragments of younger rocks (Kaibab Formation, basalt) farther from the dome

Qoaf — Andesite flow of O'Leary Peak--Flow, dark-gray, grayish-brown where weathered, massive to blocky, 15-60 m thick at margin, top irregular with numerous spines $\leq$30 m high, partly mantled by pyroclastic deposits related to the rhyolite dome of Robinson Crater (Qorr) and unmapped alluvium from erosion of dacite domes of O'Leary Peak (Qodd). Andesite contains phenocrysts of plagioclase, hypersthene, amphibole, clinopyroxene, biotite (commonly altered to opaque oxides), and, rarely, alkali feldspar, and scattered xenocrysts of quartz with reaction rims of clinopyroxene; all are in a groundmass of plagioclase, pyroxene, opaque oxides, and brown glass. For composition see analyses 4833 and 4834A. Microdiorite xenoliths are abundant. Analysis 3805 represents the composition of a light-gray, vesicular microdiorite xenolith containing scattered plagioclase phenocrysts in a mesh of plagioclase and acicular amphibole and minor amounts of opaque oxides, clinopyroxene, and olivine. The andesite flow is overlain by the dacite domes of O'Leary Peak (Qodd), dacite flow of Deadman Mesa (Qdmd), rhyolite dome of Robinson Crater (Qorr), and the basalt cinder cone (Qbb) of vent 4833

San Francisco Mountain

ANDESITE FLOWS OF YOUNGER PLEISTOCENE (OLDER BRUNHES) AGE

Qa_2 — Younger andesite flows of San Francisco Mountain--Extensive flow $\leq$60 m thick at Cedar Ridge in northwest part of map area and local flow that crops out at west edge of map area about 8 km southwest of O'Leary Peak. Andesite contains phenocrysts of plagioclase and olivine in an intersertal groundmass of plagioclase, clinopyroxene, olivine, opaque oxides, and brown interstitial glass. On petrographic grounds and on the basis of composition (analyses 3833, 4802, and, in Central map area, 4818) these flows are assigned to the younger andesite of San Francisco Mountain. The youngest known flow of that unit, capping Humphreys Peak (Central map), has a K-Ar age of 0.43$\pm$0.03 Ma

Qa_1 — Older andesite flow of San Francisco Mountain--Flow, exposed locally at west edge of map area about 8 km southwest of O'Leary Peak; consists of porphyritic andesite with phenocrysts of plagioclase, clinopyroxene, hypersthene, and opaque oxides in a feldspathic glassy to cryptocrystalline groundmass. On bases of petrography and composition (analysis 3832), unit is assigned to older andesite of San Francisco Mountain, most of which is magnetically normal and of probable Brunhes age

PUMICE OF OLDER PLEISTOCENE (MATUYAMA) AGE

Qsfp — Pumice of San Francisco Mountain--White to light-gray pumice in northwest corner of map area, <1 m thick. For composition see analysis 5828B (SP Mountain map). Equivalent pumice exposed in nearby pits in the SP Mountain map area gives a fission-track age of 0.80$\pm$0.11 Ma (C. W. Naeser and G. A. Izett, written commun., 1975)

SEDIMENTARY ROCKS OF TRIASSIC AND LOWER PERMIAN AGE

TRPs — MOENKOPI FORMATION (MIDDLE? AND LOWER TRIASSIC), KAIBAB FORMATION (LOWER PERMIAN), AND TOROWEAP FORMATION AND COCONINO SANDSTONE (LOWER PERMIAN), UNDIVIDED--Red sandstone, siltstone, and minor shale and conglomerate of the Moenkopi Formation; sandy dolomitic limestone and minor sandstone and siltstone of the Kaibab Formation; and sandstone of the Toroweap Formation and

Coconino Sandstone, which is exposed in the Little Colorado River valley north of Grand Falls and in a deep canyon north of Doney Mountain (vent 5914). Volcanic rocks near southern edge of map area overlie the Kaibab Formation, whereas the mesa-capping flows of Matuyama age (Qmb, Tmb) near eastern and northern edges of map area mainly overlie the Moenkopi Formation

ANALYTICAL DATA

Tables 1-5 present chemical data for rocks in the East map area.

Table 1 lists general information about each analyzed rock.

Table 2 lists the complete analyses of major oxides in weight percent, the laboratory numbers, and the analysts.

Table 3 lists the major oxides normalized to 100 percent after subtraction of all analyzed water and CO_2, subtraction of sufficient CaO to combine with CO_2 in normative calcite, and adjustment of the FeO/Fe_2O_3 ratio.

The normative mineralogy of the volcanic rocks is sensitive to the proportions of FeO and Fe_2O_3. Therefore, the FeO/Fe_2O_3 ratio was adjusted in order to minimize the effect of oxidation of iron due to weathering or to other alteration and presumably brings the adjusted FeO/Fe_2O_3 value for most rocks closer to the original magmatic value. The adjusted iron ratio was computed from an equation for the least-squares fit through 15 points representing the least-oxidized 15 of 599 rocks from the entire volcanic field in an FeO/Fe_2O_3 versus SiO_2 diagram (fig. 2; an additional two points representing unusually high analyzed FeO/Fe_2O_3 were not included in controlling the line). The equation for the line, which gives adjusted FeO/Fe_2O_3 of approximately 5 in basalts and 2.5 in rhyolites, is:

$$FeO/Fe_2O_3=9.627-0.0921xSiO_2 \quad .$$

Table 4 lists the CIPW normative minerals calculated for each of the analyses in table 3.

Table 5 lists the trace-element analyses for the map area.

The major oxides for most of the rocks were determined in U.S. Geological Survey laboratories in Menlo Park, Calif., Washington, D.C., Reston, Va., and Flagstaff, Ariz. The analyses done at Menlo Park (lab. nos. with prefix M) were performed primarily by X-ray fluorescence spectroscopy. Analyses done at Flagstaff (lab. nos. without prefix) were performed by the rapid-rock procedure described by Shapiro and Brannock (1962) supplemented by atomic absorption. Analyses done at Washington (lab. nos. with prefix W) were performed by the rapid-rock procedures of Shapiro (1967, 1975). Analysis for sample 3802B (lab. no. R7) was reported by Robinson (1913, p. 117). Trace-element analyses were conducted by quantitative X-ray spectroscopy, emission spectroscopy, and neutron-activation methods.

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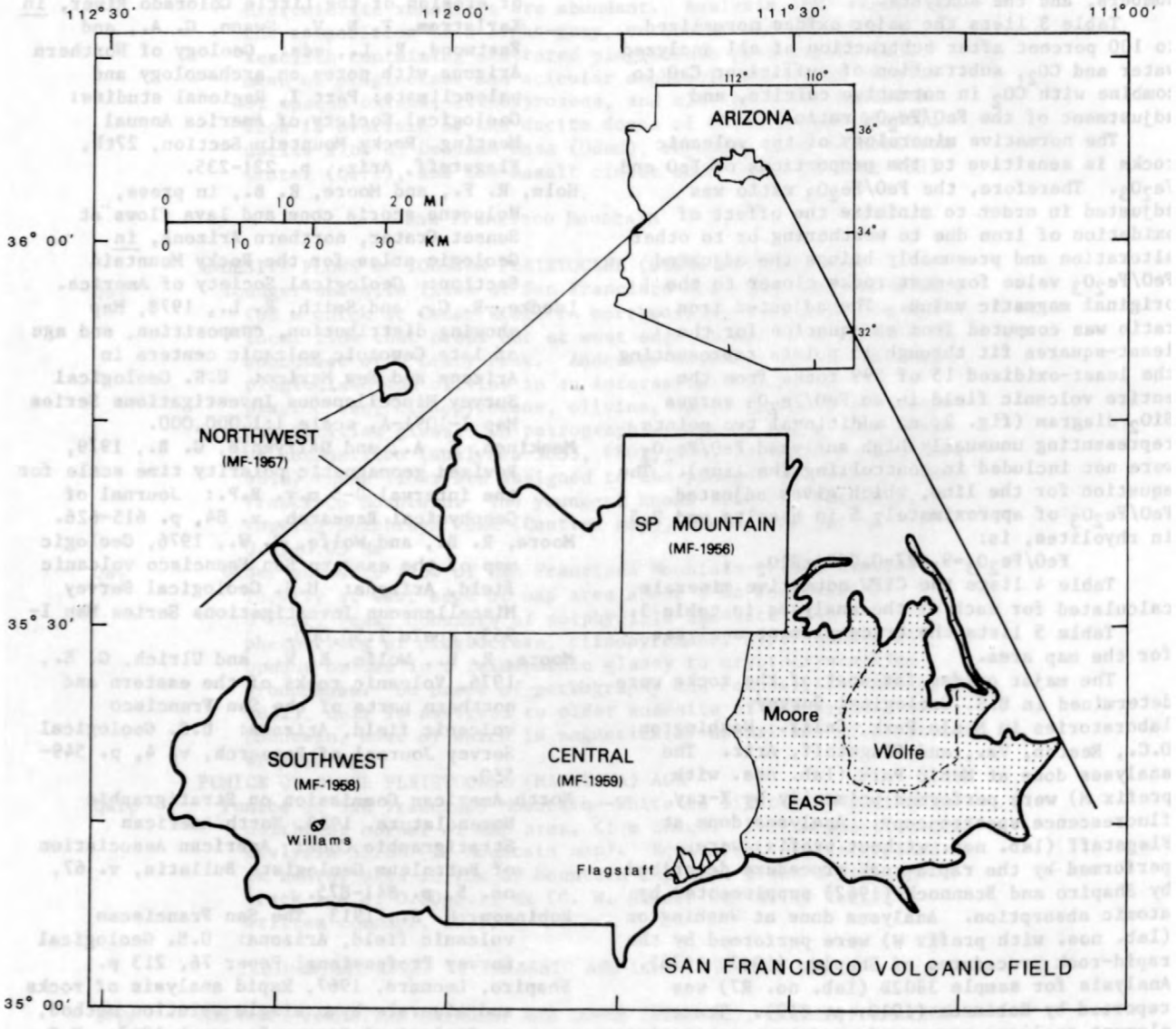

FIGURE 1. Index map showing (1) location of the East part of the San Francisco volcanic field, Arizona, (2) mapping responsibility in the East map area, and (3) relation of the map of the East part to other maps in this series that cover other parts of the volcanic field.

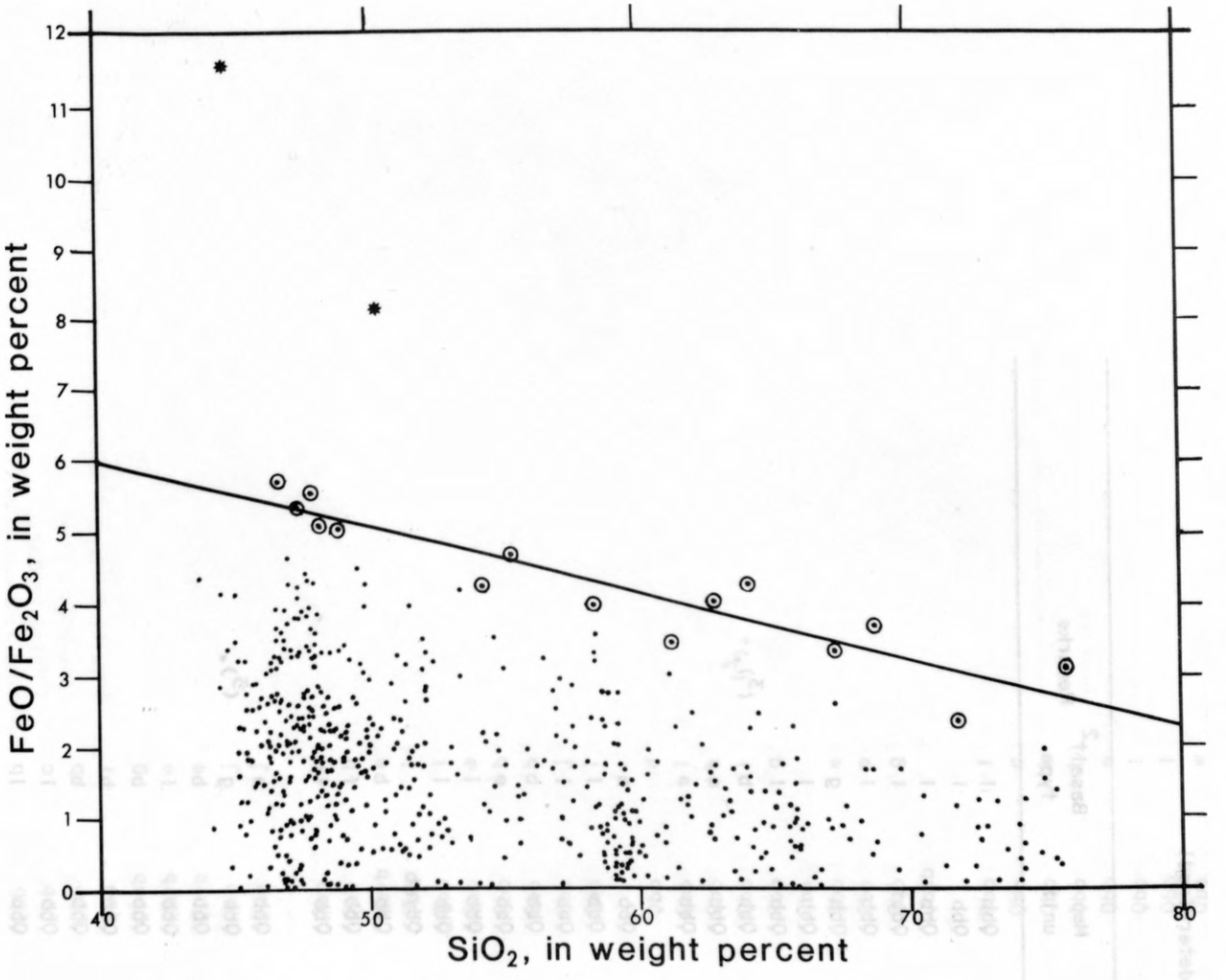

FIGURE 2. Diagram showing variation of FeO/Fe_2O_3 versus SiO_2 for 601 volcanic rocks for which both FeO and Fe_2O_3 were analyzed. Line, described by the equation $FeO/Fe_2O_3=9.627-0.0921xSiO_2$, is a least-squares fit through 15 points (circled) that represent the highest values for FeO/Fe_2O_3 throughout the range of SiO_2 values. Note that two analyses (asterisks) with unusually high FeO/Fe_2O_3 were not included in controlling the position of the line.

TABLE 1. ANALYZED ROCKS IN THE EAST MAP AREA

[ND, not determined]

Sample No.	Rock type	Vent[1] No.	Feature	Map unit	Basalt[2] type	Remarks
0002	BASALT	0003	Flow	Qbb	i	
0003	BASALT	0003	Vent	Qbb	i	
1002	BASALT	1009	Flow	Qbb	i	
1004	BASALT	1004	Vent	Qbbt	i	
1005	BASALT	1007	Flow	Qbb	i	
1007	BASALT	1007	Vent	Qbb	g	
1009	BASALT	1009	--do--	Qbb	i	
1013	BASALT	1A07	Flow	Qbb	i	
1014	BASALT	1009	--do--	Qbb	b	[3].
1019	BASALT	1028	--do--	Qbb	a	
1028	BASALT	1028	--do--	Qbb	a	
1028A	BASALT	1028	Vent	Qbb	a	
1033	BASALT	1033	--do--	Qbb	i	
1802	BASALT	1802	--do--	Qbb	i	
1805	BASALT	1805	--do--	Qbb	b	
1805A	BASALT	1805A	--do--	Qbb	e	
1809	BASALT	1809	--do--	Qbb	i	
1904	BASALT	1909	--do--	Qbb	i	
1904B	BASALTIC ANDESITE	2929	Flow	Qbyab		
1910B	BASALT	1904A	--do--	Qbb	b	
1910C	BASALT	1910	Vent	Qbb	f	
1910E	BASALT	1909?	Flow	Qbb	i	
1911	BASALT	1911	Vent	Qbb	h	
1912	BASALT	1912	--do--	Qbb	g	[3].
1914	BASALT	1914A	Flow	Qbb	b	
1914A	BASALT	1914A	--do--	Qbb	i	
1914B	BASALT	1914	Vent	Qbb	b	
1914D	BASALT	1914B	--do--	Qbbt	b	
1924	BASALT	1914	Flow	Qbb	b	
1A05	BASALT	1A07	--do--	Qbb	i	
1A17	BASALT	1A07	--do--	Qbb	i	
1B06	BASALT	2014	--do--	Qbb	b	

2001	BASALT	3036	Pyroclastic sheet	Qbybp	g
2003	BASALT	3033	Flow	Qbb	b
2003A	BASALT	2003	Vent	Qbb	c
2004	BASALT	3033	--do--	Qbb	b
2005	BASALT	3032	Flow	Qbb	i
2006	BASALT	2902	Flow	Qbsb	g
2008	BASALT	2008	--do--	Qbyb	e
2008A	BASALT	2008	Vent	Qbyb	e
2011	BASALT	2011	--do--	Qbb	j
2012A	BASALT	2012	--do--	Qbb	j
2014	BASALT	2014	Flow	Qbb	b
2016	BASALT	2016	Vent	Qbb	b
2016A	BASALT	2008	Flow	Qbyb	e
2019	BASALT	2019	Vent	Qbb	i
2019A	BASALT	2019	--do--	Qbb	i
2021	BASALT	2020	Flow	Qbb	e
2023A	BASALT	2014	--do--	Qbb	b
2024	BASALT	2024	Vent	Qbb	b
2024A	BASALT	2027	Flow	Qbb	j
2025	BASALT	1009	--do--	Qbb	i
2027	BASALT	2022	Vent	Qbb	d
2030	BASALT	2019	Hornito, flow	Qbb	i
2031A	BASALT	1911	Flow	Qbb	h
2031B	BASALT	2019	--do--	Qbb	i
2801	BASALT	ND	--do--	Qbb	g
2805	ANDESITE	2805	Vent	Qba	
2809	BASALT	2809	--do--	Qbb	e
2809A	BASALT	2809	--do--	Qbb	e
2811	BASALT	ND	Flow	Qbb	g
2812	BASALTIC ANDESITE	3835	--do--	Qbab	
2812A	BASALT	ND	--do--	Qbb	i
2813	BASALT	2813	Vent	Qbb	c
2813A	BASALT	ND	Flow	Qbb	h
2815	BASALT	2815A	Vent	Qbb	h
2815A	BASALT	2815B	--do--	Qbb	e
2815B	BASALT	2815	--do--	Qbb	i
2815C	BASALT	2815	Flow	Qbb	i
2822	BASALT	2822	Vent	Qbb	e
2825	BASALT	2825	--do--	Qbb	i

[3].

TABLE 1. ANALYZED ROCKS IN THE EAST MAP AREA--Continued

Sample No.	Rock type	Vent[1] No.	Feature	Map unit	Basalt[2] type	Remarks
2825A	BASALT	2825A	--do--	Qbb	i	
2825D	BASALT	2825A	--do--	Qbb	i	
2825E	BASALT	2825A	--do--	Qbb	i	
2825G	BASALT	2825B	--do--	Qbb	e	
2834	BASALT	2835	Flow	Qbb	i	
2834A	BASALT	1805	--do--	Qbb	b	
2835	BASALT	2835	Vent	Qbb	i	
2836A	BASALT	2836	Vent	Qbb	e	
2836B	BASALT	2836	--do--	Qbb	e	
2903	BASALT	2903	--do--	Qbb	i	
2905	BASALTIC ANDESITE	2905	--do--	Qbab		
2909A	BASALT	2909	--do--	Qbb	i	
2909B	BASALT	2909	--do--	Qbb	i	
2910	BASALT	3932	Flow	Qbb	h	
2915	BASALT	2915	Vent	Qbb	i	
2915A	BASALT	2915	--do--	Qbb	i	
2918	BASALT	2919	Pyroclastic deposit	Qbbp	c	
2919	BASALT	2919	Vent	Qbb	c	
2919F	BASALT	2919A	--do--	Qbb	c	
2919G	BASALT	2930	--do--	Qbb	c	
2919I	BASALT	ND	Flow	Qbb	i	
2919J	BASALT	2919	--do--	Qbb	c	
2926	BASALT	2926	Vent	Qbb	i	
2926A	BASALT	2926A	--do--	Qbb	i	
2926B	BASALT	2926B	Flow	Qbb	i	
2926C	BASALT	2926B	Vent	Qbb	i	
2927	BASALT	ND	Flow	Qbb	i	
2927A	BASALT	ND	--do--	Qbb	i	
2929	BASALT	2929	Vent	Qbyab	j	O'Neill Crater; ([3]).
2929B	BASALTIC ANDESITE	2929	--do--	Qbyab		Do.
2929D	BASALTIC ANDESITE	2929	--do--	Qbyab		O'Neill Crater.
2929E	DACITE	2929	Dome	Qbyd		O'Neill Crater; ([3]).
2929G	BASALT	2929	Flow	Qbyb	i	O'Neill Crater.

2929H	DACITE	2929	Unmapped airfall			Do.
2929I	DACITE	2929	--do--			Do.
2929J	BASALTIC ANDESITE	2929	--do--			
2929K	BASALT	2929	--do--		i	O'Neill Crater.
2929L	BASALTIC ANDESITE	2929	--do--			
2929N	BASALT	2930A	Vent	Qbb	b	
29290	BASALT	2930A	--do--	Qbb	b	
2930	BASALT	2930A	--do--	Qbb	b	
2931A	BASALT	2836	Flow	Qbb	e	
2932A	BASALT	2930A	--do--	Qbb	b	
2933A	BASALTIC ANDESITE	2929	--do--	Qbyab		[3].
2935	BASALT	2926B	--do--	Qbb	i	
2935B	BASALT	ND	--do--	Qbb	h	
2936	BASALT	ND	--do--	Qbb	e	
2A02A	BASALT	2A02	Vent	Qbbt	i	
2A06	BASALT	3036B	Flow	Qbyb	g	
2A07A	BASALT	2A18	--do--	Qbb	d	
2A12	BASALT	2A01	Vent	Qbb	b	
2A18A	BASALT	2A18	Flow	Qbb	d	
2A20	BASALT	2A18	--do--	Qbb	i	
2A23B	BASALT	2A23	Vent	Qbb	b	
3002	BASALT	3018	Flow	Qbb	i	
3006	BASALT	3901	--do--	Qbb	i	
3006A	BASALT	3006	Vent	Qbyb	i	
3008	BASALT	3008	--do--	Qbb	i	
3011	BASALT	ND	Flow	Qbb	b	
3011A	BASALT	3022	--do--	Qbb	g	
3013	BASALT	3022	--do--	Qbb	g	
3013A	BASALT	3022	--do--	Qbb	g	
3014	BASALT	3022	--do--	Qbb	g	
3016	BASALT	3018	--do--	Qbb	i	
3018	BASALT	3018	Vent	Qbb	i	
3018A	BASALT	3018	--do--	Qbb	i	
3024	BASALT	ND	Flow	Qmb	i	[3].
3024A	BASALT	3036	--do--	Qbyb	g	
3026	BASALT	3034	--do--	Qbyb	g	
3026A	BASALT	3034	--do--	Qbyb	g	
3026C	BASALT	3027	Vent	Qbbt	b	
3026D	BASALT	ND	Flow	Qmb	i	

TABLE 1. ANALYZED ROCKS IN THE EAST MAP AREA--Continued

Sample No.	Rock type	Vent[1] No.	Feature	Map unit	Basalt[2] type	Remarks
3027	BASALT	3022	--do--	Qbb	g	[3].
3028	BASALT	3028	Vent	Qbb	j	
3028A	BASALT	3028	--do--	Qbb	j	
3028B	BASALT	3028	Flow	Qbb	j	
3029	BASALT	3928	--do--	Qbyb	d	
3031	BASALT	3031	Vent	Qbb	b	
3032	BASALT	3032	--do--	Qbb	i	
3032A	BASALT	3032	Flow	Qbb	i	
3032B	BASALT	3031	--do--	Qbb	c	
3034	BASALT	3033	--do--	Qbb	j	
3034A	BASALT	3034	Vent	Qbyb	g	The Sproul.
3035	BASALT	3036	--do--	Qbyb	g	Merriam Crater.
3036A	BASALT	3036A	--do--	Qbyb	g	
3801	BASALT	ND	Upturned flow	Qobc	d	
3802	BASALT	ND	Upturned flow	Qobc	h	
3802B	DACITE		Flow	Qodo		O'Leary Peak.
3802C	DACITE		Flow	Qodo		O'Leary Peak.
3802D	BASALT	ND	Upturned flow	Qobc	h	
3803D	DACITE		Flow	Qodo		O'Leary Peak.
3805	MICRODIORITE		Xenolith	Qoaf		O'Leary Peak; [3].
3805A	BASALT	4833	Vent	Qbb	d	
3808	BASALT	3808	--do--	Qbb	h	
3809B	RHYOLITE		Dome	Qorr		O'Leary Peak.
3809C	BASALT	3809	Vent	Qbb	h	
3810	BASALT	3810	--do--	Qbb	i	
3810B	ANDESITE		Pyroclastic deposit	Qoap		O'Leary Peak.
3810C	ANDESITE		Pyroclastic deposit	Qoap		O'Leary Peak; [3].
3810D	DACITE		Dome	Qodd		Do.
3810E	MICRODIORITE		Xenolith	Qodd		Do.
3810F	ANDESITE		Pyroclastic deposit	Qoap		O'Leary Peak.
3811	BASALT	3811	Vent	Qbb	i	
3811C	MICRODIORITE		Xenolith	Qodd		O'Leary Peak.
3813	BASALT	3814	Vent	Qbb	b	

3814	BASALT	3814	--do--	Qbb	b	
3815	BASALT	3815	--do--	Qbb	i	
3815A	BASALT	3816	Flow	Qbb	i	
3817	BASALT	3809A	--do--	Qbb	b	
3817A	BASALT	3817	Vent	Qbb	b	
3818	BASALT	3818	--do--	Qbb	b	
3821B	BASALT	3821	--do--	Qbb	i	
3822B	BASALT	3822	--do--	Qbb	c	
3823A	BASALT	3824	Flow	Qbsb	g	Bonito flow; (3).
3824	BASALT	3824	Vent	Qbsb	g	Sunset Crater.
3824A	BASALT	3824	--do--	Qbsb	g	Do.
3826	BASALT	3828B	Flow	Qbb	i	
3827	BASALT	3828	--do--	Qbb	i	
3828	BASALT	3828	--do--	Qbb	c	
3828C	BASALT	3828	Vent	Qbb	c	
3828E	BASALT	3828C	--do--	Qbb	i	
3828F	BASALT	3828B	--do--	Qbb	i	
3828G	BASALT	3821A	--do--	Qbb	h	
3828H	BASALT	3828A	--do--	Qbb	i	
3828J	BASALT	3828	Flow	Qbb	i	
3828K	BASALT	3828A	--do--	Qbb	i	
3829A	BASALT	3829A	Vent	Qbb	h	
3829B	BASALT	3829A	Flow	Qbb	h	
3829D	BASALT	3829A	--do--	Qbb	h	
3832	ANDESITE		Flow	Qa_1		From San Francisco Mountain.
3833	ANDESITE		Flow	Qa_2		From San Francisco Mountain.
3833A	BASALT	3828B	--do--	Qbb	i	
3835A	BASALTIC ANDESITE	3835	Vent	Qbab		
3836	BASALT	3836	--do--	Qbb	h	
3906	BASALT	3906	--do--	Qbb	h	
3911	BASALT	3911	--do--	Qbb	i	
3911A	BASALT	ND	Flow	Qbb	b	
3912	BASALT	3913	Vent	Qbb	i	
3912A	BASALT	3912	--do--	Qbb	e	
3915	ANDESITE	3922	Dome and flow	Qba		
3915A	ANDESITE	3922	Dome and flow	Qba		
3915C	ANDESITE	3922	Dome and flow	Qba		
3916	BASALT	3812	Vent	Qbyb	b	
3917	BASALT	3824	Flow	Qbsb	g	Kana a flow.

TABLE 1. ANALYZED ROCKS IN THE EAST MAP AREA--Continued

Sample No.	Rock type	Vent[1] No.	Feature	Map unit	Basalt[2] type	Remarks
3919	BASALT	3930	Fissure deposits	Qbsbf	g	
3920A	BASALTIC ANDESITE	3920	Flow	Qbab		
3920B	BASALT	3920	--do--	Qbb	l	
3922A	BASALT	3922	Vent	Qbb	e	
3923	BASALT	3923	--do--	Qbb	b	
3925	BASALT	3925	--do--	Qbb	l	
3926	BASALT	3926	--do--	Qbb	b	
3927	BASALT	3922A	--do--	Qbb	b	
3928A	BASALT	3928	--do--	Qbyb	d	
3929	BASALT	3929	--do--	Qbsbf	g	
3930	BASALT	3930	Fissure deposits	Qbsbf	g	
3931	BASALT	3930A	Vent	Qbb	l	
3931A	BASALTIC ANDESITE	3931	--do--	Qba		
3934	BASALT	3934	--do--	Qbb	h	
3935	ANDESITE	3935	--do--	Qbb		
3A06	BASALT	3022	Flow	Qbb	g	
3A15	BASALT	ND	--do--	Qmb	l	
3A17	BASALT	3036	--do--	Qbyb	g	
3A28	BASALT	ND	--do--	Qmb	l	
3A28A	BASALT	ND	--do--	Qmb	l	
3A29	BASALT	3036B	--do--	Qbyb	g	
3A30	BASALT	3036B	--do--	Qbyb	g	
3A31	BASALT	3036	Pyroclastic sheet	Qbybp	g	
3A33	BASALT	2A07	Flow	Qbb	g	[3].
4004	BASALT	ND	--do--	Qmb	g	
4008	BASALT	ND	--do--	Qbb	l	
4010	BASALT	ND	Flow	Qmb	e	
4011	BASALT	ND	Flow	Qmb	l	
4017	BASALT	ND	--do--	Qbb	l	
4018	BASALT	ND	--do--	Qmb	l	
4031	BASALT	ND	--do--	Qmb	e	
4802	ANDESITE		--do--	Qa_2		From San Francisco Mountain.
4816	BASALT	ND	--do--	Qbb	g	

4826	DACITE		--do--	Qdmd		O'Leary Peak; [3].
4833	ANDESITE		--do--	Qoaf		Do.
4834	DACITE		--do--	Qod		Do.
4834A	ANDESITE		--do--	Qoaf		O'Leary Peak.
4834B	DACITE		Vent facies	Qdmdv		Do.
4835	DACITE		Flow	Qodo		Do.
4836	BASALT	4836	Vent	Qbb	h	
4836A	BASALT	4836	Flow	Qbb	h	
4836B	BASALT	4931	Vent	Qbb	a	
4836C	DACITE		Flow	Qodo		O'Leary Peak.
4903	BASALT	ND	--do--	Qmb	i	
4903A	BASALT	4836	Flow	Qbb	h	[3].
4920	BASALTIC ANDESITE	4920	Vent	Qbyab		Strawberry Crater; [3].
4920A	DACITE	4920	Dome	Qbyd		Do.
4920B	GRANULITE	4920	Xenolith	Qbyd		Do.
4920C	BASALT	4920	Vent	Qbyab	c	
4922	BASALT	3904	Flow	Qbb	h	
4929	BASALTIC ANDESITE	4920	--do--	Qbyab		Strawberry Crater; [3].
4930	BASALT	4836	--do--	Qbb	h	
4A33A	BASALT	4A31	--do--	Qbb	e	
4A34	BASALT	3034	--do--	Qbyb	g	[3].
5033	BASALT	ND	--do--	Qbb	l	
5035	BASALT	ND	--do--	Qbb	l	
5824	BASALT	3705?	--do--	Qbb	h	
5913	BASALT	5914	--do--	Qbyb	b	
5919	BASALT	3705?	--do--	Qbb	h	[3].
5923	BASALT	5923	--do--	Qbyb	b	
5926	BASALT	ND	--do--	Qmb	h	
5933	BASALT	5933	Vent	Qbb	c	Strawberry Crater; [3].

[1]Blank entry indicates isolated domes or other volcanic units originating at nonbasaltic volcanic centers to which vent numbers were not assigned. Such volcanic loci are normally indicated under "Remarks."

[2]Blank entry indicates rock type other than basalt.

[3]For trace-element analyses see table 5.

TABLE 2. COMPLETE ANALYSES OF OXIDES IN WEIGHT PERCENT, EAST MAP AREA

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO[1]	MgO	CaO	Na_2O	K_2O	H_2O[2]	TiO_2	P_2O_5	MnO[2]	CO_2[2]	Total	Lab. No.	Analysts[3]
0002	49.70	16.60	1.80	8.01	6.70	10.00	3.70	0.90	0.66	1.60	0.51	0.21	0.05	100.44	2605	RS
0003	50.00	16.80	3.80	5.85	6.50	9.80	3.80	1.00	0.84	1.40	0.42	0.15	0.05	100.41	2606	RS
1002	47.40	16.20	3.80	7.20	7.90	9.50	3.30	0.80	0.38	1.96	0.53	0.19	0.14	99.30	2136	RS
1004	46.61	14.70	4.94	5.90	9.09	10.16	2.44	0.81	1.83	1.68	0.54	0.16	0.23	99.09	M124440	BF,BK,JT,SN
1005	47.10	15.90	2.00	9.18	8.50	10.10	3.00	0.80	0.33	1.98	0.43	0.19	0.39	99.90	2138	RS
1007	45.50	15.60	10.60	1.80	10.10	10.80	2.40	0.70	0.24	2.07	0.40	0.20	0.06	100.47	2170	RS
1009	46.60	14.70	4.40	7.11	10.10	10.50	2.80	0.90	0.47	2.24	0.37	0.20	0.10	100.49	2171	RS
1013	49.30	16.20	10.10	0.45	6.30	9.20	4.30	1.70	0.39	1.93	0.64	0.20	0.09	100.80	2993	DE
1014	45.90	13.70	3.70	8.10	11.20	10.60	2.30	0.90	0.50	1.92	0.46	0.20	0.05	99.53	2135	RS
1019	46.80	13.40	3.30	7.02	12.40	11.80	2.30	0.70	0.77	1.40	0.46	0.17	0.05	100.57	2614	RS
1028	48.60	14.30	3.00	6.84	10.90	10.60	2.80	0.90	0.41	1.30	0.45	0.17	0.05	100.32	2612	RS
1028A	46.80	13.50	2.40	7.74	12.60	11.70	2.70	0.70	0.23	1.30	0.42	0.17	0.05	100.31	2613	RS
1033	49.00	16.50	2.40	7.97	7.00	10.50	3.70	0.80	0.70	1.50	0.45	0.16	0.05	100.73	2604	RS
1802	48.40	17.50	10.70	0.72	5.90	10.00	3.50	0.60	0.20	1.83	0.49	0.19	0.05	100.08	2996	DE
1805	48.40	16.50	2.40	7.92	7.70	10.20	3.30	0.90	0.48	1.80	0.63	0.19	0.05	100.47	3001	DE
1805A	46.50	17.80	7.40	4.32	7.10	9.80	3.80	0.80	0.29	2.05	0.68	0.20	0.05	100.79	3002	DE
1809	49.50	18.00	4.50	6.30	6.10	9.50	3.40	0.70	0.34	1.80	0.46	0.17	0.05	100.82	2615	RS
1904	47.60	16.30	3.70	8.37	6.90	9.10	4.10	1.10	0.52	2.10	0.55	0.18	0.10	100.62	2602	RS
1904B	57.60	15.70	1.70	4.80	4.40	7.50	3.70	2.40	0.82	0.98	0.51	0.10	0.03	100.24	W179970	HS
1910B	47.80	16.30	3.50	7.83	7.30	9.50	3.50	1.00	0.28	2.17	0.60	0.19	0.05	100.02	2140	RS
1910C	53.50	13.60	1.60	6.62	7.60	9.30	3.60	1.70	0.18	1.50	0.48	0.14	0.05	99.87	2599	RS
1910E	46.30	16.60	3.40	8.73	6.60	8.90	3.80	1.10	1.08	2.10	0.62	0.23	0.05	99.51	2601	RS
1911	51.60	17.70	3.60	6.21	5.20	7.90	4.10	1.50	0.51	1.70	0.40	0.15	0.05	100.62	2577	RS
1912	45.50	15.70	4.10	7.74	10.10	10.40	2.90	0.90	0.65	2.11	0.38	0.21	0.06	100.75	2169	RS
1914	48.10	16.40	2.40	8.55	7.30	10.20	3.70	0.90	0.37	2.10	0.56	0.17	0.05	100.80	2607	RS
1914A	48.60	16.80	3.70	6.60	5.90	11.40	3.70	0.70	0.17	1.50	0.42	0.17	0.05	99.71	2608	RS
1914B	48.50	16.00	4.10	6.71	7.30	10.20	3.60	1.00	0.39	2.00	0.59	0.16	0.05	100.60	2610	RS
1914D	47.48	15.16	5.93	5.43	7.57	9.82	3.40	1.00	0.52	2.04	0.63	0.17	0.03	99.18	M124445	BF,BK,JT,SN
1924	46.60	17.40	3.80	7.29	7.10	10.70	3.30	1.00	0.71	2.20	0.56	0.17	0.05	100.88	2609	RS
1A05	49.80	16.10	3.80	6.12	6.20	8.90	3.90	1.50	0.71	1.74	0.63	0.18	0.47	100.05	2159	RS
1A17	47.90	16.10	3.00	7.56	7.50	9.60	3.50	1.20	0.61	1.95	0.61	0.19	0.05	99.77	2160	RS
1B06	46.60	13.30	2.90	7.56	11.40	11.20	3.00	1.00	0.90	1.89	0.48	0.19	0.06	100.48	2162	RS
2001	48.30	15.50	3.80	6.90	8.40	10.40	2.90	0.80	0.74	1.49	0.63	0.19	0.05	100.10	709	RS,DE,PL

2003	48.40	15.20	3.20	7.00	8.70	11.50	2.90	0.90	0.65	1.43	0.59	0.18	0.08	100.73	695	RS,DE,PL
2003A	49.70	15.90	6.70	3.60	7.30	10.70	3.10	1.10	0.22	1.42	0.80	0.17	0.12	100.83	705	RS,DE,PL
2004	49.50	14.50	7.20	2.50	8.90	11.00	2.90	1.10	0.71	1.22	0.58	0.16	0.25	100.52	704	RS,DE,PL
2005	47.60	15.90	3.10	6.80	8.50	11.60	2.80	0.90	0.72	1.44	0.55	0.17	0.06	100.14	696	RS,DE,PL
2006	47.28	17.45	2.59	8.40	6.80	10.36	3.42	0.78	0.00	1.77	0.48	0.18	0.06	99.57	M126454	HE,LE,MC,GA,JT
2008	49.00	17.70	3.00	7.60	5.10	8.40	4.00	1.40	0.64	1.72	0.77	0.17	0.05	99.55	694	RS,DE,PL
2008A	50.70	17.90	3.65	6.30	4.64	7.92	4.85	1.50	0.29	1.68	0.81	0.14	0.12	100.50	3684	DE
2011	47.60	12.60	3.50	6.20	12.80	12.40	2.20	0.50	0.53	1.04	0.67	0.17	0.05	100.26	691	RS,DE,PL
2012A	48.10	13.60	2.40	7.40	11.80	12.10	2.50	0.60	0.37	1.09	0.56	0.17	0.05	100.74	692	RS,DE,PL
2014	46.70	12.90	2.70	7.38	12.30	11.70	2.30	0.80	0.61	1.65	0.46	0.19	0.10	99.79	2149	RS
2016	45.20	14.80	3.90	7.38	10.60	10.90	2.60	0.80	0.62	2.30	0.50	0.17	0.06	99.83	2579	RS
2016A	50.00	17.40	3.50	7.30	5.20	9.00	4.00	1.30	0.57	1.64	0.76	0.17	0.05	100.89	693	RS,DE,PL
2019	52.10	17.90	2.30	7.02	4.50	7.20	4.30	1.60	0.46	1.60	0.58	0.15	0.05	99.76	2592	RS
2019A	51.00	18.20	4.10	5.27	4.80	8.30	4.10	1.10	0.46	1.50	0.51	0.14	0.05	99.53	2593	RS
2021	48.50	17.50	5.30	6.12	5.40	8.10	4.30	1.00	0.25	2.17	0.45	0.19	0.05	99.33	2144	RS
2023A	46.80	13.00	2.80	7.38	11.70	11.70	2.30	0.90	0.40	1.79	0.48	0.19	0.19	99.63	2150	RS
2024	50.10	14.10	3.00	5.67	10.70	11.20	2.60	0.90	0.30	1.13	0.39	0.18	0.05	100.32	2152	RS
2024A	45.50	13.70	3.20	7.92	10.50	11.10	2.90	1.10	0.28	2.28	0.58	0.20	0.06	99.32	2148	RS
2027	45.20	14.20	11.50	0.45	10.30	11.20	3.20	0.60	0.93	2.20	0.59	0.17	0.08	100.62	2578	RS
2030	51.30	18.50	3.00	6.48	5.20	8.20	3.70	1.60	0.50	1.60	0.53	0.14	0.05	100.80	2581	RS
2031A	49.80	17.10	3.60	6.48	6.10	9.00	3.70	1.00	0.38	1.70	0.38	0.17	0.05	99.46	2166	RS
2031B	50.50	18.30	3.00	6.66	5.10	8.10	3.90	1.30	0.60	1.64	0.58	0.17	0.05	99.90	2165	RS
2801	47.00	14.90	3.80	7.74	7.70	10.50	3.50	1.30	0.36	2.46	0.52	0.20	0.05	100.03	3105	DE
2805	55.60	16.90	6.00	3.51	2.20	5.60	5.10	2.10	0.26	2.28	0.54	0.17	0.05	100.31	3013	DE
2809	47.50	17.10	12.10	0.09	5.90	9.50	3.60	1.20	0.37	2.36	0.53	0.19	0.05	100.49	3011	DE
2809A	47.10	16.10	6.80	4.95	7.40	9.40	3.80	1.20	0.31	2.38	0.57	0.20	0.05	100.26	3012	DE
2811	48.00	15.70	4.00	7.56	6.70	9.70	3.50	1.40	0.41	2.60	0.52	0.20	0.05	100.34	3110	DE
2812	58.50	15.00	1.60	5.67	4.80	7.10	3.80	2.30	0.53	1.14	0.35	0.15	0.05	100.99	3103	DE
2812A	49.60	15.90	4.30	7.29	5.90	9.40	3.70	1.00	0.13	2.23	0.52	0.20	0.05	100.22	3104	DE
2813	46.90	13.90	6.00	5.31	9.90	11.60	2.50	0.70	0.51	1.90	0.48	0.20	0.05	99.95	3101	DE
2813A	47.90	15.80	3.50	8.37	6.30	9.40	3.20	1.30	0.49	2.66	0.56	0.20	0.05	99.73	3102	DE
2815	51.10	16.40	11.60	0.05	3.10	6.00	5.80	2.20	0.33	1.64	1.28	0.20	0.05	99.75	3005	DE
2815A	52.20	15.90	2.00	6.57	6.70	8.60	3.70	1.60	0.48	1.36	0.67	0.18	0.05	100.01	3006	DE
2815B	48.00	15.80	6.30	4.68	8.50	9.60	3.10	1.30	0.61	1.95	0.54	0.18	0.05	100.61	3009	DE
2815C	48.40	15.90	4.30	6.30	8.60	9.40	3.20	1.30	0.53	1.89	0.56	0.18	0.05	100.61	3010	DE
2822	51.70	15.60	9.30	0.18	6.20	8.30	4.20	1.70	0.34	1.26	0.68	0.18	0.05	99.69	3007	DE
2825	45.80	15.80	4.80	6.84	9.70	10.80	2.60	0.70	0.27	2.00	0.78	0.20	0.05	100.34	3075	DE
2825A	45.80	15.60	3.20	8.01	10.20	10.90	2.70	0.70	0.35	1.97	0.27	0.20	0.09	99.99	3076	DE
2825D	46.80	15.80	1.70	9.63	9.30	10.60	3.00	0.80	0.31	2.13	0.29	0.20	0.05	100.61	3079	DE

TABLE 2. COMPLETE ANALYSES OF OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO[1]	MgO	CaO	Na_2O	K_2O	H_2O[2]	TiO_2	P_2O_5	MnO[2]	CO_2[2]	Total	Lab. No.	Analysts[3]
2825E	46.50	16.20	2.80	8.82	9.20	10.30	2.70	0.70	0.52	2.08	0.29	0.20	0.05	100.36	3080	DE
2825G	49.20	16.40	2.60	8.82	5.90	8.20	4.20	1.20	0.30	2.18	0.78	0.22	0.05	100.05	3082	DE
2834	48.50	17.40	3.10	7.56	7.20	10.00	3.50	0.70	0.18	1.84	0.49	0.19	0.05	100.71	2995	DE
2834A	48.30	16.50	3.30	7.29	7.80	9.90	3.60	0.90	0.28	1.84	0.66	0.19	0.05	100.61	2999	DE
2835	48.50	17.20	10.90	0.05	6.50	10.00	2.90	0.60	0.32	1.71	0.51	0.18	0.05	99.42	2997	DE
2836A	49.90	16.60	4.30	6.93	5.40	8.00	3.90	1.20	0.81	2.18	0.81	0.21	0.05	100.29	3083	DE
2836B	48.60	16.50	4.50	7.38	5.90	8.10	4.30	1.20	0.84	2.24	0.81	0.21	0.05	100.63	3084	DE
2903	49.18	17.28	6.76	4.68	5.65	8.11	4.03	1.22	0.34	2.08	0.55	0.17	0.12	100.17	M126455	HE,LE,MC,GA,JT
2905	56.50	15.40	2.60	4.60	5.40	7.80	3.00	2.00	0.91	1.00	0.35	0.10	0.06	99.72	W179973	HS
2909A	46.30	17.40	5.30	5.85	8.10	11.60	3.00	0.60	0.25	1.78	0.46	0.20	0.05	100.89	3088	DE
2909B	46.80	17.50	11.50	0.05	7.40	11.40	2.90	0.70	0.29	1.72	0.42	0.20	0.05	100.93	3091	DE
2910	51.00	18.60	3.00	5.80	5.20	8.40	3.70	1.10	0.68	1.60	0.32	0.10	0.04	99.54	W179969	HS
2915	50.10	16.60	7.30	3.51	6.10	9.10	2.80	1.10	0.82	1.82	0.56	0.20	0.05	100.06	3089	DE
2915A	48.50	16.90	4.40	7.20	6.10	9.60	3.50	1.00	0.22	2.02	0.50	0.20	0.05	100.19	3090	DE
2918	46.30	14.60	8.00	2.34	8.60	11.90	3.10	2.40	0.56	1.53	0.88	0.20	0.05	100.46	3099	DE
2919	52.30	14.80	5.00	3.69	7.10	9.70	3.40	1.70	0.20	1.26	0.73	0.18	0.05	100.11	3054	DE
2919F	47.00	15.10	3.40	6.75	8.60	11.90	2.90	1.00	0.42	1.58	0.95	0.21	0.05	99.86	3060	DE
2919G	47.50	15.40	3.00	7.11	8.20	11.70	3.00	1.00	0.56	1.57	0.99	0.22	0.05	100.30	3061	DE
2919I	48.40	16.50	4.40	5.67	7.00	10.90	3.40	0.80	0.61	1.50	0.42	0.19	0.05	99.84	3073	DE
2919J	48.60	14.70	3.00	6.57	8.20	11.70	3.10	1.00	0.17	1.45	0.79	0.19	0.05	99.52	3100	DE
2926	47.10	17.20	5.90	5.54	6.40	10.80	3.60	0.80	0.15	1.80	0.47	0.18	0.06	100.00	2596	RS
2926A	47.10	17.90	3.90	7.83	6.20	8.90	4.10	1.00	0.45	2.30	0.43	0.17	0.05	100.33	2597	RS
2926B	47.80	17.40	2.30	8.73	6.20	10.60	3.90	0.80	0.12	1.80	0.47	0.17	0.05	100.34	2598	RS
2926C	47.40	17.30	10.70	1.08	6.20	10.30	3.10	0.80	0.37	1.82	0.47	0.19	0.05	99.78	3094	DE
2927	46.00	16.70	3.10	7.83	7.20	11.80	3.60	0.60	0.44	1.77	0.45	0.20	0.05	99.74	3093	DE
2927A	47.69	16.89	12.05	0.00	6.80	10.05	2.69	0.73	0.00	1.81	0.47	0.17	0.00	99.35	M139276	GK
2929	46.96	14.66	2.20	7.61	9.25	12.61	2.84	0.74	0.22	1.37	0.78	0.18	0.06	99.48	M126435	HE,LE,MC,GA,JT
2929B	54.40	15.20	2.60	5.24	6.50	9.10	3.40	1.80	0.20	1.14	0.59	0.17	0.05	100.39	3044	DE
2929D	54.30	15.10	2.40	5.15	6.00	8.70	3.90	2.00	0.55	1.11	0.59	0.17	0.05	100.02	3046	DE
2929E	67.30	15.30	0.80	2.66	1.20	2.60	4.90	3.70	0.98	0.45	0.23	0.10	0.05	100.27	3047	DE
2929G	52.20	15.00	2.30	6.03	7.40	10.10	3.30	1.60	0.44	1.26	0.69	0.19	0.05	100.56	3051	DE
2929H	65.70	15.70	1.20	2.70	1.40	2.80	4.90	3.70	0.99	0.49	0.21	0.10	0.05	99.94	3064	DE
2929I	64.10	15.70	0.80	3.42	2.70	3.90	4.40	3.50	0.40	0.58	0.29	0.11	0.05	99.95	3065	DE

2929J	55.10	15.40	1.80	5.49	5.60	8.30	3.90	2.10	0.31	1.08	0.56	0.17	0.05	99.86	3066	DE
2929K	47.10	15.30	4.00	5.94	8.70	12.40	2.50	0.90	0.86	1.49	0.72	0.18	0.09	100.18	3067	DE
2929L	56.90	15.60	1.90	5.22	5.20	7.70	3.80	2.20	0.36	1.06	0.57	0.16	0.05	100.72	3068	DE
2929N	45.20	14.50	6.10	5.31	9.80	11.70	2.90	1.10	0.29	2.34	0.55	0.21	0.05	100.05	3070	DE
29290	45.30	16.90	5.10	6.12	7.70	10.10	2.40	0.60	3.64	1.48	0.78	0.22	0.05	100.39	3071	DE
2930	45.20	14.40	4.30	6.75	10.20	11.60	2.50	1.10	1.10	2.32	0.60	0.22	0.05	100.34	3063	DE
2931A	49.20	17.00	3.90	8.10	5.00	7.40	4.60	1.50	0.17	2.16	1.12	0.24	0.05	100.44	3086	DE
2932A	49.30	15.20	3.10	7.02	8.80	11.00	3.40	0.60	0.32	1.39	0.36	0.19	0.05	100.73	3072	DE
2933A	58.40	15.50	1.30	5.13	4.30	6.70	4.10	2.60	0.66	0.96	0.51	0.14	0.06	100.36	3052	DE
2935	47.80	17.40	2.90	8.01	7.00	10.80	3.00	0.70	0.22	1.74	0.46	0.20	0.05	100.28	2143	RS
2935B	47.50	17.00	1.80	9.54	6.50	9.70	3.50	1.40	0.31	2.61	0.53	0.20	0.05	100.64	3092	DE
2936	47.70	17.10	6.00	6.03	5.90	8.60	3.60	1.10	0.97	2.30	0.44	0.17	0.05	99.96	2580	RS
2A02A	50.49	14.45	7.29	3.87	6.54	8.43	3.54	1.27	0.46	2.00	0.82	0.17	0.19	99.52	M124439	JT,SN
2A06	48.60	15.00	2.55	6.80	8.97	11.26	3.21	0.68	0.19	1.55	0.62	0.17	0.15	99.75	3679	DE
2A07A	50.10	17.10	2.90	6.84	6.70	9.90	3.60	0.90	0.40	1.35	0.48	0.19	0.05	100.51	2155	RS
2A12	46.42	14.93	4.51	6.12	8.02	10.64	2.57	1.04	2.12	1.98	0.71	0.18	0.17	99.41	2009	DE
2A18A	50.60	15.60	4.80	5.04	8.30	9.30	3.30	1.10	0.51	1.38	0.45	0.18	0.19	100.75	2154	RS
2A20	50.20	16.50	3.00	6.84	6.20	10.50	3.60	0.80	0.40	1.29	0.37	0.18	0.05	99.93	2157	RS
2A23B	48.11	14.45	3.62	6.37	9.12	10.67	2.69	0.94	0.89	1.59	0.57	0.16	0.12	99.30	M124446	BF,BK,JT,SN
3002	49.49	16.98	2.93	7.83	5.10	8.16	3.95	1.34	0.38	2.17	0.47	0.18	0.05	99.03	1476	DE,PL,JM,SV
3006	46.71	15.27	6.43	5.16	8.42	11.23	2.57	0.53	0.39	1.69	0.65	0.17	0.25	99.47	M124456	BF,BK,JT,SN
3006A	47.99	18.40	3.11	7.74	6.50	9.51	3.54	0.77	0.16	1.63	0.50	0.17	0.05	100.07	M124466	BF,BK,JT,SN
3008	46.73	15.26	3.75	7.47	9.57	11.39	2.60	0.56	0.15	1.67	0.45	0.21	0.05	99.86	1484	DE,JM,PL,SV
3011	44.66	14.13	2.17	8.91	10.35	11.91	2.43	1.11	0.44	2.46	0.45	0.19	0.05	99.26	1477	DE,PL,JM,SV
3011A	46.50	16.41	2.83	8.64	7.81	10.88	2.81	0.71	0.21	2.13	0.43	0.19	0.15	99.70	1478	DE,PL,JM,SV
3013	45.81	16.94	3.03	8.64	7.95	10.71	2.86	0.56	0.16	2.04	0.45	0.19	0.06	99.40	1472	DE,PL,JM,SV
3013A	47.19	16.35	3.35	8.01	7.95	10.71	2.86	0.71	0.29	2.17	0.48	0.19	0.05	100.31	1475	DE,PL,JM,SV
3014	46.50	16.35	3.08	8.28	7.81	11.22	2.81	0.71	0.34	2.13	0.44	0.20	0.19	100.06	1479	DE,PL,JM,SV
3016	50.20	17.10	3.99	6.64	5.66	8.90	3.99	1.10	0.39	1.83	0.51	0.16	0.13	100.60	3681	DE
3018	52.13	16.64	3.33	6.70	5.45	7.79	3.97	1.55	0.32	1.70	0.50	0.17	0.06	100.31	M126436	HE,LE,MC,GA
3018A	51.84	15.86	3.48	6.86	5.54	8.04	3.64	1.55	0.49	1.80	0.51	0.17	0.11	99.89	M124435	BF,BK,JT,SN
3024	47.80	16.00	2.60	8.80	7.30	9.50	3.60	1.10	0.43	2.30	0.46	0.18	0.05	100.12	687	RS,DE,PL
3024A	44.90	16.70	9.60	2.90	7.80	10.10	3.30	0.90	0.17	1.73	0.86	0.19	0.00	99.15	684	RS,DE,PL
3026	45.60	15.40	3.20	8.70	8.30	11.10	3.50	1.30	0.55	2.51	0.62	0.19	0.00	100.97	681	RS,DE,PL
3026A	45.50	15.10	2.80	8.90	8.60	10.80	3.30	1.30	0.79	2.51	0.62	0.18	0.07	100.47	683	RS,DE,PL
3026C	50.90	15.20	4.85	3.57	8.10	10.01	2.83	1.23	0.96	1.28	0.46	0.14	0.15	99.68	3635	DE
3026D	47.50	16.00	2.35	8.85	7.56	9.37	3.67	1.07	0.42	2.06	0.55	0.15	0.04	99.59	3634	DE
3027	45.40	16.10	7.10	5.30	7.60	11.70	2.80	0.60	0.65	1.91	0.50	0.20	0.18	100.04	688	RS,DE,PL
3028	44.20	14.30	6.60	5.60	10.00	12.40	2.70	1.20	0.18	2.45	0.55	0.19	0.13	100.50	703	RS,DE,PL

TABLE 2. COMPLETE ANALYSES OF OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO[1]	MgO	CaO	Na_2O	K_2O	H_2O[2]	TiO_2	P_2O_5	MnO[2]	CO_2[2]	Total	Lab. No.	Analysts[3]
3028A	44.80	14.60	0.90	0.40	9.70	12.10	2.60	1.00	0.74	1.36	0.53	0.19	0.27	99.19	702	RS,DE,PL
3028B	44.90	14.10	2.70	9.00	8.50	13.00	2.90	1.20	0.18	2.32	0.52	0.22	0.05	99.59	700	RS,DE,PL
3029	47.90	15.70	2.50	8.30	8.70	10.20	3.40	0.70	0.31	1.27	0.57	0.19	0.05	99.79	701	RS,DE,PL
3031	48.77	14.04	4.62	4.46	10.03	11.35	2.76	1.17	0.26	1.35	0.66	0.17	0.33	99.97	M126457	HE,LE,MC,GA,JT
3032	45.60	15.60	6.10	5.70	8.70	11.60	2.80	1.00	0.56	2.25	0.62	0.19	0.14	100.86	706	RS,DE,PL
3032A	45.20	15.00	2.30	9.40	8.80	11.80	2.80	1.00	0.23	2.25	0.61	0.18	0.05	99.62	698	RS,DE,PL
3032B	49.50	16.20	3.60	6.40	6.60	10.00	3.80	1.50	0.51	1.74	0.76	0.18	0.05	100.84	699	RS,DE,PL
3034	47.50	14.60	2.40	7.90	11.40	10.60	2.80	1.00	0.51	1.49	0.44	0.16	0.05	100.85	697	RS,DE,PL
3034A	45.81	15.08	2.86	8.19	9.29	11.22	3.03	1.19	0.35	2.37	0.51	0.20	0.21	100.31	1482	DE,PL,JM,SV
3035	46.60	15.70	2.60	8.40	8.60	11.10	3.00	0.80	0.20	1.52	0.60	0.18	0.00	99.30	708	RS,DE,PL
3036A	47.50	16.00	2.10	8.80	9.30	11.20	2.80	0.70	0.17	1.54	0.49	0.19	0.05	100.84	707	RS,DE,PL
3801	47.50	14.20	2.10	8.51	11.30	10.70	3.00	0.70	0.27	1.49	0.48	0.19	0.05	100.49	2691	PL,TD,SV,JM,RS
3802	51.20	17.70	4.58	6.41	4.40	7.40	4.30	1.00	0.32	1.88	1.04	0.19	0.02	100.44	3612	DE
3802B	66.98	16.47	2.31	2.14	0.52	2.02	5.05	3.32	0.71	0.35	0.13	0.00	0.00	100.00	R7	HR
3802C	68.80	15.90	0.80	2.93	0.40	1.80	5.60	3.10	0.14	0.25	0.12	0.14	0.05	100.03	2697	PL,TD,SV,JM,RS
3802D	51.10	17.70	3.70	7.38	4.30	7.20	4.10	1.20	0.40	1.94	0.90	0.20	0.05	100.17	2690	PL,TD,SV,JM,RS
3803D	67.70	15.60	1.92	2.19	0.80	2.20	5.70	2.80	0.14	0.33	0.15	0.13	0.02	99.68	3616	DE
3805	53.10	17.04	3.76	6.48	3.17	6.10	4.78	1.74	0.45	2.04	0.64	0.17	0.09	99.56	M129338	HE,LE,JT
3805A	47.36	14.26	2.30	8.68	10.07	11.19	2.66	0.65	0.23	1.60	0.48	0.17	0.07	99.72	M124458	BF,BK,JT,SN
3808	48.79	18.56	10.63	0.67	4.63	8.56	3.79	0.80	0.36	1.67	0.56	0.17	0.16	99.35	M124448	BF,BK,JT,SN
3809B	71.30	15.30	1.90	0.56	0.09	0.95	4.90	3.70	0.53	0.11	0.05	0.05	0.02	99.46	W179992	HS
3809C	47.19	17.92	12.08	0.39	5.43	9.37	3.43	0.78	0.22	2.01	0.78	0.18	0.11	99.89	M124449	BF,BK,JT,SN
3810	48.40	17.20	8.89	1.97	6.60	10.40	3.20	0.90	0.14	1.28	0.78	0.18	0.06	100.00	3602	DE
3810B	61.00	15.80	5.91	0.66	1.90	3.90	4.70	2.60	1.67	1.16	0.34	0.14	0.10	99.88	3604	DE
3810C	56.70	16.90	8.83	0.05	2.70	5.50	4.80	1.80	0.43	1.70	0.50	0.17	0.12	100.20	3605	DE
3810D	70.50	15.00	2.93	0.23	0.60	1.70	5.20	3.60	0.15	0.34	0.14	0.09	0.09	100.57	3606	DE
3810E	56.60	16.70	9.46	0.05	2.50	5.00	4.70	2.20	0.46	1.76	0.53	0.18	0.07	100.21	3609	DE
3810F	56.70	16.30	8.90	0.05	2.80	5.50	4.80	1.50	1.48	1.74	0.52	0.16	0.16	100.61	3610	DE
3811	46.64	17.70	8.00	3.74	6.84	9.57	3.37	0.82	0.30	1.69	0.63	0.18	0.21	99.69	M126459	HE,LE,MC,GA,JT
3811C	55.60	16.10	3.97	4.97	3.40	6.60	4.60	1.50	0.72	1.90	0.56	0.17	0.15	100.24	3599	DE
3813	49.23	15.65	3.51	6.61	7.10	10.96	3.09	0.93	0.12	1.21	0.77	0.18	0.08	99.44	M124442	BF,BK,JT,SN
3814	46.72	11.88	8.85	1.90	12.08	10.95	1.42	0.95	1.68	1.83	0.48	0.16	0.44	99.34	M124454	BF,BK,JT,SN
3815	47.86	16.44	3.18	6.68	8.00	11.33	2.81	0.72	0.29	1.22	0.84	0.18	0.04	99.59	M126462	HE,LE,MC,GA,JT

3815A	47.50	16.00	3.20	7.11	7.60	11.40	3.10	0.80	0.16	1.38	0.76	0.20	0.05	99.26	3125	DE
3817	49.00	16.40	1.60	8.00	8.10	10.70	2.70	0.77	0.54	1.30	0.73	0.14	0.02	100.00	W179993	HS
3817A	46.85	16.18	4.39	5.72	8.27	11.18	2.32	0.66	1.66	1.33	0.84	0.18	0.47	100.05	M124470	BF,BK,JT,SN
3818	47.69	12.71	2.62	7.09	12.33	11.50	1.98	0.69	0.47	1.37	0.61	0.17	0.11	99.34	M124453	BF,BK,JT,SN
3821B	46.90	16.20	10.40	1.35	6.70	9.80	2.80	1.30	0.86	2.33	0.52	0.20	0.05	99.41	3037	DE
3822B	46.91	15.79	12.15	0.21	5.96	11.85	3.02	0.91	0.38	2.19	0.75	0.18	0.22	100.52	M124451	BF,BK,JT,SN
3823A	48.20	14.40	3.70	7.38	8.70	10.30	3.30	0.80	0.26	1.91	0.44	0.19	0.06	99.64	3121	DE
3824	46.80	16.10	2.60	8.37	8.40	10.40	3.40	0.90	0.28	1.92	0.46	0.20	0.05	99.88	3119	DE
3824A	46.20	16.20	3.20	7.38	7.80	9.60	3.60	0.90	2.13	1.80	0.44	0.18	0.05	99.48	3123	DE
3826	48.00	15.20	6.50	5.13	7.40	10.40	3.30	1.20	0.17	2.38	0.51	0.19	0.05	100.43	3109	DE
3827	48.60	17.40	3.50	6.95	6.00	10.40	3.30	1.10	0.34	1.32	0.95	0.21	0.11	100.18	3029	DE
3828	49.60	14.90	2.70	6.93	7.90	12.20	2.70	0.90	0.35	1.13	0.85	0.21	0.05	100.42	3021	DE
3828C	48.50	15.80	6.00	3.96	7.40	11.80	2.50	1.00	0.59	1.15	0.86	0.20	0.05	99.81	3024	DE
3828E	48.00	16.30	6.90	4.04	6.70	10.70	3.20	1.10	0.60	2.28	0.50	0.20	0.06	100.58	3026	DE
3828F	47.50	16.20	5.00	5.85	7.20	10.50	2.80	1.20	0.19	2.30	0.52	0.19	0.05	99.50	3027	DE
3828G	50.10	17.90	3.40	6.71	5.10	9.30	3.60	1.20	0.50	1.41	0.97	0.21	0.05	100.45	3032	DE
3828H	48.80	17.40	3.80	6.74	5.30	9.30	3.20	1.10	1.00	1.42	1.00	0.21	0.05	99.32	3033	DE
3828J	48.60	17.80	5.80	5.04	4.90	9.10	3.90	1.20	0.27	1.39	0.97	0.21	0.05	99.23	3036	DE
3828K	47.00	15.90	2.20	8.54	8.20	10.60	3.70	1.20	0.26	2.27	0.57	0.20	0.05	100.69	3042	DE
3829A	49.90	18.00	4.80	5.45	5.30	9.40	3.50	1.20	0.41	1.35	0.92	0.21	0.05	100.49	3034	DE
3829B	49.90	18.30	2.50	7.52	5.40	9.60	3.00	1.10	0.57	1.34	0.96	0.21	0.05	100.45	3039	DE
3829D	49.80	17.70	10.40	0.45	5.40	9.40	3.40	1.20	0.38	1.30	0.94	0.21	0.05	100.63	3041	DE
3832	60.70	17.20	2.10	3.69	2.10	4.60	4.70	2.60	0.57	1.13	0.39	0.11	0.05	99.94	3015	DE
3833	54.82	16.78	9.52	0.00	3.60	6.21	4.00	1.77	0.00	1.67	0.35	0.13	0.00	98.85	M139275	GK
3833A	46.70	15.90	4.40	6.75	7.40	10.60	3.40	1.20	0.43	2.36	0.58	0.20	0.05	99.97	3019	DE
3835A	55.60	14.40	4.30	4.05	4.50	8.90	3.70	2.00	0.24	0.95	0.62	0.17	0.05	99.48	3108	DE
3836	46.66	18.00	11.62	0.00	7.00	10.12	3.05	0.76	0.48	1.70	0.44	0.17	0.12	100.12	M126433	HE,LE,MC,GA,JT
3906	52.50	18.20	10.20	0.68	3.30	6.50	3.20	1.00	1.97	2.00	0.42	0.14	0.02	100.13	W179963	HS
3911	46.12	14.93	4.45	6.47	9.45	11.42	2.81	0.84	0.44	1.86	0.47	0.18	0.10	99.54	M126456	HE,LE,MC,GA,JT
3911A	47.45	12.46	2.40	7.80	12.60	12.28	2.14	0.41	0.36	1.24	0.45	0.17	0.12	99.88	M124437	BF,BK,JT,SN
3912	48.92	15.95	8.25	2.85	7.29	10.32	3.11	0.69	0.27	1.50	0.52	0.17	0.08	99.92	M124436	JT,SN
3912A	50.31	17.71	11.27	0.00	6.10	8.77	3.30	1.05	0.00	1.79	0.43	0.16	0.00	100.89	M138225	SK
3915	52.80	18.30	8.80	0.24	3.60	7.90	4.30	1.50	0.67	1.30	0.68	0.13	0.12	100.34	W179972	HS
3915A	53.30	18.70	3.47	5.39	3.34	6.96	4.34	1.36	0.37	1.35	0.72	0.15	0.06	99.51	3633	DE
3916	47.10	15.10	3.20	8.20	10.60	10.00	2.70	0.51	0.60	1.40	0.49	0.17	0.06	100.13	W179975	HS
3917	47.80	16.20	2.10	9.20	8.90	9.70	2.90	0.71	0.47	1.80	0.41	0.15	0.02	100.36	W179971	HS
3919	47.90	15.80	11.90	0.05	7.90	9.90	3.60	0.80	0.09	1.87	0.39	0.19	0.05	100.44	3116	DE
3920A	58.30	15.24	1.91	4.49	4.00	6.43	3.88	2.58	0.86	0.74	0.44	0.13	0.17	99.17	M124443	BF,BK,JT,SN
3920B	46.28	15.54	5.50	5.83	8.17	12.16	2.51	0.59	0.37	1.20	0.84	0.19	0.05	99.23	M124444	BF,BK,JT,SN

TABLE 2. COMPLETE ANALYSES OF OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO[1]	MgO	CaO	Na_2O	K_2O	H_2O[2]	TiO_2	P_2O_5	MnO[2]	CO_2[2]	Total	Lab. No.	Analysts[3]
3922A	50.40	18.00	3.00	6.30	5.50	8.70	4.00	1.50	0.60	1.70	0.59	0.12	0.07	100.48	W179988	HS
3923	47.23	13.42	9.34	2.00	10.21	11.56	2.27	0.77	0.22	1.85	0.50	0.17	0.21	99.75	M124438	BF,BK,JT,SN
3925	45.89	14.52	4.09	6.05	9.43	11.87	3.01	1.24	0.60	1.70	0.81	0.17	0.41	99.79	M126458	HE,LE,MC,GA,JT
3926	47.06	14.83	10.56	1.03	7.68	11.20	2.57	0.95	0.28	1.95	0.73	0.17	0.19	99.20	M124455	BF,BK,JT,SN
3927	46.69	13.90	6.33	4.51	11.52	12.06	1.52	0.33	0.41	1.34	0.54	0.17	0.17	99.49	M124469	BF,BK,JT,SN
3928A	46.90	15.10	5.50	4.86	9.80	11.80	2.70	0.70	0.58	1.34	0.54	0.20	0.05	100.07	3115	DE
3929	47.60	15.40	3.30	7.83	8.80	10.50	3.40	0.90	0.17	2.12	0.48	0.19	0.05	100.74	3112	DE
3930	46.80	16.90	10.80	0.99	8.10	9.90	3.30	0.80	0.36	1.94	0.42	0.19	0.05	100.55	3118	DE
3931	48.80	15.00	3.30	7.29	8.30	10.60	3.10	0.70	0.51	1.68	0.50	0.20	0.05	100.03	3111	DE
3931A	53.36	16.05	8.33	0.57	5.41	8.24	3.69	1.91	0.25	1.50	0.55	0.14	0.11	100.11	M124463	BF,BK,JT,SN
3934	51.66	18.73	3.07	5.81	5.16	8.20	3.97	1.20	0.31	1.52	0.27	0.13	0.04	100.07	M126463	HE,LE,MC,GA,JT
3935	53.10	17.50	2.80	5.40	4.70	7.50	4.00	1.30	0.92	1.60	0.65	0.13	0.05	99.65	W179991	HS
3A06	46.04	16.41	4.17	8.28	7.81	10.71	2.81	0.71	0.42	2.14	0.45	0.19	0.05	100.19	1473	DE,PL,JM,SV
3A15	47.49	16.88	3.16	8.10	6.61	9.51	3.58	0.97	0.61	1.92	0.41	0.16	0.51	99.91	2002	DE
3A17	48.00	14.40	2.80	7.50	10.40	10.30	2.80	1.10	0.63	1.62	0.46	0.17	0.06	100.24	679	RS,DE,PL
3A28	46.85	16.12	2.64	8.37	7.94	9.88	2.91	1.12	1.10	2.17	0.50	0.17	0.25	100.02	2005	DE
3A28A	48.14	16.99	4.43	7.16	6.61	8.95	3.76	0.90	0.51	1.95	0.43	0.17	0.07	100.07	2006	DE
3A29	46.70	15.70	2.40	8.30	9.10	11.10	2.90	0.80	0.92	1.41	0.57	0.19	0.00	100.09	685	RS,DE,PL
3A30	47.90	14.60	2.20	8.60	8.70	11.00	2.90	0.70	0.51	1.64	0.58	0.19	0.00	99.52	686	RS,DE,PL
3A31	48.00	15.50	4.10	6.80	9.00	10.80	2.60	0.80	0.79	1.52	0.63	0.18	0.05	100.77	710	RS,DE,PL
3A33	51.90	16.60	3.52	6.03	6.47	7.86	3.98	1.35	0.22	1.59	0.46	0.14	0.13	100.25	3666	DE
4004	46.73	15.89	3.21	7.90	8.82	10.39	3.03	1.72	0.46	1.42	0.62	0.17	0.43	100.79	1463	DE,PL,JM,SV
4008	48.11	16.47	2.57	8.37	7.95	9.44	3.35	0.95	0.13	2.15	0.36	0.16	0.05	100.06	1465	DE,PL,JM,SV
4010	47.01	16.95	12.79	0.00	6.58	9.06	3.18	0.97	0.00	2.32	0.43	0.17	0.00	99.46	M139274	GK
4011	48.11	16.46	5.16	6.66	6.75	9.32	3.68	1.08	0.37	2.32	0.48	0.15	0.05	100.59	1461	DE,PL,JM,SV
4017	48.00	16.47	2.70	8.73	7.68	9.29	3.35	1.03	0.22	2.14	0.38	0.16	0.05	100.20	1466	DE,PL,JM,SV
4018	47.19	15.35	2.47	8.19	8.82	11.05	2.81	0.95	0.26	2.15	0.47	0.17	0.05	99.93	1467	DE,PL,JM,SV
4031	52.12	16.24	2.60	9.00	4.02	6.86	4.01	1.56	0.68	2.20	0.70	0.18	0.25	100.42	M126461	HE,LE,MC,GA,JT
4802	54.70	17.40	3.60	5.00	2.50	5.30	5.00	2.20	1.10	1.50	0.91	0.14	0.09	99.44	W179983	HS
4816	46.40	16.16	3.81	7.50	8.75	10.85	3.24	0.71	0.36	1.66	0.49	0.18	0.24	100.35	M126450	HE,LE,MC,GA,JT
4826	67.30	16.30	1.20	3.11	0.60	2.50	5.70	2.80	0.16	0.41	0.18	0.15	0.00	100.41	2693	PL,TD,SV,JM,RS
4833	62.35	15.75	2.05	4.09	1.90	3.95	4.90	2.86	0.68	1.13	0.35	0.13	0.03	100.17	M131426	MV,BK,PK
4834	65.30	16.70	1.50	2.60	0.68	2.60	5.00	2.90	2.21	0.39	0.24	0.11	0.02	100.25	W179979	HS

4834A	59.12	16.90	2.30	4.60	2.20	4.90	4.70	2.40	0.97	1.30	0.45	0.10	0.04	99.98	W179986	HS
4834B	67.50	15.90	2.30	1.98	0.40	2.20	5.70	3.00	0.42	0.32	0.18	0.14	0.05	100.09	2696	PL,TD,SV,JM,RS
4836	49.92	16.88	11.75	0.19	4.66	8.40	3.70	0.82	0.37	1.73	0.80	0.18	0.13	99.53	M124450	BF,BK,JT,SN
4836A	51.55	17.23	3.69	6.59	4.08	7.47	4.05	1.41	0.38	1.88	0.52	0.16	0.16	99.17	M124447	BF,BK,JT,SN
4836B	47.49	12.12	9.96	0.62	14.02	9.57	1.92	0.96	1.33	1.28	0.69	0.17	0.43	100.56	M124452	BF,BK,JT,SN
4836C	69.70	14.70	1.00	1.67	0.30	1.30	5.00	3.90	1.84	0.13	0.07	0.10	0.05	99.76	2694	PL,TD,SV,JM,RS
4903	46.80	16.50	5.50	6.40	7.30	9.70	3.50	1.00	1.20	2.40	0.50	0.15	0.02	100.97	W179976	HS
4903A	51.70	18.00	4.10	6.10	4.00	7.10	4.00	1.30	0.87	2.00	0.51	0.12	0.06	99.86	W179990	HS
4920	58.91	15.81	1.73	4.69	4.04	6.26	3.90	2.64	0.34	0.91	0.43	0.12	0.02	99.80	M124467	BF,BK,JT,SN
4920A	62.82	15.42	0.92	3.69	2.54	4.28	4.27	3.27	1.20	0.62	0.27	0.10	0.04	99.44	M124464	BF,BK,JT,SN
4920B	74.68	13.53	1.24	0.91	0.67	4.35	4.22	0.22	0.23	0.19	0.04	0.03	0.04	100.35	M131438	MV,BK,PK
4920C	49.19	14.39	4.51	5.56	8.69	11.37	2.95	0.91	0.25	1.25	0.60	0.17	0.05	99.89	M131439	MV,BK,PK
4922	45.70	16.60	4.60	8.20	6.40	9.20	3.20	0.94	0.57	2.50	0.43	0.16	0.15	98.65	W179982	HS
4929	59.30	16.60	1.80	4.90	3.90	6.40	3.80	2.30	0.69	0.98	0.21	0.10	0.04	101.02	W179964	HS
4930	52.06	17.69	3.87	6.51	4.12	7.26	4.18	1.40	0.33	1.86	0.48	0.16	0.21	100.13	M126460	HE,LE,MC,GA,JT
4A33A	50.93	18.89	2.34	6.66	4.79	7.86	4.23	1.38	0.56	1.27	0.54	0.15	0.12	99.72	2004	DE
4A34	44.60	14.80	2.97	8.38	9.23	11.59	3.59	1.10	0.54	2.34	0.58	0.20	0.44	100.36	3670	DE
5033	47.65	16.42	2.31	8.91	7.87	9.78	3.35	0.95	0.22	1.87	0.36	0.15	0.06	99.90	1464	DE,PL,JM,SV
5035	46.96	16.20	2.45	8.19	8.87	11.22	2.71	0.74	0.20	1.64	0.34	0.19	0.16	99.87	1483	DE,PL,JM,SV
5824	49.70	17.30	3.70	7.40	4.10	6.60	5.00	1.30	0.76	2.60	0.54	0.12	0.08	99.20	W179989	HS
5913	48.20	16.40	2.60	7.30	7.60	12.00	3.10	0.85	0.72	1.40	0.71	0.15	0.12	101.15	W179968	HS
5919	49.40	18.10	2.70	8.60	4.20	7.00	5.00	1.40	0.92	2.80	0.66	0.13	0.03	100.94	W179994	HS
5923	48.41	16.24	2.79	7.14	7.11	10.93	3.24	0.94	0.26	1.38	0.85	0.18	0.26	99.73	M126452	HE,LE,MC,GA,JT
5926	47.70	17.20	3.50	9.30	5.70	8.10	3.80	1.20	0.67	3.40	0.58	0.16	0.08	101.39	W179965	HS
5933	46.09	14.31	10.25	0.29	9.24	12.39	2.86	0.96	0.47	1.83	0.61	0.17	0.13	99.60	M126453	HE,LE,MC,GA,JT

[1]0.00, total iron was determined by X-ray fluorescence and reported as Fe_2O_3.

[2]0.00, not determined.

[3]Analysts:

BK = Bi-Shia King
BF = B. P. Fabbi
DE = D. J. Emmons
GA = Gil Ambats
GK = G. M. Kawakita
HE = H. Neil Elsheimer
JT = J. Tillman
HR = H. H. Robinson (1913)
HS = Hezekiah Smith
JM = J. McElfresh
PK = Paul Klock
LE = L. Espos
MC = Marcelyn Cremer
MV = M. Villarreal
TD = T. DeRosa
PL = P. Longmore
RS = R. L. Swenson
SK = S. Kramer
SN = Sarah Neil
SV = S. Vendela

TABLE 3. ADJUSTED ANALYSES OF MAJOR OXIDES IN WEIGHT PERCENT, EAST MAP AREA

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO[1]
0002	49.88	16.66	1.62	8.20	6.72	9.97	3.71	0.90	1.61	0.51	0.21
0003	50.39	16.93	1.57	7.92	6.55	9.80	3.83	1.01	1.41	0.42	0.15
1002	48.18	16.47	1.75	9.21	8.03	9.47	3.35	0.81	1.99	0.54	0.19
1004	48.35	15.25	1.71	9.17	9.42	10.24	2.53	0.84	1.74	0.56	0.17
1005	47.74	16.11	1.79	9.51	8.62	9.73	3.04	0.81	2.01	0.44	0.19
1007	45.87	15.73	1.79	9.79	10.17	10.81	2.41	0.71	2.09	0.40	0.20
1009	46.82	14.77	1.78	9.52	10.15	10.42	2.81	0.90	2.25	0.37	0.20
1013	49.62	16.31	1.60	8.15	6.34	9.15	4.33	1.71	1.94	0.64	0.20
1014	46.50	13.88	1.83	9.91	11.35	10.67	2.33	0.91	1.94	0.47	0.20
1019	47.03	13.47	1.61	8.58	12.46	11.79	2.31	0.70	1.41	0.46	0.17
1028	48.77	14.35	1.58	8.15	10.94	10.57	2.81	0.90	1.30	0.45	0.17
1028A	46.86	13.52	1.59	8.47	12.62	11.65	2.70	0.70	1.30	0.42	0.17
1033	49.08	16.53	1.68	8.62	7.01	10.45	3.71	0.80	1.50	0.45	0.16
1802	48.96	17.70	1.72	8.91	5.97	10.04	3.54	0.61	1.85	0.50	0.19
1805	48.50	16.53	1.66	8.60	7.72	10.16	3.31	0.90	1.80	0.63	0.19
1805A	46.59	17.83	1.75	9.41	7.11	9.76	3.81	0.80	2.05	0.68	0.20
1809	49.46	17.99	1.73	8.77	6.10	9.42	3.40	0.70	1.80	0.46	0.17
1904	47.75	16.34	1.91	10.01	6.92	9.00	4.11	1.09	2.11	0.54	0.18
1904B	58.01	15.81	1.22	5.27	4.43	7.51	3.73	2.41	0.99	0.51	0.10
1910B	48.07	16.39	1.80	9.41	7.34	9.49	3.52	1.01	2.18	0.60	0.19
1910C	53.74	13.66	1.44	6.79	7.63	9.28	3.62	1.71	1.51	0.48	0.14
1910E	47.17	16.91	1.92	10.28	6.72	9.00	3.87	1.12	2.13	0.63	0.23
1911	51.71	17.74	1.63	7.99	5.21	7.85	4.11	1.50	1.70	0.40	0.15
1912	45.63	15.74	1.80	9.83	10.13	10.35	2.91	0.90	2.12	0.38	0.21
1914	47.99	16.35	1.75	9.10	7.28	10.11	3.69	0.90	2.10	0.56	0.17
1914A	48.98	16.93	1.65	8.52	5.95	11.43	3.73	0.71	1.51	0.42	0.17
1914B	48.57	16.02	1.71	8.86	7.31	10.15	3.61	1.00	2.00	0.59	0.16
1914D	48.37	15.44	1.77	9.36	7.71	9.96	3.46	1.02	2.08	0.64	0.17
1924	46.68	17.43	1.71	9.17	7.11	10.65	3.31	1.00	2.19	0.56	0.17
1A05	50.80	16.42	1.63	8.25	6.32	8.47	3.98	1.53	1.77	0.64	0.18
1A17	48.43	16.28	1.69	8.84	7.58	9.64	3.54	1.20	1.97	0.61	0.19
1B06	46.92	13.39	1.64	8.76	11.48	11.20	3.02	1.01	1.90	0.48	0.19

2001	48.77	15.65	1.71	8.88	8.48	10.44	2.93	0.81	1.50	0.64	0.19
2003	48.53	15.24	1.62	8.42	8.72	11.43	2.91	0.90	1.43	0.59	0.18
2003A	49.79	15.93	1.61	8.17	7.31	10.57	3.11	1.09	1.42	0.80	0.17
2004	50.17	14.70	1.52	7.72	9.02	10.83	2.94	1.11	1.23	0.59	0.16
2005	48.02	16.04	1.57	8.25	8.58	11.63	2.82	0.91	1.45	0.54	0.17
2006	47.60	17.57	1.74	9.22	6.85	10.35	3.44	0.79	1.78	0.48	0.18
2008	49.67	17.94	1.73	8.87	5.17	8.45	4.05	1.42	1.74	0.78	0.17
2008A	50.84	17.95	1.63	8.13	4.64	7.79	4.86	1.50	1.68	0.81	0.14
2011	47.88	12.68	1.53	8.02	12.88	12.41	2.21	0.50	1.05	0.67	0.17
2012A	48.02	13.58	1.56	8.13	11.78	12.02	2.50	0.60	1.09	0.56	0.17
2014	47.25	13.05	1.59	8.49	12.45	11.71	2.33	0.81	1.67	0.47	0.19
2016	45.73	14.97	1.73	9.45	10.72	10.95	2.63	0.81	2.33	0.51	0.17
2016A	49.99	17.40	1.76	8.86	5.20	8.92	4.00	1.30	1.64	0.76	0.17
2019	52.57	18.06	1.59	7.73	4.54	7.20	4.33	1.61	1.61	0.59	0.15
2019A	51.68	18.44	1.55	7.67	4.86	8.35	4.14	1.11	1.52	0.52	0.14
2021	49.19	17.75	1.82	9.40	5.48	8.15	4.36	1.01	2.19	0.46	0.19
2023A	47.43	13.18	1.61	8.57	11.86	11.61	2.33	0.91	1.81	0.49	0.19
2024	50.23	14.14	1.41	7.11	10.73	11.17	2.61	0.90	1.13	0.39	0.18
2024A	46.08	13.87	1.72	9.38	10.63	11.16	2.94	1.11	2.31	0.59	0.20
2025	45.73	15.58	1.92	10.47	9.65	10.39	2.71	0.80	2.16	0.37	0.21
2027	45.88	14.41	1.72	9.41	10.45	11.26	3.25	0.61	2.22	0.60	0.17
2030	51.28	18.49	1.58	7.75	5.20	8.13	3.70	1.60	1.60	0.53	0.14
2031A	50.43	17.32	1.65	8.34	6.18	9.04	3.75	1.01	1.72	0.38	0.17
2031B	50.99	18.48	1.61	8.00	5.15	8.11	3.94	1.31	1.66	0.59	0.17
2801	47.31	15.00	1.81	9.59	7.75	10.50	3.52	1.31	2.47	0.52	0.20
2805	55.89	16.99	1.65	7.46	2.21	5.56	5.13	2.11	2.29	0.54	0.17
2809	48.00	17.28	1.80	9.47	5.96	9.53	3.64	1.20	2.38	0.54	0.19
2809A	47.42	16.21	1.79	9.52	7.45	9.40	3.83	1.20	2.40	0.57	0.20
2811	48.20	15.77	1.83	9.54	6.73	9.67	3.51	1.41	2.61	0.52	0.20
2812	58.32	14.95	1.38	5.84	4.77	7.01	3.79	2.29	1.14	0.35	0.15
2812A	49.74	15.94	1.88	9.50	5.92	9.36	3.71	1.00	2.24	0.52	0.20
2813	47.43	14.06	1.74	9.25	10.01	11.67	2.53	0.71	1.92	0.49	0.20
2813A	48.41	15.97	1.90	9.91	6.37	9.42	3.23	1.31	2.69	0.57	0.20
2815	51.98	16.68	1.83	9.01	3.15	6.04	5.90	2.24	1.67	1.30	0.20
2815A	52.54	16.00	1.47	7.10	6.74	8.59	3.72	1.61	1.37	0.67	0.18
2815B	48.28	15.89	1.70	8.87	8.54	9.59	3.12	1.31	1.96	0.54	0.18
2815C	48.55	15.95	1.68	8.69	8.63	9.36	3.21	1.30	1.90	0.56	0.18
2822	52.52	15.85	1.50	7.32	6.30	8.37	4.27	1.73	1.28	0.69	0.18
2825	45.97	15.86	1.77	9.59	9.74	10.78	2.61	0.70	2.01	0.78	0.20

TABLE 3. ADJUSTED ANALYSES OF MAJOR OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO[1]
2825A	46.13	15.71	1.73	9.40	10.27	10.86	2.72	0.71	1.98	0.27	0.20
2825D	46.71	15.77	1.79	9.52	9.28	10.52	2.99	0.80	2.13	0.29	0.20
2825E	46.68	16.26	1.82	9.74	9.24	10.28	2.71	0.70	2.09	0.29	0.20
2825G	49.42	16.47	1.87	9.52	5.93	8.16	4.22	1.20	2.19	0.78	0.22
2834	48.37	17.34	1.70	8.79	7.18	9.91	3.49	0.70	1.84	0.49	0.19
2834A	48.28	16.49	1.68	8.74	7.80	9.83	3.60	0.90	1.84	0.66	0.19
2835	49.47	17.54	1.65	8.55	6.63	10.13	2.96	0.61	1.74	0.52	0.18
2836A	50.34	16.75	1.84	9.24	5.45	8.01	3.93	1.20	2.19	0.82	0.21
2836B	48.90	16.59	1.89	9.78	5.94	8.09	4.33	1.20	2.25	0.81	0.21
2903	49.65	17.45	1.81	9.23	5.70	8.03	4.07	1.23	2.10	0.56	0.17
2905	57.34	15.63	1.32	5.85	5.48	7.84	3.04	2.03	1.01	0.36	0.10
2909A	46.23	17.36	1.69	9.08	8.09	11.52	3.00	0.60	1.78	0.46	0.20
2909B	47.02	17.58	1.68	8.92	7.43	11.39	2.91	0.70	1.73	0.42	0.20
2910	51.72	18.85	1.47	7.28	5.27	8.47	3.75	1.12	1.62	0.32	0.10
2915	50.83	16.83	1.72	8.66	6.19	9.16	2.84	1.12	1.85	0.57	0.20
2915A	48.70	16.97	1.85	9.54	6.12	9.57	3.51	1.00	2.03	0.50	0.20
2918	46.71	14.73	1.53	8.23	8.67	11.94	3.13	2.41	1.54	0.89	0.20
2919	52.60	14.89	1.44	6.93	7.14	9.69	3.42	1.71	1.27	0.73	0.18
2919F	47.41	15.23	1.59	8.45	8.66	11.94	2.93	1.01	1.59	0.96	0.21
2919G	47.75	15.48	1.60	8.41	8.24	11.70	3.02	1.01	1.58	1.00	0.22
2919I	48.97	16.70	1.60	8.29	7.08	10.96	3.44	0.81	1.52	0.42	0.19
2919J	49.05	14.84	1.54	7.96	8.28	11.74	3.13	1.01	1.46	0.80	0.19
2926	47.44	17.32	1.76	9.34	6.45	10.80	3.63	0.81	1.81	0.47	0.18
2926A	47.31	17.98	1.84	9.73	6.23	8.88	4.12	1.00	2.31	0.43	0.17
2926B	47.78	17.39	1.76	9.21	6.20	10.53	3.90	0.80	1.80	0.47	0.17
2926C	48.18	17.58	1.76	9.29	6.30	10.40	3.15	0.81	1.85	0.48	0.19
2927	46.45	16.85	1.70	9.19	7.27	11.85	3.64	0.61	1.79	0.45	0.20
2927A	48.51	17.18	1.79	9.41	6.92	10.22	2.74	0.74	1.84	0.48	0.17
2929	47.41	14.80	1.55	8.27	9.34	12.65	2.87	0.75	1.38	0.79	0.18
2929B	54.43	15.21	1.37	6.34	6.50	9.04	3.40	1.80	1.14	0.59	0.17
2929D	54.72	15.22	1.33	6.16	6.05	8.70	3.93	2.02	1.12	0.59	0.17
2929E	67.87	15.43	0.79	2.69	1.20	2.56	4.94	3.73	0.45	0.23	0.10

2929G	52.25	15.01	1.41	6.83	7.41	10.04	3.30	1.60	1.26	0.69	0.19
2929H	66.51	15.89	0.85	3.05	1.42	2.77	4.95	3.75	0.50	0.21	0.10
2929I	64.46	15.79	0.90	3.35	2.72	3.86	4.42	3.52	0.58	0.29	0.11
2929J	55.45	15.50	1.31	5.97	5.64	8.29	3.92	2.11	1.09	0.56	0.17
2929K	47.64	15.48	1.56	8.24	8.79	12.43	2.53	0.91	1.51	0.73	0.18
2929L	56.79	15.57	1.31	5.74	5.19	7.62	3.79	2.19	1.06	0.57	0.16
2929N	45.57	14.62	1.70	9.35	9.88	11.73	2.92	1.11	2.36	0.54	0.21
2929O	47.05	17.55	1.74	9.54	8.00	10.42	2.49	0.61	1.54	0.81	0.23
2930	45.73	14.57	1.68	9.22	10.32	11.67	2.53	1.11	2.35	0.61	0.22
2931A	49.23	17.01	1.93	9.87	5.00	7.34	4.60	1.50	2.16	1.12	0.24
2932A	49.23	15.18	1.63	8.32	8.79	10.92	3.40	0.60	1.39	0.36	0.19
2933A	58.67	15.57	1.23	5.21	4.32	6.65	4.12	2.61	0.96	0.51	0.14
2935	47.89	17.43	1.73	9.07	7.01	10.76	3.01	0.70	1.74	0.46	0.20
2935B	47.40	16.97	1.81	9.50	6.49	9.62	3.49	1.40	2.60	0.53	0.20
2936	48.45	17.36	1.89	9.90	5.99	8.66	3.66	1.12	2.34	0.45	0.17
2A02A	51.48	14.73	1.80	9.00	6.67	8.35	3.61	1.30	2.04	0.84	0.17
2A06	49.04	15.13	1.51	7.81	9.04	11.17	3.24	0.69	1.56	0.63	0.17
2A07A	50.17	17.11	1.59	8.02	6.71	9.85	3.61	0.90	1.35	0.48	0.19
2A12	48.05	15.45	1.68	9.02	8.29	10.79	2.66	1.08	2.05	0.73	0.19
2A18A	50.87	15.68	1.60	7.96	8.34	9.11	3.32	1.11	1.39	0.45	0.18
2A20	50.57	16.61	1.62	8.14	6.25	10.51	3.63	0.81	1.30	0.37	0.18
2A23B	49.13	14.76	1.60	8.37	9.30	10.74	2.75	0.96	1.62	0.58	0.16
3002	50.29	17.25	1.78	9.02	5.18	8.23	4.01	1.36	2.21	0.48	0.18
3006	47.65	15.58	1.79	9.54	8.59	11.13	2.62	0.54	1.72	0.66	0.17
3006A	48.16	18.47	1.73	9.01	6.52	9.48	3.55	0.77	1.64	0.50	0.17
3008	47.02	15.35	1.75	9.33	9.63	11.40	2.62	0.56	1.68	0.45	0.21
3011	45.27	14.32	1.71	9.46	10.49	12.01	2.46	1.13	2.49	0.46	0.19
3011A	46.95	16.57	1.81	9.66	7.89	10.79	2.84	0.72	2.15	0.43	0.19
3013	46.29	17.11	1.82	9.84	8.03	10.74	2.89	0.57	2.06	0.45	0.19
3013A	47.31	16.39	1.78	9.42	7.97	10.67	2.87	0.71	2.18	0.48	0.19
3014	46.90	16.49	1.78	9.53	7.88	11.07	2.83	0.72	2.15	0.44	0.20
3016	50.36	17.15	1.74	8.70	5.68	8.76	4.00	1.09	1.84	0.51	0.16
3018	52.30	16.69	1.70	8.20	5.47	7.74	3.98	1.55	1.71	0.50	0.17
3018A	52.38	16.03	1.75	8.51	5.60	7.98	3.68	1.57	1.82	0.52	0.17
3024	48.05	16.08	1.82	9.54	7.34	9.49	3.62	1.11	2.31	0.46	0.18
3024A	45.73	17.01	1.83	10.09	7.94	10.29	3.36	0.92	1.76	0.88	0.19
3026	45.47	15.36	1.82	9.90	8.28	11.07	3.49	1.30	2.50	0.61	0.19
3026A	45.77	15.19	1.81	9.85	8.65	10.77	3.32	1.31	2.52	0.61	0.18
3026C	51.93	15.51	1.38	6.85	8.26	10.02	2.89	1.25	1.31	0.47	0.14

TABLE 3. ADJUSTED ANALYSES OF MAJOR OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO[1]
3026D	47.97	16.16	1.80	9.45	7.63	9.41	3.71	1.08	2.08	0.56	0.15
3027	46.11	16.34	1.87	10.19	7.72	11.65	2.84	0.61	1.94	0.51	0.20
3028	44.41	14.37	1.79	9.98	10.04	12.29	2.71	1.20	2.46	0.54	0.19
3028A	45.75	14.91	1.79	9.83	9.91	12.01	2.66	1.02	1.39	0.54	0.19
3028B	45.26	14.21	1.79	9.90	8.57	13.04	2.92	1.20	2.34	0.52	0.22
3029	48.25	15.81	1.73	9.05	8.76	10.21	3.42	0.71	1.28	0.57	0.19
3031	49.45	14.24	1.44	7.43	10.16	11.08	2.80	1.19	1.37	0.67	0.17
3032	45.81	15.67	1.77	9.64	8.74	11.48	2.81	1.00	2.26	0.61	0.19
3032A	45.56	15.12	1.81	9.91	8.87	11.83	2.82	1.01	2.27	0.61	0.18
3032B	49.50	16.20	1.61	8.17	6.60	9.94	3.80	1.50	1.74	0.76	0.18
3034	47.44	14.58	1.63	8.57	11.38	10.52	2.80	1.00	1.49	0.44	0.16
3034A	46.11	15.18	1.71	9.28	9.35	11.02	3.05	1.20	2.38	0.51	0.20
3035	47.07	15.86	1.74	9.27	8.69	11.21	3.03	0.81	1.54	0.61	0.18
3036A	47.26	15.92	1.72	9.07	9.25	11.08	2.79	0.70	1.53	0.49	0.19
3801	47.47	14.19	1.69	8.87	11.29	10.63	3.00	0.70	1.49	0.48	0.19
3802	51.31	17.74	1.81	8.91	4.41	7.39	4.31	1.00	1.88	1.04	0.19
3802B	67.56	16.60	0.97	3.37	0.52	2.04	5.08	3.35	0.35	0.13	0.00
3802C	68.95	15.94	0.87	2.87	0.40	1.74	5.61	3.11	0.25	0.12	0.14
3802D	51.38	17.80	1.84	9.10	4.32	7.18	4.12	1.20	1.95	0.90	0.20
3803D	68.12	15.70	0.92	3.11	0.80	2.19	5.74	2.82	0.33	0.15	0.13
3805	53.81	17.27	1.76	8.39	3.21	6.07	4.83	1.76	2.07	0.65	0.17
3805A	47.71	14.36	1.75	9.25	10.14	11.18	2.68	0.65	1.61	0.48	0.17
3808	49.93	18.99	1.73	8.90	4.74	8.54	3.88	0.82	1.71	0.57	0.17
3809B	72.21	15.49	0.58	1.77	0.09	0.94	4.95	3.75	0.11	0.05	0.05
3809C	47.96	18.21	1.85	9.78	5.52	9.38	3.49	0.79	2.04	0.79	0.18
3810	48.89	17.36	1.66	8.58	6.67	10.43	3.23	0.91	1.29	0.79	0.18
3810B	62.56	16.20	1.23	5.00	1.95	3.87	4.82	2.67	1.19	0.35	0.14
3810C	57.42	17.10	1.52	6.71	2.73	5.41	4.86	1.82	1.72	0.51	0.17
3810D	70.51	15.00	0.71	2.22	0.60	1.59	5.20	3.60	0.34	0.14	0.09
3810E	57.29	16.90	1.63	7.20	2.53	4.97	4.76	2.22	1.78	0.54	0.18
3810F	57.85	16.63	1.54	6.83	2.86	5.40	4.89	1.53	1.78	0.53	0.16
3811	47.46	18.01	1.78	9.51	6.96	9.47	3.43	0.83	1.72	0.64	0.18

3811C	56.20	16.27	1.60	7.20	3.44	6.48	4.64	1.52	1.92	0.57	0.17
3813	49.75	15.82	1.65	8.39	7.18	10.97	3.12	0.94	1.22	0.78	0.18
3814	48.71	12.39	1.65	8.79	12.59	10.83	1.48	0.99	1.91	0.50	0.17
3815	48.33	16.59	1.57	8.21	8.08	11.39	2.84	0.73	1.23	0.85	0.18
3815A	48.07	16.19	1.64	8.62	7.69	11.47	3.14	0.81	1.40	0.77	0.20
3817	49.30	16.50	1.57	8.07	8.15	10.74	2.72	0.77	1.31	0.73	0.14
3817A	48.29	16.68	1.60	8.51	8.52	10.91	2.38	0.68	1.37	0.87	0.19
3818	48.41	12.90	1.56	8.17	12.52	11.53	2.01	0.70	1.39	0.61	0.17
3821B	48.07	16.60	1.76	9.38	6.87	9.98	2.87	1.33	2.38	0.53	0.21
3822B	47.58	16.02	1.82	9.66	6.05	11.74	3.06	0.92	2.22	0.76	0.18
3823A	48.67	14.54	1.77	9.21	8.78	10.32	3.33	0.81	1.93	0.44	0.19
3824	47.09	16.20	1.73	9.21	8.45	10.40	3.42	0.91	1.93	0.46	0.20
3824A	47.60	16.69	1.68	9.04	8.04	9.82	3.71	0.93	1.85	0.45	0.19
3826	48.16	15.25	1.80	9.39	7.42	10.37	3.31	1.20	2.38	0.51	0.19
3827	48.90	17.51	1.67	8.64	6.04	10.32	3.32	1.11	1.33	0.96	0.21
3828	49.68	14.92	1.57	7.95	7.91	12.16	2.70	0.90	1.13	0.85	0.21
3828C	49.17	16.02	1.56	8.07	7.50	11.90	2.53	1.01	1.17	0.87	0.20
3828E	48.34	16.41	1.68	8.79	6.75	10.70	3.22	1.11	2.30	0.50	0.20
3828F	48.05	16.39	1.70	8.92	7.28	10.56	2.83	1.20	2.33	0.53	0.19
3828G	50.27	17.96	1.66	8.30	5.12	9.27	3.61	1.20	1.41	0.97	0.21
3828H	49.80	17.76	1.71	8.82	5.41	9.42	3.27	1.12	1.45	1.02	0.21
3828J	49.38	18.08	1.72	8.87	4.98	9.17	3.96	1.22	1.41	0.99	0.21
3828K	46.88	15.86	1.69	8.97	8.17	10.51	3.69	1.20	2.26	0.57	0.20
3829A	50.08	18.07	1.65	8.30	5.32	9.37	3.51	1.20	1.35	0.92	0.21
3829B	50.07	18.35	1.65	8.30	5.42	9.57	3.01	1.09	1.34	0.96	0.21
3829D	50.17	17.83	1.66	8.38	5.44	9.41	3.43	1.20	1.31	0.95	0.21
3832	61.22	17.34	1.14	4.60	2.12	4.57	4.74	2.62	1.14	0.39	0.11
3833	55.92	17.11	1.59	7.29	3.67	6.33	4.08	1.81	1.70	0.36	0.13
3833A	47.10	16.04	1.73	9.24	7.46	10.63	3.43	1.20	2.38	0.58	0.20
3835A	56.25	14.57	1.48	6.68	4.55	8.94	3.74	2.02	0.96	0.63	0.17
3836	47.44	18.30	1.70	9.09	7.12	10.13	3.10	0.77	1.73	0.45	0.17
3906	53.98	18.71	1.78	8.52	3.39	6.66	3.29	1.03	2.06	0.43	0.14
3911	46.78	15.14	1.68	9.10	9.59	11.45	2.85	0.85	1.89	0.48	0.18
3911A	47.85	12.57	1.62	8.57	12.71	12.23	2.16	0.41	1.25	0.45	0.17
3912	49.52	16.14	1.72	8.84	7.38	10.34	3.15	0.70	1.52	0.53	0.17
3912A	50.35	17.72	1.72	8.60	6.10	8.78	3.30	1.05	1.79	0.43	0.16
3915	53.52	18.55	1.46	6.95	3.65	7.85	4.36	1.52	1.32	0.69	0.13
3915A	53.95	18.93	1.53	7.23	3.38	6.97	4.39	1.38	1.37	0.73	0.15
3916	47.46	15.22	1.80	9.53	10.68	10.00	2.72	0.51	1.41	0.49	0.17

TABLE 3. ADJUSTED ANALYSES OF MAJOR OXIDES IN WEIGHT PERCENT, EAST MAP AREA--Continued

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO[1]
3917	47.89	16.23	1.81	9.48	8.91	9.69	2.91	0.71	1.80	0.41	0.15
3919	48.28	15.93	1.76	9.24	7.96	9.91	3.63	0.81	1.88	0.39	0.19
3920A	59.59	15.58	1.23	5.23	4.08	6.35	3.97	2.64	0.76	0.45	0.13
3920B	47.05	15.80	1.75	9.38	8.30	12.30	2.55	0.60	1.22	0.85	0.19
3922A	50.62	18.08	1.53	7.65	5.52	8.65	4.02	1.51	1.71	0.59	0.12
3923	48.06	13.66	1.71	9.04	10.39	11.49	2.31	0.78	1.88	0.51	0.17
3925	46.83	14.82	1.57	8.51	9.62	11.58	3.07	1.27	1.73	0.83	0.17
3926	48.22	15.20	1.74	9.22	7.87	11.23	2.63	0.97	2.00	0.75	0.17
3927	47.54	14.15	1.66	8.89	11.73	12.06	1.55	0.34	1.36	0.54	0.17
3928A	47.39	15.26	1.60	8.47	9.90	11.86	2.73	0.71	1.35	0.54	0.20
3929	47.46	15.36	1.75	9.17	8.77	10.41	3.39	0.90	2.11	0.48	0.19
3930	47.20	17.04	1.73	9.23	8.16	9.91	3.33	0.81	1.96	0.42	0.19
3931	49.18	15.12	1.71	8.79	8.36	10.62	3.12	0.71	1.69	0.50	0.20
3931A	53.95	16.23	1.45	6.84	5.47	8.19	3.73	1.93	1.52	0.56	0.14
3934	51.92	18.82	1.49	7.27	5.19	8.19	3.99	1.20	1.53	0.27	0.13
3935	53.93	17.77	1.42	6.75	4.77	7.55	4.06	1.32	1.62	0.66	0.13
3A06	46.31	16.51	1.92	10.36	7.86	10.71	2.83	0.71	2.15	0.45	0.19
3A15	48.46	17.23	1.81	9.53	6.75	9.04	3.65	0.99	1.96	0.42	0.16
3A17	48.31	14.49	1.65	8.60	10.47	10.29	2.82	1.11	1.63	0.46	0.17
3A28	47.69	16.41	1.75	9.34	8.08	9.73	2.96	1.14	2.21	0.51	0.17
3A28A	48.56	17.14	1.84	9.58	6.67	8.94	3.79	0.91	1.97	0.43	0.17
3A29	47.13	15.84	1.70	9.02	9.17	11.20	2.93	0.81	1.42	0.58	0.19
3A30	48.40	14.75	1.75	9.11	8.79	11.12	2.93	0.71	1.66	0.59	0.19
3A31	48.18	15.56	1.72	8.97	9.03	10.78	2.61	0.80	1.53	0.63	0.18
3A33	52.14	16.68	1.61	7.79	6.50	7.73	4.00	1.36	1.60	0.46	0.14
4004	47.11	16.02	1.74	9.29	8.89	9.91	3.05	1.73	1.43	0.63	0.17
4008	48.24	16.52	1.75	9.12	7.97	9.40	3.36	0.95	2.16	0.36	0.16
4010	47.80	17.23	1.88	9.99	6.69	9.21	3.23	0.99	2.36	0.44	0.17
4011	48.22	16.50	1.85	9.65	6.77	9.28	3.69	1.08	2.33	0.48	0.15
4017	48.11	16.51	1.82	9.53	7.70	9.25	3.36	1.03	2.15	0.38	0.16
4018	47.44	15.43	1.69	8.94	8.87	11.05	2.83	0.96	2.16	0.47	0.17
4031	52.59	16.39	2.00	9.64	4.06	6.60	4.05	1.57	2.22	0.71	0.18

4802	55.86	17.77	1.53	7.03	2.55	5.30	5.11	2.25	1.53	0.93	0.14
4816	46.76	16.29	1.75	9.41	8.82	10.63	3.27	0.72	1.67	0.49	0.18
4826	67.16	16.27	0.96	3.30	0.60	2.49	5.69	2.79	0.41	0.18	0.15
4833	62.77	15.86	1.25	4.83	1.91	3.94	4.93	2.88	1.14	0.35	0.13
4834	66.68	17.05	0.89	3.23	0.69	2.63	5.11	2.96	0.40	0.25	0.11
4834A	59.83	17.09	1.33	5.55	2.22	4.91	4.76	2.43	1.32	0.46	0.10
4834B	67.89	15.99	0.94	3.22	0.40	2.15	5.73	3.02	0.32	0.18	0.14
4836	51.01	17.25	1.85	9.32	4.76	8.41	3.78	0.84	1.77	0.82	0.18
4836A	52.49	17.54	1.74	8.51	4.14	7.40	4.12	1.44	1.91	0.53	0.16
4836B	48.76	12.44	1.59	8.40	14.39	9.26	1.97	0.99	1.31	0.71	0.17
4836C	71.30	15.04	0.63	2.05	0.30	1.26	5.11	3.99	0.13	0.07	0.10
4903	47.11	16.60	1.83	9.76	7.35	9.74	3.52	1.01	2.41	0.50	0.15
4903A	52.43	18.25	1.71	8.38	4.06	7.12	4.06	1.32	2.03	0.52	0.12
4920	59.29	15.91	1.23	5.17	4.07	6.28	3.93	2.66	0.92	0.43	0.12
4920A	64.00	15.71	0.97	3.73	2.59	4.31	4.35	3.33	0.63	0.28	0.10
4920B	74.72	13.54	0.54	1.52	0.67	4.30	4.22	0.22	0.19	0.04	0.03
4920C	49.57	14.50	1.61	8.23	8.76	11.39	2.97	0.92	1.26	0.60	0.17
4922	46.89	17.03	2.00	10.85	6.57	9.24	3.28	0.96	2.56	0.44	0.16
4929	59.19	16.57	1.28	5.35	3.89	6.34	3.79	2.30	0.98	0.21	0.10
4930	52.53	17.84	1.76	8.50	4.16	7.06	4.22	1.41	1.88	0.48	0.16
4A33A	51.55	19.11	1.52	7.50	4.85	7.80	4.27	1.40	1.29	0.54	0.15
4A34	45.19	15.00	1.74	9.63	9.35	11.18	3.64	1.11	2.37	0.59	0.20
5033	47.90	16.51	1.80	9.41	7.91	9.75	3.37	0.95	1.88	0.36	0.15
5035	47.33	16.33	1.68	8.95	8.94	11.10	2.73	0.75	1.65	0.34	0.19
5824	50.68	17.64	1.84	9.28	4.18	6.63	5.10	1.33	2.65	0.54	0.12
5913	48.18	16.39	1.58	8.21	7.60	11.84	3.10	0.85	1.40	0.71	0.15
5919	49.47	18.13	1.84	9.37	4.20	6.97	5.01	1.40	2.80	0.66	0.13
5923	49.02	16.45	1.61	8.30	7.20	10.73	3.28	0.95	1.40	0.86	0.18
5926	47.52	17.14	2.01	10.58	5.68	7.97	3.79	1.20	3.39	0.58	0.16
5933	47.05	14.61	1.54	8.32	9.42	12.48	2.92	0.98	1.87	0.61	0.17

[1]0.00, not determined.

TABLE 4. CIPW NORMATIVE COMPOSITIONS, EAST MAP AREA

Sample No.	Q	C	or	ab	an	dl	hy	ol	ne	mt	il	ap	dl			hy		ol	
													wo	en	fs	en	fs	fo	fa
0002	0.00	0.00	5.34	30.20	26.12	16.35	0.00	14.75	0.66	2.34	3.05	1.21	8.35	4.75	3.25	0.00	0.00	8.41	6.34
0003	0.00	0.00	5.96	30.53	26.03	16.25	0.00	14.28	1.02	2.28	2.68	1.00	8.30	4.71	3.24	0.00	0.00	8.13	6.15
1002	0.00	0.00	4.81	27.65	27.47	13.05	0.00	19.06	0.40	2.54	3.78	1.28	6.69	3.91	2.45	0.00	0.00	11.27	7.79
1004	0.00	0.00	4.96	21.42	27.77	15.71	8.00	15.05	0.00	2.48	3.31	1.33	8.08	4.93	2.70	5.17	2.83	9.38	5.67
1005	0.00	0.00	4.79	25.36	27.93	14.26	0.00	20.04	0.20	2.60	3.81	1.03	7.31	4.32	2.62	0.00	0.00	12.01	8.03
1007	0.00	0.00	4.17	17.62	29.97	17.06	0.00	22.15	1.55	2.60	3.96	0.96	8.78	5.41	2.87	0.00	0.00	13.98	8.17
1009	0.00	0.00	5.34	19.20	25.00	19.65	0.00	20.59	2.50	2.58	4.27	0.88	10.14	6.34	3.18	0.00	0.00	13.27	7.33
1013	0.00	0.00	10.11	26.19	20.01	17.28	0.00	13.25	5.66	2.32	3.69	1.53	8.83	5.02	3.44	0.00	0.00	7.55	5.70
1014	0.00	0.00	5.39	17.55	24.72	20.38	0.00	23.36	1.17	2.66	3.69	1.10	10.52	6.62	3.25	0.00	0.00	15.16	8.20
1019	0.00	0.00	4.16	15.58	24.29	25.11	0.00	22.63	2.15	2.33	2.67	1.10	13.03	8.63	3.46	0.00	0.00	15.70	6.93
1028	0.00	0.00	5.34	22.71	23.88	20.67	0.00	21.02	0.58	2.28	2.48	1.07	10.70	6.95	3.02	0.00	0.00	14.22	6.80
1028A	0.00	0.00	4.14	14.02	22.68	26.05	0.00	22.56	4.80	2.31	2.47	1.00	13.52	8.98	3.55	0.00	0.00	15.72	6.84
1033	0.00	0.00	4.74	26.51	26.09	18.67	0.00	15.04	2.63	2.44	2.85	1.07	9.53	5.37	3.77	0.00	0.00	8.48	6.56
1802	0.00	0.00	3.59	29.96	30.62	13.16	1.49	14.04	0.00	2.49	3.52	1.17	6.68	3.55	2.93	0.81	0.67	7.36	6.68
1805	0.00	0.00	5.33	26.69	27.61	15.20	0.00	17.18	0.70	2.41	3.43	1.50	7.79	4.59	2.82	0.00	0.00	10.25	6.93
1805A	0.00	0.00	4.74	22.98	29.21	12.07	0.00	17.99	5.00	2.54	3.90	1.61	6.15	3.43	2.48	0.00	0.00	10.01	7.98
1809	0.00	0.00	4.13	28.75	31.76	9.86	7.97	10.54	0.00	2.51	3.42	1.09	5.02	2.71	2.14	4.44	3.52	5.63	4.92
1904	0.00	0.00	6.52	25.12	22.90	14.91	0.00	17.27	5.25	2.76	4.00	1.31	7.58	4.09	3.24	0.00	0.00	9.22	8.05
1904B	5.70	0.00	14.28	31.53	19.28	11.95	12.42	0.00	0.00	1.77	1.88	1.22	6.12	3.53	2.31	7.51	4.91	0.00	0.00
1910B	0.00	0.00	5.94	26.82	25.96	14.04	0.00	17.49	1.61	2.61	4.14	1.43	7.17	4.07	2.80	0.00	0.00	9.96	7.53
1910C	0.00	0.00	10.09	30.60	16.00	21.73	10.15	5.37	0.00	2.08	2.86	1.14	11.22	7.12	3.39	6.87	3.27	3.52	1.85
1910E	0.00	0.00	6.62	24.55	25.46	12.41	0.00	18.22	4.45	2.78	4.06	1.50	6.30	3.31	2.80	0.00	0.00	9.42	8.80
1911	0.00	0.00	8.88	34.77	25.52	8.90	4.47	10.94	0.00	2.37	3.24	0.95	4.52	2.39	1.99	2.44	2.03	5.71	5.23
1912	0.00	0.00	5.33	15.60	27.24	17.54	0.00	21.89	4.88	2.62	4.02	0.90	9.03	5.55	2.96	0.00	0.00	13.79	8.10
1914	0.00	0.00	5.31	24.86	25.42	17.23	0.00	15.93	3.46	2.53	3.98	1.32	8.81	5.05	3.37	0.00	0.00	9.17	6.76
1914A	0.00	0.00	4.17	24.97	27.38	21.81	0.00	11.86	3.57	2.40	2.87	1.00	11.08	5.91	4.82	0.00	0.00	6.24	5.62
1914B	0.00	0.00	5.92	25.93	24.58	17.89	0.00	15.55	2.48	2.48	3.80	1.40	9.15	5.29	3.44	0.00	0.00	9.05	6.49
1914D	0.00	0.00	6.02	26.04	23.58	17.68	0.00	16.91	1.77	2.57	3.95	1.52	9.04	5.21	3.42	0.00	0.00	9.81	7.10
1924	0.00	0.00	5.92	20.14	29.76	15.88	0.00	16.10	4.24	2.48	4.19	1.33	8.11	4.61	3.15	0.00	0.00	9.18	6.92
1A05	0.00	0.00	9.04	33.37	22.43	12.58	0.00	15.20	0.16	2.37	3.37	1.52	6.42	3.60	2.56	0.00	0.00	8.52	6.68
1A17	0.00	0.00	7.17	25.47	24.95	15.37	0.00	16.99	2.42	2.45	3.75	1.46	7.87	4.60	2.90	0.00	0.00	10.02	6.98
1B06	0.00	0.00	5.95	14.84	20.01	26.11	0.00	20.18	5.81	2.38	3.61	1.15	13.53	8.87	3.71	0.00	0.00	13.82	6.36
2001	0.00	0.00	4.77	24.78	27.18	16.65	3.89	15.93	0.00	2.47	2.86	1.51	8.54	5.06	3.05	2.42	1.46	9.57	6.37

2003	0.00	0.00	5.33	22.41	25.87	21.90	0.00	16.85	1.19	2.35	2.72	1.40	11.26	6.83	3.81	0.00	0.00	10.44	6.41
2003A	0.00	0.00	6.51	26.28	26.27	17.06	4.72	12.27	0.00	2.34	2.70	1.90	8.73	5.07	3.25	2.88	1.84	7.19	5.08
2004	0.00	0.00	6.59	24.87	23.62	21.25	3.02	14.74	0.00	2.20	2.35	1.39	10.96	6.87	3.42	2.02	1.01	9.52	5.22
2005	0.00	0.00	5.37	20.56	28.41	20.82	0.00	16.71	1.81	2.28	2.76	1.31	10.71	6.52	3.59	0.00	0.00	10.40	6.32
2006	0.00	0.00	4.64	24.02	30.16	14.79	0.00	16.59	2.77	2.53	3.38	1.15	7.53	4.13	3.13	0.00	0.00	9.05	7.54
2008	0.00	0.00	8.39	32.57	26.56	8.47	0.00	15.44	0.94	2.51	3.31	1.85	4.28	2.14	2.05	0.00	0.00	7.52	7.92
2008A	0.00	0.00	8.89	35.82	22.70	8.78	0.00	13.47	2.89	2.37	3.20	1.92	4.44	2.22	2.12	0.00	0.00	6.56	6.91
2011	0.00	0.00	2.97	18.13	23.17	27.32	0.00	22.33	0.32	2.22	1.99	1.60	14.20	9.54	3.59	0.00	0.00	15.79	6.54
2012A	0.00	0.00	3.54	18.80	24.08	25.69	0.00	21.02	1.26	2.26	2.07	1.32	13.32	8.75	3.63	0.00	0.00	14.43	6.59
2014	0.00	0.00	4.78	16.08	22.78	25.95	0.00	21.91	1.96	2.30	3.17	1.10	13.47	9.02	3.46	0.00	0.00	15.40	6.50
2016	0.00	0.00	4.78	15.95	26.66	19.68	0.00	21.41	3.42	2.51	4.42	1.20	10.17	6.50	3.02	0.00	0.00	14.16	7.25
2016A	0.00	0.00	7.68	32.81	25.68	11.30	0.00	14.55	0.56	2.55	3.11	1.80	5.71	2.85	2.74	0.00	0.00	7.07	7.48
2019	0.00	0.00	9.54	36.71	25.04	5.66	8.85	7.46	0.00	2.31	3.07	1.39	2.87	1.45	1.35	4.59	4.26	3.69	3.77
2019A	0.00	0.00	6.59	35.16	28.38	7.95	6.90	8.70	0.00	2.25	2.89	1.22	4.03	2.09	1.82	3.69	3.21	4.44	4.27
2021	0.00	0.00	5.99	32.73	25.86	9.57	0.00	15.73	2.26	2.63	4.18	1.08	4.84	2.47	2.26	0.00	0.00	7.83	7.90
2023A	0.00	0.00	5.39	17.04	22.79	25.46	0.00	20.95	1.46	2.34	3.45	1.15	13.21	8.76	3.49	0.00	0.00	14.56	6.40
2024	0.00	0.00	5.33	22.06	24.21	23.03	5.49	14.78	0.00	2.05	2.15	0.93	11.95	7.98	3.09	3.96	1.53	10.36	4.42
2024A	0.00	0.00	6.58	13.91	21.38	24.37	0.00	19.58	5.93	2.50	4.39	1.39	12.59	8.03	3.75	0.00	0.00	12.93	6.65
2025	0.00	0.00	4.75	17.41	27.95	17.22	0.00	21.91	3.01	2.78	4.10	0.88	8.83	5.24	3.15	0.00	0.00	13.17	8.74
2027	0.00	0.00	3.60	15.93	22.95	23.47	0.00	19.68	6.26	2.49	4.24	1.42	12.12	7.67	3.68	0.00	0.00	12.87	6.81
2030	0.00	0.00	9.45	31.30	29.14	6.37	8.52	8.67	0.00	2.29	3.04	1.26	3.24	1.73	1.41	4.70	3.83	4.57	4.10
2031A	0.00	0.00	5.98	31.70	27.44	12.24	3.20	12.88	0.00	2.39	3.27	0.91	6.24	3.44	2.56	1.84	1.37	7.08	5.80
2031B	0.00	0.00	7.76	33.32	28.87	6.23	6.81	10.19	0.00	2.33	3.15	1.39	3.16	1.66	1.41	3.68	3.14	5.25	4.94
2801	0.00	0.00	7.73	19.21	21.25	22.39	0.00	15.14	5.75	2.63	4.70	1.24	11.46	6.65	4.27	0.00	0.00	8.87	6.28
2805	1.77	0.00	12.47	43.38	17.11	5.85	11.43	0.00	0.00	2.39	4.35	1.29	2.90	1.13	1.82	4.38	7.05	0.00	0.00
2809	0.00	0.00	7.17	26.02	27.24	13.62	0.00	15.00	2.58	2.61	4.53	1.27	6.92	3.67	3.04	0.00	0.00	7.84	7.17
2809A	0.00	0.00	7.14	23.07	23.49	15.84	0.00	16.94	5.04	2.60	4.55	1.36	8.10	4.64	3.10	0.00	0.00	9.75	7.19
2811	0.00	0.00	8.31	24.66	23.09	17.60	0.00	14.78	2.75	2.65	4.96	1.24	8.98	5.01	3.61	0.00	0.00	8.23	6.54
2812	6.04	0.00	13.55	32.05	17.03	12.65	13.73	0.00	0.00	2.00	2.16	0.83	6.47	3.70	2.48	8.22	5.51	0.00	0.00
2812A	0.00	0.00	5.93	31.39	23.89	15.76	1.97	12.89	0.00	2.72	4.25	1.24	8.00	4.19	3.58	1.06	0.91	6.64	6.25
2813	0.00	0.00	4.18	19.72	24.92	24.13	0.00	18.85	0.90	2.52	3.65	1.15	12.44	7.74	3.96	0.00	0.00	12.05	6.80
2813A	0.00	0.00	7.76	27.36	25.17	14.73	1.02	14.79	0.00	2.76	5.11	1.34	7.49	4.04	3.20	0.57	0.45	7.89	6.90
2815	0.00	0.00	13.22	40.26	12.43	7.59	0.00	12.44	5.23	2.66	3.17	3.08	3.77	1.46	2.36	0.00	0.00	4.48	7.96
2815A	0.00	0.00	9.52	31.51	22.19	13.04	9.75	7.70	0.00	2.13	2.60	1.60	6.69	3.99	2.35	6.14	3.61	4.67	3.03
2815B	0.00	0.00	7.73	24.24	25.51	15.06	0.00	18.86	1.16	2.47	3.73	1.29	7.74	4.68	2.64	0.00	0.00	11.64	7.22
2815C	0.00	0.00	7.71	25.39	25.26	14.23	0.00	19.13	0.96	2.43	3.60	1.33	7.32	4.46	2.45	0.00	0.00	11.93	7.20
2822	0.00	0.00	10.20	36.07	18.99	14.70	0.00	13.81	0.01	2.18	2.43	1.64	7.52	4.31	2.87	0.00	0.00	7.97	5.84
2825	0.00	0.00	4.15	19.88	29.48	15.31	0.00	21.80	1.19	2.56	3.81	1.85	7.88	4.81	2.62	0.00	0.00	13.62	8.18
2825A	0.00	0.00	4.17	16.57	28.59	19.06	0.00	21.22	3.49	2.51	3.77	0.64	9.83	6.14	3.10	0.00	0.00	13.63	7.59

TABLE 4. CIPW NORMATIVE COMPOSITIONS, EAST MAP AREA--Continued

Sample No.	Q	C	or	ab	an	di	hy	ol	ne	mt	il	ap	di			hy		ol	
													wo	en	fs	en	fs	fo	fa
2825D	0.00	0.00	4.72	19.14	27.23	18.72	0.00	19.53	3.36	2.59	4.04	0.69	9.62	5.84	3.25	0.00	0.00	12.11	7.43
2825E	0.00	0.00	4.15	21.10	30.13	15.40	0.00	20.95	0.99	2.63	3.97	0.69	7.91	4.75	2.75	0.00	0.00	12.79	8.16
2825G	0.00	0.00	7.12	33.63	22.45	10.68	0.00	16.32	1.12	2.71	4.16	1.86	5.42	2.83	2.44	0.00	0.00	8.36	7.95
2834	0.00	0.00	4.13	27.81	29.62	13.36	0.00	17.08	0.94	2.46	3.49	1.16	6.83	3.90	2.63	0.00	0.00	9.80	7.28
2834A	0.00	0.00	5.32	26.38	26.19	14.89	0.00	17.57	2.20	2.44	3.49	1.56	7.63	4.49	2.77	0.00	0.00	10.46	7.11
2835	0.00	0.00	3.62	25.03	32.78	11.54	13.23	6.90	0.00	2.40	3.31	1.23	5.89	3.29	2.36	7.71	5.52	3.86	3.04
2836A	0.00	0.00	7.15	33.30	24.46	8.18	8.30	9.88	0.00	2.66	4.18	1.94	4.14	2.13	1.91	4.37	3.93	4.96	4.92
2836B	0.00	0.00	7.13	32.32	22.31	10.28	0.00	16.73	2.32	2.74	4.28	1.93	5.21	2.69	2.38	0.00	0.00	8.47	8.25
2903	0.00	0.00	7.28	33.79	25.70	8.67	0.00	16.32	0.34	2.62	3.99	1.32	4.40	2.29	1.98	0.00	0.00	8.35	7.97
2905	7.12	0.00	11.99	25.76	22.98	11.05	16.42	0.00	0.00	1.91	1.93	0.84	5.67	3.37	2.01	10.28	6.14	0.00	0.00
2909A	0.00	0.00	3.54	17.87	32.19	17.90	0.00	17.57	4.05	2.45	3.38	1.09	9.17	5.35	3.38	0.00	0.00	10.36	7.21
2909B	0.00	0.00	4.16	20.36	32.82	17.10	0.00	16.56	2.33	2.43	3.28	1.00	8.74	4.98	3.37	0.00	0.00	9.48	7.08
2910	0.00	0.00	6.59	31.75	31.33	7.01	11.87	5.48	0.00	2.13	3.08	0.77	3.57	1.98	1.46	6.84	5.03	3.03	2.46
2915	0.00	0.00	6.60	24.04	29.91	9.73	22.27	0.14	0.00	2.50	3.51	1.35	4.95	2.70	2.07	12.61	9.66	0.07	0.06
2915A	0.00	0.00	5.93	28.83	27.56	13.71	0.00	15.78	0.49	2.68	3.85	1.19	6.96	3.65	3.11	0.00	0.00	8.14	7.65
2918	0.00	0.00	14.31	6.31	19.00	27.94	0.00	14.31	0.92	2.22	2.93	2.10	14.38	8.81	4.76	0.00	0.00	8.97	5.34
2919	0.00	0.00	10.10	28.94	20.22	18.73	8.81	7.01	0.00	2.09	2.41	1.74	9.63	5.87	3.23	5.69	3.13	4.37	2.65
2919F	0.00	0.00	5.96	19.16	25.45	22.35	0.00	16.50	3.03	2.31	3.03	2.27	11.49	6.99	3.87	0.00	0.00	10.24	6.25
2919G	0.00	0.00	5.94	21.22	25.74	20.98	0.00	16.18	2.33	2.32	3.00	2.36	10.77	6.45	3.75	0.00	0.00	9.86	6.32
2919I	0.00	0.00	4.78	25.16	27.72	19.52	0.00	14.49	2.14	2.32	2.88	1.01	9.98	5.72	3.82	0.00	0.00	8.35	6.14
2919J	0.00	0.00	5.96	23.27	23.46	24.02	0.00	14.69	1.74	2.24	2.78	1.89	12.36	7.54	4.13	0.00	0.00	9.16	5.53
2926	0.00	0.00	4.76	22.05	28.61	17.97	0.00	14.84	4.67	2.56	3.44	1.12	9.13	4.88	3.96	0.00	0.00	7.83	7.01
2926A	0.00	0.00	5.94	25.27	27.61	11.19	0.00	16.76	5.19	2.67	4.39	1.02	5.68	3.01	2.50	0.00	0.00	8.76	8.00
2926B	0.00	0.00	4.73	23.38	27.60	17.74	0.00	14.29	5.20	2.55	3.42	1.11	9.01	4.77	3.96	0.00	0.00	7.47	6.83
2926C	0.00	0.00	4.81	26.66	31.43	14.02	0.00	15.91	0.00	2.55	3.51	1.13	7.12	3.79	3.12	0.00	0.00	8.35	7.57
2927	0.00	0.00	3.58	16.65	27.91	22.84	0.00	14.48	7.64	2.46	3.39	1.08	11.66	6.53	4.65	0.00	0.00	8.11	6.37
2927A	0.00	0.00	4.39	23.15	32.40	12.45	10.07	10.33	0.00	2.60	3.50	1.13	6.34	3.47	2.64	5.72	4.35	5.63	4.71
2929	0.00	0.00	4.42	17.26	25.31	26.19	0.00	16.33	3.80	2.25	2.63	1.87	13.50	8.39	4.31	0.00	0.00	10.42	5.90
2929B	0.61	0.00	10.64	28.79	20.91	16.31	17.22	0.00	0.00	1.99	2.17	1.40	8.39	5.10	2.82	11.09	6.13	0.00	0.00
2929D	0.00	0.00	11.91	33.26	17.93	17.37	10.98	3.13	0.00	1.93	2.12	1.41	8.92	5.36	3.09	6.97	4.02	1.91	1.22
2929E	17.01	0.00	22.05	41.81	8.90	1.90	5.80	0.00	0.00	1.14	0.86	0.55	0.95	0.42	0.52	2.59	3.21	0.00	0.00
2929G	0.00	0.00	9.46	27.95	21.41	19.39	8.00	7.75	0.00	2.05	2.40	1.64	9.99	6.17	3.23	5.25	2.75	4.92	2.83
2929H	14.43	0.00	22.13	41.97	10.04	1.93	6.83	0.00	0.00	1.23	0.94	0.50	0.97	0.44	0.53	3.09	3.74	0.00	0.00

2929I	12.60	0.00	20.80	37.44	12.82	3.61	9.65	0.00	0.00	1.30	1.11	0.69	1.84	1.05	0.72	5.72	3.93	0.00	0.00
2929J	0.24	0.00	12.49	33.21	18.43	15.47	14.90	0.00	0.00	1.90	2.06	1.34	7.94	4.71	2.82	9.32	5.58	0.00	0.00
2929K	0.00	0.00	5.38	18.68	28.19	23.28	0.00	16.20	1.48	2.26	2.86	1.73	11.98	7.37	3.93	0.00	0.00	10.20	6.00
2929L	3.48	0.00	12.98	32.09	18.98	12.32	14.93	0.00	0.00	1.90	2.01	1.35	6.31	3.71	2.30	9.22	5.71	0.00	0.00
2929N	0.00	0.00	6.55	11.54	23.49	25.17	0.00	17.88	7.15	2.47	4.48	1.31	12.98	8.14	4.05	0.00	0.00	11.54	6.33
29290	0.00	0.00	3.68	21.09	34.86	9.45	8.23	15.36	0.00	2.53	2.92	1.92	4.83	2.72	1.91	4.84	3.39	8.66	6.70
2930	0.00	0.00	6.58	12.97	25.11	23.30	0.00	19.19	4.57	2.44	4.46	1.44	12.04	7.66	3.60	0.00	0.00	12.64	6.55
2931A	0.00	0.00	8.87	35.03	21.32	6.45	0.00	16.72	2.12	2.80	4.11	2.65	3.25	1.54	1.66	0.00	0.00	7.65	9.07
2932A	0.00	0.00	3.54	25.42	24.41	22.26	0.00	16.75	1.79	2.36	2.64	0.85	11.45	6.99	3.83	0.00	0.00	10.44	6.31
2933A	5.06	0.00	15.44	34.85	16.29	10.93	12.65	0.00	0.00	1.78	1.83	1.21	5.59	3.19	2.15	7.56	5.08	0.00	0.00
2935	0.00	0.00	4.14	25.07	32.00	15.02	0.00	16.68	0.20	2.51	3.31	1.09	7.66	4.26	3.10	0.00	0.00	9.25	7.42
2935B	0.00	0.00	8.26	22.95	26.49	14.56	0.00	15.39	3.58	2.62	4.95	1.25	7.42	4.09	3.05	0.00	0.00	8.45	6.93
2936	0.00	0.00	6.60	29.81	27.68	10.23	0.00	16.86	0.61	2.74	4.44	1.06	5.18	2.69	2.36	0.00	0.00	8.58	8.29
2A02A	0.00	0.00	7.65	30.55	20.18	12.92	14.87	5.42	0.00	2.62	3.87	1.98	6.59	3.68	2.65	8.63	6.24	3.02	2.40
2A06	0.00	0.00	4.05	25.37	24.73	21.50	0.00	16.63	1.10	2.19	2.97	1.48	11.10	7.03	3.38	0.00	0.00	10.87	5.76
2A07A	0.00	0.00	5.33	30.51	27.88	14.59	1.12	14.60	0.00	2.31	2.57	1.14	7.45	4.22	2.92	0.66	0.46	8.29	6.31
2A12	0.00	0.00	6.36	22.51	27.05	17.63	2.94	15.48	0.00	2.43	3.89	1.74	9.05	5.41	3.17	1.85	1.09	9.40	6.08
2A18A	0.00	0.00	6.53	28.07	24.63	14.27	8.03	12.46	0.00	2.32	2.64	1.07	7.34	4.48	2.45	5.20	2.84	7.78	4.68
2A20	0.00	0.00	4.76	30.69	26.70	18.88	0.23	13.07	0.00	2.35	2.47	0.88	9.62	5.27	4.00	0.13	0.10	7.12	5.95
2A23B	0.00	0.00	5.67	23.25	25.10	19.74	4.14	15.34	0.00	2.32	3.08	1.38	10.18	6.36	3.20	2.75	1.39	9.87	5.47
3002	0.00	0.00	8.05	33.97	25.04	10.44	1.01	13.63	0.00	2.58	4.19	1.13	5.28	2.69	2.46	0.53	0.48	6.79	6.84
3006	0.00	0.00	3.20	22.18	29.14	17.73	4.48	15.88	0.00	2.59	3.27	1.57	9.08	5.30	3.35	2.74	1.74	9.36	6.52
3006A	0.00	0.00	4.57	28.17	32.16	9.52	0.00	17.80	1.03	2.50	3.11	1.19	4.84	2.62	2.06	0.00	0.00	9.55	8.25
3008	0.00	0.00	3.33	19.97	28.49	20.37	0.00	19.89	1.17	2.54	3.19	1.07	10.48	6.37	3.53	0.00	0.00	12.34	7.54
3011	0.00	0.00	6.65	10.02	24.70	25.77	0.00	18.72	5.86	2.48	4.74	1.08	13.32	8.49	3.96	0.00	0.00	12.36	6.36
3011A	0.00	0.00	4.24	22.15	30.36	16.61	0.00	17.93	1.01	2.62	4.08	1.03	8.50	4.88	3.24	0.00	0.00	10.35	7.58
3013	0.00	0.00	3.34	21.13	32.06	14.93	0.00	19.14	1.80	2.64	3.92	1.08	7.63	4.35	2.94	0.00	0.00	10.97	8.17
3013A	0.00	0.00	4.21	23.72	29.76	16.35	0.00	17.84	0.30	2.59	4.13	1.14	8.37	4.88	3.10	0.00	0.00	10.49	7.35
3014	0.00	0.00	4.23	21.28	30.16	17.85	0.00	17.33	1.46	2.57	4.08	1.05	9.13	5.27	3.45	0.00	0.00	10.06	7.27
3016	0.00	0.00	6.52	33.87	25.58	11.96	0.65	14.23	0.00	2.52	3.49	1.21	6.07	3.21	2.68	0.35	0.30	7.41	6.82
3018	0.00	0.00	9.19	33.70	23.08	9.89	10.11	7.18	0.00	2.46	3.24	1.19	5.02	2.68	2.19	5.56	4.55	3.77	3.41
3018A	0.00	0.00	9.26	31.12	22.59	11.22	15.09	3.54	0.00	2.54	3.46	1.22	5.70	3.03	2.49	8.27	6.82	1.86	1.69
3024	0.00	0.00	6.53	25.26	24.37	16.07	0.00	16.76	2.90	2.64	4.39	1.10	8.21	4.66	3.20	0.00	0.00	9.54	7.22
3024A	0.00	0.00	5.42	19.03	28.61	13.67	0.00	20.14	5.10	2.66	3.35	2.07	6.97	3.87	2.83	0.00	0.00	11.15	8.99
3026	0.00	0.00	7.66	12.52	22.41	23.20	0.00	16.17	9.22	2.65	4.75	1.46	11.89	6.96	4.35	0.00	0.00	9.57	6.60
3026A	0.00	0.00	7.73	14.25	22.68	21.72	0.00	17.26	7.50	2.63	4.80	1.48	11.15	6.64	3.93	0.00	0.00	10.44	6.82
3026C	0.00	0.00	7.42	24.43	25.65	16.95	14.92	5.07	0.00	2.00	2.48	1.11	8.76	5.60	2.60	10.19	4.73	3.36	1.72
3026D	0.00	0.00	6.39	25.08	24.26	15.35	0.00	17.68	3.40	2.61	3.95	1.32	7.85	4.50	3.01	0.00	0.00	10.17	7.50
3027	0.00	0.00	3.60	18.23	30.06	20.02	0.00	17.37	3.16	2.71	3.69	1.20	10.20	5.62	4.19	0.00	0.00	9.53	7.83

TABLE 4. CIPW NORMATIVE COMPOSITIONS, EAST MAP AREA--Continued

Sample No.	Q	C	or	ab	an	di	hy	ol	ne	mt	il	ap	di			hy		ol	
													wo	en	fs	en	fs	fo	fa
3028	0.00	0.00	7.12	6.41	23.46	27.49	0.00	18.01	8.96	2.59	4.68	1.31	14.16	8.74	4.59	0.00	0.00	11.41	6.60
3028A	0.00	0.00	6.04	11.01	25.75	24.64	0.00	19.88	6.21	2.59	2.64	1.28	12.64	7.53	4.47	0.00	0.00	12.02	7.86
3028B	0.00	0.00	7.15	7.26	22.09	31.93	0.00	13.85	9.47	2.60	4.44	1.24	16.36	9.60	5.96	0.00	0.00	8.23	5.63
3029	0.00	0.00	4.17	24.77	25.70	17.27	0.00	19.55	2.28	2.51	2.43	1.36	8.85	5.21	3.21	0.00	0.00	11.64	7.90
3031	0.00	0.00	7.01	23.25	22.78	22.42	0.00	18.08	0.23	2.09	2.60	1.59	11.62	7.63	3.17	0.00	0.00	12.40	5.68
3032	0.00	0.00	5.94	15.31	27.17	20.90	0.00	17.78	4.60	2.56	4.29	1.48	10.73	6.40	3.78	0.00	0.00	10.77	7.01
3032A	0.00	0.00	5.96	13.34	25.61	23.66	0.00	17.37	5.71	2.63	4.31	1.46	12.13	7.19	4.33	0.00	0.00	10.44	6.93
3032B	0.00	0.00	8.86	26.45	22.71	17.66	0.00	13.83	3.09	2.33	3.30	1.80	9.02	5.14	3.49	0.00	0.00	7.91	5.92
3034	0.00	0.00	5.90	18.16	24.28	20.20	0.00	22.28	2.98	2.36	2.83	1.04	10.46	6.81	2.94	0.00	0.00	15.10	7.18
3034A	0.00	0.00	7.08	14.52	24.19	22.00	0.00	17.90	6.11	2.48	4.53	1.22	11.34	7.03	3.64	0.00	0.00	11.40	6.51
3035	0.00	0.00	4.77	19.41	27.28	19.86	0.00	18.46	3.38	2.52	2.92	1.44	10.18	5.98	3.70	0.00	0.00	10.97	7.49
3036A	0.00	0.00	4.12	20.58	28.88	18.61	0.00	19.66	1.62	2.50	2.91	1.16	9.57	5.78	3.27	0.00	0.00	12.10	7.56
3801	0.00	0.00	4.13	19.82	23.20	21.32	0.00	22.13	3.01	2.45	2.83	1.14	11.03	7.08	3.22	0.00	0.00	14.75	7.38
3802	0.00	0.00	5.92	36.46	26.10	3.12	14.80	4.99	0.00	2.63	3.58	2.47	1.57	0.74	0.81	7.03	7.77	2.25	2.74
3802B	18.14	1.22	19.79	43.11	9.25	0.00	6.11	0.00	0.00	1.40	0.67	0.31	0.00	0.00	0.00	1.31	4.80	0.00	0.00
3802C	18.43	0.46	18.36	47.49	7.85	0.00	5.39	0.00	0.00	1.26	0.48	0.29	0.00	0.00	0.00	1.00	4.39	0.00	0.00
3802D	0.00	0.00	7.13	34.88	26.49	2.65	16.37	4.00	0.00	2.67	3.71	2.14	1.33	0.62	0.71	7.63	8.74	1.77	2.24
3803D	16.64	0.00	16.65	48.53	8.77	0.94	6.17	0.00	0.00	1.33	0.63	0.36	0.46	0.14	0.33	1.86	4.31	0.00	0.00
3805	0.00	0.00	10.42	40.99	20.17	4.75	13.44	2.26	0.00	2.56	3.93	1.54	2.37	1.01	1.37	5.70	7.74	0.90	1.35
3805A	0.00	0.00	3.87	21.32	25.23	21.95	0.00	20.17	0.73	2.54	3.06	1.15	11.31	6.99	3.65	0.00	0.00	12.80	7.37
3808	0.00	0.00	4.84	32.82	32.00	5.54	7.20	10.52	0.00	2.51	3.25	1.36	2.79	1.34	1.41	3.51	3.69	4.87	5.65
3809B	25.78	1.69	22.14	41.99	4.31	0.00	2.92	0.00	0.00	0.84	0.21	0.12	0.00	0.00	0.00	0.23	2.69	0.00	0.00
3809C	0.00	0.00	4.69	29.50	31.71	7.98	2.52	15.21	0.00	2.68	3.88	1.88	4.03	2.00	1.95	1.28	1.25	7.34	7.88
3810	0.00	0.00	5.37	27.35	30.21	13.43	1.57	15.39	0.00	2.40	2.46	1.87	6.84	3.75	2.84	0.89	0.68	8.38	7.00
3810B	11.64	0.00	15.76	40.79	14.70	1.85	10.40	0.00	0.00	1.80	2.26	0.83	0.92	0.40	0.53	4.46	5.94	0.00	0.00
3810C	4.90	0.00	10.77	41.13	19.49	3.39	13.67	0.00	0.00	2.20	3.27	1.20	1.70	0.75	0.94	6.06	7.61	0.00	0.00
3810D	21.17	0.00	21.28	44.01	6.95	0.00	4.59	0.00	0.00	1.03	0.65	0.33	0.00	0.00	0.00	1.50	3.10	0.00	0.00
3810E	4.61	0.00	13.16	40.25	18.19	2.48	14.32	0.00	0.00	2.36	3.38	1.27	1.24	0.51	0.74	5.80	8.52	0.00	0.00
3810F	6.20	0.00	9.04	41.44	18.87	3.72	13.89	0.00	0.00	2.23	3.37	1.26	1.87	0.84	1.02	6.28	7.62	0.00	0.00
3811	0.00	0.00	4.93	26.45	31.29	9.42	0.00	19.19	1.39	2.58	3.27	1.52	4.80	2.60	2.03	0.00	0.00	10.32	8.86
3811C	3.85	0.00	8.96	39.34	19.05	7.78	13.74	0.00	0.00	2.32	3.65	1.34	3.92	1.88	1.98	6.68	7.06	0.00	3.92
3813	0.00	0.00	5.55	26.43	26.36	18.80	3.68	12.67	0.00	2.39	2.32	1.84	9.60	5.44	3.76	2.18	1.51	7.19	5.48
3814	0.00	0.00	5.85	12.53	24.22	21.09	18.74	10.39	0.00	2.39	3.62	1.19	10.96	7.34	2.80	13.57	5.17	7.32	3.07

3815	0.00	0.00	4.30	24.01	30.41	16.73	1.75	16.23	0.00	2.27	2.34	2.01	8.58	5.09	3.06	1.09	0.66	9.77	6.47
3815A	0.00	0.00	4.78	22.91	27.71	19.73	0.00	16.09	1.97	2.38	2.65	1.82	10.10	5.82	3.82	0.00	0.00	9.34	6.75
3817	0.00	0.00	4.58	22.99	30.54	14.58	10.29	10.57	0.00	2.28	2.48	1.74	7.49	4.51	2.58	6.54	3.75	6.48	4.09
3817A	0.00	0.00	4.02	20.23	32.76	12.76	12.35	10.96	0.00	2.32	2.60	2.05	6.55	3.92	2.29	7.79	4.55	6.67	4.29
3818	0.00	0.00	4.14	17.01	24.11	23.35	7.90	17.16	0.00	2.27	2.64	1.47	12.13	8.15	3.07	5.73	2.16	12.12	5.04
3821B	0.00	0.00	7.87	24.29	28.49	14.35	1.47	15.21	0.00	2.56	4.54	1.26	7.32	4.10	2.93	0.86	0.61	8.51	6.69
3822B	0.00	0.00	5.45	22.86	27.23	21.42	0.00	12.77	1.66	2.63	4.22	1.80	10.87	5.68	4.87	0.00	0.00	6.57	6.20
3823A	0.00	0.00	4.77	25.39	22.33	21.12	0.00	17.61	1.52	2.56	3.66	1.05	10.85	6.52	3.76	0.00	0.00	10.77	6.85
3824	0.00	0.00	5.35	20.18	26.17	18.23	0.00	18.07	4.75	2.51	3.67	1.10	9.35	5.55	3.34	0.00	0.00	10.87	7.20
3824A	0.00	0.00	5.48	22.62	26.15	15.99	0.00	18.00	4.75	2.44	3.52	1.07	8.19	4.80	3.00	0.00	0.00	10.66	7.34
3826	0.00	0.00	7.12	23.43	23.20	20.33	0.00	15.12	2.48	2.60	4.54	1.21	10.40	5.99	3.94	0.00	0.00	8.76	6.36
3827	0.00	0.00	6.54	28.10	29.60	12.65	0.74	15.22	0.00	2.42	2.52	2.26	6.42	3.38	2.85	0.40	0.34	7.89	7.34
3828	0.00	0.00	5.33	22.88	25.92	23.46	5.05	10.95	0.00	2.28	2.15	2.02	12.04	7.14	4.29	3.16	1.90	6.59	4.36
3828C	0.00	0.00	5.99	21.45	29.33	19.57	6.57	10.59	0.00	2.26	2.21	2.07	10.02	5.82	3.73	4.01	2.57	6.21	4.39
3828E	0.00	0.00	6.55	24.42	27.05	18.57	0.00	13.91	1.54	2.44	4.36	1.19	9.49	5.42	3.66	0.00	0.00	7.98	5.93
3828F	0.00	0.00	7.17	23.87	28.42	16.73	0.00	15.66	0.05	2.46	4.42	1.25	8.57	4.99	3.17	0.00	0.00	9.21	6.44
3828G	0.00	0.00	7.12	30.57	29.24	8.57	8.04	9.13	0.00	2.40	2.69	2.31	4.33	2.19	2.05	4.15	3.89	4.49	4.64
3828H	0.00	0.00	6.63	27.63	30.48	7.94	12.44	7.27	0.00	2.49	2.75	2.42	4.02	2.01	1.91	6.38	6.06	3.55	3.72
3828J	0.00	0.00	7.21	32.05	27.96	9.24	0.00	15.30	0.80	2.49	2.68	2.33	4.65	2.24	2.34	0.00	0.00	7.12	8.18
3828K	0.00	0.00	7.07	17.88	23.17	20.53	0.00	16.06	7.23	2.44	4.30	1.35	10.54	6.34	3.64	0.00	0.00	9.83	6.23
3829A	0.00	0.00	7.12	29.72	29.97	8.65	7.50	9.94	0.00	2.39	2.57	2.19	4.38	2.24	2.03	3.93	3.58	4.96	4.98
3829B	0.00	0.00	6.52	25.47	33.33	6.47	17.37	3.67	0.00	2.39	2.55	2.28	3.28	1.69	1.51	9.17	8.20	1.85	1.82
3829D	0.00	0.00	7.14	28.99	29.71	8.88	9.26	8.93	0.00	2.41	2.49	2.24	4.50	2.30	2.08	4.86	4.40	4.47	4.46
3832	9.50	0.00	15.50	40.11	18.31	1.51	10.35	0.00	0.00	1.65	2.16	0.93	0.76	0.36	0.39	4.92	5.43	0.00	0.00
3833	4.21	0.00	10.67	34.52	23.06	5.00	16.18	0.00	0.00	2.31	3.24	0.85	2.52	1.22	1.27	7.93	8.25	0.00	0.00
3833A	0.00	0.00	7.15	19.67	24.79	19.66	0.00	15.28	5.06	2.51	4.52	1.39	10.07	5.84	3.76	0.00	0.00	8.93	6.34
3835A	3.14	0.00	11.96	31.68	16.97	19.17	11.67	0.00	0.00	2.14	1.83	1.49	9.72	5.07	4.37	6.27	5.40	0.00	0.00
3836	0.00	0.00	4.57	24.61	33.73	11.15	0.00	18.28	0.88	2.46	3.28	1.06	5.69	3.18	2.29	0.00	0.00	10.20	8.09
3906	7.77	1.12	6.08	27.84	30.21	0.00	19.51	0.00	0.00	2.58	3.91	1.02	0.00	0.00	0.00	8.45	11.06	0.00	0.00
3911	0.00	0.00	5.04	16.99	26.01	22.46	0.00	18.51	3.86	2.44	3.58	1.13	11.57	7.14	3.75	0.00	0.00	11.73	6.79
3911A	0.00	0.00	2.44	18.26	23.38	27.63	0.53	21.98	0.00	2.35	2.38	1.08	14.33	9.50	3.80	0.38	0.15	15.26	6.72
3912	0.00	0.00	4.13	26.64	27.86	16.36	6.09	12.34	0.00	2.50	2.88	1.25	8.36	4.74	3.26	3.61	2.48	7.02	5.32
3912A	0.00	0.00	6.21	27.94	30.43	8.45	12.76	7.32	0.00	2.50	3.40	1.02	4.30	2.34	1.80	7.21	5.55	3.96	3.36
3915	0.00	0.00	8.99	36.88	26.56	6.55	12.98	1.84	0.00	2.12	2.50	1.63	3.30	1.58	1.67	6.30	6.68	0.85	0.99
3915A	1.07	0.00	8.14	37.17	27.86	1.62	17.65	0.00	0.00	2.22	2.60	1.73	0.81	0.37	0.44	8.05	9.60	0.00	0.00
3916	0.00	0.00	3.04	23.02	27.79	15.08	1.80	22.85	0.00	2.62	2.68	1.17	7.76	4.79	2.52	1.18	0.62	14.46	8.39
3917	0.00	0.00	4.20	24.59	29.14	13.23	2.79	19.05	0.00	2.63	3.43	0.97	6.79	4.04	2.40	1.75	1.04	11.51	7.54
3919	0.00	0.00	4.77	25.19	24.79	17.81	0.00	17.42	2.99	2.56	3.58	0.93	9.12	5.29	3.40	0.00	0.00	10.19	7.23
3920A	7.05	0.00	15.58	33.55	16.91	9.55	13.09	0.00	0.00	1.78	1.44	1.07	4.87	2.68	2.00	7.50	5.59	0.00	0.00

TABLE 4. CIPW NORMATIVE COMPOSITIONS, EAST MAP AREA--Continued

Sample No.	Q	C	or	ab	an	di	hy	ol	ne	mt	il	ap	di			hy		ol	
													wo	en	fs	en	fs	fo	fa
3920B	0.00	0.00	3.54	20.11	29.88	20.88	0.00	17.96	0.80	2.54	2.32	2.02	10.67	6.07	4.14	0.00	0.00	10.25	7.71
3922A	0.00	0.00	8.90	32.91	26.85	9.99	0.00	13.94	0.59	2.21	3.24	1.40	5.09	2.81	2.08	0.00	0.00	7.67	6.27
3923	0.00	0.00	4.63	19.55	24.58	23.54	3.68	16.80	0.00	2.48	3.58	1.21	12.15	7.70	3.69	2.49	1.19	11.00	5.80
3925	0.00	0.00	7.48	14.93	22.90	23.58	0.00	17.63	5.99	2.28	3.30	1.96	12.17	7.65	3.76	0.00	0.00	11.43	6.20
3926	0.00	0.00	5.75	22.28	26.77	19.61	4.09	13.45	0.00	2.53	3.80	1.77	10.04	5.84	3.73	2.50	1.59	7.89	5.56
3927	0.00	0.00	1.99	13.10	30.68	20.63	14.49	12.86	0.00	2.41	2.59	1.30	10.67	6.89	3.07	10.02	4.47	8.62	4.24
3928A	0.00	0.00	4.18	18.21	27.29	22.65	0.00	18.89	2.64	2.32	2.57	1.29	11.68	7.30	3.66	0.00	0.00	12.16	6.72
3929	0.00	0.00	5.30	21.41	24.03	19.88	0.00	17.78	3.94	2.53	4.02	1.13	10.22	6.18	3.48	0.00	0.00	10.98	6.80
3930	0.00	0.00	4.77	22.90	29.18	14.07	0.00	19.02	2.85	2.51	3.72	1.00	7.21	4.23	2.63	0.00	0.00	11.29	7.73
3931	0.00	0.00	4.17	26.43	25.14	19.72	2.05	15.62	0.00	2.48	3.22	1.19	10.12	6.04	3.56	1.29	0.76	9.46	6.16
3931A	0.00	0.00	11.41	31.57	21.83	12.39	16.12	0.42	0.00	2.10	2.88	1.32	6.33	3.62	2.43	9.65	6.47	0.24	0.18
3934	0.00	0.00	7.13	33.76	29.89	7.35	8.11	8.07	0.00	2.16	2.90	0.64	3.74	2.05	1.56	4.60	3.51	4.39	3.68
3935	1.28	0.00	7.80	34.37	26.36	5.57	17.95	0.00	0.00	2.06	3.09	1.56	2.84	1.57	1.16	10.32	7.63	0.00	0.00
3A06	0.00	0.00	4.22	20.69	30.24	16.32	0.00	18.86	1.75	2.79	4.09	1.07	8.32	4.63	3.37	0.00	0.00	10.47	8.40
3A15	0.00	0.00	5.85	28.26	27.68	11.85	0.00	17.61	1.44	2.62	3.72	0.99	6.03	3.27	2.55	0.00	0.00	9.48	8.13
3A17	0.00	0.00	6.54	21.73	23.63	19.71	0.00	20.68	1.15	2.39	3.10	1.10	10.19	6.51	3.01	0.00	0.00	13.70	6.98
3A28	0.00	0.00	6.74	24.31	28.11	13.73	0.00	18.80	0.41	2.54	4.20	1.21	7.04	4.14	2.55	0.00	0.00	11.20	7.60
3A28A	0.00	0.00	5.37	29.24	27.06	11.87	0.00	17.52	1.55	2.66	3.74	1.03	6.03	3.25	2.58	0.00	0.00	9.36	8.17
3A29	0.00	0.00	4.77	19.08	27.71	19.60	0.00	19.27	3.08	2.46	2.70	1.36	10.06	6.05	3.48	0.00	0.00	11.79	7.48
3A30	0.00	0.00	4.18	24.43	25.01	21.40	0.00	17.74	0.20	2.54	3.15	1.39	10.98	6.55	3.86	0.00	0.00	10.75	6.99
3A31	0.00	0.00	4.75	22.09	28.37	17.04	4.46	16.45	0.00	2.49	2.90	1.50	8.76	5.27	3.02	2.84	1.62	10.09	6.36
3A33	0.00	0.00	8.02	33.84	23.55	9.61	9.04	9.52	0.00	0.00	2.33	3.03	1.10	4.92	2.84	1.86	5.46	3.57	5.53
4004	0.00	0.00	10.25	16.42	24.88	16.50	0.00	20.15	5.11	2.53	2.72	1.48	8.46	4.99	3.06	0.00	0.00	12.03	8.13
4008	0.00	0.00	5.63	26.45	27.17	13.93	0.00	18.28	1.07	2.54	4.10	0.86	7.15	4.23	2.56	0.00	0.00	10.95	7.32
4010	0.00	0.00	5.83	27.36	29.60	10.88	0.54	17.58	0.00	2.73	4.48	1.04	5.53	2.98	2.37	0.30	0.24	9.38	8.20
4011	0.00	0.00	6.40	27.03	25.26	14.44	0.00	16.38	2.26	2.69	4.42	1.14	7.36	4.05	3.04	0.00	0.00	8.97	7.41
4017	0.00	0.00	6.10	26.29	26.92	13.45	0.00	18.49	1.15	2.65	4.07	0.90	6.88	3.95	2.62	0.00	0.00	10.67	7.82
4018	0.00	0.00	5.64	20.51	26.61	20.36	0.00	17.39	1.84	2.45	4.11	1.12	10.48	6.45	3.43	0.00	0.00	10.96	6.44
4031	0.39	0.00	9.30	34.24	21.90	5.20	20.23	0.00	0.00	2.90	4.22	1.67	2.60	1.15	1.45	8.95	11.27	0.00	0.00
4802	1.04	0.00	13.28	43.21	18.93	1.06	15.20	0.00	0.00	2.22	2.91	2.20	0.53	0.22	0.32	6.14	9.05	0.00	0.00
4816	0.00	0.00	4.23	19.73	27.67	17.77	0.00	19.46	4.28	2.54	3.18	1.17	9.11	5.38	3.29	0.00	0.00	11.62	7.83
4826	15.56	0.00	16.51	48.13	10.60	0.52	6.10	0.00	0.00	1.39	0.78	0.43	0.25	0.06	0.21	1.43	4.67	0.00	0.00
4833	10.92	0.00	17.01	41.74	12.62	3.86	9.06	0.00	0.00	1.81	2.16	0.84	1.93	0.84	1.09	3.93	5.13	0.00	0.00

4834	17.51	1.26	17.50	43.21	11.44	0.00	6.47	0.00	0.00	1.29	0.76	0.58	0.00	0.00	0.00	1.73	4.74	0.00	0.00
4834A	7.78	0.00	14.35	40.25	18.14	2.69	11.31	0.00	0.00	1.92	2.50	1.08	1.35	0.59	0.76	4.96	6.35	0.00	0.00
4834B	16.20	0.00	17.83	48.52	8.99	0.42	5.65	0.00	0.00	1.36	0.61	0.43	0.20	0.04	0.18	0.97	4.69	0.00	0.00
4836	0.00	0.00	4.95	32.00	27.62	7.29	17.29	2.92	0.00	2.68	3.36	1.94	3.67	1.73	1.90	8.25	9.04	1.32	1.60
4836A	0.00	0.00	8.48	34.89	25.12	6.74	14.70	2.68	0.00	2.52	3.64	1.25	3.39	1.60	1.75	7.01	7.68	1.21	1.47
4836B	0.00	0.00	5.82	16.68	22.19	15.34	15.00	18.52	0.00	2.31	2.50	1.68	7.99	5.48	1.87	11.18	3.82	13.45	5.07
4836C	21.86	0.18	23.58	43.28	5.81	0.00	3.97	0.00	0.00	0.92	0.25	0.17	0.00	0.00	0.00	0.76	3.20	0.00	0.00
4903	0.00	0.00	5.95	23.14	26.53	15.12	0.00	17.24	3.61	2.66	4.59	1.19	7.72	4.37	3.03	0.00	0.00	9.77	7.47
4903A	0.00	0.00	7.79	34.33	27.71	3.53	18.89	0.23	0.00	2.49	3.85	1.22	1.78	0.84	0.91	9.11	9.78	0.10	0.12
4920	6.96	0.00	15.70	33.22	17.95	8.47	13.18	0.00	0.00	1.78	1.74	1.03	4.32	2.42	1.72	7.70	5.48	0.00	0.00
4920A	12.58	0.00	19.69	36.81	13.50	4.99	9.18	0.00	0.00	1.40	1.20	0.65	2.54	1.36	1.10	5.09	4.10	0.00	0.00
4920B	39.07	0.00	1.30	35.73	17.33	3.12	2.19	0.00	0.00	0.80	0.36	0.10	1.56	0.69	0.86	0.98	1.22	0.00	0.00
4920C	0.00	0.00	5.42	25.01	23.52	23.59	0.00	16.25	0.08	2.34	2.39	1.43	12.13	7.39	4.07	0.00	0.00	10.11	6.14
4922	0.00	0.00	5.70	25.38	28.89	11.60	0.00	18.34	1.30	2.90	4.87	1.05	5.88	3.05	2.67	0.00	0.00	9.32	9.02
4929	8.08	0.00	13.57	32.10	21.41	7.10	13.55	0.00	0.00	1.85	1.86	0.50	3.62	1.98	1.50	7.71	5.84	0.00	0.00
4930	0.00	0.00	8.35	35.69	25.60	5.18	14.63	3.33	0.00	2.55	3.57	1.15	2.61	1.23	1.35	6.98	7.65	1.51	1.82
4A33A	0.00	0.00	8.25	36.23	28.83	5.19	2.87	12.72	0.00	2.20	2.44	1.30	2.63	1.36	1.20	1.52	1.35	6.44	6.28
4A34	0.00	0.00	6.59	10.90	21.30	24.60	0.00	17.46	10.77	2.53	4.50	1.39	12.65	7.73	4.21	0.00	0.00	10.91	6.55
5033	0.00	0.00	5.64	24.06	27.10	15.45	0.00	18.33	2.40	2.61	3.57	0.86	7.90	4.55	3.00	0.00	0.00	10.62	7.71
5035	0.00	0.00	4.41	20.22	30.09	18.49	0.00	18.86	1.57	2.44	3.14	0.81	9.50	5.73	3.26	0.00	0.00	11.59	7.27
5824	0.00	0.00	7.83	39.78	21.34	6.59	0.00	13.66	1.82	2.66	5.04	1.30	3.32	1.57	1.71	0.00	0.00	6.20	7.46
5913	0.00	0.00	5.02	21.82	28.31	21.02	0.00	14.86	2.38	2.29	2.66	1.68	10.77	6.33	3.92	0.00	0.00	8.83	6.03
5919	0.00	0.00	8.29	35.82	22.84	6.16	0.00	13.81	3.55	2.67	5.33	1.57	3.10	1.47	1.59	0.00	0.00	6.31	7.50
5923	0.00	0.00	5.63	27.38	27.34	16.57	0.00	15.90	0.21	2.34	2.65	2.04	8.47	4.86	3.24	0.00	0.00	9.16	6.74
5926	0.00	0.00	7.06	30.81	26.23	7.85	0.00	16.70	0.66	2.92	6.43	1.37	3.98	2.06	1.81	0.00	0.00	8.47	8.23
5933	0.00	0.00	5.79	14.70	23.86	27.48	0.00	15.52	5.42	2.24	3.55	1.48	14.19	8.99	4.30	0.00	0.00	10.16	5.36

TABLE 5. ANALYSES OF TRACE ELEMENTS IN PARTS PER MILLION, EAST MAP AREA

[ND, not determined]

Sample No.	Ba	Rb	Sr	Zn	Zr	Y	Cd	Li	Co	Cr	Cu	Ga	Ni	Sc	V	Lab. No.	Analysts[1]	Remarks
1014	360	27	560	88	171	23	2	13	71	480	70	32	240	46	210	M125970	REM,MV,BK,SN	Basalt, type b, vent 1009.
1912	360	<10	430	58	190	26	<2	<50	51	190	70	18	170	36	250	M140268	TF,VM	Basalt, type g, vent 1912.
2031B	920	18	920	91	168	15	3	30	40	16	40	36	46	30	180	M125969	REM,MV,BK,SN	Basalt, type i, vent 2019.
2929	1050	7	960	79	144	11	2	19	59	410	80	32	140	60	270	M125975	REM,MV,BK,SN	Basalt, type j, O'Neill Crater.
2929B	1100	5	780	78	195	12	ND	ND	42	300	67	28	110	45	270	M131534	MV,BK	Basaltic andesite, O'Neill Crater.
2929E	1250	38	355	58	305	<5	1	41	5	30	17	26	6	<4	27	M125972	REM,MV,BK,SN	Dacite, O'Neill Crater.
2933A	1250	26	700	65	250	17	4	31	25	110	60	28	92	26	130	M125966	REM,MV,BK,SN	Basaltic andesite, O'Neill Crater.
3024	560	18	780	96	166	22	1	22	50	320	72	25	37	32	190	M125984	REM,MV,BK,SN	Basalt, type i.
3027	610	13	690	91	139	17	ND	2	68	93	110	32	64	47	275	M129372	MV,BK,CH	Basalt, type g, vent 3022.
3805	700	9	730	115	240	30	ND	17	23	<2	29	34	6	17	107	M129379	MV,BK,CH	Microdiorite xenolith, O'Leary Peak.
3810C	760	28	750	90	235	26	ND	14	18	<2	16	32	3	19	87	M129383	MV,BK,CH	Andesite, O'Leary Peak.
3810D	1200	68	345	57	230	12	1	84	24	<2	6	28	<2	<4	10	M125967	REM,MV,BK,SN	Dacite, O'Leary Peak.
3810E	860	37	800	184	220	30	3	115	22	<2	45	35	27	22	80	M125968	REM,MV,BK,SN	Microdiorite xenolith, O'Leary Peak.
3823A	490	19	840	92	133	11	2	14	83	240	57	37	120	46	220	M125982	REM,MV,BK,SN	Basalt, type g, vent 3824.
3915C	860	31	1200	95	159	22	2	30	28	7	45	45	12	20	130	M125979	REM,MV,BK,SN	Andesite, vent 3922.
3A33	680	30	715	86	184	20	2	30	45	300	65	30	100	32	160	M125962	REM,MV,BK,SN	Basalt, type g, vent 2A07.
4826	1250	41	530	96	370	18	ND	19	3	<2	3	31	<2	6	<2	M129381	MV,BK,CH	Dacite, O'Leary Peak.
4833	920	22	530	69	240	16	ND	16	11	3	10	26	4	12	59	M131426	ML	Andesite, O'Leary Peak.
4834	1200	42	540	92	340	14	ND	19	4	<2	4	32	<2	6	<2	M129380	MV,BK,CH	Dacite, O'Leary Peak.
4835	1400	69	157	86	245	15	ND	28	<2	<2	2	31	<2	<2	<2	M129382	MV,BK,CH	Do.
4903A	760	20	840	97	187	26	2	32	31	32	39	34	27	22	130	M125960	REM,MV,BK,SN	Basalt, type h, vent 4836.
4920	1150	27	620	71	230	8	2	33	28	40	46	33	28	24	150	M125973	REM,MV,BK,SN	Basaltic andesite, Strawberry Crater.
4920A	1170	40	440	57	255	<5	2	43	14	100	34	29	33	14	84	M125976	REM,MV,BK,SN	Dacite, Strawberry Crater.
4920B	164	<5	365	19	45	<5	ND	4	4	7	63	17	4	12	15	M131438	ML	Granulite xenolith, Strawberry Crater.
4920C	860	<5	790	75	151	5	ND	7	63	370	87	33	120	64	300	M131439	ML	Basalt, type c, Strawberry Crater.
4929	150	30	630	74	245	16	2	31	24	46	48	28	46	28	130	M125965	REM,MV,BK,SN	Basaltic andesite, Strawberry Crater.
4A34	500	17	820	88	178	21	2	21	65	290	66	31	110	41	220	M125980	REM,MV,BK,SN	Basalt, type g, vent 3034.
5919	660	23	1150	83	220	20	2	26	32	<2	33	33	7	20	110	M125961	REM,MV,BK,SN	Basalt, type h, vent 3705?

[1]Analysts:

BD = B. D. Dover CH = Chris Heropoulus MV = M. Villarreal SN = Sarah Nell VM = V. McDaniel

BK = Bi Shia King ML = Michael Leong REM = R. E. Mays TF = T. L. Fries