[illegible] OF THE NORTHERN MT. JEFFERSON VOLCANIC [illegible] TOQUIMA RANGE, SOUTH-CENTRAL NEVADA

Nº 18854

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[illegible] for the Mt. Jefferson volcanic center has been establish- [illegible] previously undifferentiated volcanic rocks in the vicinity of [illegible] central Toquima range, Nevada.

[illegible] a minimum of two eruptive centers that have a combined [illegible] extent of approximately 150 square miles. The northern center [illegible] two volumetrically significant ash flow units. The younger of [illegible] northern units is the rhyolitic to rhyodacitic Mt. Jefferson [illegible] compound cooling unit with a minimum thickness of approximately [illegible] Mt. Jefferson Tuff comprises a significant portion of the [illegible] caldera fill. Compositionally equivalent extra caldera Mt. Jeffer- [illegible] has been mapped but volume considerations remain problematic; [illegible] outflow sheets have been recognized although preliminary invest- [illegible] suggest outflow from the Mt. Jefferson caldera may exist in [illegible] Range, 10 miles West of Mt. Jefferson. The Mt. Jefferson [illegible] characterized by plagioclase, quartz and biotite phenocrysts. [illegible] and magnetite are diagnostic accessory minerals.

[illegible] Mt. Jefferson Tuff is underlain by the rhyolitic Moores Creek [illegible] older accumulation of ash flow sheets. Moores Creek Tuff is [illegible] rich and generally contains less biotite than the Mt. Jefferson [illegible] fragments within the Moores Creek Tuff are ubiquitous but [illegible] abundance. Both intra and extra caldera Moores Creek Tuff [illegible] recognized.

[illegible] rhyolite intrusions and water-lain tuffaceous sediments [illegible] mapped inside the topographic wall and probably delineate [illegible] of the ring fracture and mote zones, respectively.

[illegible] and Range faults have dissected and tilted the volcanic centers [illegible] sheets.

[illegible] STRATIGRAPHY, GEOCHEMISTRY, AND SOURCE [illegible] MIOCENE ASH-FLOW TUFFS AND LAVAS OF THE [illegible] MOUNTAIN AREA, NORTHWESTERN NEVADA

Nº 24726

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[illegible] ash-flow tuff of middle Miocene age exposed in the vicinity [illegible] Mountain (41°38'N., 119°19'W.) does not, as previously [illegible], belong to the Soldier Meadow Tuff. Although lithologically [illegible], the slightly peralkaline tuff has lower FeO* (1.9 vs. 2.8 wt. [illegible] reverse magnetization (TRM) compared to a stronger normal [illegible] (TRM) for the Soldier Meadow Tuff, and different cathodolumi- [illegible] properties of sanidine phenocrysts. Distribution and facies [illegible] suggest that the tuff of Badger Mountain was erupted from [illegible] Badger Mountain, and likely from vents now covered by the [illegible] lavas of Badger Mtn. As shown by Korringa (1973), the [illegible] Meadow Tuff was erupted from a linear vent area 25 km to the SSE. [illegible] pronounced negative gravity anomaly in the Badger Mountain area [illegible] interpreted by Greene and Plouff (1981) as reflecting a buried [illegible] caldera 20 km in diameter. This caldera cannot have formed [illegible] the eruption of the tuff of Badger Mountain, which extends in a [illegible] and unbroken fashion for as much as 10 km inside the inferr- [illegible] margin. Moreover, the void-free original volume of about [illegible] the tuff of Badger Mountain is too small to explain a caldera [illegible] size. A more likely possibility is that the buried caldera [illegible] source of the Summit Lake Tuff.

[illegible] subalkaline silicic lavas exposed over an area of 50 km^2 [illegible] of Badger Mountain in the vicinity of Devaney Mountain over- [illegible] peralkaline tuffs and lavas of the Badger Mountain area and [illegible] dated at 14.3±0.3 m.y. Chemical variations and petrographic [illegible] of these rocks suggest that they reflect the mixing of magmas [illegible] silica rhyolitic and dacitic composition.

[illegible] EXTENSIVE VOLATILE-CHARGED RHYODACITE FLOW, BAJA [illegible], MEXICO

Nº 21771

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[illegible] Providencia Rhyodacite lava flow of southern Baja California is an [illegible] extensive but high silica extrusion. Remnants of the flow [illegible] lower to middle Miocene volcanics for a distance of 27 km north [illegible] of the city of La Paz. Isopachs on the flow show a maximum [illegible] of 120 m and indicate a minimum volume of 8.6 km^3. Persistant [illegible] foliations are closely-spaced and parallel the base of the [illegible] In the upper part of the flow these foliations decrease in abun- [illegible] and are strongly deformed into isoclinal to open folds. Flow [illegible], developed from fold axial information, together with isopach [illegible] suggest that the rhyodacite flowed N-NW from its source south of [illegible]

[illegible] Providencia Rhyodacite (68-69% SiO_2, 3.7% Na_2O, and 4.5% K_2O) [illegible] about 6% phenocrysts (plag>cpx>Fe-Ti oxides>ap) set in a devitrified groundmass of fine-grained alkali feldspar. Lithophysal foliations are filled with large (up to 3 mm) vapor phase crystals that occur in symmetrical mineralogical bands. This zoning defines a crystallization order of: fayalite (Fa~0.9), tridymite, low quartz + brown hornblende + Fe-Ti oxide + rare biotite(?), and finally green amphibole.

The following model is proposed for the formation of the lithophysal foliations and vapor phase crystals: Devitrification crystals nucleated along planar flow shears in the lava just prior to or following complete solidification. As devitrification progressed outward from the shear planes, cavities were formed due to the decrease in volume in the crystallization reaction. Simultaneously, vapor exolved from the glass filled the newly-formed cavities. As the flow slowly cooled, the vapor phases sequentially precipitated onto the walls of these cavities. The low viscosity of this flow may be attributed to either a very high eruption temperature or high volatile content of the magma.

MESOZOIC ALKALINE AND CALC-ALKALINE IGNEOUS ROCKS, NORTH-CENTRAL SAN BERNARDINO MOUNTAINS, CALIFORNIA

Nº 17090

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Studies of igneous rocks from a 64 square km area in the highlands of the north-central San Bernardino Mountains and northern rangefront reveal contrasting alkaline and calc-alkaline affinities. Intrusion of alkaline hornblende quartz monzonite during the Triassic marked the initial phase of emplacement of the Mesozoic batholith. Jurassic, highly silicic (69-77 wt% SiO_2), calc-alkaline quartz latite tuff and porphyry mapped as a series of shallow, northwest trending dikes, exhibit depleted $\delta^{18}O$ values (+2.5 to +5.0 ‰). On the basis of similar Early Mesozoic age, depleted $\delta^{18}O$ signatures, and lithology, a tentative correlation between the volcanic complex and the Sidewinder Volcanic Series, northeast of Victorville, CA, can be made. During the Cretaceous, a calc-alkaline biotite quartz monzonite (BQM) pluton, high in alkalis (Na + K = 9.0-12.0 wt%) intruded the region. This granitoid is peraluminous (A/CNK = 1.1 to 1.2) and is similar in composition and mineralogy to the weakly peraluminous La Posta Granodiorite of the northern Peninsular Ranges batholith. A heterogeneous Cretaceous mixed-igneous complex, combining a variable mixture of a granitic component with a volcanic protolith, geochemically represents an intermediate composition between the quartz latite and the BQM. The major oxide chemistry suggests the volcanic rocks are comagmatic with differentiates of the BQM and may have been a shallow precursor to intrusion of the Cretaceous pluton. Depleted $\delta^{18}O$ values within the volcanic complex indicate significant exchange with Jurassic (?) meteoric waters. The calc-alkaline peraluminous, alkali-enriched chemistry of the Late Cretaceous BQM suggests the parental magma may have assimilated appreciable alkaline crustal material and aluminous meta-sediments as it was intruded.

MID-TERTIARY VOLCANISM OF THE CLIPPER MOUNTAINS AREA, EASTERN MOJAVE DESERT, CALIFORNIA

Nº 26453

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A 600m thick sequence of late Oligocene? to early Miocene calc-alkaline volcanic rocks which are exposed in the Clipper Mountains were deposited upon the northern slopes of a mid-Tertiary basin-graben. They pinch out to the north against a paleohigh of Precambrian gneisses.

The volcanic rocks are divided into upper and lower sequences, based upon gross compositional differences. The lower sequence (~400m) consists largely of dark basalt to andesite flows. Two rhyodacitic plugs punch through and locally upwarp all but the upper units of the lower sequence. The upper sequence (~200m) consists of a thick pile of andesitic to rhyodacitic breccias and flows which were derived from a large dacitic volcanic center located southwest of the area studied. Plateau-forming basaltic andesite flows and an exotic rhyolitic welded tuff cap the upper sequence. The rhyolite correlates(?) with tuffs in adjacent ranges that are 18 my old. Deformation is post-volcanic and is dominated by NW to WNW trending normal faults.

The volcanic suite is high-K calc-alkaline, with an alkali-lime index of 58 and a K_2O @ 57.5 of 2.6 wt%. The suite becomes C-normative at ~70 wt% SiO_2, culminating in peraluminous bio-plag rhyodacites. Ne-normative alkaline basalts are present at the base of the volcanic pile.

The adjacent Ship, Marble, and Van Winkle Mtns. contain mid-Tertiary volcanic sequences similar to, but thinner than that of the Clipper Mtns. The upper units in all these ranges and in the Clipper Mtns. are compositionally bimodal, often capped by the same widespread welded tuff. This suggests that the well documented change from intermediate calc-alkaline to bimodal basalt-rhyolite volcanism occurred just prior to 18 mybp in this part of the Mojave Desert.