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Isochron/West, Bulletin of Isotopic Geochronology, v. 1, pp. 33-43

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K/Ar AGES OF TERTIARY IGNEOUS ROCKS IN CENTRAL AND WESTERN NEW MEXICO

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The following list consists of three sections, each containing a series of age determinations of Tertiary igneous rocks by K-Ar analyses made in separate laboratories. The first series of 5 analyses includes only unpublished age determinations made by Geochron Laboratories, Inc., for the New Mexico Bureau of Mines and Mineral Resources during the period from February to October 1969. The second series, reported by Weber and Bassett (1963), is included herein for easier availability for comparison of relevant ages. The third series, reported by Burke, et al. (1963), is included, with supplemental data, for the same purpose. All samples except one in the second series were collected by Bureau personnel in conjunction with continuing studies of Mesozoic and Cenozoic igneous petrology and chronology. A preliminary brief chronologic summary may be found in Kottlowski, Weber, and Willard (1969).

SECTION I

In the 5 samples listed below, prefixed G to indicate Geochron Laboratories, Inc., argon analyses were made by standard isotope dilution techniques in which the samples were fused by RF induction heating and the extracted argon was analyzed with an MS-10 mass spectrometer in the static mode. Potassium analyses were performed by differential flame photometry using a Beckman DU spectrophotometer.

All analyses are in duplicate on separate aliquots of the samples and averages are reported. Analytical errors are reported at the 68-percent confidence level. The errors are based upon a statistical analysis of more than 500 pairs of duplicate argon and potassium analyses and include all analytical uncertainties. The constants used in the age calculations are:

$\lambda_\varepsilon = 0.585\times10^{-10}$/yr; $\lambda_\beta = 4.72\times10^{-10}$/yr; $K^{40}/K_{total} = 1.22\times10^{-4}$ gm/gm.

G-A1369/NMBM-155A-V1 K-Ar (hornblende) 36.9±1.2 m.y.

Espinaso Volcanics. Hornblende latite porphyry. Sample is from the north wall of the canyon of Arroyo Pinovetito (Arroyo del Tuerto of recent

maps) where it cuts through Espinaso Ridge, 11.5 miles west-southwest of Cerrillos, Sandoval Co., NM; NW/4 SE/4 sec. 4, T. 13 N., R. 6 E.; 35°22'54" N., 106°18'31" W. Analytical data: K = 1.055%; K^{40} = 1.287 ppm; $\overset{*}{A}r^{40}$ = 0.0028 ppm; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 56, 47%. Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The analyzed hornblende concentrate of over 98 percent purity was extracted from fresh cobbles of latite porphyry from volcanic conglomerate interbedded with latitic to andesitic tuff and tuff breccia in the lower part of the type section of the Espinaso Volcanics (Stearns, 1953a, 1953b; Disbrow and Stoll, 1957). The rock consists of abundant coarse (up to 5 mm) euhedral phenocrysts of zoned, complexly twinned andesine-labradorite, oxyhornblende, sparse ovoids of quartz, and accessory apatite in a very fine-grained matrix of anhedral potash feldspar and minor laths of plagioclase.

The K-Ar age of 36.9 m.y. is in full agreement with stratigraphic relationships and faunal age markers. Basal bentonite beds of the Espinaso Volcanics contain the Eocene-Oligocene transition form Brontothere sp. and the early Oligocene form Teleodus sp. (Disbrow and Stoll, 1957, p. 24). The underlying Galisteo Formation contains a characteristic Duquesnean fauna in its uppermost beds (Stearns, 1943).

Correlation with the lower part of the Datil Group (Spears Member) is strongly suggested by distinctive petrographic similarities, stratigraphic relationships, and by a single K-Ar date of 37.1 m.y. for the Spears (SM-192, below).

G-R1251/NMBM-248D-V1 K-Ar (whole rock) 15.8±1.5 m.y.

Popotosa Formation. Silver Creek basaltic andesite. A lava flow on the east side of Silver Creek and on the northern flank of an exhumed composite cone, 19.5 miles north-northwest of Socorro, Socorro Co., NM; SE/4 NE/4 sec. 15, T. 1 N., R. 2 W. (unsurveyed, Sevilleta Grant); 34°18'42" N., 107°01'52" W. Analytical data: K = 2.375%; K^{40} = 2.898 ppm; $\overset{*}{A}r^{40}$ = 0.00270 ppm; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 24, 35%. Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample, from a massive, slightly vesicular lava flow, is composed of small phenocrysts of clinopyroxene and sparse altered olivine set in a fine-grained matrix of flow-aligned calcic plagioclase laths, minor potash feldspar(?), clinopyroxene, and iron oxides. The basaltic andesite sequence is overlapped by, and probably interfingers with, clastic sediments of the Popotosa Formation in the type section as defined by Denny (1940).

The K-Ar age of 15.8 m.y. is acceptable within the known framework of the local stratigraphy. Correlation with La Jara Peak Member of the original Datil Formation of Tonking (1957) has been suggested but lacks confirmation (Weber, 1963a, p. 138). Willard (1959) recommended

that La Jara Member be reassigned to a post-Datil sequence of basalts and basaltic andesites that are widely distributed to the west in Catron County; the present writer concurs with this interpretation. (Note: the Datil Formation has been elevated to group status in this report on the basis of what appears to be a concensus of opinion among the various investigators who have mapped correlative units in the region outside the type area. Although the member designation of major subunits of the Datil has been retained, further mapping probably will show that these merit elevation to formational rank).

G-B1243/NMBM-318D-V1 K-Ar (biotite) 28.3±1.6 m.y.

Datil Group(?). Monticello Box latite. From the north wall of the "Box" of Monticello Canyon, 5 miles SE of Dusty, Socorro Co., NM; NW/4 SW/4 sec. 32, T. 8 S., R. 7 W.; 33°34'06" N., 107°35'20" W. Analytical data: K = 2.082%; K^{40} = 2.540 ppm; $\overset{*}{A}r^{40}$ = 0.00424 ppm; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 26, 26%. Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample is from a massive porphyritic aphanite with distinct planar structure suggestive of welded tuff. In hand specimens, abundant phenocrysts of granular, zoned feldspar up to 4 mm in diameter, and sparse, ragged biotite less than 1 mm in diameter are set in a microcrystalline matrix. In thin section, alteration was found to be more severe than expected; both potash and plagioclase (andesine) feldspars are replaced by patchy calcite and biotite is bleached and heavily dusted with iron oxides. In view of the degree of alteration (although endogenic propylitic alteration may not cause a shift in isotopic ratios), coupled with the low purity of the biotite concentrate (20-30% biotite, 70-80% feldspar and rock fragments) the calculated age of 28.3 m.y. probably should be considered questionable.

Willard (1957, 1959), followed by Hillard (1969) assigned the andesite-latite sequence in Monticello Canyon to a pre-Datil volcanic group on the basis of similarities with an older unit to the south in the Black Range. Although the present writer has suggested an alternative correlation with the Datil Group, (Weber, 1964, p. 106) the question is not resolved by this analysis.

G-R1242/NMBM-325D-70 K-Ar (whole rock) 31.8±1.3 m.y.

Sierra Blanca Volcanics. Church Mountain latite vitrophyre. From the northwest slope of Church Mountain in the Sierra Blanca, 8.6 miles southeast of Carrizozo, Lincoln Co., NM; SW/4 NE/4 sec. 2, T. 9 S., R. 11 E.; 33°33'27" N., 105°46'08" W. Analytical data: K = 4.216%; K^{40} = 5.144 ppm; $\overset{*}{A}r^{40}$ = 0.00966 ppm; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 59, 59%. Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample consisted of fresh, pitchy black glass with minor glomerocrysts of orthoclase, oligoclase-andesine, hauynite-noselite, and sparse biotite, clinopyroxene, and

iron oxides. The vitrophyre is a minor phase of a thick section of latitic welded tuffs, breccias, and flows that constitute the upper sequence of the Sierra Blanca Volcanics (Weber, 1964, fig. 2, p. 106).

The K-Ar age of 31.8 m.y. is acceptable in the context of the known local and regional stratigraphy. It falls within the range of the Datil Group in Socorro County about 90 miles to the northwest.

G-B1241/NMBM-325D-79b K-Ar (biotite) 34.4 ± 1.2 m.y.

Alkali syenite dike. Porphyritic anorthoclase syenite of the Sierra Blanca alkalic suite from the southeastern foot of Willow Hill, 5.5 miles south of Carrizozo, Lincoln, Co., NM; SW/4 SE/4 sec. 35, T. 8 S., R. 10 E.; $33^{o}33'49''$ N., $105^{o}52'16''$ W. Analytical data: K = 6.990%; K^{40} = 8.528 ppm; $\mathring{A}r^{40}$ = 0.01731 ppm; $\mathring{A}r^{40}/\Sigma Ar^{40}$ = 62, 62%. Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: A conspicuously porphyritic dike rock with large phenocrysts (up to 5 cm) of anorthoclase set in a medium-grained matrix of alkali feldspar showing extensive deuteric alteration. Biotite is locally abundant in unaltered lustrous, euhedral prisms up to 2 mm in diameter. Accessory aegerine augite occurs as clusters of euhedral prisms and sparse miarolitic cavities are lined with calcite and thomsonite. The biotite concentrate was reported to contain less than 1 percent impurities.

The age of 34.4 m.y. is acceptable and fully compatible with age relationships indicated by related dikes, sills, and small stocks of alkali syenite that are intrusive into rocks as young as the andesitic (lower) sequence of the Sierra Blanca Volcanics, but were not found penetrating the overlying latitic sequence. The indicated relative ages of the syenite and of the latite vitrophyre (G-R1242, above) agree with these field relationships.

SECTION II

The following 9 K-Ar determinations, prefixed B to indicate the Brookhaven National Laboratory, were made by William A. Bassett and associates during the summer of 1962 and reported previously by Weber and Bassett (1963). Analytical procedures are described by Bassett, et al. (1963, p. 215-216) with the exception that potassium analyses of this series were made by x-ray spectrometry.

The decay constants used in age calculations are: $\lambda_{\varepsilon} = 0.585 \times 10^{-10}$ years -1; $\lambda_{\beta} = 4.83 \times 10^{-10}$ years -1; K^{40} half life = 1.28×10^{9} years; branching ratio = $0.121 = \lambda_{\varepsilon} / \lambda_{\beta}$. Instrumental errors are based solely on a mean deviation of 5 percent.

B/NMBM-247D-KA1 K-Ar (biotite) 30.6±2.8 m.y.

Datil Group, Hells Mesa Member. Welded rhyolite tuff from the base of Hells Mesa Member in the type section (Tonking, 1957), on the eastern slope of Hells Mesa in the Bear Mountains, 13.6 miles north of Magdalena, Socorro Co., NM; SW/4 NE/4 sec. 17, T. 1 N., R. 4 W.; 34°18'40" N., 107°16'44" W. Analytical data: K = 6.77%; $\overset{*}{A}r^{40}/K^{40}$ = 0.001791; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 52, 64%. Cited by: Weber and Bassett (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: Highly welded lithic-crystal tuff containing abundant phenoclasts of sanidine, quartz, biotite, and sphene, plus lithic inclusions.

The K-Ar age of 30.6 m.y. is fully acceptable and in close agreement with presumed correlative units in the Gallinas Mountains and the Joyita Hills (SM-187 and SM-191, below).

B/NMBM-272C-KA1 K-Ar (biotite) 28.0±1.4 m.y.

Nitt stock. Monzonite intrusive from the central part of the stock 3,000 feet north of the Nitt shaft, on the west slope of the Magdalena Mountains, 2.4 miles east-southeast of Magdalena, Socorro Co., NM; CSE/4 sec. 25, T. 2 S., R. 4 W.; 34°06'15" N, 107°12'12" W. Analytical data: K = 7.55%; $\overset{*}{A}r^{40}/K^{40}$ = 0.001636; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 41%. Cited by: Weber and Bassett (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: A fine medium-grained granitoid rock composed of potash and plagioclase feldspars, minor quartz, and glomerocrysts of lustrous tablets of biotite. The sample was somewhat coarser-grained than typical monzonite of the stock as described by Loughlin and Koschmann (1942, p. 37).

Although only a single analysis was made, which the analyst reported as a "poor run", the K-Ar age of 28.0 is acceptable. It shows excellent agreement with biotite ages of the adjacent closely related Anchor Canyon stock (28.3 m.y.) and is properly a little younger than mineral ages obtained from local units of the Datil Group that were intruded by these stocks.

B/NMBM-272C-KA2 K-Ar (biotite) 28.3±1.4 m.y.

Anchor Canyon stock. Granite intrusive from a roadcut near the western edge of the stock 700 feet east of the Vindicator shaft, on the west slope of the Magdalena Mountains, 2.2 miles east of Magdalena, Socorro Co., NM; NE/4 NE/4 sec. 25, T. 2 S., R. 4 W.; 34°06'49" N., 107°12'17" W. Analytical data: K = 7.40%; $\overset{*}{A}r^{40}/K^{40}$ = 0.001653; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 51, 46%. Cited by: Weber and Bassett (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: A slightly porphyritic, medium-grained grani-

toid rock composed of potash and plagioclase feldspars, quartz, and glomerocrysts of lustrous biotite, green hornblende, and magnetite, with conspicuous accessory sphene. The sample conforms closely with the granite described by Loughlin and Koschmann (1942, p. 40).

The K-Ar age of 28.3 m.y. is fully acceptable and agrees with a biotite age of 28.0 m.y. from the adjacent Nitt stock.

B/NMBM-272C-KA3 K-Ar (whole rock) 14.3±1.0 m.y.

Post-Datil volcanics. Porphyritic perlite from a prospect pit in the Stendel perlite deposit, on the eastern border of Agua Frio Canyon, 4.9 miles south of Magdalena, Socorro Co., NM; NE/4 SW/4 sec. 14, T. 3 S., R. 4 W.; 34°02'54" N., 107°13'58" W. Analytical data: K = 3.88%; $\overset{*}{A}r^{40}/K^{40}$ = 0.0008344; $\overset{*}{A}r^{40}/\Sigma Ar^{40}$ = 74, 64%. Cited by: Weber and Bassett (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: A massive, porphyritic, finely perlitic, fresh glass with phenocrysts of sanidine, oligoclase, biotite, and hornblende. A chemical analysis shows it to be a high-silica rhyolite (Weber, 1957).

The K-Ar age of 14.3 m.y. is fully acceptable within the framework of the local stratigraphy.

B/NMBM-294D-KA1 K-Ar (whole rock) 23.1, 42.6 m.y.

Datil Group(?). Intrusive perlite cutting the latite-rhyolite facies of the Datil Group (Willard, 1957) one mile east of Indian Spring, 13.7 miles east-southeast of Datil, Catron Co., NM; SE/4 sec. 6, T. 6 S., R. 9 W.; 33°45'25" N., 107°43'40" W. Analytical data: K = 3.78%; $\overset{*}{A}r^{40}/K^{40}$ = 0.001350, 0.002489; $Ar^{40}/\Sigma Ar^{40}$ = 41, 72%. Cited by: Weber and Bassett (1963). Collected by: M. E. Willard, N. Mex. Bur. Mines. Comments: The sample, a finely perlitic glass with sparse small phenocrysts of feldspar, quartz, and biotite, contained narrow seams and small irregular patches of alteration products.

The discordance in argon values of successive runs results in two contrastingly separate ages. If the greater age of 42.6 m.y. is valid, then the age of the Datil Group is extended beyond the 37 m.y. value of the single date from the Spears Member (SM-192, below). Alternatively, however, the sample may be from the older, pre-Datil volcanic group that crops out about one mile to the east, and for which isotope ages have not been obtained.

B/NMBM-313A-KA1 K-Ar (glass concentrate) 28.3±1.8 m.y.

Datil Group. Rhyolitic vitrophyre, the basal phase of a welded rhyolite

ash-flow tuff from the eastern slope of the Saliz Mountains, one mile west of Lower San Francisco Plaza, Catron Co., NM; SE/4 sec. 28, T. 9 S., R. 19 W.; 33°39'46" N., 108°48'18" W. Analytical data: K = 3.18%; $\ddot{A}r^{40}/K^{40}$ = 0.00166; $\ddot{A}r^{40}/\Sigma Ar^{40}$ = 64, 64%. Cited by: Weber and Bassett (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The analyzed sample consisted of a concentrate of the glassy matrix of a fresh, slightly perlitic pitchy vitrophyre containing abundant phenoclasts of potash and plagioclase feldspars, quartz, and minor biotite, plus scattered small spherulites. The vitrophyre is a local basal phase of a tuff sequence of the Datil Group that overlies a distinctive volcanic conglomerate (Weber and Willard, 1959b). Assignment to the Datil Group was based on reconnaissance mapping that extended from the vicinity of the Datil type section. The tuff sequence is similar to the Hells Mesa Member, whereas the conglomerate is similar to common facies of the Spears Member, but specific correlation over such distances is insecure on the basis of available data.

The K-Ar age of 28.3 m.y. is compatible with other available approximate age criteria, although it is significantly older than a sanidine age of 23.2 m.y. (Damon, et al. 1967, Table 25, No. 2; Elston, et al. 1968, Table 1, No. 3) from moonstone tuff about 5 miles to the northeast that was mapped in the same sequence as the vitrophyre (Weber and Willard, 1959b). It is younger than ages obtained in the type section of the Datil Group, but the upper limits of the Datil have not been dated there. The 27.2 m.y. determination on obsidian from Ewe Canyon (338A-KA1, below) overlaps within limits of error with the vitrophyre.

B/NMBM-338A-KA1 K-Ar (whole rock) 27.2±1.8 m.y.

Datil Group. Obsidian nodules (marekanites) from flow-banded rhyolite in Ewe Canyon, 17.5 miles east-northeast of Mogollon, Catron Co., NM; W/2 sec. 32, T. 9 S., R. 16 W.; 33°28'50" N., 108°30'52" W. Analytical data: K = 4.02%; $\ddot{A}r^{40}/K^{40}$ = 0.001588; $\ddot{A}r^{40}/\Sigma Ar^{40}$ = 79, 79%. Cited by: Weber and Bassett (1963). Collected by: M. E. Willard, N. Mex. Bur. Mines. Comments: Vitreous black obsidian from flows correlated with the upper part of the Datil Group (Weber and Willard, 1959a).

The K-Ar age of 27.2 m.y. is compatible with other available age criteria and overlaps with that of the vitrophyre (313A-KA1, above).

B/NMBM-361C-KA1 K-Ar (whole rock) 18.6±0.9 m.y.

Post-Datil volcanics. Obsidian nodules (marekanites) from perlite in a rhyolite dome complex, 5.2 miles west of Mule Creek, Catron Co., NM; SE/4 sec. 6, T. 14 S., R. 21 W.; 33°06'29" N., 109°02'44" W. Analytical data: K = 4.13%; $\ddot{A}r^{40}/K^{40}$ = 0.001087; $\ddot{A}r^{40}/\Sigma Ar^{40}$ = 60%. Cited by:

Weber and Bassett, (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample is from a sequence of post-Datil rhyolitic domes, flows, and tuffs that interfinger with local equivalents of the lower part of the Gila Conglomerate and with basaltic andesite flows (Weber and Willard, 1959a).

The K-Ar age of 18.6 m.y. is acceptable within the framework of the geologic relationships. It falls within a time niche compatible with that indicated for the lower Gila Conglomerate and basaltic andesites elsewhere in southwestern New Mexico and southeastern Arizona (Damon, et al. 1967, p. 68).

B/WAB61-7-15-1-P K-Ar (whole rock) 23.7, 33.2 m.y.

Post-Datil(?) volcanics. Pumiceous "perlite" from the open-pit mine of Great Lakes Carbon Corp. at the south end of the Socorro Mountains, 3.5 miles southwest of Socorro, Socorro Co., NM; SW/4 NW/4 sec. 27, T. 3 S., R. 1 W.; 34°01'21" N., 106°56'18" W. Analytical data: K = 4.16%; $\mathring{A}r^{40}/K^{40}$ = 0.001388, 0.001939; $\mathring{A}r^{40}/\Sigma Ar^{40}$ = 46, 60%. Cited by: Weber and Bassett (1963). Collected by: W. A. Bassett, Univ. Rochester. Comments: The sample is from an industrial perlite deposit that consists of flow-banded, microvesicular, nonperlitic rhyolitic glass emplaced as a volcanic dome (Weber, 1963b). Although a small section of the northeastern edge of the deposit has been altered to montmorillonite, the analyzed sample was fresh and unaltered.

The divergent values of argon content on successive analyses yields contradictory ages of 23.7 and 33.2 m.y. Although inconclusive geologic evidence suggested a post-Datil age, the older indicated isotope age falls well within the known age of the Datil.

SECTION III

The following 5 K-Ar determinations were made in the Field Research Laboratory of Socony Mobil Oil Company, Dallas, Texas, and were previously reported by Burke, et al. (1963). They are repeated here, with some additional data, because of their particular significance to the age of the Datil Group. Analytical data and laboratory procedures are not available. Laboratory measurements were believed accurate to $\pm$1.5 m.y.

SM-187/NMBM K-Ar (biotite) 32.1 m.y.

Datil Group, Hells Mesa Member. A vitric-crystal tuff from the west side of North Lake Canyon in the Gallinas Mountains, 6.2 miles northwest of North Lake, Socorro Co., NM; SE/4 SE/4 sec. 7, T. 1 N., R. 8 W.;

34°19'11" N., 107°42'54" W. Cited by: Burke, et al. (1963). Collected by: R. W. Foster, N. Mex. Bur. Mines. Comments: The sample probably was from the basal unit of the Datil Group (Unit 1 of Givens, 1957, p. 17), a persistent crystal tuff that immediately overlies the Spears Member throughout the Dog Springs quadrangle.

The K-Ar age of 32.1 m.y. is fully acceptable. It is synchronous with one of 32.4 m.y. on biotite from the base of the Hells Mesa Member in the Joyita Hills (SM-190, below) and slightly older than, but within the range of instrumental error of the 30.6 m.y. biotite age from the base of the Hells Mesa type section (247D-KA1, Section II, above).

SM-188/NMBM K-Ar (whole rock) 10.7 m.y.

Post-Datil(?) volcanics. Reported as trachyandesite from the highest point of Socorro Peak in the Socorro Mountains, 4.5 miles west-northwest of Socorro, Socorro Co., NM; NE/4 SW/4 sec. 5, T. 3 S., R. 1 W.; 34°04'30" N., 106°58'06" W. Cited by: Burke, et al. (1963). Collected by: R. W. Foster, N. Mex. Bur. Mines. Comments: The rock type at the cited location is a welded tuff of rhyolitic character. The analyst noted that the whole-rock age is minimal, but that the rock "is probably no older than Miocene."

SM-190/NMBM-392-632 K-Ar (biotite) 33.6 m.y.

Thurman Formation. A welded crystal-vitric tuff from the base of the Thurman Formation on the east side of Apache Valley, in the western foothills of the Caballo Mountains, Sierra Co., NM; SE/4 SE/4 sec. 22, T. 16 S., R. 4 W.; 32°53'43" N., 107°13'59" W. Cited by: Burke, et al. (1963). Collected by: F. E. Kottlowski, N. Mex. Bur. Mines. Comments: According to Kottlowski (personal comm.), the sample consisted of glass shards, sanidine, quartz, biotite (averaging 1.5 mm in diameter), and lithic fragments 5 to 25 mm in diameter. This is from the basal tuff-breccia of the type section of the Thurman as defined by Kelley and Silver (1952, p. 122), who noted the similarity in lithology and stratigraphic position with parts of the Datil, Espinaso, and Abiquiu Formations. A columnar section by Hawley (1970, p. 25) indicates the stratigraphic position of the sample.

The K-Ar age of 33.6 m.y. is fully acceptable and places the unit within the time span of the Datil Group.

SM-191/NMBM-249C-SR1 K-Ar (biotite) 32.4 m.y.

Datil Group, Hells Mesa Member. Welded rhyolite ash-flow tuff from the south side of the canyon of Arroyo los Alamos, at the northern end of the

Joyita Hills, 3.4 miles southeast of La Joya, Socorro Co., NM; Sevilleta Grant (unsurveyed); 34°18'54" N., 106°47'51" W. Cited by: Burke, et al. (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample is from the basal part of a vitric-crystal tuff correlated by Weber with the Hells Mesa Member of the Datil Group (Burke, et al. 1963). The rock is composed of abundant angular phenoclasts of sanidine, oligoclase-andesine, quartz, biotite, oxyhornblende, and minor sphene set in a matrix of compressed, moderately welded vitric shards and lenticules of spherulites. Biotite shows slight oxidation rims and oxyhornblende is partially replaced by secondary minerals.

The K-Ar age of 32.4 m.y. is in good agreement with two other biotite ages from the base of the Hells Mesa Member, one from the type section and the other from the Gallinas Mountains (see above: Section II, 247D-KA1; Section III, SM-187).

SM-192/NMBM-249C-SR3 K-Ar (biotite) 37.1

Datil Group, Spears Member. Latite tuff-breccia from the north side of Arroyo los Alamos, at the northern end of the Joyita Hills, 4.5 miles southeast of La Joya, Socorro Co., NM; Sevilleta Grant (unsurveyed); 34°18'36" N., 106°46'40" W. Cited by: Burke, et at. (1963). Collected by: R. H. Weber, N. Mex. Bur. Mines. Comments: The sample was from the upper part of a thick, massive latite tuff-breccia correlated by Weber (1963a, p. 135) with the Spears Member of the Datil Group. The latite is directly overlain 800 feet to the west by the Hells Mesa Member (SM-191, above) and underlain by the Baca Formation about 5,000 feet to the southeast. The dated sample was from a breccia block composed of abundant euhedral phenocrysts of complexly zoned and twinned calcic andesine, oxyhornblende, biotite (lepidomelane), and minor clinopyroxene set in a very fine-grained matrix of plagioclase laths and anhedral potash feldspar. Patches of replacement calcite in the matrix confirm field evidence of groundwater leaching, hence the younger whole-rock age of 31.9 m.y. (also run by Burke, et al. 1963) was not unexpected.

The K-Ar age of 37.1 m.y. is fully acceptable, fitting conformably between the 30 to 32 m.y. base of the overlying Hells Mesa Member and the Eocene age of the underlying Baca Formation, indicated by two vertebrate fossil finds (Gardner, 1910; Wilpolt and Wanek, 1951; Snyder, 1970).

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