Rb-Sr isochron ages of two Precambrian igneous rock units, Colfax County, New Mexico

D.G. Brookins and T.L. Leyenberger

Isochron/West, Bulletin of Isotopic Geochronology, v. 32, pp. 21-24

This page is intentionally left blank to maintain order of facing pages.

Rb-Sr ISOCHRON AGES OF TWO PRECAMBRIAN IGNEOUS ROCK UNITS, COLFAX COUNTY, NEW MEXICO

D. G. BROOKINS
T. L. LEYENBERGER
University of New Mexico, Albuquerque, NM 87131

We report Rb-Sr isochron ages for two Precambrian rock units from Colfax County, New Mexico as part of a continuing study of the Precambrian basement rocks of New Mexico. The rock units included in this study are not officially named, and are simply described as granite (Unit A) and quartzo-feldspathic gneiss (Unit B). The reader is referred to Leyenberger (M.S. thesis, in prep.) for a reconnaissance map of the area. The Rb-Sr isochron ages reported here are considered preliminary pending completion of other studies. Samples collected by T. L. Leyenberger.

Rb-Sr and concentrations were determined by isotope dilution and the $^{87}Sr/^{86}Sr$ ratios calculated following normal procedures. Replicate analyses of the samples reported here and for other samples show that the $^{87}Rb/^{86}Sr$ ratios are precise to ± 0.5% (one sigma) and $^{87}Sr/^{86}Sr$ ratios precise to ± 0.3% (one sigma). All $^{87}Sr/^{86}Sr$ ratios were normalized to $^{86}Sr/^{86}Sr = 0.1194$. Eight replicate analyses of the Eimer and Amend $SrCO_3$ yielded $^{87}Sr/^{86}Sr = 0.70800 \pm 0.00006$. The decay constant for ^{87}Rb was taken as $1.42 \times 10^{-11}y^{-1}$ and the isochrons were constructed using the York (1969) least squares regression.

Analyses were carried out at the University of New Mexico by R. L. Miller, M. S. Abashian, and H. A. Vogler. The data are presented as Tables 1 and 2 and shown graphically as Figures 1 and 2.

Granite—Unit A

The granite studied is a 13 sq km exposed pluton which intrudes the quartzo-feldspathic gneiss and other basement rocks in the area. The granite is a pink, medium-grained rock which shows a gneissic texture near its margins with the intruded rocks. The rock is equigranular with grains varying in maximum dimension from 0.5 to 2.0 mm. The rock is composed of 20–30% quartz, 50–55% microcline, 10–20% oligoclase (An_{27-29}), cataclastic texture, especially near its margins.

Quartzo-feldspathic gneiss—Unit B

This rock is an equigranular gneiss composed of 35–40% microcline, 30–35% quartz, 15% muscovite, 8–15% plagioclase, 5% orthoclase, and 3–5% magnetite and other opaques. The rock is coarse grained (1.0–3.0

Table 1. Data for Unit A.: Granite.

Sample	Rb (ppm)	Sr (ppm)	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	Latitude/Longitude
TL-025	134.2	29.72	13.39	0.9838	36°32.5'N, 105°07'W
TL-034	172.8	22.15	23.59	1.1849	36°32.5'N, 105°07'W
TL-046	216.9	19.38	35.05	1.4808	36°32.5'N, 105°07'W
TL-047	26.45	60.57	1.26	0.7272	36°32.5'N, 105°07'W
TL-026	189.3	27.13	21.08	1.1765	36°32.5'N, 105°07'W
TL-Ap	n.d.	50.	—	0.7030	36°32.5'N, 105°07'W

Age = 1,488 ± 42 m.y.
$(^{87}Sr/^{86}Sr)_o = 0.7028 \pm 0.0005$
All samples are whole rocks except TL-Ap (apatite).

Table 2. Data for Unit B.: Quartzo-feldspathic gneiss.

Sample	Rb (ppm)	Sr (ppm)	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	Latitude/Longitude
TL-013	171.1	87.88	5.71	0.8241	36°30'30"N, 105°15'10"W
TL-021	149.4	112.9	3.85	0.7879	36°30'30"N, 105°15'10"W
TL-010	112.3	108.2	3.33	0.7760	36°30'30"N, 105°15'10"W
TL-029	162.7	67.67	7.05	0.8562	36°30'30"N, 105°15'10"W
TL-051	141.9	90.24	4.59	0.8028	36°30'30"N, 105°15'10"W
TL-028	155.3	83.52	5.44	0.8182	36°30'30"N, 105°15'10"W

Age = 1,462 ± 35 m.y.
$(^{87}Sr/^{86}Sr)_o = 0.7070 \pm 0.0024$
All samples whole rocks.

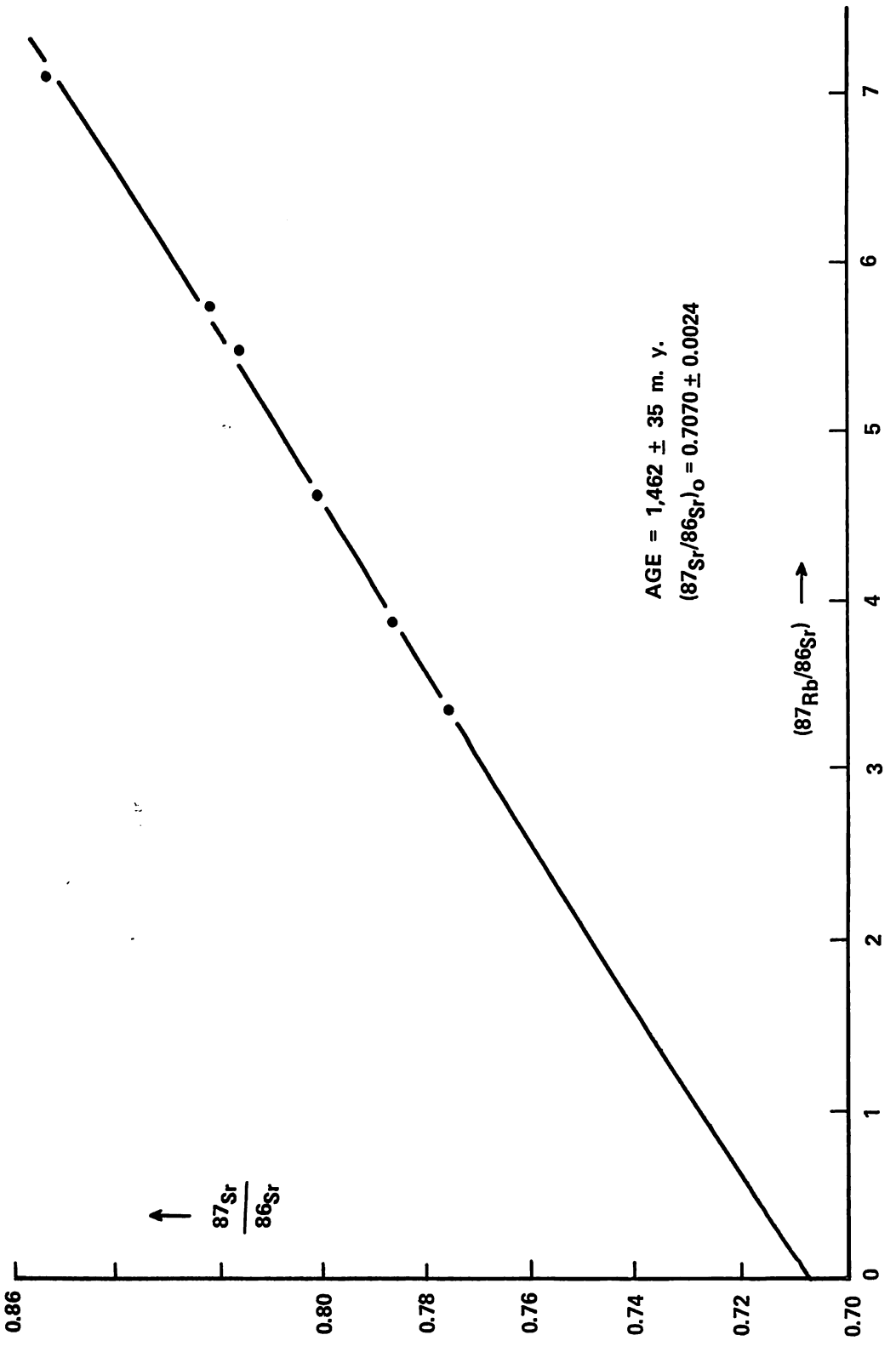

FIGURE 2. Unit B. Quartzo-feldspathic gneiss.

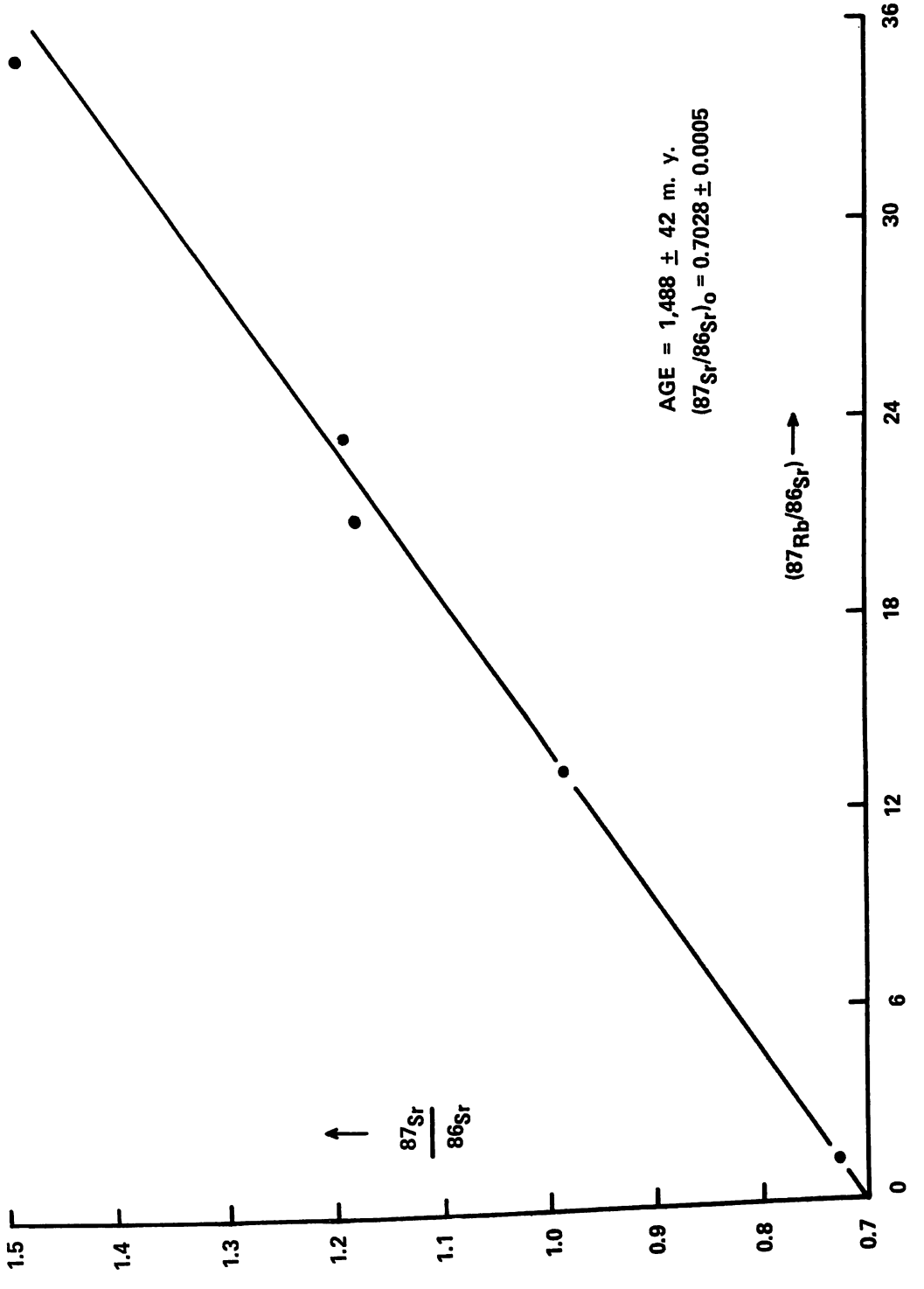

FIGURE 1. Unit A. Granite.

mm) and possesses one major foliation and perhaps a second, weak foliation. In places the gneiss becomes somewhat schistose. This unit is intruded by the granite (Unit A).

COMMENT

The isochron ages for the granite and quartzo-feldspathic gneiss are extremely close to each other, although the granite is clearly younger. Either the quartzo-feldspathic gneiss age is too young due to some perturbations of internal Rb-Sr systematics or the granite age is too old, perhaps due to lack of initial $^{87}Sr/^{86}Sr$ homogenization in the parent magma. The foliations(s) noted in the quartzo-feldspathic gneiss argue for a complex history prior to intrusion by the granite, and the quartzo-feldspathic gneiss age should be considered a minimum age for this unit and the granite age a maximum age for intrusion. This problem will be studied in more detail.

REFERENCE

York, D. (1969) Least squares fitting of a straight line with correlated errors: Earth Plan. Sci. Lttrs., v. 5, p. 320–328.