

AGE DETERMINATIONS OF THE
SAN GABRIEL ANORTHOSITE MASSIF

By George J. Neuerburg and David Gottfried



Trace Elements Memorandum Report 709

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

JAN 29 1954

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Dr. T. H. Johnson, Director
Division of Research
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Dr. Johnson:

Transmitted herewith is one copy of TEM-709, "Age
determinations of the San Gabriel anorthosite massif," by George J.
Newerburg and David Gottfried, January 1954.

We plan to submit this report for publication in the
Bulletin of the Geological Society of America.

Sincerely yours,

for *Andrew Ransom*
W. H. Bradley
Chief Geologist

Geology and Mineralogy

This document consists of 4 pages.
Series A.

UNITED STATES DEPARTMENT OF THE INTERIOR
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George J. Neuerburg and David Gottfried

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*This report concerns work done on behalf of the Division of Research of the U. S. Atomic Energy Commission.

USGS - TEM-709

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AGE DETERMINATIONS OF THE SAN GABRIEL ANORTHOSITE MASSIF

By George J. Neuerburg and David Gottfried

Lead alpha activity measurements on zircon from the mafic border facies of the San Gabriel anorthosite massif and from a granite pegmatite intrusive into it have yielded ages of 933 million years and 810 million years, respectively. The ages were determined in the Geological Survey laboratories using the method described by Larsen et al. (1952).

The zircon from the border facies of the anorthosite massif comes from the outer part of an ilmenite deposit in a much altered norite in Sand Canyon, San Gabriel Mountains, Los Angeles County, Calif. The alteration is thought to be deuteric. The rock is a granoblastic aggregate of oligoclase, microcline, hornblende, biotite, ilmenite, pyrite, zircon, apatite, and carbonate in highly variable proportions. The anorthosite massif has been described by Higgs (in press). The zircon-bearing granite pegmatite is intrusive into the border facies of the anorthosite massif in Paccima Canyon, roughly 10 miles east of Sand Canyon. The pegmatite may be related to granodiorite intrusives in the anorthosite in its eastern exposures. This pegmatite is briefly described by Neuerburg (in press).

The measurements on which these ages are based follow:

	α /mg/hr	Pb ppm	Age (million years)
Zircon - altered norite	18	7	933
Zircon - pegmatite	50	17	810

The alpha activity of the zircon from the altered norite is the lowest so far obtained for zircons separated from igneous rocks. This accords

with recent investigations on the radioactivity of zircons from the rocks of the Southern California batholith. The zircons from the more mafic rocks, such as the quartz diorites, are lower in alpha activity than those separated from the granites. The alpha activity of zircons from pegmatites follows no consistent trend.

Because of the low alpha activities and the slight lead content of these zircons, small errors in measurements would produce appreciable changes in the calculated ages. The data, however, are believed to be sufficiently accurate so that the ages are correct within 10 percent of the reported figures. These are minimum ages for the anorthosite and pegmatite and demonstrate a pre-Cambrian age for yet another anorthosite massif. Furthermore, the data provide a first age determination on the pre-Cretaceous crystalline rocks of the San Gabriel Mountains and point to the existence of pre-Cambrian rocks near the edge of the Continental Shelf.

REFERENCES

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