Uranium-thorium-lead isotopic ages of zircon from the Southern Snake Range, Nevada

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Isochron/West, Bulletin of Isotopic Geochronology, v. 31, pp. 25-26

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URANIUM-THORIUM-LEAD ISOTOPIC AGES OF ZIRCON FROM THE SOUTHERN SNAKE RANGE, NEVADA

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We have previously reported the uranium-thorium-lead isotopic ages determined for sample 40A-MW-60 zircon, which was recovered from the main intrusive phase exposed in the Snake Creek–Williams Canyon area of the southern Snake Range, White Pine County, Nevada (Lee and others, 1968, table 2). The purpose of this note is to present the isotopic ages for sample 40B-MW-60 zircon, which was recovered from a xenolith of Cambrian Pioche Shale collected about two meters away from sample site 40A-MW-60. The two sets of results (table 1) are in good agreement, and indicate a Middle Jurassic age for the pluton.

The granitoid rocks exposed in the lower reaches of Snake Creek contain many xenoliths of Pioche Shale, and several of these xenoliths and their constituent minerals have been studied in an effort to understand the assimilation of the Pioche Shale by the magma that intruded it (Lee and Van Loenen, 1971, and papers cited therein). A Pb/α age of 20 m.y. was previously reported for zircon 40B-MW-60 (Lee and others, 1968, table 1). The Pb/α age of a mineral is based on the ratio of the total lead content determined by optical spectrograph to the measured alpha activity of the mineral (Larsen and others, 1952; Gottfried and others, 1959). The 20 m.y. Pb/α age obtained for zircon 40B-MW-60 was based in part on a Pb determination of 2 ppm. In view of the present results (table 1) this spuriously low Pb value apparently was the result of an error in the lead determination and not due to loss of lead from the zircon through diffusion as previously suggested by Lee and others (1968, p. D202).

Finally, as regards the assimilation process, it is interesting to note that no xenocrystic zircons were detected in sample 40B-MW-60, a xenolith of Pioche Shale about the size and shape of a large coconut. The zircon fraction recovered from sample 40B-MW-60 is typical of zircons recovered from sample 40A-MW-60 and from other parts of the main intrusive phase in the area of xenolith 40B-MW-60. From the morphology of these zircons, illustrated by Lee and others, (1968, fig. 2), it seems apparent that they crystallized in place, and that any sedimentary zircons previously present have been completely dissolved. The higher uranium and thorium contents, and the very different U/Th ratio of zircon 40B-MW-60 must reflect the composition of the Pioche Shale in terms of uranium and thorium.

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Table 1. Uranium-thorium-lead isotopic ages of samples 40A-MW-60 and 40B-MW-60 zircons from the southern Snake Range, Nevada[1].

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	Concentration (ppm)			Atom Percent Abundance				Ages (m.y.)		
								^{206}Pb	^{207}Pb	^{208}Pb
	U	Th	Pb	^{204}Pb	^{206}Pb	^{207}Pb	^{208}Pb	^{238}U	^{235}U	^{232}Th
40A-MW-60[2]	411.5	203.9	12.84	0.215	73.82	7.10	18.86	161	174	151
40B-MW-60	734.4	750.8	22.0	0.682	71.05	4.16	24.71	154	140	146

Decay Constants: $U^{238} = 1.55 \times 10^{-10}$ Yr^{-1}
$U^{235} = 9.85 \times 10^{-10}$ Yr^{-1}
$Th^{232} = 4.95 \times 10^{-11}$ Yr^{-1}

Atomic Ratios: $U^{238}/U^{235} = 137.88$
Pb^{204}, Pb^{206}, Pb^{207}, Pb^{208} =
1.000, 18.51, 15.72, 38.44

[1]Samples located at latitude 38°56'10"N, longitude 114°15'42"W.

[2]Data from Lee and others (1968); ages recalculated according to the decay constants recommended by the IUGS Subcommission on Geochronology (See Steiger and Jager, 1977, p. 359).