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Title of article Petrology and Geochemistry of the Cretaceous Independence Volcanic Suite, Absaroka Mountains, Montana: Clues to the Composition of the Archean Sub-Montanan Mantle

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Samples for major element analysis were dissolved in nitric acid following lithium metaborate fusion and analyzed by the Spectrometrics Spectroscan III DC plasma spectrometer in the Mineral Constitution Laboratory of The Pennsylvania State University, employing a germanium internal standard. One gram aliquots of rock powder were dissolved using HF and HClO$_4$ and analyzed for trace elements as nitrate solutions using the Spectrometrics Spectroscan III IC plasma spectrometer at the Materials Research Laboratory of The Pennsylvania State University.

Fifteen rock standards were used as standards and were also analyzed as samples. The accuracy of analyses relative to the values of the standards given by Abbey (1980) varies from 1% (more abundant major elements) and 2-3% (major elements with concentrations =1% and trace elements at levels >100 ppm), to 5% (trace elements at 10 ppm). Replication of sample analyses was comparable with or better than accuracy relative to standards. Blanks were <0.1% for major and minor oxides and <1 ppm for trace elements (except Ba — 12 ppm; Sr — 8 ppm; Rb — 2 ppm; Zr — 7 ppm).

Isotopic analyses were undertaken at the Department of Terrestrial Magnetism, Carnegie Institution of Washington. For isotopic analyses, ~200 mg of -100 mesh powder was dissolved in a closed Teflon screw-top beaker using HF and HNO$_3$. The samples were spiked with $^{85}$Rb and $^{84}$Sr prior to dissolution. REE, Rb, and Sr were separated by cation-exchange chromatography using HCl as eluant. A second ion-exchange column with 2-methyl-lactic acid as eluant separated Nd from the other REE.

A separate HF-HNO$_3$ dissolution of 200 mg of powder was used for Pb isotopic analysis. Pb in HBr solution was separated from other elements by the use of two anion columns using HBr and HCl as eluants.
Sr was measured on a 15 cm, Rb on a 23 cm, and Nd and Pb on a 38 cm thermal ionization mass spectrometer controlled by microcomputer. Ion currents were typically $1-2 \times 10^{-11}$ amp for Sr, $3-7 \times 10^{-12}$ amp for Nd, and $5 \times 10^{-11}$ to $5 \times 10^{-12}$ amp for Pb. Nd was run as NdO$. At least 200 ratios were measured for each analysis, and quoted errors are 2σ mean values of these ratios. Measured Sr ratios were fractionation corrected to $^{86}\text{Sr}/^{88}\text{Sr}=0.1194$ and reported relative to $^{87}\text{Sr}/^{86}\text{Sr}=0.70800$ for the E&A Sr standard. Measured Nd ratios were fractionation corrected to $^{146}\text{NdO}/^{144}\text{NdO}=0.72225$ ($^{146}\text{Nd}/^{144}\text{Nd}=0.7219$) and then for oxygen using the isotopic compositions of Nier (1950), and are reported relative to $^{143}\text{Nd}/^{144}\text{Nd}=0.51186$ for the La Jolla Nd standard. Interference by Sm was monitored by comparing the value of $^{142}\text{Nd}/^{144}\text{Nd}$ in the sample with that measured in the La Jolla Nd standard. No other interferences were observed. Analyses of BCR-1 for $^{87}\text{Sr}/^{86}\text{Sr}$ were 0.70501±3; for $^{143}\text{Nd}/^{144}\text{Nd}$ were 0.51263±4.

Average measured values for the NBS 981 Pb standard were $^{206}\text{Pb}/^{206}\text{Pb}=2.16562$, $^{207}\text{Pb}/^{206}\text{Pb}=0.91428$, $^{204}\text{Pb}/^{206}\text{Pb}=0.059050$. Based on these measurements, all measured values have been corrected for fractionation relative to the NBS 981 values reported by Catanzaro and others (1968). Within-run precision for Pb isotopic analyses averaged 0.03% (2σ).

Average blanks measured during this work were: Rb 108 pg (high value 160), Sr 700 pg (high 920), and Nd 60 pg (high 100). No blank corrections were made.
References cited

