

TABLE 2. TRACE ELEMENT AND ISOTOPIC DATA, SOUTHERN RIO GRANDE RIFT VOLCANIC ROCKS

Sample	Unit	Lithology	Age [*] (Ma)	La [#] (ppm)	Ta [#] (ppm)	Nd ^{**} (ppm)	Sm ^{**} (ppm)	¹⁴³ Nd/ ¹⁴⁴ Nd ^{##}	ε _{Nd} ^{***}
RP009	Rubio Peak	Andesitic lava	40.0	28.3	0.44	27.0	5.15	0.512418	-4.0
RP012	Rubio Peak	Andesitic lava	40.0	n.d.	n.d.	n.d.	n.d.	0.512392	-4.5
RP013	Rubio Peak	Andesitic lava	40.0	n.d.	n.d.	n.d.	n.d.	0.512361	-5.1
BT007	Bell Top	Basaltic andesitic lava	35.0	n.d.	n.d.	n.d.	n.d.	0.512467	-2.9
UBA011	Uvas volcanic field	Basaltic lava	27.0	23.3	0.51	28.1	6.24	0.512466	-3.1
UBA023	Uvas volcanic field	Andesitic lava	27.0	47.5	0.94	n.d.	9.17	0.512385	-4.6
UBA025	Uvas volcanic field	Basaltic lava	27.0	9.4	0.21	12.3	3.34	0.512644	0.2
UBA026	Uvas volcanic field	Andesitic lava	27.0	48.2	0.70	n.d.	8.43	0.512374	-4.8
UBA029	Uvas volcanic field	Basaltic andesitic lava	27.0	37.2	0.65	n.d.	7.91	0.512512	-2.2
UBA034	Uvas volcanic field	Basaltic andesitic lava	27.0	41.5	0.69	n.d.	8.98	0.512466	-3.1
UBA089	Uvas volcanic field	Basaltic lava	27.0	34.5	1.33	35.4	7.49	0.512434	-3.7
DH01	Selden basalt	Tholeiitic basaltic lava	9.8	18.5	1.93	n.d.	4.76	0.512994	7.0
DH03	Robledo basalt	Trachybasaltic lava	7.1	43.6	5.05	n.d.	7.53	0.513006	7.3
DH05	Columbus basalt	Tephritic lava	3.0	35.3	3.79	n.d.	6.81	0.513011	7.3
DH06	Columbus basalt	Tephritic lava	5.2	47.7	5.34	n.d.	12.44	0.513005	7.2
DH07	Columbus basalt	Trachybasaltic lava	3.9	49.5	4.67	n.d.	9.00	0.512967	6.5

^{*} Approximate ages estimated stratigraphically; DH01, DH03, DH05 - DH07 are K-Ar age determinations from Seager et al. (1984).

[#] La and Ta determined by neutron activation analysis at the University of Texas at El Paso using software by W. V. Boynton by license agreement. U.S. Geological Survey standards AGV-1, BHVO-1, STM-1 and NBS standard NBS688 were used for calibration. Two-sigma precision is <1% for La and <3% for Ta. Error in La/Ta is ~6.5%.

^{**} Nd and Sm determined by neutron activation analysis at the University of Texas at El Paso. Two-sigma precision is < 6.5% for Nd and < 2% for Sm.

^{##} ¹⁴³Nd/¹⁴⁴Nd determined by mass spectrometry at McMaster University using methods described in Gibson et al. (1995). Within-run 2-sigma precision is +0.000 011.

^{***} ε_{Nd} calculated at the estimated age of the unit. If necessary, Nd concentrations interpolated between La and Sm were used to calculate initial ¹⁴³Nd/¹⁴⁴Nd ratios. If rare earth element data were unavailable, initial ratios were calculated using Sm/Nd of lavas of similar major and trace element composition. Maximum error in ε_{Nd} from these estimations is +0.6 epsilon units.

TABLE 1. TRACE ELEMENT AND ISOTOPIC DATA, BISBEE BASIN VOLCANIC ROCKS

Sample	Unit	Lithology	Age [*] (Ma)	La [#] (ppm)	Ta [#] (ppm)	Nd ^{**} (ppm)	Sm ^{**} (ppm)	¹⁴³ Nd/ ¹⁴⁴ Nd ^{##}	ε _{Nd} ^{***}
BB307	Glance	Andesitic lava	160	43.0	0.91	22.70	4.50	0.512381	-3.45
BB309	Glance	Andesitic lava	160	30.9	0.93	58.34	10.14	0.512399	-2.79
GD9514	Dike	Trachybasalt	150	13.7	1.00	17.34	4.34	0.512743	2.92
GTCL9511	Crystal Cave	Spilitic hyaloclastite	153	16.5	1.10	19.11	4.31	0.512766	3.67
PB9512	Crystal Cave	Spilitic hyaloclastite	153	26.7	1.70	25.56	5.20	0.512772	4.06
96HF21	Dike	Trachybasalt	150	21.1	1.50	21.90	4.76	0.512798	4.37
BB094	Crystal Cave	Spilitic hyaloclastite	153	15.5	1.27	17.30	4.00	0.512779	3.86
BB095	Crystal Cave	Spilitic hyaloclastite	153	17.2	1.37	19.50	4.40	0.512839	5.11
BB302	Onion Saddle	Trachybasaltic lava	150	22.1	1.79	21.62	4.52	0.512795	4.41
BB306	Onion Saddle	Basaltic trachyandesitic lava	150	35.8	2.21	30.45	5.77	0.512768	4.11

^{*} Approximate ages estimated stratigraphically.

[#] La and Ta (ppm) determined by neutron activation analysis at the University of Texas at El Paso using software by W. V. Boynton by license agreement. U.S. Geological Survey standards AGV-1, BHVO-1, STM-1 and NBS standard NBS688 were used for calibration. Two-sigma precision is <1% for La and <3% for Ta. Error in La/Ta is ~ 6.5%.

^{**} Nd and Sm determined by isotopic dilution at the University of California, Santa Cruz. Nd and Sm for BB094 and BB095 determined by neutron activation analysis at University of Texas at El Paso.

^{##} ¹⁴³Nd/¹⁴⁴Nd determined by mass spectrometry at University of California, Santa Cruz. Analytical error ranges from +0.000005 to +0.000010. Samples were spiked with ¹⁵⁰Nd and ¹⁴⁹Sm tracers before digestion in Parr bombs, which sat at 180 °C for 3 days. Complete digestion was achieved. Samples were then passed through a cation exchange column (Dowex AG509X) to concentrate the rare earth elements before Nd and Sm were separated on consisting of Teflon beads coated with DEHP (Di-ethyl hexyl orthophosphoric acid). Nd was run via a triple ribbon assembly as the metal species on a VG Sector/WARP thermal ionization mass spectrometer in static analyses of the La Jolla standard yielded ¹⁴³Nd/¹⁴⁴Nd = 0.511858 ± 6 (n = 8). Sm was run on single Re using a Ta activator solution, again in static mode.

^{***} ε_{Nd} calculated at the estimated age of the unit.