

Supplemental Table A: APXS data of soil end member components

Feature/Target Names	Sol	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	Cl	K ₂ O	CaO	TiO ₂	Cr ₂ O ₃	MnO	FeO	Ni	Zn	Br
Gusev/First Soil	A014	2.6	8.6	9.8	46.2	0.9	6.5	0.5	0.5	6.4	0.9	0.3	0.3	16.3	609	313	23
Sugar Loaf Flats/Soil 1	A065	3.2	8.9	9.8	45.7	0.9	6.7	0.6	0.5	6.0	0.8	0.3	0.3	16.2	648	468	-
Deserts/Gobi 1	A071	2.7	8.5	9.5	45.0	0.9	7.5	0.6	0.5	6.2	0.9	0.3	0.3	16.9	673	434	20
Truckin Flats/Accelerator	A126	3.0	8.4	9.9	46.1	0.9	6.3	0.5	0.4	6.5	1.0	0.3	0.3	16.2	684	420	-
Bear Paw/Panda New	A074	2.8	9.2	10.0	46.4	0.7	4.3	0.4	0.4	6.6	0.9	0.5	0.4	17.4	508	226	50
Santa Anita/Seattle Slew	A135	2.9	9.1	10.6	46.6	0.8	4.6	0.4	0.4	6.3	0.9	0.4	0.3	16.6	527	327	12
Shredded/Dark 4	A158	3.2	9.0	11.1	47.4	0.8	4.0	0.3	0.4	6.3	0.7	0.4	0.3	15.7	557	217	31
Arena/Crest	A041	2.7	9.0	9.9	45.8	0.9	5.2	0.5	0.4	7.0	0.7	0.5	0.4	17.0	364	348	120
Angel Flats/Halo 01	A045	2.9	8.9	9.8	45.3	0.8	6.1	0.5	0.5	6.7	0.7	0.4	0.3	16.9	597	227	62
Ramp Flats/Soil 1	A044	2.4	9.0	10.1	46.1	0.9	6.0	0.5	0.4	6.5	0.8	0.3	0.3	16.6	330	265	20
Mont Blanc/Les Hauches	B060	2.2	7.8	9.2	45.4	1.0	7.2	0.5	0.5	6.6	1.0	0.3	0.3	17.9	587	438	17
Hilltop/McDonnell	B123	2.2	7.7	9.2	45.4	0.9	7.0	0.6	0.5	6.7	1.0	0.4	0.4	17.9	601	408	30
Big Dig/Hema Trench 1	B025	2.0	7.6	9.1	45.9	0.8	6.9	0.5	0.5	6.7	1.1	0.4	0.3	18.0	750	464	181
PhotoTIDD/Nougat	B090	2.2	7.9	9.2	45.6	0.9	5.7	0.4	0.4	6.7	1.1	0.5	0.4	18.8	542	351	274
Millstone/Dahlia	B166	2.3	7.2	10.0	47.7	0.8	5.1	0.4	0.5	7.3	0.8	0.4	0.4	16.9	445	248	16
Auk/Auk RAT	B237	2.2	7.0	10.3	48.9	0.8	4.5	0.4	0.6	7.4	0.8	0.3	0.3	16.3	439	197	9
Dog Park/Jack Russell	B080	2.1	7.0	7.6	38.6	0.8	4.8	0.5	0.4	5.0	0.7	0.3	0.3	31.9	1024	323	24
PhotoTIDD/Fred Ripple	B091	2.1	7.5	7.6	38.9	0.8	4.7	0.5	0.3	4.9	0.7	0.3	0.3	31.2	1178	388	49

Data reduction follows techniques described in Gellert et al. *Science* **305**, 829-832, 2004, but with improvements in the calibration relative to previously published values. Accuracy is described in Supplemental Table B, and precisions of these analyses are listed in Supplemental Table C. Ni, Zn, and Br values represented in ppm, all other are weight percentages. In the column of sol numbers, "A" = Spirit and "B" = Opportunity.