

Table 5.4. Mineralogy determined by XRD.

[Raw, raw sample of leach column starting material; LTA, sample after low-temperature ash to remove organic material; LCR, leach column residue after 16 weeks leaching. Data reported as weight percent of crystalline part of the rock. For each mineral, the error of the fit is on the order of ± 1 weight percent or less. Amorphous content estimated by Rietveld refinement on corundum-spiked samples. ‘-‘, not included in refinement]

	HCS-IN			LKFC-PA			KBF-WV			BCS3-PA		
	Raw	LTA	LCR	Raw	LTA	LCR	Raw	LTA	LCR	Raw	LTA	LCR
Chi ² *	3.68	3.13	3.3	3.53	3.29	3.47	4.03	3.34	2.9	3.79	3.6	3.49
Mineral												
Quartz	32.4	30.7	34.3	37.1	36.8	40.0	42.0	42.2	39.7	34.4	32.2	33.7
Chlorite	5.0	4.2	4.6	9.9	9.0	8.9	6.2	8.9	6.3	10.9	11.4	7.2
Muscovite	7.8	14.2	8.4	16.4	17.1	12.0	15.7	15.3	15.2	16.8	19.8	18.0
Phengite	4.6	4.4	5.7	3.7	11.3	11.5	10.3	12.9	16.0	6.8	10.5	20.1
Biotite	-	-	-	-	-	-	0.1	0.8	1.7	-	-	-
Illite	11.6	7.7	12.9	9.5	4.6	8.4	2.3	1.6	2.7	8.6	8.4	6.5
Kaolinite	2.4	3.2	3.4	4.6	3.7	5.9	5.4	3.5	4.3	5.2	5.6	3.8
Micas & clay	26.4	29.5	30.4	34.2	36.7	37.8	33.8	34.1	39.9	37.4	44.3	48.4
Albite	4.5	4.3	4.4	0.0	0.0	0.0	9.3	6.2	3.5	0.0	0.0	0.0
Anorthite	0.9	2.5	0.6	1.6	0.1	0.1	0.8	0.1	0.1	0.2	0.1	0.1
Potassium feldspar	0.3	0.8	0.0	1.4	0.0	0.0	1.2	0.0	1.4	1.6	0.8	0.0
Feldspars	5.7	7.6	5	3	0.1	0.1	11.3	6.3	5	1.8	0.9	0.1
Apatite	3.3	6.4	3.5	1.5	2.4	0.1	0.4	1.5	0.9	0.0	0.2	2.2
Zircon	0.6	0.5	0.5	0.5	0.1	0.6	0.0	0.2	0.4	0.9	0.4	0.5
Rutile	0.0	0.5	0.3	0.7	0.4	0.6	0.8	1.1	0.4	0.7	0.9	1.3
Accessory minerals	3.9	7.4	4.3	2.7	2.9	1.3	1.2	2.8	1.7	1.6	1.5	4
Gypsum	6.4	0.0	9.1	0.0	0.0	0.6	0.0	0.0	0.4	0.0	0.0	0.0
Barite	0.0	0.0	0.1	0.2	0.0	0.1	0.7	0.2	0.0	0.9	0.3	0.0
Pyrite	17.5	17.3	11.2	7.5	7.9	2.4	0.8	1.3	0.9	3.0	3.4	3.0
Calcite	0.6	0.6	0.1	0.0	0.7	0.0	0.4	0.9	0.7	2.9	2.0	1.7
Siderite	0.0	0.3	0.0	5.0	4.8	8.4	3.1	1.8	5.2	4.7	3.9	1.5
Ankerite	2.1	2.7	0.9	0.3	1.1	0.2	0.7	1.6	0.3	2.4	0.0	0.4
Carbonate minerals	2.7	3.5	1	5.3	6.6	8.6	4.2	4.3	6.2	10.0	5.9	3.6
Amorphous content	69%			53%			51%			57%		
Low temperature ash (LTA)		79%			99%			99%			100%	
% Mass lost by LTA		21%			1%			1%			0%	
%LOI (chemistry)	32%			12%			9%			12%		

* Chi² is a computed statistical residual, which is used as a measure of the fit of the refinement of the XRD pattern. Chi²=1 for a perfect correspondence between the least-squares model and the observed data. In complex rocks, ideal values are almost never observed due to systematic errors and imperfect physical corrections. Values less than 5 are considered reasonable fits for these rocks.

Table 5.4—Continued.

	MKSS			Wadesville #29		LRBT	
	Raw	LTA	LCR	Raw	LTA	Raw	LTA
Chi ^{2*}	3.7	3.97	3.03	3.51	3.5	4.2	3.68
Quartz	64.5	58.9	61.7	41.62	41.7	22.98	23.16
Chlorite	4.3	6.0	5.4	3.73	3.24	2.13	1.77
Muscovite	13.8	8.3	13.6	2.54	6.79	7.27	8.3
Phengite	2.2	4.6	3.3	2.65	2.46	0.55	0.55
Biotite	-	-	-	-	-	-	-
Illite	0.5	3.6	3.7	1.7	1.4	14.91	13.68
Kaolinite	1.8	2.3	3.2	1.87	0.28	10.41	13.02
Micas & clay	18.3	18.8	23.8	8.76	10.93	33.14	35.55
Albite	0.3	1.4	0.5	2.6	0.87	0.01	0.02
Anorthite	1.5	2.0	0.0	0.5	1.11	4.35	3.01
Potassium feldspar	0.4	1.0	0.5	0.78	0.94	0.02	0.02
Feldspars	2.2	4.4	1	3.88	2.92	4.38	3.05
Apatite	0.6	1.2	0.9	1.89	0.7	3.89	2.9
Zircon	0.5	0.9	0.2	0.3	0.13	0.65	1.28
Rutile	1.0	1.2	0.9	1.04	0.52	0.63	1.23
Accessory minerals	2.1	3.3	2	3.23	1.35	5.17	5.41
Gypsum	0.0	0.0	0.0	0	0	0.5	0.88
Barite	0.4	0.5	0.5	0.01	0.11	0.62	0.02
Pyrite	0.4	0.7	0.5	0.91	0.53	29.08	29.02
Calcite	3.8	3.1	3.8	1.39	1.02	0.76	0.03
Siderite	2.5	2.9	1.2	0.3	0.06	0.02	0.2
Ankerite	1.6	1.5	0.2	36.1	38.1	1.21	0.88
Carbonate minerals	7.9	7.5	5.2	38	39	2.0	1.1
Amorphous content	37%			15%		77%	
Low temperature ash (LTA)		91%		100%		45%	
% Mass lost by LTA		9%		0%		55%	
%LOI (chemistry)	5%			17%		60%	