Table 3.4. Surface area measurements, sieve analysis, and calculations of effective surface areas before and after weathering tests.

	Sieve Size	Surface Area (BET) m^2/g		% retained on Sieve		Effective surface area	
		before	after	before	after	before	after
Shale	3/8	15.90	16.40	3.84	4.36	0.611	0.715
	#4	11.10	10.00	21.79	26.83	2.419	2.683
	#8	13.70	11.00	24.13	26.21	3.306	2.883
	#20	14.90	13.80	24.08	22.41	3.588	3.093
	#40	15.70	15.40	9.21	8.23	1.446	1.267
	#100	15.30	15.20	9.76	7.54	1.493	1.146
	#200	15.50	15.40	6.04	2.56	0.936	0.394
	pan	16.90	16.20	1.15	1.87	0.194	0.303
					Total	**13.993 m^2/g**	**12.484 m^2/g**
Sandstone	3/8	0.66	0.25	25.50	26.30	0.168	0.066
	#4	0.81	1.00	36.96	35.80	0.299	0.358
	#8	1.42	1.30	14.08	16.60	0.200	0.216
	#20	0.91	0.80	10.77	8.60	0.098	0.069
	#40	1.02	1.41	4.01	4.10	0.041	0.058
	#100	1.75	2.99	4.73	4.70	0.083	0.141
	#200	2.68	4.17	3.24	2.20	0.087	0.092
	pan	2.91	5.00	0.97	1.70	0.028	0.085
					Total	**1.004 m^2/g**	**1.083 m^2/g**
Coal Refuse	3/8	0.17	0.40	40.00	37.40	0.068	0.150
	#4	0.92	0.60	25.00	26.90	0.230	0.161
	#8	0.21	0.90	10.00	9.90	0.021	0.089
	#20	0.39	0.50	10.00	8.00	0.039	0.040
	#40	3.39	0.70	5.00	6.40	0.170	0.045
	#100	9.17	1.40	10.00	11.50	0.917	0.161
	#200						
	pan						
					Total	**1.445 m^2/g**	**0.646 m^2/g**

The before-weathering distributions for the shale and sandstone samples are exactly what resulted from crushing the samples; the particle size distribution for the coal refuse sample was reconstructed/adjusted to meet the specification of the revised method as shown in Table 3.3. The BET measurements of surface area for the shale are an order of magnitude greater than the sandstone and coal refuse surface areas for most size classes (except the 0.149 mm coal refuse pre-weathering). This is probably due to much greater intrinsic porosity in the shale laminae. The sandstone sample was from a very hard and well-cemented lithologic unit, thus there was little difference in the particle size distributions or surface area measurements after weathering. The coal refuse sample showed the greatest change in effective surface area of all samples tested at Laboratory 3 in the 2002 and 2003 weathering tests (Table 3.5). This change is largely due to the reduction in surface area of the two finest size classes (Table 3.4). Two factors that probably contributed to this reduction are (a) loss of fines during weekly sample collection and (b) weathering of fine-grained pyrite in these size classes.