Table 2. Spectral End-Members Used for New Deconvolutions of MGS-TES Emissivity Data[a]

Feldspars	Pyroxenes	Phyllosilicates	Olivines
Albite WAR5851	Enstatite HS9.4B	Muscovite WAR5474	Forsterite AZ01
Oligoclase WAR5804	Bronzite NMNH93527	Biotite BUR840	Fayalite WARRGFAY01
Andesine BUR240	Diopside WAR6454	Phlogopite HS23.3B	
Labradorite WARRGAND01	Hedenbergite DSMHED01	Serpentine HS8.4B	
Labradorite WAR4524	Augite BUR620	Serpentine BUR1690	
Bytownite WAR1384	Augite NMNH9780	Antigorite NMNH47108	
Anorthite WAR5759	Pigeonite[b]	Ca-montmorillonite STX1	
Anorthite BUR340		Nontronite WAR5108	
Microcline BUR3460		Saponite ASUSAP01	
Microcline BUR3460A		Illite IMt2	
Anorthoclase WAR0579		Fe-smectite SWA1	
		Chlorite WAR1924	
		Na-montmorillonite SWY2	

Amphiboles	Glasses	Carbonates	Sulfates
Actinolite HAS116.4B	Si-K glass[b]	Calcite MLC10	Anhydrite MLS9
Mg-hornblende WAR0354	Basaltic glass[b]	Dolomite C28	Gypsum MLS6
	Silica glass[b]	Magnesite C60	
		Siderite C62	
		Aragonite C11	

[a]Numbers indicate ASU spectral library phase.
[b]Spectra of pigeonite and glasses are from *Wyatt et al.* [2001].

the surface type 2 spectrum show low RMS values of 0.0009 [*Bandfield et al.*, 2000], 0.0023 [*Hamilton et al.*, 2001], 0.0014 [*Wyatt and McSween*, 2002], and 0.0019 (this study). Figures 7a and 7b also demonstrate that the extended spectral range used in this study is well modeled and does not adversely affect the overall quality of modeled spectra. Deconvolved mineral abundances from each of the previous studies and new mineral abundances from this study are listed in Table 3 and shown in Figures 7a and 7b. The detection limit for mineral abundances deconvolved from TES spectra is 10–15 vol.% based on instrument uncertainties [*Christensen et al.*, 2000a], errors associated with atmospheric corrections [*Bandfield et al.*, 2000; *Smith et al.*, 2000], and limits of the deconvolution technique [*Ramsey and Christensen*, 1998]. Surface type 1 deconvolved mineral abundances for all end-member sets are similar to within the 10–15 vol.% TES uncertainty and the 5–10 vol.% absolute uncertainty that has been associated with all modeled mineral abundances based on comparisons with petrographic point-counting modes [*Feely and Christensen*, 1999; *Hamilton and Christensen*, 2000] and high-resolution electron microbe phase mapping techniques [*Wyatt et al.*, 2001]. Surface type 2 deconvolved mineral abundances for all end-member sets are also similar to within the 10–15 vol.% TES uncertainty, except for feldspar abundances from *Hamilton et al.* [2001] and this study which represent the relative maximum and minimum modeled feldspar abundances. The low modeled feldspar abundance for surface type 2 in this study, and increase in the total of minor phases modeled well below TES detectability limits, may result from the extended wave number range used in deconvolution. The end-member sets that include a variety of alteration phases (phyllosilicates, carbonates, silica) have lower RMS errors than the *Hamilton et al.* [2001] fits, which focused almost entirely on igneous phases. These results suggest that small to modest amounts of alteration minerals may be present in both surface types. Carbonate abundance is modeled well below TES detectability limits, in agreement with the conclusion of *Bandfield* [2002] that carbonates are not detectable in low-albedo regions.

[30] Chemical compositions calculated from modeled mineral abundances for each of the spectral end-member sets are presented in Table 4. The derived chemical compositions plotted in Figures 2, 8, and 9 are calculated on a H_2O-free and CO_2-free basis (also presented in

Table 3. Modeled Phase Abundances for MGS-TES Surface Types 1 and 2 Materials[a]

	Feldspars	Pyroxenes	Glass	Sheet Silicates	Other
		Surface Type 1			
Bandfield et al. [2000]	49	29	0	17	6
Hamilton et al. [2001]	55	29	9	5	2
Wyatt and McSween [2002]	33	41	0	14	12
This study	35	29	2	22	14
		Surface Type 2			
Bandfield et al. [2000]	33	10	23	17	17
Hamilton et al. [2001]	49	8	28	8	7
Wyatt and McSween [2002]	39	16	0	31	14
This study	18	8	34	18	24

[a]All mineral groups have detection limits of ~10–15 vol.%. In modeled results, feldspars are dominated by plagioclase, pyroxenes by high-Ca pyroxene, glass by Si-K glass, and sheet silicates by smectite. Other category includes the sums of carbonates and sulfates individually modeled well below detection limits.