

**Supplementary Table S4:** Descriptions of spectral endmembers not matched to any Jackson Group rock or core sample shown in main **table 1** of the article.

endmember class #	comments
2	Spectrum is also listed in <b>table 2</b> and has an unusual and unexplained shape with major absorption features at 660, 832, 1210 and 1730 nm (i.e. could be anthropogenic-related). It also exhibits a strong spectral sloping drop-off between 2165 and 2330 nm that is likely calcite-related (needs further validation before use)
3	Spectrum has a very strong goethite feature and a weak but broad clay feature at 2200 nm that may represent a mixture with gypsum (i.e. a valid mappable class)
4	Spectrum has an unusual and unexplained shape with major absorption features at 660 and 950 nm (i.e. could be anthropogenic-related) and a strong spectral sloping drop-off between 2165 and 2330 nm that may be carbonate (i.e. anthropogenic cement?) related (needs further validation before use)
6	Spectrum has an unusual and unexplained shape with major absorption features at 660, 950 and 1570 nm (i.e. could be anthropogenic-related or data calibration artifact) and a strong clay feature at 2205 nm that most resembles illite (?) (needs further validation before use)
7	Spectrum has a moderate goethite feature and a very weak but broad clay feature at 2205 nm that may represent a mixture with gypsum (i.e. a valid mappable class)
8	Spectrum is also listed in <b>table 2</b> and exhibits a strong ferric-iron slope between 425 and 605 nm. It also exhibits two strong absorption features at 1210 and 1570 nm, the latter of which could be a WV3 data calibration artifact. There is a weak clay feature at 2205 nm (a valid initial endmember for class mapping purposes, but needs further validation of clay and ferric-iron mineralogy and features at 1210 and 1570 nm)
9	Spectrum has a weak feature at 660 nm which could be chlorophyll and thus residual vegetation related despite masking thresholds. However, it has a sloping clay feature at 2205 nm which could represent a kaolinite-smectite mixture (i.e. a valid initial mappable class, but maybe soil/regolith related and thus excluded later)
10	Spectrum matches the shape of lignite (or charcoal if anthropogenic) in the VNIR with a broad hydrous silica absorption feature at 2260 nm in the SWIR. One of two SAM matches to the lignite spectrum of Kroger et al (1998) with a spectral angle of 0.094753 radians, the other being endmember spectrum 56 below. Spectral angle match to a field charcoal spectrum measured by the first author at a forest burn site in Alaska, yielded a larger value and thus worse fit of 0.125270 radians (i.e. a valid mappable class)
15	Spectrum is also listed in <b>table 2</b> It has an unusual and unexplained shape with major absorption features at 660, 950, 1210 and 1570 nm (i.e. could be anthropogenic-related) and a strong continuum slope which is bright in the VNIR and dark in the SWIR, possibly due to gypsum. It also has a strong montmorillonite absorption feature at 2205 nm (a valid initial endmember for class mapping purposes, but needs further validation)

16	Spectrum has a mixed slightly green to dry vegetation shape with a weak absorption features at 660 nm which could be chlorophyll and thus residual vegetation related despite masking thresholds. There is also a strong feature at 1570 nm which could be due to anthropogenic materials (or data calibration artifact), and a 2205 nm that is broad and suggestive of mixing with perhaps gypsum or a carbonate mineral (a valid initial mappable class, but maybe soil/regolith related and thus excluded later)
18	Spectrum has a very strong absorption feature at 950 nm, which at first glance resembles jarosite, but lacks the prominent peak at 725 nm. Also, the reflectance rises too rapidly towards 1210 nm. This feature may be related to spatially coherent noise in the WV3 data because similar features are noted elsewhere in pixels nears this same column locations in the data (needs further validation before use).
20	Spectrum is also listed in <b>table 2</b> and represents one of three spectral endmembers extracted from well-exposed areas of the McCrady mine waste pile. It exhibits a strong absorption feature in WV3 band 9 (1210 nm) that may be related to small concentrations of uranium (i.e. coffinite) or more abundant zeolite (i.e. heulandite or clinoptilolite) deposits. It also exhibits a strong montmorillonite absorption feature at 2205 nm (i.e. a valid mappable class)
21	Spectrum is also listed in <b>table 2</b> It displays the strongest absorption feature in WV3 band 9 (1210 nm) that may be related to small concentrations of uranium (i.e. coffinite) or more abundant zeolite (i.e. heulandite or clinoptilolite) deposits. It also has a broad 2205 nm feature that could reflect a montmorillonite mixture with hydrous silica and/or gypsum (needs further validation, but is included as a valid mappable class for exploratory purposes)
26	Spectrum has weak chlorophyll-vegetation (?) and clay mineral related features at 660 nm and 2205 nm respectively (i.e. a valid initial mappable class, but maybe soil/regolith related and thus excluded later).
31	Spectrum is also listed in <b>table 2</b> and exhibits a strong ferric-iron slope between 425 and 605 nm. It also exhibits a weak absorption features at 1570 nm, which cannot be matched to any ferric or ferrous iron mineral without further ground truth. There is a broad SWIR feature at 2260 nm which could be related to either hydrous silica, jarosite or both (a valid initial endmember for class mapping purposes, but needs further validation of clay and ferric-iron mineralogy)
32	Spectrum is also listed in <b>table 2</b> It has an unusual and unexplained overall shape (i.e. continuum slope which is bright in the VNIR and dark in the SWIR) with major absorption features at 1210, 1730 and 2260 nm (i.e. could be anthropogenic-related, and most definitely needs further validation before use)
38	Spectrum is the only endmember extracted near the Spoonamore mine site and has a very strong absorption feature at 950 nm, which at first glance resembles jarosite, but lacks the prominent peak at 725 nm. Also, the reflectance rises too rapidly towards 1210 nm. It resembles endmember spectrum 18 above, except that it has a strong feature at 1570 nm (anthropogenic-related or data calibration artifact?), which endmember spectrum 18 lacks. This feature may be related to spatially coherent noise in the WV3 data because similar features are noted elsewhere in pixels nears this same column locations in the data (needs further validation before use).
46	Spectrum has a very weak and barely resolved absorption feature at 660 nm which could be chlorophyll and thus residual vegetation related despite masking thresholds. There is also a strong feature at 1570 nm which could be due to anthropogenic materials (or data calibration artifact), and a 2165-2205 nm absorption feature that suggests a kaolinite-montmorillonite mixture (a valid initial mappable class, but maybe soil/regolith related and thus excluded later)

47	Spectrum is also listed in <b>table 2</b> It has a very weak and barely resolved absorption feature at 660 nm which could be chlorophyll and thus residual vegetation related despite masking thresholds. There is also a weak feature at 1210 nm and an even stronger feature at 1570 nm which could be due to anthropogenic materials (or data calibration artifact). It also displays a very weak and barely resolved clay feature at 2205 nm and a strong spectral sloping drop-off between 2165 and 2330 nm that is likely carbonate-mineral related (a valid initial mappable class, but maybe soil/regolith related and thus excluded later)
51	Spectrum has a weak goethite feature and a strong spectral sloping drop-off between 2165 and 2330 nm that is carbonate mineral (calcite-dolomite mixture?) related (a valid initial endmember for class mapping purposes, but needs further validation)
53	Spectrum has a very weak and barely resolved absorption feature at 660 nm which could be chlorophyll and thus residual vegetation related despite masking thresholds. There is also a strong feature at 1570 nm which could be due to anthropogenic materials (or data calibration artifact), and a weak 2165 nm absorption feature that may be dry vegetation related despite masking thresholds (a valid initial mappable class, but maybe soil/regolith related and thus excluded later)
56	Spectrum is also listed in <b>table 2</b> It matches the shape of lignite (or charcoal if anthropogenic) in the VNIR with a strong montmorillonite absorption feature at 2205 nm in the SWIR. One of two SAM matches to the lignite spectrum of Kroger et al (1998) with a spectral angle of 0.084812 radians, the other being endmember spectrum 10 above. Spectral angle match to a field charcoal spectrum measured by the first author at a forest burn site in Alaska, yielded a larger value and thus worse fit of 0.158538 radians (i.e. a valid mappable class)