Frontier Analysis, Ltd

<u>TECHNICAL SERVICE RESPONSE NO</u>.: UT049

<u>Subject</u>: Infrared Analysis of Metal Fragments Purportedly from a Crashed UFO on the Plains of San Agustin circa 1947

<u>Date</u>: May 17, 2006

<u>Requested By</u>: Chuck Wade

<u>Reported By</u>: P. A. Budinger
Analytical Scientist

<u>Background/Objective</u>:

A purported UFO crashed on the San Agustin Plains in New Mexico circa July 1947. For many years investigators have tried to locate fragments from this crash. Chuck Wade has made trips to the possible site of the crash and brought back a number of metal fragments and one sample of plastic-like material. The metal samples have been examined by other laboratories using EDS (Energy dispersive X-Ray Spectroscopy)[1] elemental analysis and other tests. The objective is to determine what information infrared spectroscopy[2] can provide about these fragments and the "plastic". It should be noted that infrared analysis is used for molecular determination of substances and does not reveal information regarding metal alloys or its elements.

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[1] X-ray fluorescence identifies elements and their semi quantitative amounts. Samples are stimulated with X-rays that cause them to emit X-ray fluorescence radiation. This emitted radiation is resolved into a spectrum characteristic of each element.

[2] Infrared spectroscopy is used for molecular structure identification and quantitation of solids, liquids and gases. An infrared spectrum is the result of light (in the 2 to 25 micron wavelength range) interacting with the vibrations of molecules. The particular set of vibrations of a molecule gives rise to specific spectral absorption bands, often referred to as the "fingerprint" spectrum

Conclusions:

•Infrared analysis shows that all metal samples including the plastic are covered with environmental debris from where the samples were found, such as mineral silicates and carbonates, common components found in dirt. Small amounts of organics are detected which may be humic material in the soil or contaminants. A trace amount of a silicone is found exclusively in Wade 3. This is probably contamination, perhaps from a lubricant.

•The most interesting of the metals is Wade 6, not only because of its unique thickness, 60 mils (1.5 mm), but it also has a protein-containing material on the surface which suggests animal origin, besides being coated with the soil minerals and trace organics from the environmental debris listed above.

•It can be speculated that the source of Wade 1, 3, 4, 5, 7 and 8, with thicknesses of 1-2 mils (0.02-0.05 mm) are aluminum foil, which has a thickness of 1 mil (0.02 mm). The remaining samples, Wade 2, 12, 21 and 6 are thicker and clearly cannot be related to aluminum foil. Their source remains unknown.

•The plastic material is composed of polyethylene which is a very common man-made polymer.

•No radiation above background was detected from any of the metal samples or the plastic.

Comments: Other tests, which normally would be recommended, for purported other-worldly metal samples would be isotopic analysis and possibly examination of the samples for trace elements. The isotopic analysis cannot be done for this sample because it is aluminum, and this element only has one isotope[3]. Examination for trace metals is also unlikely to be fruitful because the samples are so contaminated with dirt[4]. Sample 6, if deeply cleaned, might possibly be a

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[3] Isotopic (measurements) ratios of the elements can be taken by ICP/MS (Inductively Coupled Plasma/Mass Spectrometry) to see if they differ from terrestrial values. An element is defined by the number of protons in its nucleus. Most elements have two or more isotopic forms. That is, the element may have more or less neutrons. Each neutron has a weight of one. So an isotope with more neutrons weighs more than an isotope with less. The ratios of isotopes for any given element on earth will always be the same, i.e. it's a constant. The theory is that these isotopic ratios might be a result of the elements formation in the earliest phase of our solar system, i.e. they are unique to this system. It is thought that these ratios might vary in other solar systems because the elemental formations may have been different. So, if we find the ratios are not normal as compared to terrestrial elements, then the sample may have an extraterrestrial origin.

[4] Examination of trace elements in the sample by ICP might indicate an unusual array not seen before.

candidate for this analysis. But someone would have to be found who is familiar with the variances in aluminum trace metals.

Procedure:

The samples were from the plains of San Augustin, NM and were submitted in plastic bags with the following information:

Samples received June 6, 2005 via Brian Boldman

- Wade #1 Foil-like metal, pliable.

- Wade #2 Foil-like metal, semi-pliable

- Wade #3 Foil-like metal, pliable.

•Wade #4 Foil-like metal, pliable

•Wade #5 Foil-like metal, pliable

•Wade #6 Metal, not pliable.

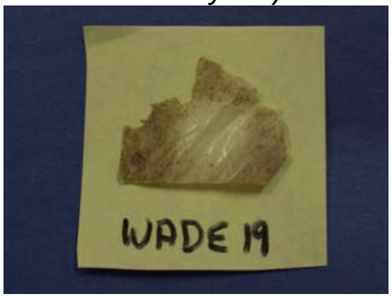
•Wade #7 Foil-like metal, pliable

The following samples were received September 6, 2005 from Chuck Wade

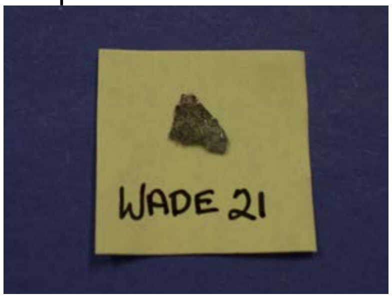
•Wade #8 Foil-like metal, pliable

•Wade #12 Foil-like metal, semi-pliable

•Wade #19 Plastic-like material (Note: The surface was cleaned of dirt in the center in order to sample for infrared analysis.)



•Wade #21 Foil-like metal, not pliable.



Infrared spectra[5] were taken of both sides of the surfaces from selected samples using the Harrick SplitPea™ accessory on the Nicolet Avatar 360 spectrometer.

Stereomicroscope photographs were obtained using the Leika GZ6 microscope interfaced to a Kodak Digital Science MDS 120 camera. Radioactivity measurements were made with an SE International Radiation Alert® Monitor 5. Thickness measurements were made in duplicate on each sample, as well as several pieces of aluminum foil for reference. An electronic digital caliper made by Fowler & NSK was used.

Results:

The results of the individual tests done on the samples follow. These results are summarized in the conclusions section on page two of this report. It should be reiterated that infrared spectroscopy is used for molecular structure identification and not elemental. It will not impart information on metals, alloys and some inorganic materials.

The Metal Fragments

Infrared analysis of both sides of all the metal fragments show they are coated with a mixture of common minerals (dirt), such as an assortment of silicates, which are most similar to illite/smectite, montmorillonite and possibly some quartz. In addition, a few samples also contain some calcite mineral (calcium carbonate). Small amounts of organics are indicated in some samples which may be humic material in the soil or contaminants. In one sample (Wade 3) there is a trace poly(dimethylsiloxane), a silicone polymer, which is a very common material with many uses. The most common is as a lubricant. It is most likely a contaminant.

Wade 6 is interesting because it also has an amide material which may be from a protein indicating an animal/biological origin. It is also the only sample thicker, i.e. 60 mils (1.5 mm), than the rest of the metal samples.

The following Table presents the infrared results for each sample.

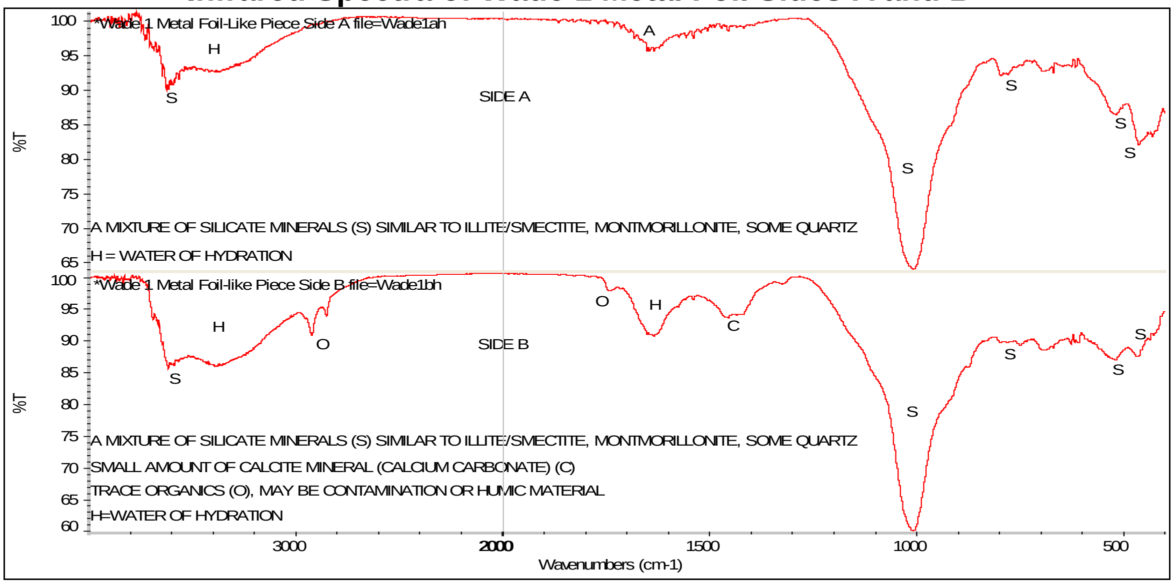
[5] **Infrared Spectroscopy (IR):** Infrared spectroscopy is used for the molecular structure identification and quantitation of solids, liquids, and gases. An infrared spectrum is the result of light (in the 2 to 25 micron wavelength range) interacting with the vibrations of molecules. The particular set of vibrations of a molecule gives rise to specific spectral absorption bands, often referred to as the 'fingerprint' spectrum.

Sample	Infrared Characterization of Surface Material
Wade 1	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possible some quartz. Also a small amount of calcite mineral (calcium carbonate). A trace amount of organic material which may be contamination or a humic substance.
Wade 2	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Side B	A silicate mineral mixture most similar to types like illite/smectite, montmorillonite. A large amount of calcite mineral (calcium carbonate).
Wade 3	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace if poly(dimethylsiloxane) probably contamination.
Wade 4	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace of organics which may be contamination or humic material.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Wade 5	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace of organics which may be contamination or humic material.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite.

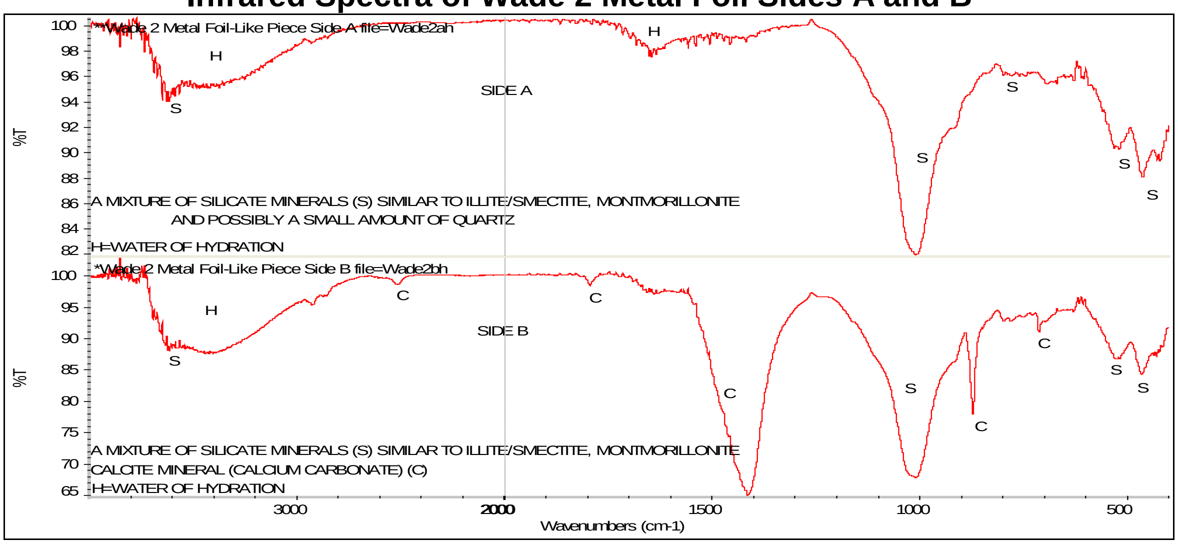
Wade 6	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. Some organics which may be contamination. Possible protein containing material which suggests animal origin.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Wade 7	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz.
Wade 8	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A large amount of calcite mineral (calcium carbonate). A trace of organics which may be contamination or humic material.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite.
Wade 12	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace of organics which may be contamination or humic material.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace of organics which may be contamination or humic material.
Wade 21	
Side A	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite and possibly some quartz. A trace of organics which may be contamination or humic material.
Side B	Primarily a silicate mineral mixture most similar to types like illite/smectite, montmorillonite. A trace of organics which may be contamination or humic material.

The spectra follow with pertinent peaks labeled. The appendix contains mineral references for comparison.

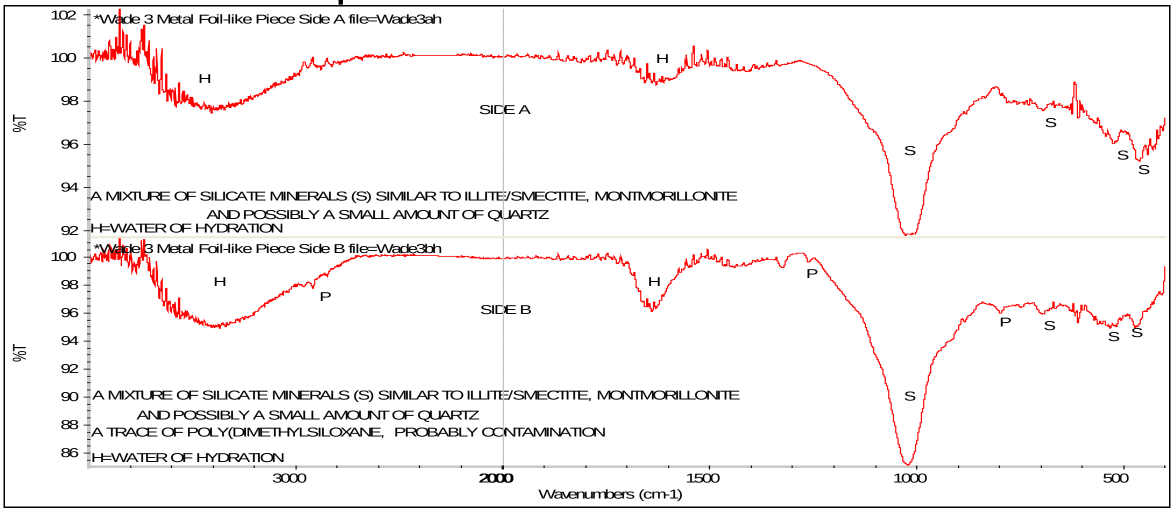
Infrared Spectra of Wade 1 Metal Foil Sides A and B



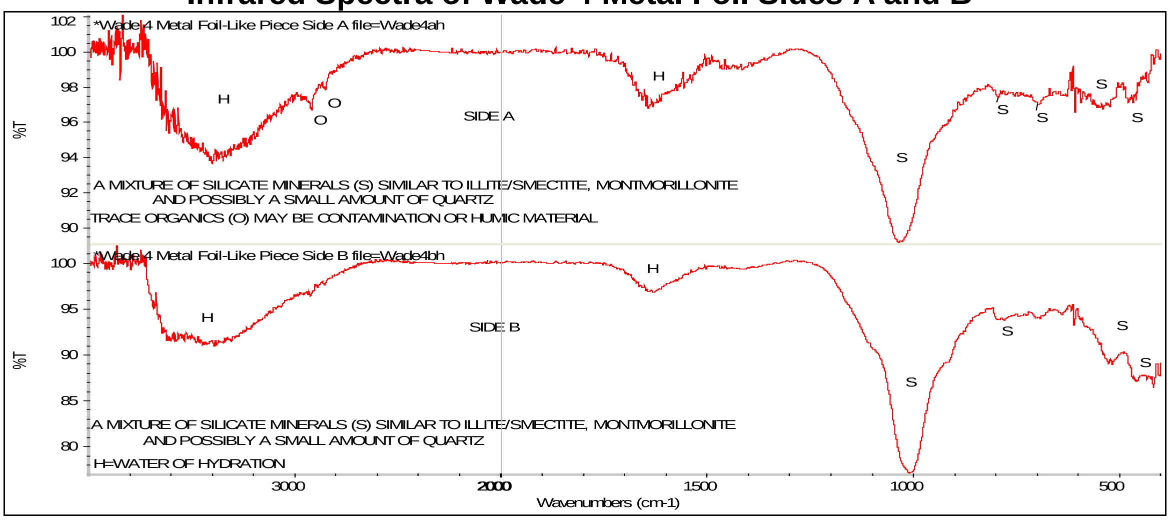
Infrared Spectra of Wade 2 Metal Foil Sides A and B



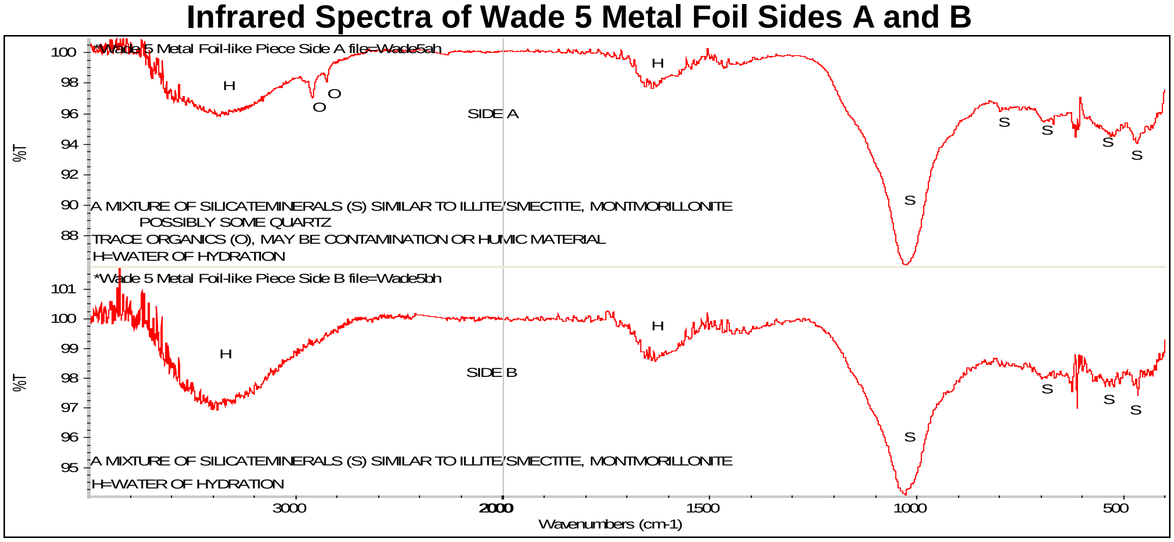
Infrared Spectra of Wade 3 Metal Foil Sides A and B



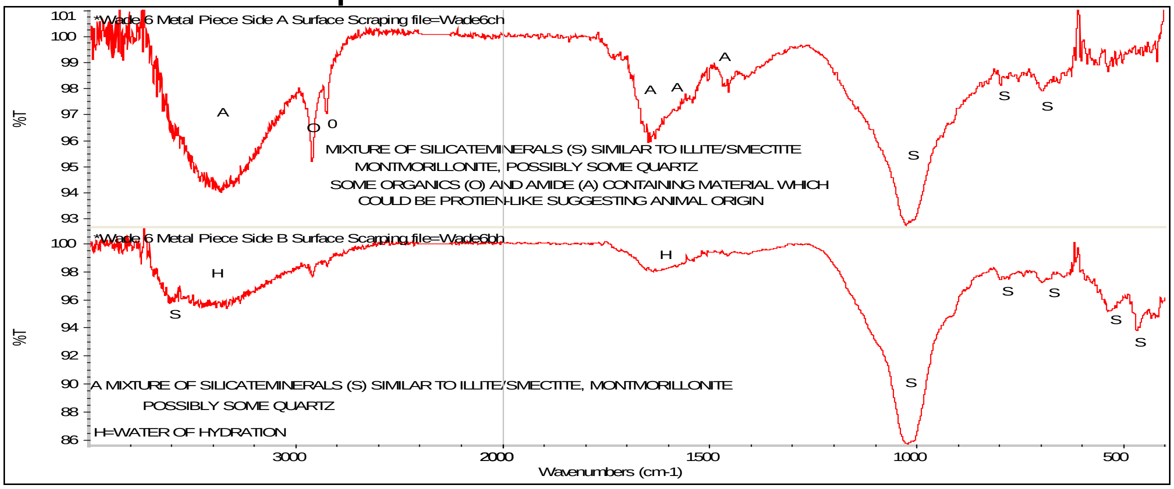
Infrared Spectra of Wade 4 Metal Foil Sides A and B



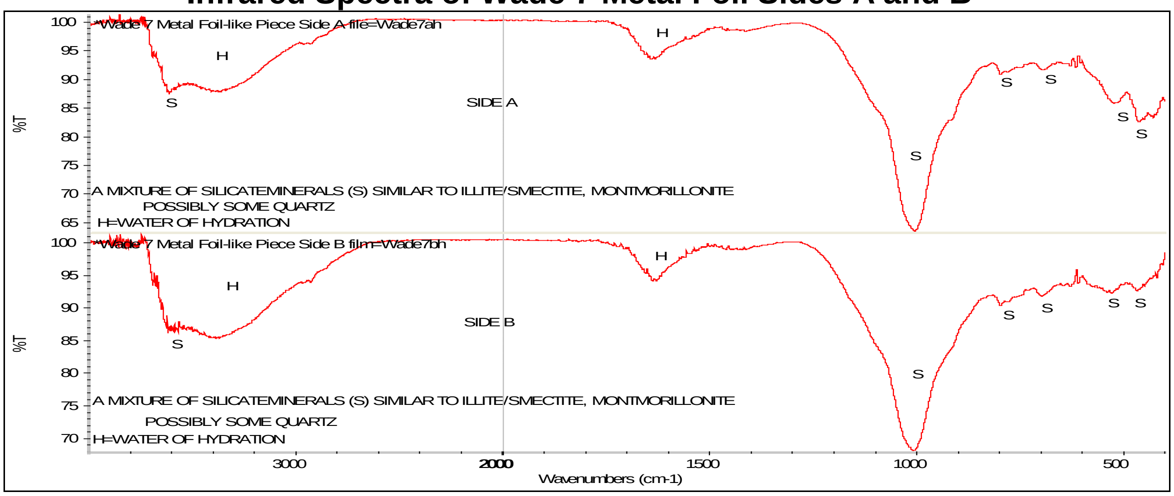
Infrared Spectra of Wade 5 Metal Foil Sides A and B



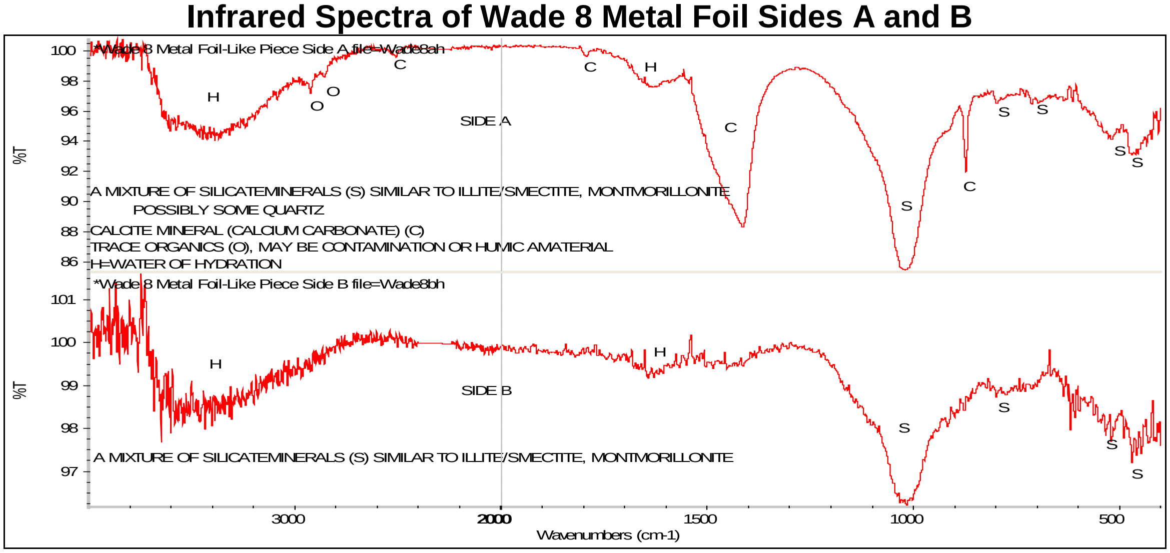
Infrared Spectra of Wade 6 Metal Foil Sides A and B



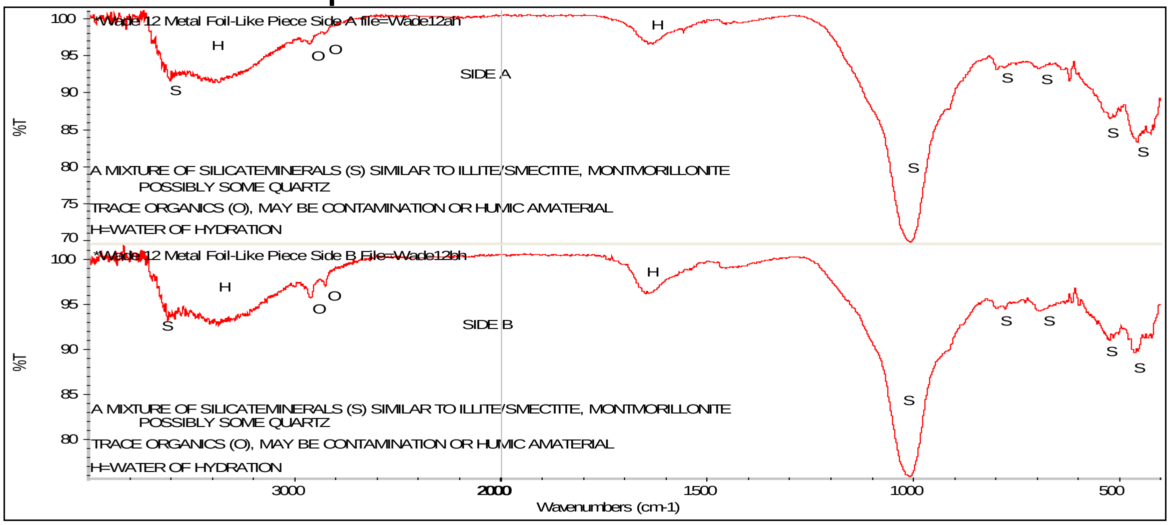
Infrared Spectra of Wade 7 Metal Foil Sides A and B



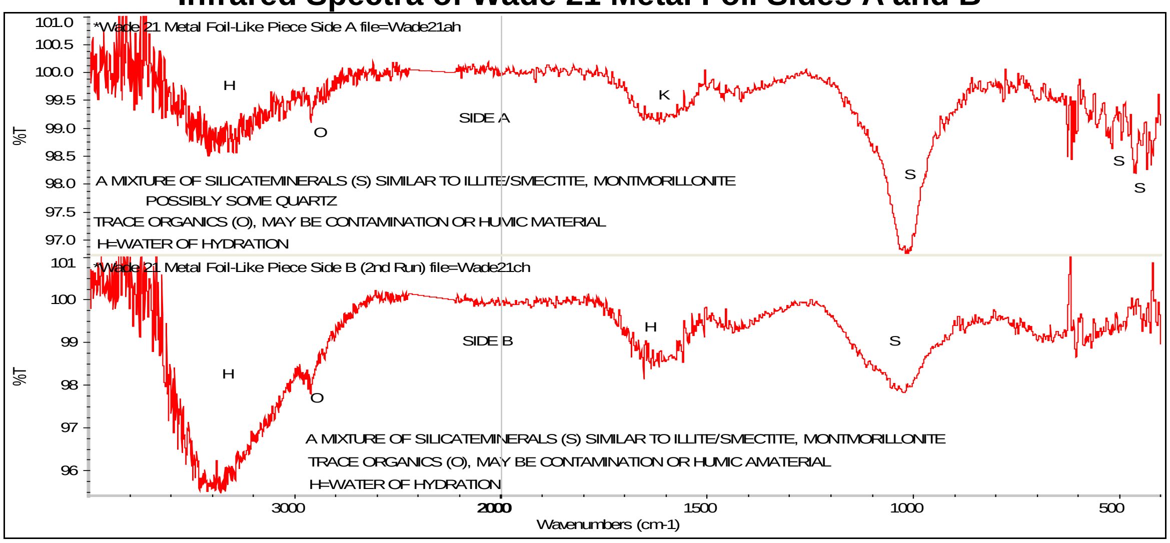
Infrared Spectra of Wade 8 Metal Foil Sides A and B



Infrared Spectra of Wade 12 Metal Foil Sides A and B



Infrared Spectra of Wade 21 Metal Foil Sides A and B



Thickness measurements using digital calipers shows very pliable samples Wade 1, 3, 4, 5,and probably 7 and 8 can be grouped in the aluminum foil range at 1-2 mil (0.02-0.05 mm). Wade 2 and 12 at 3 mils (0.07 mm) are a bit thicker, but still pliable. Wade 21 is not pliable and is 27 mils (0.69 mm). Finally, Wade 6 has a thickness of 60 mils (1.5 mm), and is clearly not pliable. Following is a table showing the samples the thicknesses of the samples and consistencies along with an aluminum foil reference for comparison.

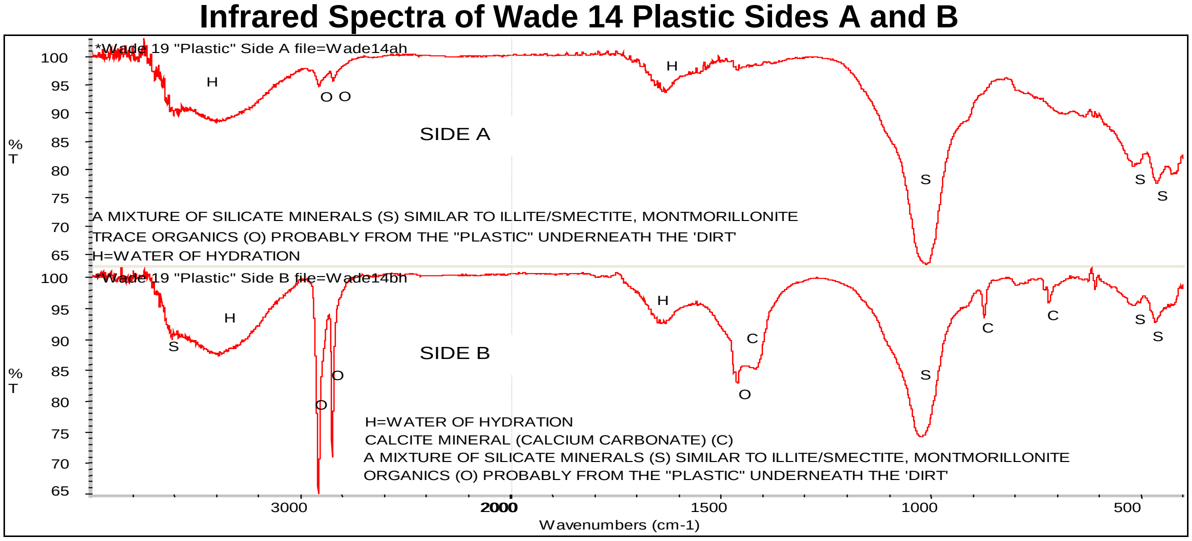
Sample	Consistency	Thickness (mils)	(mm)
•Wade 1	Pliable	1	0.02
•Wade 2	Semi-Pliable	3	0.07
•Wade 3	Pliable	1	0.02
•Wade 4	Pliable	1	0.02
•Wade 5	Pliable	1	0.02
•Wade 6	Not Pliable	60	1.5
•Wade 7	Pliable	2	0.05
•Wade 8	Pliable	2	0.05
•Wade 12	Semi-Pliable	3	0.7
•Wade 21	Not Pliable	27	0.69
Aluminum Foil Reference	Pliable	1	0.02

No radiation above background was detected from any of the metal samples.

The Plastic

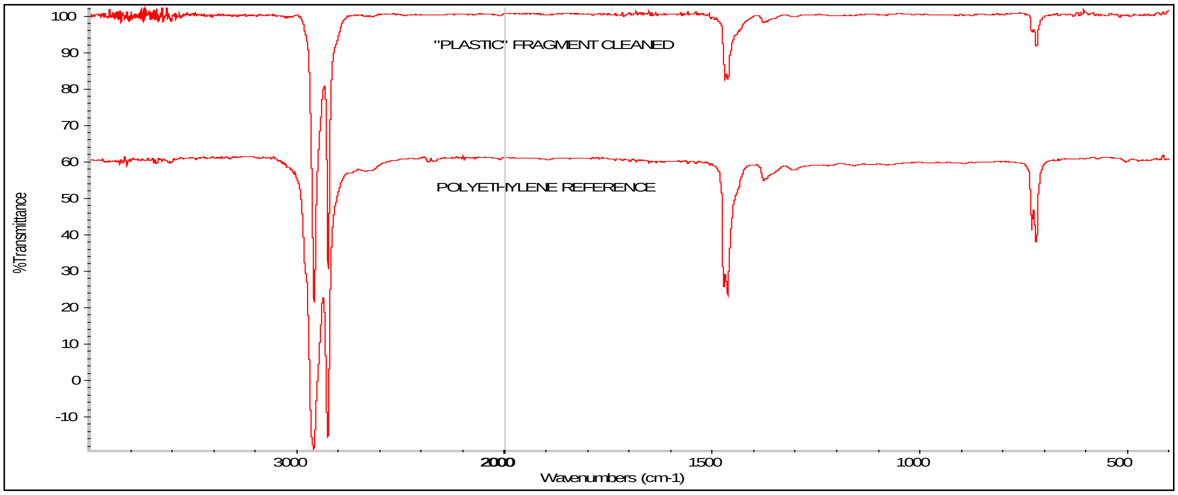
Infrared analysis of both surfaces of the “plastic” show it is coated with dirt, like the metal samples. The infrared spectra of both surfaces show primarily a silicate mineral mixture most similar to types like illite/smectite and montmorillonite. Additionally, a small amount of calcite mineral (calcium carbonate) is on side B. Some organic absorption is present which is part of the underlying plastic. Following are the spectra with pertinent peaks labeled.

Infrared Spectra of Wade 14 Plastic Sides A and B



A portion of the surface was cleaned of dirt. An infrared spectrum of the clean area identifies the plastic as polyethylene. It matches a reference of this polymer. Following are spectra of the clean area along with a reference of polyethylene for comparison.

Infrared Spectra of Wade 14 Cleaned Plastic Surface and Polyethylene Reference



A thickness measurement shows the polyethylene is 1 mil (0.02 mm). This is a typical thickness for plastic sheeting.

No radiation above background was detected for the plastic.

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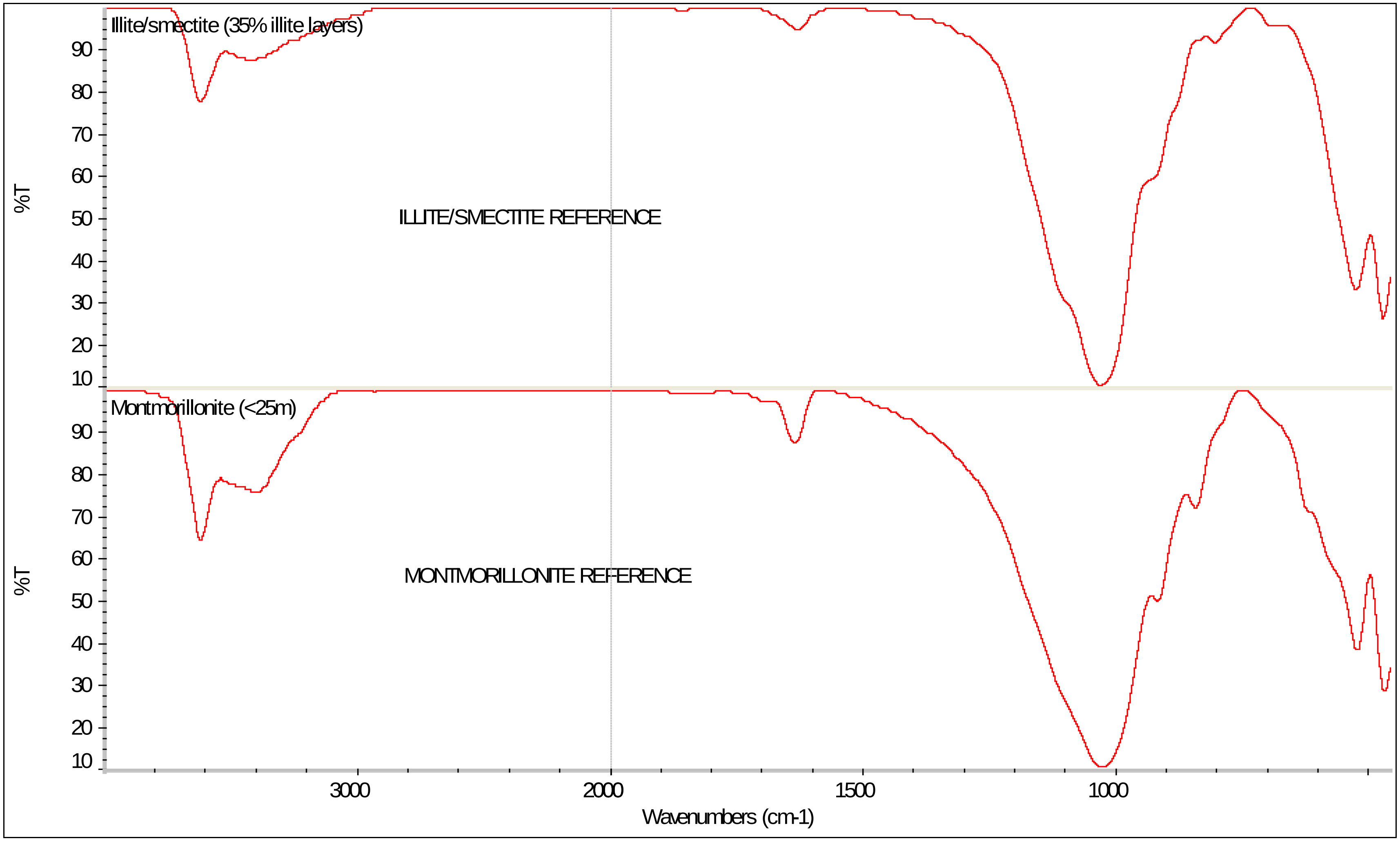
Phyllis A. Budinger

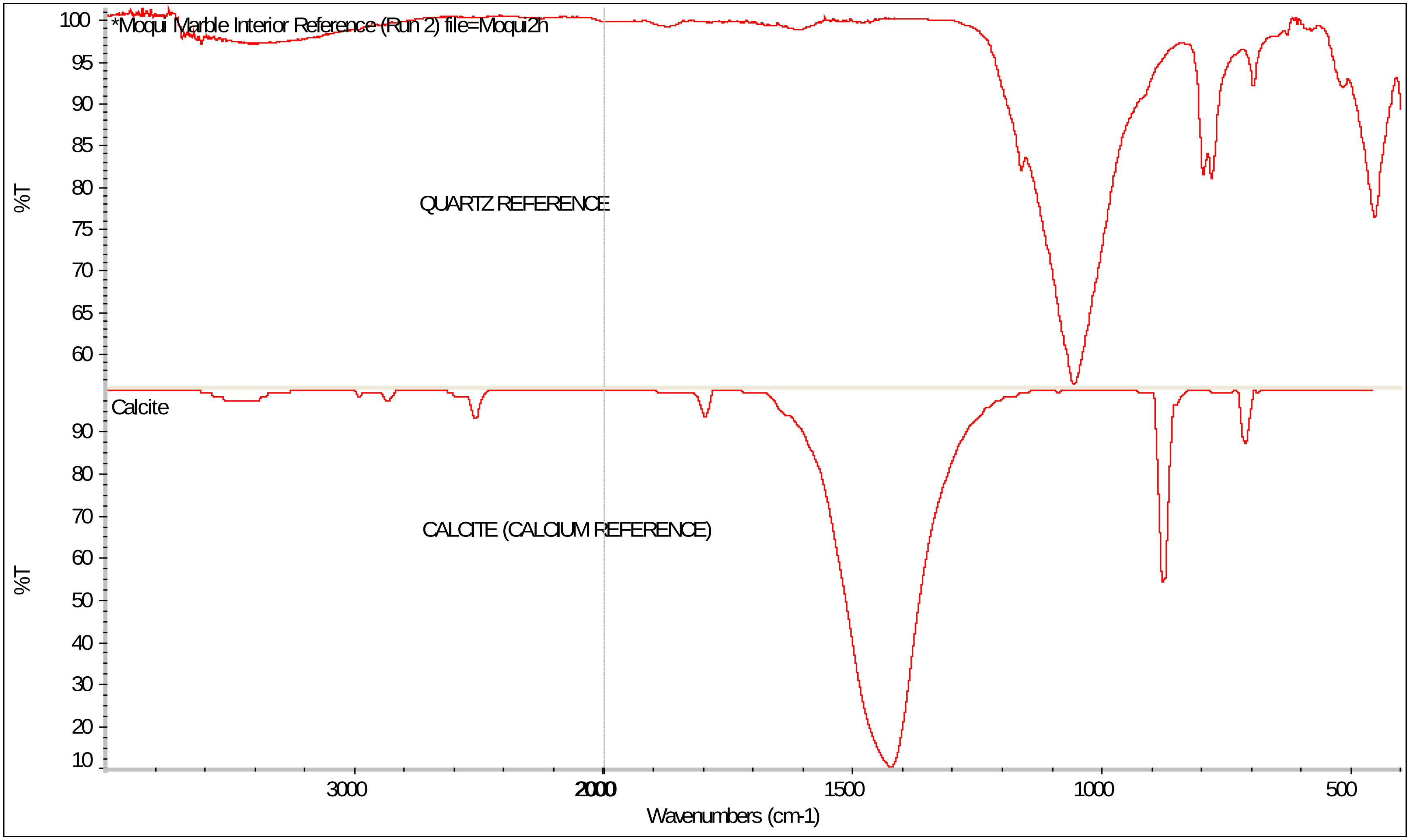
APPENDIX

Infrared References

Illite/Smectite
Montmorillonnite
Quartz
Calcite



Infrared references of illite/smectite and montmorillonite minerals.



Infrared references of quartz and calcite (calcium carbonate) minerals.