

Frontier Analysis, Ltd

TECHNICAL SERVICE RESPONSE NO.: UT043

Subject: Analysis of Samples from Burned Ground and Tree Trunks Related to a UFO Close Contact (Gaffney, South Carolina – February 22, 2004)

Date: January 7, 2006

Requested By: Nancy Talbott
BLT Research

Investigators:
Mike Price
Cheryl Gilmore
Arlene Chukusky

Reported By: P. A. Budinger
Analytical Scientist

Background/Objective: The event is briefly described in a request submitted by Nancy Talbott as follows.

“A 4-5 ft. diam. glowing, translucent ball of light was observed drifting horizontally 10 feet above power lines at dusk. Flames erupted, moving “like electricity” thru tree tops, as object (w/multiple 6-8 inch fiery red rods protruding from underside) hit tree line, and falling sparks ignited brush on ground.”

Mike Price prepared a very detailed, well-researched final report for MUFON on January 6, 2006.

The objective is to analyze soils, wood samples and a piece of plastic from the site to determine whether there are any unusual materials present. And, specifically ascertain whether any accelerants are present.

Following are some selected photographs pertaining to the site, taken by Mike Price.



Site location and object's path.



Burned oval area on ground.



Close ups showing charring indicating intense heat of the ground fire in spite of wet ground conditions.



This is a piece of plastic on the ground in the center of the burn area. It was under a larger piece in the tree above it. A section of the larger piece was analyzed.

Conclusions:

- 1.) No hydrocarbon-type accelerant is detected in any of the soil samples thus eliminating fuels such as gasoline, kerosene, diesel fuel, etc. as possible accelerants.
- 2.) High concentrations of ammonium chloride, perhaps between 0.2-0.8 wt.%, were found in all the soil samples which include both burn area and control samples. Additionally, calcium nitrate was found in two control soils (C-1, C-2) and one burn area soil (S-3) at roughly the same concentrations. Hawley's Chemical Dictionary¹ relates the following concerning ammonium chloride (my underlining). Its uses include "dry batteries, mordant (dyeing and printing), soldering flux, manufacturing of various ammonia compounds, fertilizer, pickling agent in zinc coating and tinning, electroplating, washing powders, melt retarding snow treatment, production of urea-formaldehyde resins and adhesives, bakery products." The following information is provided for calcium nitrate. Its uses include "pyrotechnics, explosives, matches, fertilizers, other nitrates, source of ¹⁴C by nuclear irradiation." The dictionary also lists it as a hazard "strong oxidizer, dangerous fire risk in contact with organic materials, may explode if shocked or heated." The detection of these unusual components bears further inquiry of the landowner by the investigators.
- 3.) No unusual materials are detected in the tree wood/bark samples from the burn area. Only natural products were observed. Some degradation due to the heat was noted.
- 4.) The plastic is composed of polyethylene. Some oxidation of the plastic was observed in a melt area, which is obviously due to heat exposure.

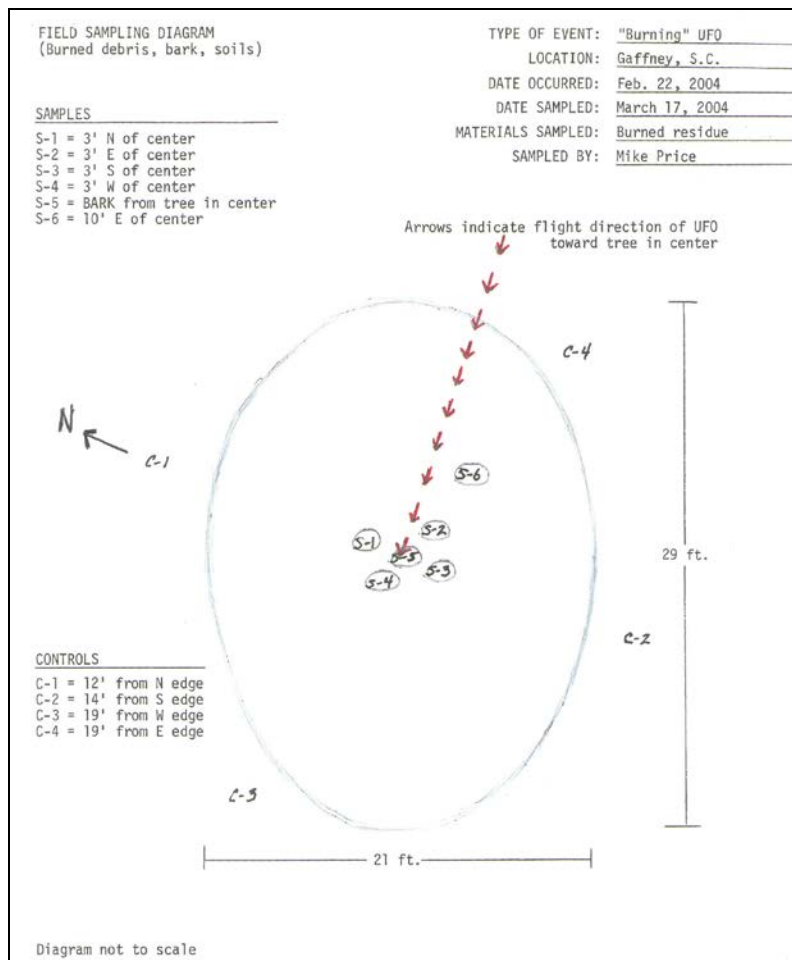
¹ Lewis Sr., Richard J., "Hawley's Condensed Chemical Dictionary, John Wiley & Sons, Inc., New York, Fourteenth Edition, 2001.

5.) None of the samples, i.e. includes all soils, tree samples and plastic, are radioactive or contain fluorescing materials.

Procedure:

Samples: A total of 15 samples were received. There were two sets, i.e. those collected by Mike Price (10) and those collected by both Cheryl Gilmore and Arlene Chukusky (5). Not all were analyzed due to cost and time. Of the 15 samples, 12 were selected for analysis. Following are the sample identifications.

Mike Price samples (received 7 October 2005): Five burn area samples and two controls were analyzed. One burn soil and two control soil samples were not examined because of cost and time. A site drawing showing the sampling locations follows:

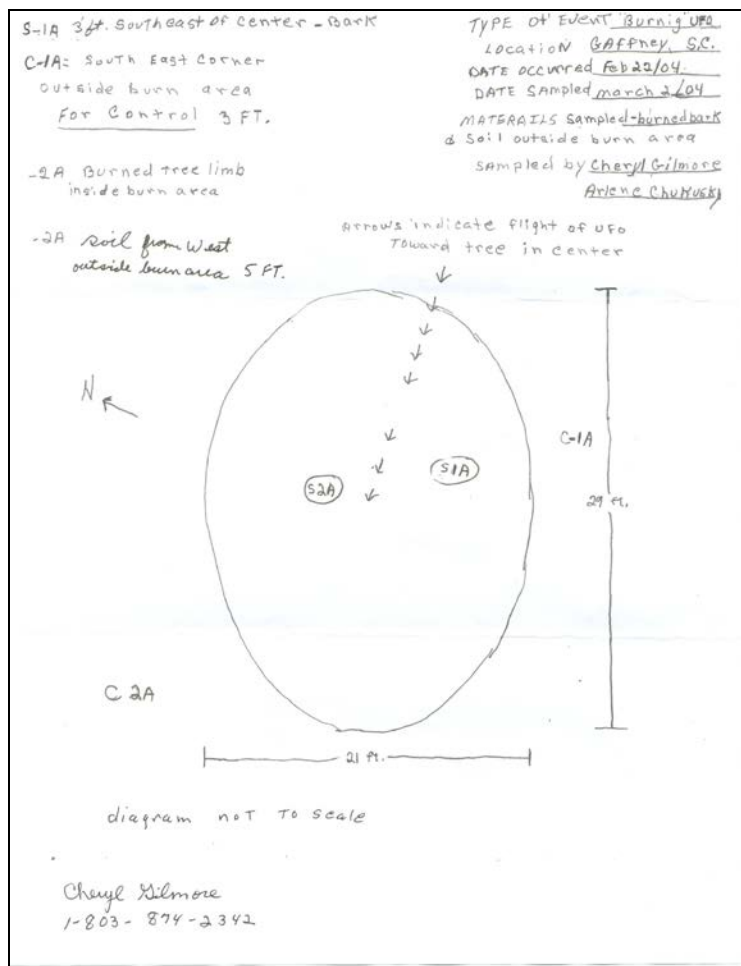


Following are the Price sample identifications.

- S-1 (3' N of center), soil from burn area

- S-2 (3' E of center), soil from burn area
- S-3 (3' S of center), soil from burn area
- S-4 (3' W of center), soil from burn area
- S-5 (Bark from center), tree bark from burn area
- S-6 (10' E of center), soil from burn area (Not Analyzed)
- C-1 (12' from North edge), control soil
- C-2 (14' from South edge), control soil
- C-3 (19' from West edge), control soil (Not Analyzed)
- C-4 (19' from East edge), control soil (Not Analyzed)

Cheryl Gilmore and Arlene Chukusky samples (received 11 October 2005):
The site drawing shows the sampling location of these samples.



Following are the Gilmore/Chukusky sample identifications.

- S1A - bark wood inside burn area, SE corner (Feb 2, 2004)
- S2A - burned tree limb (Feb 2, 2004)
- C1A - control soil outside burn area, southeast

- C2A – control soil outside burn area, west
- "Clear kitchen plastic" from large piece found in treetop in center of burned area Feb 25, 2004

All soil samples were each thoroughly mixed, ground and strained through a 40-mesh sieve. This was done to insure homogeneity of each soil sample. Infrared spectra were obtained from these samples, sections of the tree wood and bark samples, and of the "kitchen plastic" on Analect 360 spectrometer using the Harrick SplitPea[®] sampling accessory. The samples were also examined with a radiation monitor (SE International's Radiation Alert[™] Monitor 4) and a UV light (Optical Engineering's Model 22-UV).

Solvent extractions were also quantitatively done on eight selected soils and the tree wood/bark samples. This was done gravimetrically, i.e. the initial samples were weighed as well as each of the extracts (after solvent removal at ambient or low temperature). Chloroform, followed by water extractions were performed. Each sample was extracted twice with each solvent. Infrared spectra were obtained of all the extracts from the soils. Additionally, a Beilstein test² for chlorine was done on the water extracts.

The above procedure is similar, though slightly modified, to those used for the analysis of samples from purported UFO burn areas in England, Arkansas³ and Centerville, Ohio⁴.

Results:

The results of the individual tests done on the samples follow. These results are summarized in the conclusions section on the page three of this report.

Analysis of the Samples "As Received"

Soils: Infrared analysis of the ground soil samples detects no significant differences between the types of materials from the burn area and the control areas. The spectra show components such as mineral material (predominately kaolinite clay), humus materials and other organic miasma, i.e. decaying vegetation and mold/mildew. Band intensity ratio differences among the spectra of the samples show there are slightly varying amounts of these components in the samples. No unusual materials are detected at this point. Following are the infrared spectra of the soil samples from the burn area, followed by spectra of the

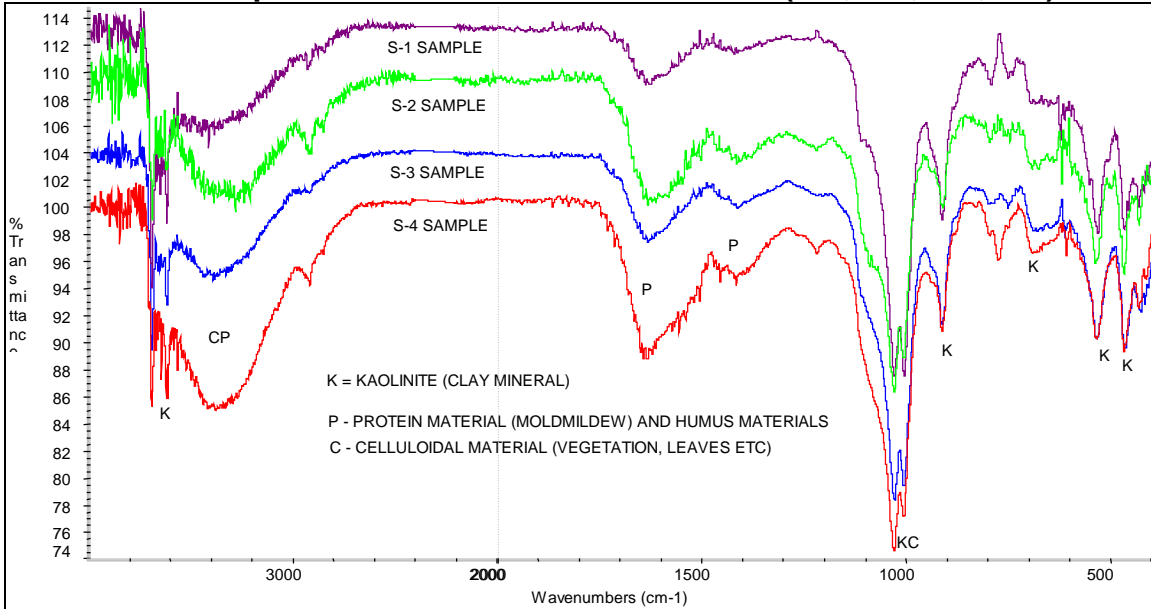
² This is a test to detect halogens in compounds. A copper wire is heated in a flame until the flame shows no green color; if the addition of the compound produces a green flame, chlorine is present.

³ Frontier Analysis Technical Service Response No.: UT006, "Analysis of Samples Related to a Fire in England, Arkansas (March 9, 2000).

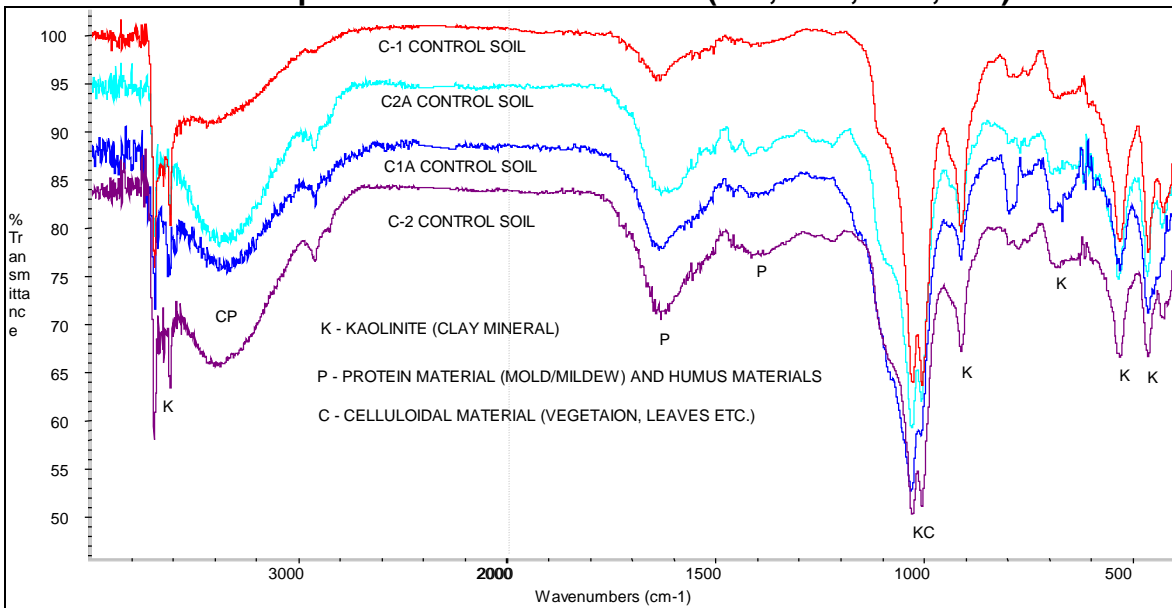
⁴ Frontier Analysis Technical Service Response No.: UT034, "Analysis of Tree Branches which Purportedly Came into Contact with a UFO (Centerville, Ohio, March 6, 2004)".

control soils for comparison. The spectra include band assignments for the various components.

Infrared Spectra of Soils from the Burn Area (S-1, S-2, S-3, S-4)



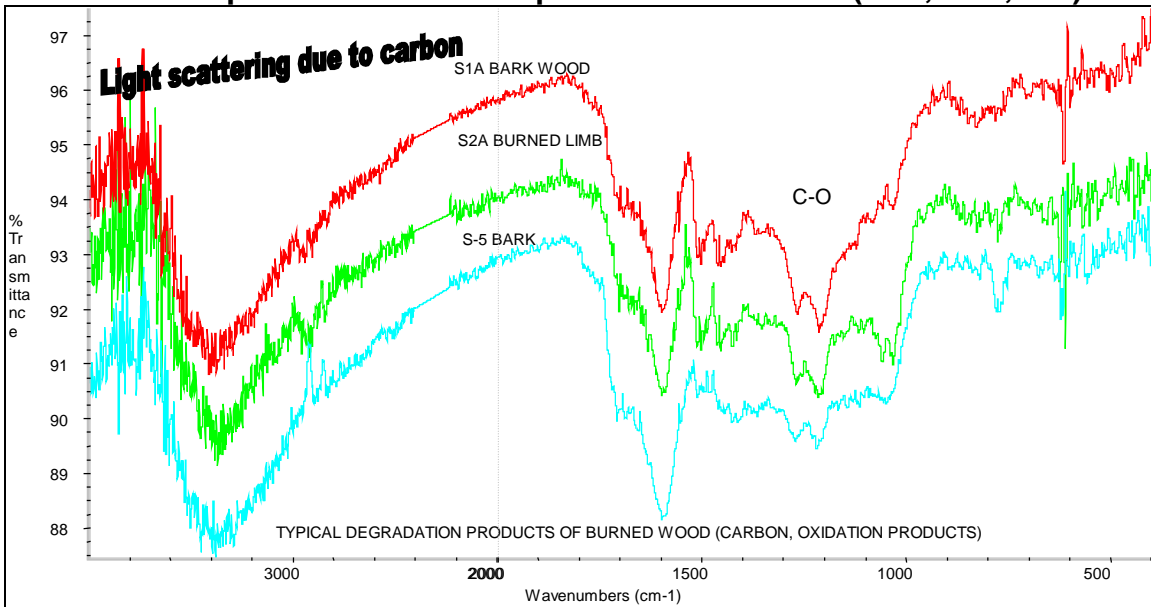
Infrared Spectra of the Control Soils (C-1, C2A, C1A, C-2)



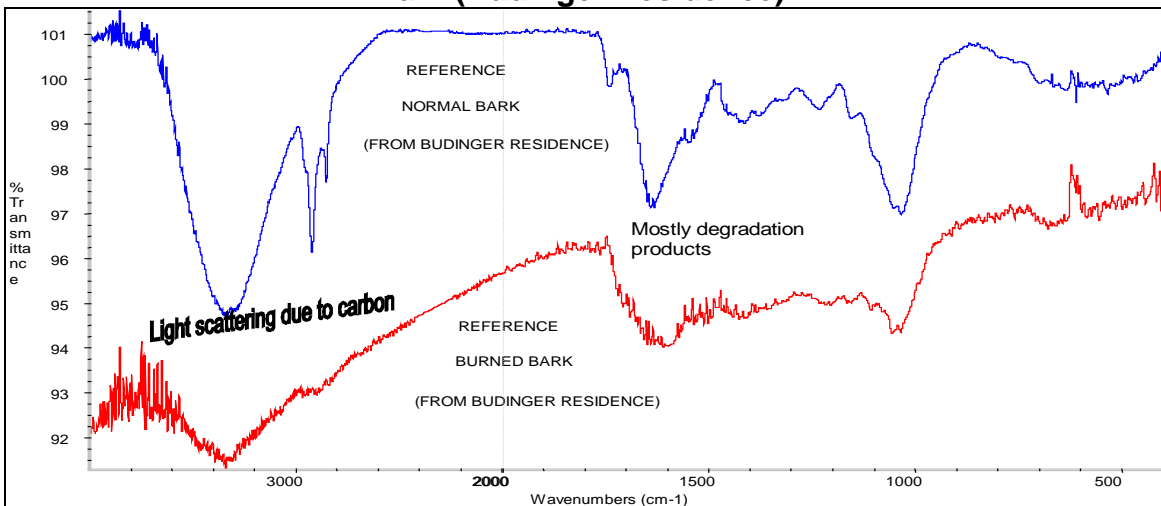
Tree Wood/ Bark: Infrared analysis of the burned areas of the tree samples show products typical of burned wood. There are no unusual anomalies. The usual patterns of burned wood, its degradation products, and carbon are apparent. It should be noted that when comparing spectra to references of burned and unburned bark (from the Budinger residence) there is some additional absorbance between 1300-1100 cm^{-1} in the Gaffney samples which is

indicative of C-O bonding. I do not believe it is significant. It could be due to a difference in the type of trees examined as references. We are comparing well-aged, degraded wood from South Carolina to aged fireplace wood from northern Ohio. The spectra of three samples follow. Reference spectra of unburned bark and a burned piece of bark from the Budinger residence are also presented for comparison.

Infrared Spectra of Wood Samples from Burn Area (S1A, S2A, S-6)

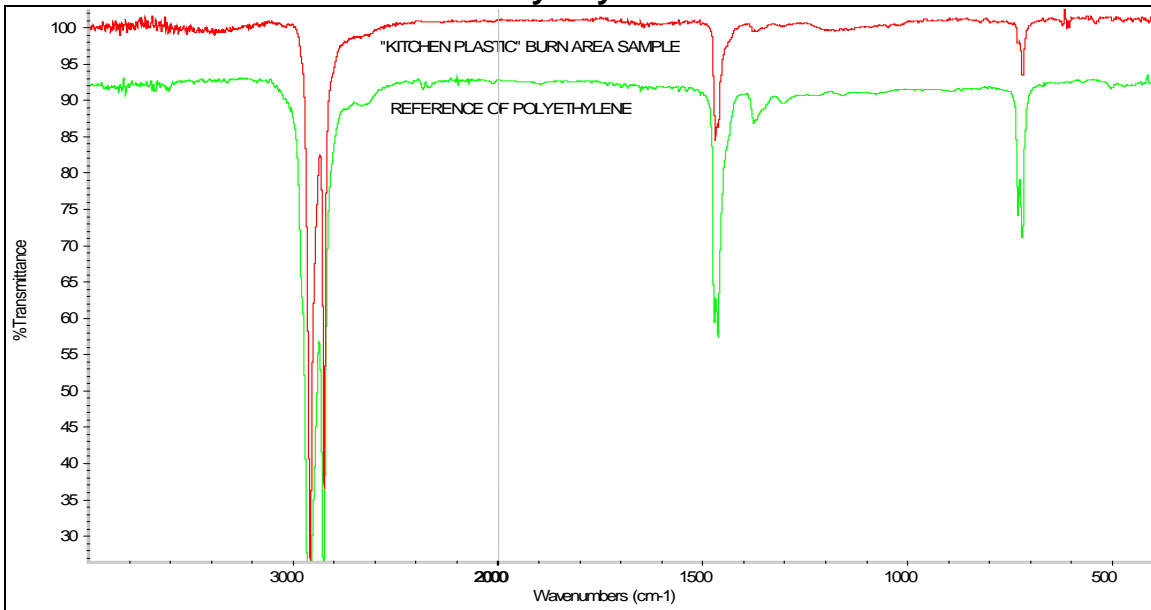


Infrared reference Spectra of Unburned Bark and Severely Burned area of Bark (Budinger Residence)



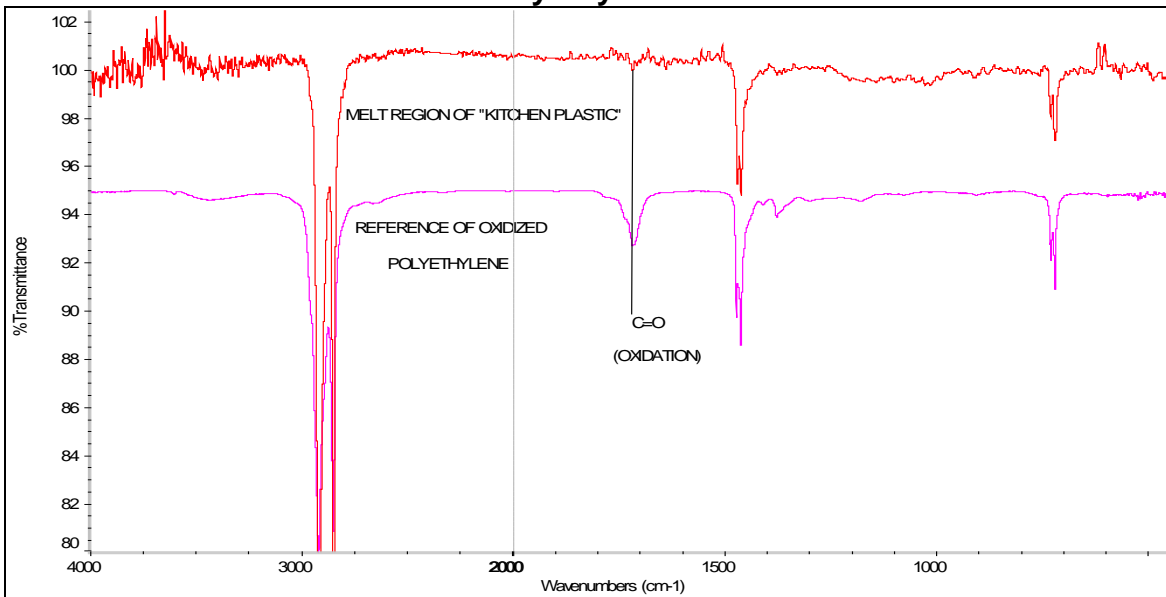
“Kitchen Plastic” Burn Area Sample: Infrared analysis of a clear area of the plastic identifies it as polyethylene. The spectrum matches a reference of this polymer. Following is the spectrum along with a reference of polyethylene for comparison.

Infrared Spectra of "Kitchen Plastic" Clear Area and Reference of Polyethylene



A spectrum of the melt area reveals weak oxidation absorption besides the polyethylene bands. This indicates this part of the sample has been exposed to heat. Following is the spectrum along with a reference spectrum of oxidized polyethylene for comparison.

Infrared Spectra of "Kitchen Plastic" Melt Area and Reference of Oxidized Polyethylene



Other Tests: Radiation measurements show no radiation above normal background for any of the above samples. Additionally, no fluorescing material was detected under UV light.

Analysis of the Chloroform and Water Extracts from the Samples

Quantitative measurements: The extractions were quantitatively done on the soil and wood samples. The data provide a very rough estimate of the amount of the extracted material, because error was introduced by at least three variables. 1) The soils varied in organic content. That is, some contained more vegetation which has more soluble material. 2) Insoluble and very fine soil mineral particulates could not be excluded entirely from the some of the extracts thus adding to the weight in these instances. 3) The materials identified in the water extracts, (ammonium chloride and calcium nitrate, see page 12) were found to be hygroscopic (easily picks up water), and therefore, precise and accurate weights were difficult to obtain. They had to be dried at a low temperature and weighed within a few minutes after removal from the drying oven. It was noted that during weighing you could see the weight slowly increase on the balance. The following table presents the results. It does conclusively show very little material is chloroform soluble compared to the amount of material that is water soluble. It is in the chloroform extracts that any evidence of a hydrocarbon accelerant such as gasoline, diesel fuel, kerosene etc. should show up. (See infrared results of the chloroform extracts, page 11.)

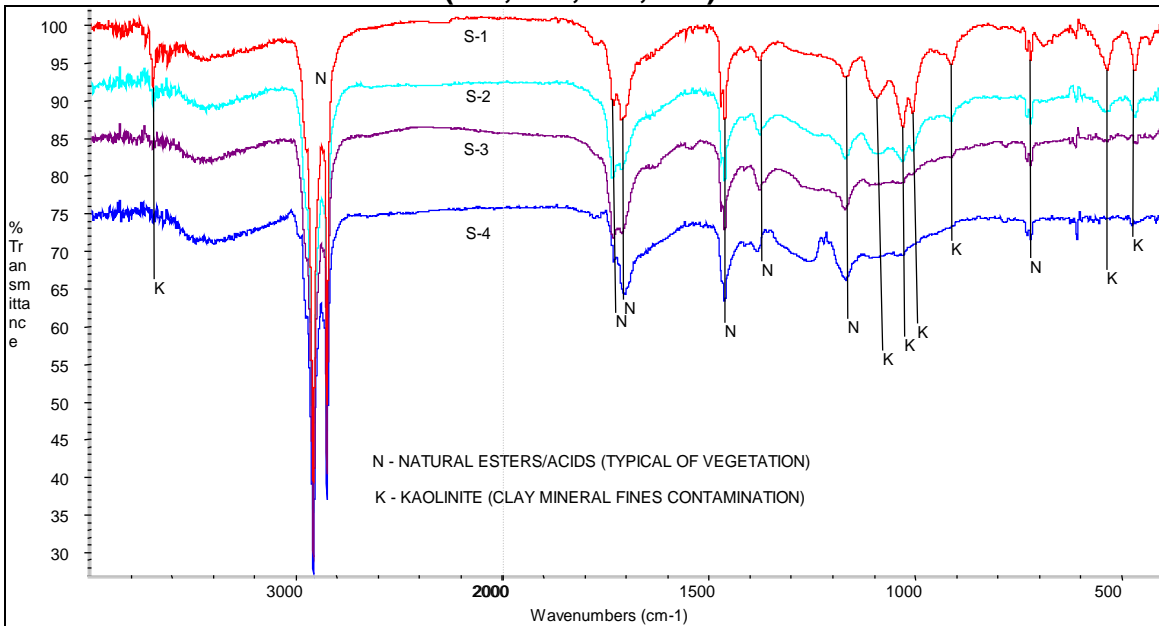
Table 1. Amounts of Solvent Extracts

| Samples | Chloroform Extracts | | Water Extracts | |
|------------------------------|---------------------|------|----------------|------|
| | Mg/G | Wt.% | Mg/G | Wt.% |
| •Soils from Burn Area | | | | |
| S-1 | 2 | 0.2 | 26 | 2.6 |
| S-2 | 2 | 0.2 | 22 | 2.2 |
| S-3 | 3 | 0.3 | 30 | 3.0 |
| S-4 | 3 | 0.3 | 19 | 1.9 |
| •Control Soils | | | | |
| C-1 | 3 | 0.3 | 33 | 3.3 |
| C-2 | 4 | 0.4 | 49 | 4.9 |
| C1A | 16 | 1.6 | 86 | 8.6 |
| C2A | 13 | 1.3 | 59 | 5.9 |
| •Tree Samples from Burn Area | | | | |
| S1A Bark | 3 | 0.3 | 17 | 1.7 |
| S2A Tree Limb | 1 | 0.1 | 28 | 2.8 |
| S-5 Bark | 5 | 0.5 | 57 | 5.7 |

Chloroform Extracts: Infrared analysis of the extracts from both the burn area and control soils shows they contain the same materials. The spectra show they

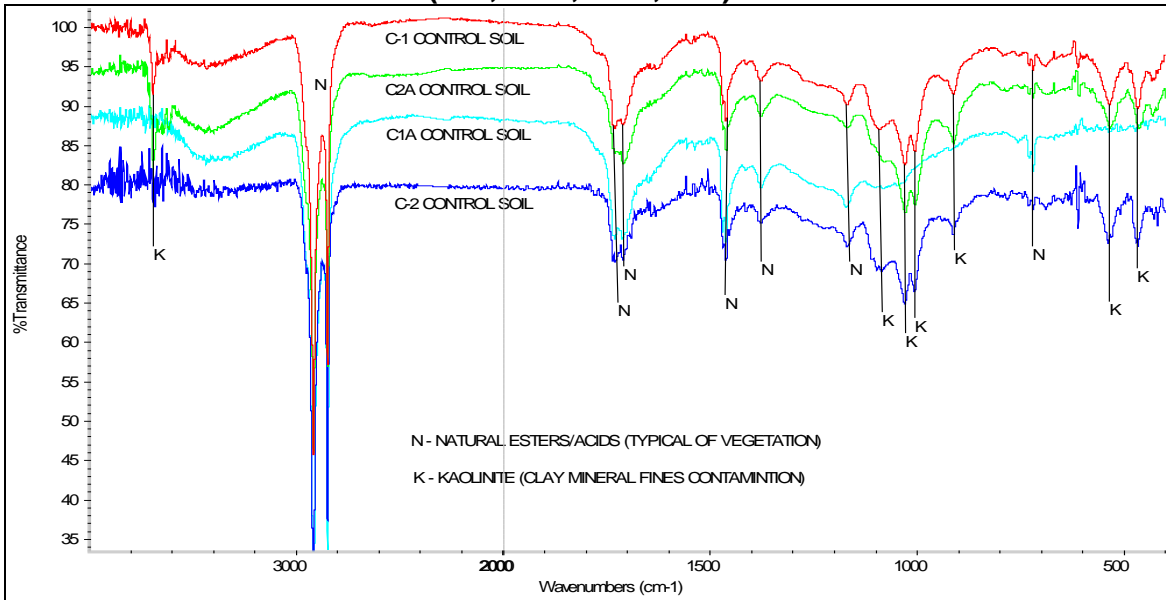
contain natural long chain esters and acids from the vegetation. Insoluble soil fines that could not be filtered out are also observed in some samples. Nothing unusual is observed, which includes any hydrocarbon residue from hydrocarbon-type fuels. If a hydrocarbon derived fuel were present, strong aromatic absorption due to non-volatile heavy ends of gasoline⁵ and other higher boiling fuels would be observed between 1000- 700 cm^{-1} in the spectra. None is present. Following are spectra of the extracts from burn area and control samples.

Infrared Spectra of the Chloroform Extracts of Soils from the Burn Area (S-1, S-2, S-3, S-4)



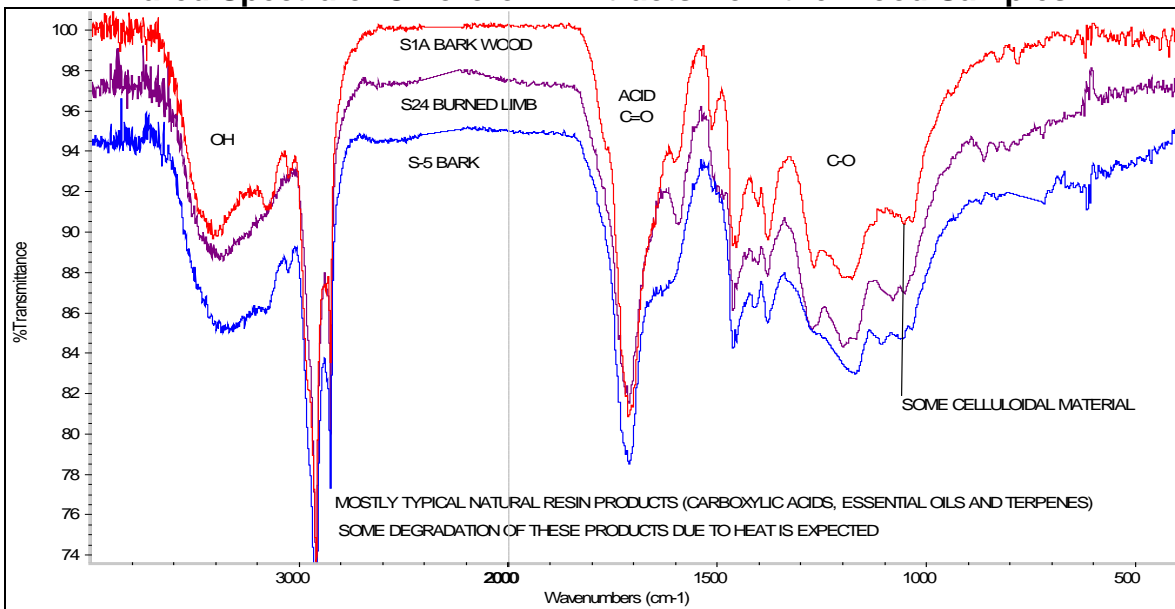
⁵ I am familiar with infrared spectra of gasoline heavy ends as well as higher boiling fuels from weathering studies I performed when employed by the petroleum industry. I also have some of these references on file.

Infrared Spectra of the Chloroform Extracts of Control Soils (C-1, C2A, C1A, C-2)



The infrared spectra of the tree samples show natural resin. Some degradation from the heat may have occurred. There is a small amount of soluble celluloidal material also present. No unusual components are detected.

Infrared Spectra of Chloroform Extracts from the Wood Samples



Water Extracts: The infrared analysis of the water extracts of the soils show a variation of components in both the extracts from the burn area and from the control areas. These are inorganics. All samples contain ammonium chloride. However, it is not apparent in the spectra of two controls C-1 and C-2, and one

burn soil S-3 because they additionally contain calcium nitrate, which has strong absorption bands that mask those of ammonium chloride. So besides infrared analysis, a Beilstein flame test for chlorine was done to both confirm the chloride ion in those extracts containing ammonium chloride⁶, and to determine if chloride was also present in the samples containing calcium nitrate. In all instances the flame turned a vivid green which was a confirmation. Additionally indicated in all samples are varying amounts of water (mostly water of hydration and a small amount of free water) and some mineral fines (kaolinite clay). Following is a table showing the results. Based on the rough quantitative measurements in Table 1, a conservative “ballpark” estimate for the amounts of ammonium chloride and calcium nitrate suggests they are present between 0.2 to 0.8 wt.%. This is quite significant. The components are listed in order of apparent concentration.

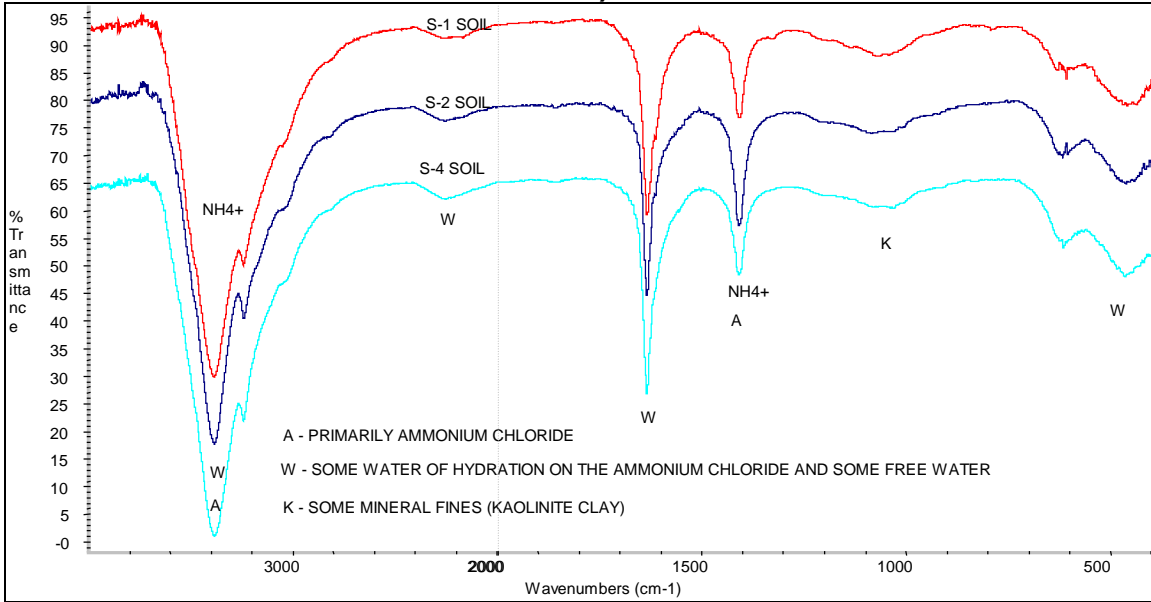
Table 2. Identification of Water Extracts

| Soil Water Extracts | Identification |
|-----------------------|--|
| •Soils from Burn Area | |
| S-1 | Ammonium Chloride; Water; Mineral Fines |
| S-2 | Ammonium Chloride; Water; Mineral Fines |
| S-3 | Calcium Nitrate; Ammonium Chloride; Water, Mineral Fines |
| S-4 | Ammonium Chloride; Water; Mineral Fines |
| •Control Soils | |
| C-1 | Calcium Nitrate; Ammonium Chloride; Water; Mineral Fines |
| C-2 | Calcium Nitrate; Ammonium Chloride; Water; Mineral Fines |
| C1A | Ammonium Chloride; Water; Mineral Fines |
| C2A | Ammonium Chloride; Water; Mineral Fines |

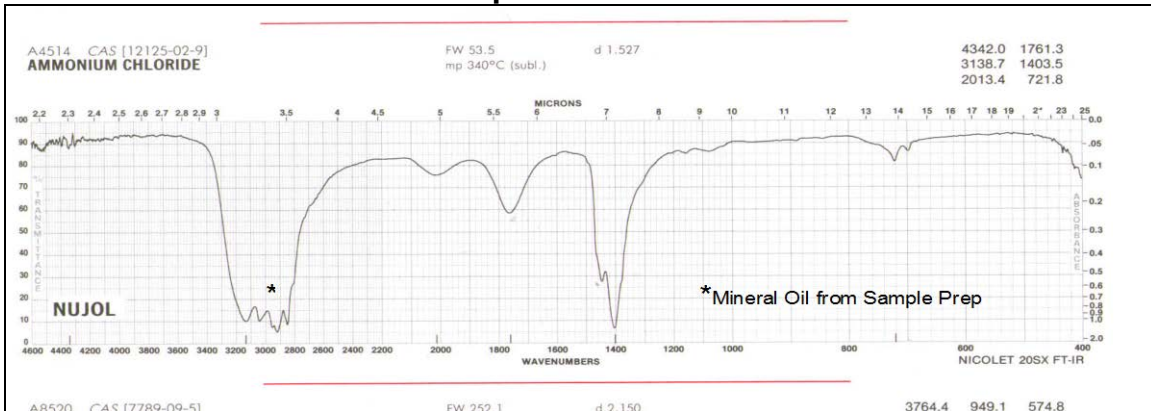
Following are the infrared spectra of three soils from the burn area (S-1, S-2, S-4) which show ammonium chloride, water and mineral fines. An infrared reference of ammonium chloride follows for comparison.

⁶ Monoatomic anions or cations are sometimes difficult to identify by infrared analysis. Chlorine is one such anion. While the polyatomic ammonium ion along with other subtle weak bands did indicate ammonium chloride, it was decided to use the Beilstein test to confirm the chloride ion.

Infrared Spectra of the Water Extracts of Soils from the Burn Area (S-1, S-2, S-4)

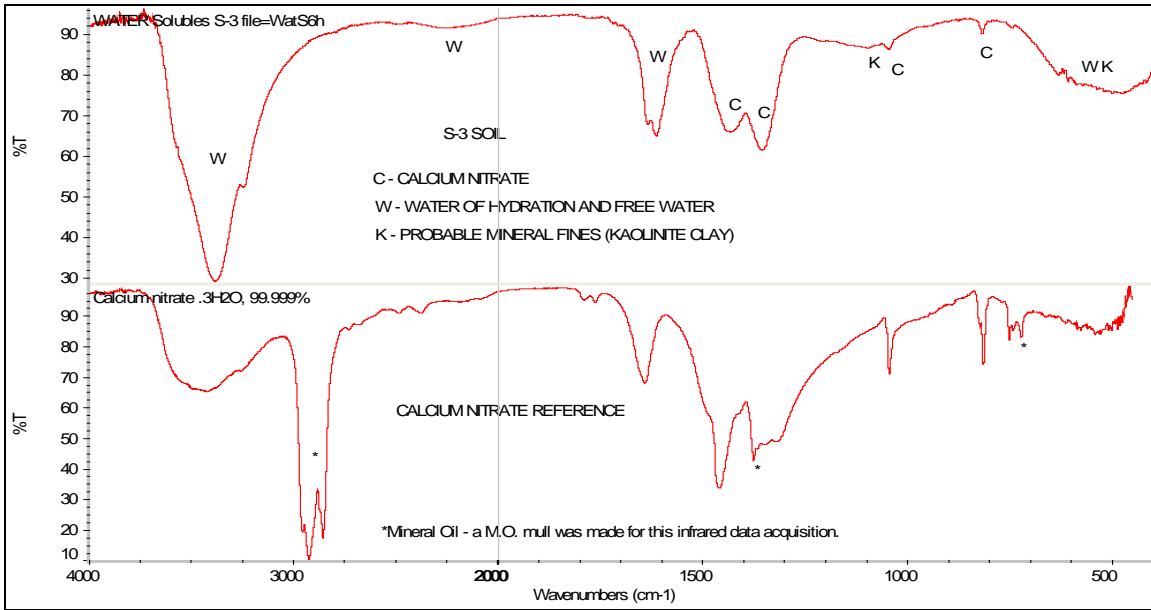


Infrared Reference Spectrum of Ammonium Chloride



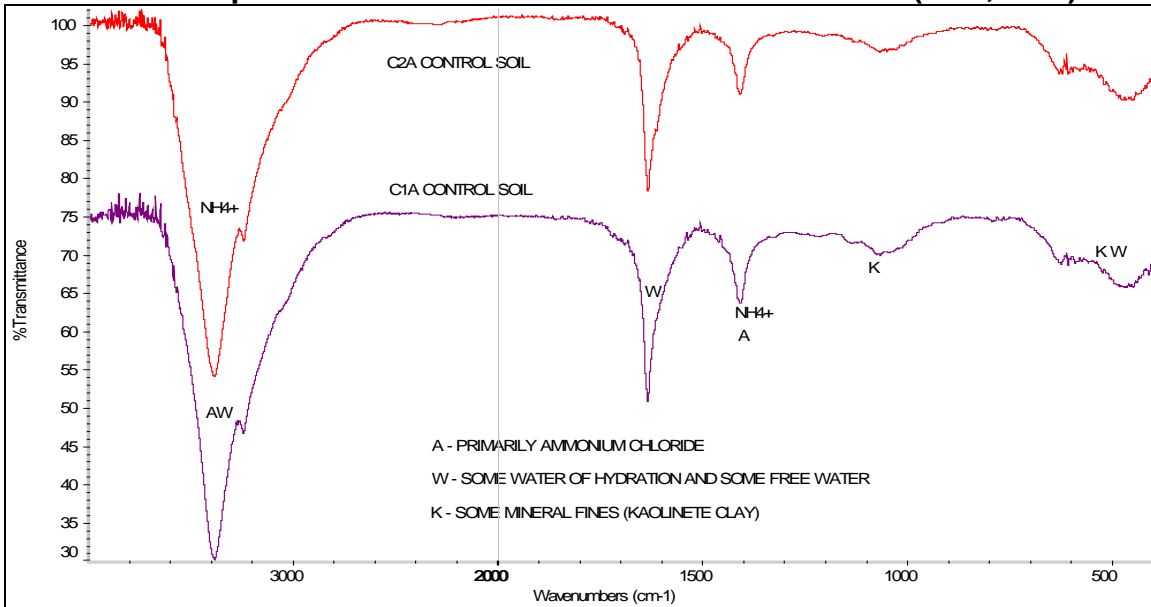
The spectrum of the extract of soil S-3 from the burn area shows calcium nitrate, water and mineral fines. Therefore, it is presented separately along with a reference of calcium nitrate. Note the absorption is in the same region as ammonium chloride. So this component would be masked.

Infrared Spectra of the Water Extract of Soil S-3 and Reference of Calcium Nitrate



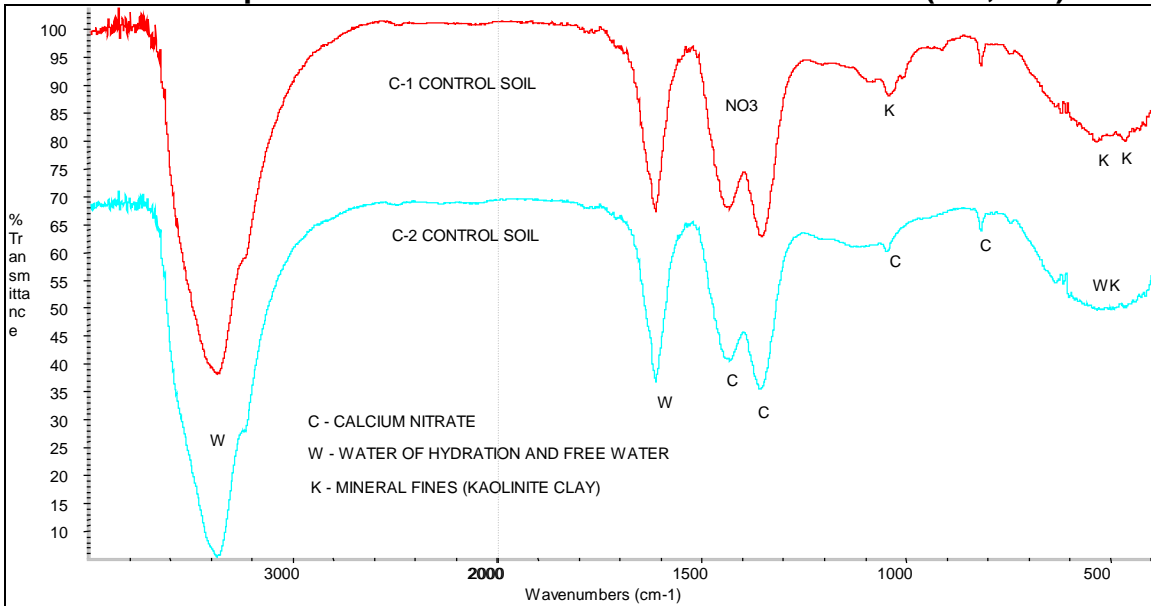
Following are two control soil extracts (C1A and C2A) showing ammonium chloride, water and mineral fines. Compare to the reference of ammonium chloride on page 14. As in soil S-1 ammonium chloride is masked in the spectrum.

Infrared Spectra of the Water Extracts of Control Soils (C2A, C1A)



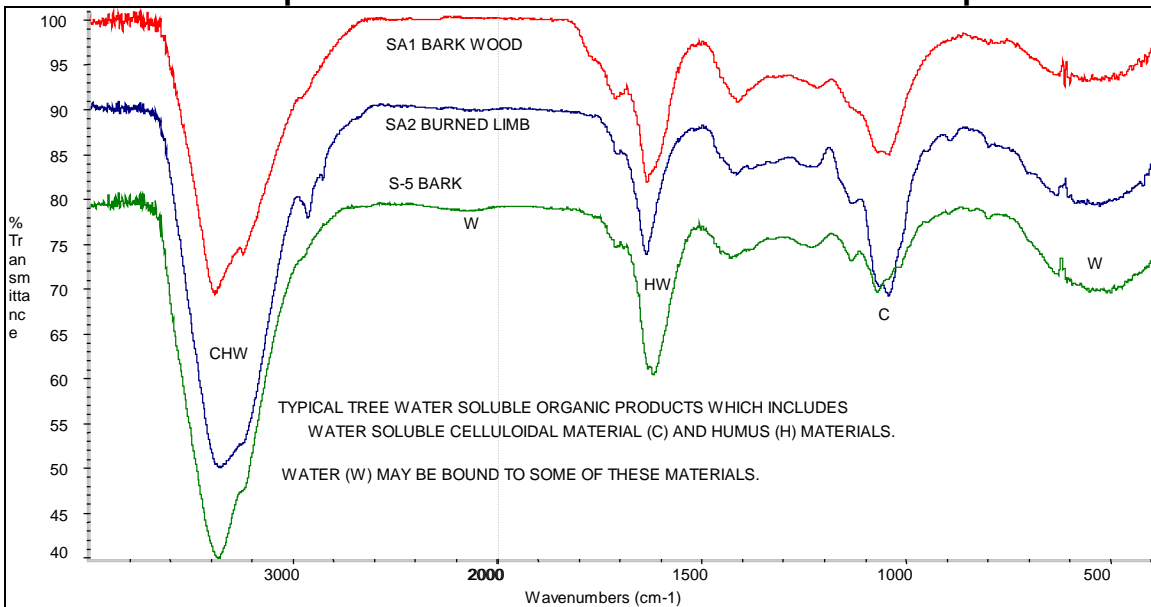
The following spectra of control soils C-1 and C-2 display calcium nitrate, water and mineral fines. See the reference of calcium nitrate on this page for comparison.

Infrared Spectra of the Water Extracts of Control Soils (C-1, C-2)



Infrared spectra of the water extracts from the wood samples detect no unusual materials. There is absorption typical of water-soluble products from wood which include some cellulosidal and humus materials. Water is indicated to be bound to these materials.

Infrared Spectra of Water Extracts from the Wood Samples



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