

Frontier Analysis, Ltd

TECHNICAL SERVICE RESPONSE NO.: UT061

Subject: Analysis of Privet Leaves and Soils Related to a Purported UFO Sighting in Levittown, PA (July 8, 2008)

Date: March 8, 2009

Requested By: Nancy Talbott
BLT Research

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Background/Objective:

The background of this event is reported in the September 2008 MUFON Journal and follows.

“Denise Murter was out in the yard with her dog at 4:10 AM on July 8, 2008. This was her fourth sighting since mid-April. She looked up in the sky and saw four lights this time, three on the front of the object that looked like two eyes and a nose and were as bright as headlights, and a pink colored light toward the rear of the object. The craft emitted a blue fog out of what appeared to be the rear; the fog contained silver flakes which fell through two trees, filtering down through the trees until they hovered about three feet off the ground. After a while the silver flakes went back up to the object. The witness observed the whole encounter for 40 minutes this time. A robin which had lived in one of the affected trees for four months was found dead on the patio the next morning.” (*F.I. Bob Gardner*)

The object is to determine if there are any anomalies in the leaf and soil samples exposed to the fog/silver flakes.

Conclusions:

- There was a slight elevation in boron content in the exposed leaves compared to control leaves. It is unknown if this is related to the UFO. There are a number of sources, which release borates/boric acid in the air (and eventually deposits on leaves/soil). Some include: release through evaporation from the seas; mining operations; glass and ceramics manufacturing; application of fertilizers and herbicides; and from coal-fired power plants. The borates do not remain in

the atmosphere at significant levels and return to the land during rainfall. These sources and others should be investigated.

- A 300-400 micron flake found on an exposed leaf fluoresced under UV light and was thought to be related to the silver flakes, which fell through trough the trees. The analysis identified it as bird urine.
- No unusual anomalies were detected between the control and affected soils.
- Unfortunately, investigators collected most of the samples 21 days after the event. Additional leaves were collected even later (ca. 2 weeks after the first leaves). It is highly possible any anomalies were gone by the time of collection due to weathering and/or other effects.

Procedure: Samples were submitted with the following information:

Leaves

(Samples received 8/25/2008 by Frontier Analysis)

- UFO affected privet tree leaves, they were sampled 7/26/2008, which was 21 days after the event. They were received in a pint-canning jar.
- Control privet tree leaves, they were sampled 7/26/2008, which was 21 days after the event. They were received in a pint-canning jar.

(Samples Received 10/4/2008 by Frontier Analysis)

- UFO affected privet tree leaves; they were sampled a few weeks after 7/26/2008, which was probably at least 45 days after the event. They were received in a plastic bag.
- Control privet tree leaves, they were sampled a few weeks after 7/26/2008, which is estimated to be at least 45 days after the event. They were received in a plastic bag.

All leaf samples were submitted by Nick Reiter to Brookside Laboratories for ICP elemental analysis.

FT-IR spectra were obtained by Frontier Analysis from the front and back of the leaf samples 21 days after the event. Additionally, these same leaves were extracted with distilled water. The extracts were also examined by infrared spectroscopy. The leaves sample ca. 45 days after the event were not examined.

A 400 by 500 micron flake was isolated by Nick Reiter from the "21 day leaves". He noted it fluoresced under a UV light. He obtained SEM/EDS data from the

flake. Also, XPS (X-ray Photoelectron Spectroscopy) was done by another laboratory. This was followed by FT-IR analysis by Frontier Analysis.

Soils

(Samples Received 10/4/2008 by Frontier Analysis)

- UFO affected soil. The soil was sampled 7/26/2008, which like the leaves, was 21 days after the event. The soil was received in a pint-canning jar.
- Control soil. The soil was sampled 7/26/2008, which like the leaves, was 21 days after the event. The soil was received in a pint-canning jar.

The soils were submitted by Nick Reiter to Brookside Laboratories for ICP elemental analysis. Infrared analysis was done by Frontier Analysis on water extracts of the soils.

Results:

The results of the individual tests done on the samples follow. These results are summarized in the conclusions section on pages one and two of this report.

Leaves Analysis

ICP Analysis:¹ Nick Reiter reports the ICP elemental analysis from the Brookside Laboratory shows the affected leaves taken two weeks after the event appeared to be depleted in several minerals (potassium (K), calcium (Ca), magnesium (Mg), sulfur (S)), but had about double the content of boron (B) compared to the control leaves. The new leaf sets - taken a few weeks after the first sets - still show heavy boron for sparkle, and less for control. However the calcium difference, which was high in the first set, has now subsided. This might mean the calcium depletion was indeed a "transient" effect. In summation, boron seems like the main oddity. It is unknown what this all means. Following is the elemental analysis:

¹ Inductively Coupled Plasma emission spectroscopy (ICP) is an analysis system in which the energy of a plasma excites the atoms of an injected sample causing the excited atoms to emit light at signature wavelengths. Three-dimensional computer-generated images are used to interpret the results. (Qualitative and quantitative information of the elements is obtained.)

ICP Elemental Analysis

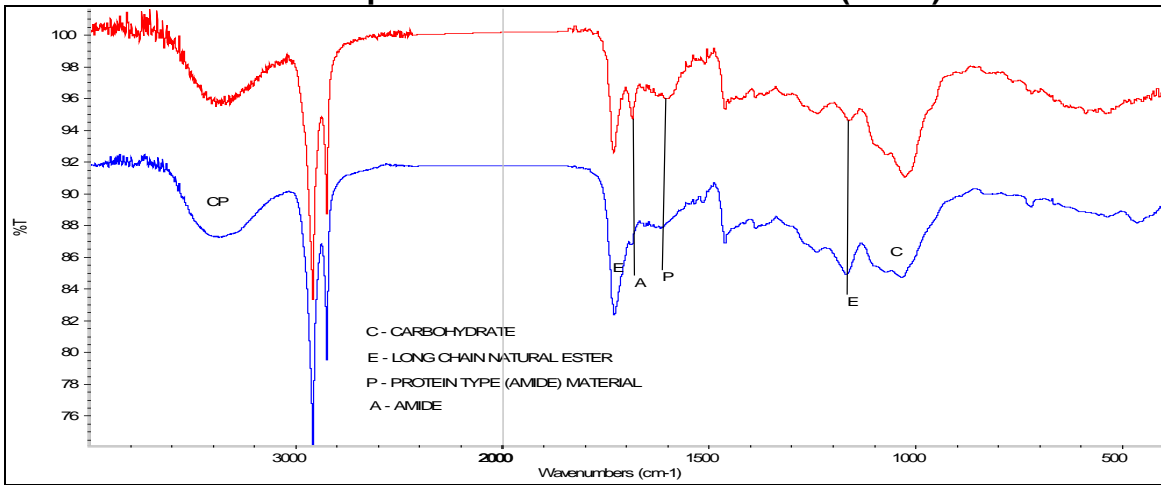
	Control Leaves #1	Control Leaves #2 (T+2 weeks)	Affected Leaves #1	Affected Leaves #2 (T+2 weeks)
(Values in %)				
Nitrogen	2.06	1.98	2.16	2.46
Phosphorus	0.225	0.256	0.23	0.335
Potassium	1.69	1.15	1.22	1.49
Calcium	2.27	2.91	1.43	1.74
Magnesium	0.425	0.483	0.234	0.337
Sulfur	0.331	0.359	0.275	0.377
(Values in ppm)				
Boron	21.3	15.9	44.5	78.8
Iron	179.1	129.2	147.6	196.5
Manganese	119.4	137.5	131.7	154.9
Copper	17.8	8	19.4	10
Zinc	64.1	66.1	77.8	81.9
Aluminum	110.5	103.8	105.6	126.8

FT-IR Analysis:² Comparison of several infrared spectra of the front and backs of the control and affected leaves sampled two weeks after the event show no anomalies.³ The spectra are all similar and show typical components such as: carbohydrate, protein amide, another amide, and a natural ester. These components vary quantitatively in composition. The spectra compare to that of a dead tree seedpod reference. It should be noted that these leaves were sampled 21 days after the event and received by this laboratory 47 days after the event. They were brown and crumbly. It is highly possible that any unusual components were gone due to weathering. The spectra follow with pertinent peaks labeled. Following are the privet leaves spectra, along with a dead tree pod reference for comparison.

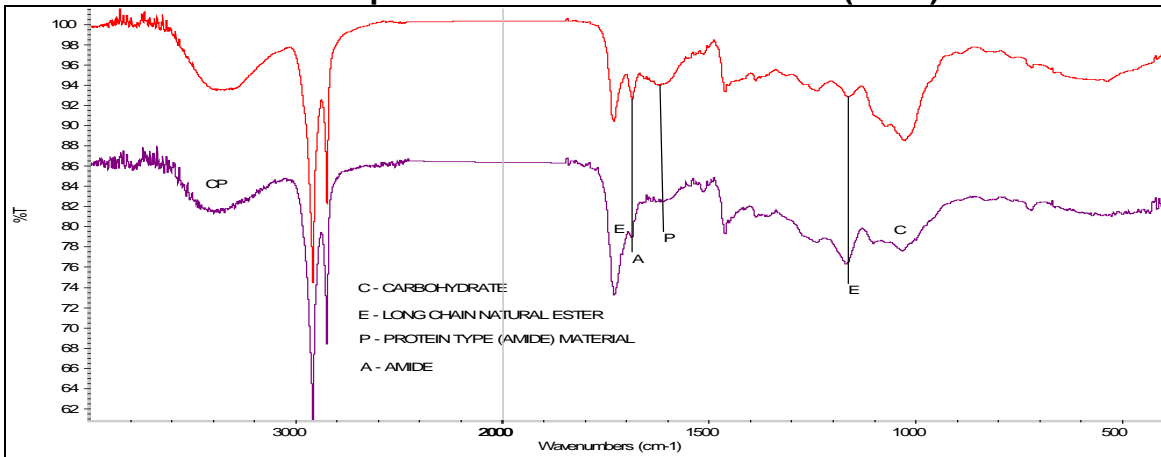
² **FT-IR (Fourier Transform Infrared Spectroscopy):** Infrared spectroscopy is used for the molecular structure identification and quantification of solids, liquids, and gases. An infrared spectrum is the result of light (in the 2 to 25 micron wavelength range) interacting with the vibrations of molecules.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

³ Leaf samples taken two weeks after the original leaves were sampled were not examined.

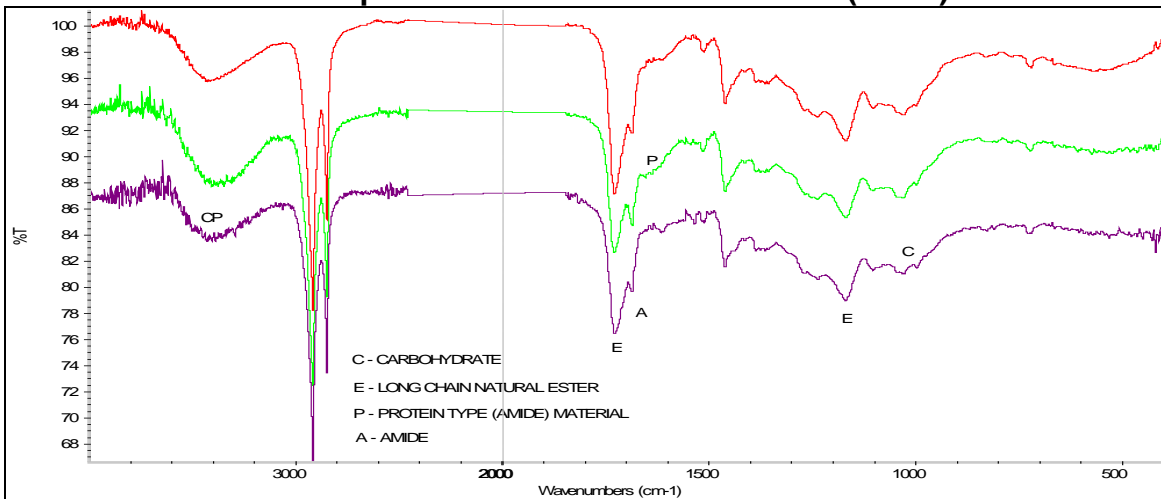
Infrared Spectra of Control Privit Leaves (Front)



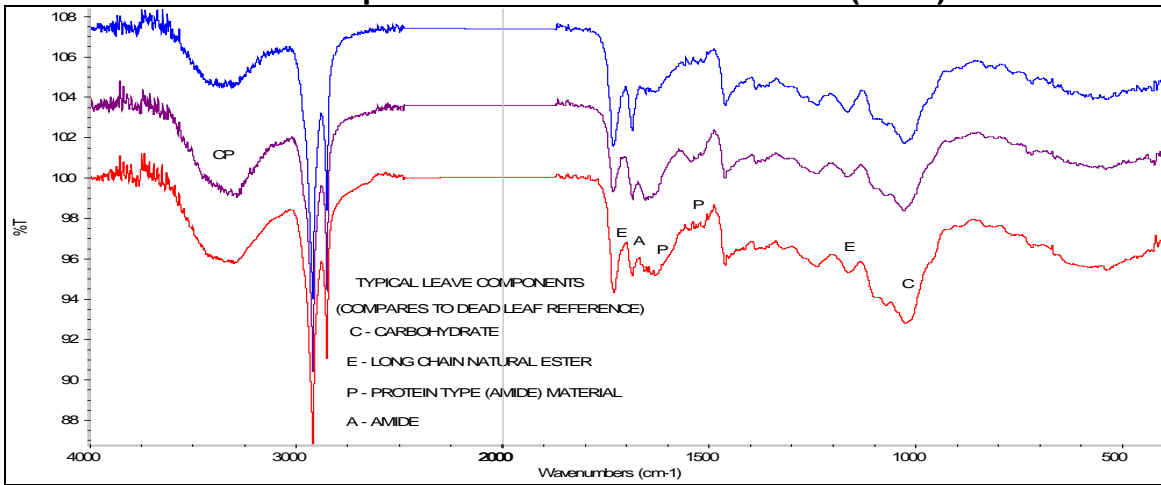
Infrared Spectra of Control Privit Leaves (Back)



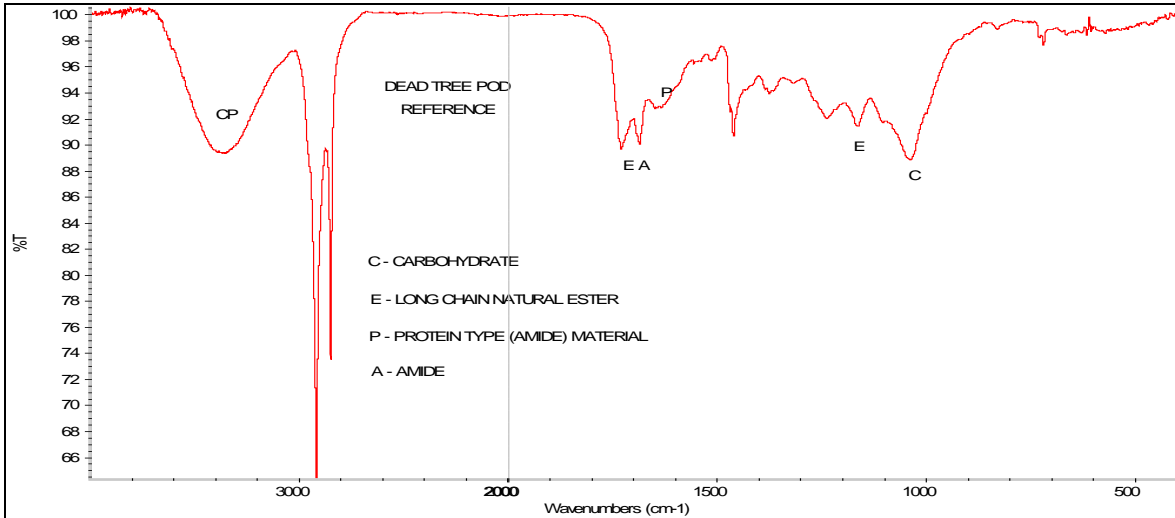
Infrared Spectra of Affected Privit Leaves (Front)



Infrared Spectra of Affected Privit Leaves (Back)

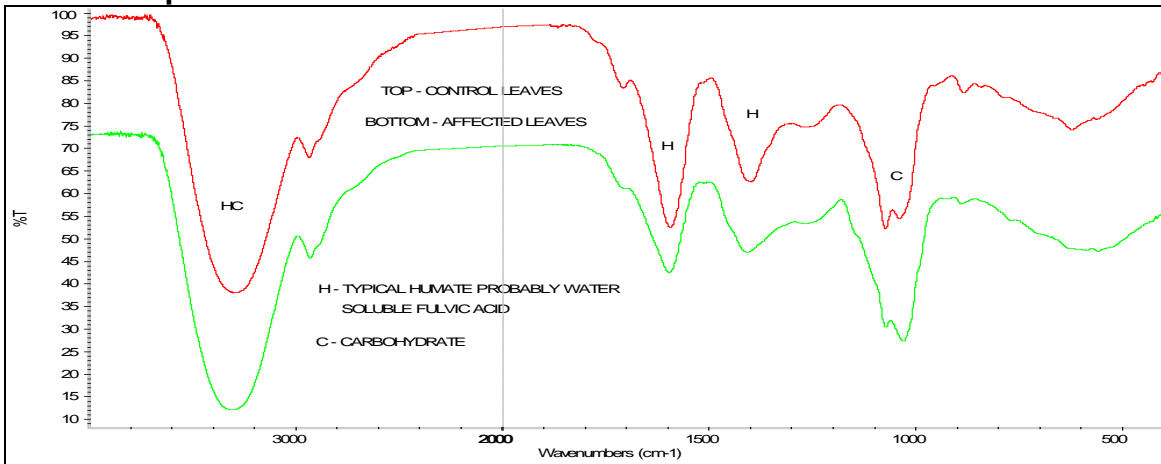


Infrared Reference of Tree Pod

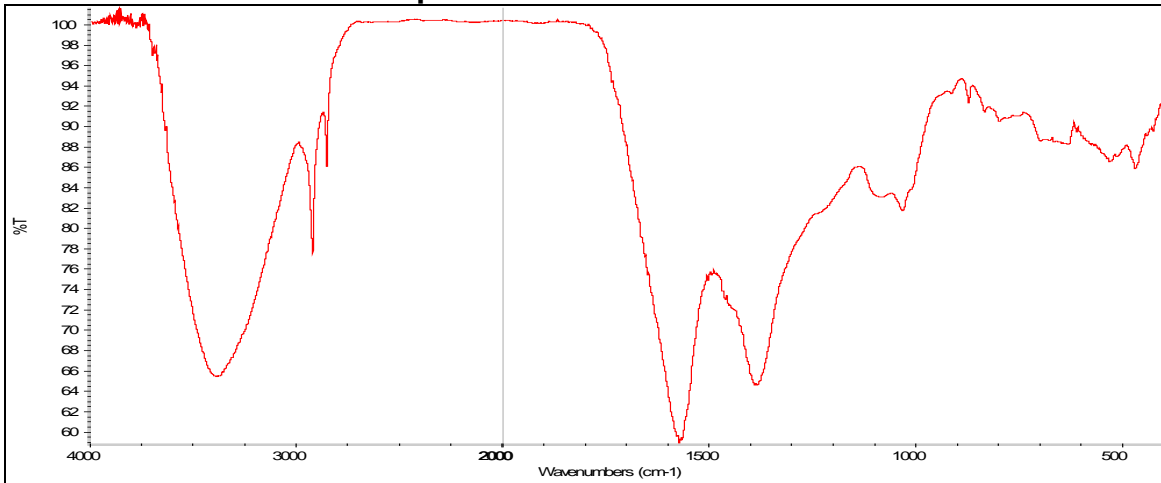


Water Extracts: The extracts for the control and affected leaves are almost identical, showing they contain the same materials. These consist of humate (which because they are water soluble is probably fulvic acid) and some carbohydrate. No anomaly is detected in the affected leaf extract. Following are the infrared spectra of the extracts. After these spectra is a reference of humic acid for comparison.

Infrared Spectra of Water Extracts from Affected and Control Privet Leaves



Infrared Reference Spectrum of the Sodium Salt of Humic Acid



Flake Analysis

A concerted effort was made to identify a microscopic-size (ca. 400 microns by 500 microns) white flake found on an affected leaf with the thought that it may have been related to the UFO "silver flakes". It was found and observed by Nick Reiter. Nick thought it to be quite unusual due to the fact that it fluoresced brightly green under long wave (ca. 530 nm) UV light. Nick obtained SEM/EDS data, and then passed the sample to me. First I sent it to another laboratory for both XPS analysis and microscopic FT-IR analysis rather than analyze it myself. This was because I thought the flake was too small for my spectrometer to detect with my sampling accessories. The flake was crushed during sampling for the microscopic FT-IR analysis at the other laboratory. The analyst then took a spectrum of the wrong area. The crushing was fortunate, because the flake surface area now became large enough for me to successfully obtain a FT-IR spectrum. Following are the results for each test.

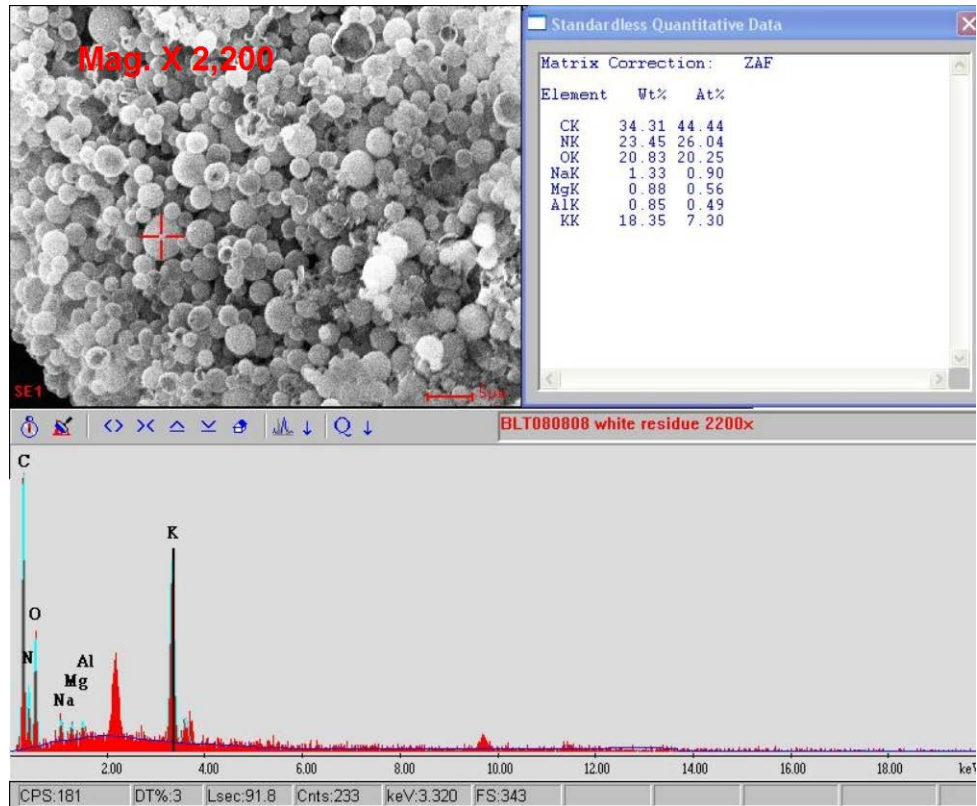
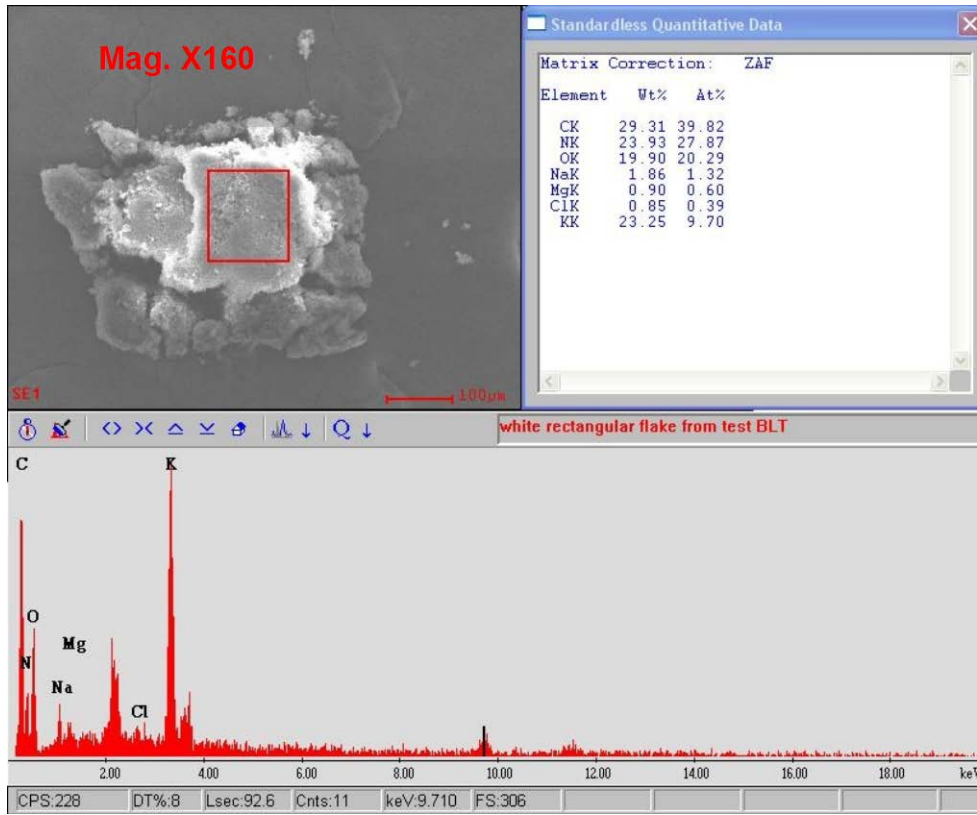
SEM/EDS:⁴ It is fitting that the SEM/EDS results are presented first. These report Nick Reiter's first observations of the white flakes. Following are his comments (edited).

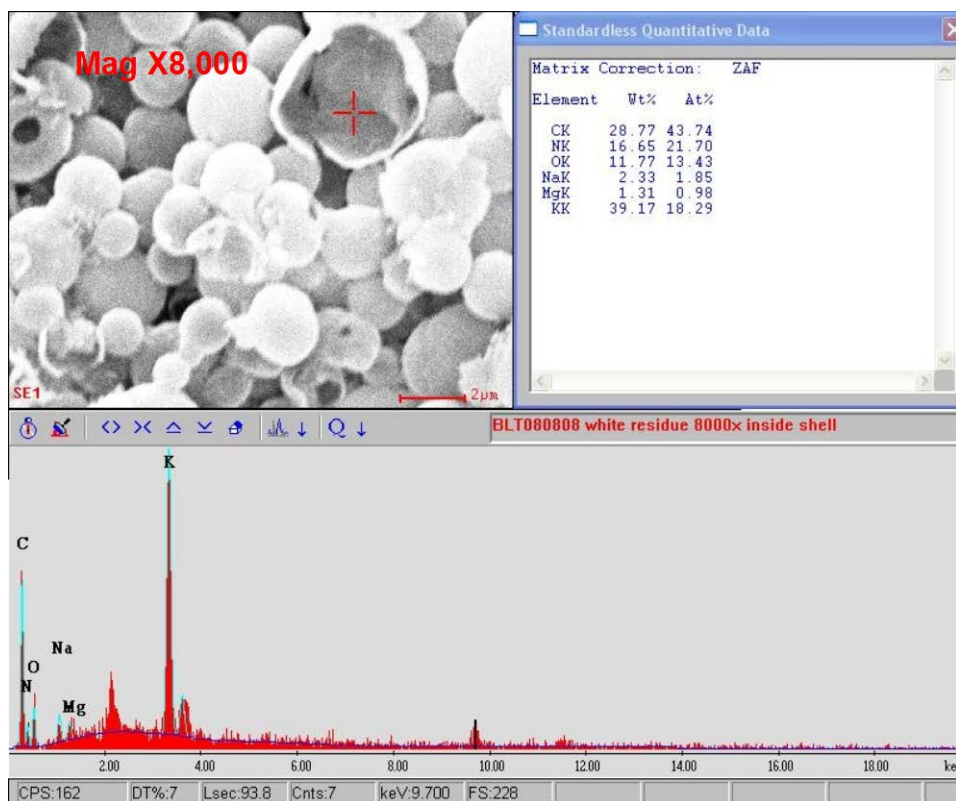
"When I looked through the two sets of leaves, in the "affected" set, I found, by close visual inspection, a few very small white flakes that seemed to be differentiated from clumps of pollen or buff colored dust. I did not find any in the control set, however, it's not as though the affected set was covered in them or anything like that. I certainly am not stating they are necessarily anomalous, because my knowledge of leaf "crud" is so limited. I used a strong black light, long wave UV lamp (ca. 530 nm) to see if anything on the leaves would fluoresce. (When concentrated, chlorophyll will fluoresce a brilliant crimson color in long wave UV.)" I found the little white flakes... which truly were maybe 200 to 300 microns across... fluoresced a vivid green. I found a couple of them in the bag by this method. They were deucedly hard to isolate and get onto an SEM stub. I was really only able to give a good look at three of them.

The flakes, at about 1500x, resolve into some micron sized features - little plate crystals, needles, a broken eggshell or reticulated matrix, and piles of tiny hollow spheres. (The spheres were ca. one to two microns in diameter.) EDS showed all of this to be similar in composition - carbon, oxygen, nitrogen (as one would suspect if organic) but also very considerable potassium content, with hints of magnesium and chlorine. I would say it is probably safe to consider it to be a potassium compound of some sort, or very potassium rich organic that crystallizes in some interesting forms.

Following are the SEM microphotographs along with the EDS elemental analysis of the 400 by 500 micron flake in increasing magnification:

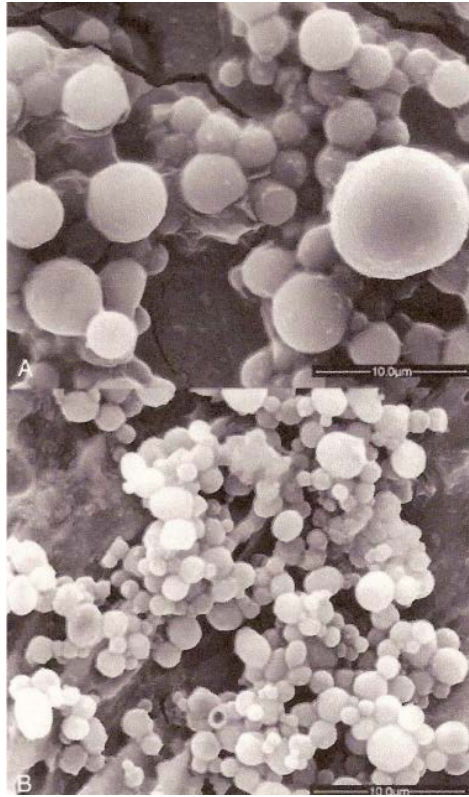
⁴ **SEM/EDX (Scanning Electron Microscopy/Energy Dispersive X-ray Spectroscopy):** This is an elemental identification using an energy dispersive X-ray (see EDX definition) system interfaced to a scanning electron microscope (see SEM definition). **SEM (Scanning Electron Microscopy):** Scanning Electron Microscopy (SEM) is a method for characterizing the topography and texture of rough or polished materials over a large magnification range (25 to 100,000x) while maintaining substantial depth of focus. A beam of electrons is systematically scanned in raster fashion across a sample. The result is a variety of electron-induced signals that provide a great deal of morphological, physical, and chemical information about a sample. These signals include secondary electrons, backscattered electrons, and characteristic X-rays. Secondary electrons form the signal primarily used to produce SEM images of the sample. **EDX (Energy Dispersive X-ray Spectroscopy):** XRF identifies elements and their semi-quantitative amounts. Samples are stimulated with X-rays which causes them to emit X-ray fluorescence radiation. This emitted radiation is resolved into a spectrum characteristic of each element.





Later FT-IR analysis positively identified the main component as uric acid, a component of bird urine. (See below.) A literature search on the bird urinary system also included a SEM photograph of bird urine.⁵ Indeed the photograph showed identical spheres. The article also says the spheres vary in size depending on the bird. Following are two SEM photographs from the publication for comparison to the above photographs.

⁵ http://people.eku.edu/ritchisong/bird_excretion.htm.



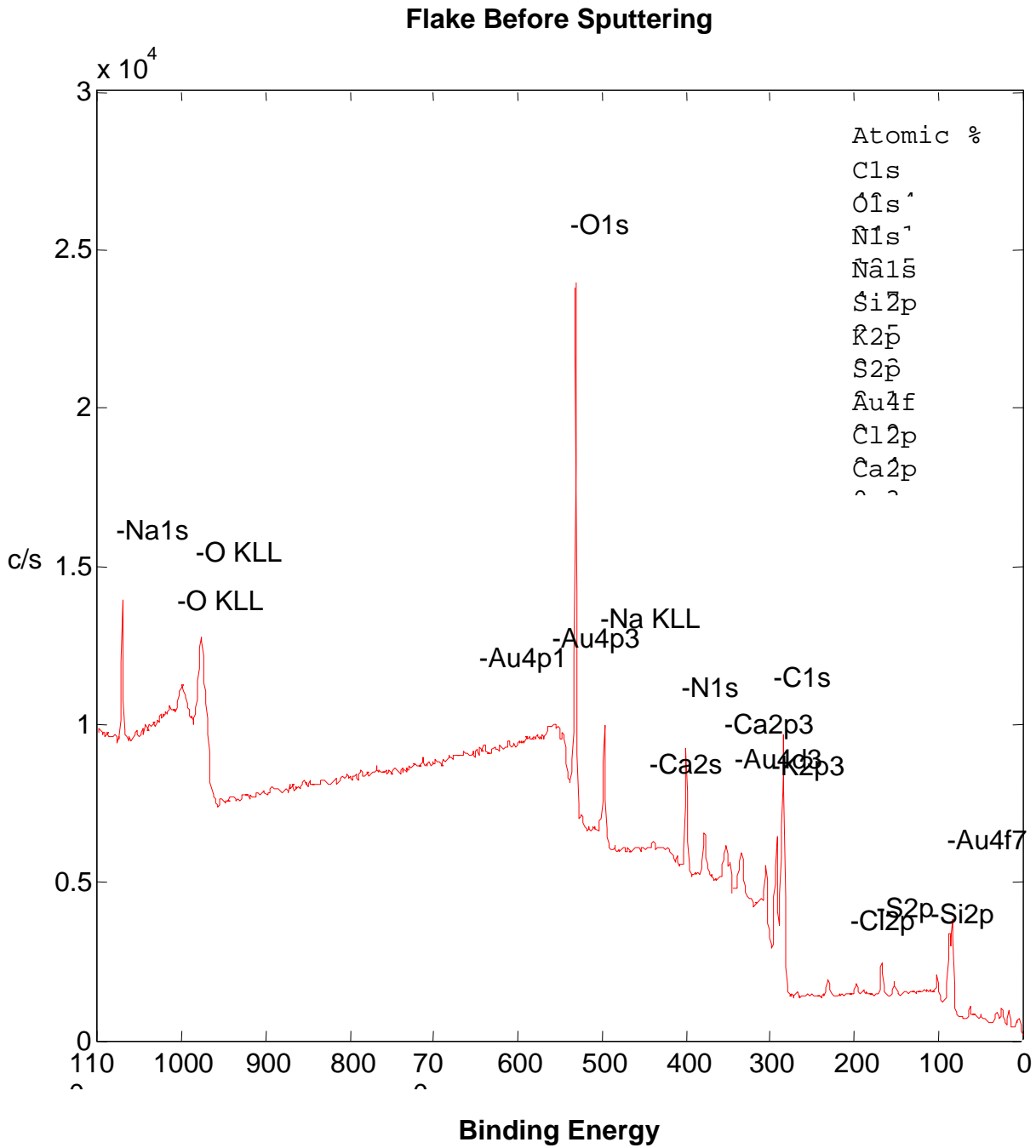
“Urine spheres” showing differences in size.
Top photo = domestic chicken; Bottom photo = wood Trush.
(From: Casotti and Braun 2004).

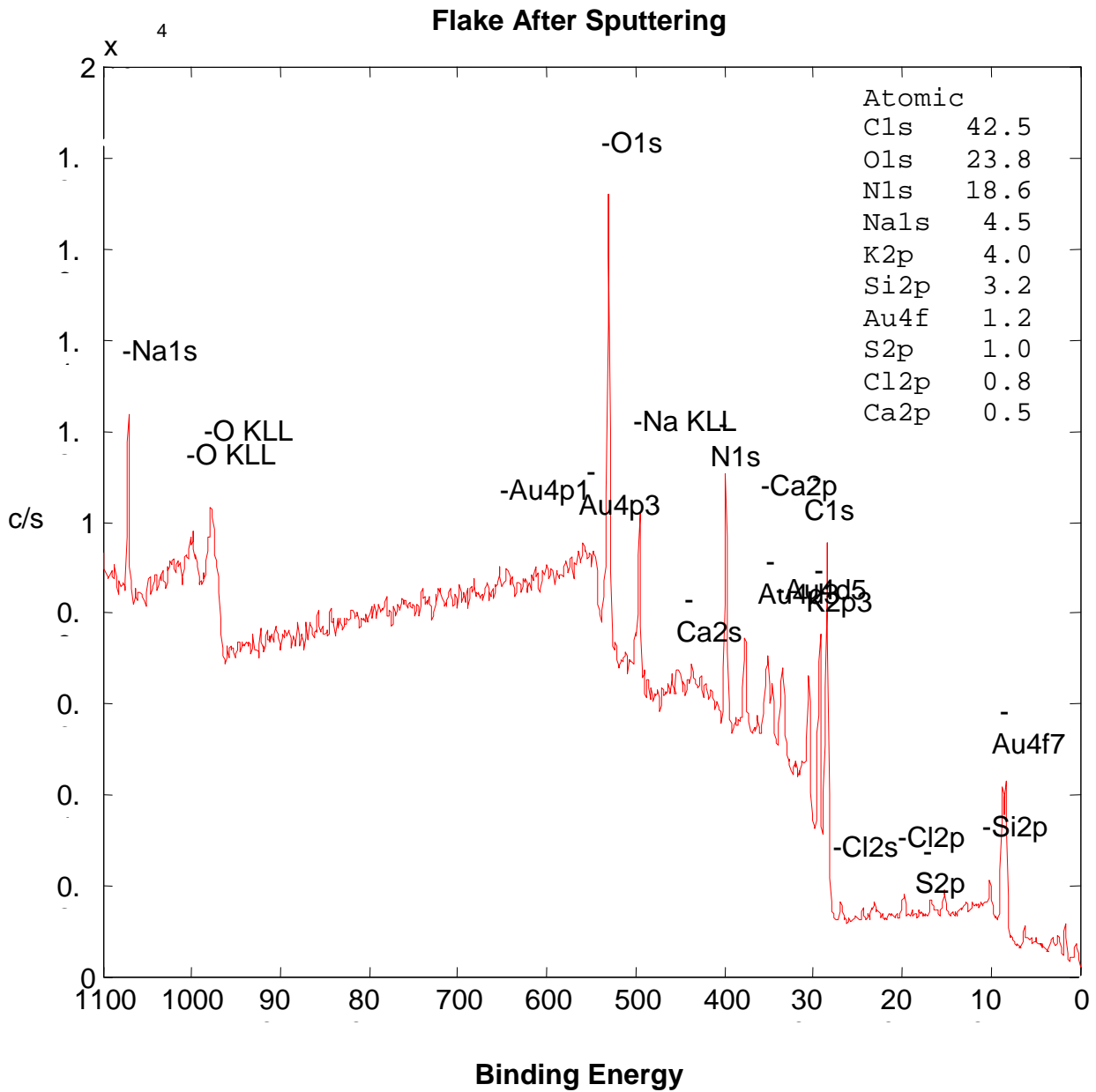
XPS:⁶ The particle had been crushed during an attempted FT-IR analysis at the same laboratory this XPS analysis was done. This exposed a white, salt-looking material, which is the part that was analyzed by XPS. This sample was analyzed using a PHI VersaProbe XPS, monochromated Al anode, 100µm spot size. Some residual gold was still found on the particle surfaces (from SEM/EDS analysis). A survey scan was taken first, followed by individual multiplex regions. The sample was then lightly sputtered and a new survey taken. (XPS analysis only looks at the top 30 Angstroms of a surface). Sputtering really isn't very effective on such a rough, uneven surface.

The analysis expectedly detected the same elements as Nick Reiter's EDS analysis. Carbon, oxygen and nitrogen are in significant amounts, and the XPS data additionally suggests that the carbon and nitrogen are present together.

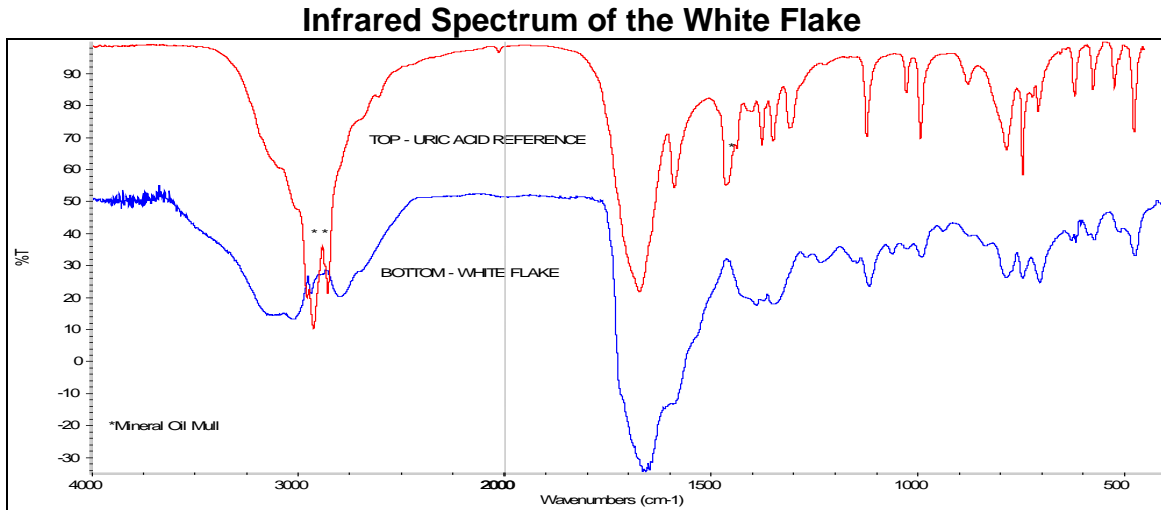
⁶ **XPS (X-ray Photoelectron Spectroscopy):** This is a surface analysis technique often used to map elemental distributions. The sample surface is illuminated by a beam of soft X-rays and the energy distribution of the ejected photoelectrons is observed. The spectrum both identifies the elements and provides information regarding their chemical state.

As shown below, infrared showed this is indeed true and this also includes oxygen. It also shows sodium (Na), silicon (Si), potassium (K), sulfur (S), gold (Au) (from SEM/EDS sample preparation), chlorine (Cl) and calcium (Ca). There were a lot of salts present. Two spectra, before and after sputtering follow.





FT-IR: An infrared spectrum was successfully obtained after the above analyses. The spectrum positively identified the flake as mostly uric acid. This is the main component of bird urine. Following is the spectrum, along with a reference of uric acid for comparison.



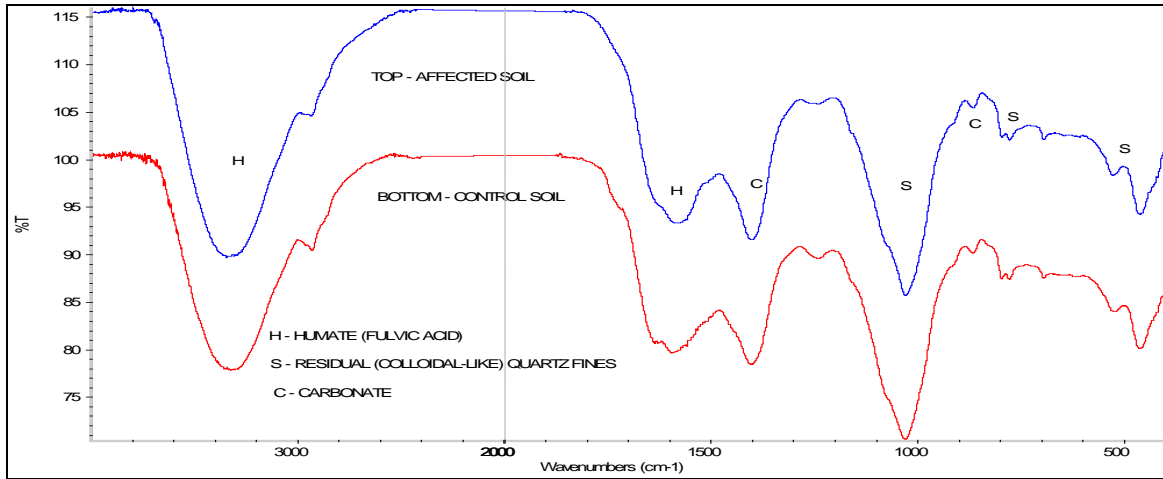
The Soil Analysis

ICP Analysis: Nick Reiter reports the ICP analysis from Brookside Laboratory shows no real difference in boron content in the soil samples (sparkle tree and control tree) taken at the same time as the original leaf sets were taken. The leaves did show a difference, so this would suggest the heavy boron in the sparkle tree was likely not a function of more boron in the soil at that tree.” The ICP analysis follows.

ICP Elemental Analysis

(All values in ppm)	Control Tree Soil (Sampled at T1)	Affected Tree Soil (Sampled at T1)
Sulfur	15	15
Phosphorus	121	98
Calcium	1205	1303
Potassium	197	188
Magnesium	309	156
Sodium	35	33
Boron	0.74	0.73
Iron	387	374
Manganese	131	161
Copper	3.51	4.54
Zinc	6.97	10.4
Aluminum	676	683

FT-IR Analysis: Infrared analysis was done for water extracts of the affected and control soils. No differences were noted in the spectra. Both contain a humate (fulvic acid), inorganic carbonate, and residual (colloidal-like) quartz fines. The latter is a common soil mineral. Following are the spectra with peak assignments.



File: UT061

Phyllis A. Budinger