Frontier Analysis, Ltd

**TECHNICAL SERVICE RESPONSE NO.: UT021**

**Subject:** Identification of a White Substance that Formed Rings in Fields after Plowing (New Pine Creek, Oregon)

**Date:** April 4, 2002

**Requested By:** W. L. Levengood
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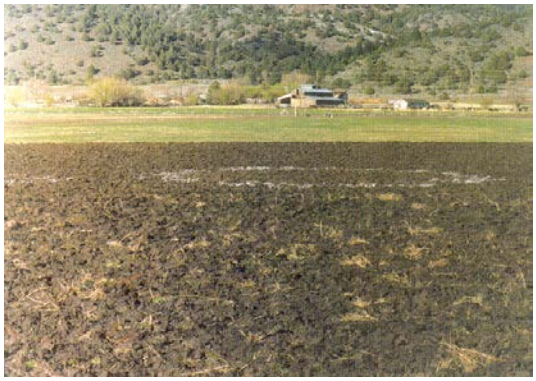
BLT Research

**Reported By:** P. A. Budinger
Analytical Scientist

**Background/Objective:** White circles have appeared in freshly plowed fields in New Pine Creek, Oregon. It was first seen during plowing in May of 1995. The white material in one field was sampled September 20, 1996. This is an area that purportedly has high UFO activity, though to this analyst's knowledge none were reported in conjunction with the appearance of the white circles. Yet, the circle formation is a mystery. The object of this analysis is to identify the white substance. Following are photographs of one of the sites. These were provided via Dr. Levengood and Nancy Talbott.

Veronica Butler

**Arial View of the Circles on a Freshly Plowed Field**



Veronica Butler

Veronica Butler

**Ground Level views of the Circles**

Veronica Butler

One of the sampled rings.

Veronica Butler

White material at edge of plowed area. Clumps and traces at 18” depth noted.

**More Ground Level Views with Close ups of the White Material**

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3-6” under the surface before brought up by plow.

**The White Material**

**Conclusions:**

1. The white material forming rings in the soil is positively identified as calcium oxalate.

2. There is a high probability that aged vegetation is the source of the calcium oxalate in the circles. It is noted that white calcium oxalate is common to many types of vegetation, e.g. damp aged mulch contains calcium oxalate. (See microphotograph and spectrum of calcium oxalate from mulch on pages 7 and 8.) However, the reason it is concentrating in the form of circles is unknown.

3. Calcium oxalate was found to be in significant amounts in the famous Delphos, Kansas event.[1] In this 1972 event a UFO was observed releasing a large quantity of material.

**Procedure:** The sample was submitted with the following information"

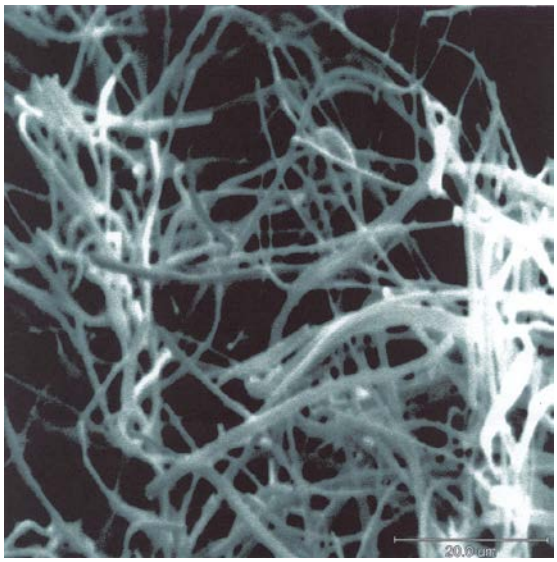
Sample: KS-03-139 - White material from a circle formed after a field was freshly plowed in 1996 (New Pine Creek, Oregon). Soil is also very obviously present in the sample. It was sampled September 20, 1996.

Small samples of white material were isolated from the field soil. Then infrared spectra were obtained using the Harrick SplitPea® cell on the Nicolet Avatar 360 spectrometer. Microscope photographs were obtained using the Leika GZ6 stereomicroscope interfaced to a Kodak Digital Science MDS 120 camera Additionally, SEM/EDS analysis was provided by Dr. Levengood. Nick Reiter did the analysis.

**Results:**

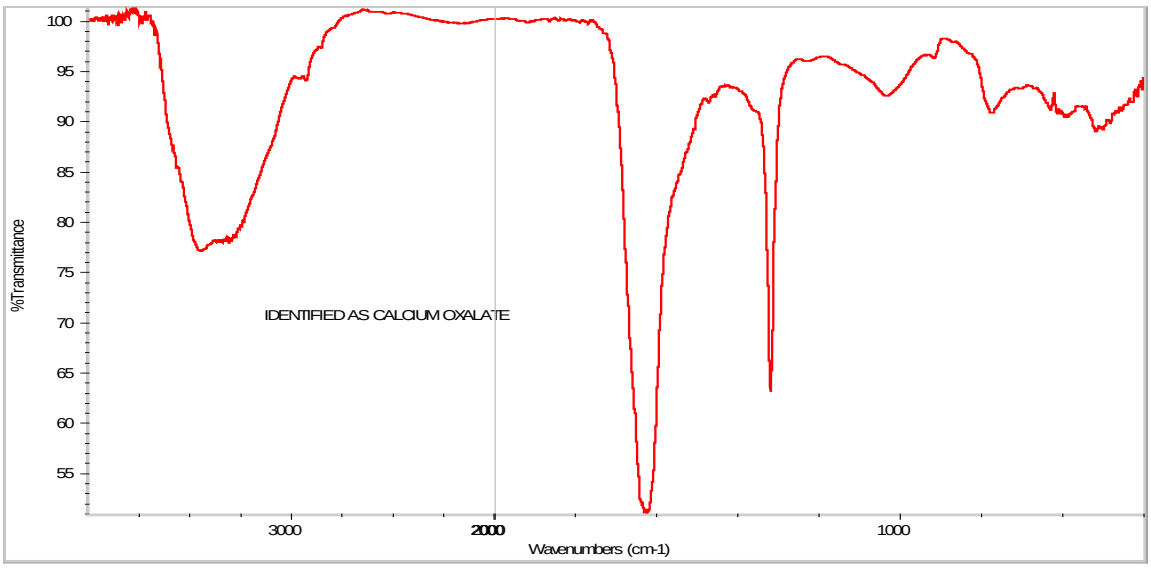
A SEM microscope high magnification photograph of the white material is described by Nick Reiter. " Under higher magnification, we find that the needle-like character of the white material dissolves, and we observe a very fine filament system, resembling hair roots. We are, however surprised by the dimensions of the individual filaments, many having diameters of 0.1 microns and lengths of between 5 and 20 microns. Very tiny indeed." The photograph follows.

[1] See TSR No. 001 published by this laboratory.

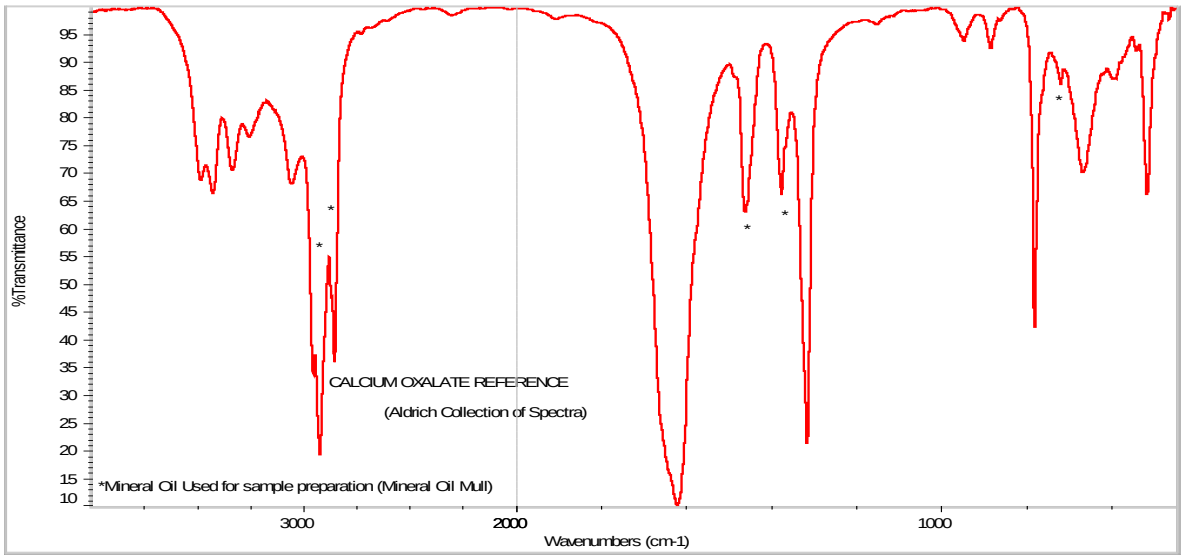


Nick Reiter

Infrared analysis of the isolated white material positively identifies it as calcium oxalate. No other components are detected. Following are spectra of the white material and a reference of calcium oxalate for comparison.



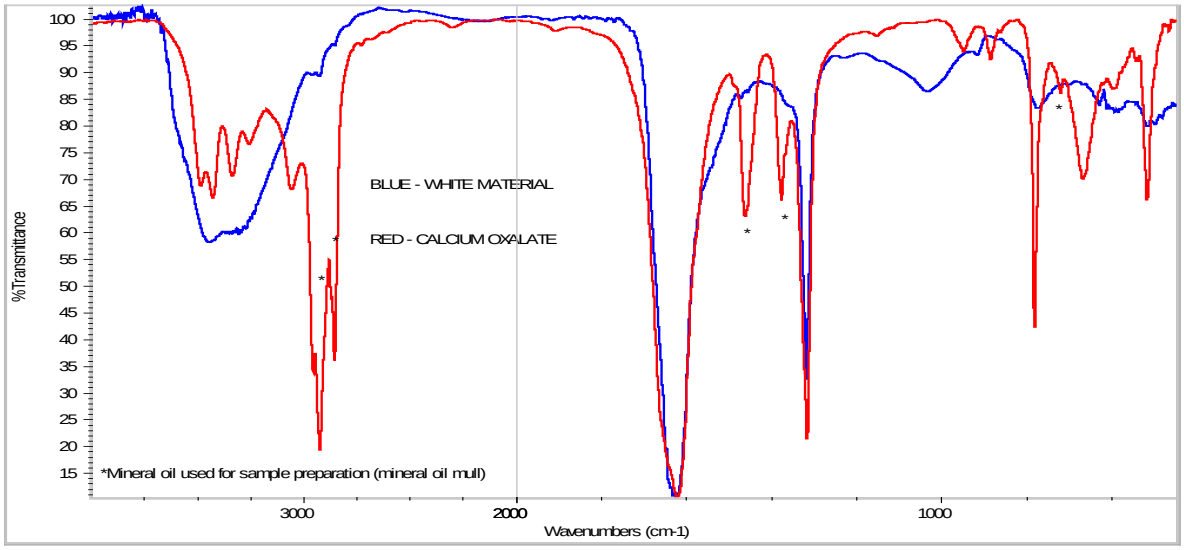

**Infrared Spectrum of the White Material**




**Reference Infrared Spectra of Calcium Oxalate**

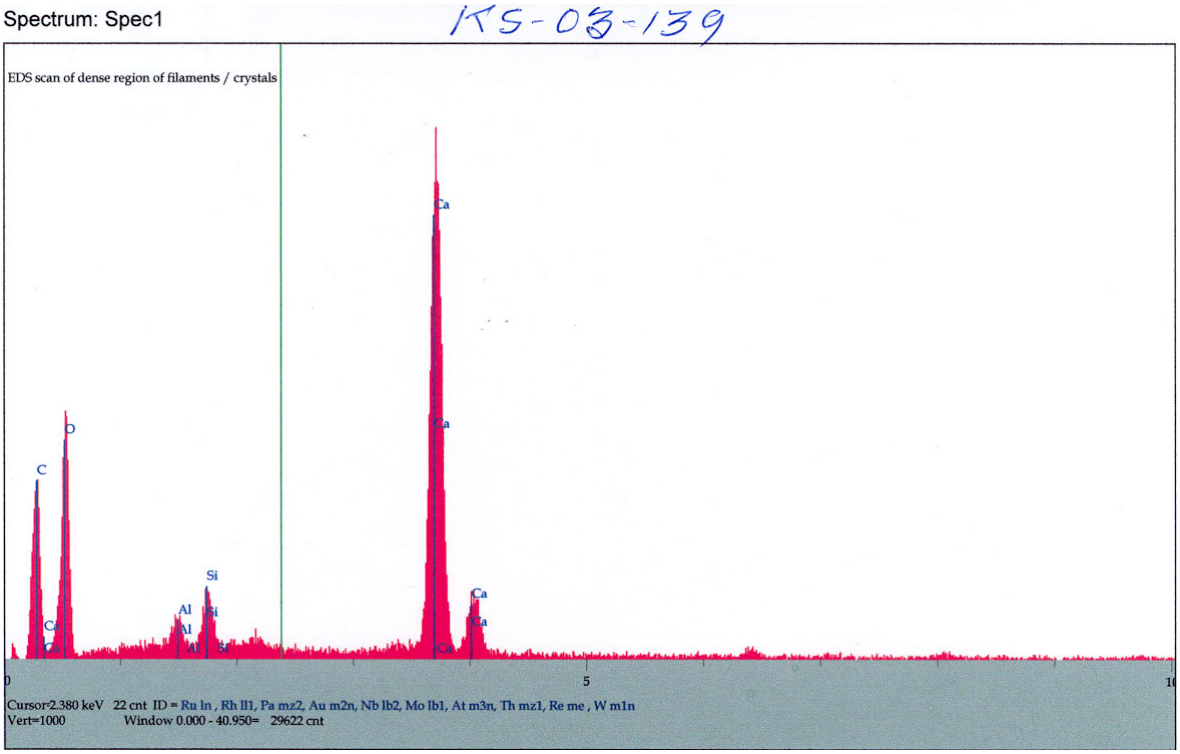
It should be noted that any spectral differences perceived between the spectra of the white material and calcium oxalate reference are due to the different sampling techniques used for spectroscopic examination, and the enhanced crystallinity of the reference material. The reference compound was scanned as a mineral oil mull, hence additional bands between 3000-2800 $cm^{-1}$ and at 1460, 1375, and 722 $cm^{-1}$. The reference calcium oxalate is also more crystalline as shown by sharper bands at 785 and 520 $cm^{-1}$ and splitting of the $H_2O$ absorption between 3700-3000 $cm^{-1}$. .

The spectra of the white material and calcium oxalate are superimposed to more clearly display the similarities.




**Infrared Spectra of White Material and Calcium Oxalate Reference**

The EDS elemental data show primarily calcium, carbon and oxygen. This is further confirmation of the infrared analysis identification of calcium oxalate. There are very small amounts of aluminum and silicon detected, suggesting some residual soil is present in the aliquot of material that was sampled for this analysis. Following is the EDS Spectrum.




There is a high probability that the source of the calcium oxalate may be from decaying vegetation. Many species of decayed vegetation do have calcium oxalate. Following is an excerpt from an article that can be found on the internet entitled "Oxalate and Its Biodegradation".[2]

> "…In the plant kingdom, enormous quantities of oxalate are often found in leaves of some plants and in fungi. Accumulation of oxalate by fungi, particularly in *Aspergillus, Penicillium* and *Mucor* species is of such an order that these fungi could be used for industrial fermentation for oxalate. Especially oxalic acid is often accumulated as a metabolic end-product in plant cells and in fungi, most often as calcium or magnesium oxalate crystals, or in soluble form (free acid or potassium salt). Several plant genera accumulate important amounts of oxalate crystals, e.g. several Cactaceae may accumulate up to 80-90 % of their total dry weight as calcium oxalate. On the death and decay of plants containing oxalate, the chelating properties imparted to the soil (sic.) will prove toxic and interfere with plant growth. Nevertheless, as oxalate does not seem to accumulate

[2] www.mu.edu.tr/private/nsahin2.html

significantly in soils and in the litter below oxalate-bearing plants, it can be postulated that it is rapidly catabolized aerobically by soil microorganisms…." It is speculated that, perhaps, aged vegetation is the source of the calcium oxalate in the circles.

For example, calcium oxalate is the white material noted in aged mulch which has been exposed to damp conditions. A microphotograph of the white material in damp aged mulch obtained by this laboratory follows. This photograph shows some residual mulch particles clinging to the white material. The white material itself is noted to attach itself to residual plant debris. Following is a microphotograph.

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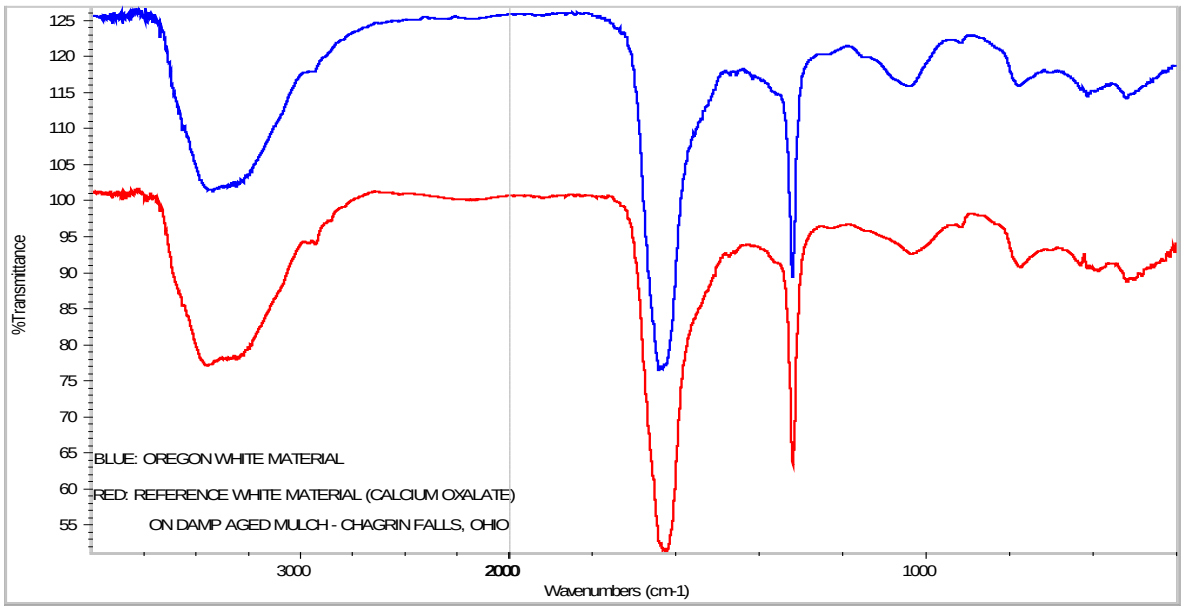
**White Material on Damp Aged Mulch**

An infrared spectrum of the reference mulch white material identifies it as calcium oxalate. In fact, this reference spectrum is a match to that of the Oregon white material. Spectra of the reference mulch calcium oxalate and the Oregon white material are reproduced on the same graph to demonstrate the match. They follow.

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Copies:

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