

Frontier Analysis, Ltd

TECHNICAL SERVICE RESPONSE NO.: UT070

Subject: Analysis of Samples from a Snow Formation (Holland, February 2, 2010)

Date: June 16, 2010

Requested By: Nancy Talbott
BLT Research

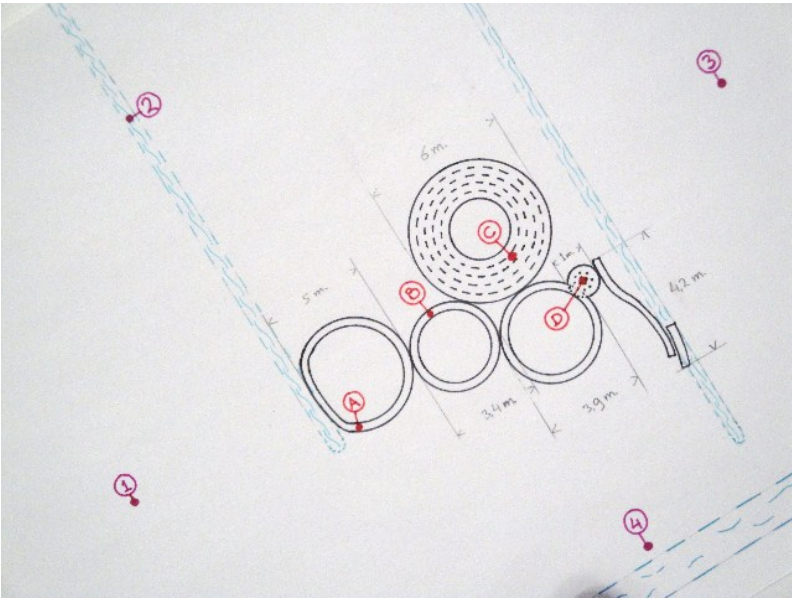
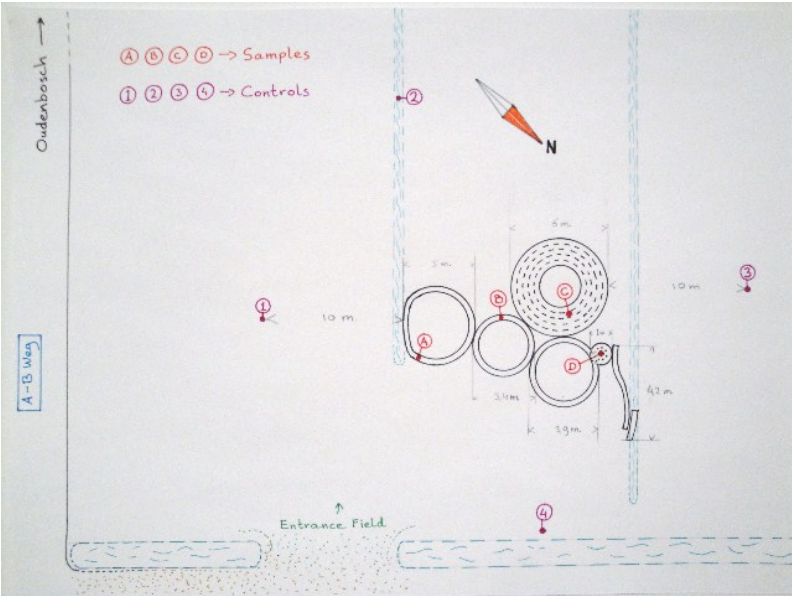
Reported By: P. A. Budinger
Analytical Scientist

Background/Objective:

Two formations in snow appeared in December 2009, one on December 19th and the other on December 22nd. (See <http://bltresearch.com/robbert/snow09.php>. Observations of them included:

- a.) No footprints were found in the rings or elsewhere in the field;
- b.) No marks of any kind in the centers of the circular rings;
- c.) Rings were created by removal of the top 4 inches of snow, but snow was not removed down to the surface of the soil.
- d.) No evidence of the snow that had been removed to create rings (where did it go?);
- e.) No evidence of icing in the rings (which would be expected if something had been used to melt the snow in the rings).

Another snow formation appeared on February 2, 2010. There was much less snow on the ground than in the above formations, and this one is also very “rough” looking, i.e. not as “geometric” or precise. And there are “scrape” marks, the same as appeared in the larger rings in the other two formations, as if somebody just dragged something around and around. There are no footprints anywhere in any of the rings, and even the slightest weight on the snow leaves a very clear mark. This time snow samples were collected for analysis. Following are diagrams of the formation with sampling locations, as well as photographs.





The objective of this analysis is to determine if there is any chemical signature which could indicate a substance placed on the field either prior to or following the discovery of the new snow formation.

Conclusions:

- pH measurements and amounts of residues from the snow control and formation snows are equivalent. Ph measurements amounted to 5.8 for all samples. This is normal for snow. Residues amount (on average) to 0.1 g/l for all samples.
- No anomalous material is obvious in the formation snow samples. All snow samples (both control and formation) contain similar components, which can be considered as originating from the environment and some contamination. While they are qualitatively similar, they quantitatively vary in amounts of components. The control samples contain environmental materials such as inorganic sulfate and nitrate, humate and carboxylic acid salt functionalities, which resemble sodium formate (though this structure is not confirmed), and some natural ester. A trace amount of poly(dimethylsiloxane) contamination is also detected. This may be from the containers. The formation snows contain environmental components such as humate, and carboxylic acid salt similar to sodium formate¹, and inorganic nitrate and sulfate.
- It should be noted that inorganic nitrates appear to predominate only in snow formation samples C and D. The two nitrates appear to be different. Spectral bands in C are most similar to sodium nitrate and those in D are closer to ammonium nitrate. It is unknown if this is significant.
- No snow melting components were found in the formation samples. Sodium formate is possibly present, though not confirmed, in both control and formation

¹ Sodium formate is not confirmed.

snows. This is used in deicing formulas. If present, it did not effect melting in the control snows.

Recommendations:

- Analysis of more snow formation samples should be done, especially on the more precise types as encountered on December 19 and 22 in 2009. Larger sample amounts are also recommended.
- Other laboratories should do additional testing. Test suggestions include: ion chromatography for anions, ICPMS and/or Atomic Absorption for elements.

Procedure:

The “snow” (as water) was received in canning jars (ca. 8oz) on March 5, 2010. They are identified as follows. (The sampling locations can be found on the formation diagrams.)

Formation snow samples: A, B, C, D.



Control snow samples: 1, 2, 3, 4



pH measurements were taken of all the samples using colorpHast® (pH between 4.0-7.0). Then, 10cc aliquots of each snow (water) sample were measured into evaporating dishes. The water was allowed to evaporate at lab ambient conditions. The weights of the residues were obtained. Then all the water was allowed to evaporate from the samples at ambient temperature. The remaining solids were

extracted with water. The water was removed from the extracts at slightly elevated temperature. Infrared spectra were acquired of all the residues and the water extracts on the Thermo Electron Avatar 360 spectrometer using the Smart Herrick diamond sampling accessory.

Results:

pH Measurements of All Samples

All samples (control and formation) have the same pH, which is 5.6. This is slightly on the acid side and is normal for rainwater.²

Residue Content of Water Aliquots from All Samples

The amounts of residues from 10 ml aliquots from the controls and formation samples are also essentially the same and calculate to be ca. 0.1g/l. The values indicate no significant difference in residues amounts between the control and formation samples. They are within standard of error ± 0.04 for the method. These values are found in the following table.

Sample	(g/l)
Formation	
A	0.11
B	0.11
C	0.05
D	0.06
	Ave. 0.08 (0.1)
Control	
1	0.14
2	0.11
3	0.07
4	0.07
	Ave. 0.10 (0.1)

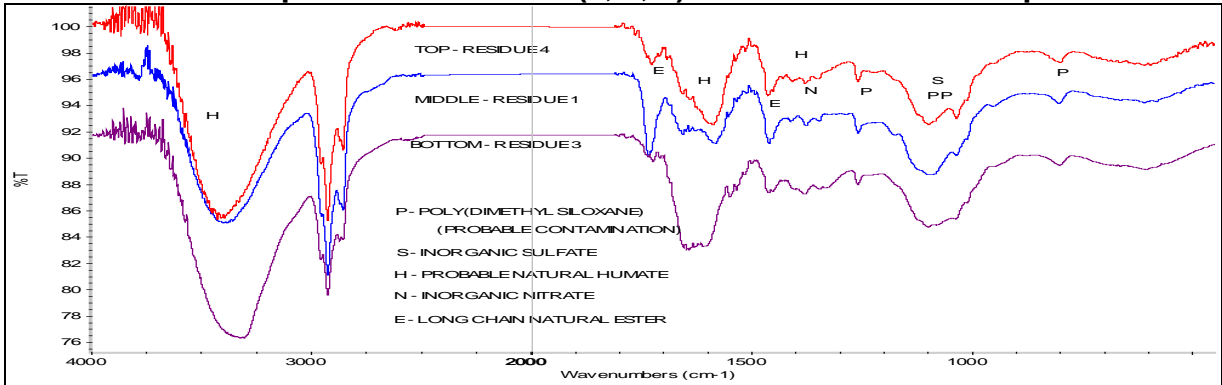
Infrared Analysis of Snow Control Samples

The residues from the aliquots of the control samples, after water removal, probably contain both insolubles (colloidal solids) and solubles. Infrared analysis indicates they all contain multiple components. Predominating the three residues (1, 3 and 4) are natural environmental products, which appear to be humic substances and inorganic sulfate, along with small amounts of inorganic nitrate and long chain natural esters. There is, expectedly, a small amount of contamination i.e.

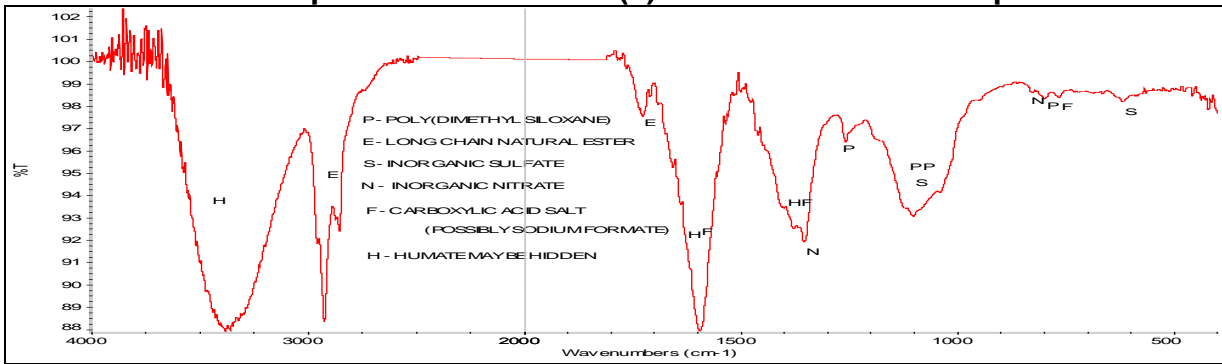
² <http://www.newton.dep.anl.gov/askasci/wea00342.htm>;
http://extension.usu.edu/files/publications/publication/NR_WQ_2005-19.pdf.

poly(dimethylsiloxane). This is a common contaminant found most everywhere and could possibly be from the container. The control 2 sample contains the same components, but in addition there is a predominant amount of a carboxylic acid salt which has spectral bands similar to sodium formate³. Following are the spectra.

Infrared Spectra of Residues (1, 3, 4) from the Control Samples

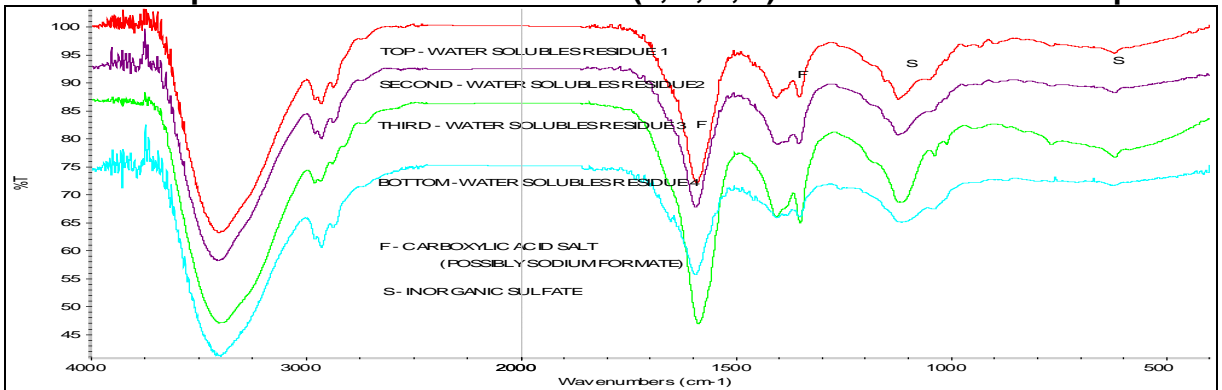


Infrared Spectrum of Residue (2) from the Control Samples



Infrared analysis of the water solubles from all the control samples (1, 2, 3, 4) are similar to each other. They show primarily carboxylic acid salt with bands similar to sodium formate. Also, some inorganic sulfate is indicated. The spectra follow.

Infrared Spectra of the Water Solubles (1, 2, 3, 4) from the Control Samples

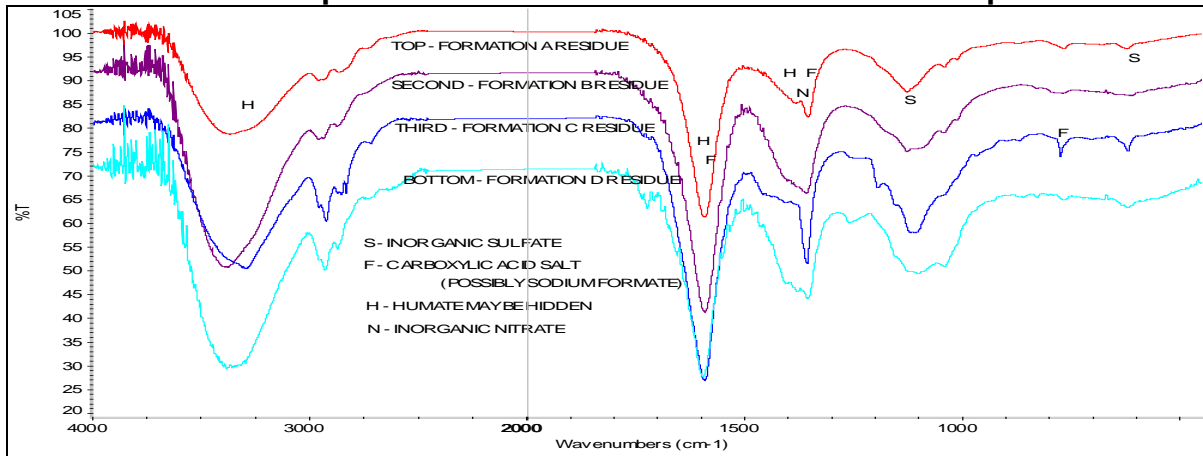


³ Ibid footnote 1.

Infrared Analysis of the Snow Formation Samples

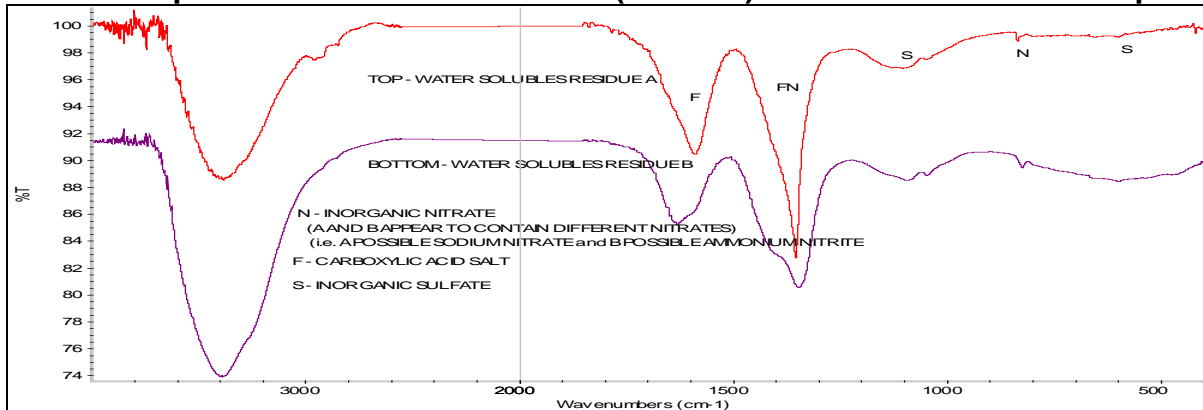
The 10ml water aliquots from the formation samples contain both insolubles and solubles, as do the control aliquots. Infrared examination of the residues from all formation samples shows they compare to each other and are also similar to the water solubles from the control samples. The spectra show carboxylic acid salt with bands similar to sodium formate, and a smaller amount of inorganic sulfate. The spectra follow.

Infrared Spectra of Residues from the Formation Samples

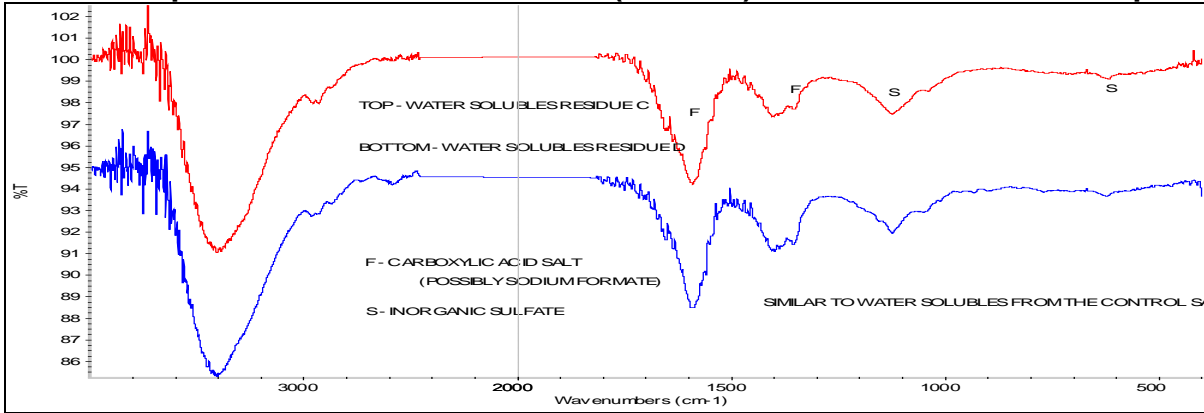


Infrared analysis shows the water solubles vary in the formation samples. The spectra of A and B are similar to each other, indicating inorganic nitrate and carboxylic acid salt(s), plus a small amount of inorganic sulfate. The nitrates appear to be different in these two samples. That is, A has nitrate bands similar to sodium nitrate, but B's bands are similar to ammonium nitrate. The spectra of C and D compare to each other, as well as the spectra of the formation residues, and the water solubles from the control samples. These spectra display mostly carboxylic acid salt, with bands similar to sodium formate, and a small amount of inorganic sulfate. The spectra follow.

Infrared Spectra of the Water Solubles (A and B) from the Formation Samples



Infrared Spectra of the Water Solubles (C and D) from the Formation Samples



File: UT070

Phyllis A. Budinger