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**LAW & COMPANY**  
*Consulting and Analytical Chemists*

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**Chemical Report**

03/25/97

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Mr. Dave McGarva

Bio-Tech

994 Blanding Blvd-Bldg. 118

Orange Park, Fl. 32065

Description: Microsolve

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**Project Overview**

This project was constructed to evaluate Microsolve in its efficiency towards bioremediating animal grease, vegetable grease and hair in an environment similar to a clogged drain pipe.

The project was set up using one gallon glass jars with a mixture of greases and hair as the contamination. The jars were placed on a paddle stirrer and allowed to stir once per day. Microsolve was dosed at the manufacturer's recommended dosing rate. The test was run in full light.

The samples were allowed to bioremediate for four months. The samples were then sieved with 3/4" and a 1/4" stacked sieves. The grease and hair was weighed then extracted to remove the grease and the residual hair was weighed. The breakdown of the remaining grease and hair was determined.

### Project Setup and Initiation

A synthetic grease clog was made from hair, vegetable grease and animal grease. The greases were mixed together and cooked at 360° F for two hours to remove any residual bactericides. The greases used were Crisco for the vegetable grease and lard for the animal grease. Two pounds of each grease was used. Hair was obtained from a local hair cutting establishment. To the grease, 125 grams of the hair was added. This was all mixed well and allowed to cool. Once cool, the mixture was semisolid and could be handled and sampled with ease.

Microsolve was set up to be analyzed in duplicate. A wide mouth clear glass jar was loaded with 50 grams of the hair/grease mixture. To the jar, three liters of dechlorinated water was added. Microsolve was then dosed according to the instructions on the product. A control was setup also in duplicate with 50 grams of the mixture and three liters of water. All jars were placed on a paddle stirred and were allowed to stir for thirty minutes.

The samples were stirred for fifteen minutes daily Monday through Friday. The jars were redosed as per manufacture's directions. When dosing occurred, the samples were allowed to stir for thirty minutes.

The samples were allowed to remediate at room temperature. The room which holds the stirring unit is not heated however, and the temperature of the samples dropped at times down to approximately 45° F.

## Results

The hair and grease residue upon the completion of the test is contained in the following table.

ID	Hair/Grease Residue (g)
Control A	48.57
Control B	48.62
Microsolve A	13.98
Microsolve B	13.84

The averages for the duplicates are in the following table.

ID	Average Hair/Grease Residue (g)
Control	48.60
Microsolve	13.91

The percent removal of the hair/grease mixture is as follows.

ID	Percent Removal of Hair/Grease
Control A	2.86
Control B	2.76
Microsolve A	72.04
Microsolve B	72.32

The average percent removal for the duplicates is as follows.

ID	Average Percent Removal of Hair/Grease
Control	2.81
Microsolve	72.18

The following table contains the breakdown by sieve size, by hair and by grease:

ID	Residual Grease/Hair (g)	Residual Hair (g)
Control A 3/4"	47.20	3.46
Control A 1/4"	1.37	0.27
Control B 3/4"	46.43	3.59
Control B 1/4"	2.19	0.32
Microsolve A 3/4"	5.47	1.43
Microsolve A 1/4"	8.51	2.15
Microsolve B 3/4"	3.11	1.26
Microsolve B 1/4"	10.73	2.54

## Discussion

The results of the bioremediation of vegetable grease, animal grease and hair show that Microsolve shows reduction. The control was reduced only by an average of 2.81% while Microsolve showed an average reduction of 72.18%.

Visual observations were also noted for the test. Both of the Microsolve samples became very turbid early in the testing and the color of the solution changed to a brownish yellow and remained that way through the duration of testing. The control showed little or no change in color or clarity. One would surmise that the turbidity and the color change that occurred in the samples, may be attributable to bacterial activity.

The testing was completed at room temperature. The room the test was run in however is not heated. This allowed the testing vessels to drop in temperature to approximately 40°F at times during the test period. The original length of the project was set at ninety days, but after some of these cooler temperatures were realized, the testing was allowed to continue for thirty days longer. The total length of bioremediation of the grease and hair was 120 days.

## Conclusions

The breakdown of grease and hair clogs in water drain systems should be accelerated by the use of Microsolve. By showing good reduction in the test, one would expect this information to be valid for a sanitary drain system.

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Respectfully Submitted,  
LAW & COMPANY

By: Thomas E. Larty



June 12, 1997

Mr. Dave McGarva  
Bio Tech Industries  
994 Blanding Boulevard, Suite 118  
Orange Park, Fl. 32065

Dear Dave,

After careful review of the Law & Company report concerning the project to evaluate the efficiency of Microsolve towards grease and hair, I have a few further insights into the conclusions. Microsolve definitely appears to reduce levels of grease even at temperatures as low as 45°F. This is an amazing feat since bacterial action decreases as the temperatures decreases. One would surmise then that at higher temperatures, around 60-80°F, Microsolve would promote bacterial destruction of grease at even a faster rate.

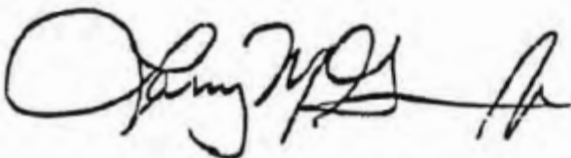
The turbidity that was observed in the testing is a sign of bacterial activity. The change in color and turbidity, then, is attributed to the greater bacterial action in the Microsolve tests.

The reduction of grease and hair by an average of 72.18% is very promising. However, if one realizes that the hair did not bioremediate, the reduction calculated from the report results is actually closer to 88.4%. This reduction is the grease removed compared to the original grease added to the system. The hair weights were subtracted out of both the starting material and the final residue weight.

Overall, this report has very promising results. An 88.4% removal of grease is outstanding. You must realize that the major problem in grease traps, lift stations, and wet wells is mainly animal and vegetable oils and greases, the laboratory bioremediation results will be seen in the actual field results from the use of Microsolve.

If you need any further assistance in this matter, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Larry M. Gwinn, Jr.", with a stylized flourish at the end.

Larry M. Gwinn, Jr.