



Herguth Laboratories, Inc.

LABORATORY ANALYSIS REPORT

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Herguth Project Number: #600891 Determine the effects of Boric Acid Diesel Fuel Treatment on microbiological growth

Dear Mr. Phelps

Thank you for your confidence in Herguth Laboratories, Inc. Please accept this report to the above numbered project/sample descriptions.

Conclusion: When mixed in the recommended proportions the subject "Boric Acid Diesel Fuel Additive" acts as an effective biocide under these test conditions.

Background: A sample of good clean diesel fuel was contaminated with 20% creek water containing moderate to heavy microbial contamination. The fuel and water mix was treated with ALT's Diesel Fuel Treatment and the microbial growth measured. The treatment killed all measurable bacteria.

Experiment: Herguth Laboratory Number 515341, diesel fuel supplied by nuclear power plant client for use in Emergency Diesel Generators and previously analyzed under Herguth's Nuclear Grade Quality Assurance Program, was selected as the candidate fuel. This fuel was analyzed for microbial growth using HL-1126, Liquid Cult Method, and found free from microbial contamination. This sample also met the specifications of ASTM D975 for #2 diesel fuel.

On 08/09/01 the sample was spiked with 20% of local creek water. Later the same day the sample was analyzed for the presence of living microbial growth. It was found to contain moderate to heavy microbial growth.





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Two method were employed:

Method 1. HL-1126, Microbial Growth

This method employees the use of the "Liquid-Cult" test kit. These kits are used specifically to detect microbial growth in hydrocarbons. A 5 mL portion of the fuel is injected into the test bottle, which contains the liquid agar, shaken vigorously and allowed to incubate for 30 hours for bacterial growth or 72 hours for fungal growth.

Method 2. HL-1161, HMB Biomass Culture Study

This is rapid method, which determines the biological activity of fluid within 15 minutes. It employees the use of strong oxidizing reagent full of rich nutrients. The sample is directly injected into this solution and oxygen is given off as an measured as pressure. The amount of oxygen released in directly proportional to the amount of biological activity present.

On 08/09/01 the contaminated sample was treated with the diesel fuel treatment containing boric acid in the amount of 1mL for every 1000 mL of fuel. Microbial growth was measured after 1 hour.

Sample Description	HMB III Reading			
	Date	Reading	Level	Liquid-Cult Reading (30 hrs)
515341 new fuel	8/9/11	0.0-0.1	Nil	Nil
ALT Fuel Treatment	8/9/11	0.0-0.1	Nil	Nil
Creek Water Contaminant	8/9/11	1.3	Moderate	Heavy
Diesel fuel with 20% Creek Water	8/9/11	1.2	Moderate	Heavy
Treated diesel fuel with 20% Creek water	8/9/11	0.2	Nil	Nil
Preliminary test				
514395 new fuel	7/6/11	0.0-0.1	Nil	Nil
Diesel fuel with 17% Creek Water	7/12/11	1.3	Moderate	Heavy
Treated diesel fuel with 17% Creek water	7/19/11	0.2	Nil	Nil

If you have any questions or comments, please feel to call.

Respectfully Submitted,

Dennis Kelley

CLS, Certified Lubrication Specialist

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