MILLSAPS COLLEGE

February 19, 2007

To: Boyd Eifling
Nature's Broom

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Subject: Environmental and economic considerations in sorbent selection

When cleaning up chemical or oil spills consumers must choose from sorbents made from organic, inorganic, or synthetic materials. Organic sorbents are readily found in nature and are derived from plants or animals. Inorganic sorbents are earth materials such as Fuller's earth (clay) or diatomaceous earth; synthetic sorbents which are composed of man made chemicals. Some of these sorbents have highly specialized applications while others can be used in a wide range of situations. The cost varies widely and the performance of each also varies with respect to the target fluid.

Historically, consumers often gave little consideration to the development and processing of materials required to bring a product to market, and even less regard to the fate of post-consumer waste. Attitudes are slowly changing and consumers are becoming more aware of their place and responsibility in economic and environmental consumerism. Every item brought to the marketplace has pre- and post-consumer environmental costs associated with the accepted economic value. The challenge to 21st century entrepreneurs is to promote products with the proper balance between environmental and economic costs and still remain competitive. You are among many 21st century businesses that recognize the value and importance of operating within the guidelines set by nature, not outside of them.

Nature's Broom Environmental Absorbent is a blend of agricultural and industrial byproducts which were previously treated as waste and sent to landfills for burial. The pre-consumer environmental cost of production then is limited to the fuel consumed to generate the power required for blending and packaging equipment. The cellulose based product presents a low health risk and the low particle density of facilitates shipping and handling.

Fuller's earth, a conventional inorganic sorbent product which has been used for decades without question, presents a very different scenario. Fuller's earth is composed of clays that are weathering products of rocks; the clay must be intentionally mined for end use. Once excavated from open pit mines, the excess moisture must be driven from the ore by heating the material in large rotation kilns fired by either natural gas or residual fuel oil. Once dry, the clay is crushed, sieved, sized, and bagged.

The pre-consumer environmental costs associated with clay or DE are considerable and include: 1) wildlife habitat destruction, 2) fossil fuel consumption during mining, 3) fossil fuel consumption during reclamation of the mine site, 4) significant fossil fuel required to operate kilns to dry the ore, and 5) power necessary to operate additional processing equipment. The occupational work place is heavily dust laden and must be monitored for airborne silica which is an inhalation health hazard. The relatively high density of the product increases shipping costs.

Waste generation is an inevitable consequence of using any of the above products. Once saturated, the Environmental Absorbent is 100% combustible and can be utilized as fuel in industry or safely transported to landfills for disposal. The Fuller's earth has no BTU value and must be disposed of in a landfill. Although I could not assign values to the above environmental costs, the differences outlined between the two products is considerable.

The Millsaps College Sorbent and Environmental Laboratory has been engaged in oil spill technology and standardization since 1988. Routine research includes the testing and development of oil spill and contaminant removal products. All testing utilizes protocols approved by the American Society for Testing and Materials (ASTM) and the Canadian General Standards Board (CGSB). I have been associated with the Millsaps Lab for 14 years. The data presented in Figure 1 displays the sorbency (amount of oil absorbed relative to the sorbent's dry weight) of Nature's Broom and Fuller earth in three fluids. The sorbency of Nature's Broom exceeds that of Fuller's earth in all three fluids.

Table 1 is provided to display the amount of each sorbent necessary to clean up a 2 gallon spill of 10W-30 motor oil, #2 diesel fuel, or antifreeze. Comparative test performance data between Nature's Broom and Fuller's earth indicates that between 2.7 to 4.8 times as much Fuller's earth is needed to clean up an equivalent spill.

Based on the considerable pre- and post-consumer environmental costs for mining and processing, and the overall low sorbency of Fuller's earth, it makes little sense economically or environmentally to continue use of the material as a sorbent.

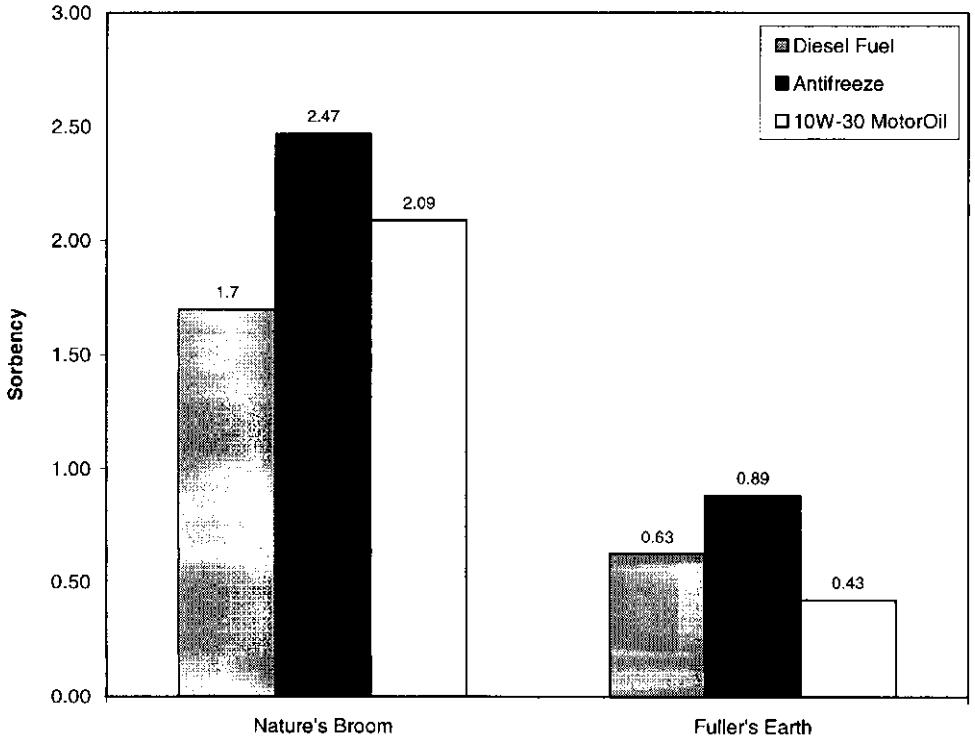

Figure 1. Sorbency of Nature's Broom and Fuller's earth in diesel fuel, motor oil, and antifreeze. Sorbency is calculated as the weight of fluid sorbed divided by the dry weight of the sorbent.

Sorbent Performance

	Nature's Broom	Fuller's Earth
Diesel Fuel	8.4	22.5
Motor Oil	6.8	33.0
Antifreeze	7.5	20.8

Table 1. Amount of sorbent (in pounds) required to clean up a two gallon spill based on experimental data.