



**FOREST AND WILDLIFE RESEARCH CENTER**  
**FOREST PRODUCTS DEPARTMENT**

**Examination of TACKL Concentrate, a biobased oil absorbent**

**SUBMITTED TO:**

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## Summary:

This project evaluated the oil absorbent properties of the bio based product TACKL Concentrate. The product was tested by exposing it to motor oil, hydraulic fluid, and water. Total petroleum hydrocarbons were measured and monitored to see what changes the bioproduct has on the content. The results of this test match the result in the previous examination.

## Materials and Methods:

One hundred grams of the product were measured into each of the nine brown baking glass dishes used for the test. Three of the nine dishes contained 60 grams of deionized water in addition to the absorbent as a control. Three of the nine dishes contained absorbent, one gram of used motor oil, and 60 grams of deionized water. The three remaining dishes contained absorbent, one gram of used hydraulic fluid, and 60 grams of deionized water. This yielded 60% moisture content for all samples and a 10,000 ppm petroleum concentration for both the hydraulic and the motor oil treatments. The 60% moisture content is optimum for bacterial growth in a matrix of this nature (Borazjani et al., 1997). Each sample was homogenized by hand mixing, and labeled for identification.

A 20 gram sample was taken from each dish for day 0 testing. Each dish was weighed and recorded to determine future moisture loss in the dishes. The moisture loss was adjusted to 60% with deionized water every three days. A 20 gram sample was pulled from each dish every three weeks during a nine week study. Samples were tested and analyzed for bacteria counts and TPH. A total petroleum hydrocarbon (TPH) test was determined on each sample pulled for testing.

TPH concentrations were measured by using the modified Standard Method 5520-F (Clesceri et al., 1989). Ten mL of methylene chloride will be added to a vial containing one gram of product. The mixture was vortexed for one minute and sonicated for 10 minutes. One mL of extract was plated into a test tube containing nine mL of methylene chloride and one gram of silica gel to remove fatty acids. The mixture will be vortexed for one minute. The solution was filtered through 10 grams of activated sodium sulfate into a pre-weighed flask containing boiling chips. The filter and sodium sulfate was rinsed with 20 mL of methylene chloride to remove residual petroleum hydrocarbons. Flasks containing the solution were placed into a boiling water bath to evaporate the methylene chloride. The flasks were allowed to cool and subsequently reweighed. The difference in the initial weight and the final weight of the flasks was attributed to TPH (Borazjani et al., 1997; ATSDR, 1999).

In order to estimate bacteria populations, nutrient agar media was made by adding 23 grams of nutrient agar to one L of deionized water. The solution was autoclaved at 120°C for 20 minutes then allowed to cool to 60°C. Seventeen mL of the media solution will be added to plates by a Wheaton Unispense II (Wheaton Instruments, Millville, New Jersey) and placed under a flow hood to solidify. Nutrient agar was amended with petroleum for bacteria acclimated to TPH. The agar plates were exposed to bacteria by using the dilution plate technique. One gram of each sample was added to autoclaved water tubes for dilution. Each sample was diluted and plated on two nutrient agar plates and two plates with TPH agar. Bacteria counts will be performed on the samples on day 0, week 3, week 6, and week 9. The plates were loaded into an incubator at 28°C for approximately 48 hours to allow the bacteria present in the sample to multiply. After multiplying, the bacteria colonies are easier to count. (Hogan and Smith, 1999)

## Results and Discussion:

TACKL Concentrate reduced the TPH levels by 74% over the nine week test period for motor oil and reduced hydraulic fluid by 59% over the same period. Figure 1 illustrates the reduction in TPH for both oils.

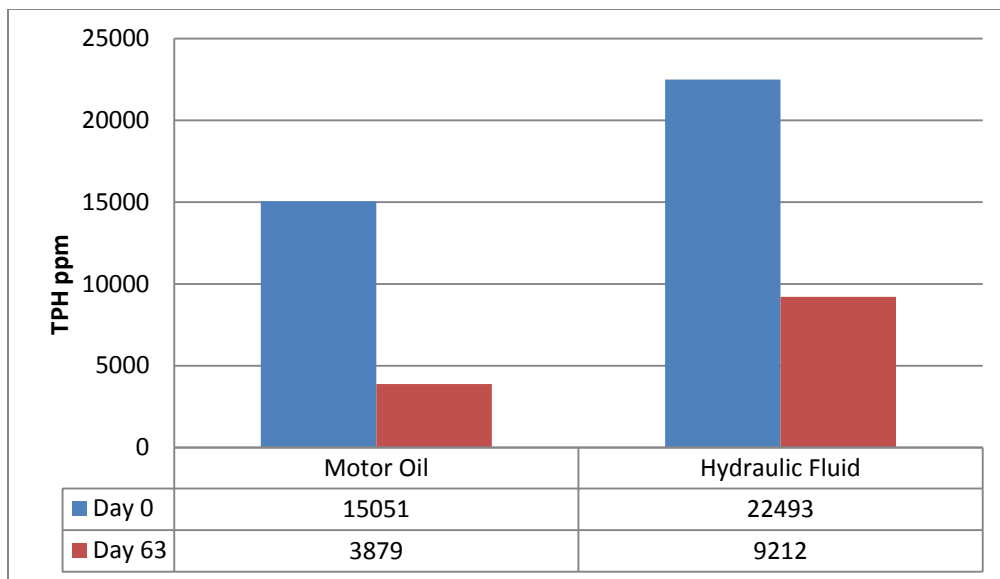


Figure 1. TPH levels measured at day 0 and day 63 for the two oils tested in this project.

Bacteria count yielded exponential growth throughout the nine week test. Figure 2 shows the increase in bacterial activity.

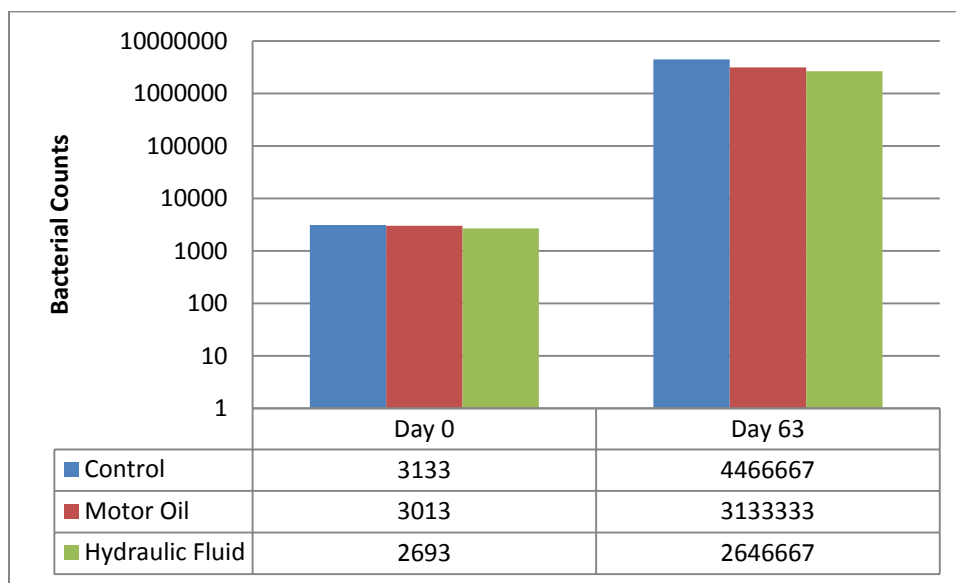


Figure 2. Bacterial counts for the nine week period for the products tested.

These results match results found earlier when the product was previously tested.

**References:**

Agency for Toxic Substances and Disease Registry. 1999. *Identify and Analysis of Total Petroleum Hydrocarbons*. Pp. 17-38.

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Clesceri, S., A.E. Greenberg, and Trussell. 1989 *Standar Methods for Examination of Water and Wastewater*. 17<sup>th</sup> Edition. American Public Health Association, Washington DC.

Hogan, J.S., and K.L. Smith. 1997. "Bacteria Counts in Sawdust Bedding." *Journal of Dairy Science* 0:1600-1605.