ON SITE
TECHNOLOGIES, LTD.

PRESSURE TEST REPORT

Test procedure API product Filtrate pressure test
On Site Technologies Limited

API FILTRATE PRESS:
Pressure Recorded: 50 psi, 80 psi, 100 psi

TEST MEDIA:
Diesel Fuel, Motor Oil 10W-40

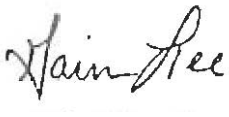
MATERIAL TEST:
New, lower moisture Sphag Sorb

The analysis of new, lower moisture Sphag Sorb and various Petroleum Products was conducted to measure the leaching characteristics of the new product at respective pressures and to compare these results to the original Sphag Sorb test. As with the original Sphag Sorb the results were conclusive in that at a one to one ratio of the new, lower moisture Sphag Sorb to Petroleum Product no leaching occurred at any given pressure up to 100 psi. A one to one ratio of the new Sphag Sorb to Motor was also subjected to a pressure of 160 psi for five hours with no apparent leaching.

The % PETROLEUM PRODUCT RECOVERED at 100 psi for a four to one ratio of Petroleum Product to Sphag Sorb, ranged form 45.0 – 60.0%. The original Spahg Sorb under the same experimental conditions was reported to have a % PETROLEUM PRODUCT RECOVERED equalling between 50 – 60% the Diesel Fuel and Motor Oil had a decrease in the % PETROLEUM PRODUCT RECOVERED of roughly 5%, for the new Sphag Sorb at the above ratio, although showed no decrease in the amount of Gasoline recovered. The same trend followed for the remaining ratios where the new Sphag Sorb had relatively the same leaching characteristics at the characteristics at the respective ratios and pressures.

Reducing the ratio two to one of petroleum Product to new Sphag Sorb at 100 psi the highest under the same parameters had a % PETROLEUM PRODUCT RECOVERED between 22 – 27%. It should also be noted at the two to one ratio of new Sphag Sorb to Motor Oil no leaching occurred at any given pressure.

As with the original Sphag Sorb the new Sphag Sorb had exceptional results reported when equalling the parts of Petroleum Product to Sphag Sorb, a one to one ratio. At this ratio there was on leaching, no filtrated recovered, and a % PETROLEUM PRODUCT RECOVERED reported as 0.0%.

Analysis Performed by: 

PROCEDURE for API ½ AREA FILTER PRESS

The Outline procedure is for the analysis of the industrial Organic Absorbent, Sphag Sorb and various petroleum products utilizing a NL Baroid API ½ AREA FILTER PRESS.

A. Add Sphag Sorb into the rubber diaphragm (boot) to within 1.6mm of the top.
- **1.** Record the quantity, in *grams,* of Sphag Sorb added.

B. Add sufficient Petroleum Product to rubber diaphragm for desired ratio.
- **1.** Record the quantity, in *grams,* of Petroleum Product added.

C. Place a sheet of filter paper, 9-cm, across the top of the boot and screw down the end cap firmly

D. Add new CO2 cartridge and screw down firmly.

E. Place tared beaker directly under the end cap to catch the filtrate.

F. Apply pressure to the system.
- **1.** Open call valve by pushing it toward the back of the cell.
- **2.** The regulator T-screw may then be adjusted for the respective pressure.

G. After the allotted time at each respective pressure weigh the amount of filtrate recovered.

F. % PETROLEUM PRODUCT RECOVERED = [Weight of filtrate recovered (g)] [X 100]
[Weight of Product added (g)]

% = [FILTRATE RECOVERED (g)] / [X (g)] 100

RATIO X: SPHAG	PERCENT (%) of FILTRATE RECOVERED % 50 PSI for 10 min.	% 80 PSI for 10 min.	% 100 PSI for 20 min
SYSTEM #1 DIESEL			
4 to 1	43.8	52.5	55.4
3 to 1	19.9	32.3	41.4
2 to 1	14.2	25.3	27.6
1 to 1	0	0	0
SYSTEM #2 GASOLINE			
4 to 1	49.8	59.3	60
3 to 1	25	35.6	39.7
2 to 1	11.5	21.6	25.5
1 to 1	0	0	0
SYSTEM #3 MOTOR OIL 10W – 40			
4 to 1	35.5	41.2	44.7
3 to 1	25.3	29.8	32
2 to 1	0	0	0
1 to 1	0	0	0

AMOUNT of FILTRATE RECOVERED AT RESPECTIVE PRESSURE

			WEIGHT (g) of FILTRATE RECOVERED		
			Wt. (g)	Wt. (g)	Wt. (g)
RATIO	SPHAG	X	50 PSI	80 PSI	100 PSI
X: SPHAG	Wt. (g)	Wt. (g)	for 10 min.	for 10 min.	for 20 min.
SYSTEM #1 DIESEL FUEL					
4 to 1	13.2015	52.9938	23.2178	27.829	29.3761
3 to 1	12.0529	36.255	7.208	11.7124	14.9982
2 to 1	9.8999	19.5397	2.7713	4.9434	5.3998
1 to 1	10.8749	10.8152	0	0	0
SYSTEM #2 GASOLINE					
4 to 1	8.7179	34.4816	17.168	20.4602	20.6967
3 to 1	10.3104	30.984	7.7643	11.0352	12.2941
2 to 1	9.7775	19.235	2.2159	4.1551	4.9041
1 to 1	11.1179	11.3204	0	0	0
SYSTEM #3 MOTOR OIL 10W – 40					
4 to 1	9.5603	38.2986	13.5912	15.7965	17.1075
3 to 1	9.681	29.1064	7.3725	8.6829	9.3272
2 to 1	10.2378	20.3191	0	0	0
1 to 1	10.1244	10.0522	0	0	0

Table 1

SORBENT EVALUATIONS

Sorbent	Capacity[1] W / W		Leaching[2]		Biodegradation[3]
	Oil	Gas	Oil	Gas	
Diatomaceous Earth (Clay)	1:1	fail	failed	failed	Pass
Polypropylene	1:1	fail	failed	failed	Pass
Sphag Sorb	1:5	1:3:5	passed	passed	Pass
Corn Cob Particle	1:1	fail	failed	failed	Fail

[1] Passed Paint Filter test at 1:1
[2] Liquids Release test (pass/fail) conditions; 1:1 – Sorbent, Oil 40 PSI, 5 minute interval (gasoline under same conditions).
[3] Based on Federal Register / Vol. 57, No. 233

In Summary, an ideal sportive material for hazardous waste use would have a high binding capacity, non-leaching properties and would be non-biodegradable. There are three tests that measure these properties. The paint filter test measures the sorption capacity (ASTM Method 9095), the liquids release test measures leaching and either ASTM G21-70(1984a) or ASTM G22-76(1984b) measures biodegradability using fungi or bacterial, respectively. In the new regulations (Federal Register / Vol. 57. 223), EPA chose to only use criteria #1 and #3. Sorptive capacity (Paint filter test) and biodegradability to evaluate sorptive materials.

Several types of sorbents are available on the market and none of these are ideal, based on the evaluation of the three ideal characteristics. The two groups of absorbents which easily qualify under the new regulations are synthetic polymers, such as polypropylene and diatomaceous earth (clays). It is interesting that neither of these two would perform well under routine land fill operations since both have relatively low absorptive capacity and leach readily, that is score poorly on the liquids release test (see Table1). ***Spahg Sorb***, a peat-derived product, performs well on all three tests (see Table1)

The biodegradation discussion in the new ruling would indicate the peat-derived products would be considered biodegradable because they have biological origin. The ***Sphag Sorb*** can be considered non-biodegradable because of it's large molecular mass. ***Spahg Sorb*** is derived from peat, but is dehydrated and sized to yield a very dry (<10% water) uniform product. The drying induces cross linking between the polymeric chains which make up peat decreasing the probability of significant biodegradation.

Table 1 summarizes the relative merits of some absorbents available today. Looking at the paint filler (capacity), liquids release (leaching) and biodegradation test, ***Sphag Sorb*** is clearly the best performing sorbent. The biodegradaton studies (ASTM G22-76 [1984b]) have been completed recently and show conclusively that ***Sphag Sorb*** can be considered as non-biodegradable. From the measured comparative data, it is clear that ***Spahg Sorb*** out performs it's sorptive competitors and is overwhelmingly superior for hazardous waste as well as for non-hazardous waste disposal. It is also apparent that if you use the criteria listed in the summary of this new EPA ruling, that of the currently available sorbents, only ***Spahg Sorb*** clearly meets all criteria. Polypropylene and Diatomaceous Earth barely pass the pain filter test and bid only one-fifth of the oil that ***Sphag Sorb*** can. Both leach easily and both have positive characteristic that they are non-biodegradable.

Respectfully Submitted,

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