

# NATURAL ENVIRONMENTAL SOLUTIONS



A Division of Kleenoil USA Inc.

- *Oil & Chemical Absorbents*
- *Bio-Remediation Systems*
- *Aqua-Gells*

**Saving our planet...one spill at a time**



## THE HYDROCARBON ABSORBENT PEAT

**Natural absorption. We call it... "Environmental Intelligence."**

**Bio-Matrix** is a non-toxic, all natural, 100% organic, lab-tested, field proven, industrial absorbent that is economical, efficient, non-abrasive, non-toxic, non-leaching and in its natural state is already biodegraded. The inherent capillary action of the activated peat provides a powerful wicking action and encapsulates oils, solvents, heavy metals, pesticides, herbicides and all other organic chemicals on contact.

**Bio-Matrix** suppresses vapors and absorbs hydrocarbons on land or water, in dry or wet conditions, and does not require specially trained technicians or high tech equipment for handling or disposing of the spent peat.

**Bio-Matrix** weighs little and affords users the ability to carry more, clean up more, and save on transportation and disposal costs.

**Bio-Matrix** that is used will not leech or discharge used pollutants, making it clean and easy to handle.

**Bio-Matrix** that is used can be incinerated or disposed of in landfills or land farmed with no detrimental effects to the environment.

**Bio-Matrix** is the ideal host for use in the microbial degradation/bio-remediation of contaminated land. It also contains HAC, a natural organic catalyst that accelerates the process of microbial degradation bringing the soil back to its original condition in a fraction of the usual time frame.

- 4 cubic foot double compressed bag
- 50 US gallon/200 liter absorbency capacity (0.904 specific gravity Bow River crude oil test base)
- Model 4CF-200L, approx. 50 lbs/23 kg bag.



**Bio-Matrix** as an energy source contributes 8,400 BTUs per lb./18,500 per kilo weight of product, excluding absorbed hydrocarbons, and burns to a residue of less than 2% of it's original volume.

**Bio-Matrix** is available in compressed and loose-filled bags, in booms, socks, cushions and pads, in various combinations of spill kits, and in customized filtration and bio-remediation treatment packages. Some examples are shown in this catalogue.

### TYPICAL ABSORPTION TIMES ARE AS FOLLOWS:-

Gasoline	2 Seconds
Gas - Oil	5 Seconds
Engine Oil	20 Seconds
Blood	30 Seconds
Light Crude	60 Seconds
Heavy Crude	90 Seconds

**BIO-MATRIX PRODUCTS PROVIDE COST EFFECTIVE AND ENVIRONMENTALLY INTELLIGENT CLEANUP AND RESTORATION SOLUTIONS. CHECK OUR WEBSITE OUT AT:-**



## OIL & CHEMICAL ABSORBENT

Insisted upon by leaders in the emergency response profession

*Bio-Matrix* is used for environmental spill cleanup and remediation purposes by fire departments, industries, airports, railways, transportation companies, garages and service stations, oil refineries and distribution facilities, oil

# Risking a \$30,000 Fine?



# No - they used Bio-Matrix!

(Photos courtesy of TMS Environmental LLC, Austin, Texas.)



wells and drilling rigs, and from marine vessels to harbors; the list is endless!

*Bio-Matrix* is used to filter industrial wastes, untreated effluents, heavy metals, algae, and polluted industry and mining remnant wastes.

For industrial and home use, *Bio-Matrix* absorbs PCBs, oil based paints, inks and dyes, animal fats, vegetable oils and blood.

*Bio-Matrix's* high vapor suppression capacity greatly reduces combustible vapors eliminating the chance of an explosion. In the case of gasoline 90% of vapor suppression is commonly achieved.



- 1.2 cubic foot double compressed bag.
- 15 US gallon/60 liter absorbency capacity (0.904 specific gravity Bow River crude oil test base).
- Model 1.2CF-60L, approximately 16 lbs/7 kg bag,



## ABSORBENCY COMPARISON CHART

Product chart based on 50 gallons of crude oil 0.904 specific gravity

Product	Leaching	Weight	Quantity Required	Acids	On Water	Remediation	Vapor Suppression	Renewable Resource	Non Abrasive
Bio-Matrix	NO	55lbs 25kg	1 BAG	YES	YES	YES	YES	YES	YES
Clay	YES	500lbs 225kg	8-10 BAGS	NO	NO	NO	NO	NO	NO
Cellulose	YES	80lbs 36kg	2.6 BAGS	NO	YES	NO	NO	YES	YES
Diatamatus Earth	YES	240lbs 109kg	5.45 BAGS	NO	NO	NO	NO	NO	NO
Sand	YES	1100lbs/500kg	20 BAGS	NO	NO	NO	NO	NO	NO
Recycled Paper	YES	75lbs 34kg	3.3 BAGS	NO	NO	NO	NO	NO	YES
Polypropylene	YES	75lbs 34kg	5 BAGS	NO	YES	NO	NO	YES	YES

## SUPPLIERS OF BOOMS, SOCKS, PADS & SPILL KITS

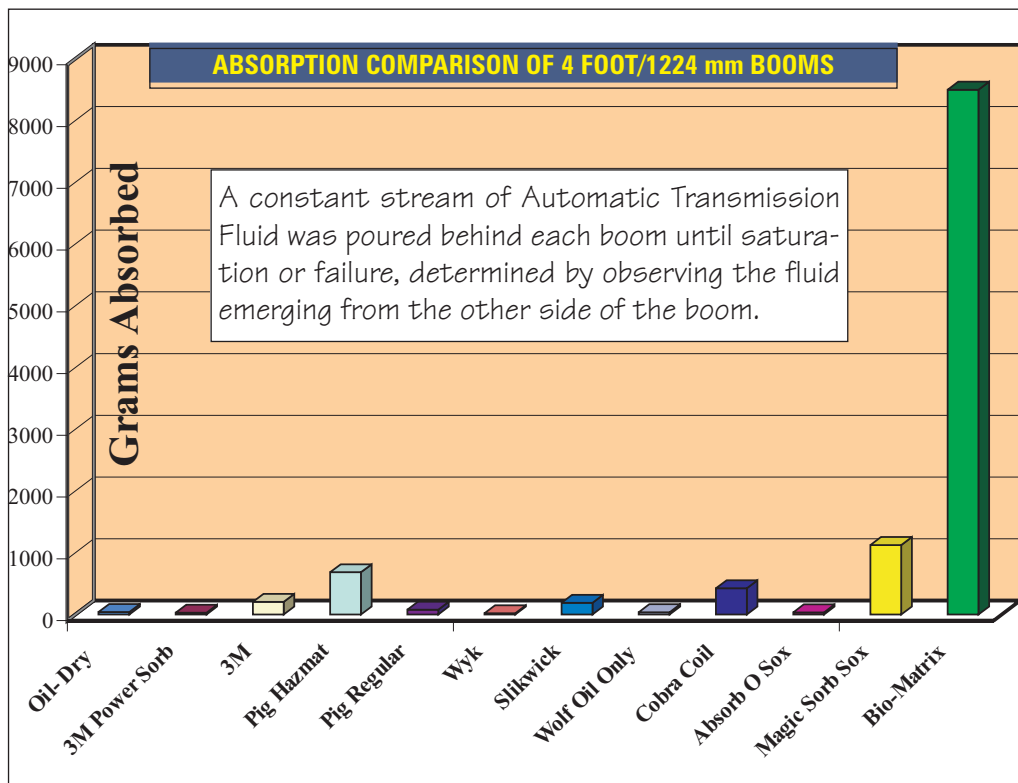
### Custom made to meet local industry requirements.



For use on land and water, standard and customized booms, socks, pads and spill kits are available in a variety of sizes. Illustrations are typical packages to make cleanups easy, safe, and effective.

Pads with loop and tie tapes and 5 pocket quilted mats 500 by 500 mm / 20" by 20" – 2.5 to 10 liters / 5 pints to 3 gallons absorbency rating.

Booms with ropes and tie tapes 2000 to 4000 by 125 to 180 mm / 8' to 14' by 4" to 8" – 25 to 75 liters / 10 to 50 gallons absorbency rating. Portable and mobile spill cleanup kits in carry bags and wheeled containers include brooms, shovels, pads, booms, and bags of *Bio-Matrix*.





## BIO-MATRIX VERSUS CLAY PRODUCTS COMPARISON

Label shown is typical of MSDS hazardous warnings required by the EPA.

- Dust from clay can cause silicosis which is often progressive and disabling and on rare occasions fatal. Bio-Matrix is non-toxic!
- Unsaturated clay will leach contaminants after *AD*sorption; Bio-Matrix *AB*sorbs and will not leach!
- Clay is highly abrasive; Bio-Matrix is non-abrasive!
- Bio-Matrix *AB*sorbs 8 to 12 times more contaminants than *AD*sorbed by the same weight of clay product!
- The cost of disposing of contaminants *AD*sorbed by clay products into landfills is 8 to 12 times that of disposing of the same amount *AB*sorbed by Bio-Matrix!
- Handling and transporting clay products is inordinately more expensive than when using Bio-Matrix!
- Many States prohibit contaminants *AD*sorbed by clay products to be disposed of in toxic or non toxic landfills!
- Clay products cannot be incinerated; Bio-Matrix can be incinerated and adds 4,600 BTU per pound to the process!

Consists of amorphous diatomaceous earth and crystalline silica in varying amounts (typically less than 1%)

Diatomaceous Earth, Calcined  
CAS No. 91053-39-3  
Cristobalite  
CAS No. 14464-46-1

**WARNING!**

- Breathing crystalline silica dust over a prolonged period of time in excess of the permissible exposure limit, can cause silicosis, a lung disease which is often progressive and disabling and on rare occasions fatal.
- Inhaled crystalline silica from occupational sources has been classified as carcinogenic to humans (Group 1) by the International Agency for Research on Cancer (IARC).
- Proper use of adequate protective devices, such as respirators, and the maintenance of dust levels below the OSHA permissible limit or the ACGIH TLV, will minimize or eliminate any excess risk.

**Precautions:**

- Avoid dust cloud formation.
- Avoid eye contact.
- Avoid breathing dust.
- Adequate protective devices such as respirators approved for silica dust should be worn when airborne dust is present.

**First Aid:** If inhaled, remove to fresh air. For eye contact, wash with plenty of water. Consult a physician if irritation persists. For skin contact, use a moisture renewing lotion if dryness occurs. If ingested, drink water to reduce drying effects.



## BIO-MATRIX AQUA-GELL

Aqua-Gell is a solid granular powder that rapidly absorbs and retains large volumes of aqueous solutions, converting them into a semi sorb, gelled state. The absorptive properties of Aqua-Gell are ideally suited for the absorption and solidification of industrial waste streams containing inks, heavy metals and other general contaminants. Aqua-Gell is a remarkable tool to aid in spill management, containment, cleanup and disposal.

### APPLICATIONS:

- Medical waste (blood and body fluids)
- Solidifying aqueous waste for transportation
- Water stop material
- Water solidification

### SPECIFICATIONS:

- Absorbs over 200 times its weight in water
- Is nontoxic, nonhazardous, and does not produce heat or off-gases
- Meets and exceeds EPA, OSHA, & ANSI guidelines for absorbent material performance
- Passes the paint filter liquid test (method 9095)
- Non biodegradable polymer (per 40 CFR 264.314 (e) (1) (I I))
- Expands by less than 1% when hydrated
- SEG certified incinerable material with heat value of 5560 BTUs/lb./12,232 BTUs/kg calorific value
- Strong ion exchange capability allows for heavy metals to be bound and water to pass TCLIP (EPA 1311/6000/7000 test series methods)
- Freeze-thaw tested. Will not release liquids after freezing and subsequent heating to 160 degrees Fahrenheit
- Solidifies most aqueous solutions in less than 2 minutes (no mixing required)

AQUA-GELL TYPICAL ABSORPTION RATIOS AUNL G/G			
Free swell in D. I. Water	250	10 ppm chromium	130
1% NaCl solution	42	30 ppm chromium	104
10 ppm cadmium	142	10 ppm lead	137
30 ppm cadmium	47	30 ppm	110



## BIO-REMEDICATION/DEGRADATION

**THE PROBLEM:** Hydrocarbons in/on soil; from the level of a fresh spill to saturation over years of exposure. The hydrocarbons (oils) render the soil contaminated and unfit for any form of agricultural production. Hydrocarbon exposure for extended periods of time in the soil may see the product leeching down to the water table causing further environmental problems.

**THE SOLUTION:** Bio-Remediation; the breakdown of hydrocarbons to their natural compound state of Carbon / Hydrogen / Oxygen / Water / etc. In order for Bio-Remediation/Bio-Degradation to occur in an effective manner, the following elements must be present:-

**Soil**

**Enzymes** (produced from microbes/bacteria)

**Oxygen** (air)

**Water**

**Heat** (from the sun)

**Nitrogen** (urea/fertilizer food)

**Bio-Matrix** (the host).

**SOIL** is used for four reasons. It is plentiful, it is environmentally friendly, it contains the microbes and bacteria that aids the bio-remediation process, and soil is the most useful tool we have on hand for bio-remediation/degradation “farming.”

**ENZYMES** are produced during the reproductive stages of the bacterium/microbe cell where they release/secrete enzymes which act like acids that attack and break down the long hydrocarbon chain.

**BACTERIA/MICROBES** are always in soils, however adding additional quantities into the “farming” process will speed up the bio-remediation process considerably.

**OXYGEN** in the air is vital for the micro-organisms to become active. In sealed containers, or in hard-packed earth, metabolism will not occur until oxygen is introduced. This is done by opening the container or tilling the soil.

**WATER** is necessary for the reproduction of the microorganisms.

**HEAT** from the sun is a prime requisite for bacterial and microbial reproduction. The enzymatic performance, reproduction, and working of the bacteria and microbes is directly related to the temperature; the hotter the better.

**NITROGEN** in the form of a commercial fertilizer or urea must be present, or added. Bacteria is autotrophic, and in conjunction with the nitrogen, metabolic synthesis occurs, where the carbon in the oils is food for the bacterial enzyme and is converted back to its original structure, that of the tetravalent element, carbon.



**Oil waste spillage**



**After application of Bio-Matrix**



**Six months later**



## BIO-REMEDIATION/DEGRADATION Continued

**BIO-MATRIX** is nature's host, carrying agent, or medium, used to •ENCAPSULATES the free flowing, floating, in-ground, or previously spilled, hydrocarbons •CONTAINS the spill to a specific area, •ARRESTS further leeching of the hydrocarbons into the soil, or groundwater below •ACCELERATES the process dramatically as *Bio-Matrix* naturally/organically contains Humic

Acid, a "kick-starter" to bio-remediation •ACTS as a bed for the soil, bacteria/microbes, oxygen, water, heat, and nitrogen while the reproduction of enzyme takes place, •NURTURES the soil so as to leave it more serviceable after bioremediation than it was prior to "land farming" the spill.

Please note:– Bio-remediation is combining the above so that the enzymes produced break down the long hydrocarbon chain into its original, and environmentally safe elements, those being carbon, hydrogen and oxygen.

## CONCENTRATED BIO-REMEDIATION CULTURES

*Bio-Matrix* bio-remediation products are a proprietary blend of bacterial cultures specifically designed to degrade the light-distilled oil fractions, as well as the heavier fractions of hydrocarbons normally associated with # 4, # 5, and #6 fuel oils, crude oil and coal tar. What sets *Bio-Matrix* products apart from others is the high concentration of live synergistic cultured bacteria in a remediation liquid or powder that immediately activates the bio-remediation process. Because of their relatively low cost Bio-Matrix bio-remediation products are the ideal solution for industries wanting to bio-remediate their own contaminated sites and waterways.

**Benefits:** Quickly decontaminates soil and groundwater containing hydrocarbons resulting from leaking underground storage tanks, transfer line leaks, and spills, in combination with competent management practices. Eliminates or reduces further environmental damage through biodegradation of contaminant plume. Available in dry and liquid form. Can tolerate petroleum concentrations inhibitory to many indigenous populations.

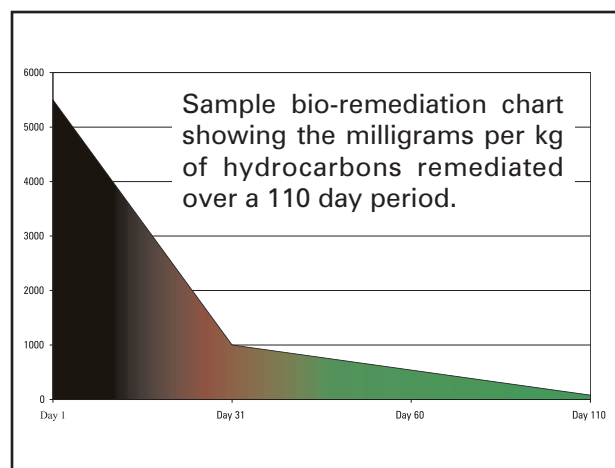
**Advantages:** Eliminates future liability risks associated with offsite disposal. Remediate the site with minimal disruption. Provides a natural and ecologically sound approach to remediation.

**Products include:** **CHR (Concentrated Hydrocarbon Remediator)** a liquid solution that is supplied with a mini powder pack containing concentrated nutrients, bio-remediation accelerators, buffers and supplemental micro-organisms for use on land and waterway spills; **CSR (Concentrated Surface Remediator)**, a proprietary blend of bacterial spores and agents, for use as a total remediator for combined hard surface cleaning on concrete, asphalt, machinery, rocks, ballasts, and vehicles; **CGR (Concentrated Grease Trap Remediator)** is a concentrated liquid solution that inoculates grease trap waste while metabolizing the fats and oils into environmentally safe carbon dioxide and water.

**BIO-MATRIX PRODUCTS ARE SAFE, EFFECTIVE AND ENVIRONMENTALLY ENHANCING.**



Department of Energy, July 15, 1999. Following application of Bio-Matrix bioremediation systems ppm hydrocarbons dropped to 573.





# NATURAL ENVIRONMENTAL SOLUTIONS

*Saving our planet  
one spill at a time*



**Diesel spill on the highway adjacent to the Bio-Matrix Canada plant. Prompt action by Bio-Matrix employees prevented an environmental disaster.**



December 2004. A highway spill is safely contained using only 4 bags of Bio-Matrix. Less than a month later, the natural organic properties of Bio-Matrix has turned an environmental threat into a green median. *(Photos courtesy of TMS Environmental LLC, Austin, Texas.)*



**Bio-Matrix boom contains oil spill in Colorado.**  
*(Photo courtesy of Pletcher Enterprises, Yuma, Colorado),*

