

# SOS5300 Hydrocarbon Treatment



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water

HIGH-END BIOTECHNOLOGY FOR THE BIOREMEDIATION OF VARIOUS TYPES OF HYDROCARBON POLLUTION

IN-SITU, EX-SITU APPLICATIONS – HIGH-RATE BIODEGRADATION OF HYDROCARBON SUBSTANCES IN AEROBIC, AND ANAEROBIC CONDITIONS AS WELL

## SOS5300 – PRODUCT DESCRIPTION

The SOS5300 technology is based on a natural botanical blend of enzyme systems coupled with 12 strains of microbes to accelerate the digestion of Hydrocarbon pollution. The unique combination of microbial strains in SOS-5300 couples with our nutrient blend to break down the hazardous contaminants and use them as a food source for the microbes. This results in natural, effective remediation which results Carbon Dioxide, water and salts as end-products, and no harmful byproducts. The key advantage of SOS5300 compared to its competition is its enzymatic system. The products contain enzymes responsible for the acceleration of Hydrocarbon biodegradation,



moreover, the bacterial species in the product produce these enzymes when the system runs out from them during the biodegradation of the pollutants. The surface-active botanical extracts in SOS5300 are responsible for the shredding of oil drops to extremely small particles. Due to this action the contact area becomes extremely large which further increases the pace of metabolism, and the biodegradation of the pollutants. We included substances in SOS5300 which convert the hydrophobic surface of oil drops to hydrophilic aiding the contact of oil drops with the enzymes, and the attachment of microbes on the surface of the oil drops. As a result of the above SOS5300 technology delivers multiple pace in Hydrocarbon biodegradation than most of its direct competitors ensuring our clients to calculate with way less time needed for the entire bioremediation process.

We carefully selected the most suitable microorganisms for the biodegradation of various Hydrocarbon types. Our microbes are able to adapt to the presence of various Hydrocarbon by-products. After the quick adaptation period the system produces the necessary enzymes needed for the biodegradation of pollutants present. SOS5300 is coupled with the necessary nutrients, trace elements, and vitamins in order to avoid any metabolic limitations, providing an environment for the microbial system to run with maximum enzyme activity, cell reproduction, and metabolic pace. In case of high pollution levels, nutrient supplement is needed though, that is why we developed

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BioBooster (see next chapter), which is a low-cost nutrient combo to keep the SOS5300 system at its maximum performance in highly polluted environment. SOS5300 has another huge advantage compared to its closest competition: the microbial system is highly resistant to various toxic materials (e.g. Phenol, and related compounds).

We used SOS5300 Hydrocarbon Treatment as a baseline, and we derived custom products by the modification of the ratio of the bacterial species used, and adding substances which accelerates the biodegradation of various groups of Hydrocarbons.



### SOS5300 BTEX

Most of fuel types contain BTEX materials, so fuel pollution usually contains high concentration of BTEX in the soil or groundwater. The name BTEX is coming from the name of the 4 main constituents of this Hydrocarbon group of monoaromatic volatile Hydrocarbons: Benzene, Toluene, Ethylbenzene, Xylene. Nearly all members of this group are highly carcinogenic, and hardly biodegradable. SOS5300 BTEX contains carefully selected microbes boosted by an enzyme-coenzyme-cofactor system which are resistant to BTEX toxicity, and are able to biodegrade the pollution with a fair rate.

### SOS5300 HALOGEN DIGESTER

Remediation of Halogenated Hydrocarbon pollution in polluted soil or groundwater usually causes a headache for remediation professionals. Since these types of Hydrocarbons are toxic to most of microbes, they are inhibitory for their metabolism even at very low concentrations, and nearly all are considered as hardly biodegradable in general. Bioremediation, which is considered to be the most effective, and cost-effective way of eliminating Hydrocarbon pollution, is ruled out by professionals because of the above written. SOS5300 Halogen Digester is a natural botanical blend of enzyme systems coupled with 12 strains of microbes to accelerate the digestion of halogenated solvents such as Methylene Chloride, TCE, DCE, DBE, CCL, PCBs etc. in contaminated soil and water both in in-situ anaerobic, or ex-situ aerobic environment.

### SOS5300 MTBE

MTBE (Methyl tert-butyl ether) is an artificially made chemical used worldwide for increasing the octane number of fuels, and reducing noise of motors. MTBE irritates respiratory organs, and skin, it is a volatile compound with a massive health risk. MTBE usually appears in soil or groundwater polluted with fuel. We developed SOS5300 MTBE for quick in-situ bioremediation of MTBE in anaerobic environment.

### SOS5300 TPH

SOS5300 TPH is a microbial digestion system specifically designed to eliminate hazardous materials that contain crude oil-type contaminants. These contaminants include, but are not limited to, hexane, benzene, paraffin wax, naphthalene, polyethylene and polypropylene. The unique combination of microbial strains in SOS5300 TPH couples with our custom nutrient blend to break down the hazardous contaminants and use them as a food source for the microbes. This results in natural, effective remediation with no harmful byproducts.



## SOS5300 – FIELDS OF APPLICATION

- Biodegradation of Hydrocarbon pollution on hard surfaces (e.g. concrete, stones)
- Biodegradation of Hydrocarbon pollution in contaminated soil (applicable both for in situ, and ex situ applications)
- Biodegradation of Hydrocarbon pollution in contaminated groundwater (applicable both for in situ, and ex situ applications)
- Biodegradation of Hydrocarbon pollution on the surface of freshwater bodies



## BENEFITS OF SOS5300

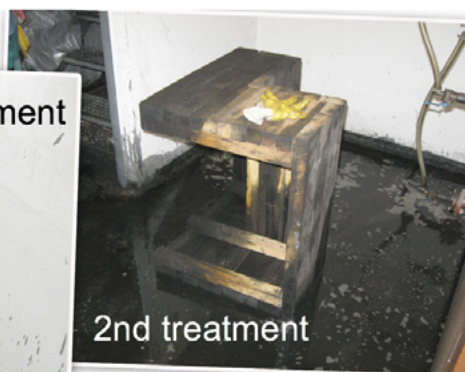
- Ability to digest a very broad range of Hydrocarbon compounds.
- The microorganisms we selected are able to adapt very well to continuously changing environment, and are highly resistant to the toxicity of Phenol, and related compounds.
- All microorganism we use in our products are non-GMO, naturally occurring soil bacteria
- Broad range of application
- Quick action, and metabolism both in aerobic, and anaerobic environment compared to its closest high-end competition.
- Completely biodegradable, non-toxic, non-allergenic, and non-hazardous
- Can be formulated for aerobic or anaerobic use
- Cost-effective way to eliminate hazardous spills
- Minimal disturbance to surrounding infrastructure, compared with traditional “dig-and-haul” methods
- Minimal labour required
- Easy to implement
- Versatile on numerous types of small contaminated sites





## APPLICATION OF SOS5300 – BIOREMEDIATION OF HYDROCARBON POLLUTION ON SURFACES (CONCRETE, STONES ETC.)

Cleaning mineral oil pollution by biodegradation from polluted surfaces like concrete or stones is the most widespread application of SOS5300 Hydrocarbon Treatment. Since Diesel or motor oil spills are very common in petrol stations, parking lots, home garages etc, it can be a low-scale or household scale application as well, not just industrial scale. The specific dosage of the product, and the length of treatment process depend on the type of Hydrocarbon pollution, the depth of penetration, and the porosity of the surface. Before the treatment the polluted surface needs to be sprinkled with water. Once the surface is wet, SOS5300 Hydrocarbon Treatment must be sprayed or poured evenly onto the surface in 5-time dilution with pure water. In case of heavy pollution when [BioBooster](#) is also needed as nutrient supplement, a concentrated solution of BioBooster must be sprayed onto the surface before SOS5300. After the treatment, the treated surface must be covered with a perforated foil layer which will ensure enough Oxygen for the treatment to run in aerobic way but it prevents the surface from drying out, which would result the death of our bacteria. Fresh spills with low level of penetration can be removed in 3-4 days by one treatment. After the treatment the foil cover must be removed, and we recommend to clean the surface with pure water (both high- or low-pressure cleaning can be applied). High amount of Hydrocarbon, deeply penetrated pollutions, or hardly biodegradable high-chain Hydrocarbon pollution (e.g. motor oil) may require multiple treatments.





# APPLICATION OF SOS5300 – BIOREMEDIATION OF HYDROCARBON POLLUTED SOIL

SOS5300 Product Line can be applied for the biodegradation of various types of Hydrocarbon pollution in soil. The treatment can be executed right at the place, and depth of the pollution (in-situ treatment), or excavated polluted soil can also be treated (ex-situ treatment). Whenever the polluted soil is excavated, and placed into prisms, the aeration of the prisms (with the control of moisture content of the soil) can significantly improve the pace of bioremediation since the biodegradation of Hydrocarbon compounds in aerobic conditions is way faster than anaerobic treatment. However, when we developed SOS5300, one of our main objectives was to create a product which can outpace its closest competitors not just in terms of efficiency in Hydrocarbon removal, but also in the rate of the bioremediation process in anaerobic, in-situ treatments. As a thumb rule we can assume that 70% of the pollution can be removed in 70 days with SOS5300 bioremediation in-situ, considering totally anaerobic conditions, which means an environment with the lowest metabolic rate for our bacteria. Aerobic treatment requires way less time ex-situ, or in-situ (by bioventillation which means continuous injection of Oxygen-rich air in the ground at the level of pollution).



## DOSAGE INFORMATION FOR IN-SITU SOIL BIOREMEDIATION TREATMENTS WITH SOS5300

Recommended and minimum litre of SOS5300 and kg of BioBooster NOC/ m3 of contaminated soil		
1/a TPH is below 1 000 mg/kg.....	0.12 l + 0.12 kg of BioBooster NOC	Minimum: 0.05-0.05
1/b TPH is betw. 1 000-5 000 mg/kg....	0.25 l + 0.25 kg of BioBooster NOC	Minimum: 0.10-0.10
1/c TPH is betw 5 000-20 000 mg/kg...0.5 l + 0.5 kg of BioBooster NOC		Minimum: 0.20-0.20
1/d TPH is betw. 20 000 - 50 000 mg/kg...1 l + 1 kg of BioBooster NOC		Minimum: 0.40-0.40
1/e TPH is above 50 000 mg/kg.....	2 l + 2 kg of BioBooster NOC	Minimum: 0.80-0.80
Dosage is also highly dependent on: soil type, pH of water, temperature of water, flow direction and volume, depth of water and depth of contamination		

# APPLICATION OF SOS5300 - BIOREMEDIATION OF HYDROCARBON POLLUTED GROUNDWATER

Hydrocarbon pollution in groundwater can be bioremediated in-situ or ex-situ, just like in case of polluted soil. If the application is done in-situ, SOS5300 (and BioBooster if needed) is poured into perforated inspection wells in the polluted area. After pouring the necessary amount of biotech materials, the wells must be filled with pure water. The hydrostatic pressure drives the mixture into the groundwater. The natural flow direction of the groundwater must be taken into consideration when digging the necessary number of wells in the area. In-situ bioremediation lasts longer since the environment in the groundwater is anaerobic.



As a thumb rule we can assume that 70% of the pollution can be removed in 70 days with SOS5300 bioremediation in-situ, considering totally anaerobic conditions, which means an environment with the lowest metabolic rate for our bacteria. Ex-situ bioremediation offers higher metabolic pace, if aerobic conditions are given. Usually groundwater is pumped into a reactor equipped with submerged aeration. SOS5300 is dosed into this bioreactor. The treated water is pumped back into the groundwater bulk. The process of bioremediation can be controlled by occasional sampling of the lifted groundwater before entering the bioreactor.

## DOSAGE INFORMATION FOR IN-SITU GROUNDWATER BIOREMEDIATION TREATMENTS WITH SOS5300

2) recommended and minimum litre of SOS5300 and BioBooster NOC / m3 of contaminated groundwater		
2/a TPH is below 1 000 microgram/l.....60 mls + 60 g BioBooster NOC	Minimum:	20-20
2/b TPH is betw 1 000-5 000 microgram/l....120 mls + 120 g BioBooster NOC	Minimum:	40-40
2/c TPH is betw 5 000-20 000 microgram/l....250 mls + 250 g BioBooster NOC	Minimum:	70-70
2/d TPH is betw. 20 000 - 50 000 microgram/l.....500 mls + 500 g BioBooster NOC	Minimum:	200-200
2/e TPH is above 50 000 microgram/l.....500 mls + 500 g BioBooster NOC	Minimum:	200-200
Dosage is also highly dependent on: soil type, pH of water, temperature of water, flow direction and volume, depth of water and depth of contamination		

## APPLICATION OF SOS5300 - BIOREMEDIATION OF OIL SPILLS ON WATER SURFACE

Mineral oil and related compound may enter freshwater bodies or seawater as a result of industrial accidents, human negligence, or the failure of watercraft engines. The density of mineral oil is less than water's, and oil molecules are hydrophobic. As a result, it forms a spill on the water surface in large area but tiny layer height. From the perspective of bioremediation with SOS5300 technology this scenario is very similar to the bioremediation of oil pollution on hard surfaces: Oxygen rich environment is given for aerobic respiration, the contact area for the microbes is high, so the pace of metabolism is very high. As a result, SOS5300 offers a quick, and cost-effective solution for the bioremediation of an oil spill on a water surface. The treatment method is quite similar to the one used at hard surfaces with a minor difference: SOS5300 must be diluted 5-times with pure water, and it needs to be sprayed directly on the surface of the oil spill. The lower the size of the particles are in the spray, the cost efficiency increases as less material will enter the water body unused. If the pollution consists of a monolayer oil film, the spill could be digested by SOS5300 microbes within a few days.



## PACKAGING INFORMATION

The product is available in 19 litre safety pails which is the lowest unit for ordering.

## STORAGE INFORMATION

Keep the product in a cool and dry place below 28 Celsius. Avoid exposure to direct sunlight.