



HYGEA[®] OLEOCLEAN

Advanced Biotechnology for
Hydrocarbon Biodegradation

— Biological Solutions for Soil and Water Spill Remediation —

FROM **CONTAMINATION**

TO **NATURAL RECOVERY**



POWERED BY



BLACKWATER
HOLDING SYSTEMS LLC

TRANSFORMING
POLLUTION
INTO NATURAL
RECOVERY



What is HYGEA[®] OLEOCLEAN?

HYGEA[®] OLEOCLEAN is an advanced biological formulation based on a synergistic consortium of naturally selected microorganisms and specialized enzymes that accelerate the biodegradation of petroleum hydrocarbons in soil and water.



IT IS NOT A DETERGENT OR DISPERSANT

It does not dissolve, disperse or transfer the contamination. It biologically transforms it into harmless compounds.



BIOLOGICAL MINERALIZATION

Breaks carbon-hydrogen bonds and converts hydrocarbons into CO₂, water and stable biomass.



SAFE AND ENVIRONMENTALLY FRIENDLY

Non-toxic, non-corrosive and non-hazardous to humans, animals, plants and aquatic life when used as directed.



HIGH PERFORMANCE

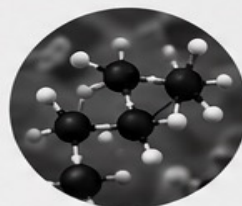
Effective across a wide range of hydrocarbon types, environmental conditions and contaminated matrices.



SUPPORTS NATURAL RECOVERY

Restores the ecological balance and allows ecosystems to recover naturally.

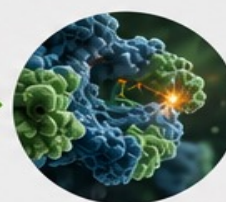
HOW IT WORKS MECHANISM OF ACTION



1. HYDROCARBON
MOLECULE
(C_nH_m)



2. BIOLOGICAL
ACTIVATION
Microorganisms
colonize the
hydrocarbon.



3. ENZYMATIC
CLEAVAGE
Enzymes break
carbon-hydrogen
bonds.



4. MICROBIAL
METABOLISM
The compounds are
metabolized as a
source of energy
and growth.



5. FINAL PRODUCTS

CARBON DIOXIDE
(CO₂)
+
WATER (H₂O)
+
STABLE BIOMASS



The objective is not to disperse hydrocarbons, but to **biologically mineralize** them into environmentally harmless compounds.



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THE PROBLEM: HYDROCARBON SPILLS

Accidental releases of petroleum hydrocarbons in soil and water cause **severe environmental damage**, operational disruptions and high economic costs.



ENVIRONMENTAL IMPACT

Contamination of soil, surface water and groundwater. Destruction of ecosystems, loss of biodiversity and long-term ecological imbalance.



OPERATIONAL DISRUPTION

Shutdowns, clean-up operations, loss of productivity and interruption of industrial activities.



ECONOMIC COSTS

High expenses in containment, disposal and remediation. Fines, legal liabilities and damage to reputation.



HEALTH AND SAFETY RISKS

Exposure risks for personnel and communities. Air quality degradation and fire/explosion hazards.

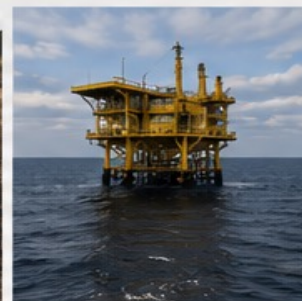
WHERE AND HOW THEY OCCUR



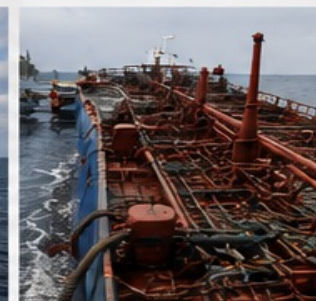
STORAGE TANK LEAKS



PIPELINE RUPTURES



OFFSHORE OPERATIONS

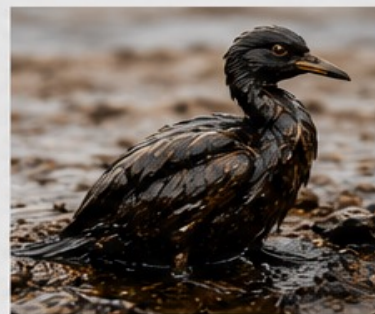


TRANSPORT AND
TRANSFER



INDUSTRIAL AND
MAINTENANCE ACTIVITIES

THE CONSEQUENCES CAN PERSIST FOR YEARS



HARM TO WILDLIFE



SOIL AND WATER
CONTAMINATION



LOSS OF BIODIVERSITY



EXPENSIVE AND
COMPLEX REMEDIATION



HOW DOES BIODEGRADATION WORK?

HYGEA[®] OLEOCLEAN harnesses the power of specialized microorganisms and enzymes that naturally break down hydrocarbons into simple, non-toxic compounds.

NATURE'S INTELLIGENT SOLUTION



NATURAL AND EFFECTIVE

Works with nature to accelerate a process that already exists.



TARGETED ACTION

Microorganisms selectively degrade hydrocarbons as their food source.



SAFE AND SUSTAINABLE

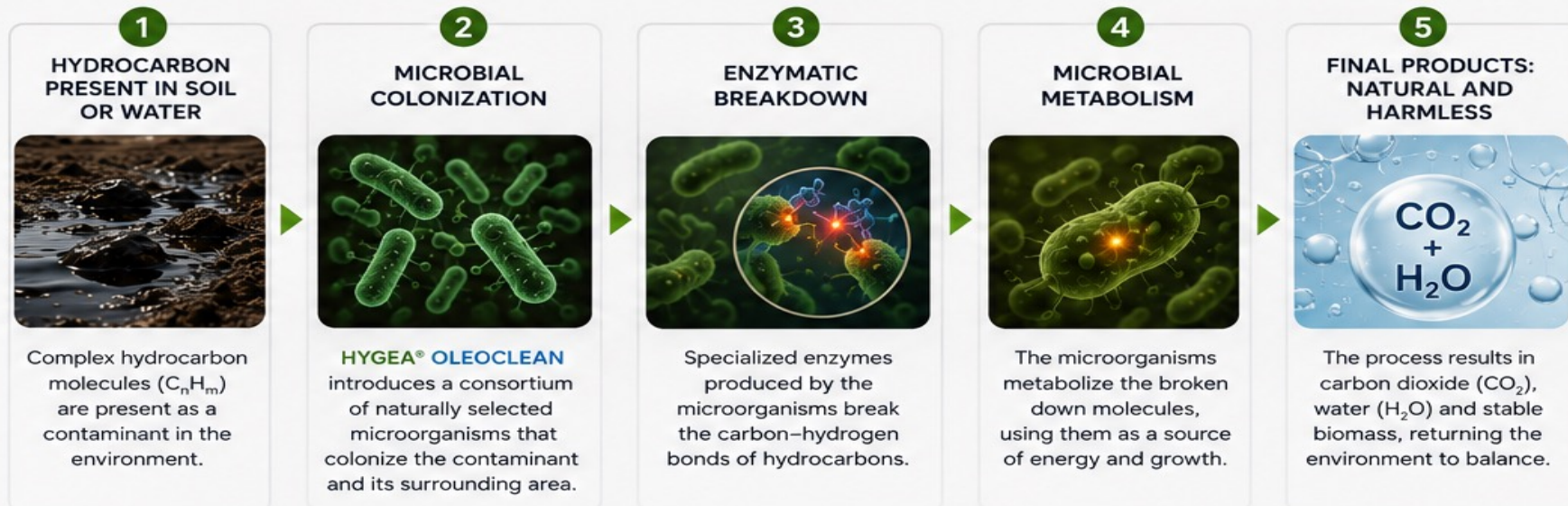
Produces harmless by-products: CO₂, water and biomass.



SELF-SUSTAINING PROCESS

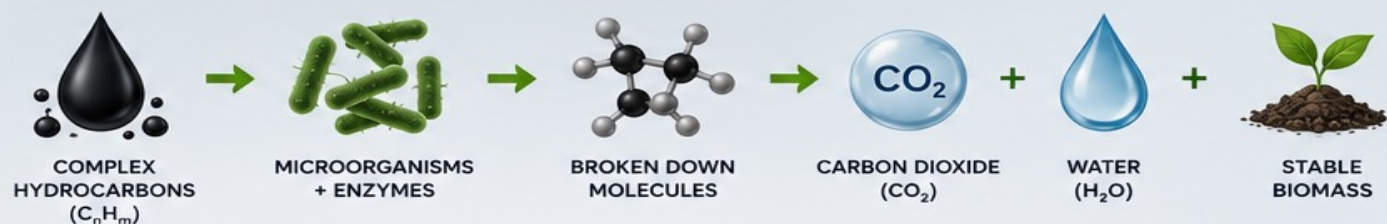
Once established, the microbial activity continues as long as hydrocarbons are present.

THE BIODEGRADATION PROCESS: STEP BY STEP



FROM COMPLEX POLLUTANTS...

...TO NATURAL COMPOUNDS



Biodegradation is the natural way to restore the environment.
HYGEA[®] OLEOCLEAN accelerates it.



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WHAT MAKES HYGEA[®] OLEOCLEAN DIFFERENT?

HYGEA[®] OLEOCLEAN is not just another bioremediation product. It is a next-generation biological solution, specifically engineered to deliver superior performance in real-world conditions.



POWERFUL SYNERGISTIC CONSORTIUM

Proprietary blend of naturally selected microorganisms that work together to degrade a wide range of hydrocarbons efficiently.



ADVANCED ENZYMATIC SYSTEM

Enzymes accelerate the breakdown of complex hydrocarbons, including heavy fractions and weathered oils.



FAST AND EFFECTIVE

Delivers visible results in less time, reducing contamination levels and speeding up site recovery.



SAFE AND ENVIRONMENTALLY RESPONSIBLE

100% biological, non-toxic, non-corrosive and non-hazardous to humans, animals and ecosystems.



VERSATILE AND ADAPTABLE

Effective in diverse environments and conditions (soil, water, tropical, arid, marine, freshwater).



COST-EFFECTIVE SOLUTION

Reduces remediation time, operational costs and disposal volumes, generating measurable savings.

HYGEA[®] OLEOCLEAN vs. CONVENTIONAL METHODS

FEATURE	HYGEA [®] OLEOCLEAN	CONVENTIONAL METHODS
Mechanism	Biological degradation by specialized microorganisms and enzymes	Physical removal, chemical treatment or containment
Speed of Action	Fast and progressive results	Slow or temporary results
Environmental Impact	No secondary pollution, restores natural balance	Risk of secondary pollution and ecosystem impact
Safety	Non-toxic, safe for operators and environment	Potentially hazardous chemicals and handling risks
Cost Efficiency	Lower overall cost due to faster remediation and reduced volumes	Higher cost due to long timelines, disposal and site handling
Sustainability	Supports natural recovery and long-term sustainability	Does not promote natural recovery processes

ENGINEERED BY NATURE. PROVEN BY RESULTS.



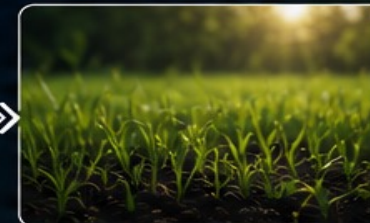
SCIENCE

Advanced formulation developed through biotechnology.



APPLICATION

Designed for real-world challenges in the most demanding environments.



TRANSFORMATION

Nature is allowed to recover. Sustainable results that last over time.



HYGEA[®] OLEOCLEAN goes beyond treatment:
it restores, protects and rebuilds.



WHERE HYGEA® OLEOCLEAN MAKES THE DIFFERENCE

HYGEA® OLEOCLEAN is designed to work in a wide range of environments and conditions where hydrocarbon contamination is a challenge.

One solution. Multiple applications.



OIL SPILLS IN SOIL AND WATER

- Shorelines, beaches, rivers, lakes and wetlands
- Onshore and offshore spill response



INDUSTRIAL FACILITIES

- Tank farms, loading/unloading areas, and bunds
- Process areas and maintenance yards



PIPELINES AND RIGHT-OF-WAY

- Pipeline leaks and ruptures
- Soil contamination along transmission lines



MINING AND CONSTRUCTION

- Fuel and oil storage areas
- Equipment maintenance and wash areas



WASTEWATER AND BIOTREATMENT SYSTEMS

- Oily wastewater treatment
- Enhancement of biological treatment processes



AGRICULTURAL AND REMEDIATION PROJECTS

- Contaminated soils in agricultural areas
- Site remediation and land reclamation



Effective in a wide range of hydrocarbon types:

- ✓ Crude Oil | ✓ Diesel | ✓ Gasoline | ✓ Jet Fuel | ✓ Lubricating Oils | ✓ Other Petroleum Derivatives



Field-proven performance
in diverse climates and
real-world conditions.



ENVIRONMENTAL ORGANIC SOLUTIONS



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METHODOLOGY OF APPLICATION

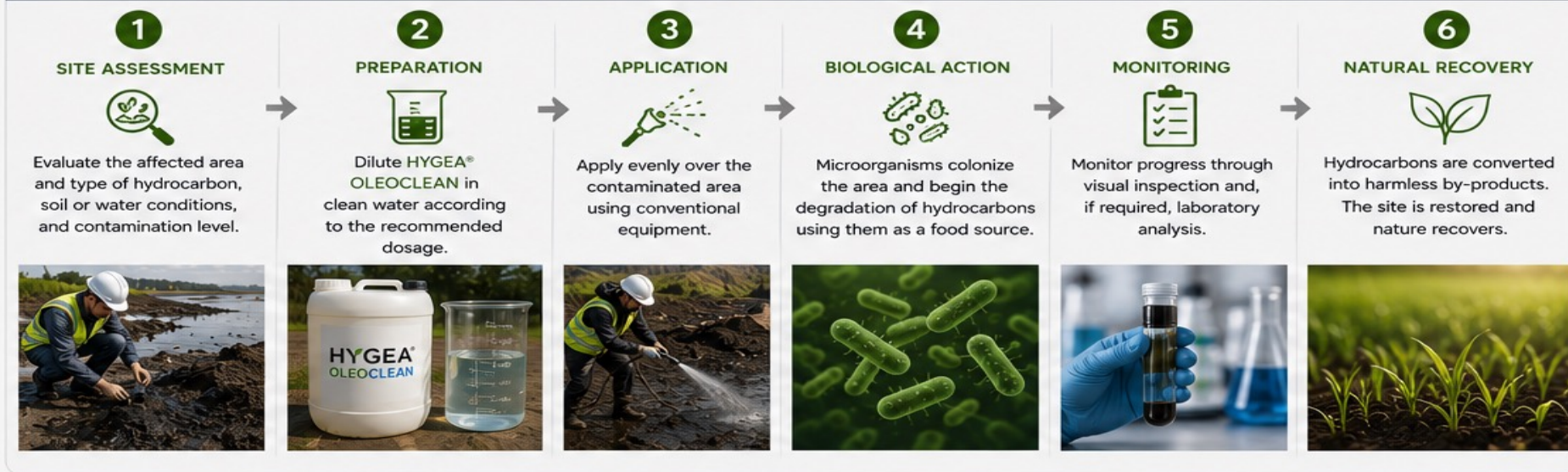
HYGEA[®] OLEOCLEAN is easy to apply
and adaptable to different environments
and contamination levels.



OUR APPROACH

- ✓ Biological solution, easy to handle and non-hazardous.
- ✓ No specialized equipment required.
- ✓ Can be applied preventively or correctively.
- ✓ Effective in a wide range of environmental conditions.

STEP-BY-STEP APPLICATION PROCESS



APPLICATION METHODS



SPRAYING

For soils and land surfaces.



SOIL DRENCHING

For heavily contaminated areas.



IRRIGATION

For large areas and stockpiles.



MARINE APPLICATION

For water surfaces and shorelines.

RECOMMENDED DOSAGE*



SOILS

1 to 5 L of HYGEA[®] OLEOCLEAN per m² of contaminated area, diluted in water.



WATERS

0.5 to 2 L per m³ of water, depending on contamination level.



Dosage may vary depending on the type of hydrocarbon, site conditions and project objectives.

*Technical recommendation. Field adjustment may optimize results.

KEY FACTORS FOR SUCCESS



Optimum temperature:
10 – 40 °C



Adequate moisture:
Improves microbial activity



Oxygen availability:
Supports biodegradation



Continuous monitoring:
Ensures efficiency and optimal results



BEFORE

AFTER



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BENEFITS OF HYGEA® OLEOCLEAN

TOTAL VALUE THAT GENERATES RESULTS

HYGEA® OLEOCLEAN delivers measurable and sustainable benefits that optimize operations, reduce costs and protect the environment.



TECHNICAL BENEFITS



HIGH BIODEGRADATION EFFICIENCY

Specialized microorganisms and enzymes break down hydrocarbons rapidly and completely.



FAST AND VISIBLE RESULTS

Reduces hydrocarbon concentrations, odors and residual toxicity in less time.



OPERATIONAL RELIABILITY

Stable performance in a wide range of conditions (pH, salinity, temperature, soil types).



EASY TO APPLY

Simple application with conventional equipment. Can be applied preventively or correctively.



COMPATIBLE AND SAFE

Non-corrosive, non-toxic and safe for personnel, infrastructure and equipment.



SCALABLE SOLUTION

Effective in small, medium and large scale projects, from spills to industrial sites.



ECONOMIC BENEFITS



REDUCES OPERATIONAL COSTS

Lower spending on chemicals, fuel, equipment and labor.



REDUCES DISPOSAL COSTS

Decreases the volume of contaminated material and the need for off-site disposal.



MINIMIZES DOWNTIME

Faster remediation means less interruption of operations and productivity loss.



INCREASES ASSET VALUE

Protects infrastructure, extends asset life and maintains site value.



AVOIDS FINES AND LIABILITIES

Helps comply with environmental regulations and reduces legal and financial risks.



HIGH RETURN ON INVESTMENT

Measurable savings and fast payback through efficiency and risk reduction.



ENVIRONMENTAL BENEFITS



ENVIRONMENTAL RESTORATION

Degrades hydrocarbons into harmless by-products: CO₂, water and biomass.



PROTECTS ECOSYSTEMS

Reduces soil, water and air contamination, protecting flora and fauna.



IMPROVES WATER QUALITY

Clears petroleum contamination and restores natural balance.



REDUCES GREENHOUSE GASES

Biodegradation generates less emissions compared to chemical or thermal methods.



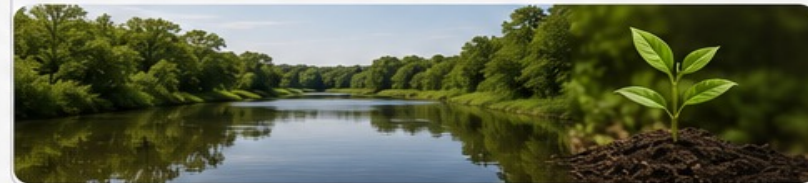
SUSTAINABLE AND GREEN SOLUTION

100% biological, derived from nature and aligned with circular economy principles.



SOCIAL AND COMMUNITY RESPONSIBILITY

Promotes safer environments and contributes to community well-being.



ONE PRODUCT. MULTIPLE BENEFITS. LASTING IMPACT.

HYGEA® OLEOCLEAN: Technology that works for your operations, your bottom line and our planet.



OPTIMIZES
OPERATIONS



REDUCES
COSTS



PROTECTS
THE PLANET



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