ESSPO

NEWCLYN WOODCLYN

OIL CONTAMINATION TREATMENT

NEWCLYN

OIL CONTAMINATION TREATMENT

- The problem.
- Our technology.
- Why “Newclyn”?
- How it works.
- Cleaning time.
- Product characteristics.
- Recommendations.
- Standart workflow.
- The experience.

WOODCLYN

TREATMENT OF CREOSOTE-IMPREGNATED WOOD

- The problem.
- Our technology.
- How it works.
- Technology advantages.
- Product characteristics.
- Standart workflow.
- The experience.

- Other activities.
- Our core competencies.
- Contact us.

ESSPO

ABOUT US

In 2013 a group of Lithuanian biotech engineers realized that many nowadays problems faced by environment sector could be solved by the solutions they had. That gave for ESSPO an impulse to invest in biotechnologies.

PRODUCTS THAT MAKE A CHANGE

ESSPO has a modern laboratory that develops and produces various biological preparations for environment.
Every day our biotech engineers create effective, environmentally friendly and high return products, and provide innovative environmental solutions.

CREATED BY OUR HANDS

The essence of ESSPO products – unique microorganisms collected from the soil and nature by our hands.
We work in a way that you do not have to sacrifice one advantage over the other – ESSPO technologies are affordable with rapid rates of return, harmless to people and the environment.

THE PROBLEM – A START POINT OF OUR WORK

Our products and technologies are based on the use of bacteria or other microorganisms. After identifying the problem in business, agriculture or personal household, we look for the right microorganism in nature, to tackle this problem. It is definitely a long and diligent work.
Following the identification of the preferred species of microorganisms, we isolate them and select those that have the strongest potential in performing the required functions and are suitable for growth in bioreactors.

WE TEST IT

We test every product and technology, commission studies in accredited institutions and release our products to the market when the evidence of efficiency and cost-effectiveness is acquired. We put much effort, so we guarantee that partners are fully happy with our products.

NEWCLYN

OIL CONTAMINATION TREATMENT

THE PROBLEM

In the oil industry, there are moments then oil contamination happens: when oil is extracted, transported, refined, used, etc. Solving these problems by old techniques, we face other issues: the solutions are not environmentally friendly, are not effective for a high concentration of oil; are not cost-effective, so companies prefer not to solve the problem at all.

OUR TECHNOLOGY

NEWCLYN is a next-generation bioremediation technology for oil contamination. Microorganisms use oil hydrocarbons as a source of their food and decompose them to compounds that are safe for humans and the environment – H_2O and CO_2.

WHY “NEWCLYN”

300 g/kg<

No limits for oil concentration.

Effective with heavy oil hydrocarbons C_{30-40}, PAH16, BTEX and etc.

Economically, it is more profitable way of handlingsuch waste.

Does not cause secondary pollution.

Does not pose a risk to humans or the surrounding environment.

HOW IT WORKS

NEWCLYN is a new generation biological product produced by cultivating specially selected microorganisms. The product is used to clean oil products from contaminated water, soil, industrial sludge, etc. The technology is suitable for cleaning both heavy and light oil hydrocarbons.

The concentrate of the preparation is diluted with water and sprayed on a contaminated surface. The latter is not only treated with the preparation, but is also aerated according to the schedule, supplemented with special bacteria-stimulating materials, and maintained with the required moisture.

CLEANING TIME

Each client is informed clearly before commencement of work regarding how fast the technology will be able to break down petroleum products in the contaminated object. For this, a detailed assessment of the object is carried out by determining the concentrations of petroleum product and their nature, analysing soil structure, considering soil remediation requirements, etc.

If the object will be dominated by a lighter group of petroleum hydrocarbons $C_{6\text{-}30}$, we can predict that we will be able to reduce concentrations of such products by up to 90% per month. Objects that commonly occur in practice which are dominated by hardly decomposing petroleum hydrocarbons belonging to $C_{30\text{-}40}$ group can complicate remediation, however the microorganisms that we have are very effective at breaking down even the aforesaid petroleum hydrocarbons. Our practice shows that, by using our technology, we will reduce up to 60% of such petroleum hydrocarbons per month.

PETROLEUM HYDROCARBOS REDUCTION PER MONTH !

$C_{6\text{-}30}$ ↓ 90%

$C_{30\text{-}40}$ ↓ 60%

USE

1. NEWCLYN is suitable for cleaning oil-contaminated soil, water, oily sludge, etc. The product can be used for both methods of cleaning up: *in situ* and *ex situ*.

2. The product concentrate is diluted with water and sprayed on the contaminated surface. According to the provided schedule, the contaminated area is also continuously aerated and humidified, various substances may be added.

PRODUCT CHARACTERISTICS

State	**Liquid**
pH	**Neutral**
Freezing temperature	**≤ -2 °C**
Toxicity	**None**
Storage	**-18 °C**
Expiry date	**If frozen, 1 year**

OPERATING MODE

	Operating conditions	Best at
Temperature, °C	**+5 – +40**	**+20 – +25**
Humidity, %	**10 – 60**	**20 – 30**
pH	**5,7 – 8,2**	**7 – 7,2**

RECOMMENDATIONS FOR INFRASTRUCTURE

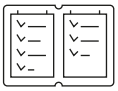
The situation of each customer is very individual. The concentration of pollutants, its age, origin, soil or water contents, working conditions, etc. may differ. Therefore, specialists of ESSPO submit individual work plans for each case.

At the same time, there are a sufficient number of similar principles of preparation for each situation, which will determine how successful the cleaning works will be. Below are recommendations for the preparation of cleaning infrastructure.

TREATMENT AREA OR WATER RESERVOIR

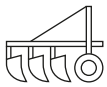
Cleaning works require certain working area for oil contaminated soil/sludge or suitable reservoir for water cleaning. When cleaning soil/sludge, it must be spread over the site thickness which allows the proper performance of various processes: soil mixing, maintenance of moisture and oxygen, etc.
The water tank should be prepared in such way as to allow the water to be continuously aerated and mixed over its entire volume.

Cleaning infrastructure can be installed both indoors, and out doors.
When cleaning works are carried out in closed room, it is necessary to provide cavities (windows) for the entrance of sunlight.

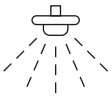


The cleaning infrastructure must meet all environmental requirements specific to the location.
Groundwater must be protected from hazardous wastewater (e.g., it will form additionally irrigating the soil or by rain), wastewater must be collected, the area must be restricted to the access of unauthorized persons, etc.

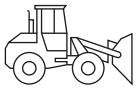
EQUIPMENT



MIXING. Mixing is required to ensure the availability of oxygen for microorganisms and the uniformity of moisture and microorganisms throughout the whole volume of cleaned substance.
Usually agricultural machinery can be used: tractors, ploughs, cultivators.



SPRAYING. The bacteria are sprayed with specially adapted (agricultural or other) equipment.
The bacteria must be sprayed at a pressure of not more than 3 bar. Each spraying aggregate has different properties and technical parameters, so the first sprays are used to take control samples and assess the suitability of the spraying equipment.



MOISTURE. Proper moisture of cleaned soil/sludge is critically important for the viability of microorganisms. Additional moisture may also be carried out by agricultural or other equipment. Technical parameters are selected individually depending on the amount of work and the situation.

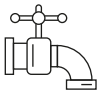
COMMUNICATIONS

Electricity. Premises with an electrical input (power is set for a specific object) are required.
There must be a possibility of installing refrigeration rooms or to build freezers of certain size. They will be used for storing bacteria, the amount of which will be set in advance.

Water. Water will be used for both additional moisture and spraying of bacteria, and maintenance of equipment and surroundings.
According to predefined requirements, the water amount and its availability must be guaranteed 24/7.

STORAGE AND PREPARATION OF BACTERIA

Freezing. In order to extend the expiry date of the biological preparation, it is frozen to -18°C immediately after production.
The product is only removed for the purpose of transport (under the same temperature regime) or before use for cleaning purposes.



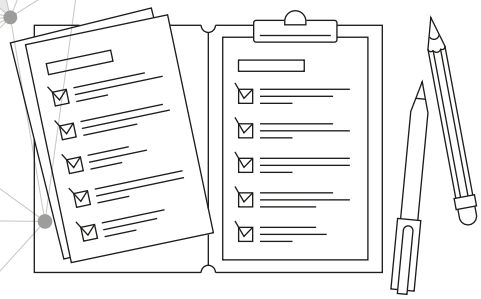
Thawing. The container of the biological product is removed from the refrigerator and maintained in a positive temperature-controlled environment for complete thawing.
To speed up thawing, it is recommended to twiddle a container every 30-60 minutes. After thawing, the product should be used within 5-10 hours.
It is forbidden to use artificial heat sources for thawing, keep it in direct sunlight, and so on.

Mixing with water. Concentrate is always diluted with water.
Dilution ratio can be from 1:10 to 1:100
according to a particular situation.

STANDART WORKFLOW

STAGE 1

1



SITUATION ASSESSMENT

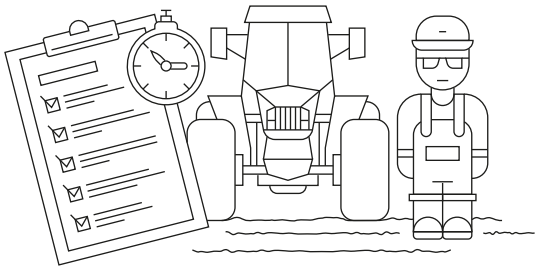
Complete information about the contamination of an existing facility is collected:

- Amount of pollutants (concentration)
- Origin of pollutants
- Amount of polluted water/soil/sludge
- Waste amounts (annual or monthly)
- Working conditions

(weather conditions, infrastructure for cleaning)

- etc.

2



PREPARATION OF PLAN FOR CLEANING

After the assessment of the contamination, a plan for cleaning is prepared:

- Amount of pollutants (concentration)
- Origin of pollutants
- Amount of polluted water/soil/sludge
- Waste amounts (annual or monthly)
- Working conditions

(weather conditions, infrastructure for cleaning)

- etc.

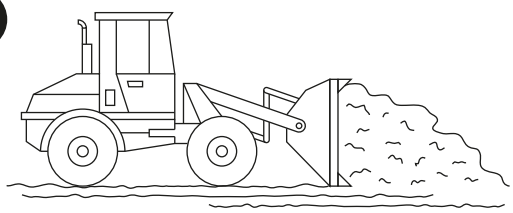
EACH CLIENT AND EACH SITUATION ARE DIFFERENT. THEREFORE, IT IS VERY IMPORTANT TO ASSESS THE CONTAMINATED OBJECT CORRECTLY AND TO MAKE A CLEANING PLAN, ESSENTIAL PARTS OF WHICH ARE:

1. Intensity of use of the preparation. In most cases the contaminated surface is treated 2 - 8 times a month.
2. Maintenance of proper moisture and pH. Water and suitable pH are required for bacteria to perform.
3. Monitoring of biogenic substances. In most cases addition of biogenic substances is necessary in cleaning processes if oil product concentration is very high and the addition takes place 3-4 times during the whole treatment period. Usually these procedures constitute for a small part of the cleaning process.
4. Maintenance of oxygen content. It is recommended to spread the soil with 30-60 cm thickness of the layer and thoroughly mix it 2-8 times per month.

STANDART WORKFLOW

STAGE 2

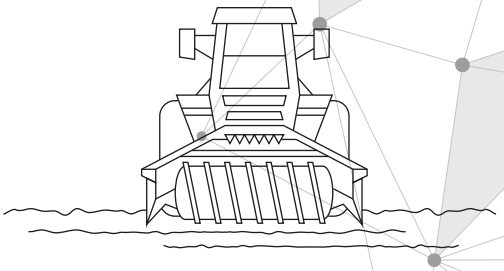
1



SPREAD

Soil/sludge must be spread over the site thickness which allows the proper performance of various processes: soil mixing, maintenance of moisture and oxygen, etc.
The cleaning site must meet all environmental requirements specific to the location.

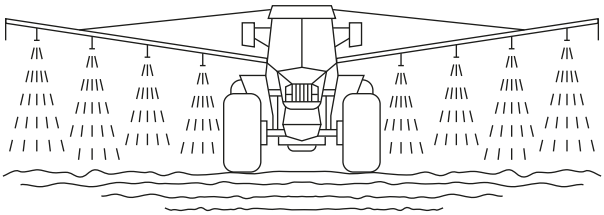
2



MIXING

Mixing is required to ensure the availability of oxygen for microorganisms and the uniformity of moisture and microorganisms throughout the whole volume of soil.

3



SPRAYING MICROORGANISMS

The bacteria are sprayed with specially adapted (agricultural or other) equipment.

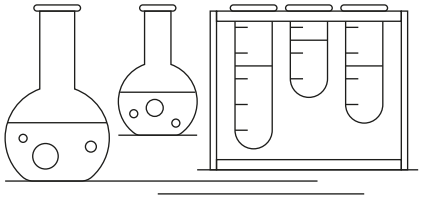
DOSAGE

Usually, we are applying our microorganisms once or twice a week with 10-30 ml/tonne contaminated soil.

MOISTURISING

Proper moisture of soil wood is critically important for the viability of microorganisms.

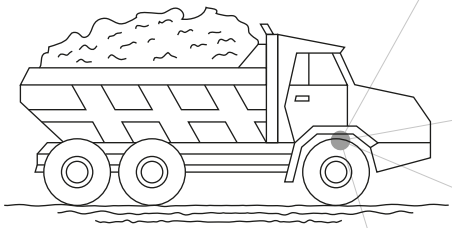
4



CONTROL SAMPLES

During the entire cleaning, control samples are taken usually every two weeks, which not only shows how the concentrations of hazardous substances change, but also allows you to control the proper workflow and intensity of work.

5



SECONDARY USE

Once we have cleaned the soil, it can be used for other purposes.

THE EXPERIENCE

CASE STUDY No 1

OIL REFINERY | more than 30,000 tons of oil sludge.

1

excavation of contaminated soil
(oil sludge) from the pool

2

spreading contaminated soil
(oil sludge) on treatment
(bioremediation site).
Oil concentration ~150-200 g/kg

3

cleaning process
(after ~3-4 months).
Oil concentration ~80 g/kg

4

cleaning process
(after ~7-10 months).
Oil concentration ~15 g/kg

THE EXPERIENCE

CASE STUDY No 2

TRIALS WITH VILNIUS UNIVERSITY LIFE SCIENCE CENTRE BIOSCIENCE INSTITUTE

1

Starting TPH concentration C_{10-40}
40.000 mg/kg
C_{10-28} - 40 %
C_{28-40} - 60%

2

Starting TPH concentration C_{10-40}
102.000 mg/kg
C_{10-28} - 40 %
C_{28-40} - 60%

RESULTS

60 DAYS OF TRIALS

	Concentrations of petroleum products, mg/kg					
	A			**B**		
	Starting	Final	**Reduction**	Starting	Final	**Reduction**
C_{10-12}	438	55	**87%**	1 830	402	**78%**
C_{12-16}	1 420	289	**80%**	7 520	2 550	**66%**
C_{16-35}	30 500	6 990	**77%**	82 800	38 000	**54%**
C_{35-40}	7 680	1 750	**77%**	10 300	3 840	**63%**
C_{10-40}	40 000	9 080	**77%**	102 000	44 800	**56%**

WOODCLYN

TREATMENT OF CREOSOTE-IMPREGNATED WOOD

THE PROBLEM

To increase the longevity of wooden rail ties or electricity poles, they are treated with creosote. This chemical guards the wood against humidity and its caused rot. However, creosote is toxic, making used wooden a toxic waste, which may be hazardous to humans and the environment.

OUR TECHNOLOGY

WOODCLYN is new generation biological product used to biodegrade polycyclic aromatic hydrocarbons (PAH). The preparation is intended for the cleaning of the wood of used railway sleepers or electricity poles that have been impregnated with creosote.



HOW IT WORKS

Microorganisms in the product use polycyclic aromatic hydrocarbons (PAHs) as a source of food and decompose them into H_2O and CO_2, i.e., compounds that are not harmful either to the environment, or humans.

TECHNOLOGY ADVANTAGES

- Technology is easy to apply.
- There is no secondary pollution or side effects.
- Wood that can be used for biofuel after cleaning.
- Cost effective - it is a cheaper way to solve your pollution problems

PRODUCT CHARACTERISTICS

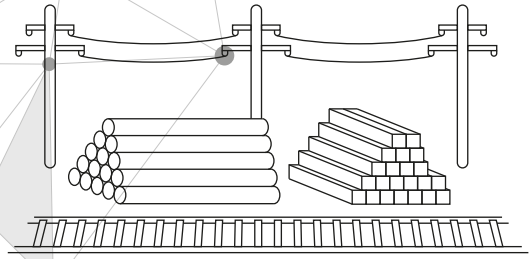
State	**Liquid**
pH	**Neutral**
Freezing temperature	**≤ -2 °C**
Toxicity	**None**
Storage	**-18 °C**
Expiry date	**If frozen, 1 year**

OPERATING MODE

	Operating conditions	Best at
Temperature, °C	**+5 – +40**	**+20 – +25**
Humidity, %	**10 – 60**	**20 – 30**
pH	**5,7 – 8,2**	**7 – 7,2**

STANDART WORKFLOW

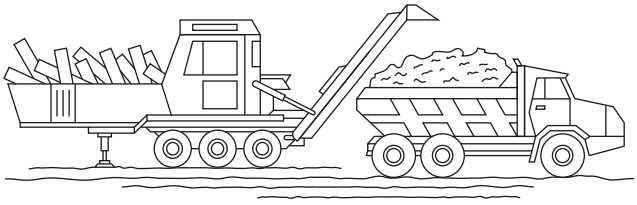
1



WOODEN
• RAILWAY SLEEPERS
• ELECTRICITY POLES

Wood that has been impregnated with creosote. After use such sleepers and poles become hazardous waste.

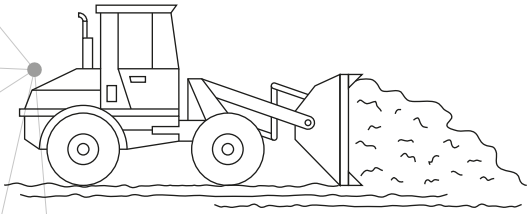
2



CRUSHING AGGREGATE

For efficient cleaning of w ooden sleepers, they must be crushed. It is recommended that the particles of crushed wood be 3-5 cm in size.

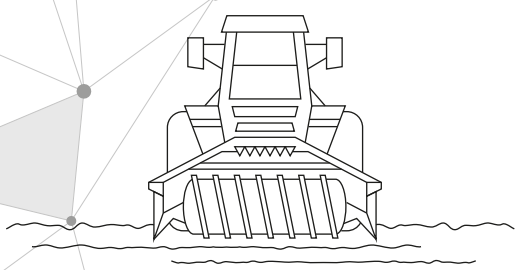
3



SPREAD

The crushed wood must be spread over the site thickness which allows the proper performance of various processes: soil mixing, maintenance of moisture and oxygen, etc.
The cleaning site must meet all environmental requirements specific to the location.

4



MIXING

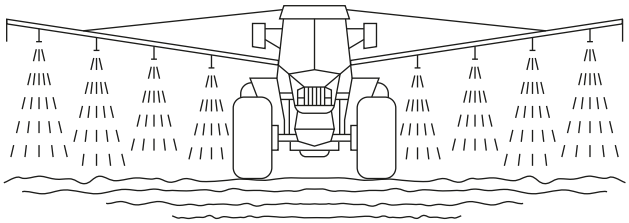
Mixing is required to ensure the availability of oxygen for microorganisms and the uniformity of moisture and microorganisms throughout the whole volume of crushed wood.

STANDART WORKFLOW

5

SPRAYING MICROORGANISMS

The bacteria are sprayed with specially adapted (agricultural or other) equipment.



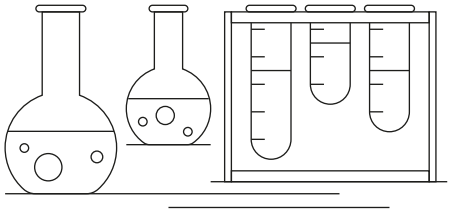
DOSAGE

Usually, we are applying our microorganisms once or twice a week with 10-30 ml/tonne contaminated wood.

MOISTURISING

Proper moisture of crushed wood is critically important for the viability of microorganisms.

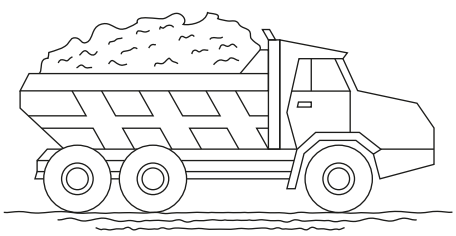
6



CONTROL SAMPLES

During the entire cleaning, control samples are taken usually every two weeks, which not only shows how the concentrations of hazardous substances change, but also allows you to control the proper workflow and intensity of work.

7



SECONDARY USE

Once we have cleaned the wood, it can be used for biofuel or for other purposes.

THE EXPERIENCE

CASE STUDY No 1

RAILWAY SLEEPERS TREATMENT TRIALS | 10 tones (~100 units) of used railway sleepers

1

Used wooden railway sleepers

2

Crushed wooden railway sleepers.

RESULTS

	Concentrations µg/kg		
PAH		**after 75 days**	**%**
naphthalene	72 000	6 610	**-90,8**
acenaphthene	44 900	5 000	**-88,9**
fluorene	28 100	4 220	**-85,0**
phenanthrene	96 300	8 080	**-91,6**
anthracene	27 600	4 020	**-85,4**
fluoranthene	78 100	16 200	**-79,3**
pyrene	36 800	11 200	**-69,6**
benz[a]anthracene	18 800	5 630	**-70,1**
chrysene	12 600	5 510	**-56,3**
benzo[b]fluoranthene	4 590	2 530	**-44,9**
benzo[k]fluoranthene	2 590	1 110	**-57,1**
benzo[a]pyrene	3 810	2 590	**-32,0**
dibenz[a,h]anthracene	389	309	**-20,6**
benzo[g,h,i]perylene	1 180	1 560	**32,2**
indeno[1,2,3-c,d]pyrene	653	486	**-25,6**
SUM:	**428 412**	**75 055**	**-82,5**

OTHER ACTIVITIES

ESSPO is a science-based production company. Our specialists will be happy to give you the best service not only by supplying you with the technologies and products already developed, but also by developing new solutions for you.

OUR CORE COMPETENCIES

Selection of the necessary microorganisms from nature to perform the required functions.

Production of microorganisms that are best concentrated, more stable and feature wide-ranging application potential.

Development of technologies to support the solution of problems in your business by using microorganisms or their products.

NEWCLYN
WOODCLYN

OIL CONTAMINATION TREATMENT

Martynas Paškevičius
PARTNER Biotechnology

+370 615 88378

martynas@esspo.lt

www.esspo.lt/en/

Troškūnų st. 1, Anykščiai
LT-29100, Lithuania

BIOTECHNOLOGIES FOR A CLEANER FUTURE


ESSPO