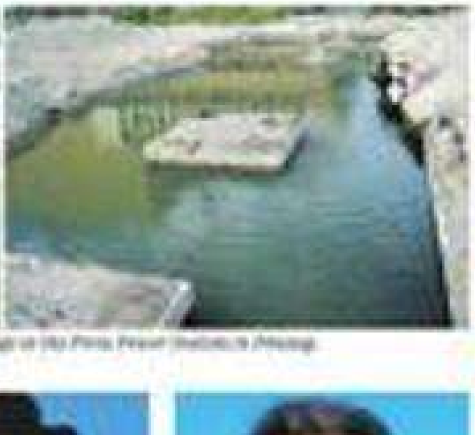
A new natural clean up process



TENAGA NASIONAL BERHAD

THE NEW STRAITS TIMES

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Before (Inset): Soil contaminated by transformer oil at the Perai Power Station in Penang. After: The soil was remediated using effective microbes, after which cow grass was planted.

A new natural clean up process

A NEW and innovative process, bioremediation is a process that helps rid harmful chemicals in the environment. A natural process that does not harm the environment, bioremediation uses microbes that live in the soil to remediate contaminants, for example those found in gasoline and oil spills.

However, the soil and groundwater must be the right temperature, and have the right amount of nutrients and oxygen in order for these microbes to cleaning up the contaminants. The microbes degrade the contaminants and change it into water and harmless gasses like carbon dioxide. This is vital as when the conditions of the soil are not right, the microbes will grow too slowly or die. If the conditions of the soil are not conducive for bioremediation, aeration, nutrients and other substances are supplied to the contaminated area.

This process is a very safe one as the microbes pose no threat to people who are conducting the bioremediation or the community while the nutrients that are added to make the microbes grow are ones that are commonly used in gardens.

PIONEERING THE PROJECT

In 2009, bioremediation was successfully carried out by TNB Research (TNBR), the in-house solution provider for Tenaga Nasional Berhad, at the Perai Power Station in Penang.

"The initial idea of using bioremediation came about from the Department of Environment in Penang. It was a big challenge for us as the technology at that time was new not only to TNB but also to Malaysia. Still, we managed to identify a local microbiology expert who had knowledge of basic microbiological work and application coupled with the knowledge from literature reviews based on successful areas treated using bioremediation from abroad," says Ir Mohd Noh Ahmad, Head of TNBR's Environmental Unit and Project Director of its bioremediation project.

The power station had demolished some of its old power plants and dismantled some of the transformer units. During the dismantling work, spillage of transformer oil occurred and this spillage contaminated the soil near the switch yard area, seeping through the upper layer of soil. These contaminants were classified by the Department of Environment as scheduled waste, which are spillages of potentially harmful contaminants.

To remedy the situation, TNB Research carried out a study on the bioremediation of oil-contaminated soil using effective microbes. Effective microbes are a natural, probiotic technology that was developed more than 25 years ago based on beneficial and effective microorganisms.

"The effective microbes were produced originally from the contaminated area itself. Isolation and screening of these oil degrading microbes enabled us to utilised them in treating the contamination," says Shahril Mod Husin, Senior Researcher and Project Leader of the bioremediation project.

"We used the local microbes to treat the contaminants because no harmful contaminants would be created if the microbes die. But if we used off-the-shelf microbes from abroad, they may have had potential to create harmful chemicals should they have died," he adds.

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TREATING THE SOIL WITH EFFECTIVE MICROBES

Five stages of effective microbes treatment were developed in this study, explains Ahmad Nazri Saidin, Researcher for Bioremediation in TNBR. The first stage of treatment is isolation and during this stage of treatment the biological and physical needs of naturally occurring microbes are isolated. From the study it was discovered that production of effective microbes is through a combination of many microbe species.

The second stage of the treatment is the environmental site assessment and geophysical analysis that is an intrusive investigation and assessment of a property to identify and determine the presence, nature and extent of potential subsurface contamination. This stage is to establish contaminant risk level, both the extensiveness and the intensiveness of the contamination.

"In the third stage of the treatment, a suitable physical separation technique was developed at the contaminated area. This treatment is to reduce the contaminants concentration by reducing the contamination the degradation period is shortened" Nazri continues.

During the fourth stage, inoculums are developed and effective microbes are produced on a large scale. The final stage of treatment involves developing techniques and approaches to enhance the treatment of effective microbes. During this stage, post-treatment is conducted where the treated soil is then transferred back from the treatment area to its original place. The surface layer of the soil is then covered with cow grass for landscaping.

BENEFITS OF BIOREMEDIATION

"There are a lot of arguments on which clean-up method is more effective, however, we feel that engaging in bioremediation to relieve the environment of harmful chemicals has more advantages. For one, it is a method of treatment that is very cost-effective compared to the cost of incineration," explains Nazri.

As bioremediation uses only natural treatment, it does no harm to the environment. The microbes are able to degrade contaminants to harmless substances like carbon dioxide, water and cell biomass that pose no threat to the environment.

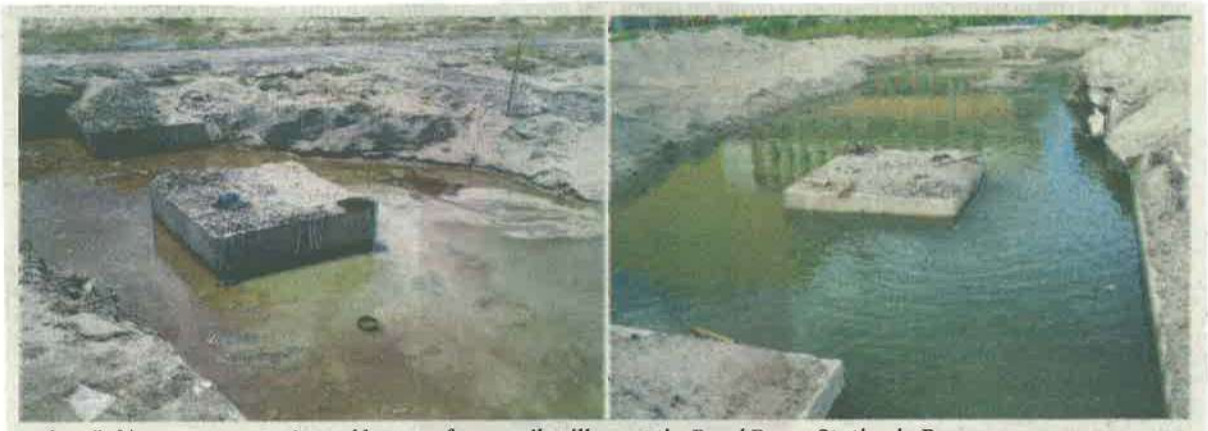
"While conventional methods often require personnel to come in close contact with contaminants, which run the risk of a more widespread exposure in the event of an accident during clean up procedures, bioremediation keeps risks at a minimum as the process degradation takes place naturally," he adds.

TNBR has now further developed the identified an effective microbe consortia. This will allow it to get the maximum treatment efficiency to be applied in any oil-contaminated soil within the TNB premises.

***Ahmad Nazri Saidin**, Researcher for Bioremediation at TNB Research.*

***Shahril Mod Husin**, Senior Researcher and Project Leader of the bioremediation project.*

***Ir Mohd Noh Ahmad**, Head of TNBR's Environmental Unit and Project Director of its bioremediation project.*



Before (left): Water contaminated by transformer oil spillage at the Perai Power Station in Penang.
After: Clean water after the bioremediation process.