**Microbial based remediation of oil spill & oily sludge: A sustainable approach for environmental protection from oil contaminants**

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Owing to the detrimental impact of hazardous petroleum hydrocarbons on terrestrial and aquatic environment, environmental contamination with oil spill and oily sludge has become a serious problem worldwide. This is mainly attributed to ‘oil production’ and ‘oil importing’. In spite of preeminent efforts of petroleum industry and regulatory authorities, several incidents of oil spills are reported globally across countries. Traditional methods employed for decontamination of ‘oil spill’ and oily sludge include; dumping oily sludge and oil well drill cuttings into specifically constructed pits. Oil industries spend millions of rupees to tackle this oil contamination problem. Traditional methods do not eliminate oil contaminants completely and they are laborious and expensive and thus are not sustainable. Hence, sustainable technologies are increasingly in demand for protection of the environment from hazardous contaminants

Keeping in mind the challenging global scenario for sustainable mitigation of oil contaminated environment, researchers at TERI investigated intensively on development of a microbial based process for biodegradation of hazardous petroleum hydrocarbons. Six years of in-depth research investigation at TERI finally paved the way for invention of ‘Oilzapper’ that could biodegrade the oil in a sustainable manner from terrestrial as well as aquatic environment. After screening for more than 1000 bacterial strains, ‘Oilzapper’ cocktail could be formulated by selecting unique strains. ‘Oilzapper’ is a defined stable consortium of selected natural occurring nonpathogenic bacterial strains isolated from petroleum hydrocarbon contaminated soil sample. These bacterial strains have good synergy to work in the consortium yet capable of specific degradation of alkane, aromatic, NSO (nitrogen, oxygen, sulphur containing compound) and asphaltanes fractions from the total petroleum hydrocarbon. Oilzapper could biodegrade oily sludge at a very fast rate under laboratory conditions. Further to scale up this process in pilot scale and then in field implementation scale, various nutrient medium and fermentation conditions were standardized for mass scale production of Oilzapper.

Oilzapper was produced in bulk in a bioreactor and mixed with a biodegradable carrier material. Oilzapper is in powder form hence application is easy. Oilzapper was packed in reusable polybags and transported at various oil refineries and oil exploration sites for cleanup of oil spills and treatment of oily sludge. ‘Oilzapper’ remediates oil contaminated environment in a sustainable manner and thus eco-friendly in nature and economically viable. Broad scale application of oil zapper along with TERI’s state of art pilot scale fermentation facilities ranging from; 15000 liter, 1500 liter, 300 liter, 150 liter fermenters, presently ‘Oilzapper’ production could be scaled up in Industrial scale.

‘Oilzapper’ have been successfully used by several oil industries. Presently, the list of clients for Oilzapper includes all the oil-producing and exploration companies operating in India such as Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd, Oil India Ltd, Hindustan Petroleum Corporation Ltd, Oil and Natural Gas Corporation Ltd, Cairn Energy, UK, Tata Power Company Limited, Reliance Industries Ltd, Numligarh Refinery, BG Exploration and Production India Limited, Canoro Resources Ltd, etc. TERI’s Oilzapper technology has also carried out successful demonstration on bioremediation of oil contaminated land at Kuwait including oil contaminated drill cuttings of ADNOC, Abu Dhabi.

Further ‘Oilzapper’ technology enabled TERI to get a pilot scale project from KOC (Kuwait Oil Company) to restore the effluent pits, to repair environmental damage and eventually for cleanup of oil contaminated soil in Kuwait and to rehabilitate the remediated site.

Till date ‘Oilzapper’ has cleaned more than **4,14,000 tonnes** of oily sludge and oil contaminated soil and successfully helped in restoring the land in sustainable manner.