Slick solution for oil spills

With at least 250,000 gallons of "anti-freeze-like" synthetic dispersants having been pumped into the Gulf of Mexico to mitigate the Deepwater Horizon catastrophe, and serious concerns raised about the effect of this type of technology on the marine food chain, has the time come to look at alternatives? Jose Maria Sanchez de Muniain speaks with a company that has a multi-purpose, eco-friendly "bio-agent" with bioremediative capacities that turns the slick into marine food.

At the time of going to press the decision had been taken by the US Coast Guard to halt the use of dispersants in deep water because the effects these chemicals were having on deep water marine life were unknown.

One alternative technology that (up to now) hadn't been used in the Gulf of Mexico was Bioversal HC, owned by Bioversal International in Vienna (Austria). Although the company's technology is widely used in Europe, it has not managed to find an opening in the USA because, believes the company, of the strong influence exerted by the competing chemical lobby therein. In contrast to synthetic substances, Bioversal is composed of biochemical ingredients of botanic origin.

Ioannis Athanasiou, Technical Director & International Business Development for Bioversal, spoke exclusively to *IFJ* about how the product works. "Actual dispersant science is a 40-year-old conventional approach based on a trade-off, decision-making process. It accepts eco-toxicological impact when applied in order to avoid spills contaminating natural coasts infrastructures, but this is no longer coherent with state-of-the-art environmental engineering and microbiology scientific knowledge.

"Current requirements and standards of synthetic dispersants follow visions, objectives and tactics that handle oil spills in a very different way to the Bioversal HC approach. Oil spills nowadays are treated like chemotherapy and cancer-cells – killing and weakening the immune-system of nature. Our approach is completely different, we treat and enhance the immune system so that the immune system can cure itself."

What Bioversal HC does is first of all disperse the hydrocarbons on the surface of a spill, and then encapsulates them so that volatile organic compounds (VOC) cannot escape into the atmosphere – the aim is to keep the oil on the surface where oxygen supply is unlimited and light is available – and heat (bacterial biodegradation processes have their maximum performance at 25-30°C). "This way a biodiversity of micro-organisms degrade the oil and take the oxygen required to do so from the air – as opposed to the sea. The end result from the aerobic biodegradation process is carbon dioxide and water, as well as biomass."

Bioversal contains special "biotensides" that don't inhibit bacterial growth due to eco-toxicological interactions, as well as a bio-activator, which stimulates the mechanisms of the whole aerobic biodegradation process. The result is that bacteria experience a population growth spurt, thus naturally accelerating the biodegradation process of the hydrocarbon in a natural way.

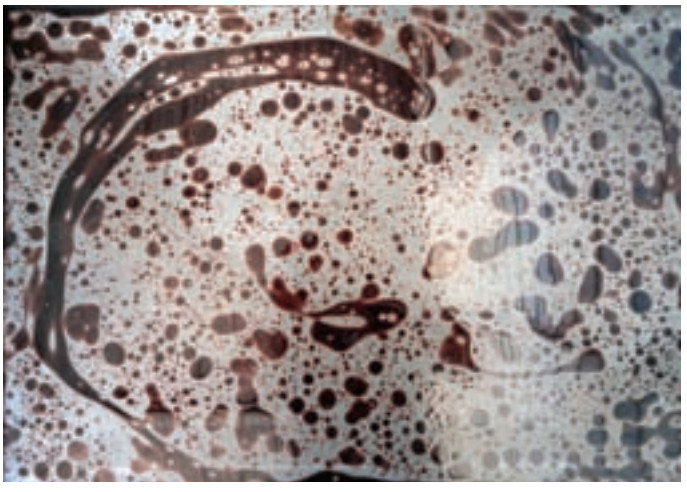
So would Bioversal HC have been the solution for a massive slick like that in the Gulf of Mexico? Athanasiou believes it could have been useful in some crucial applications. "After a few hours oil has a tendency to sink somewhat, so even when you spray synthetic dispersant the effect is small because the oil has to be mixed with the dispersant, typically with high pressure nozzles that create the turbulence to mix it in. We have tested it and if you do not get to the slick before the oil starts sinking, it is not easy.

"Where it can be extremely helpful is in wetting the coast infrastructure because once stones, plants etc are sprayed with Bioversal HC, the oil cannot stick to them while wet. The product is completely non-toxic, and it has been successfully applied to clean the oil-contaminated plumage of birds – even oral administration brings no negative effects whatsoever."

Due to the fact that the product is so revolutionary, no relevant standards exist for it and as a result Bioversal International has had to create its own standard just to be able to classify the product. This was recognised recently by the Legislature of Italy, where biocompatible surfactants (termed "tesioattivi pseudonaturali") have been approved as a separate class of remediative products for applications in marine oil spill remediation within Italian territories.

Speaking at the recent First Adriatic Oil Spill Conference in Opatija, Croatia in May this year, the molecular physiologist and ecotoxicologist Reinhard Dallinger (Institute of Zoology, University of Innsbruck, Austria) spoke about the use of such products during oil spills: "In such critical situations, modern biocompatible surfactants may help to stimulate and enhance the natural process of hydrocarbon biodegradation that is brought about by inherent microbial communities… The use of 'Bioversal' as a modern and novel means to combat mineral oil contaminations

Spill being tackled with Bioversal in County Roscommon, Connacht (Ireland). Bioversal is typically applied to water with high pressure nozzles to ensure a good mix with any oil that has sunk beneath the top surface of the water.



Bioversal HC disperses hydrocarbons on the surface of the spill, then encapsulates them and keeps them on the surface of the water. The end result is carbon dioxide, water, and biomass.

hence appears to be ecologically compatible and expedient."

Josef Buchta, President of the Austrian Fire Service Association, has in the past spoken positively on the use Bioversal HC in Lower Austria during extensive flooding of the river Danube in 2002, where the product was used on a large scale to deal with oil. Similarly, it was used in the municipality of Dürnkrut (Austria) in March/April 2006 following a dam failure resulting in large quantities of oil flowing from ruptured tanks. In that particular incident the product was applied with special 10-litre hand-spraying devices which work with high pressure technology from the firefighting trucks.

Other applications – emergency response

In Austria, Germany, Italy, and Switzerland, municipal fire brigades are using Bioversal HC to neutralise environmental damage that can arise from hydrocarbon (diesel, petrol, biofuel, oil, animal fats) leaks. "After absorbents have been used to clear spillages, fire brigades in these countries are permitted to apply Bioversal on the surface of the ground. The big issue here is that while most of the oil may have been removed with absorbents, some will remain on the ground – and it could be flushed out by rain and even cause a further accident. Once Bioversal HC has been applied, nature takes its course and breaks it down in around 14 days, depending on variables such as temperature."

Interestingly, different variations of the Bioversal product are also used as extinguishing materials without losing the same bioremediative effect as Bioversal HC. Bioversal QF, for example, is EN-1568-3 Level 1A, GOST, ICAO level B (3%) approved for ARFF usage in airports. It has also been successfully tested at TNO Netherlands according to UL-162 requirements (UL Standard for Safety for Foam Equipment and Liquid Concentrates). "Our fire extinguishing agent fulfils environmental requirements that simply don't exist at the moment. As well as having a high performance as a fire extinguishing agent, it cleans up the oil by first encapsulating it and then neutralising it as a combustible. This means that any foam water will also transform into something highly biodegradable."

So is Bioversal a miracle product? Athanasiou doesn't like that term. "No, such miracle products do not exist. This is a scientific product with all the relevant certification. Our aim is to communicate the concept behind the product. So whatever the primary mission is, to clean oil or extinguish fires, or even doing industrial cleaning in refineries, what is important to realise is that once that primary mission is completed, there is no new contamination problem to deal with."