

# Slurry... the future in europe?

Pressures for better and cheaper disposal of drilling fluid have led to the development of a new biodegradable product

**W**ITH the advent of new Environmental legislation in the UK and an increase of environmental awareness from both utility companies and municipal bodies it is not surprising that drilling fluids, and their disposal, have been put under the spotlight.

The UK legislation governing the disposal of waste drilling and tunnelling fluids is the Waste Management Licensing Regulations 1994. The European directive on such matters is the European Framework Directive on Waste which encourages waste reduction, recycling, and the development of clean technologies. Article 11 of this Waste Framework Directive gives European member states discretion to provide exemptions from waste permitting requirements for the disposal of waste at the place of production (except hazardous waste) and for genuine waste recovery. These exemptions (which included slurry waste) were found to be abused and a consultation on plans to amend the exemptions from waste management licensing was launched.

These consultations, culminating with the ever-evolving modification of legislation led to the June 2003 amendments of the UK's regulations and amendments to 'The Landfill Directive'.

'The Landfill Directive' (council directive 1999/31/EC on the landfill of waste) which raised its head in 2001 by banning fluid disposal at new landfill sites, aims to reduce landfill gas in order to reduce global warming. This is to be done by reducing the amount

of biodegradable waste going to landfill. The targets are:

- 75% of the 1995 quantity by 2006
- 50% of the 1995 quantity by 2009
- 35% of the 1995 quantity by 2014

Article 5 of the legislation forbids 'liquid waste' to be disposed at landfill sites. In addition, the new amendments state that the disposal of slurry to land is not permitted unless one can prove that it benefits the soil with ecological improvement. The amendments came into effect in the UK on July 16, 2004.

Anyone would be forgiven for being confused at the myriad of proposals and amendments and the labyrinth of legislation and directives, however one thing that will strike all of those involved in the industry is that slurry can no longer be legally disposed of, without treatment, to landfill sites or fields.

The disposal of waste mud has traditionally been by tanker to landfill tips. However, as discussed, this is no longer permitted without expensive pre-treatment. This has led to the requirement of a cost-effective, biodegradable, treatable fluid with the rheology required for various drilling and tunnelling operations.

#### NEW PRODUCT

To accommodate the new legislation, Drilling Supplies Europe has developed an environmentally friendly, cost-effective drilling fluid suitable for all tunnelling and drilling operations. The final product, after testing in

the laboratory and in the field, was achieved in February 2004 and is patented as Clearbore™.

Produced from dry, free flowing polymers, Clearbore provides exceptional borehole stability and cuttings removal in a wide range of ground conditions. The product is claimed to be universal, meaning that no additional additives are required for varying ground conditions. It provides highly enhanced gel strengths as well as additional fluid loss control in comparison to other fluids, meaning a lesser volume is required. The product has a high carrying capacity, prevents bit balling and provides clay and shale inhibition making it a 'one-sack' drilling fluid for all ground conditions. These properties also make it ideal for working below the water table and in saltwater.

The product is non-toxic, biodegradable and re-cycles well. Because the product naturally biodegrades it will soon become a requirement for all drilling operations in environmentally sensitive areas.

The product has a 10-fold volume-to-volume rheology comparison to high-yielding bentonite making a 5 kg bag of Clearbore the equivalent to 50 kg of high yielding bentonite. This reduces manual handling risks. Due to its gel strength and fluid loss abilities, the product can also be used as an additive to traditional bentonite admixtures.

One of the major advantages of Clearbore is the reduction of disposal volumes and costs. The product's polymeric chains are designed to instantly break down and become chemically destroyed in the presence of small quantities



Clearbore solution treated with Calcium Hypochlorite bleach (left) compared to untreated (right)

of calcium hypochlorite. As the polymer breaks down, drilled cuttings will settle out of the fluid forming approximately 20% of the volume whilst the liquid phase will form about 80% of the volume. This can be done overnight in a pit or holding tank to leave a fluid phase of less than 400 ppm suspended solids. The water phase can then be decanted and disposed of to a wastewater treatment facility or in the sewerage infrastructure, with permission from the authorities. The sludge/solids can be disposed of as semi-dry waste to landfill at a reduced cost.

**TESTING**

Clearbore is composed of a propriety blend of natural and synthetic biopolymers, which

are based on raw materials which will biodegrade within 4 to 52 weeks to break down into oxides of carbon and nitrogen. For EPA approval the product was subject to a 5-day technical scooping study to investigate the potential toxicity and environmental impact. This included X-Ray fluorescence spectroscopy (XRF), inductively coupled plasma atomic emission spectroscopy (ICP-AES), ion chromatography (IC), ecotoxicology assessment and biological oxygen demand

tests on the product. The XRF, ICP-AES and IC results recorded very low concentrations for the elements and anionic analytes they were measuring i.e. fluoride, bromide, calcium, sodium, sulphates, heavy metals etc.

The eco-toxicology was assessed by the EA utilising the BSI method BS6068. This involved exposing juvenile daphnids to the Clearbore solution for 48 hours under controlled laboratory conditions to investigate the effect on the swimming capabilities of the organisms. The number of immobile daphnids out of a test population of 100 is counted by optical microscopy. The result at a 1:10000 concentration showed 10% mortality and the toxicity at this concentration was assumed to be negligible.

The BOD5 results at a 1:10000 concentration was below a level that would be considered an environmental threat and is similar to that of many unpolluted surface waters.

The product has been successfully field-tested in the UK, Ireland and the Middle East to the satisfaction of the drilling operators and managers.

Joe May, Drilling Supplies Europe sales manager, said: "With the new legislation concerning the disposal of slurry we believe this product will be the key to environmental success in the trenchless industry for all contractors in Europe.

"The product is amazing. Operators love it for it's ease of use and owners are impressed with the low cost of disposal. We think it is the panacea for all ground conditions and environmental implications."

Mr May continued: "The current legislation states that £20,000 fines will be given for incorrect disposal of slurry. With this in mind, and considering Clearbore's highly reduced disposal costs, universal rheology properties, reduced product volume, reduced manual handling risks, reduced transport costs, biodegradable and non-toxic properties, ability to operate in salt and fresh water and exceptionally superior rheology properties, it has been referred to as 'the Alchemist's stone of the trenchless industry' by one industry leader."

*Edited by Ian Clarke from information provided by Drilling Supplies Europe Ltd*

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