

Drill cuttings initiative has begun its second phase

THE DRILL CUTTINGS INITIATIVE, which was launched in June 1998 by the **UK Offshore Operators Association (UKOOA)**, began its second phase in May 2000. The project is scheduled to be completed by the end of this year.

The drill cuttings initiative has the backing of all operators with drilling cuttings accumulations at sites on the UK continental shelf. The initiative is supported by the Oil and Gas Producers Association (formerly the E&P Forum) and the Norwegian oil and gas industry trade association, OLF.

The project is aimed at finding solutions for dealing with accumulations of drill cuttings on the seabed.

The initiative combines research and development with extensive public consultation and cooperation between industry organizations.

The combined efforts between OLF and UKOOA allow separate studies to take place without duplication, and include an information swap to help achieve the initiative's goal.

Ultimate goal of the project is to identify the best available techniques and best environmental practice (BAT and BEP) for dealing with cuttings accumulations, in accordance with the principles set out by the OSPAR Convention for the Protection of the Marine Environment of the Northeast Atlantic.

Det Norske Veritas was appointed full time project manager in May 1999 and initial industry funding was secured to begin the R&D program.

Consultation with key stakeholders and workshops for contractors and research institutions were held and an independent scientific review group was established to review progress on a regular basis.

FIRST PHASE FINDINGS

The first phase of the project, completed at the end of 1999 at a cost of £1 million, comprised a series of desk studies gathering information from different sources to establish what was already known about drill cuttings accumulations.

Various solutions for managing the cuttings piles were also investigated,

including a range of options from leaving the cuttings in place to total removal.

The first phase improved what is known about the physical characteristics of cuttings accumulations, but there is still a shortage of reliable data, said UKOOA.

UKCS cuttings volumes at production sites are estimated at 700,000 cu m in the central North Sea and 500,000 cu m in the northern North Sea. The characteristics of each accumulation varies greatly, depending on the types of muds used, the volumes drilled, cuttings discharge methods, water depth and currents.

Further surveying and sampling of accumulations is needed.



Samples are collected for drill cuttings study project. Photo is courtesy Rogaland Research.

The environmental impact of accumulations depends on the nature of the source material, the path between the source and its immediate environment and the "receptors," the marine organisms that could potentially be affected.

The first phase of the initiative found that total hydrocarbon concentrations within accumulations exceed the "no effect concentration" for typical market species, such as for mud shrimp.

Further research is required to deter-

mine if pathways exist from the accumulations to marine life in the vicinity.

Heavy metals do not seem to be leaching from the accumulations, the first phase found. Nor do the accumulations appear to affect marine life as long as the pile remains undisturbed.

Hydrocarbons with the surface layers (top 5 mm) are decomposing rapidly, it was found in Phase I, and re-colonization was observed. The rates of these processes need to be determined.

The first part of the project also found that bio-diversity is reduced within the vicinity of the accumulations. It also found that re-colonization by bristle worms occurs within one year of cuttings discharges ceasing.

In outlining management options after Phase I of the study, UKOOA said there is no proven remediation method. Enhanced bio-remediation is too theoretical as yet, but merits further investigation. Covering the drill cuttings accumulations is still a potential solution.

It was noted that if lifting to the surface is attempted, there are issues related to the secondary contamination of seawater as a result of the accumulations being disturbed and to the significant volumes of water which would be pumped up along with the solid materials.

Re-injection into the reservoir is technically feasible but not possible for all North Sea fields and its legal status is also uncertain, said UKOOA. Natural degradation also merits further consideration.

PHASE TWO

The second phase of the project, budgeted at £3.5 million will build on research done in Phase I. Using a representative range of cuttings piles with different physical characteristics, the second phase includes specific projects to:

- Assess the current environmental impacts of the piles;
- Determine how the accumulations' characteristics change over time through the natural processes of degradation, erosion, sedimentation and recolonization;

- Adapt and evaluate the mathematical disturbance prediction model developed in Phase I to incorporate the impact of these natural processes;

- Assess the feasibility of two potential in situ solutions: Covering over the piles and enhancing the natural process of bioremediation;

- Assess the feasibility and environmental performance of removal solutions.



Drill cuttings core sample is part of a range of representative accumulations that will help build a database. Photo courtesy Rogaland Research.

To assess removal solutions, a pilot lifting operation will be coordinated with trials planned both onshore and off at BP's North West Hutton platform. Options for treating and disposing of the lifted cuttings, both on and offshore, will be evaluated.

In October **Rogaland Research** collected samples from accumulations on the Beryl field (a large accumulation of cuttings drilled predominantly with oil

based mud) and Ekofisk field (a large deposit drilled predominantly with water based mud) for laboratory-based characterization studies.

The samples supplement those gathered over the summer from Blenheim and Bladon fields where there are small accumulations of cuttings material with

traces of synthetic muds mixed with water-based muds.

Existing data for an accumulation at Maureen (small pile drilled with oil based mud) will also be collated and summarized. The data from this range of accumulations will help the industry build more accurate assessment parameters, allowing future pile samples to be analyzed and their characteristics defined more precisely.

Environment and Research Technology Ltd is doing research to determine whether

the accumulations drilled predominantly with water based muds are toxic while **URS-Dames and Moore** is establishing whether cuttings drilled with oil based muds have any effect on the food chain.

How the environmental impact of cuttings accumulations change with time is the focus of work by Norway's Rogaland Research.

The results will be used by **BMT Marine Information Systems** to fine-tune the mathematical model developed in Phase I which predicts the processes of the degradation, erosion and recolonization by marine flora and fauna.

The model will also help improve understanding of what is likely to happen to the accumulations if they are disturbed, such as by storms, trawling or during the removal of platforms.

Tests that are part of Phase II of the initiative to determine both the feasibility and the environmental impact of lifting cuttings from the seabed are being done in two stages under the management of BP. The first stage was completed at Blyth Dock in September 2000; the second stage was scheduled at the North West Hutton platform.

AEA Technology is determining bioremediation rates from lab-based experiments prior to assessing the feasibility of using an in situ bioreactor system to degrade hydrocarbons within accumulations. And a team led by **Dredging Research Ltd** is exploring the possibility of covering the accumulations.

Experiments assessing leaching potential will help establish design criteria and develop possible cover designs. ■