# Dealing with oil pollution

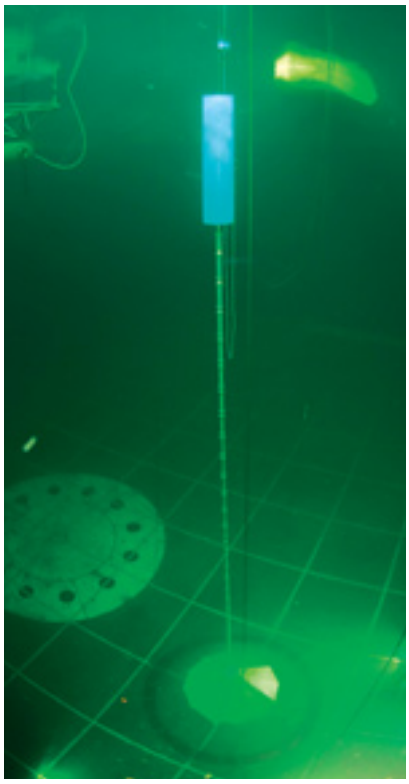
*Double Inverted Funnel for the Intervention on Ship wrecks (DIFIS)...*

Maritime disasters leading to major environmental pollution occur regularly every few years. Examples are Amoco Cadiz in 1978, TANIO in 1980, Aegean Sea in 1992, Erika in 1999 and Prestige in 2002.

The Prestige case has shown that a lack of tools, systems and methodologies exist for the prompt intervention on shipwrecks, necessary to confine the pollution and eliminate the source of the pollution threat.

## Project scope

The scope of the European research project, DIFIS, is the study, design and validation of an EU reference method for the prompt and cost-effective intervention on shipwrecks. The developed system should be able to deal with oil leaking from wrecks even in very large water depths. The proposed method will be of general applicability as long as the trapped pollutant does not dissolve and is of lower density than sea water.

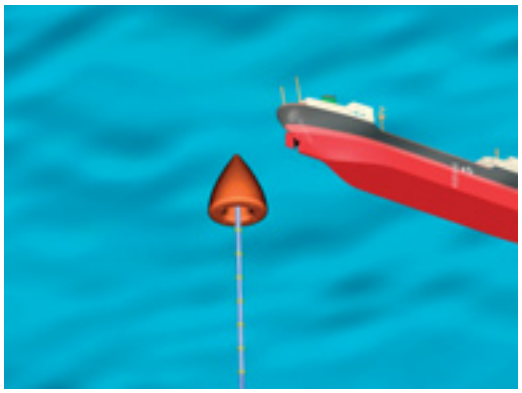


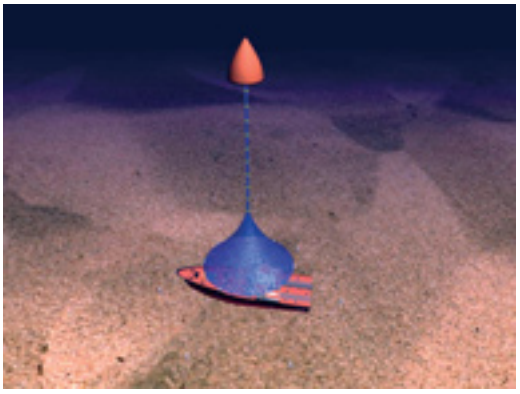
## The DIFIS system

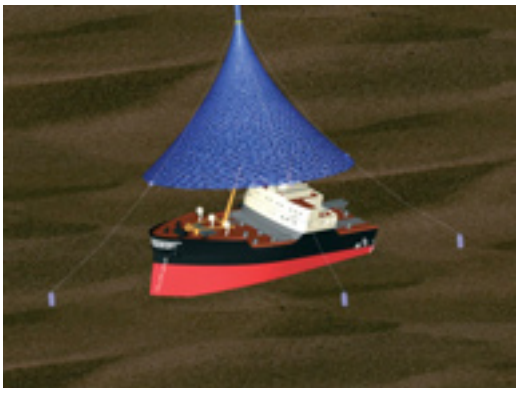
The DIFIS system will be a light and quickly deployable flexible structure that should stay in place until all the tanks of the wreck are emptied and the pollution threat is eliminated. Compared to conventional methods, the system is designed to be cheap and flexible.

The main items in the DIFIS system are the dome, the riser tube and the buffer bell. Fuel leaking from the wreck is captured in the dome and flows up towards the surface through the riser tube. The fuel-water mixture is collected in the buffer bell, which is located 30-50m below the sea surface, where it is not affected by rough weather. The buffer bell is provided with standard off-shore off-loading equipment.

With the DIFIS system, spreading of the pollutants in the sea is prevented and neither will they reach the sea surface, where their recovery could be affected by the weather conditions. Instead, a shuttle tanker is used for periodical off-loading of the collected fuel and transport to shore.







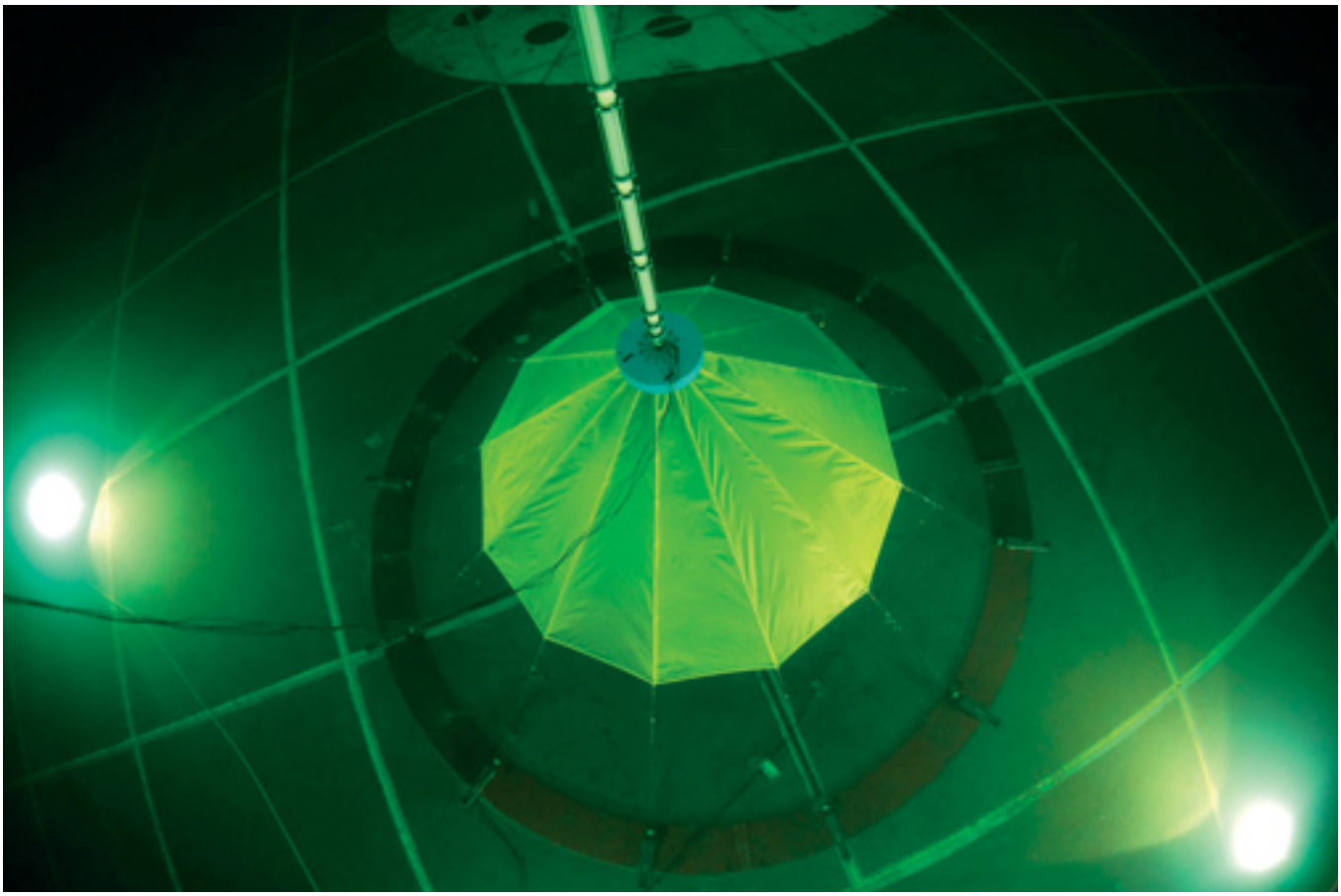
## Project approach

The project is carried out by a consortium of eight participants, each with their own field of expertise. The Maritime Research Institute Netherlands (MARIN) is the project co-ordinator. The participants are:

- MARIN (The Netherlands)
- SENER (Spain)
- IFREMER (France)
- CEA (France)
- Cybernetix (France)
- Sirehna (France)
- ISI (Greece)
- Consultrans (Spain)

The total budget is €3.2m, of which €1.8m is funded by the European Commission. The scope of work includes numerical simulations, hydrodynamic scale model tests and deployment simulations, as well as an analysis of the system costs and planning.

Besides the above participants, the EC's JRC (Joint Research Centre) is involved



as a scientific and technical advisor to the DIFIS project. In this respect, Dr Fivos Andritsos of JRC should be mentioned, since he had the original idea for the system concept and was the originator of the DIFIS project.

## Schedule

The DIFIS project had its kick-off in September 2005 and has a total duration of three years.

During the first months of the project, the generic operational requirements of the intervention method and state-of-the-art technology were defined. This work was based on in-depth analysis of the main incidents that have occurred in the oil sea transport, and the different technologies used in similar operations in off-shore or fuel removal. This was the basis for the solidification of the functional specifications of the system.

Analysis and comparison of a number of design alternatives was then carried out, and a selected early design was ready at the beginning of 2007. This included early dimensioning of the main elements in the system (dome, anchor lines, riser tube, buffer bell) and material definition. The feasibility was supported by specific calculations, in particular, on the internal system flow, motions of the buffer bell due to the waves and the current, pressure distribution on the dome, riser tube vortex induced vibrations.

In February and March 2007, MARIN carried out hydrodynamic scale model tests to investigate the feasibility of this newly developed system. The system's behaviour was tested at model scale in various weather conditions (wind, waves and current), also including heavy storm conditions.

The first preliminary designs of the system are ready. The results of the model tests carried out at MARIN will be implemented in the DIFIS system final design. In the next 18 months, the DIFIS project will further develop procedures for the installation and inspection of the system. Furthermore, economical and logistic aspects will be taken into account. In October 2007, a second series of model tests is planned at MARIN, more closely investigating the installation of the system.

## DIFIS key figures

The key figures of the DIFIS project are:

- EU research project in FP6 (6th Framework Programme);
- Total budget €3.2m;
- Total EC funding €1.8m;
- Eight participants, from four different European countries;
- Duration 36 months.

## Contact

More information can be found at www.difis.eu or contact Ir Hans Cozijn at the details listed below.

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