Mr. Sjon Huisman
Head Marine Pollution Response Organisation
North Sea Directorate
Ministry of Transport, Public Works and Water Management
The Netherlands

OPERATIONAL EXPERIENCE AND RECENT DEVELOPMENTS IN OIL AND CHEMICAL INCIDENT RESPONSE.

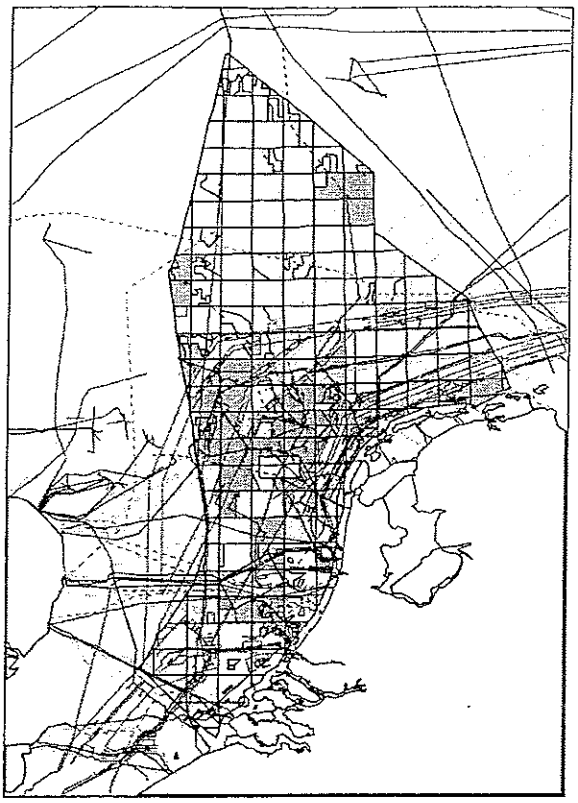
Background.

In the early nineties the Netherlands Parliament agreed to the proposed national contingency plan, that was a reflection of some 15 years of studies, research and tests.
In brief the plan described the response organisation that should be capable and equipped with means to combat a 30,000 tonnes outflow of oil, assuming 50% of this original volume would disperse and evaporate naturally.
Th likelihood of this event was calculated to be once in 45-70 years.
Mechanical recovery was the prime and only option apart from the do-nothing choice, that can be regarded to be a response.
Application of chemical dispersants was a prohibited tool.

Concerning response to chemical accidents, the plan described the various phases of chemicals (evaporators, dissolvers, floaters and sinkers). Undoubtedly this implied liquid chemicals rather then packed goods.

Setting the scene.

The Dutch part of the Continental Shelf (NCP) is some 57,000 km^2, which 1.5 times the size of the main land.
Coming from the English Channel a main shipping lane leads along the Dutch coastline into the German Bight; a junction to starboard leads into Flushing / Antwerp and another shipping lane into Rotterdam.
Two main deep channels, the Eurogeul and IJ-geul have been built (dredged) to guide VLCC's into Europort and Ijmuiden (iron plant).
A deepwater route runs over the NCP up north.
Monitoring programmes indicate that on the NCP some 425,000 ship movements occur annually. This figure is excluding fishery and coastal recreation (yachts).



Besides this the North Sea is a shallow sea, the NCP also has offshore areas where 160 installations are located.

Despite all efforts, both internationally (IMO regulations) and nationally (shipping lanes and pilotage) sometimes things go wrong. An accident happens which may involve outflow of oil. The contingency plan 1990 anticipated the collision between a laden tanker and another ship, resulting in a damaged wing-tank, carrying 30,000 tonnes of oil.
The location of the collision about 30 miles west of Rotterdam. Required equipment stored in the Europort area.

Operational discharges; violation of MARPOL regulations.
Ship accidents, involving outflow of large quantities of oil, always attract the attention of mass media. The "Amoco Cadiz", "Exxon Valdez", "Sea Empress" and the "Erica" guaranteed headlines for some days.
Being prepared to respond to similar accidents is what authorities invest in and organisations educate and train personnel to be ready.
A more chronic plague for the environment, and maybe also for the responders are the daily discharges by ships. Although it may involve minor quantities (up to 10 tonnes of oil/water mixtures) their frequency of occurrence is high.
In most occasions the quantity is too small to apply dispersants or to deploy booms and recover the oil. The oil is left to mother nature to disperse it into the water column.
However, a limited number of this type of spills cause a contamination of the coast line and need to be removed.
The Netherlands situation is that on average 5 times per annum a so-called operational discharge requires a response operation at sea. Once or twice every year oil needs to be removed from the beach.

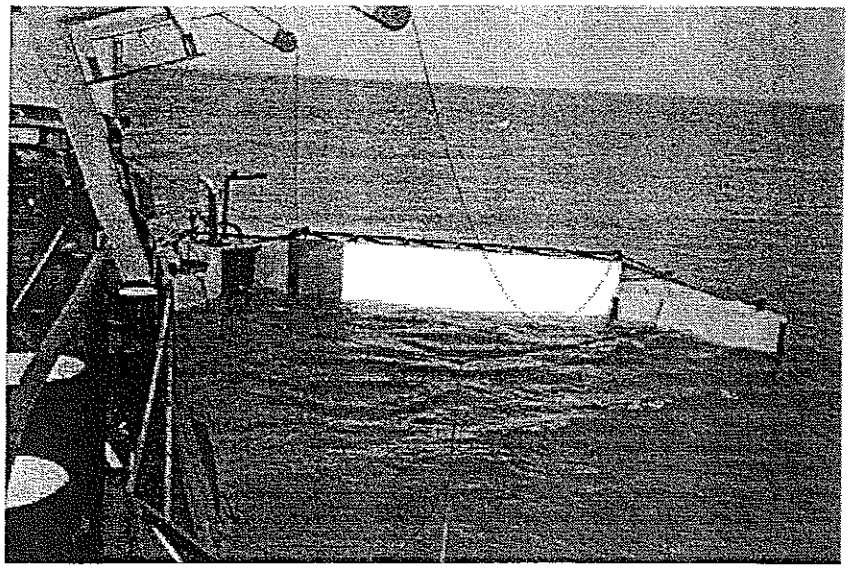
Application of dispersants.
In the 1990 contingency plan is was decided to prohibit the use of chemical dispersants as a means to combat an oil slick.

Three arguments formed the fundament for this decision:

1. the (wave) energy required to mix the dispersant with the oil was thought to be sufficient to disperse the oil;
2. the toxicity of the chemical, thus adding a pollution to the floating oil slick;
3. vulnerability of Waddenzee and the coastal area's with less then 10 meters of water.

Equipment.

A vessel that was used for research and studies, as well as to test systems, the m.v. "Smal Agt" served the Rijkswaterstaat until 1998. On board this ship the specially developed mechanical recovery system, the sweeping-arm, was installed.
She was Rijkswaterstaat's main recovery vessel, always available and ready to sail.
The sweeping-arm consists of a construction formed by two pontoons and a frame in between which is like reflecting boom. In the inside pontoon (close to the recovery vessel) a pump is installed in a hydraulically adjustable trough.
Recovered oil is pumped into the tanks of the vessel. The width of the skimmed area is twice the length of the sweeping-arm and the width of the vessel.
This path can be extended by having two ships towing two sets of booms (2 times 100 mtr) in front of the recovery vessel.



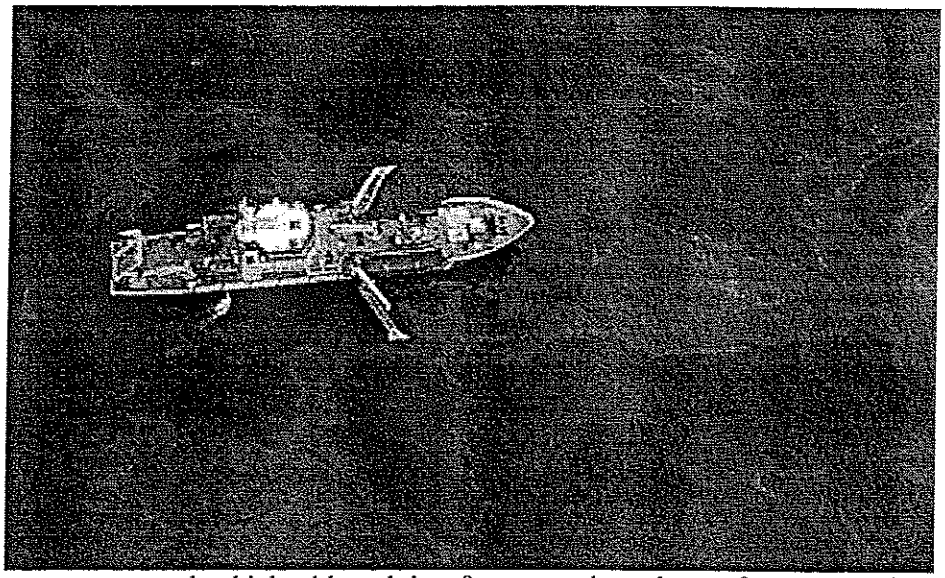
Apart from the "Smal Agt", as prime response vessel, Rijkswaterstaat contracted several suction hopper dredges on which sweeping-arms are installed in case of an accident.
Hopper dredges are available in Dutch water throughout year and the type of vessel is very suitable due to the storage capacity.

Special suction head.

One of the missing response means was a system to combat high viscous oil. Recognising that the viscosity may cause a problem for the pumps in the sweeping arms, a special suction head was developed to replace the mud or sand suction head on the pipe and using the mud-pump as oil pump.
Rijkswaterstaat is currently trying to finalise the testing phase with this system and it still has some disadvantages.

Revision of the contingency plan.

In the past ten years in practice the North Sea directorate, bearing the responsibility for the response organisation has found the disadvantages in the response methods.
In brief these disadvantages involve costs to maintain a dedicated vessel; the time elapsing after a call-out and the first response. Oil spreads rapidly and the recovery vessel is easily only a tiny instrument in a large polluted area.



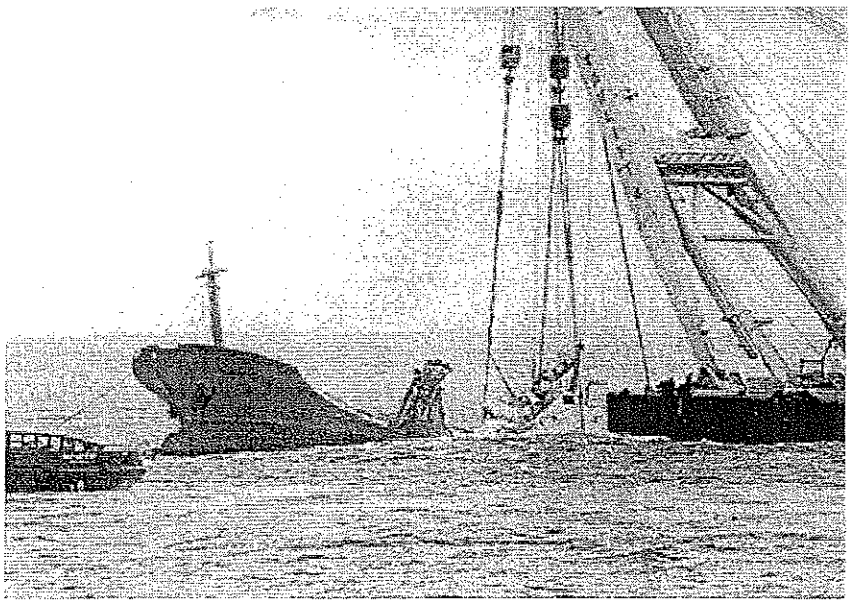
Success rates are not that high, although in a few cases the volume of recovered oil was considerable in relation to the amount discharged.
It may well be that in real life the deciding authorities were to conservative and did not allow themselves to mobilise more equipment. However, if recovery of oil is the prime option to protect the marine environment against pollution, it implies high costs.
Do nothing is the cheapest solution.

Analysis of response actions.
An evaluation of response actions in the period 1983 - 1993 and the analysis of figures and facts learnt that a total of 6287 slicks were reported of which 6169 had an estimated volume of less than 10 m^3 and in 1.6% were qualified with "combatible".
In 46 reported spills a response action (mechanical recovery) was initiated, in the remaining cases no action was undertaken due to sea conditions and response time.
The average effectiveness of the mechanical recovery was 55-60%. Too many parameters and conditions were involved thus making a profound analysis possible.
Calculating the pump capacity based on time/recovered oil, some results are dramatically low, varying from 1.8 to 25 m^3 per hour.
Supply of floating oil towards the skimmer influences this figure. Containing oil in booms is an option, but again the sailing speed of the recovery vessel decreases.
A more recent incident, the "Erika", shows much higher rates of pump capacity. Again the figure varies due to circumstances, but the best figure was 50 m^3/hr. A situation which is obvious knowing that layer thickness was measured to be 30 centimetres.
In this extreme situation the recovery vessel "Arca" almost had no sailing speed at all, due to amount of oil brought in front of the skimmer pump.

Accidents involving chemicals.
So far response only seems to concern oil and indeed accidents involving oil get more attention then when chemicals are involved.

Nevertheless ships accidents involving chemical do occur. In the contingency plan 1990 it appears that not much attention is given to chemicals. However in fact the outlines remain the same. Chemical have been discriminated in floaters, evaporators, dissolvers and sinkers.
In only a few cases response is possible. Liquid chemicals still contained in tanks might be transferred or if in tank containers removal is possible.
A floater might be skimmed and a neutralising substance might be useful to combat a dissolving chemical.

Recently the revision of the national contingency plan has been completed and although the risk-analysis has changed the likelihood (down to once in 30 years) of an accident besides some other theoretical factors that changed to some extent, it really is the experience in accidents such as "Sea Empress, "Erika" and "Anna Broere" that gave reasons to revise the plan.
Ships of opportunity or semi-dedicated vessels as well as mechanical recovery equipment are readily available.
On shore tank storage can be made available on request and disposal of waste can be dealt with quick and easy.
Potential risk areas at sea have been identified and plans have been drafted and are frequently practised.
Moreover the small scale discharges, the so-called operational discharges, are reason for concern and call for improvements and new R&D.



The revised contingency plan
The key-problem is: response time
Keeping the response time as short as possible is vital in order to limit spreading of the floating slick.
It is a nasty business to mover around with a set op booms, in a open-U configuration, an a recovery vessel behind this set trying to recover oil. And all this at a speed of 1 to 1.5 knots. Under favourable conditions one may succeed to recover some 20 tons of oil in an hour.

R&D

The North Sea Directorate has therefore decided to focus studies and research on:

1. **shorten the response time,**
   Study possibilities to reach corners of the zone of responsibility (EEZ) within a certain period. Specific attention will be given to Voordelta and a 10 miles zone west/north of the Wadden Islands.

2. **development of a high-speed mechanical recovery system,**
   Current systems such as the sweeping arm or V-sweep in combination with a skimmer can only be applied at a sailing speed of 1.5 knots. Sometimes it is hard to compete with the rate of spreading.

3. **find means to avoid spreading of oil,**
   Any combatible oil slick at sea should preferably contained directly on detection / observation in order to make recovery efficient and avoid spreading. Laying a boom around the slick has all to do with response time of ships. Would it be possible to equip the remote sensing aircraft with a spraying gear to spray a substance that acts as a boom?

4. **application of chemical dispersants under stringent conditions,**
   Review all studies on chemicals and their application and define conditions for use in the Dutch area.

5. **define net environmental benefit analysis,**
   All response methods should be justified on the basis of a net environmental benefit analysis. Question to be answered what factors play a role in NEBA? Does it include fuel burnt on board a recovery ship.

6. **improve preparedness for complex and/or lengthy accidents,**
   Extending the handbook for dealing with emergency response bearing in mind personnel, material etc.

7. **develop an unambiguous decision table for response operations.**
   Basically this means a flow chart that shows "when to we do something and what", a system that is applicable for oil, chemicals, lost cargo, sunken obstacles (wrecks).

On the detection of a floating pollution the observer in the remote sensing aircraft assesses the situation with regard to the type of pollution and the volume, resulting in a "combatible" or "non-combatible" slick.
This means that the pollution should be recovered, that it is recoverable technically if a system was available in the direct vicinity and sea conditions permit a response operation.
The operator's conclusion may be: technically combatible.
Now he estimates the behaviour of the slick over a period of time that is required to mobilise the response vessel(s) and the weather conditions at the time of arrival. These factors lead to the conclusion whether the slick is "operationally combatible" or should be left to mother nature.