

# Response Options and their Limitations

## Response Options and their Limitations

An overview of the main oil spill response strategies.

A discussion on their limitations and issues which may arise.

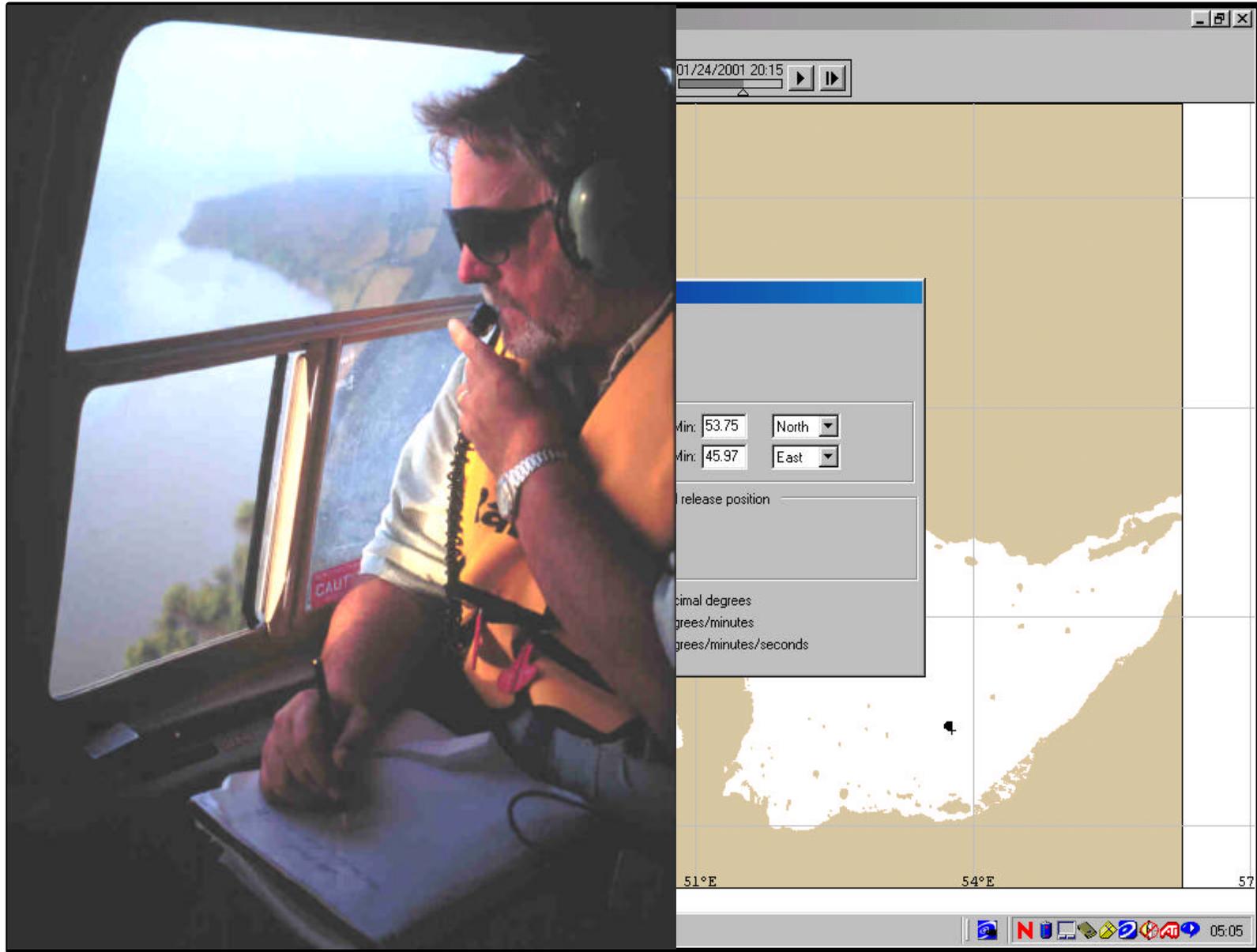


# Strategies

- Monitor and evaluate
- Dispersants
- Contain and recover
- Protection
- Shoreline clean-up
- Other options
  - burning
  - bioremediation



# Monitoring



# Monitor and Evaluate

## Issues

- Competence
  - lack of organisation
  - unable to respond
- Cheap way out
- Lack of concern
  - environment
  - community
- Lack of action
  - gambling



# Dispersants

- What is a dispersant?

- solvents

- surfactants



*hydrophilic 'head'*

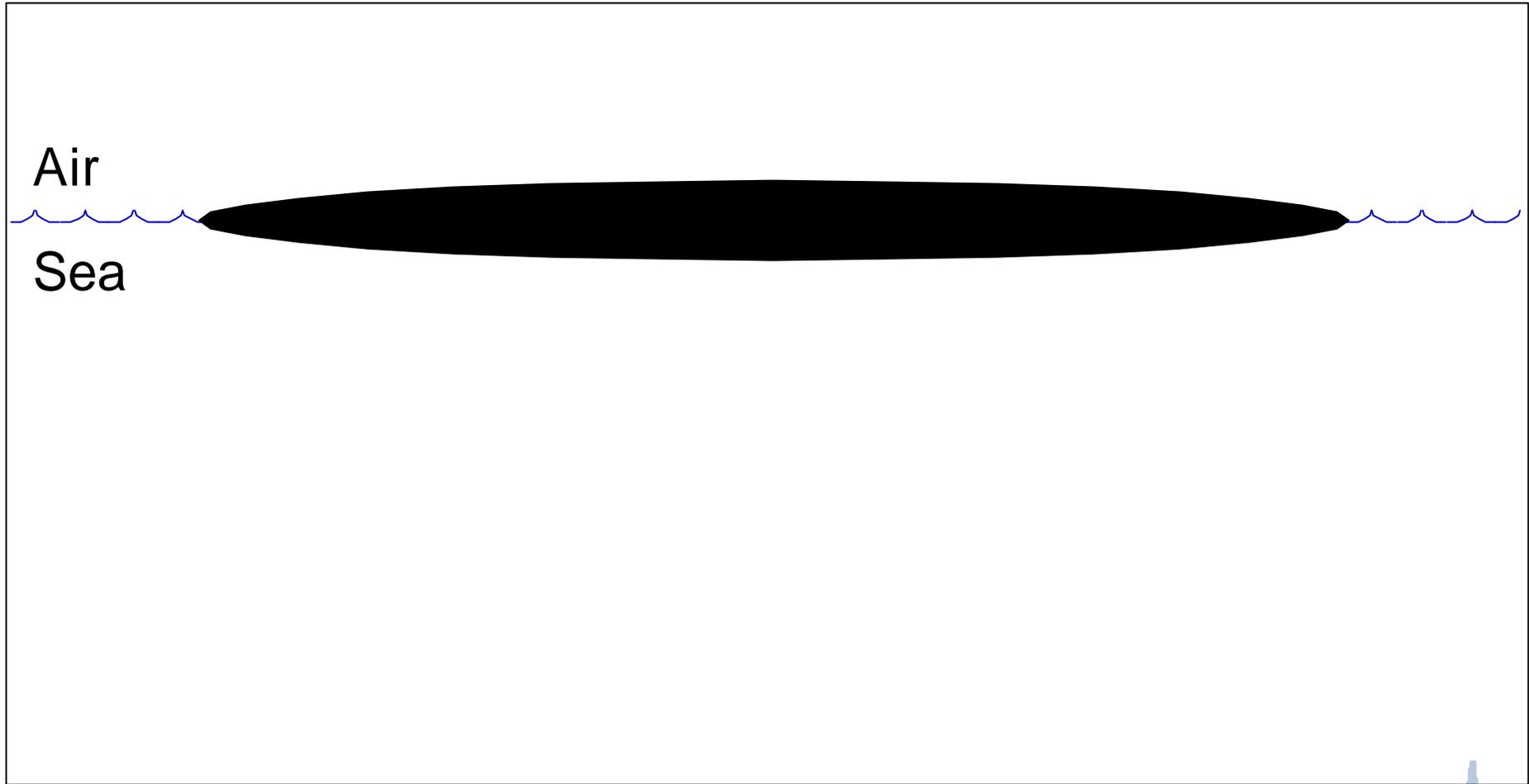
- What does it do?

- enhances natural dispersion by reducing the oil-water 'interfacial tension'

- redistributes oil into the water



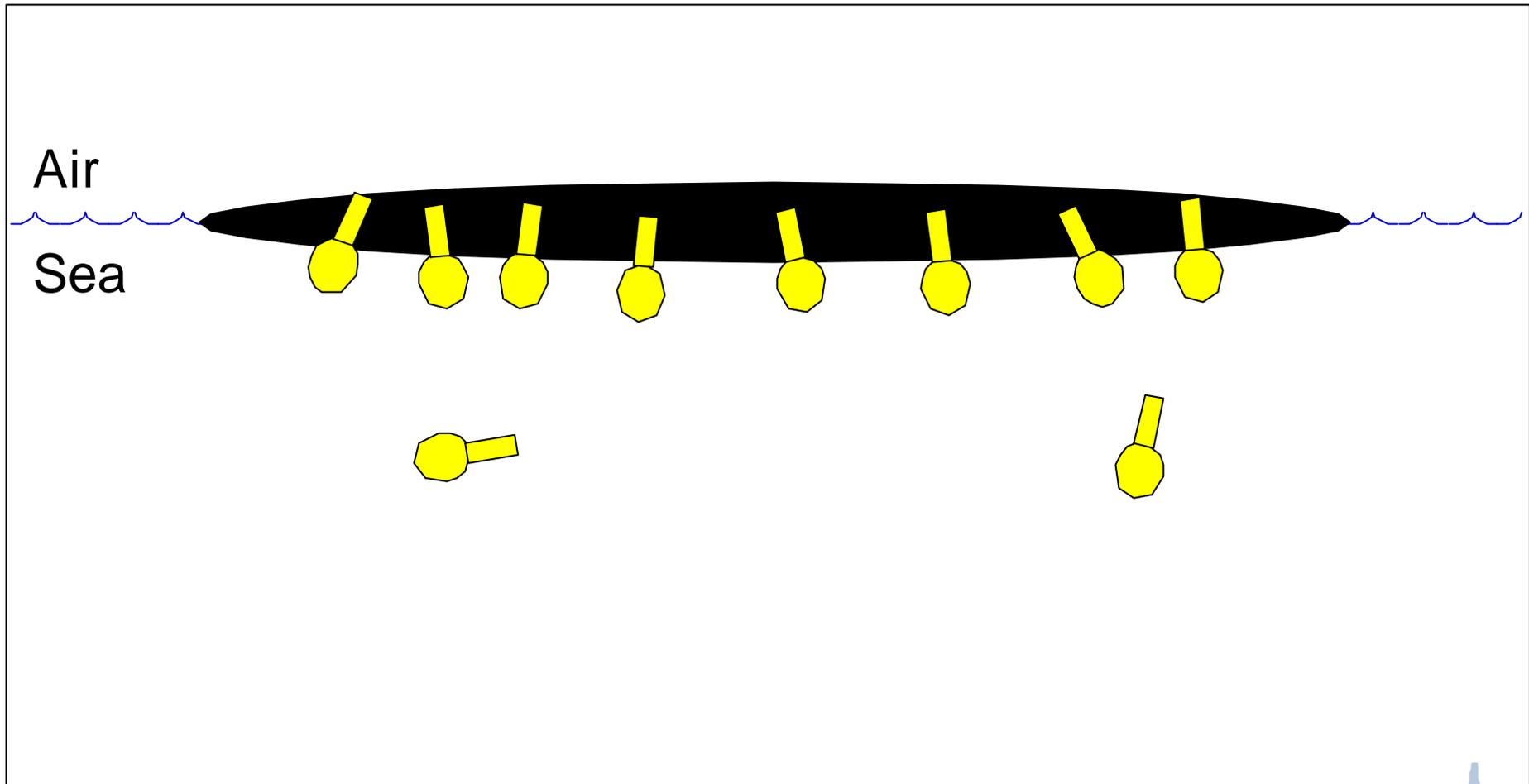
# Mechanism of Chemical Dispersion



1. Floating oil



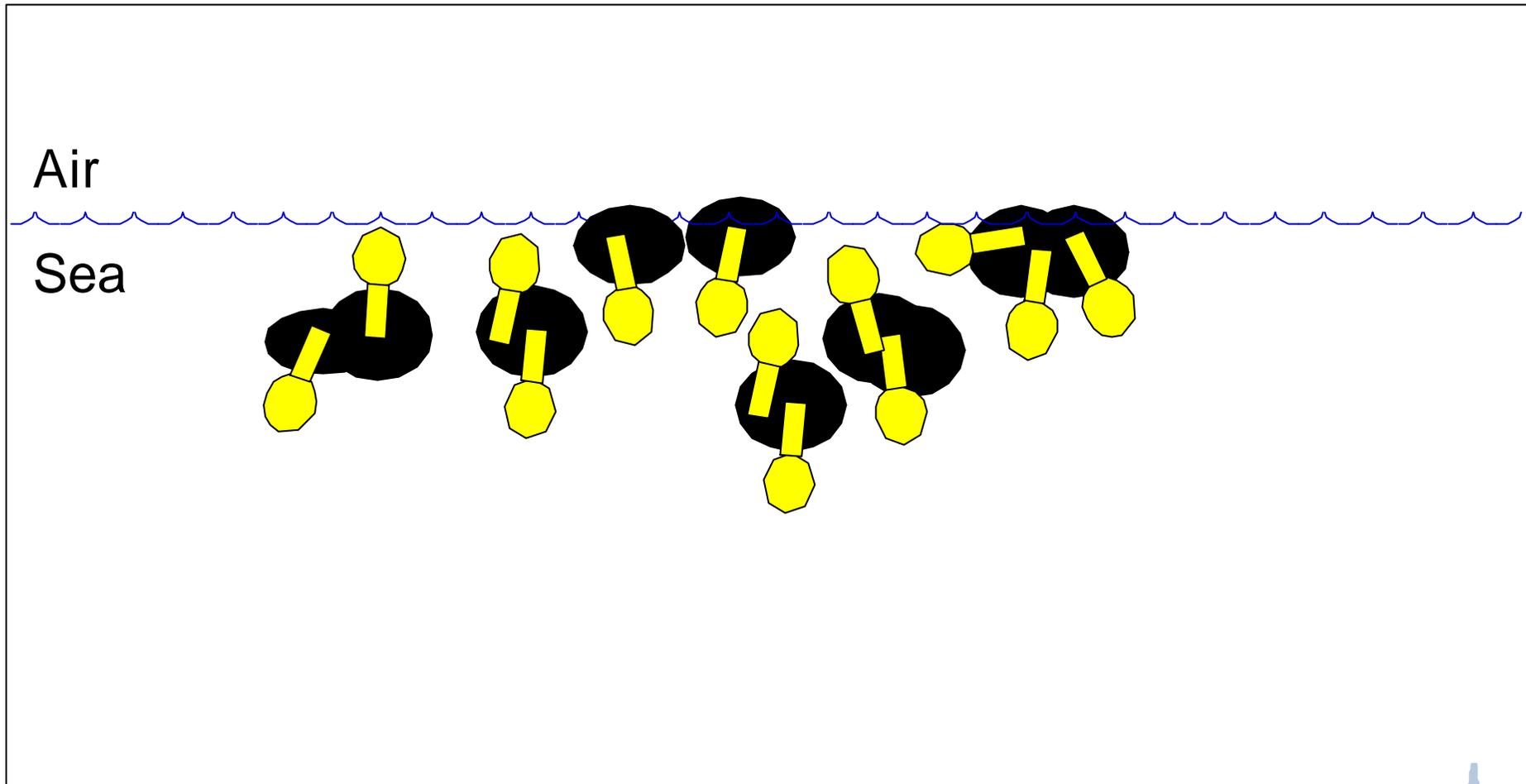
# Mechanism of Chemical Dispersion



## 2. Application of dispersant



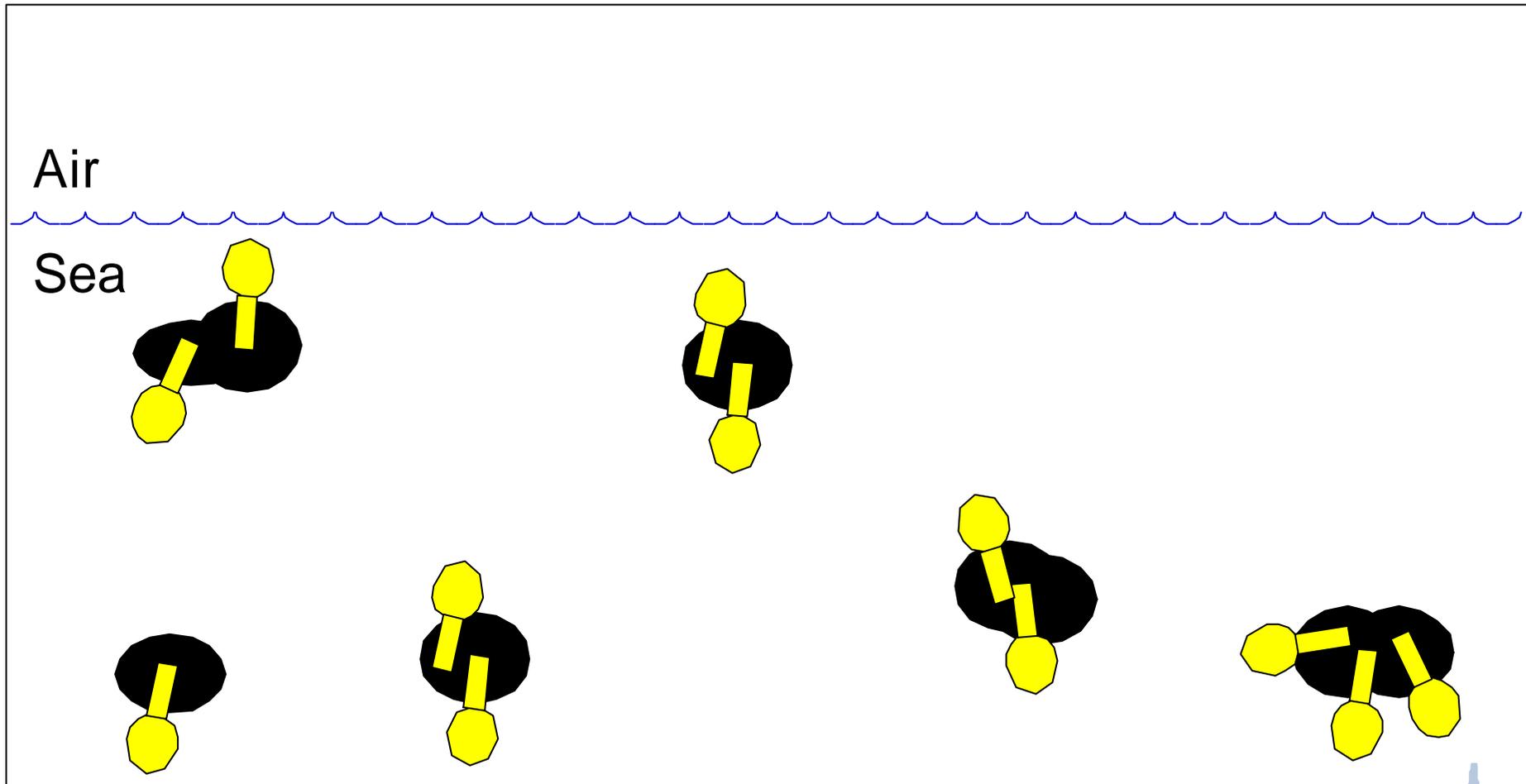
# Mechanism of Chemical Dispersion



## 3. Formation of small droplets



# Mechanism of Chemical Dispersion



4. Dilution of dispersed oil into surface waters



# Advantages

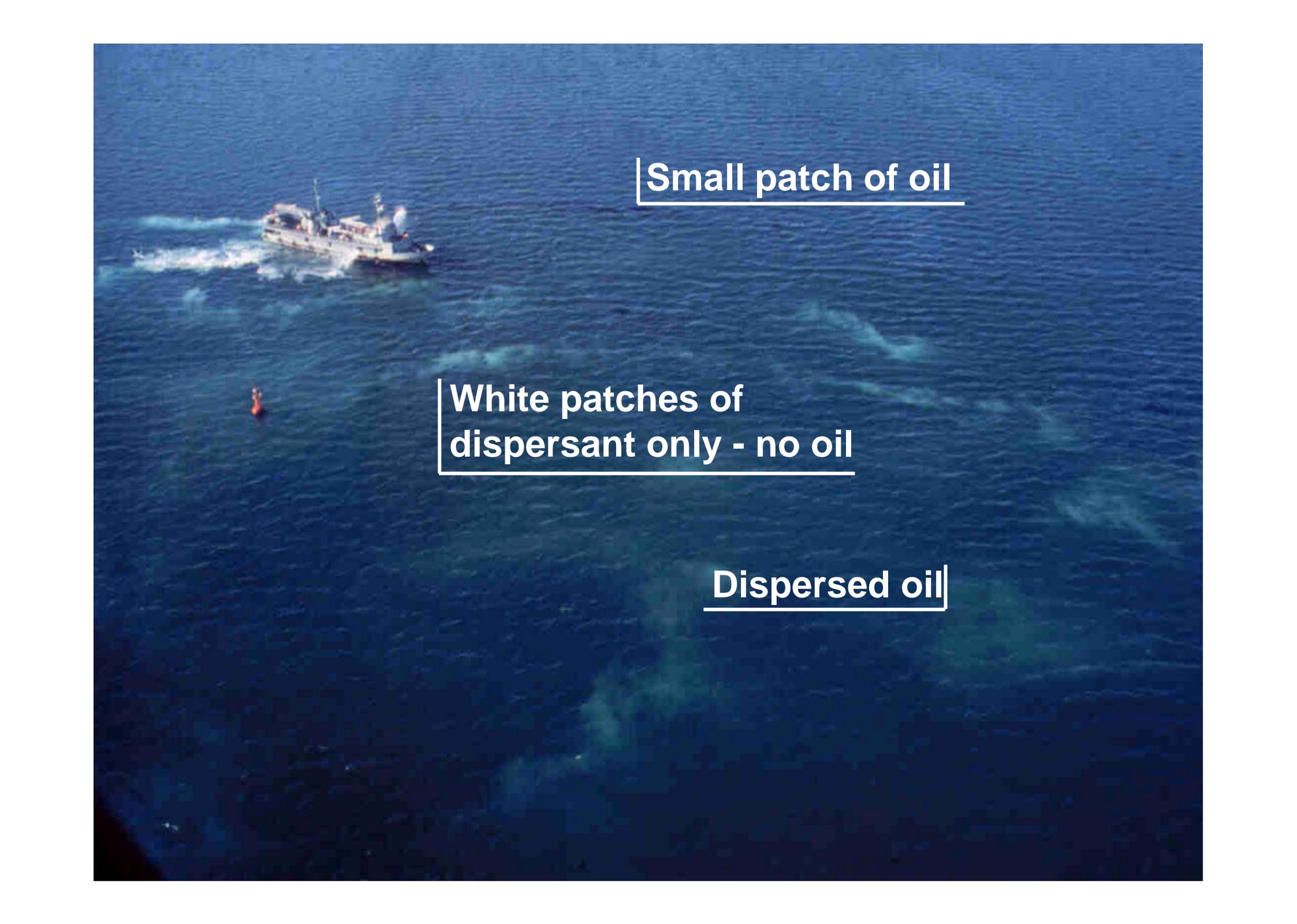
- Rapid response over large distances and areas is possible
- Applicable in relatively rough weather
- Reduces the risk of contamination of birds and shorelines
- May 'break' or inhibit the formation of emulsions
- Reduces waste and improves biodegradation



# Disadvantages

- Oil is not removed, but re-distributed
- Can adversely affect sensitive resources
  - toxicity and 'tainting' e.g. farmed fish, shellfish and coral reefs
  - industrial water intakes
- 'Time window' for effective use  $\updownarrow$ 
  - as viscosity rises...*
  - ...effectiveness falls*
- Generally inappropriate in shallow water **and for light products**



An aerial photograph of a large body of dark blue water. In the upper left, a white oil spill response vessel is moving, leaving a white wake. In the lower left, a small orange buoy is visible. The water shows various patterns of white foam and light-colored patches, indicating the presence of oil and dispersants. Three text labels with white borders are overlaid on the image: 'Small patch of oil' in the upper right, 'White patches of dispersant only - no oil' in the center, and 'Dispersed oil' in the lower right.

Small patch of oil

White patches of  
dispersant only - no oil

Dispersed oil



# Dispersants

## Issues

- *Torrey Canyon* legacy
- Toxicity
  - effect on environment
  - public health
- What happens to the oil?
- Adding further pollutant
- Convenient, 'out-of-sight' option?



# Contain and Recover

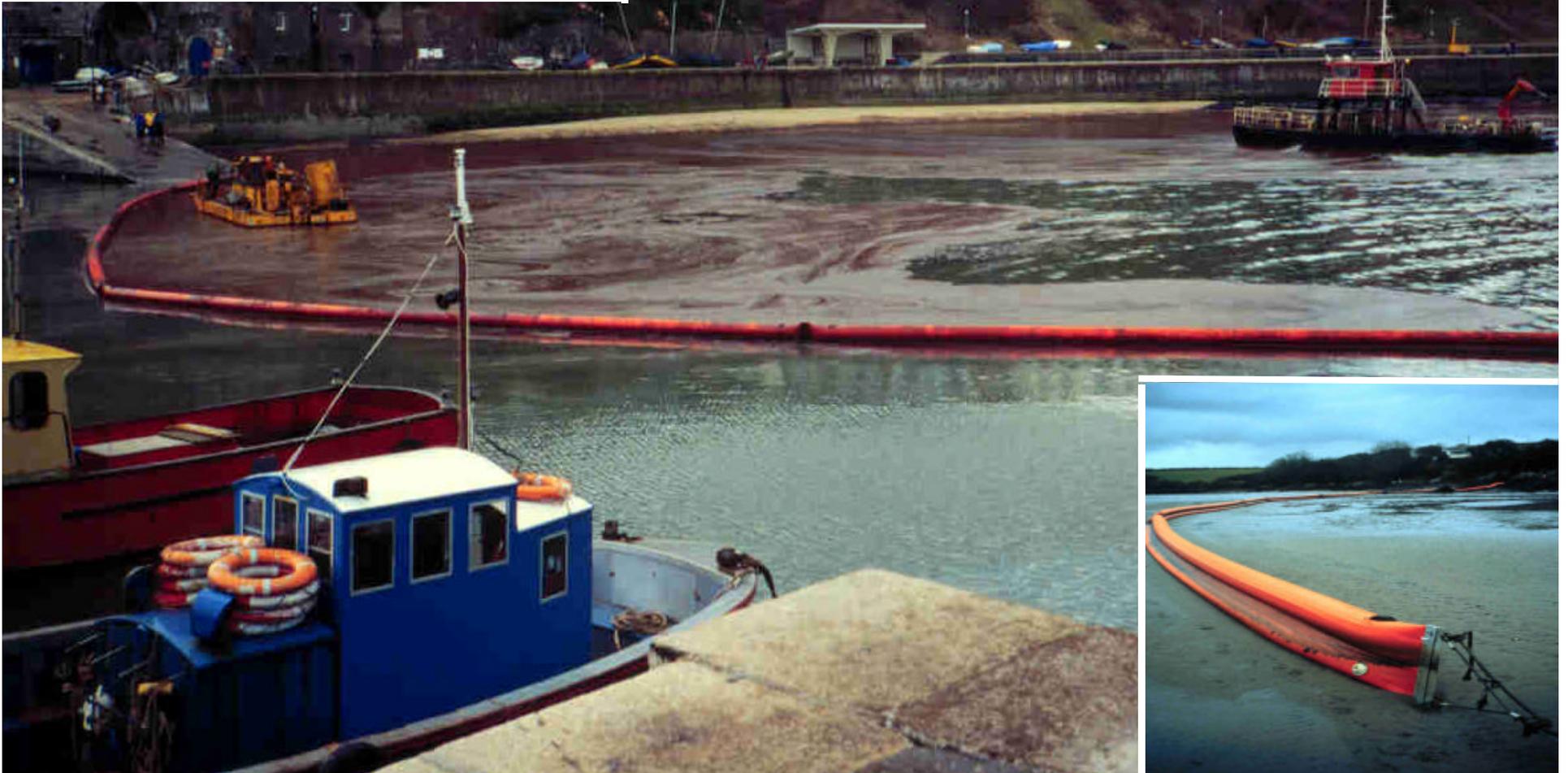
- High capital investment
- Logistics
- Operational limitations
- Encounter rate
- Training
- Temporary storage & disposal



# Protection

- Requires prioritisation of sensitivities
- An effective use of available resources
- A practical use of equipment
- Cost effective response







# Limitations of Booms

- Oil loss to excessive flow
- Drainage failure
- Splashover failure



# Main Skimmer Types

- Weir
- Oleophilic
- Vacuum
- Mechanical



## Desmi 250 weir skimmer



Komara 12 K disc skimmer





Egmopol barge in action

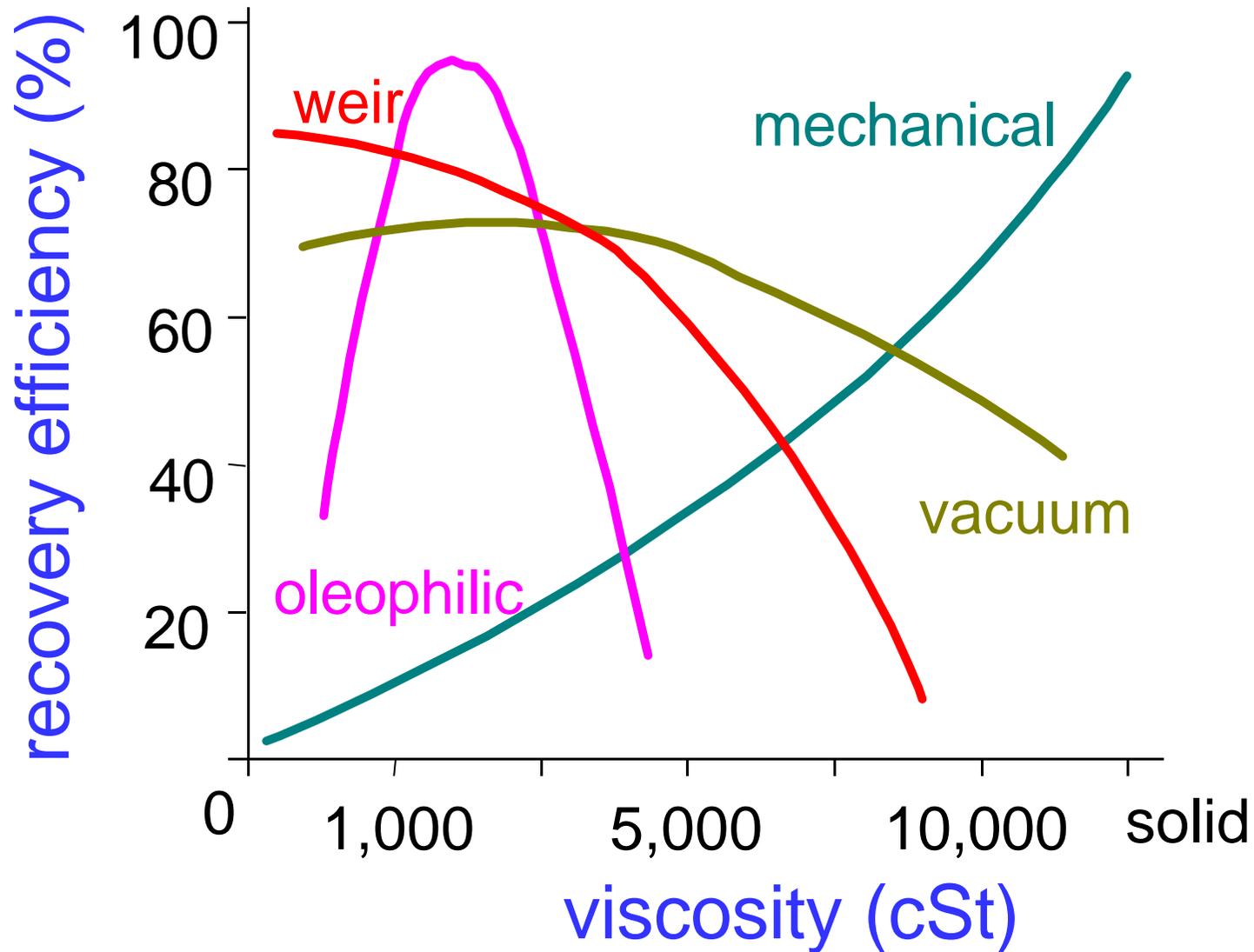
The main image shows a yellow barge named 'EGMOROI' on a river. Two workers in green and yellow suits are on board. The water is dark with some ice patches. In the background, there are trees and a house on a hill.



Egmolap in use

The inset image shows a close-up of a yellow and black device, likely an Egmolap, being used on a river. A person in a red suit is visible in the background.

# Operating Range of Skimmer Types



# Containment and Recovery

## Issues

- If it fails or has poor success:
  - competence
  - lack of preparedness
- Logistical support
- Waste management



# Shoreline Clean-up

- Shoreline type
  - sensitivity
  - amenity
  - access
- Project management
  - labour intensive
  - low-technology
  - logistics











# Shoreline Clean-up Issues

- Pollution plainly visible
- Direct & indirect impacts on:
  - ecology, amenity and industry
- Clean-up activities
  - who is responsible?
  - termination decisions
  - waste management
- External pressures
  - media, political and 'green' groups



# Other Technologies

## Burning

- Combustion requires:
  - igniters
  - low water content in oil
  - minimum oil thickness (~3mm)
  - specialised containment booms

## Bioremediation

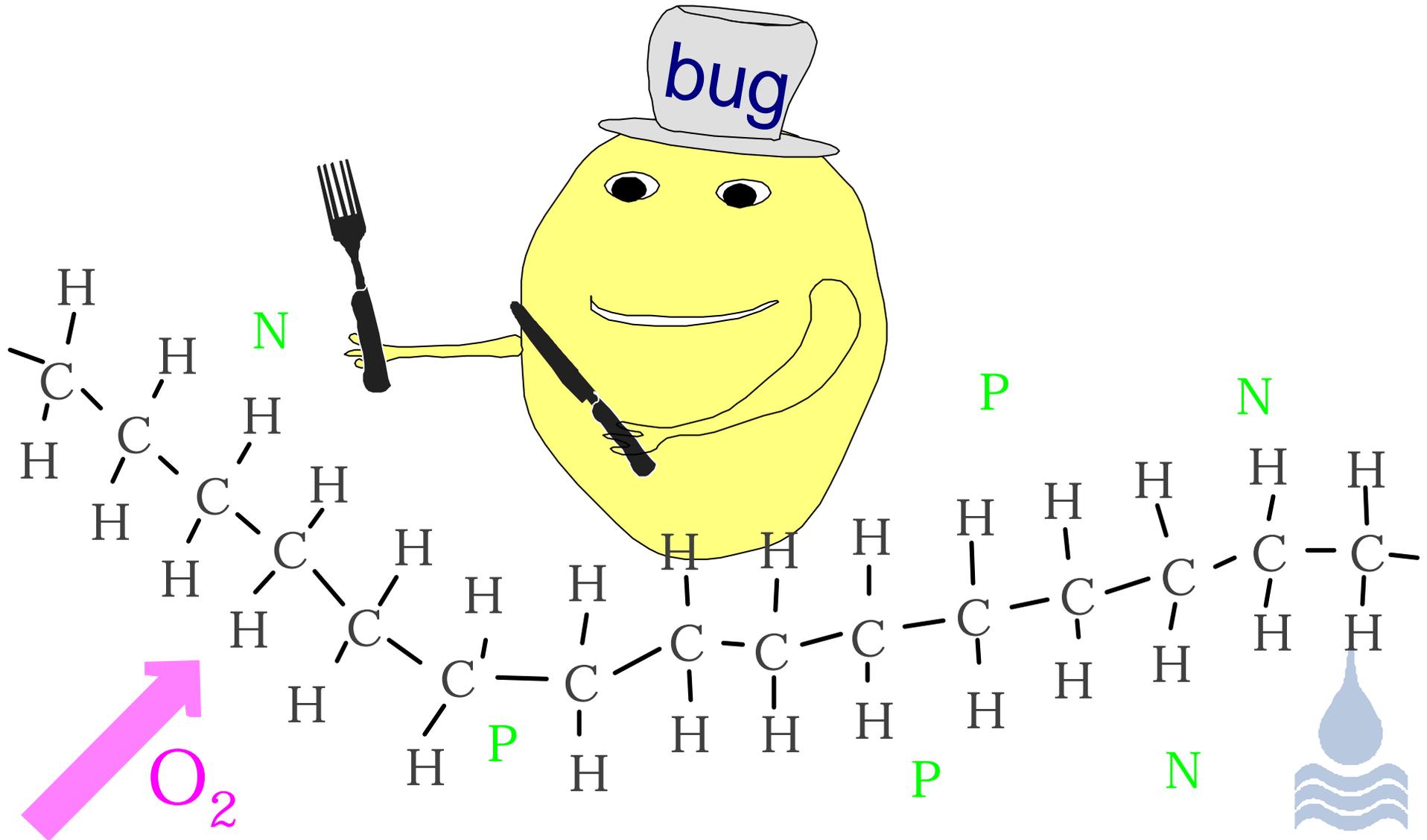
- Accelerated bioremediation:
  - addition of nutrients
  - addition of micro-organisms



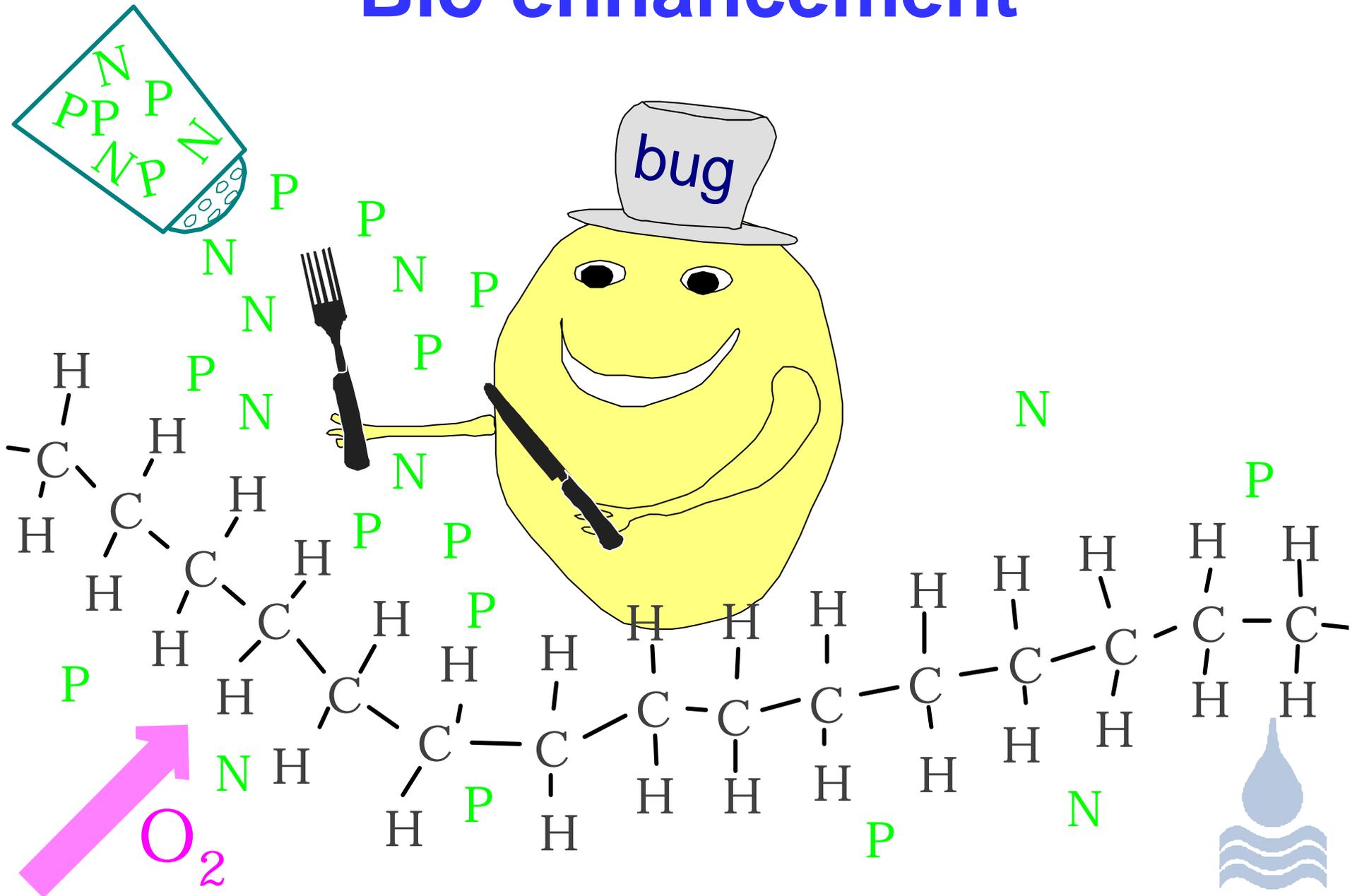




# Natural Biodegradation



# Bio-enhancement





# Emerging Technologies

## Issues

- Burning
  - need to contain oil
  - safety
  - air pollution
- Bioremediation
  - proving success
  - long-term treatment
  - upsetting ecology

