

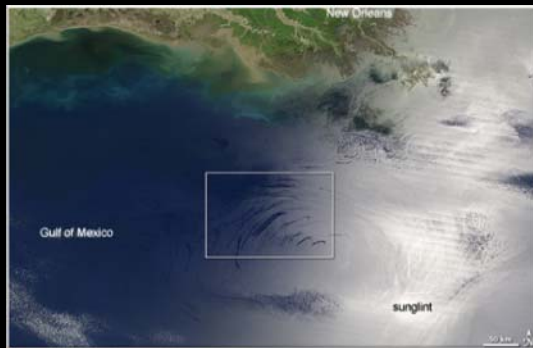
The role and effects of dispersants in an oil spill

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Clean up options

- Type of spill

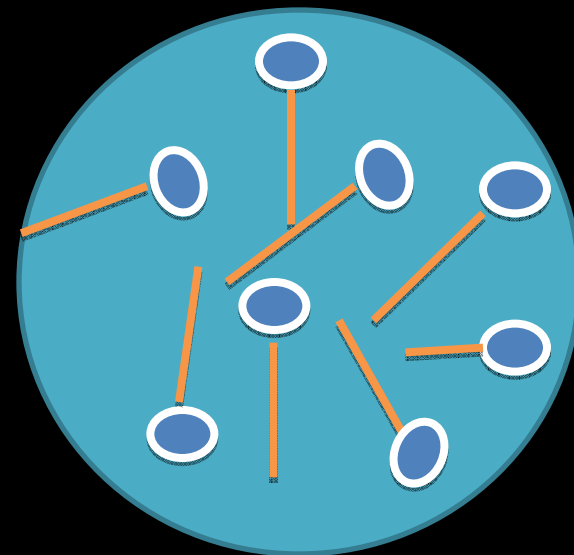


- Booms
- Skimmers
- Burned
- Hand collection
- Dispersants



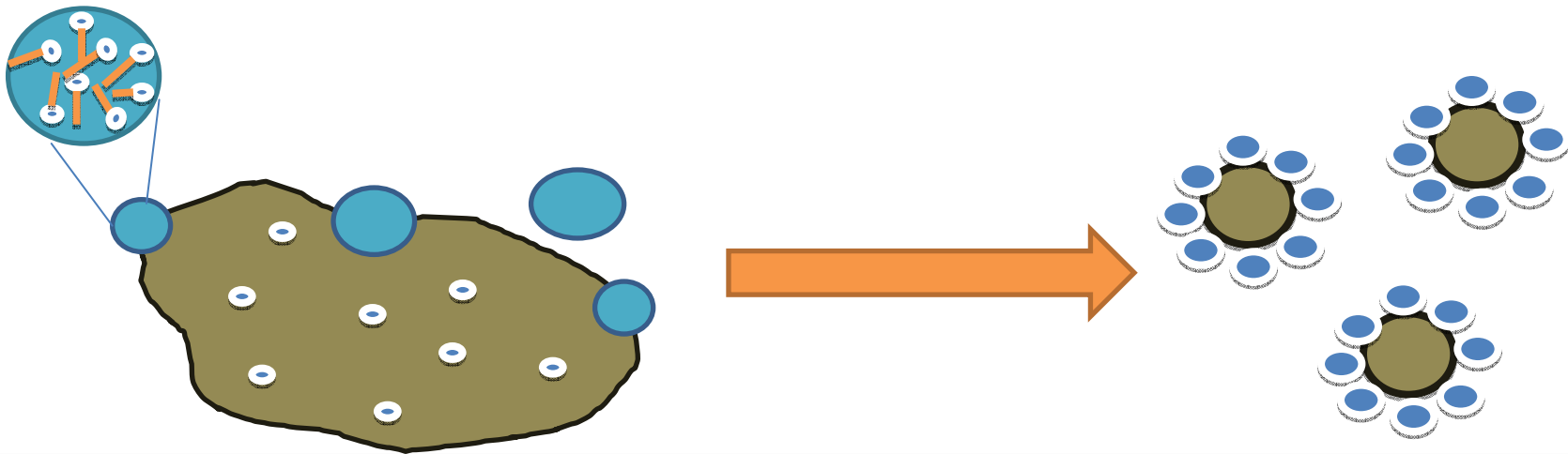
What is a dispersant:

- Similar to a grease fighting dish soap
- Surfactants and solvent **compound**
- **Surfactant**
 - Common in food, cosmetic, and pharmaceutical products
 - Oil-loving portion
 - Water-loving portion



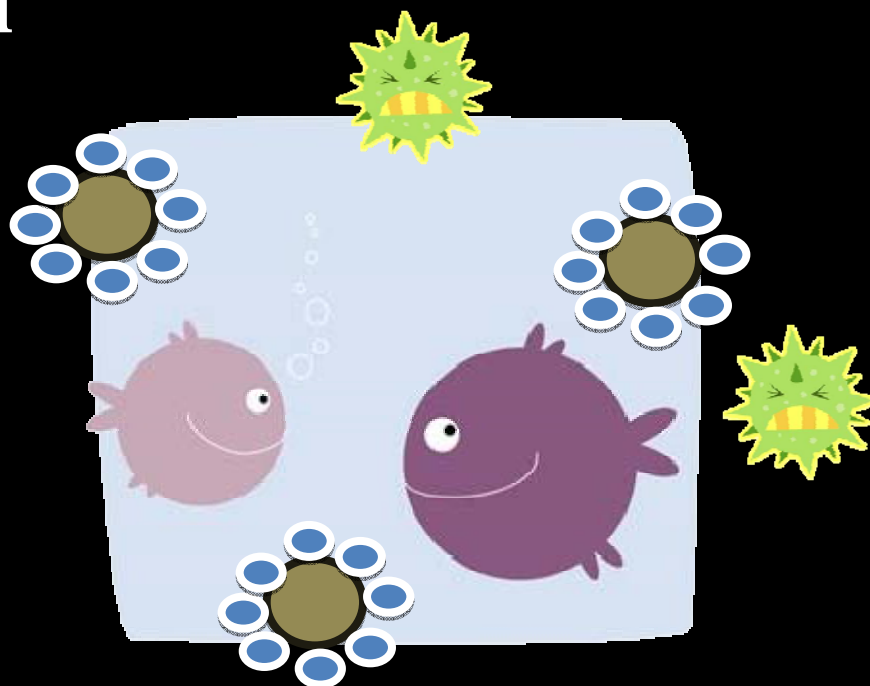
How does it work?

- Surfactant breaks up the oil
- Smaller discrete droplets form
- Surfactant forms a layer around preventing reformation
- Individual droplets move into the upper water column.



New dispersed molecules

- Less likely to adhere to fish, birds, or boats
- More surface area for bacteria to naturally break down the oil

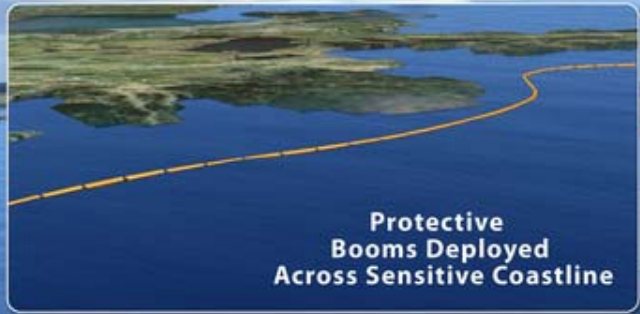


The BP spill

- “To minimize the impact of the oil on the environment” - EPA, Coast Guard, BP, & Nalco
- Prevent the oil from reaching the shorelines
 - Natural
 - Economic
- Aerial and subsea application
- 1.84 million gallons total
 - 771,000 gallons subsea
- ~50 miles offshore

BP continued

- 30 parts per billion when dispersed across the area of the oil slick
 - 1/10th of 1 percent EPA standard testing
 - Far lower level than drinking water standards
- Novel for the sheer magnitude and for subsea application
- Depth of leak (~5,000 feet)



Free Oil Recovery

Aircraft

Spotter/Observer

Dispersant

Skimming

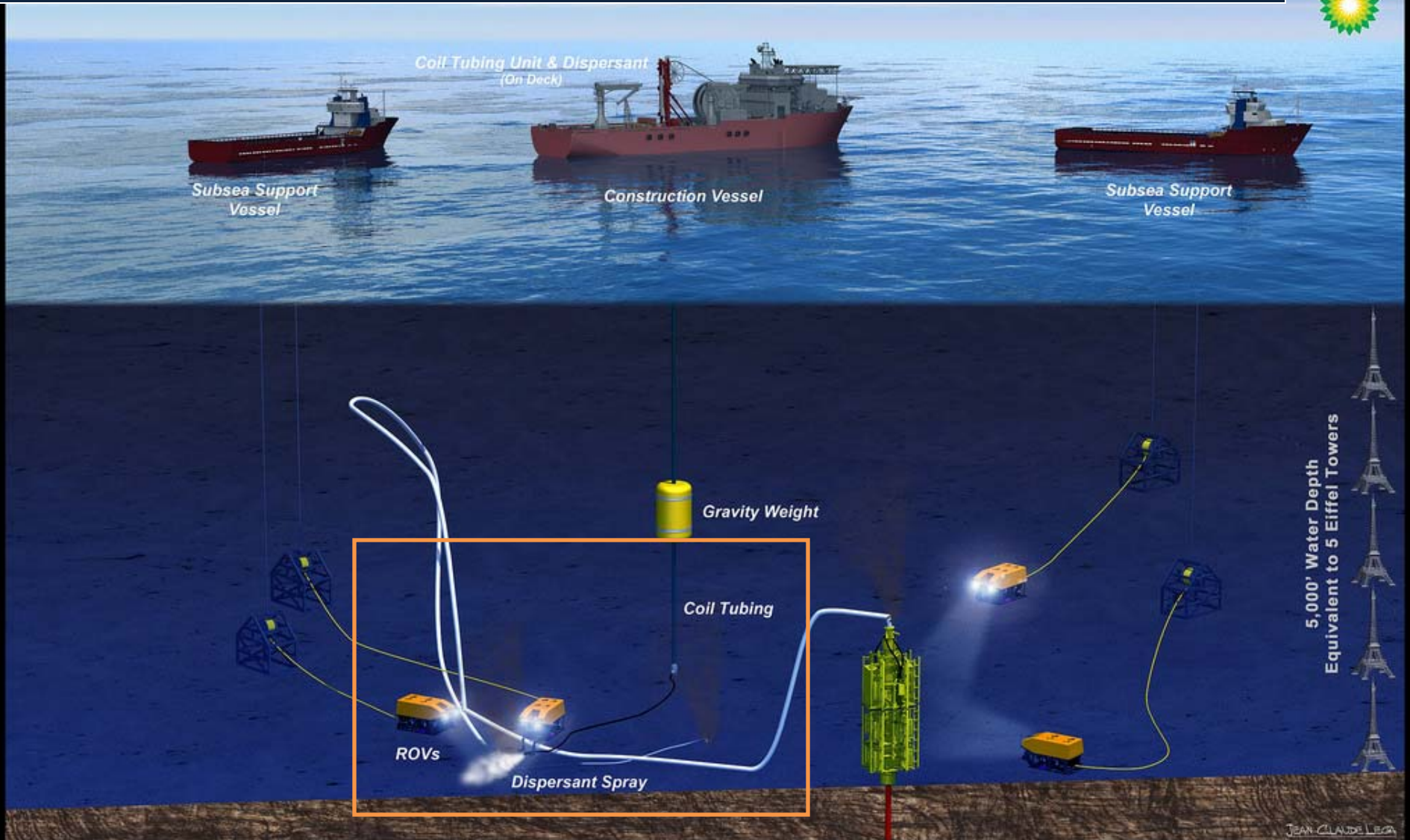
Vessels

Controlled Burning
Successfully Deployed

JEAN-CLAUDE LECH

Oil Spill Response Operation

Subsea application



Subsea Dispersant Injection System

Corexit 9500, 9500A, & 9527

- Different formulations
- Nalco
 - Dispersants very small portion of the company
- 9527 had limited usage due to available stock
 - 2-butoxy ethanol
- 9500/A primary dispersant
 - Only dispersant given by Nalco to Coast Guard for use

Ingredients

- **Surfactant- DOSS- Dioctylsulfosuccinate, sodium salt**

Name

Sorbitan, mono-(9Z)-9-octadecenoate

Sorbitan, mono-(9Z)-9-octadecenoate, poly(oxy-1,2-ethanediyl) derivs.

Sorbitan, tri-(9Z)-9-octadecenoate, poly(oxy-1,2-ethanediyl) derivs

* Butanedioic acid, 2-sulfo-, 1,4-bis(2-ethylhexyl) ester, sodium salt (1:1)

Propanol, 1-(2-butoxy-1-methylethoxy)

Distillates (petroleum), hydrotreated light

** Ethanol, 2-butoxy

Common Day-to-Day Use Examples

Skin cream, body shampoo, emulsifier in juice

Baby bath, mouth wash, face lotion, emulsifier in food

Body/Face lotion, tanning lotions

Wetting agent in cosmetic products, gelatin, beverages

Household cleaning products

Air freshener, cleaner

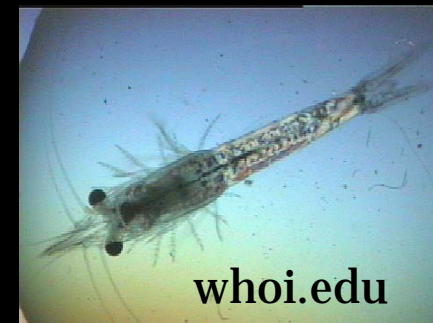
Cleaners

Dispersant research

- EPA required more testing
- Terms:
 - Toxicity testing
 - LD50/ LC50:
 - Dose or concentration resulting in median or 50% death in given time period
 - Ex. 100 mg/l in 48 hours
- Time:
 - Testing is not instantaneous
 - 2 week set up
 - 1 week run
 - Several weeks to verify
- Funding/ Supplies

EPA

- **Data collection and monitoring**
 - Air, water, and sediment
 - Benchmarks: DOSS and same compounds on ingredient list
 - All results are online
- **Toxicity testing**
 - Mysid shrimp
 - Inland silverside
 - Dispersants alone less toxic than oil alone or oil and dispersant mix



Universities & Private Entities

- Additional toxicity testing with relevant marsh, estuary and open water species
- Dispersant alone
 - Blue crab juveniles and larvae: extremely low death in very high concentrations
- Dispersant and Oil
- Sublethal



Limiting factors lab & field

- Laboratory tests cannot replicate real world
- We cannot set up true field tests: research of opportunity
- Other real world variables:
 - Freshwater diversions for spill
 - Drought
 - Freshwater diversions for floods
 - Unusually cold winter
 - Unusually hot summer

Pros and cons of use

- **Pros**

- Kept the majority of the oil out of the marshes
- Reduced surface oil
- Breaks it up to perhaps make it degrade faster

- **Cons**

- Open marine environment
- Deep sea
- Not fully researched impacts on individuals, communities, and the food chain

Future use of dispersants

- Every spill is different
- Hard to anticipate direct needs
 - Oil Spill Commission Report felt that an adequate response for a spill of this magnitude was not planned
- EPA is requiring additional toxicity testing prior to a dispersant being approved
- Tracer compound

Myths and Misconceptions

- **Shorelines and communities were sprayed with aerial dispersant**
Fact: Application was always 3+ miles offshore
- **Dispersant makes the oil vanish**
Fact: It breaks the oil up, but dispersed oil can still be detected
- **Most Gulf workers are sick from 2-butoxyethanol**
Fact: It's not in 9500
Fact: 20% detected, 0.8 ppm highest, 5.0 ppm is recommended limit
Fact: Ingredient in cleaners

Myths and Misconceptions cont.

- **This dispersant is banned in Europe/ UK/ etc.**
 - Fact : Banned from rocky intertidal
 - Fact : Not approved use by manufacture- 3+ miles out
 - Fact : Approved in UK for 3+ miles offshore use
- **Corexit is highly toxic**
 - Fact : All ingredients are found in common household products including food and cosmetics
 - Fact : Allowable toxicity levels
 - Fact : Used as directed
 - Fact: Water can be toxic at excessive quantities

Myths and Misconceptions cont.

- North America faces years of toxic oil rain from BP oil spill chemical dispersants

Fact: Oil does not evaporate, compounds in oil evaporate as gas

Fact: These compounds want to stay gases, not reform as liquid

Fact: Oil ran videos are normal rain falling on an oily street

Fact: Corexit sticks to oil

Fact: A Category 5 hurricane could physically pick up oil

Acknowledgments and Sources

- Louisiana Sea Grant
- LSU AgCenter
- Nalco.com
- Deepwater Horizon Spill Response
- EPA BP Spill Website

A photograph of a sunset over a body of water. The sun is a bright yellow circle in the center of the upper half, with its light reflecting down the water as a shimmering path. The sky is a gradient of orange and red. The word "Questions" is written in a white, serif font with a black outline, centered over the image.

Questions