OIL SPILLS CALCIUM CARBIDE: ENVIRONMENT

NEWS: Capsized ship off Kerala coast triggers oil spills concerns: All you need to know

WHAT'S IN THE NEWS?

A Liberian cargo ship carrying calcium carbide and petroleum products capsized off Kerala, triggering an environmental emergency due to the release of flammable acetylene gas and an oil spill, threatening marine ecosystems and public health. The incident raised concerns over maritime chemical safety and oil spill management capacity in India.

Context:

- A Liberian-flagged cargo vessel capsized off the Kerala coast, carrying calcium carbide and petroleum products.
- The Indian Coast Guard issued an ecological threat warning, prompting Kerala to declare an environmental emergency.

Calcium Carbide: Environmental and Health Risks

- **Chemical Reactivity**: Calcium carbide reacts **violently with water**, especially seawater, producing **acetylene gas**, which is **highly flammable and explosive**.
- **Industrial Use**: Primarily used in the production of acetylene gas for **metal welding**, chemical synthesis, and the ripening of fruits (banned in many countries due to toxicity).
- **Maritime Hazards**:
    - **Explosive Risk**: Contact with seawater can lead to sudden gas buildup and explosions.
    - **Toxicity**: Acetylene gas and associated by-products are harmful to marine organisms and can cause **respiratory and skin issues** in humans.
    - **Fire Hazard**: Any ignition source near the site could trigger large fires on the water surface.
- **Environmental Impact**: Unchecked chemical interaction can severely affect **marine biodiversity**, oxygen levels, and **coastal ecosystem stability**.
- **Regulatory Framework**:
    - Controlled under hazardous cargo handling rules in the **IMDG Code** (International Maritime Dangerous Goods).
    - Subject to stringent port and ship safety norms under **MARPOL** and Indian port regulations.

Oil Spill: Ecological and Regulatory Aspects

- **Definition**: The discharge of petroleum hydrocarbons into marine environments, typically due to accidents or illegal dumping.

- **Common Sources**: Ship accidents, leakage during bunkering, offshore drilling mishaps, and pipeline bursts.
- **Marine Ecological Impact**:
    - **Toxic Effects**: Crude oil and diesel kill **phytoplankton**, **algae**, and **zooplankton**, damaging the food chain.
    - **Fish and Hatcheries**: Eggs and larvae are highly vulnerable; adult fish suffer tissue contamination.
    - **Benthic Impact**: Tar balls and heavier hydrocarbons sink and smother **bottom-dwelling organisms** like clams and mussels.
    - **Long-Term Impact**: Persistent pollutants affect the health of coral reefs and mangroves.

Oil Spill Cleanup Technologies

- **Bioremediation**:
    - Uses microbes to degrade hydrocarbons into non-toxic compounds.
    - **Examples**:
        - *Oilzapper* (ONGC & TERI)
        - *Oilivorous-S* (TERI)
- **Sorbents**:
    - Materials that absorb oil (not water).
    - Natural example: **Milkweed plant fiber** (high oil absorption capacity).
- **Booms and Skimmers**:
    - **Booms**: Floating barriers that contain the spread.
    - **Skimmers**: Mechanized devices that collect surface oil.
- **Dispersants**:
    - Chemicals that break oil into small droplets; controversial due to possible toxicity.

Regulatory Framework

- **India**:
    - ***Merchant Shipping Act (1958)*****:** Mandates pollution control on Indian-flagged ships and compliance with **MARPOL**.
    - ***National Oil Spill Disaster Contingency Plan (NOS-DCP), 1996*****:**

        - Designates **Indian Coast Guard** as nodal agency for oil spill response.
        - Coordinates inter-agency actions in case of Tier I–III oil spills.
- **Global**:
    - ***MARPOL 73/78*:** Marine Pollution Convention covering various pollutants.
        - *Annex I* deals specifically with oil pollution.
    - ***BUNKER Convention (2001)*:** Requires ships to have insurance for fuel oil pollution damages.

Conclusion

- The Kerala incident highlights the urgent need for stricter enforcement of maritime safety and hazardous cargo protocols.
- It reinforces the importance of strengthening India's **marine disaster response infrastructure**, including predictive tracking, rapid containment, and public safety awareness.

Source: **https://indianexpress.com/article/explained/kerala-ship-sinking-oil-spills-concerns-10028102/**