

# *R&D Needs for Dispersants*

July 29, 2010

Nancy E. Kinner  
Coastal Response Research Center  
University of New Hampshire

ACS, AiCHE, Senate Science & Technology Caucus  
"Chemistry in the Clean-Up: Oil Dispersants"



Coastal Response Research Center

# CAVEATS

- Today = Unique R&D Issues Deepwater Horizon (DWH)
- Extensive List of Dispersants R&D Needs Identified Before Deepwater Horizon Spill
  - National Research Council: Oil Spill Dispersants: Efficacy and Effects (May 2005)
  - Dispersants Working Group: R&D Needs for Making Decisions Regarding Dispersing Oil (Sept 2005)
  - Dispersants Working Group: Dispersed Oil Research Data (Present)
- R&D Coordination: Dispersants Working Group



# DEEPWATER HORIZON SOURCES *(TODAY'S PRESENTATION)*

- Deepwater Horizon Dispersants Use Meeting Report
  - (May 2010)
- Deepwater Horizon Dispersants Data Webinar
  - (July 2010)



# R&D ISSUES - DEEPWATER HORIZON

## *LARGE VOLUME*

- Large Volume Applied: 1.84M Gallons Total
  - 1.07M gallons surface
  - 0.77M subsurface
- IXTOC = 2.5M gallons
- Continuous Application Over Many Days
  - Long-term exposure



# R&D ISSUES - DEEPWATER HORIZON

## *SUBSURFACE INJECTION*

- Deepwater Dispersant Use
  - Injection in turbulent plume
  - Cold water ( $\sim 4^{\circ}\text{C}$ ) in deep GOM
  - Warm oil ( $\sim 100^{\circ}\text{C}$ ) exiting well
  - Pressure high (2200 psi at 5000 ft, oil exiting under pressure too)



# R&D ISSUES - DEEPWATER HORIZON

## *EFFICACY*

- Dispersant: Oil Ratio
- Dispersant Types
- Oil Flow Rate Estimates
- Subsurface Mixing Energy



# R&D ISSUES - DEEPWATER HORIZON

## *EFFECTIVENESS*

- Droplet Size Distribution
- Monitoring Techniques:
  - Conventional = Visual + Fluorescence
  - Gas Chromatography / Mass Spectrometer
  - Acoustics
  - Particle Counter (LISST)
- Ocean Observing Systems (e.g., gliders)
- Molecular Techniques (DNA)



# R&D ISSUES - DEEPWATER HORIZON

## *FATE & BEHAVIOR*

- Fate and Behavior: (Chemical Dispersants vs. Natural Dispersion)
  - 3D behavior from deepwater upward
    - Dispersion
    - Dissolution
    - Biodegradation
    - Sinking (?)
  - Dispersability of weathered oil
  - 3D models to predict where, when, how much
    - Offshore and onshore model links





# R&D ISSUES - DEEPWATER HORIZON

## *BIOLOGICAL EFFECTS*

- Air vs. Water Exposure
- Marine Biota (Surface & Deepwater) and Humans
- Food Web, Ecosystems, Bioaccumulation
- Acute vs. Chronic
- Cytotoxicity, Endocrine Disrupters
- Realistic Exposures
  - Time and Concentration
- Seafood Safety
  - Dispersants in Seafood
  - Dispersed oil



# R&D ISSUES - DEEPWATER HORIZON

## *OTHER TOPICS*

- Dispersant Discontinuance Criteria
  - Role of Consensus Ecological Risk Assessment
- Dispersant Database
  - Build on LUMCON (LA Universities Marine Consortium)
  - Biological Threshold Database
  - Links to Previous Studies



# Coastal Response Research Center Website

[www.crrc.unh.edu](http://www.crrc.unh.edu)

