Advances in Oil Spill Response: Five Years After the Deepwater Horizon

U.S. Senate Forum

April 21, 2015

Center for Spills in the Environment
University of New Hampshire

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1

Nancy E. Kinner

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UNH Co-Director, Coastal Response Research Center (CRRC)

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Thank You to the Sponsors of Today's Briefing

Senator Jeanne Shaheen (D-NH)

Senator Kelly Ayotte (R-NH)

and Their Staff

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Thank You for Attending

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Coastal Response Research Center (NOAA $)

Center for Spills in the Environment (All Other $)

- Conduct and Oversee **Basic** and **Applied** Research and Outreach on Spill Response and Restoration
- Transform Research **Results into Practice**
- Serve as **Hub for Oil Spill R&D** (**ALL** Stakeholders)
- **Facilitate Collaboration** on R&D Among Stakeholders

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Why Oil Spill Center Started in 2004?

- Oil and Chemical **Spills Occurring**
  - Production Changes (e.g., deepwater, fracking)
- **There Will Be Another Major Spill in the U.S.**
- **Many R&D Needs** Exist on Spill Preparedness, Response and Restoration
- **Expertise to Call Upon** During Spill
  - UNH Not in Oil/Chemical Producing Area
  - **Independent, Highly Credible Resource**

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Oil Spill Response: 25 Years After the Exxon Valdez and in the Wake of Deepwater Horizon, What Have We Learned and What Are We Missing?

- CSE Forum October 28 – 29, 2014 at UNH
  - http://unh.edu/universityevents/events/osr-forum/
- Lessons Learned EVOS and DWH Applied to Future Spills (Arctic / Trains / Pipelines)
- Roles During Spills of:
  - Academic Science
  - Media
  - Policy & Politics

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Going Forward from Forum

- Role of Academic Science
  - Science Partnerships Enabling Rapid Response
- Role of Media
  - June 8, 2015 Forum at Pew in DC
- Outreach to Congress
  - Annual/Semiannual Briefings
  - Coordinated through NH Congressional Delegation

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Today's Agenda

- Welcome and Introductions
- Claudia Gelzer, Captain, U.S. Coast Guard, Marine Environmental Response
- David Westerholm, NOAA, Office of Response and Restoration
- Remarks by Senator Ayotte
- Remarks by Senator Shaheen
- Nancy Kinner, UNH, CSE

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Today's Slides and Other Information & Resources Available:

www. cse.unh.edu

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ALL SPILLS ARE BAD
BAD THINGS WILL HAPPEN
GOAL of RESPONSE: LEAST BAD!

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U.S. Coast Guard Perspective

Captain Claudia Gelzer

U.S. Coast Guard; Chief, Marine Environmental Response

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12

NOAA Perspective

David Westerholm

NOAA; Director, Office of Response and Restoration

From Famine to Feast in Five Years: Oil Spill R&D What Does It Mean for Response?

Nancy E. Kinner

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CSE/CRRC Activities

- Workshops - 48
- Working Groups -5

Oil Spill Response R&D Since DWH

- Some Federal Agency $
  - BSEE, USCG, NOAA, USEPA
- $$$$ From Other Sources
  - Gulf of Mexico Research Initiative (GOMRI)
  - National Academy of Sciences (NAS)
  - Industry

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Gulf of Mexico Research Initiative (GOMRI)

- Improve society's ability to understand, respond to and mitigate impacts of petroleum pollution and related stressors of marine and coastal ecosystems, with emphasis on conditions found in Gulf of Mexico
  - Knowledge accrued will be applied to restoration and to improving long-term environmental health of Gulf of Mexico
- $500M from BP Over 10 Years
- Consortia and Individual Grants
  - Mostly Universities
  - Annual Conference

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National Academy of Sciences Gulf Research Program

- Enhance oil system safety and protection of human health and environment in Gulf of Mexico and other U.S. outer continental shelf areas by seeking to improve understanding of region's interconnecting human, environmental, and energy systems and fostering application of insights to benefit Gulf communities, ecosystems, and Nation
- $500M from Settlement Over 30 Years
- Exploratory grants, early-career research fellowships, science policy fellowships, NRC study on practical guidance to monitoring programs

http://www.nationalacademies.org/nrc/

19

Industry

- Enhancing Oil Spill Preparedness and Response
- API and IOGP/IPIECA Joint Industry Task Forces
- Focus: Planning, Dispersants, In-Situ Burning, Mechanical Recovery, Shoreline Protection, Remote Sensing, Alternative Technologies, Arctic, Deepwater
- Guidance and Planning Documents, Recommended Practice, Training and Exercise Guidelines, Technology Evaluation, Database for R&D Activities
- Communications/Outreach and Decision-Making Tools

http://www.oilspillprevention.org/oil-spill-research-and-development-cente
http://oilspillresponseproject.org/completed-products

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ICCOPR

- Interagency Coordinating Committee on Oil Pollution Research http://www.uscg.mil/iccopr/
- Established by OPA'90 to Coordinate Federal Agency R&D
- Establish R&D Priorities
  - New R&D Needs Released in 2015
  - Collaboration with GOMRI, NAS and Industry for Ideas

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Making Sense of Published Research

- From "Famine" to "Feast"
- Post EVOS, Agencies and Industry Did Some Spill R&D
- Now Each Week, Several Published Papers
  - 2-3 Major Conferences Per Year

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Tips for Navigating the Barrage of Oil Spill Research Findings

1. "Null" Results Rarely Published
2. Simulating What Happens in the Environment is Important, But Very Hard to Do

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3. Applying Results to Practice (Spill Response) Is Goal

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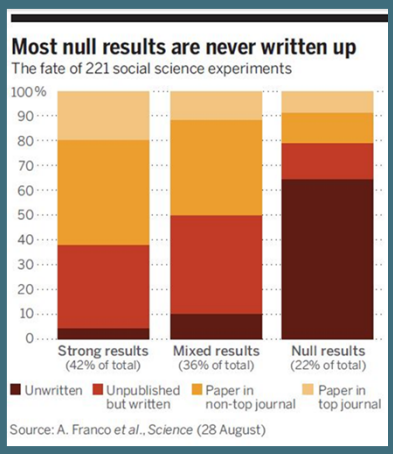
1. "Null" Results Are Rarely Published

- Scientific Journals Publish Results that Show Effects
- Experimental Conditions Lead to Measurable Effect
- 96% of Published Literature Is Strong Effects



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"Null" Results Are Rarely Published

Oil + Microbes

YES → Oil Concentration Decreases

No → Oil Concentration Does Not Change

Only "Yes" Biodegradation "Publishable" So Researchers Will Not Try to Publish "No"

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2. Simulating the Environment

- Very Hard to Do!
  - Oil is Complex Mixture
  - Many Oils, Many Environments
  - Every Spill is Unique

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3. Practical Application to Spill Response

- Most Researchers Not Familiar with Spill Response
- Most Responders Are Not Working Directly with Researchers

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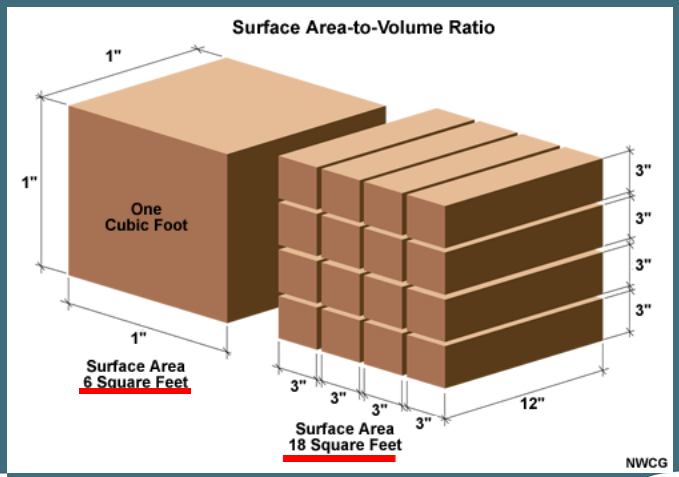
Example of 2 and 3: Dispersant Concentrations in Toxicity Experiments

- Dispersants Very Soluble in Water
- Easy to Make 200 ppm Dispersant Solution in Lab for Toxicity Experiment
- 10 ppm Is Typically Maximum Concentration In Seawater When Dispersant Applied by Airplanes Flying Over Oil Slick
- Analogy: Take 1 Aspirin, Not Whole Bottle!

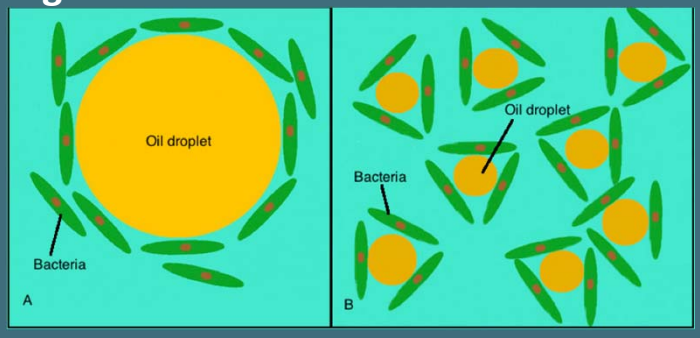
Example of 2 and 3: Oil Droplet Size

- Surface Area to Volume Concept



Why Does It Matter?
30 um vs. 300 um Oil Droplet Size

- Microbes Degrade Oil- Small Droplet Oil Degrades Faster



How You Simulate Deepwater Wellhead Matters

- High Pressure, High Flow, Oil + Gas, Cold Water Hot Fluid Leaking Out
- Flow = 23 gals/second, 6500 lbs / inch^2
- Hard To Do In Lab or Tank

Making Sense of It: State-of-the-Science

- Scientists from All Groups
  - Federal agencies
  - NGOs
  - Academia
  - Industry

- Read All Publications/Reports
- Discuss Experimental Conditions vs. Field
- Develop Statements on Knowns & Uncertainties

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From Famine to Feast in Five Years: Oil Spill R&D What Does It Mean for Response?

State of the Science Must Be Determined and Translated into Response Decisions

CSE Mission: Transform Research Results into Practice

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