

Environmental Studies Program: Ongoing Study

Study Area(s): All

Administered By: Headquarters

Title: Evaluation of the Use of Chemical Dispersants in Oil Spill Response (NSL #NT-16-X30)

BOEM Information Need(s) to be Addressed: This study is being conducted to provide a comprehensive review and synthesis of the scientific understanding to date of effects and efficacy of chemical oil spill dispersants, which will enhance the Bureau of Ocean Energy Management's (BOEM's) ability to make impact assessments. BOEM's National Environmental Policy Act (NEPA) analyses and compliance will be improved.

Total BOEM Cost: \$100,000

Period of Performance: FY 2017–2019

Conducting Organization(s): National Academies of Sciences, Engineering, and Medicine (NAS)

Principal Investigator(s): NAS Ocean Studies Board (CKarras@nas.edu)

BOEM Contact(s): Brian Zelenke (brian.zelenke@boem.gov), Zhen-Gang “Jeff” Ji (jeff.ji@boem.gov)

Description:

Background: The first large scale application of oil dispersants as a subsurface response method occurred as part of the *Deepwater Horizon* oil spill (*DWH*). The use of this response method resulted in significant public debate regarding the efficacy and possible toxic effects of the dispersant and oil-dispersant mixture. Considerable research of the subsurface dispersant effects has been conducted following the *DWH* spill, and a large number of papers have been published on the questions raised by this response method.

The National Research Council's (NRC's) Ocean Studies Board (OSB) and Marine Board (MB) have previously convened successful panels on the subject of Oil Spill Dispersant effects, which produced reports published in 1989 (MB) and 2005 (OSB). The more recent history of NRC OSB staff, NAS members, and experts associated with these previous projects makes the NRC OSB well positioned to convene and direct a panel on this topic.

Objectives: The objectives of this study are:

1. Assess the state of our knowledge about dispersant effectiveness (including comparisons across a range of dispersant formulations) and the fate, including short- and long-term fate, of untreated oil (no chemical dispersant applied), chemical dispersants, and chemically dispersed oil and the influence of

dispersants on deposition (including marine snow), biodegradation, and/or transport of oil;

2. Evaluate and summarize research on the acute and chronic (sub-lethal) toxicity of chemical dispersant formulations of comparable efficacy, chemically dispersed oil, and untreated oil at realistic environmental exposure levels. This will include characterization of the relative risks to wildlife health of untreated oil and chemically dispersed oil, taking into consideration exposure to volatile compounds, ingestion, and absorption of naturally versus chemically dispersed droplets;
3. Compare the benefits and limitations of dispersant application to the use of other clean-up methods (*e.g.*, no-action, mechanical recovery, burning, and chemical herders in combination with burning);
4. Compare the relative human health risks for the use of dispersants with the use of other clean-up methods (exposure of response personnel and residents in Gulf of Mexico coastal communities to oil and dispersants, and contamination of seafood);
5. Identify the research protocols and standards that would: i) increase the applicability of lab-based measurements to the field and ii) improve the comparability of research findings from different laboratories;
6. Assess the adequacy of the existing information to support risk-based decision-making or net environmental benefit analysis (NEBA) of response options under a variety of spill scenarios and recommend a “roadmap” of research and modelling to address identified information gaps.

Methods: A committee of approximately 16 members was appointed to conduct this study. The committee members are subject matter experts drawn from universities, federal government laboratories, nongovernmental organizations, and/or the private sector for their knowledge of oil spill response, impacts of oil spills on the environment, and environmental risk modeling. The committee is examining theoretical (modeling) and field studies used to assess the effects of oil spill dispersant chemicals.

The committee will review models for the effects of dispersants on the trajectory and concentration of oil from the spill, and evaluation of the environmental impacts (as in a NEBA). The report shall be subject to NRC review procedures prior to release. The committee shall subsequently disseminate the report through briefings and presentations at scientific conferences during the last 6 months of the project.

Current Status: The *DWH* spill and response highlighted the need for improved communication frameworks and tools for informing the public about the risks associated with spilled oil, dispersant use, and the efficacy of other spill response technologies. To address these needs this study has endeavored a comparative environmental risk assessment approach, with a stakeholder group using a matrix of criteria and measures of impact to guide a discussion of dispersants that considers

scientific knowledge and data, scientific uncertainty, and social values. The committee convened by the NAS has held four meetings thus far, which have included:

- public sessions to gather information and opinions about dispersant use
- a review of models for the effects of dispersants on the trajectory and concentration of oil from the spill and for evaluation of the environmental impacts (as in a NEBA).
- a half day workshop on the possible public health consequences of dispersant use that is based, in part, on the assessment of net environmental benefit.

A fifth and final meeting is planned for committee deliberations and report preparation. The committee shall subsequently disseminate the report through briefings and presentations at scientific conferences during the last 6 months of the project.

Final Report Due: June 14, 2019

Publications Completed: None.

Affiliated WWW Sites: <https://marinecadastre.gov/epis/#/search/study/100211>

Revised Date: February 2, 2018