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Comparative risk assessment of spill response options for a deepwater oil well blowout: Part III. Stakeholder engagement

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ABSTRACT

This paper describes oil spill stakeholder engagement in a recent comparative risk assessment (CRA) project that examined the tradeoffs associated with a hypothetical offshore well blowout in the Gulf of Mexico, with a specific focus on subsea dispersant injection (SSDI) at the wellhead. SSDI is a new technology deployed during the Deepwater Horizon (DWH) oil spill response. Oil spill stakeholders include decision makers, who will consider whether to integrate SSDI into future tradeoff decisions. This CRA considered the tradeoffs associated with three sets of response strategies: (1) no intervention; (2) mechanical recovery, in-situ burning, and surface dispersants; and, (3) SSDI in addition to responses in (2). For context, the paper begins with a historical review of U.S. policy and engagement with oil spill stakeholders regarding dispersants. Stakeholder activities throughout the project involved decision-maker representatives and their advisors to inform the approach and consider CRA utility in future oil spill preparedness.

1. Introduction

Oil spill response (OSR) seeks to mitigate the impacts of spilled oil on valued resources while limiting the negative effects of the response, that is, to strike a balance between reducing injury to some resources without unacceptably increasing the injury to other resources. By necessity, OSR planning is a predictive process that depends upon evaluating (1) the oil release conditions, (2) the fate and transport of the released oil, (3) exposure of humans, biological and socioeconomic resources to oil hydrocarbons and response activities, (4) the potential effects on valued resources, and (5) how different oil spill response methods influence these factors. OSR response planning requires consideration of these factors by decision makers and other stakeholders.

Subsurface dispersant injection (SSDI) is a recent innovation in oil spill response. The use of SSDI in a deepwater oil and gas well blowout offers potential significant benefits including effective dispersant treatment of discharging oil at the source; reducing the volume of oil that reaches the water surface; reducing human and wildlife exposure to volatile organic compounds (VOCs); dispersing the oil over a large water volume at depth; reducing the persistence of any SSDI-treated oil that does surface; enhancing oil biodegradation; and reducing surface, nearshore and shoreline exposures to floating and surface-water entrained/dissolved oil. Potential negative consequences include increased water column and benthic resource exposures to oil at depth.

To better understand the implications of SSDI use, work was conducted to model a hypothetical well blowout, located in the northern Gulf of Mexico (GoM) (Fig. 1), to predict oil fate and compare the environmental exposure for no intervention to various combinations of four response options - mechanical recovery (M), in-situ burning (B), M, B, and surface dispersant application (SD), and SSDI. Probabilistic modeling was used to evaluate the influence of variable metocean conditions (i.e., winds, currents and temperature) on oil trajectory and fate. Using individual runs representative of specific metocean conditions several different modeling simulations and combinations of response options were compared to quantify oil fate, the amount of surfaced as opposed to dispersed oil, and the area or volume of different surface and subsurface environmental compartments in which predicted exposure concentrations exceeded screening thresholds for potential effects. A comparative risk assessment methodology was used to compare the various OSR options. This work was undertaken in

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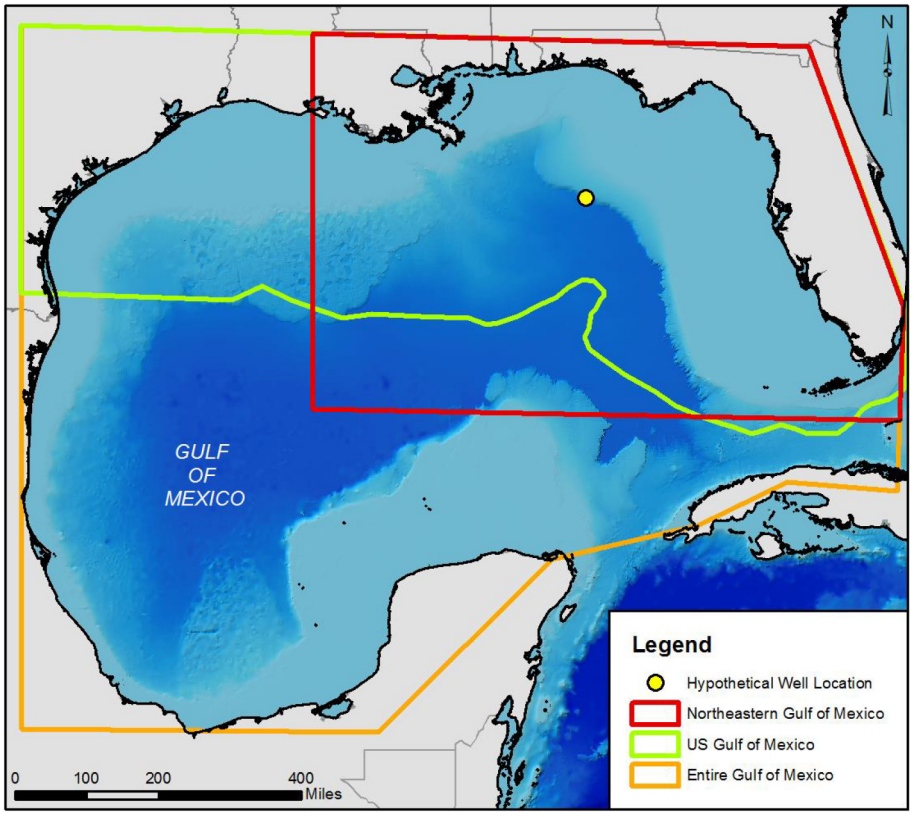

Fig. 1. Location of the hypothetical well blowout (28.044143N–86.511795W) and the three user selectable model domains. The default model domain is the Northeastern Gulf of Mexico.

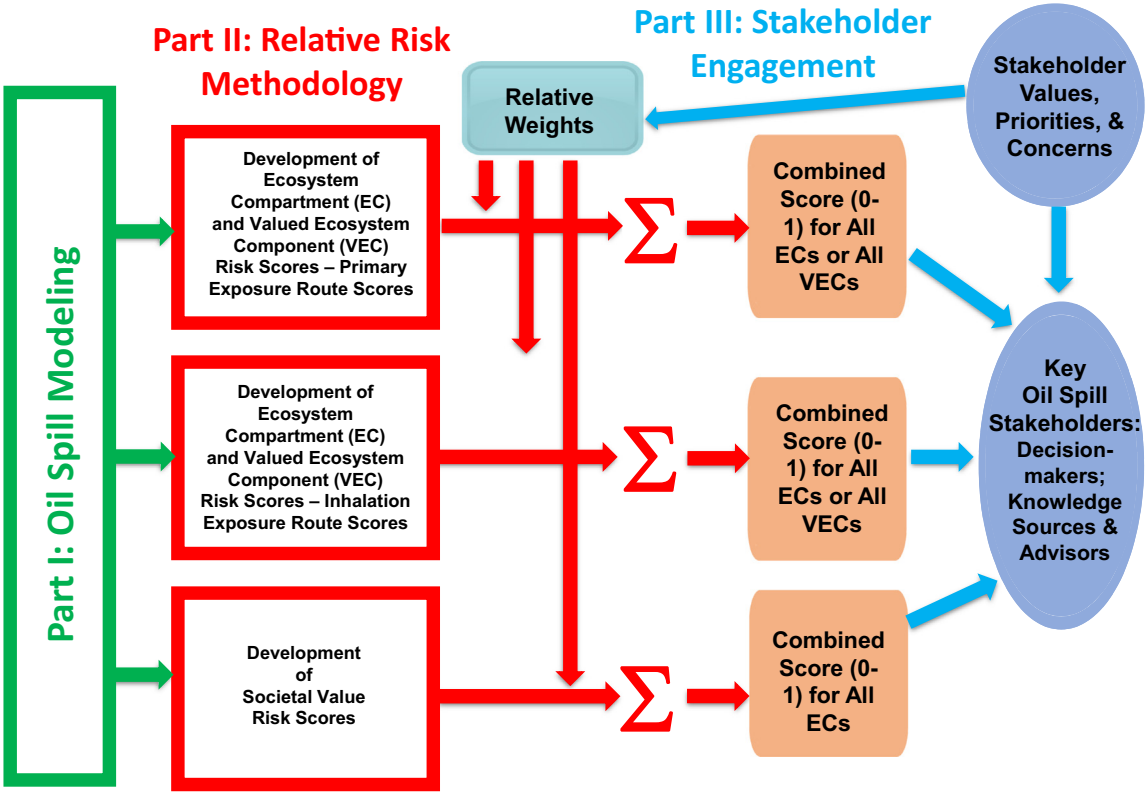

Fig. 2. Schematic of the comparative risk assessment (CRA) methodology used in this work.