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15. Supplementary Notes

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16. Abstract (MAXIMUM 200 WORDS)

This study evaluated the feasibility of conducting in-situ burning (ISB) using current technology on post 1967 major oil spills over 10,000 barrels in North America and over 50,000 barrels in South America and Europe. A diverse set of 141 spills representing various combinations of parameters affecting spill responses (e.g., spill size, oil type, weather conditions, sea temperature, and geographic location) were evaluated using four "Phase I" criteria: distance to populated area, oil weathering, logistics, and weather conditions. In Phase I, a spill that failed to meet one of the four criteria was considered an "unsuccessful" candidate for ISB. In total, 47 of the 141 spills passed the Phase I analysis. The potential effect of the plume on populated areas was the most significant of the four Phase I criteria; 59 of the 141 spills did not pass Phase I because the incident occurred near a sizable city. Spills that met all four criteria were further evaluated using a "Phase II" analysis that applied additional criteria and considered individual spill circumstances to determine if the spill should be rated a "successful," "marginal call," or "unsuccessful" ISB candidate. Fourteen spills were ultimately determined successful in the Phase II analysis, and 12 were designated marginal calls.

17. Key Words	18. Distribution Statement
in-situ burning, oil spill, past oil spills, oil type, oil weathering, weather conditions, geography, logistics, North America, South America, Europe, SINTEF	This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161

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EXECUTIVE SUMMARY

This study evaluated the degree to which in-situ burning (ISB) would have served as an effective response technique for past major oil spills. Through reviews of scientific and historical literature on oil spills and the collection of supplemental data, this study developed scenarios for 141 past oil spills that had a diverse set of parameters affecting spill response (e.g., spill size, oil type, weather conditions, sea temperature, and geographic location). Using criteria that could affect ISB, these scenarios were assessed and the feasibility of ISB as a response technique was determined.

The technical feasibility of ISB depends on the particular spill scenario, including the type of oil spilled, the location of the spill, the condition of the oil (both initially and over time), and weather and sea conditions on scene. These factors dictate a "window of opportunity" for executing an ISB operation. This study established criteria to assess whether a burn would have been successful based on the factors that most influence the feasibility of ISB. The criteria are based on the technology available in 1997 and address four primary factors: (1) oil weathering; (2) response logistics; (3) weather; and (4) distance to populated areas. Each spill was reviewed on the basis of the established criteria and assigned a pass or fail rating. These four criteria were applied to all 141 spills in the first phase of the evaluation. Spills that successfully met all criteria were subjected to a second analysis. This analysis provided an opportunity to consider more site-specific conditions for each spill. Instead of establishing any specific criteria, a number of factors were conjoined to assess the feasibility of ISB. Additional information was used to refine the initial assessment when it was available.

Of the 67 percent of the 141 spills that failed Phase I, 5 percent failed the weather criterion, 25 percent failed the oil weathering criterion, 30 percent failed the logistics criterion, and 42 percent failed the distance to populated area criterion. In total, 47 of the 141 spills passed the Phase I analysis. Fourteen of these (30 percent) were ultimately determined successful in the Phase II analysis, twelve (26 percent) spills were designated marginal calls, and 21 (45 percent) spills were designated unsuccessful candidates for ISB.

In general, the successful ISB candidate tended to occur in the coastal or offshore waters of the Gulf of Mexico or Caribbean Sea. The larger spills that occurred off the Atlantic coast of North America also tended to be successful. There were 7 successful ISB candidates out of the 38 spills that occurred in the Gulf of Mexico and Caribbean, and 4 successful candidates out of the eight spills of 50,000 barrels or more that occurred off the Atlantic coast of North America. None of the candidates were from inland waterways or from ocean waters off South America.

The results of the analysis show that, although there is growing interest in ISB for use on large volume oil spills, there are constraints to the widespread use of the technique. Considering the effectiveness of ISB, however, and the fact that constraints such as spill location, expected weather, and oil type are likely to be well known prior to

undertaking a response, the results are encouraging. If the locations, oil types, and weather conditions of future oil spill incidents are similar to those of past incidents, then ISB may be a possible response option for a small but significant fraction of future incidents. Decision-makers must compare ISB to other response options knowing the respective limitations and effectiveness of each technique.