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# *In Situ* Burning of Oil Spills Workshop Proceedings

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## **COVER**

U.S. Coast Guard and Minerals Management Service sponsored fire-resistant oil spill containment boom performance test using a non-commercial test boom at the Coast Guard Fire and Safety Test Detachment, Mobile, AL, August 1997. William D. Walton, Photographer.

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## IN SITU BURNING OF OIL SPILLS - WORKSHOP OVERVIEW

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### SUMMARY

The Minerals Management Service (MMS) is designated as the lead agency for *In Situ Burn* (ISB) research in the Oil Pollution Research and Technology Plan, prepared under the authority of Title VII of the Oil Pollution Act of 1990. In January 1994, MMS sponsored a workshop, conducted by the National Institute of Standards and Technology (NIST), to determine the research needs required to advance the use of ISB in spill response. This workshop was one of MMS's effort's to ensure the relevance of their research program to the needs of the user community. Specific emphasis was given to environmental and operational implications of ISB response technology. The proceedings of the workshop[1] provide some insight into the remaining concerns of the industrial, government, and research organizations that participated.

In the four years since the first burn workshop, many research questions identified in the proceedings have been successfully addressed and answered. However, questions remain about the effects of ISB on both water and air quality. In addition, equipment to conduct burns such as durable fire resistant booms and the ability to extend the window of opportunity to use burning as the oil weathers and emulsifies is lacking. This workshop is a follow-up to the one conducted in 1994 and will include an update on the current state of burning and include breakout sessions to determine future research needs.

### INTRODUCTION

*In Situ* Burning (ISB) of oil is not a new idea. The *Torrey Canyon* incident (1967) in Great Britain was the first major oil spill in which burning was attempted. However, due to the emulsification of the oil, results were unsuccessful and discouraged others from trying. During the 1970's and 1980's, there were many research studies and experimental burns conducted on ISB, including one successful burn conducted during the *Exxon Valdez* (1989) oil spill, but results have been varied. In 1983, the Minerals Management Service (MMS) initiated an ISB program to evaluate the burning of oil in different environments. This research has focused on the burning characteristics of crude oil fires on water, the composition of the combustion products and the dispersion and settling of particulate matter (soot) contained in the smoke plume. Results from laboratory tests, mesoscale burn experiments in Mobile, AL (1991-1994), the Alaska Emulsion Burn Experiments, and the full-scale Newfoundland Offshore Burn Experiment (NOBE), continue to show that ISB is a rapid, effective, and environmentally safe means for removing large quantities of oil from the water's surface. Information from laboratory, mesoscale, and full-scale crude oil burns has contributed significantly

to the understanding of the actual impact of oil spill burning. Burning, once regarded as a method of last resort, is now, one of the first response methods to be considered by authorities in case of spill.

## BACKGROUND

The proceedings of the first ISB workshop, conducted in January 1994, contain prioritized research and information needs required to support decisions on the use of *in situ* burning of oil spills.[1] Concerns of high priority were:

- a. Improve predictions of potential human health effects from *in situ* burning.
- b. Evaluate existing and relevant plume models for use in planning and real time estimation.
- c. Verify existing smoke plume models with real-time measurements, including compound specific measurements.
- d. Evaluate different real-time monitoring instruments for PM10, including laboratory methods.
- e. Test operational monitoring protocols.
- f. Develop criteria, protocols and performance data for fire resistant boom and igniters presently available on the market.
- g. Develop means to make heavy oils (Group 5, Bunker C) and emulsified oils easier to burn.
- h. Determine the conditions under which unconfined oil can burn.
- i. Determine the feasibility of burning on land, in marshes, and on beaches.
- j. The ability to control/extinguish an *in situ* burn at sea.
- k. Chemical agents that can be applied to enhance various elements of the burn, smoke suppression, breaking of emulsions and promotion of combustion.

A number of issues arose during this workshop that were identified as important, but were not specifically related to research and development (R&D) needs. It was important to capture these issues, but not dwell on them due to the limited time available in the workshop. These issues were:

- a. Legal/regulatory constraints
- b. Need for education of regulators, public and operational personnel
- c. Burning of residual wastes (sorbents, debris, booms)

Based on the information provided at the workshop through presentations and in the discussions held at the breakout sessions, there are no significant road blocks to having ISB accepted as a viable response technique. When additional information becomes available from R&D efforts and regulators become comfortable with the knowledge base, the procedures and pre-approval process will continue to be refined.

## PURPOSE OF THE WORKSHOP

In the past five years, significant advances in the *in situ* burning of oil spills have been made. ISB as a response tool for large marine oil spills has progressed from a demonstration burn during the *Exxon Valdez* spill in 1989 to an accepted response technique. The relatively short window of opportunity for implementing ISB requires that burn operations be pre-planned and pre-approved to ensure an adequate response to spill events. Proponents of burning believe that ISB shows great promise as a response technique and that the environmental tradeoff's (burning vs. unburned oil spills) strongly favor burning in many scenarios. Opponents of ISB do not view the issue in terms of environmental tradeoff's. They cite specific reasons (inadequate research, fear of combustion products and the lack of adequate information on the environmental and human health implications of the smoke and burn residue).

This workshop will serve to summarize and evaluate the current state of knowledge with regards to burning. It will allow proponents and opponents of ISB to work with the facts as they exist today and make decisions that are based on data, not opinions. This workshop is part of MMS's continuing effort to ensure maximum applicability and benefits of its cooperative research to the user community.

The workshop is organized into two major segments. First, we have assembled recognized experts in various aspects of *in situ* burning of spilled oil. These invited speakers will summarize and present the current state of knowledge in specific research areas. They also will present future research plans to improve our understanding of ISB. The target audience is decision makers from local, state and federal government agencies, responders, environmentalists, academia, and the user community. We have attempted to involve regulatory and scientific agencies and the public in the dialogue of this workshop.

In the second major part, following the presentations, participants will breakout into two panels, Burning Operations and Environmental and Human Health. We recognize that several potential issues overlap this distinction but will be addressed in the final consensus document. Panels will examine the information presented, determine a consensus, and develop a list of priority research needs. The proceedings of the workshop will be published as the official transmittal of workshop information and recommendations. The proceedings will contain the panel's consensus list of priority research needs and well as the individual technical paper presented. The results of the workshop will be used by MMS and other agencies as input to their planning of future research efforts.

## REFERENCES

1. Jason, N. H. *In Situ* Burning Oil Spill Workshop Proceedings, NIST SP 867, U.S. National Institute of Standards and Technology, Gaithersburg, MD, 1994.