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16. Abstract (MAXIMUM 200 WORDS)

Most response plans for in-situ burning of oil at sea call for the use of a fire-resistant boom to contain the oil during a burn. Presently, there is no standard method for the user of fire-resistant booms to evaluate the anticipated performance of different booms. The ASTM F-20 Committee has developed a draft standard, "Standard Guide for In-Situ Burning of Oil Spills On Water: Fire-Resistant Containment Boom," however, the draft provides general guidelines and does not specify the details of the test procedure. Utilizing the guidelines in the draft standard, a series of experiments was conducted to evaluate a protocol for testing the ability of fire-resistant booms to withstand both fire and waves. A wave tank capable of evaluating a 15 m section of boom by subjecting it to a 5 m diameter fire with 0.15 m high waves was designed and constructed at the U.S. Coast Guard Fire and Safety Test Detachment in Alabama. The draft ASTM F-20 test protocol was evaluated using five typical fire-resistant oil spill containment booms, and the results of this evaluation are presented. The strengths and weaknesses of the protocol are discussed, along with areas for possible improvement.

17. Key Words
diesel fuel, fire-resistant booms, oil spills, pool fires

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Executive Summary

Most response plans for in-situ burning of oil at sea call for the use of a fire-resistant boom to contain the oil during a burn. Presently, there is no standard method for the user of a fire-resistant boom to evaluate the anticipated performance of different booms. The ASTM F-20 Committee has developed a draft standard, "Standard Guide for In-Situ Burning of Oil Spills On Water: Fire-Resistant Containment Boom;" however, the draft provides only general guidelines and does not specify the details of the test procedure. Utilizing the guidelines in the draft standard, a series of experiments was conducted to evaluate a protocol for testing the ability of fire-resistant booms to withstand both fire and waves.

Five booms were subjected to the test procedure based on the draft standard. Three of the booms were of fabric based construction, one was water-cooled fabric and one was stainless steel. All of the booms showed some degradation over the course of the tests, and the test for one of the fabric booms was terminated after one hour of burning due to fire damage to the boom. During the test of the water-cooled boom, the fire became less intense and continued at a reduced rate for a total of almost two hours. This resulted in an inefficient burn, as a loss in cooling water resulted in fire damage to the boom which led to fuel loss. There was difficulty in applying the test protocol to water-cooled booms. Further study of the impact of water-cooled booms on the burning rate is recommended.

During the test series, the fire size appeared to be an adequate simulation of a real burn. The thermal impact on the boom was influenced by wind speed and direction. During the test series, internal stanchions were used to position the boom in the middle of the tank. It was noted during most of these tests that the boom appeared to be damaged by contact with the stanchions. It is recommended that alternative methods of boom constraint, such as cables attached to the boom skirt, be considered.

Overall, the test protocol and its application were considered to be a success. The test appeared to provide a realistic simulation of the thermal stresses expected during the use of a fire-resistant oil spill containment boom. The tests served to raise a number of issues concerning the application of the draft ASTM F20 protocol which was used in the test series. One of the most important aspects of the tests is the evaluation criteria. It appears unlikely that a numerical rating of fire-resistant booms can be developed from these tests. The most appropriate evaluation appears to be either to report the condition of the boom at the end of the test, or the use of a simple pass/fail criterion.