Designation: F 1413 – 92 (Reapproved 1999)

Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems[1]

This standard is issued under the fixed designation F 1413; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers design criteria, requirements, material characteristics, and essential features for oil spill dispersant application systems. This guide is not intended to be restrictive to a specific configuration.

1.2 This guide covers spray systems employing booms and nozzles and is not fully applicable to other systems such as fire monitors, sonic distributors, or fan-spray guns.

1.3 This guide covers systems for use on ships or boats and helicopters or airplanes.

1.4 This guide is one of four related to dispersant application systems. One is on design, one on calibration, one on deposition measurements, and one on the use of the systems. Familiarity with all four guides is recommended.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Equipment Description

2.1 *General*—Oil spill dispersant spray systems include one or more booms with nozzles to form droplets, a pumping or pressure system to deliver dispersants to the boom, and associated piping and valving. All systems shall include a dispersant flow meter and a pressure gauge. All systems shall be equipped with provision for cleaning and drainage.

2.2 *Ship/Boat*—Each boom holding nozzles shall be designed to be mounted near the bow of the vessel so that the spray is uniformly deposited on the slick surface. Spray units can be portable or fixed. Flow correction or straightener devices, to ensure laminar flow, shall precede the nozzles. System components should be designed to give a uniform droplet spray as described in this guide. The spray pattern should be flat and strike the water in a line perpendicular to the vessel's line of travel. The nozzle spray angle should be such that spray from adjacent nozzles overlap just above the water.

2.3 *Airplanes*—Mounting of spray booms on aircraft is subject to federal regulation. Each installation or modification requires approval.

2.3.1 Nozzles may not be necessary on aircraft flying at speeds greater than 220 km/h (120 knots or 135 mph) because the wind shear alone can produce the required droplet sizes. Pressure-activated check valves must be used to eliminate drainage during nonspraying transits. In order to minimize the effects of wind shear, nozzles should be oriented aft (180° from the direction of flight).

2.4 *Helicopters*—Systems may consist of spray booms with nozzles and pump/tank assemblies directly attached to the helicopter or a bucket system slung below the helicopter.

2.4.1 The bucket system consists of a tank and pump assembly to which spray booms with nozzles are attached. The assembly is supported from the helicopter by a cable system and is remotely-controlled from the helicopter cabin. An indication of dispersant flow is required in the helicopter cockpit. The bucket must be stabilized against rotation, yaw, and sway.

3. Minimum Equipment Performance Specifications

3.1 *Target Dosage*—Oil spill dispersant spray equipment shall provide a dispersant dosage of between 20 to 100 L per hectare (2 to 10 U.S. gal per acre).

3.2 *Droplet Size Distribution*—The droplet size distribution of the dispersant reaching the target shall have a Volume Median Diameter (VMD) of 300 to 500 µm. The volume median diameter is a means of expressing droplet size in terms of the volume of liquid sprayed. The median volume diameter droplet size, when measured in terms of volume, is a value where 50 % of the total volume of liquid sprayed is made up of droplets with diameters larger than the median value and 50 % smaller than the median value. Droplets having diameters lesser than approximately 300 µm have a lower probability of hitting the target because of excessive wind drift. Particles with diameters greater than 500 µm have a high probability of penetrating through the oil slick to the water surface.

3.3 *Maximum Delivery Variation Over Swath Width*—The equipment shall be capable of delivering dispersant with a maximum delivery variance of 10 % over the swath width. The

[1] This guide is under the jurisdiction of ASTM Committee F-20 on Hazardous Substances and Oil Spill Responseand is the direct responsibility of Subcommittee F20.13 on Treatment.

Current edition approved June 15, 1992. Published August 1992.