Weathering, Emulsification, and Chemical Dispersibility of Mississippi Canyon 252 Crude Oil: Field and Laboratory Studies

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ABSTRACT

Field observations at the Mississippi Canyon 252 spill suggested that the MC252 crude oil, though very light and non-viscous when fresh, formed viscous emulsion upon weathering. The weathering and emulsification rates of this oil were critical in determining a) the fate and impact of the spill and b) the potential effectiveness of oil spill countermeasures (e.g. chemical dispersants). In order to understand these processes for MC252 oil the following studies were completed. MC252 crude oil, collected from the Discoverer Enterprise marine riser collection system on May 22 was weathered in the laboratory under standard conditions. Changes in spill-related oil properties of this oil and its propensity to form emulsion were measured at various stages during weathering. In order to assess the potential effectiveness of oil dispersants on MC252 emulsion, 15 separate patches of MC252 oil and emulsion were sampled near the spill site from July 10 to 19, and their properties were measured. Physical properties (oil temperature, viscosity, slick thickness, water content) of the emulsions were measured; their chemical dispersibility was determined using a simple field test; and the visual appearance of the surface slicks were documented photographically. The emulsions sampled showed a wide range of properties from relatively fresh, brown/black non-viscous oil to orange/beige, highly viscous, “peanut butter” emulsion. A number of these emulsion patches were tracked and sampled over periods of up to 48 hours, in order to follow changes in emulsion properties over time. This was made possible by marking the slicks with Metocean iSphere Oil Spill Tracking Buoys. The results of these studies are presented and the implications for understanding the fate of spilled MC252 oil and the potential effectiveness of dispersants on emulsions are discussed.