FACT SHEET: Alaska North Slope Crude Blends

- Crude blends vary tremendously in their chemical composition, depending on the geographical location of their origin and the particular compounds mixed with the petroleum products. Surfactants, often added to aid transport, will affect physical properties when spilled.

- Hydrocarbons are by far the most abundant compounds in crude oils, accounting for 50-98% volume. All crude blends contain lighter "fractions" (similar to gasoline) of hydrocarbons as well as heavier tars and wax-like hydrocarbons.

- Alaskan North Slope (ANS) crude blends are Group III oil products, and considered medium grade. The BP ANS crude from Pump Station #9 has a relatively high viscosity (23.9cSt @50°F) and an API of 29.6.

- ANS crude blends tend to emulsify quickly, forming a stable emulsion (or mousse). The rate of emulsification while difficult to model is known to be accelerated by wind mixing, and is thought to be related to the blend's wax content . This blend of ANS is thought to form a mousse after it experiences about 14% evaporation of its lighter ends.

- 15-20% of this product evaporates in the first 24 hours of a spill, depending on the wind and sea conditions, and very little oil is dispersed into the water column. The weathered oil then starts to form a stable mousse with up to 75% water content (thereby increasing the slick volume four-fold), and undergoes dramatic changes in its physical characteristics.

- The viscosity of the oil-in-water mixture increases rapidly and the color usually turns from a dark brown/black to lighter browns and rust colors. As the water content of the emulsion increases, weathering processes (e.g. dissolution and evaporation) slow down.

- The "sticky" mousse behaves differently from a fluid and may react to additional weathering forces by forming a surface skin, creating a non-homogenous material with a crust of slightly more weathered mousse surrounding a less weathered core.

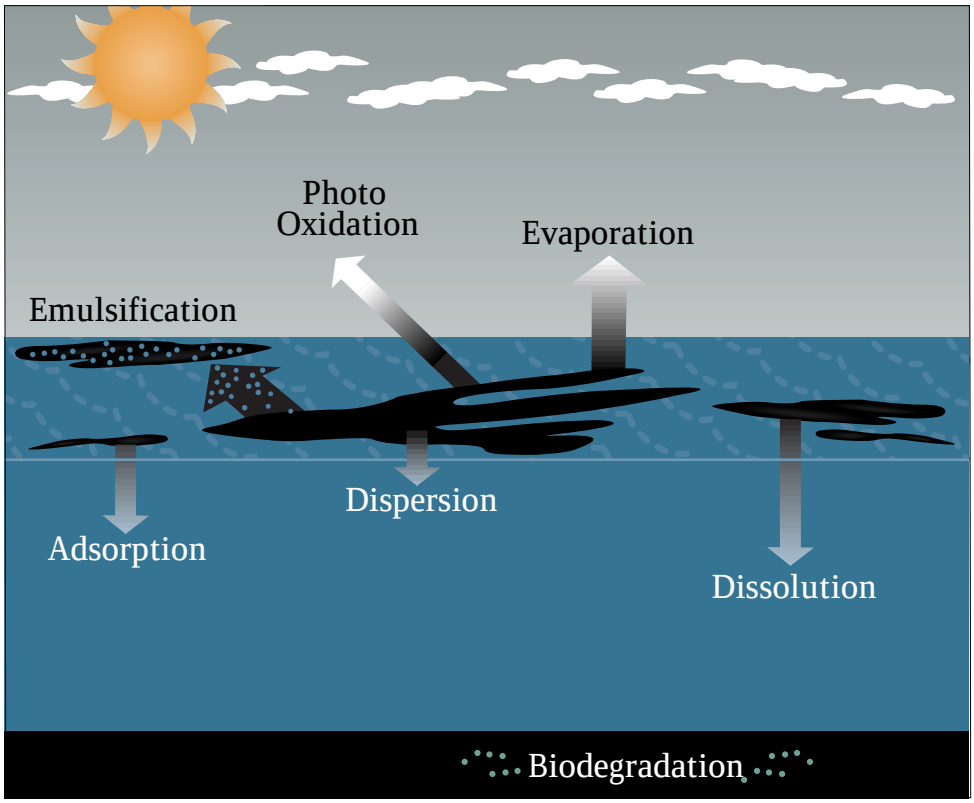
- As the mousse is subject to increased mixing from energetic wave action, the crusts can be torn or ruptured and the less weathered mousse released. The continued exposure of weathered mousse to wave action continues to stretch and tear patches of mousse into smaller bits, resulting in a field of streaks, streamers, small patches and eventually small tarballs.

- While organisms are not at high risk from crude oil dispersed into the water column, stranded crude tends to smother organisms. In birds, it can cause mortality from ingestion during preening as well as from hypothermia from matted feathers.

- The oil-in-water emulsion is very sticky and makes cleanup and removal more difficult. When stranded on the shoreline, the degree of adhesion varies depending on the substrate type, e.g. this mousse will not penetrate far in finer sediments.

(from *Trajectory Analysis for Oil Spills*, Galt, J.A. 1994. J. Adv. Mar. Tech. Conf. Vol. 11. pp 91-126)

Weathering Processes Affecting Crude Blend Spills



Emulsification is generally the primary weathering process of concern with spilled crude blends. Many crude blends emulsify quickly when spilled, creating a stable mousse that causes a persistent cleanup and removal challenge.

Adsorption*
The process by which one substance is attracted to and adheres to the surface of another substance without actually penetrating its internal structure

Biodegradation
The degradation of substances resulting from their use as food energy sources by certain micro-organisms including bacteria, fungi, and yeasts

Dispersion
The distribution of spilled oil into the upper layers of the water column by natural wave action or application of chemical dispersants

Dissolution
The act or process of dissolving one substance in another

Emulsification
The process whereby one liquid is dispersed into another liquid in the form of small droplets

Evaporation
The process whereby any substance is converted from a liquid state to become part of the surrounding atmosphere in the form of a vapor

Photo Oxidation*
Sunlight-promoted chemical reaction of oxygen in the air and oil

*not modeled by NOAA's ADIOS model

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