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Chemistry Report: IES/RCAT97-38

To: Gary Ott, NOAA SSC
Lt. Varamo, USCG

From: Paulene Roberts
Research Associate

Re: #259 Cape Fear River, NC Waste Oil Characterization

Summary:

The oil sample received is not characteristic of waste oils; it contains an alkane range of nC-12 to nC-24 and little unresolved complex mixture (UCM) or "hump." The aromatic hydrocarbon (AH) content is less than 1%. A closer comparison to this oil would be a refined petroleum product perhaps a home heating oil or heavier refined product mixed with residual oil. The sample was screened for polychlorinated biphenyls (PCBs) with a detection limit of 100 ppm. No indications of PCBs were found.

Report:

On November 18, sample #01 consisting of a thin layer of oil floating on water, was received at Institute for Environmental Studies, LSU. Assessment requested by the NOAA SSC was: 1) characterization of the oil, 2) screen for PCB presence. The spilled oil was described as a waste oil, therefore the additional screening for PCBs was requested. The sample was prepared for analysis by GC/MS selective ion monitoring for characteristic polycyclic aromatic hydrocarbons, followed by chlorinated hydrocarbons indicative of PCBs. The sample was also analyzed by full scanning mode to capture the "whole oil" in the semivolatiles range.

The oil characterization is best described as a refined petroleum, alkanes abundant, and mixed with a residual oil. Figure 1 shows the chromatographic profile of the sample compared to a waste oil. The mixture of residual oil can be observed by UCM between 40 and 60 minutes. The alkane abundance prior to the UCM is unexpected for a "waste oil" product. Figure 2 presents the relative AH abundance detected in the sample, the waste oil reference and a North Slope Crude.

Extent of weathering or alterations expected to follow would be a reduction of the alkane fraction, and a residual heavier material remaining. The rate of this process will depend completely on the environment and the viscosity of the spilled oil. Further assessment on weathering is not possible due to the small sample size.

If you have any questions regarding this report or other questions, do not hesitate to call.

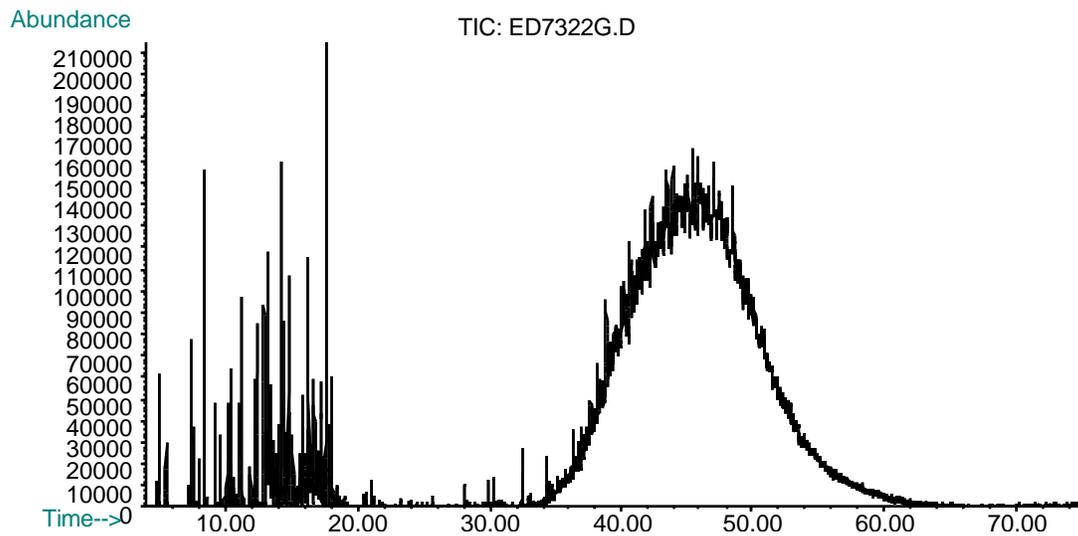
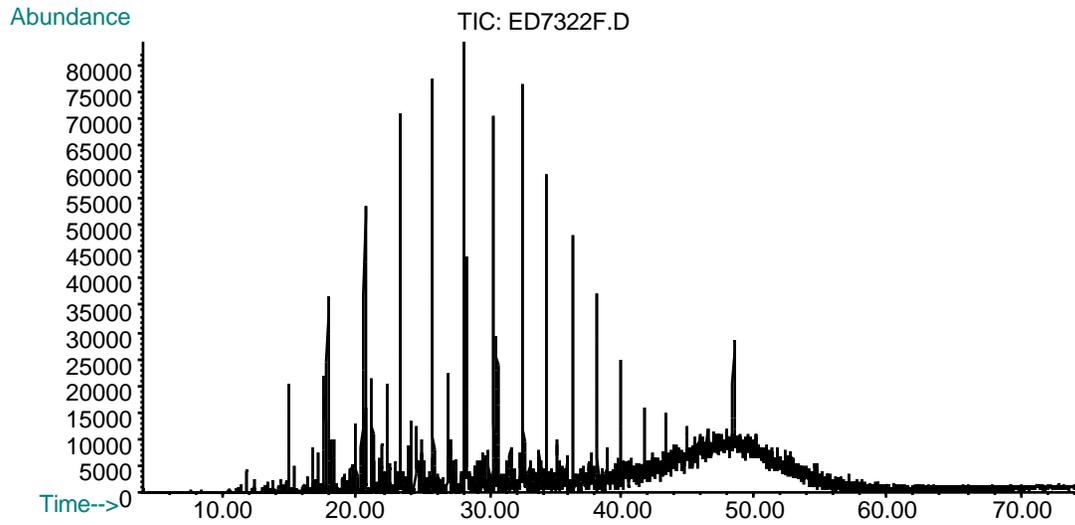


Figure 1. Full chromatographic depiction of the spilled oil (sample #1, top) compared to used motor oil (bottom) commonly found in waste oil. Note the extreme differences in the profiles. The spill sample appears to contain a refined product high in alkanes, with a heavy residual material noted by the UCM at 40 to 60 minutes.

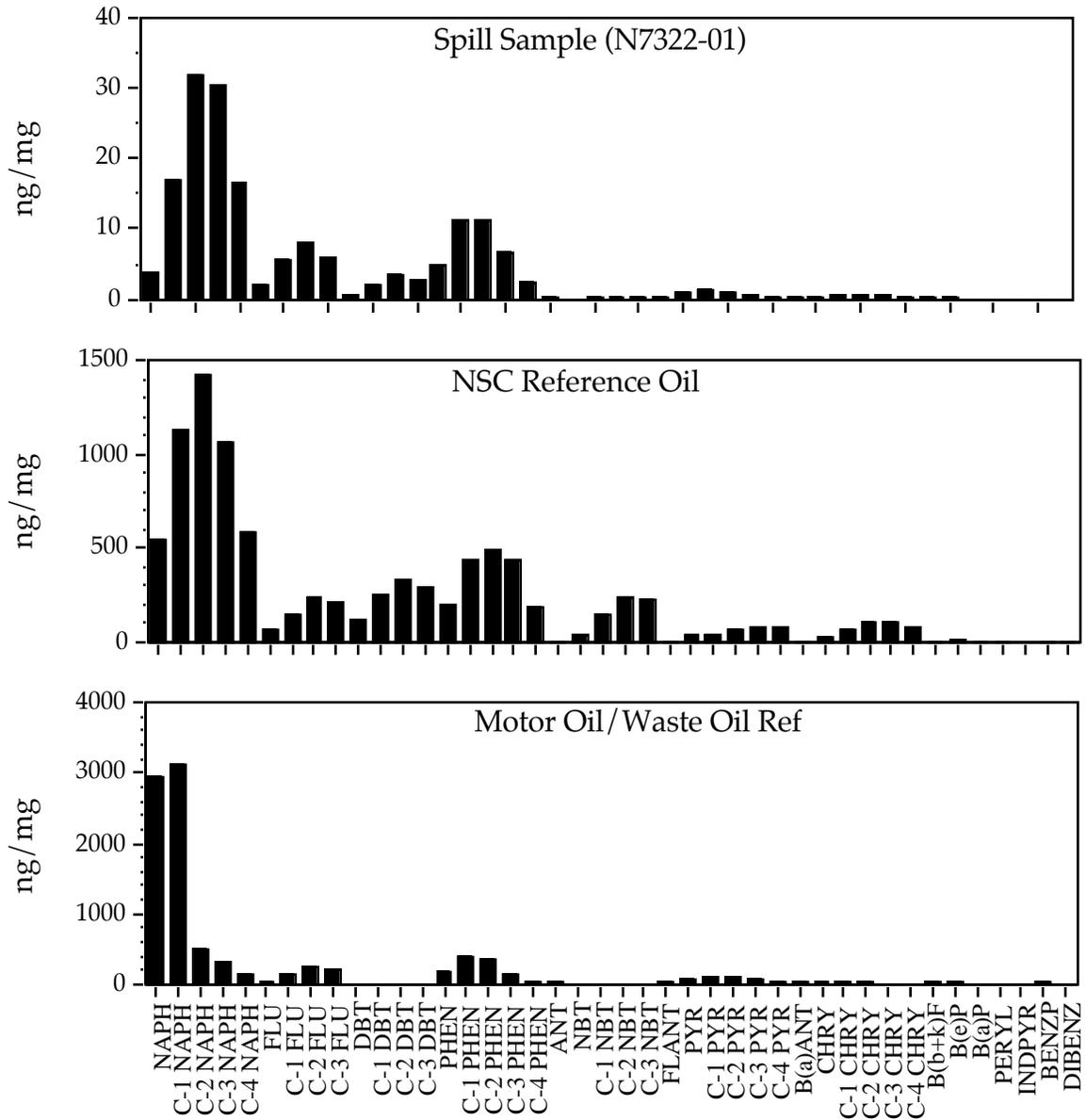


Figure 2. Aromatic hydrocarbon (AH) comparison of the spilled oil (top), to a standard reference crude oil, North Slope Crude (mid), to a used motor oil/waste oil (bottom). Note the reduced concentration of AH in the spilled sample.