ecology and environment, inc.
111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415
International Specialists in the Environment

EPA Region 5 Records Ctr.
353742

MEMORANDUM

DATE: January 9, 1990
TO: Corporate Staff
FROM: Michael D'Auben MD
SUBJECT: Petroleum Products

This memo is a brief summary of the composition of petroleum products, including gasoline, kerosene, diesel fuel, heating oil and tar. All of these products are complex mixtures of hundreds of hydrocarbons. Only a small number of these are members of the TCL list.

Gasoline is composed of almost 100% volatiles, and about 50% of these are aromatics such as benzene. In addition to these volatiles, there are traces (< 1%) of semivolatiles such as PAHs. Kerosene has less volatiles, about 80%, and only about 14% of these are aromatics. Of the remaining fraction, there are about 6% PAHs. Diesel fuel (No. 2 fuel oil) has only about 50% volatiles and only about 4% of these are aromatics. Diesel fuel does have a much larger percentage of PAHs, over 30%. Finally, tar is almost all semivolatiles, mainly PAHs, with only small amounts of aromatics (< 5%). In composition, heating oil falls somewhere between diesel fuel and tar.

There are two analyses commonly used to test for petroleum products, oil and grease (O & G) and total hydrocarbons (TPH). For the O & G analysis, the sample is extracted with a solvent such as Freon or hexane. The solvent is then either evaporated to dryness and the residue weighed (gravimetric analysis) or measured in an infrared spectrometer (spectroscopic analysis). Because the solvent is evaporated, the first method is unsuitable for samples containing gasoline, kerosene or diesel fuel

recycled paper

since most of these will be lost to volatilization. The second method is somewhat better for these light products, although losses of 50% or more for gasoline can be expected. The TPH analysis is similar to the spectrographic O & G analysis, but the extract is treated to remove non-petroleum (naturally occurring) oils which show up in the oil & grease analysis. The detection limits for all of these methods can reach 1 ppm if the analyst is competent.

SOME COMMON PETROLEUM PRODUCTS

(in order of increasing density and decreasing volatility)

Gasoline
Kerosene/jet fuel
Diesel fuel
Heating oil
Motor oil
Tar

SOME COMMON PETROLEUM COMPONENTS

<u>Volatiles</u>
ethylbenzene
benzene
styrene
toluene
xylene

<u>Semivolatiles</u>
acenaphthalene
naphthalene
2-methylphenol
4-methylphenol
anthracene
phenanthrene
fluorene
phenol

REFERENCES

Kawahara, F. K., Characterization and Identification of Spilled Residual Fuel Oil by Gas Chromatography and Infrared Spectroscopy, U.S. EPA, 1971.

Coleman, W. E., et. al., "The Identification and Measurement of Components in Gasoline, Kerosene, and No. 2 Fuel Oil that Partition in the Aqueous Phase After Mixing", Archives of Environmental Toxicology, 1984.

Environmental Monitoring & Support Laboratory, Methods for Chemical Analysis of Water and Waste, U.S. EPA, 1983.

Hawley, G. G., The Condensed Chemical Dictionary, Van Nostrand Reinhold Co., 1981.

4300:1