White, H.K., Reddy, C.M., Eglinton, T.I., *Isotopic constraints on the fate of petroleum residues sequestered in salt marsh sediments*, Env. Sci. and Technol., 2005; v39, 2545-2551

To provide a new perspective on the fate of petroleum in the marine environment, we utilized variations in the natural abundance of radiocarbon (14C) to detect and quantify petroleum residues that have persisted in Wild Harbor sediments, West Falmouth, MA, for more than 30 years. The 5730-yr half-life of 14C makes this isotope ideal for the detection of fossil-fuel-derived contaminants (14C free) within different fractions of natural org. matter (modern 14C content) in environmental matrixes. Samples of both contaminated and uncontaminated sediments were sequentially treated, first by solvent extn., followed by sapon., and then acid hydrolysis. Radiocarbon anal. of the sediment residues and select exts. was performed to probe for the presence of fossil fuel contaminants and/or their metabolites in different pools of sedimentary org. matter. Our results indicate that the majority of fossil carbon is solvent-extractable and has not been incorporated in the insol. org. matter in sediment. Unextd. sediments contaminated with petroleum contain significantly less 14C than extd. sediments, and isotope mass balance calcns. suggest that up to .apprx.9% of the total org. carbon (TOC) in the petroleum contaminated sediment horizons is derived from solvent-extractable petroleum. These ests. are similar to values calcd. when the total quantities of oil (measured by gas chromatog. with flame ionization detector (GC-FID)) are compared to TOC content (detd. by elemental anal.). These results pave the way for applications of this isotopic approach to more complex environmental systems where the fate of contaminants is less certain.