

**PETROLEUM CONTAMINATION IN GROUNDWATER/AIR AND ITS EFFECTS ON
FARMLAND SOIL IN THE OUTSKIRT OF BANDAR-E MAHSHAHR**

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A b s t r a c t

To evaluate petroleum contamination of groundwater and air and identify its sources in the Bandar-e Mahshahr, a wastewater-irrigated area located in Bandar-e Mahshahr, concentrations of aliphatic hydrocarbon components were analyzed by gas chromatography. The analysis revealed the presence of biogenic and degraded petrogenic hydrocarbons. For water, petroleum pollution and degradation levels were significantly higher in October 2012 [total aliphatic hydrocarbons (TAH): 1438.2–15634.7 $\mu\text{g L}^{-1}$] than those in May of the same year (TAH: 1057.3 to 12347.6 $\mu\text{g L}^{-1}$). For air, the concentrations of Σ n-alkanes, unresolved complex mixture (UCM), and TAH were lowest in winter (Σ n-alkanes: 147.6 $\mu\text{gm}^{-2} \text{d}^{-1}$, UCM: 217.7 $\mu\text{gm}^{-2} \text{d}^{-1}$, and TAH: 416.9 $\mu\text{gm}^{-2} \text{d}^{-1}$); the n-alkanes were more abundant in spring (2743.1 $\mu\text{gm}^{-2} \text{d}^{-1}$); and UCM and TAH were more abundant in summer and autumn (UCM: 23456.1 $\mu\text{gm}^{-2} \text{d}^{-1}$ and TAH: 24798.3 $\mu\text{gm}^{-2} \text{d}^{-1}$). Through principal component analysis, the water and air sampled in different seasons and sites were differentiated based on their degree of petroleum pollution and various aliphatic hydrocarbon compositions. Through redundancy analysis, we found the effect of irrigation water on the surface soil was much higher than that of atmospheric deposition. The variance of hydrocarbon composition in soil, explained by the hydrocarbon composition in water collected in the main irrigation period, May 2012, was 61.7%, whereas the value for atmospheric deposition was only 23.4%.

Keywords: Petroleum contamination, Water, Atmospheric deposition, Effect on soil, Multivariate statistical analysis.
