Effects of Industrial Effluents on Soil and Groundwater Quality (A Case Study of Isfahan Steel Complex)

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Abstract

Despite the role played by the reuse of industrial effluentsin alleviating the shortage of irrigation water in dry regions such asIran, the irreversible damages to the environment as a result of uncontrolled discharge of effluents into the environment and agricultural landscannot be overlooked. Industrial effluent reusepresupposesthe knowledge of their quality and a careful investigation of their environmental impactssuch as soil, groundwater, and food contamination. The present study was conducted to investigateseasonal variations in the quality of thetreated industrial effluent from Isfahan Steel Complex during the period from April to March, 2007 and to determine its effects on groundwater resourcesas determined by the chemical composition of both the applied irrigation water and the seepage from the plant's evaporation ponds intothe neighboringwater wells. For this purpose, samples were taken from both the industrial effluent and selected wells and analyzed for pH; EC; Nitrate; hardness; TSS; TDS; Cations including Na^{+}, Ca^{2+}, Mg^{2+};anions including SO_4^{2-}, CO_3^{2-}, HCO_3^{-}, Cl^{-}; and heavy metals including Pb, Cd, Cu, Fe, Cr, Mn, Co, and Zn. The results were compared with standard reference levels recommended for groundwater resources, irrigation water, and direct human consumption.The effluent studied was found appropriate neither for discharge into groundwater and absorption wells due to its quality characteristics of EC,N-NO_3,BOD,COD,Cl, and SO_4^{2-}concentrations that exceeded standard limits, nor for irrigation use due toits higher than standard concentrations of EC, SO_4^{2-}, Cl,N-NO_3, and TDSwhileits Cowas also higher (0.14 mg/l)than the standard limit of 0.05 mg/l (Environmental Protection Organization, 1984).Investigation of the effluent's effects on groundwater resources revealed thatthe groundwater abstracted from the vicinity of Isfahan Steel Complex suffered from EC,TDS,N-NO_3,HCO_3^{-} ,SAR,Cl^{-},SO_4^{2-} as well as Co(0.14 mg/l compared with the standard 0.05 mg/l) limitations.

Keywords: **Isfahan Steel Complexindustrial waste water, Heavy metals standard limits, Recommended limits**.

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