عنوان مقاله:

Management of toxic and hazardous contents of oil sludge in Siri Island

محل انتشار:

فصلنامه جهانی علوم و مدیریت محیط زیست, دوره 3, شماره 1 (سال: 1395)

تعداد صفحات اصل مقاله: 10

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خلاصه مقاله:

Sirri Island is one of the most important islands in Iran where contains massive amounts of crude oil reservoirs and is a crude oil exporting and storage spot. Petroleum sludge wastes produced by the refineries are deposited in outdoor 2-ha open pits. 30 sludge samples from different depot locations were conducted in 3-time intervals and mixed with each other to form one homogenized sample. The sample was treated by solvent extraction method using methyl ethyl ketone as an efficient polar solvent in order to recover the valuable hydrocarbon and oil. About 99.8% of the oil was recovered and determined to reach almost the same quality as the exportable crude oil of Sirri Island. The sediments were also tested for size distribution range and titled as fine-grained soil. Toxicity characteristics leaching procedure test was conducted on the residuals to determine whether the waste is categorized as toxic and hazardous.The industrial waste evaluation model used in the current work suggested different leachate concentrations (10%, 30%, 50%, 70% and 90% of total leachate) based on toxicity characteristics leaching procedure for different probable leaching scenarios. The surface and subsurface regional conditions such as depth to underground water table, climate condition, subsurface pH, soil texture and material were defined to the model as well. Then, the model simulated 10000 possible runs considering the leaching procedure, contaminant concentrations, maximum contaminant limits and surface and sub-surface conditions. The final outcomes regarding heavy metals results showed that nickel, chromium and vanadium were protective under composite liner while cobalt and lead were not safe under such liner and need proper treatment before landfilling. As the final step, the size and details of landfill were designed. The landfill was selected as a square with side and depth of 55m and 3m respectively. The composite liner consisted of 1.5mm high density polyethylene layer with 50cm compacted clay liner of 10-7 cm/s hydraulic conductivity underneath.

کلمات کلیدی:

Heavy metals; Industrial waste management evaluation model (IMEM); Linear; Maximum contaminant level (MCL); (Petroleum sludge; Toxic and hazardous management; Toxicity characteristics leaching procedure (TCLP