

HEAVY METAL HUMAN HEALTH RISK ASSESSMENT OF STABILIZED/SOLIDIFIED LOW-TEMPERATURE THERMALLY DESORBED OIL-BASED DRILL CUTTINGS

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ABSTRACT

Drill Cuttings are the various rock particles and liquids released in the drill hole during oil and gas exploration. When drill cutting is stabilized/solidified, it can be reused as construction materials. Consequently, there is the need for risk assessment for the human health risk of reused stabilized/solidified drill cutting as to make good and environmentally safe decision for reuse. The Stabilized/Solidified drill cuttings was cast in different grades of concrete, cured for 28days, then dried and grinded before laboratory analysis for heavy metal. Evidently, the different grades treatments shows that the completely Randomized Design One Way ANOVA is highly significant with concrete grades 10, 15, 20 and 25 of heavy metals. The contamination indices like contaminant factor indicate suspicion of heavy metal presence while Pollution Load Index is 5.31 showing that heavy metal pollution exists. The heavy metal in the Stabilized/Solidified drill cutting was assessed basically in the three exposure pathway for human via ingestion of chemical in the soil, ingestion in drinking water and dermal contact with the soil in the assessed heavy metal. The Hazard Index of Barium $1.20E-1$, Zinc $1.6E0$ and Lead $1.2E-1$, while Arsenic and Cadmium are negligible implying that the stabilized/solidified drill cutting has no adverse effect on the residence since the hazard index is less than 1, except zinc. The heavy metal (Lead) by oral access has a total risk of $3.72E-6$ implying a total lifetime cancer risk of an approximate 4 adult persons out of 1Million persons in Niger Delta Therefore, it is still not advisable to reuse drill cuttings for construction of residential facilities after it treatment rather risk assessment should be conducted.

Keywords: Drill cutting; heavy metal; risk; hazard index and cancer risk.