



## Radon Concentration in oily Sludge Produced from Oil Refineries in the Southern oil plant at Basra Governorate - Iraq

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### ABSTRACT

Oily sludge waste could be included Naturally Radioactive Materials (NORM) from the three natural radioactive series and Potassium. The sludge usually returned to the environment and could cause a serious hazard. The aim of the present work is to investigate the radioactive Radon gas ( $^{222}\text{Rn}$ ) concentration, which reflects the present of NORM concentration in the sludge waste produced from crude oil refinery. The selected samples of oil sludge, had been grinded and dried then a passive method for measuring radon concentration performed using solid State Nuclear Detectors (SSNTD) technique. Two detectors were used in this work; CR39 and L115-II. Samples of sludge were collected, from different locations and from each location three samples collected in different depth. The arithmetic average radon concentration was  $26089 \text{ Bq/m}^3$ , with maximum  $131618 \text{ Bq/m}^3$  and minimum  $2523 \text{ Bq/m}^3$ .

**Keyword:** Oily-sludge, Natural radioactivity, Radon, Solid State Nuclear Track Detectors.

### INTRODUCTION

One of the major challenges faced by oil refineries is safe disposal of oil sludge, scales and production water generated during the processing of crude oil, as improper disposal would lead to environmental pollution, particularly soil and ground water contamination with toxic hydrocarbons, salt, trace of heavy elements. These contamination effect soil, groundwater, and surface water [1]. Radioactive waste contains NORM, mainly from the natural radioactive series ( $^{238}\text{U}$ ,  $^{235}\text{U}$  and  $^{232}\text{Th}$ ), together with potassium ( $^{40}\text{K}$ ), or production water, which contains mainly Radium isotopes which are alpha and gamma emitter. These radioactive isotopes are part of natural radioactive series,  $^{226}\text{Ra}$  a daughter of  $^{238}\text{U}$  and  $^{228}\text{Ra}$  is a daughter of  $^{232}\text{Th}$ , and the dissolved in production water when it conduct the rocks surrounding the oil-well during crude oil production. Sludge, oily sediment that is produced during cleaning operation of oil separators storage tanks and other surface equipment, is considered as the main source of sludge contaminations. Sludge a mixture of residues left in the process of oil refinery. It's made up of sand pump up during extraction of the oil, heavy Hydrocarbons like paraffin, scale duct surface,