Contribution ID: **227** Type: **Poster**

Standard reference source for gamma-ray spectrometry analyses of pipes from oil industry containing TENORM

The concentration of NORM, often known as TENORM (Technologically Enhanced Naturally Occurring Radioactive Materials) is produced when industrial activity increases the concentrations of radionuclides.
After a given operation time, clogged metallic pipes from oil industry are discarded and stored, usually, in open areas. Waste disposal of TENORM is significantly more expensive than non-radioactive radioactive materials. Therefore traceable and accurate in situ measurements are needed to decide the recycling process or re-use options.
Four pieces of discharged oil pipes, that shown dose rates up to 10 μSv/h, were selected for this study.
TENORM that had built up in the process of extracting oil on the pipe inner walls was removed by mechanical methods. The mass of the collected TENORM samples varied between 15.1-26.4 g.
In order to estimate the contamination level of the pipes, two spectra were acquired individually for each pipe. The first acquisition was made before the TENORM was removed from inside the pipes and the second acquisition after sampling.
The spectrum acquisitions before and after sampling were made with the high resolution portable spectrometry system with hyper-pure germanium detector with 0.5 mm thick beryllium window, ORTEC, Model GMX 30P4. For the acquisition and analysis of the spectra the GammaVision-32 program was used.
To determine the TENORM removal efficiency, the following energies of the gamma emissions were used: 609.31 keV (Bi-214), 351.93 keV (Pb-214) and 238.6 keV (Pb-212). The removal yields determined were between 89.3 ± 2.0% and 95.3 ± 3.8%.
The gamma-ray spectrometry analyses of samples collected from the pipes were performed with the same gamma spectrometer system. The efficiency calculation and the summation corrections by coincidences for the determination of the radioisotopes activity concentration of the samples were calculated using GESPECOR program version 4.2.
Each sample was grinded to uniform particles of the same size in a laboratory mill. The resulting powder was mixed with a polymeric gel to obtain a uniform matrix. The entire matrix quantity was used to cover in a thin layer the interior of each pipe. After the matrix dried naturally, the gamma-ray spectrometry analyses of the pipe, which can be regarded as a reference standard, was performed
By comparing the results of the initial and final gamma-ray measurements, a “calibration factor”was established for a more accurate determination of TENORM radioisotopes activity.

Primary author: Dr FUGARU, Viorel (National Institute for Research and Development in Physics and Nuclear Engineering Horia Hulubei)

Co-authors: Dr TUGULAN, Liviu (National Institute for Research and Development in Physics and Nuclear Engineering Horia Hulubei); Dr IOAN, Mihail-Razvan (National Institute for Research and Development in Physics and Nuclear Engineering Horia Hulubei)

Presenter: Dr FUGARU, Viorel (National Institute for Research and Development in Physics and Nuclear Engineering Horia Hulubei)

Session Classification: Session IV - Characterization in Industrial Facilities and in the Environment

Track Classification: NORM Characterization, Measurement, Decontamination