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VIRTUAL EVENT

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A case study of radiological investigation in the oil and gas fields in western China

The reserves and outputs of oil and natural gas in China are among the highest in the world, and the oil and gas industry occupies an extremely important position in the development of China's national economy. On the other hand, during the process of oil and gas exploration, exploitation and utilization, radioactive contamination can be formed owing to accumulations of NORM. Limited previous data show that the problem of NORM in oil and gas industry is more prominent. Under the framework of a national plan focusing on the radiological impacts from NORM-related industries, a radiological investigation for the oil and gas industry in western China was implemented.

With reference to the IAEA technical standards, Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry (Safety Reports Series No. 34), on a basis of extensive document research and communication with oil and gas enterprises, the investigation plan was prepared in detail. Complete production process, which includes oil and gas drilling, oil-gas separation, solid and liquid waste treatment, of oil and gas fields located in the Gobi and in the desert were fallen within the scope of the investigation. Gamma dose rate survey was conducted following the process of oil and gas, various types of samples, including crude oil, produced water, scale and sludge, were taken at the facilities and on the sites. Naturally occurring radionuclides contained in the samples such as Ra-226, U-238, Th-232, Pb-210 and Po-210, were analyzed in the laboratory. As for the results, a lot of radiation hot spots up to 30 μ Sv/h at the tanks, valves and pipelines of oil-gas combined processing station, high radioactive concentration of NORM contained in scale and sludge, NORM contaminated soil onsite facilities, were found during the investigation.

Based on the investigation, the locations of NORM deposited at facilities, the exposure pathways from NORM to human, and the impact of the environment are analyzed. Interesting characteristics of radiological aspects were found between different geological conditions of and different NORM waste treatment methods adopted in the oil and gas fields.

Furthermore, recommendations on radiation protection countermeasures for operating personnel, remedial actions for contaminated facility site, further investigation and regulatory control aspects are provide in this paper. This may be very useful in the future radiological investigation of NORM-related industries.

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