Oral 4.7

IDENTIFICATION, HANDLING AND DISPOSAL OF NORM IN NORWEGIAN PETROL INDUSTRY

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The origin of the NORM waste (LSA Scale) in the oil industry is the formation of sulphate and carbonate precipitates inside tubulars and other production equipment during oil production. The radioactivity is caused by the co-precipitation of small amounts of radium together with the macro quantities of barium and strontium.

LSA Scale in the terms of a waste problem occurs either when production equipment is taken ashore for cleaning or as a part of the final waste handling during decommissioning of oil installations. Especially production tubulars and oil-water separators may contain tonne quantities of LSA scale often mixed with other materials. A survey of the LSA Scale temporarily stored at the supply bases in 2002 showed the following typical macro composition in decreasing order: sulphates, sand/clay, steel and corrosion products and oil components. The activity concentration of radium-226 varied between 10 Bq/g (the current exemption level) and 100 Bq/g, with an average of 23 Bq/g. The content of radium-228 and lead-210 was found to be typically 10 – 50 % of the radium-226 concentration.

Since becoming aware of the problem in the early 1990's, the industry has integrated the management of LSA Scale as a part of the corporate HSE systems and procedures. LSA Scale and LSA Scale contaminated equipment are routinely identified offshore using field instruments and brought to shore for cleaning and temporary storage. Radioactive doses to involved personnel are regarded as small: 0.05 mSv/year for offshore workers and 0.8 mSv/year for the industry workers who perform cleaning of contaminated equipment and handling of LSA Scale on a regular basis. By today, a total of 250 tons of LSA Scale is temporarily stored at the oil industry supply bases along the Norwegian Coast awaiting a final storage solution. Another 200 tons of NORM has been disposed in Norway's specially built underground NORM waste repository.

An ongoing survey of all Norwegian oil and gas related NORM is expected to be completed in November 2009. The results will be presented at the Symposium.

Guidelines for exemption levels and handling of LSA Scale from the Norwegian Radiation Protection Authority have been in place since 1997. These guidelines are currently under revision and new ones are expected to surface in 2010.