Natural Radioactivity and Shale Gas Drilling and Production

Nothing new under the Sun

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Abstract

Shale Gas is mainly produced from wells drilled horizontally in a shale stratum, while gas flow into the well is achieved by hydraulic fracturing ("fracking"). This is in contrast to conventional gas production exploiting wells drilled vertically in porous sandstone strata, while reservoir pressure may be maintained by reinjection of water underneath the reservoir.

Shale fragments or "drilling cuttings" will be transported to the surface during the drilling process. The Uranium (U) and Thorium (Th) content of shale strata is on average about 1.5 times higher as that in sandstone strata, so that it can readily be expected that these U and Th concentrations are reflected in the drilling cuttings.

Similar to conventional gas production during shale gas production Naturally Occurring Radionuclide's (NOR's) may be co-produced via the aqueous process stream. In case during conventional gas production salts deposits ("scaling") in tubular or flow lines, these deposits may contain low NOR concentrations, where the deposit is nowadays denoted as NORM (initially these were called Low Specific Activity (LSA) or just radioactive "scale"). In separating and/or treating the aqueous process stream ("produced water") also LSA sludge (aka NORM) may be formed. In this sense it may be expected that shale gas production is not different from conventional gas production.

This presentation will address NOR concentrations as encountered in drilling cuttings and aqueous (flow back and produced water) waste streams. Acceptable final disposal options for drilling cuttings will be discussed next to acceptable and alternative discharge/treatment methods for flow-back/produced water. For these methods a indicative radiation dose assessment for workers involved in handling these waste streams and for the public at large (as a consequence of the disposal or discharge method selected) will be provided.