

The multi-criteria feasibility study of a safe utilization of NORM waste on example of radium rich sediments from coal mining industry

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Abstract

Recycling of a NORM residue or its use in other applications rather than disposing of it as waste is the recommendation originating from the state of the art general approach to the all kind of waste treatment. According to this idea waste, in order to protect natural raw materials resources, should be regarded more as a resource of raw materials or by-products than really useless material. There are many opportunities for the safe use of NORM residues as by-products especially in construction works or civil engineering where their physical properties are more important than enhanced content of radioactivity.

When it is not feasible to recycle a NORM residue the material has to be treated as waste. Very often, regarding only existing activity concentration it should be subject to the same overall approach as for radioactive waste in order to ensure its management is safe. As a result of the inconclusive European law there is not clear if NORM residues should be classified as radioactive waste or not. This results in that non-nuclear industry often do not want to be aware of problems caused by natural radioactivity or expect negative consequences in case of implementing radiation protection measures. On the other hand such situation allows one processes NORM residues in a way completely forbidden for “real” radioactive waste but still safe when consider radiation protection restrictions.

In underground coal mining industry there are many opportunities for safe disposal or recycling NORM residues back to the processes that generated them. Moreover, the scale of excavation processes carried out often makes possible dispose NORMs from other industry in a way that is driven by the need for keeping the radiation risks for humans as well as to local environment as low as reasonably achievable but still technically possible and cost effective.

The feasibility of different methods of NORM residues was discussed. At the one extreme a non-limited landfill is considered and at another one the disposal at a radioactive waste repository is analysed. In the comparison the possibilities provided by mining industry as dilution in inert waste stream, use for backfilling or use as raw materials in some preventive actions necessary in an underground mine as e.g. fire prevention were discussed.

Various options are evaluated in terms of risks to human health as well to environment, overall safety and the lost and benefits analysis. Finally the optimum NORM waste management option is suggested for the operational and also for the post-closure period of a mine activity that is quite important when consider that coal mining activity in Europe is descending.