

Abstract

Scenarios and dose calculations supporting the Swedish suggested regulations for disposal of NORM

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Regulations for exemption and clearance of NORM (in Swedish) waste have been issued as a draft for consultation by the Swedish Radiation Safety Authority. Supporting dose calculations have been made, following results from RP 122 Part II for some scenarios.

In a recent research report, the question is posed: considering some major components of NORM and other chemo-toxic wastes, such as (mainly arsenic-) polluted soil, in Sweden, how would their relative impact be? Would alum shale-based lightweight concrete in a disposal facility be much more, or much less, hazardous than polluted soil, i.e. is it relevant to stipulate waste streams for NORM as is done for chemo-toxic wastes? To get a meaningful result, radioactive and non-radioactive substances must be compared, i.e. a common standard must be created, involving also carcinogenic and non-carcinogenic substances. Although several ways to make such comparisons exist, there is still no accepted standard to refer to. The work has therefore a pioneering, as well as a national aspect, since NORM waste streams are strongly country specific. Nevertheless, it was found that for the chosen parameters, several scenarios yielded risk burdens of the same magnitude, pointing to the relevance of a regulatory practice for NORM waste.

The main criteria for specific clearance by disposal on a municipal disposal site, was derived from a very simple principle:

The scenarios assume a situation in the distant future where the disposal site is forgotten and degraded. If waste streams are restricted (in our case to 100 ton/year) one can assume a considerable dilution over centuries, of the activity by the disposal sites' content of non-radioactive waste. It is therefore deemed that, specific exemption may be accepted for material to be disposed of in a disposal site, with 10 times higher specific activity than those accepted in the regulation for general exemption/clearance which given in the regulations as 10 kBq/kg for the U and Th series in equilibrium and K-40, or 1 kBq/kg for individual nuclides in the U and Th series. The idea is that after such a degradation, the site could be exempted using today's regulations.

Quantitative calculations for the exposure scenarios: water pathway, crop consumption, and inhalation will be presented. The water pathway scenario assumes that 10% of all private drinking water wells in the County of Dalarna uses uranium filter and take into account the existing waste streams to the county's main disposal site.

The crop consumption and inhalation pathways follow international guidance regarding their choice of parameters.