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Assessment of the relevant problems related to the management of radioactive and toxic wastes during operation and in the phase of dismantling and decommissioning of the ESS facility.

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Abstract

The purpose of this report is to assess and examine the relevant problems required for managing radioactivity and toxic waste during operation and in the phase dismantling and decommissioning of the whole ESS facility. The initial engineering design options will be examined and optimized in view of efficiency of dismantling and disposal after operation and design choices will be worked out in order to facilitate these tasks from the out-set.
Estimates of the radioactive inventories and routine operation potential source terms for the baseline Target Moderator Reflector Assembly (TMRA) model are firstly reported. The estimates are focused on three items: i) radioactive wastes arising during the operation and after final shut down: the radionuclide vector and the spatial distribution of the activity; ii) activation of the coolant of the cooling systems of various TMRA components; iii) potential emissions: volatile species production in the TMRA. Preliminary estimates of the shielding of the TMRA and associated activity levels are further presented. Accuracy of the radioactive inventory estimates is discussed via the analysis of the results obtained by means of various reaction models used by the transport Monte Carlo codes.
The identification and quantification of major radionuclides and radiochemical speciation affecting the radiological safety of target operation are also reported.
Preliminary derivation and classification of the potential radioactive wastes arising from the routine operation and after the final shut-down are further assessed in agreement with Swedish legislation. Management of operational wastes is described. Preliminary derived released limits of relevant radionuclides for routine operation are discussed. A particular attention is devoted to ^{3}H management.
The report ends-up with the analysis of the strategies, prevailing factors and constraints required for the elaboration of the ESS decommissioning plan.