

Potential for Recycling of Metals within Nuclear Sector in Slovakia

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POTENTIAL FOR RECYCLING OF METALS WITHIN NUCLEAR SECTOR IN SLOVAKIA

HRNCIR, Tomas; ZACHAR, Matej; ONDRA, Frantisek; DANISKA, Vladimir

DECOM, a.s., Sibirska 1, Trnava, Slovakia

E-mail address: hrncir@decom.sk

Abstract: The decommissioning of nuclear installations represents a complex process resulting in the generation of large amounts of waste materials containing various concentrations of radionuclides. Selection of an appropriate strategy of management of the mentioned materials strongly influences the effectiveness of decommissioning process keeping in mind financial, health and environmental impact. In line with international incentives for optimization of radioactive material management, concepts of recycling and reuse of materials are widely discussed and applications of these concepts are analysed [1-4]. Recycling of some portion of these materials within nuclear sector (e.g. scrap metals or concrete rubble) seems to be highly desirable from economical point of view and may lead to save some disposal capacity. However, detailed safety assessment along with cost/benefit calculations and feasibility study should be elaborated in order to prove the safety, practicality and cost effectiveness of possible recycling scenarios. Paper discussed the potential for recycling of metals generated during decommissioning of NPPs along with approach and lessons learned from previous related research done in Slovakia.

1. INTRODUCTION

Since, two NPPs are currently under decommissioning in Slovakia (V1 NPP –standard operation, A1 NPP – shut down after an accident), amount of various waste materials arising from decommissioning is increasing. Therefore identification of potential waste streams, modification and the optimization of waste management system is one of the top priorities in the next few years. Few specialized waste treatment facilities are designed and constructed along with plans for building of melting facility. Moreover, implementation of Council directive 2013/59/EURATOM, laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, into Slovak legislation will result into stricter clearance levels for several radionuclides of concern. This may lead to decrease of amount of materials that may be free released into the environment and may have impact on overall costs of decommissioning, i.e. the less free released material, the higher waste management costs. Taking into account possible impact of above mentioned factors, potential for clearance, recycling and reuse of these materials should be deeply analysed.

2. APPLIED METHOD AND SELECTION OF RECYCLING SCENARIOS

Method for the overall assessment including safety and economical aspects was developed within research project called CONRELMAT devoted to evaluation of possible scenarios for reuse and recycling of decommissioning materials both within and outside of nuclear sector [5].

Applied method follows international recommendations related to the basic safety principles and implements the lessons learned from numerous decommissioning costing calculation cases including simulation of material flow. The principal scheme of the overall assessment of particular scenarios analysed in the CONRELMAT project is depicted in the figure below.

Figure 1. Principal scheme of research project “CONRELMAT”.

Selection of appropriate metal recycling scenarios should follow one of these principles:

- metal material would be rather a shielding than a source (e.g. drums or containers for waste containing higher amount of radioactivity);
- radioactivity of recycled metals is very low comparing to the other sources in the vicinity (e.g. steel lining of rooms, tanks for liquid radioactive waste);
- metal material would be shielded, used as a reinforcement, i.e. it would be long-term fixed inside of robust structure (e.g. reinforcement bars, or mesh used in construction of larger structures –disposal vaults).

3. CONCLUSIONS

Based on calculations performed within the CONRELMAT project, some of the reuse and recycling scenarios are feasible and may save financial resources and disposal capacity.

To conclude, paper described preliminary proposal of several possible recycling scenarios within Slovak nuclear industry. However, detailed parameters of particular feasible recycling scenario are inevitable in order to perform more specific safety assessment as well as cost/benefit analysis. Moreover wider discussion includ-

ing stakeholder involvement (regulatory body, operator, TSO, etc.) is desirable.

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Primary author: Dr HRNCIR, Tomas (DECOM, a.s.)

Co-authors: Dr ONDRA, Frantisek (DECOM, a.s.); Dr ZACHAR, Matej (DECOM, a.s.); Dr DANISKA, Vladimir (DECOM, a.s.)

Presenter: Dr HRNCIR, Tomas (DECOM, a.s.)

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