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REMEDIATION STRATEGIES AND DECISION-AIDING TECHNIQUES

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Considerable experience has been gained in remediating areas contaminated by nuclear past activities and accidents. Despite the technical and scientific experience gained from this, environmental remediation remains a lengthy and expensive process, emphasizing the need for proper justification and optimization of the preferred remediation approach.

The contamination can include areas with elevated levels of naturally occurring substances, or former industrial sites which may have left a legacy of contamination from operational activities, as might be found in sites being decommissioned. It can also include land directly or indirectly contaminated as a result of accidents, spillages, aerial deposition and migration. The need for remediation is defined basically by two questions: is there a risk due to the contamination, and if there is a risk then how can the contamination be dealt with in a safe manner, whilst taking along those interested parties who are either impacted directly by the hazard or those with a legitimate interest in the outcome?

The focus of this paper is on the decision making process associated with the assessment of remediation options. The steps prior to a decision being made are critical to the success of a remediation project. Several tools –stand-alone or linked together –are available for risk and socio-economic analysis that help in defining the remediation approach. Effective and supported decision making requires a process that is transparent and straightforward, and many techniques have been developed to facilitate stakeholder discussion, encode uncertainties, elicit value judgements and which guide decision makers and interested parties to a shared understanding of the costs, risks and benefits of different potential remediation options and strategies. Each remediation project is going to have its own set of unique factors that need to be considered. These processes can use different 'societal'decision analysing tools, bringing together Science (our knowledge and understanding of the context and the possible consequences of our actions, including that of doing nothing) and Values (costs, benefits, ethics, anything that bears on how much particular consequences matter to us). Depending on the complexity of the remediation project a range of decision aiding tools can be used.

Formal decision analysis, including multi-criteria decision analysis (MCDA), is an approach that has assisted decision making in complex contamination problems. Tools based on MCDA, and other methods, offer a structured approach to determining the preferred remediation option. A generic framework will be presented on how to plan a remediation project, to gather the appropriate technical and non-technical information, how interested parties should be managed in the assessment of the remediation options and to identify the tools to facilitate a sound decision. It is important to recognize that there is no single method or approach that can be used across all problems and all decision models are only tools for exploring decisions: they don't make the decision!

When a decision to remediate a contaminated area is required, then a remediation plan should be prepared by the remediation project manager. This plan should outline the steps to be taken for gathering appropriate technical information and engaging interested parties. Decisions are likely to be more widely accepted if it the process is open and transparent and considers both technical and non-technical factors in an appropriate and meaningful way., and the paper seeks to offer advice to remediation project managers on the factors they should consider when seeking to make a decision.

This work has been achieved within the MODARIA (Modelling and Data for Radiological Impact Assessments) Programme of the AIEA from 2012 to 2015. The general aim of the MODARIA Programme is to improve capabilities in the field of environmental radiation dose assessment by means of acquisition of improved data for model testing, model testing and comparison, reaching consensus on modelling philosophies, approaches and parameter values, development of improved methods and exchange of information. Within this context, it was deemed appropriate to explore how decisions are made, which often use the output from modelling. This was undertaken by the Working Group 1 of MODARIA, dedicated to "Remediation strategies and decision aiding techniques".

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