

Optimisation of Radiological Protection Applied to the Development and Implementation of a DGR - The SITEX.Network standpoint

F. Bernier, J. Miksova, M. Rocher, V. Detilleux, W. Pfingsten, D. Pellegrini, N. Zeleznik, J. Swahn
secretary@sitex.network



BACKGROUND

The SITEX.Network (Sustainable network for Independent Technical EXpertise on radioactive waste management) aims at enhancing and fostering cooperation at the international level in the field of safety of radioactive waste management. It acknowledges the important role of the Civil Society in the decision-making process for national programmes, in synergy to the independent expertise of the nuclear Regulatory Authorities.

ABSTRACT

This poster gives the SITEX.Network position regarding recurring questions about how to meet compliance with the optimisation principle of radiological protection in the context of Deep Geological Repository (DGR) :

- What role does the regulator play?
- How to consider prevailing circumstances?
- How to manage operational and long-term safety optimisations?
- How to balance benefits over harm considering long term uncertainties?
- How to decide that the optimum level of radiological protection has been reached?
- Is there a conflict between reversibility and optimisation?
- How to consider other forms of optimisation as protection against non-radioactive pollutants or minimisation of cost?

SITEX.Network STANDPOINT

THE ROLE OF THE REGULATORY BODY

- The expertise function delivered by the Regulatory Body (formed by the regulator and/or its Technical Support Organisation) must assess the implementation of the optimisation principle and associated requirements throughout the disposal development process and beyond. In particular, it is important that the safety case shows that the principle of optimisation has been addressed in relevant choices and decisions.

CONSIDERING PREVAILING CIRCUMSTANCES

- Prevailing circumstances, which refers notably to non-technical aspects (social issues, resources, political context ...) can bound the optimisation process to various extents, such as by limiting the available options and/or by defining additional conditions (e.g. retrievability). However, prevailing circumstances may not unacceptably impair safety.

OPERATIONAL SAFETY VS. LONG TERM SAFETY

- Operation of a disposal facility shall be optimised to protect facility workers, the public and the environment similar to any other operated nuclear facility. Optimisation of protection during the operation of a nuclear facility employs therefore the control of actual doses as a feedback for direct remediation actions.
- Long term aspects of a disposal safety case are significantly different from those of other nuclear facilities. Optimisation of long term radiological protection requires taking into account uncertainties regarding doses and risks for the very long term. These uncertainties increase with time and no control of actual doses can be exercised. Thus, the only approach is to optimise the performance of the disposal system and its components to fulfil to the best the safety functions (mainly containment & isolation).
- Both operational and long term protection have to be optimised from early phases and across the full lifecycle of geological disposal, and balanced as a whole. Impacts of one step on the others have to be duly considered and assessed at every step of the way.

BENEFITS OVER HARM, WHEN IS THE OPTIMUM REACHED?

- The optimisation of protection is a stepwise and iterative process. It consists of the identification of safety criteria or attributes to select the optimal protective options. These criteria/attributes must allow the assessment of the safety benefits of the considered options in terms of performance and robustness. Common understanding and commitment to these criteria/attributes should be reached between all concerned organisations prior to the start of the options comparison exercise. The “optimum” is considered to be reached once the benefit in protection has become small with regard to the resources needed.

REVERSIBILITY VS. OPTIMISATION

- The fact that optimisation is a looking forward process is not in conflict with the reversibility principle. Any decision to reconsider previous decisions/choices should be the result of optimisation in the sense that the benefits to go back should be balanced with the harm.

OTHER FORMS OF OPTIMISATION

- The importance of protection against non-radioactive pollutants is recognised. A balance should exist between protective measures against potential radioactive and non-radioactive impacts. Once the protection of man and environment has been optimised, cost optimisation can be performed by ensuring that this does not impact the level of safety.

REFERENCES

- Miksova, J., Bernier, F., Janssens, P., Nachmilner, L., Tichauer, M., Ilett, D., (2017), Optimisation of radiological protection applied to the development and implementation of a geological disposal, Proceedings of EUROSAFE 2017.
- Bernier, F., & al., Developing a common understanding on the interpretation and implementation of safety requirements, SITEX-II EC Project 6621521, Deliverable 7.