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**NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

Integration Group for the Safety Case (IGSC)

MANDATE OF THE EXPERT GROUP ON OPERATIONAL SAFETY (EG-OS)

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1. PREAMBLE

The overall operational safety aims in geological repositories for radioactive waste are similar to those in operating other nuclear facilities. Namely, to address requirements such as preventing release of radioactive substances; protecting workers from irradiation; dissipating thermal power from the waste; ventilating any radioactive gases; etc. Risks are managed in accordance with the principle of defence-in-depth (INSAG 10) and ALARA.

The excavation volumes, potentially much longer operational durations, and limited possibilities for direct monitoring in geological repositories, as compared to other nuclear facilities, will impose specific design and operational requirements in the repository design. The applicability and transferability of classical nuclear safety and mining safety regulations to geological repositories must be examined. Conflicting regulatory requirements must be identified and addressed. For instance, ventilation requirements addressing mining safety may conflict with requirements addressing radiation protection.

The Joint IGSC/RF Workshop “Preparing for Construction and Operation of Geological Repositories – Challenges to the Regulator and the Implementer”, held in January 2012, confirmed the need to address operational safety issues in repository implementation. Particularly, safety case experts expressed their interest and needs to develop consensus on the best operational practices and operational guidelines of geological repositories as well as to understand commonalities and differences in operation procedures among member countries. The RWMC pointed out in March 2012 that this area of work is important in further developing geological repositories. In the 2012 IGSC plenary meeting, the members confirmed their will to share their practical experiences and approved unanimously the creation of an Expert Group on Operational Safety (EG-OS).

2. DESCRIPTION

As more high level waste (HLW) disposal projects move towards implementation and some low and intermediate level waste (L&ILW) disposal projects come into operation, achieving and demonstrating operational safety of geological disposal facilities becomes essential.

The RWMC/IGSC is launching an Expert Group on the operational safety of geological repositories for radioactive waste.

2.1 Aim and Scope

The aim of the expert group is to identify, evaluate and help define international best practice in operating geological repositories for radioactive waste safely. The scope of issues covers the pre-closure phase of these repositories, but the connection to long-term safety should also be addressed.

2.2 Work Programme

On behalf of the IGSC and its parent committee the RWMC, the EG-OS will:

- Share technical, regulatory, or stakeholder related experience in operational safety.
- Identify plausible hazards in a geological repository, utilising experience gained from the operation of mines (both uranium and non-nuclear), nuclear facilities and relevant engineering projects from outside the nuclear industry;
- Share and improve know-how on the practical assessment of hazards;
- Define best practices and technical solutions for risk prevention and mitigation;
- Enable the IGSC to foster in-depth exchanges with other international organisations/projects in the field of operational safety.

2.3 Membership

Members have responsibilities for managing operational safety or contributing to control of operational safety in existing or foreseeable repositories, or in planning groups for upcoming geological repositories, or in national review groups, e.g. those providing regulatory guidance or technical support

The IAEA will be invited as observer in the group, as well as leaders of other international projects'.

Overall, the group members are representatives from waste management agencies, regulatory authorities, technical support organisations, and research and development institutions with hands-on experience or working towards that goal in relatively short time scales.

2.4 Leadership, PoW and Modus operandi

The EG-OS will elect a chair and two or more vice-chairs at their first meeting. They will collect input from the group and propose a programme of work over the next two years. Advantage should be taken from synergies with underground repository projects and other groups and initiatives, which will avoid duplication of work. Once approved in principle by the EG-OS, final approval of the PoW is with the IGSC.

The *modus operandi* is as follows:

- One regular meeting per year.
- One optional, additional workshop per year.
- Yearly reporting to the annual meeting of the IGSC.
- Inter-sessional work through electronic means and through *ad hoc* task groups.

2.5 Resources

The NEA will provide secretarial services for organising the annual meeting and workshop. Funding for the substantial work elements as specified in the PoW, i.e. inter-sessional work with task groups, will be provided by the participating organisations.

2.5 Duration of the mandate

The duration of the current mandate is of 2 years, renewable at the discretion of the IGSC.

ANNEX I

PROJECT IMPLEMENTATION SCHEDULE

Nomination in the EG-OS	By April 15, 2013
1 st EG-OS meeting for the discussion and approval of the PoW	By Jun 30, 2013
PoW to be approved by the IGSC Core Group	By July 31, 2013
Implement project	By August 31, 2013

ANNEX II

FIRST ELEMENTS OF A POW

1. Background

In October 2012, Andra hosted a one-day meeting at its headquarters with interested IGSC safety experts and the Nuclear Energy Agency (NEA). The meeting focused on these topics: (i) identification of key operational issues; (ii) regulation framework; (iii) safety approach and (iv) technical topics (e.g. fire risk). The meeting developed a list of key questions and identified major risks which may arise in a repository:

The different fields of risk management in safely operating a geological repository include:

- a) Regulatory framework – particularly the nuclear regulatory synergies and their potential conflicts with conventional mining regulations.
- b) Risk assessment methodology – e.g. performance objectives, definition of design basis accidents in accordance with the defense in depth principle.
- c) Technical solution to manage risks, i.e. ventilation, containment options during waste container handling and transfer, fire risk.
- d) Monitoring aspects.

Risks that require specific attention in operating a geological repository have been identified as:

- a) Fire.
- b) Explosion.
- c) Risk of accidents in handling radioactive waste, container transfer and placement.
- d) Risk in carrying out co-activities, i.e. construction and waste placement.
- e) Risk of gaseous releases, both radioactive and non-radioactive.

In regard to regulatory aspects, the meeting noted that while implementers will conform to their national regulations, there are uncertainties in several areas. These include:

- a) Are regulatory guidance and approaches from existing nuclear facilities transferable to geological repository?
- b) Should the generally low hazard level of a geological repository be compared with that of a nuclear facility? How will such comparison affect the design of a repository and its monitoring targets (e.g. radiation dose limits)?
- c) How to balance between nuclear and mining regulations and practices in providing fire protection?

With respect to operational safety case, it was noted that many national programmes, in developing the different stages of their repository, have already prepared their safety studies. These studies form a good basis for operational hazards handling and design basis scenarios management (e.g. seismic events and attenuation by depth).

2 Priority areas in the next biennium

As concluded at the October meeting, the following areas and work elements have the highest priority:

- a) Fire assessment – meetings should be organised with fire and safety experts (from within and outside the nuclear industry) to exchange experience and knowledge.
- b) A “hazard” database – a database to collect and organise operational safety hazards in a geological repository should be developed. This database, to be hosted and owned by the NEA, will consider existing hazard databases developed for nuclear facilities and/or mines in its development.
- c) Ventilation in underground facilities – discussion on ventilation design and operation (e.g. maintenance and replacement of HEPA filters) should be arranged with ventilation experts.
- d) Hazards in co-activities – operational hazards which may arise in a repository with both construction work and waste placement activities ongoing will be evaluated.
- e) Waste acceptance criteria – specifically, criteria required to address operational safety aspects such as radiological protection, design functions and impact resistance of containment, fire resistance etc. Further meetings with waste managers, nuclear operators and safety experts should be arranged.

Immediate work could be:

- a) Create a task group to plan and develop a HAZARDS database for operational safety. The task group will evaluate existing databases, identify relevant hazard data and assess various needs of organisations.
- b) Create a task group, composed of implementing organisations, to address fire issues that implementers may encounter in geological repositories.