nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Security and Safeguards

The security and safeguarding of used nuclear fuel are fundamental objectives that were addressed in the development of Adaptive Phased Management (APM). **Security** provides protection against intentional malicious actions such as theft, sabotage or damage to facilities. **Safeguards** are measures to track nuclear materials in order to detect and deter diversion into weapons, either by theft or diversion by the owners themselves.

Security and Safeguards Concerns

During the Nuclear Waste Management Organization's (NWMO) public consultations, many participants expressed concerns over the possibility of terrorist action or the prospect of plutonium being extracted from used nuclear fuel for the production of nuclear weapons.

In its assessment of long-term management options, the NWMO considered threats including civil resistance, direct attack, sabotage, infiltration and seizure of used fuel or facilities and theft. Other influences taken into account included impacts on global non-proliferation of the Canadian approach, the potential for insider threats as a security risk, and the implications of societal breakdown.

A key reason for recommending Adaptive Phased Management and its goal of centralized containment and isolation deep underground, was the difficulty of access for hostile reasons that the approach provides.

Security Experience and Practices

Information related to the security of Canadian nuclear facilities is prescribed, and access is restricted to help protect these facilities. As a result, this information cannot be shared as freely as the NWMO would otherwise wish.

Security provisions in Canada are based on well-established requirements set out in the Canadian Nuclear Safety Commission's (CNSC) Nuclear Security Regulations under the *Nuclear Safety and Control Act*. Nuclear security is also an issue of international concern, and the International Atomic Energy Agency (IAEA) has carefully documented international best practices.

Any application to the CNSC to licence a Class I nuclear facility, including a facility for management of used fuel, must ensure that physical security requirements are met. Examples of controls for facilities specified in the Nuclear Security Regulations are shown in Table 1.

A licence is required from the CNSC to transport used fuel. For off-site transport, a design certificate approval is also required for the transportation package. A threat assessment would be carried out at the time of applying for the licence for the shipments and would dictate what security measures would be required. The used fuel is shipped in heavy, impact-resistant containers, so it is not easily removed, accessed or damaged. Additionally, Transport Canada enforces the requirement for detailed Emergency Response Assistance Plans.

Examples of security measures that could be applied to the transport of used nuclear fuel are shown in Table 2.

Table 1: Examples of Security Measures for Used Nuclear Fuel
(Nuclear Security Regulations, SOR/2006-191)

Stored in a protected area	» unobstructed area on both sides of a fenced barrier » continuously illuminated » vehicle entry controls » independent systems to detect and alarm on intrusion or tampering » under direct visual surveillance by a nuclear security officer
Monitored from a security monitoring room	» protected and monitored » equipped to communicate with an off-site response force
Personnel entry controls	» authorization requiring security clearance » identity verification by two separate systems » search for weapons and explosive substances on entry » search for nuclear material on exit
Availability of security officers and response force	» trained on-site response force » arrangements with an off-site local, provincial or federal police force » periodic security exercises and drills.

Safeguards Experiences and Practices

Safeguards provide assurance to the international community that Canada is not using nuclear material for the production of nuclear weapons or other nuclear explosive devices. The cornerstone of the international nuclear non-proliferation regime is the *Treaty on the Non-Proliferation of Nuclear Weapons* (*NPT*) of which Canada is an original signatory.

Safeguards are implemented by the IAEA and applied under the international non-proliferation framework. These are serious obligations, and non-cooperation has significant repercussions.

Table 2: Examples of Possible Security Measures for Transportation of Used Fuel

General
- Minimize travel time; for example, in the case of rail transport, by the use of dedicated trains
- Pre-screening of personnel involved in the shipments
- Search of vehicles before loading
- Decision on specific route to be taken shortly before shipment
- Provision for overnight stays at a prearranged secure area

Communications
- Provision of an escort to ensure communications are not interrupted by an incident
- Satellite tracking of shipments
- A direct hotline to the relevant police force (e.g. Ontario Provincial Police) from the tracking room

Delay
- Shipment vehicles equipped with immobilising devices
- Casks locked and sealed, and secured to the vehicles
- Contingency plans in the event of mechanical breakdown

Response
- Provision of armed guards or armed escort
- Regular exercises and drills with the response force
- Pre-notification of shipments to the response force
- Notification to tracking room if shipment stops

The safeguards agreement gives the IAEA the right and the obligation to monitor Canada's nuclear related activities and verify nuclear material inventories and flows in Canada. The IAEA carries out different types of on-site inspections and visits, acting independently of station management and the CNSC.

Through its regulatory process, the CNSC performs compliance and auditing activities to ensure that all licensed nuclear facilities have measures, policies and procedures in place to comply with Canada's international commitments.

Implications for the NWMO

Many security and safeguards implications will have to be considered in the implementation of Adaptive Phased Management. Among them:

- The NWMO may need to discuss the balance between information sharing with communities and security. The challenge is to balance the desire to make information on risks available to interested Canadians, while protecting information that might compromise security.
- Robust, heavy, large containers used for storing used fuel provide significant barriers to sabotage or theft. Also the high radioactivity of the used fuel provides a 'self-protecting' barrier against intruders for the first several hundred years.
- Centralizing management of used fuel has advantages; however, associated challenges include ensuring the availability of an off-site response force to respond to events at the repository site and the risks during transport to the central site.
- Flexibility in the timing of transportation to centralized facilities could be a useful factor in maintaining appropriate security.
- Once the used fuel is placed underground and the facility is backfilled and closed, the fuel is difficult to access, reducing the scope for theft, hostile intervention and dispersion of nuclear material. Even before closure, the limited access to the used fuel and the 500–1000 metres distance to surface provide considerable protection against security threats.
- Over the long term, security of used nuclear fuel in a closed and sealed repository does not rely on ongoing repackaging and handling, or active institutional oversight – an important feature for the long term.
- The balance between retrievability and security may need to be discussed.

The Adaptive Phased Management approach was selected in part because of the assessment of security and safeguards considerations among the alternative options. The risks to security are different in the different phases of the approach. The phased approach allows for these risks to be assessed as part of the timing of the decision to move forward in each phase.

Figure 1: The OPG Dry Storage Container is designed with provision for safeguard seals. Two separate stainless steel tubes are embedded in the dry storage container walls, floor and lid and are used for attaching two different types of IAEA seals.

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