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AN INTEGRATED AND COLLABORATIVE INTERNATIONAL FRAMEWORK FOR BUILDING PUBLIC SUPPORT AND ACCEPTANCE FOR THE SAFE AND SECURE LONG-TERM MANAGEMENT OF SPENT FUEL

M. Ben Belfadhel	**T. Isaacs**	**A. Newman**	**H. Umeki**
Independent Consultant	Senior Advisor, NTI	Senior Director, NTI	NUMO
Canada	USA	USA	Japan
bbelfadhel@hotmail.com	thomas.h.isaacs@gmail.com	newman@nti.org>	humeki@numo.or.jp

ABSTRACT

The development of Deep Geological Repositories (DGRs) for spent fuel is a necessary step in the nuclear fuel cycle. We have the knowledge and the means to do it safely. It is therefore our ethical responsibility to act now as we owe it to future generations. However, building and sustaining public support is a complex issue as it is influenced by a wide range of evolving economic and socio-political factors that are specific to each country. The NTI Pacific Rim Partnership is actively developing an integrated and collaborative international framework for the siting of DGRs for spent fuel or high-level radioactive waste. The framework builds on best international practices, successes, and failures to identify the common ethical, societal, political, and technical components that are required to build public acceptance and maximize the chances of success.

INTRODUCTION

Deep Geological Repositories (DGRs) are internationally accepted as the most appropriate method we have today for the long-term management of spent fuel and high-level waste. Many countries are making significant progress toward developing geological repositories, but most of the waste inventory is currently managed on an interim basis in surface storage facilities, mostly at nuclear sites [IAEA 2018]. Social and political difficulties have delayed and, in many cases, prevented the implementation of DGRs.

In 2013, NTI launched the Spent Fuel Strategies project to strengthen global approaches to nuclear materials management, leading to the establishment of a network of nuclear fuel cycle experts in the Pacific Rim to develop solutions to shared radioactive waste management issues and explore ways to address broader fuel cycle concerns [NTI]. The NTI Pacific Rim Spent Fuel Management Partnership Siting Working Group was established as an international forum for sharing experiences on the technical and non-technical challenges related to siting Geological Disposal Facilities. The working group includes participants from Australia, Canada, Japan, South Korea, Taiwan and the USA.

The paper provides a summary of the integrated approach being developed by the Siting Working Group based on best international practices. The approach includes a high-level roadmap and practical guidance that if implemented will maximize the chances of success.

WHAT HAVE WE LEARNED?

Efforts to develop sustainable solutions for the long-term management of spent fuel have been ongoing for many decades. This led to unprecedented scientific research and international collaboration mainly driven by the recognition that a long-term solution is needed. Most programs around the world have experienced both successes and failures, but we learned a lot as science and societal expectations continued to evolve [NEA 2020a, 2020b, 2017; NWMO 2005a, 2005b; US-DOE 2016].

One of the most important lessons is that public confidence and acceptance are key to success. We learned that safety has a social dimension, and, at some level, citizens have a role to play in judging whether projects that affect them are safe [NWMO 2005a]. We learned that citizens need to understand what decisions have to be made and what their role is in the decision-making process. In the end, while any preferred technical option needs to be based on sound science, it also needs to reflect citizens expectations and perspective on safety. Experience shows that public acceptance and confidence in the safe long-term management of spent fuel and high-level waste requires a dialogue driven approach that is responsive to people questions, priorities and expectations.

Building and sustaining public confidence is a complex issue as it is influenced by a wide range of constantly evolving economic, social and political landscapes that are specific to each country. While there is no universal template for the right approach, there are common themes and approaches that can be used to assemble the building blocks for public confidence and acceptance. International experience and lessons learned suggest a successful approach for the long-term management of spent fuel can be built on the following pillars:

- A compelling case and narrative for Deep Geological repositories addressing the technical, ethical, and societal challenges associated with the long-term management of spent fuel.
- A flexible, phased, and adaptable participatory approach grounded on mutual trust and respect, with a clear and transparent decision-making process; and
- A comprehensive national legislative and regulatory framework, including political will and commitment.

The common themes related to the above pillars are discussed in more detail in the following sections.

THE NEED FOR A COMPELLING NARRATIVE

Geological disposal is widely accepted as the best method we have today to ensure the long-term safety of spent fuel and high-level radioactive waste, but public acceptance and confidence vary significantly. More often the narrative in favour of geological disposal has been dominated by technical arguments with limited focus on societal and ethical aspects such as inter-generational equity and the need for our current generation to address this issue as it continues to benefit from nuclear energy [NEA 2020a, 2020b; NWMO 2025a].

The narrative needs to provide a clear and compelling articulation of the societal need that will be served by siting a Geological Disposal Facility for spent fuel or high-level waste, answering the question: “How can a member of the host community clearly explain to a relative, a skeptic, or anyone else why the important societal benefit justifies support for a disposal facility in the host community”. This includes a discussion around: what is the problem we are trying to solve? why do we need to solve it now? what are today’s social priorities and expectations regarding the long-term management

of radioactive waste? what are the management alternatives and why geological disposal is the method that responds the best to citizens' values, principles, and expectations?

The narrative should include a collection of well-articulated safety arguments to describe how the facility will protect current and future generations and the environment. It also needs to articulate how the siting of a disposal facility will enhance the long-term quality of life of the host community in a sustainable manner considering the many dimensions of well-being. The narrative is best developed and validated in a participatory manner with the early involvement of key stakeholders, considering the following:

- Identifying key stakeholders and engaging them, early, in inclusive dialogues to understand who they are, what interests they have, and how they want to be involved.
- Engaging stakeholders in a broad discussion about the nature of the radiological and chemical hazards associated with spent fuel and high-level waste, and the need for a sustainable long-term management approach.
- Understanding societal values and cultural norms, priorities, and expectations. This requires identifying key ethical, societal and technical questions and principles that need to be considered when evaluating radioactive waste management approaches and alternatives.
- Evaluating available waste management alternatives and collaboratively identifying a preferred alternative that responds the best to the people's values, priorities and expectations.

THE EMERGING APPROACH

International experience shows that public confidence and acceptance require a dialogue driven approach where key stakeholders and citizens are involved from the very beginning. The approach needs to be adaptable, grounded in fairness, trust and respect. It should ideally consider the following components:

- A transparent decision-making process with clear decision points – what decisions need to be made? When? and who makes them?
- A socially acceptable fair and inclusive siting process designed to seek an informed and willing host.
- Sustained community engagement programs to build awareness and ultimately acceptance through two-way meaningful and inclusive dialogues.
- A commitment to actively engage potential hosts on safety and well-being to understand their perspectives and address their questions, and concerns.
- A desire to implement the project in partnership with potential host communities in a manner that will enhance their quality of life considering the many lenses of well-being.
- Community funding programs to ensure potential host communities have the resources they need to build their capacity, learn and make an informed decision.

COMPREHENSIVE NATIONAL LEGISLATIVE AND REGULATORY FRAMEWORK

Successful implementation of DGRs requires a comprehensive national legislative and regulatory framework. Stakeholders' confidence is increased when the national regulatory framework is consistent with the approaches, guidelines and standards adopted by international organizations such

as the IAEA, NEA, ICRP and the European Commission. Experience shows that public confidence is increased when the following components are present:

- Integrated national policies, strategies, and regulations for the management of radioactive waste.
- Political will and commitment at various levels.
- Clear implementation framework where roles and responsibilities of governments, regulators, waste owners and implementers are clearly defined.
- A strong independent regulator with clear policies, regulations, and a transparent decision-making process which provides opportunity for the public to be heard.
- A credible and adequately resourced implementing organization.
- Support for research and development and international cooperation.
- Financial surety to ensure funding is available to cover all phases of implementation.

CONCLUSION

Deep Geological Repositories are widely accepted as the best method we have today to ensure the long-term safety of spent fuel and high-level radioactive waste without relying on long-term institutional controls. Most countries with nuclear programs are pursuing the development of DGRs supported by robust international cooperation programs to ensure best knowledge and practices are used. One of the most important learning is that stakeholders' involvement and public confidence are key to success. While any technical option must be based on sound science, it should also reflect citizens perspective on safety. International experience shows public confidence and successful repository programs can be built on the key pillars including: a compelling case and narrative for Geological Disposal; a flexible, phased, and adaptable participatory approach grounded on mutual trust and respect, with clear and transparent decision-making process; and a comprehensive national legislative and regulatory framework, including political will and commitment.

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