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The Changing Landscape for Management of Spent Nuclear Fuel: International Perspectives from the OECD/NEA

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Since the last International Conference on Management of Spent Nuclear Fuel, in 2006, there have been important evolutions in the nuclear energy and waste management arenas. As we prepare to explore these topics in the coming days, it is useful to remind ourselves of the fundamental issues we face, and to consider the conclusions in 2006 and the major changes in context and perspectives since that time.

Why are we concerned about spent nuclear fuel?

The importance of safe and sustainable management of spent nuclear fuel is evident. While it comprises only a small amount by volume of the waste from nuclear power plants, it contains most of the radioactivity in national waste inventories. Its properties mean that special management is needed both in the near term as well as far into the future. The challenges are growing as greater volumes of SNF are foreseen to be stored for longer periods of time.

Furthermore, SNF is at the heart of debates over nuclear power. At the last conference, nuclear power appeared poised to make a resurgence world-wide in response to, among other factors, desires for greater energy security and concerns over global warming. These factors have become even more prominent over the intervening years. Nuclear power is being expanded and extended in countries where it already exists. In addition, "newcomer" states seeking sustainable and secure energy solutions are pursuing nuclear power.

The proper management of radioactive waste – and especially, of spent nuclear fuel – features prominently in debates on expansions of nuclear power. Thus, the topic is crucial in itself and also related to the further expansion of nuclear power.

We are facing a period of change

The fundamental issues for spent fuel management have not changed. However, there have been important evolutions. Today, we have a broader range of options where, not so long ago, a clear choice could be made between only a few options. We see this from the highest levels: the choice of energy options – even renewable sources – is ever widening; there are advanced fuel cycles of several designs that have the potential for commercialization. It is not only the number of factors that is increasing; so is their complexity.

This complexity extends to the management of spent nuclear fuel. Take, for example, the question of whether spent nuclear fuel is considered a waste or a resource. The answer to this question dictates whether or not the fuel is reprocessed to recover its unused energy potential. Twenty years ago, there was quite a clear divide between those countries that reprocessed fuel and those that did not. Today, however, the divide may be closing – or at least becoming less pronounced. The option of reprocessing is being considered by more and more programmes. This is true even of the U.S., for example, which has had a long-standing policy not to reprocess used fuel. International strategies are being considered to improve access to the necessary technologies by smaller nuclear programmes and newcomer states, while maintaining the security of the nuclear fuel cycle. Advanced fuel cycles hold the potential to facilitate reprocessing while improving proliferation resistance.

Another example is the blurring line between storage and disposal for spent fuel. Until recently, we could outline a clear progression for waste management -- there was spent fuel, then there was storage, and then either reprocessing or direct disposal. The choices depended largely on technological capabilities and security. They were implemented in a linear fashion, based on a plan decided at the beginning of the programme.

In such a progressive plan, storage was clearly differentiated from disposal. Storage was a temporary measure that was inherently "retrievable." That is, waste is intended, eventually, to be removed from storage for another purpose, such as reprocessing or disposal. In itself, it is not a valid and sustainable endpoint in a waste management strategy (according to, for example, the Joint Convention on Radioactive Waste Management). However, the timeframes considered for storage have been growing. This is due to several factors, including the extension of nuclear power plant operating lifetimes and the unavailability of disposal facilities for spent nuclear fuel.

In contrast, disposal is intended to be a permanent solution. Material is not *disposed* unless it is viewed as a waste material and is not intended to be recovered or removed in the future. However, a growing number of deep disposal designs provide a significant degree of waste retrievability for longer periods into the future. Phased development of disposal with pilot or test programs, for example, may in practice provide nearly the same degree of retrievability as underground "storage" for periods of time on the order of a century or more. In such cases, it becomes increasingly difficult to distinguish between very long-term storage and disposal.

To navigate a coherent waste management programme such complex circumstances is a challenge. To face this challenge, programmes today adopt a stepwise approach that recognizes the long duration of the project. It is acknowledged that not everything can be known or decided at the start. Decision-making must be based on the best available information, but should also encourage further learning and should allow flexibility to adapt as technology advances and conditions evolve. Some of our systems may need to be examined and updated to match this approach; we must ask, for example, whether current licensing procedures are well adapted to such a stepwise process. Fortunately, we have already some valuable tools available that provide a solid foundation for decision-making and implementation.

National strategic plans

The first important tool is the development of comprehensive national strategies – not only for waste management, but also in terms of energy policy. This provides the foundation and ensures coherence of subsequent decision making. The strategy for waste management should address the technical aspects of the approach. Importantly, it also must provide a framework and roadmap for decision making, using a process that allows the time and means to understand and evaluate the basis for management options. It

must take into account social and political, even economic, factors. The opening and closing sessions of this conference underline the strategic considerations that drive national plans and provide examples of such plans from newcomer states as well as more established nuclear programmes.

Stakeholder engagement

Stakeholder agreement is both a contributing factor and a solution to the increasing complexity in spent fuel management. It has sometimes been seen as an obstacle to be overcome. However, there is increasing awareness that robust societal discussion and agreement can be powerful force in *supporting* implementation and providing programme stability through, for example, changes in political leadership. Furthermore, building durable links with host communities may contribute to safety by maintaining institutional care and knowledge of a facility. The NEA has invested significant work in such issues, through its Forum on Stakeholder Confidence. We find that the perception of stakeholder engagement by the waste management community has changed considerably over the last decade. We also find examples of effective approaches and success stories. These will be discussed in a roundtable discussion tomorrow, led by Mr. Pescatore of the NEA.

International cooperation

International cooperation is extremely valuable to help navigate the current landscape of spent fuel management. Activities by organisations such as the NEA and the IAEA contribute at all levels of decision-making in national programmes, from strategic choices on the fuel cycle to technical details of implementation. Policy statements, safety standards, information sharing, international peer reviews, technical guidelines and assistance: all these activities support safe and consistent management worldwide, provide a benchmark for assessing progress and help build public confidence. This conference is an example of the value that can be gained from such activities.

Conclusions

In closing, let me reaffirm that spent fuel is being safely managed today. Scientific advances and technological innovations hold the potential to further improve safety for longer storage timeframes. However, waste management programmes are in a period of change in which we are challenged by a wider range of considerations than ever before. This conference provides us the means to examine and understand these issues. Perhaps even more importantly, the conference also gives us the direction and tools to navigate this complex landscape, and to continue and expand safe and effective management of spent nuclear fuel. I look forward to a productive and interesting meeting.

REFERENCES

For further information, please consult the following publications of the OECD Nuclear Energy Agency. These and other documents can be found on the NEA web site at www.nea.fr :

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A series of national workshops explore the context, process and challenges of policy-making and implementation of waste management in different countries. See http://www.nea.fr/rwm/fsc/ (workshop proceedings and summaries)