

Statement at International Conference on Management of Spent Fuel from Nuclear Power Reactors

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Good morning Ladies and Gentlemen,

It is my pleasure to welcome you on behalf of the International Atomic Energy Agency to this *International Conference on Management of Spent Fuel from Nuclear Power Reactors* organized by the IAEA in cooperation with OECD/NEA.

In particular, I welcome you on behalf of the DG, who is very interested in the outcome of this conference and would like me to convey the following message:

"We see in front of us an expected increase in the use of nuclear power. The safe, secure and effective management of spent nuclear fuel is an important challenge for the nuclear community. Spent fuel has to be managed with due regard to the applicable safety standards and in such a way that the uranium energy resource is well utilized. The experience of long term storage of spent fuel is good but strategies need to be developed and implemented for the next step, be it recycling or disposal. For effective use of uranium the development of fast reactors holds promises, but also challenges. The discussions at this conference will be important to guide our future work."

At the time of the last conference in 2006 expectations had started rising for the future of nuclear power, and they have kept rising, year by year, since then. Moreover, specific plans for new nuclear power plants have increased. The existing plants are expected to operate longer and new plants are planned in a number of countries, including both countries that already have nuclear power, such as China, India and the UK, and countries planning to build their first plant, such as UAE, Turkey, Jordan and some others.

In addition, a large number of countries have turned to the Agency to better understand what it would mean to have nuclear power and what infrastructure it would require. Most of the focus is on what is needed for a new country to build and start operating nuclear power plants to produce electricity, that is, the legal, regulatory, educational, operational and industrial infrastructure.

Much attention has also been given to the security of fuel supply. Are uranium resources adequate? Will the fuel supply be assured? Are there political risks that fuel supplies could be cut off, and so on?

Less attention has been given so far to strategies for spent fuel management, but it must be recognised that within months of starting a new reactor, spent fuel will be discharged. Adequate capacity for storage needs to be built. Considerations need to be given to the final disposition of the fuel. Will it be seen as a resource and recycled or will it be seen as a waste and disposed of after some 30 - 40 years of storage? This is a difficult issue and only a few of the present nuclear power countries have made that choice definitively. Any country

embarking on nuclear power must therefore be prepared for long term storage of spent fuel and, depending on developments in the rest of the world, possibly also for ultimate disposal.

These issues are addressed by the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*. The contracting parties to this *Convention* have now held three review meetings, providing country reports to each other and identifying progress and continuing challenges. In addition to the generally satisfactory reports on the safety of spent fuel management, recognition by countries of the need for national spent fuel management policies and their development by many countries are seen as positive developments. However, the implementation of national policies remains elusive in many countries and the contracting parties have been urged to report on these developments at future review meetings. The member states of the Agency have also recently agreed new safety standards on the storage of spent nuclear fuel and on the disposal of radioactive waste.

So what has happened on spent fuel management since the last conference? Quite a lot that is good, and some that is not so good. Many initiatives are underway. Storage of spent fuel in both wet and dry conditions has become routine with no major incidents reported. Reprocessing and recycling of the plutonium in MOX-fuel is performed on a commercial scale in France, but few other countries have renewed their reprocessing contracts. There have been operational and teething problems with the reprocessing plants and MOX facilities in UK and Japan, but the policy for recycling is clear. Additional leverage has come from political initiatives to dispose of surplus weapons plutonium. The US and Russia have agreed to burn 34 tons of weapons grade plutonium each as MOX fuel for LWRs in USA and for fast reactors in Russia.

For the future, more effective use of plutonium will be needed. India and Russia are taking important steps towards their first and second large scale fast reactors. Japan and China are operating fast test reactors and France has decided to build a prototype fast reactor by about 2020. The recognition that fast reactors will be important for sustainable nuclear systems is rising again.

Important steps have been taken towards the first geological disposal facilities in Finland and Sweden for spent fuel and in France for high level waste from reprocessing. Sites or areas have been chosen and the first licence applications are expected shortly. In most other countries, however, plans for geological disposal are only developing slowly. In most cases the possible retrievability of the waste also needs to be considered.

The developments in the USA have been more erratic. Important work was initiated to improve spent fuel processing methods and to develop recycling and burning capacity in fast reactors. In parallel the work on the disposal facility for spent fuel and high level waste at Yucca Mountain was speeded up and a licence application was submitted by the DOE to the NRC in the summer of 2009. In 2010, however, President Obama declared that Yucca Mountain is not suitable for disposal and the DOE has applied for a withdrawal of the licence application. A Blue Ribbon Commission on America's Nuclear Future has been appointed to study alternatives and provide recommendations for developing a safe, long-term solution to managing the USA's used nuclear fuel. The Commission is expected to provide draft recommendations within 18 months.

At the same time, March 26 2010 marked eleven years of safe operation of the Waste Isolation Pilot Plant in the USA, and, moreover, in April trucks transporting transuranic waste

to the WIPP had logged ten-million safe, loaded miles, with 8,400 shipments. So the experience in disposing and transporting of transuranic waste of military origin is quite good.

On the international scene we have seen the discussion on multilateral approaches for assurance of supply has intensified. So far mainly assurance of enriched uranium has been discussed and a fuel bank of enriched uranium has been established by the Russian Federation at Angarsk. There is a need for similar discussions on the backend of the fuel cycle including, first, the possibility of fuel take-back, as has been exercised for some research reactor fuel and fuel for Russian built reactors, and, second, considerations of fuel leasing. There are, however, quite strong political barriers, especially when it comes to disposal of spent fuel or high level waste. The advent of new reactor projects in several countries with similar interests could be a good basis for further discussions at a regional level.

We will certainly hear more about these and other developments during this week.

Irrespective of what will be the final destination of the fuel there will be an increasing need for long-term storage of the fuel. Storage periods of 100 years or even longer are being considered and the amount of fuel that will be stored is constantly increasing. Today 225,000 tons of fuel is stored around the world and there is a need to ensure the efficiency, reliability, safety and security of storage. Improving storage efficiency through burn-up credits is increasingly being considered. The experience with both wet storage in pools and dry storage in casks and vaults is very good. Casks are commercially available, including in some cases combined storage and transport casks. Also the combination of storage, transport and disposal casks has been considered.

A key issue for storage is that the fuel (and facilities) must not deteriorate and that one must be sure of being able to remove the fuel (or sometimes the full cask) at the end of the storage period. Although the experience so far is very good, new challenges are connected to the trend of increasing burn-up. The IAEA SPAR projects are designed to collect information on fuel and facility behaviour. Further it is important that the combined storage and transport casks can be relicensed for transport after perhaps 50 years when the transport will be needed. These and other issues have important reliability and safety consequences and will, I am sure, be discussed during the safety sessions tomorrow.

The ability to demonstrate the long term reliability, efficiency and safety of spent fuel management requires an understanding of the phenomena that will influence all these aspects in the fuel's handling, transport and storage prior to disposal or reprocessing. Progress is being made internationally to harmonize approaches to safety demonstration, which should contribute to building confidence amongst all stakeholders and facilitate licensing processes associated with national and multinational programmes. Of importance in this regard would be the development of cases for long term storage of dual use casks, with good prospects for meeting transport regulations when necessary in the future.

The assurance of safety and security in the long term is the main safety concern associated with spent fuel management. Taking into account that uncertainties increase the further we look into the future, long term assurance can only be provided by disposal. Additionally, clear strategies to implement national waste management policies are needed to optimize safety and to avoid unnecessary handling and transport of spent fuel, with their attendant radiological impact and potential for accidents or unlawful diversion.

Reprocessing is a key component in a sustainable nuclear energy system, in particular for closed cycle systems with fast reactors that will be able to utilise uranium at least 50 times

more effectively than today's reactors. But there are concerns about proliferation issues in connection with reprocessing and recycling, and new more proliferation resistant processing schemes are being developed that do not separate plutonium from uranium, or that keep some of the other actinides together with plutonium to increase the proliferation barrier. Also dry processing methods are being developed - so-called pyroprocessing - that are considered to be more proliferation resistant and might also be more effective when reprocessing fast reactor fuels.

We should not forget that spent fuel management and, in particular, long term storage and disposal of spent fuel and/or high level waste have a public acceptance dimension. Good progress on public acceptance has been made in a few countries, but in many countries there is still a strong public concern about waste disposal. One possible way to alleviate these concerns could be to recycle not only the plutonium and uranium but also some of the long-lived actinides and fission products. Work in this direction has started, but the challenges are still great. However, it is important to think early about all possible strategies and I hope that the round table on Friday on future strategies will be able to cover both short term strategies for the fuel from the present reactors and some more visionary approaches.

Finally, like in most areas of the nuclear industry, we are witnessing a hand-over from one generation of experts to the next. Many of us are nearing an age where we begin to consider retirement and there is concern over not only finding qualified, trained staff to replace us, but also on our ability to manage effectively accumulated knowledge and to pass down the lessons and experience gained in the past to this new generation of experts.

In closing, I wish you a successful and profitable experience at this conference. I encourage you to engage in open and frank discussion and thank you for your contribution to the future of spent fuel management around the world.

Thank you for your attention.