

Fuel Banks and International Nuclear Waste Repositories - a Critical Review of IAEA Plans

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All nuclear waste (military and civil) has to be kept away from the environment. Nuclear material has to be protected from deliberate as well as unintended damage for a very long time. Generation of more and more of this toxic material without a safe solution to the waste problem is irresponsible – even for the nuclear lobby.

“Currently, about 165,000 tonnes of heavy metal equivalent (t HM) of irradiated fuel (spent fuel) from nuclear power reactors are stored worldwide. By the year 2015, the mass of stored spent fuel will rise to about 280,000 t HM. More than 62,000 fuel assemblies from research reactors also are stored worldwide.” [IAEA, 2005]. In addition, 20,000 nuclear warheads are dispersed over the world and will hopefully also end up in a secure nuclear waste dump.

The Joint Convention on the Safety of Spent Fuel Management is demanding *“that radioactive waste ...should be disposed of in the State in which it was generated ... accepting other agreements among Parties as exception not as the rule (particularly for waste from joint projects)”* [Joint Convention, 1997].

But the IAEA’s latest activities on “multilateral approaches to the nuclear fuel cycle” (MNA) put an end to this principle of the Joint Convention.

In 2005 the IAEA had revived the discussion of multinational fuel banks in order to avoid every country using nuclear energy constructing its own enrichment facility.

“... the civil nuclear fuel cycle has been used to support a weapons programme in a few instances. Despite strengthened IAEA safeguards, clearly it is not desirable from a non-proliferation point of view that every State with nuclear research and/or nuclear energy programmes should necessarily establish its own enrichment and reprocessing facilities (even if such activities would be within the boundaries of Article IV of the NPT).“ [IAEA, 2005]

In today's difficult situation, when more and more countries try to achieve nuclear technology (e.g. Iran), the IAEA commissioned an expert group to examine multilateral approaches to the nuclear fuel chain. The experts' report was issued in spring 2005.

In July 2005 the IAEA sponsored the **Moscow Conference on Multilateral Approaches for Nuclear Fuel Cycle** organized by Rosatom. The conference followed the IAEA expert group’s report and was opened by Mr. Yuri Sokolov, IAEA Deputy Director General for Nuclear Energy. At the conference options for the realisation of fuel banks and an international spent fuel management centre were explored.

To minimize the proliferation risk the IAEA promotes fuel banks in order to prevent more and more states providing themselves with enrichment facilities. The IAEA is convinced that it is impossible to solve the front end of the fuel chain without solving the back end. At the Moscow conference Russian officials proposed the Zhelesnogorsk site near Krasnoyarsk in Siberia for an international long-term storage of spent fuel.

Both the IAEA report and the Moscow conference concluded that an international fuel bank will have a greater chance of success if the services can be extended not only to interim storage, but to a final solution for spent fuel management (most likely being reprocessing and final storage of HLW).

Russia has offered to host an international Nuclear Fuel Cycle Center in Siberia: Zhelesnogorsk is the largest underground nuclear complex in the world. The nuclear mega-labyrinth is located 250-300 meters deep under the surface. It consists of 3,500 rooms and halls. The complex includes a nuclear reactor for plutonium production and a reprocessing facility. There are current plans to establish Zhelesnogorsk internationally as a center offering its services for nuclear waste management for interim storage and reprocessing or final storage of nuclear waste. (1)

“The Russian Federation has become increasingly serious about spent fuel imports and is the only country publicly supporting this at the government level. The government is preparing international arrangements for the import and storage of spent fuel. For the time being, the offer does not include the final disposal of spent fuel.” [IAEA, 2005]

Economics of scale should be favourable for multinational repositories according to the IAEA report: cost will be 690,000 Euro/ t U in a repository with 1,000 t capacity compared to 300,000 Euro/ t U if the capacity is 8,000 t:

“... the above cost figures reflect favourable conditions and thus somewhat optimistic scenarios. In countries such as Germany, Sweden, Switzerland and the USA, the real costs are much higher due to technical difficulties, political controversies, and programmatic delays extending over several decades.” [IAEA, 2005]

The IAEA report praises the system of fuel supply and take back practised by the former Soviet Union as a good example for a fuel leasing system: *“...under this system fresh fuel was supplied to the owners... of Soviet designed plants with a full commitment to take back the spent fuel At present, while fuel leasing is relatively straightforward, fuel take-back, while more controversial, is more relevant from a non-proliferation standpoint.”* [IAEA, 2005]

The discussion was continued at the IAEA Special Event at the General Conference in September 2006 titled **New Framework for the Utilization of Nuclear Energy in 21st Century: Assurances of Supply and Non-proliferation**. The report about this special event to the IAEA General Assembly outlines possible ways forward to guarantee countries' **supplies of nuclear fuel, while minimizing proliferation risks**. Proposals under discussion include a nuclear "fuel bank" where the IAEA would administer a nuclear fuel reserve. (2)

In March 2007 the IAEA and Russia signed a joint agreement to set up a working group and continue developing the proposal. The discussions were held in Siberia at the headquarters of the Angarsk Electrolysis Chemical Complex, a manufacturer of low-enriched uranium - the fuel for nuclear power plants - that Russia is proposing should be the site of an international centre.

The so-called front end of the nuclear fuel chain, when fuel is enriched, as well as the back end - the reprocessing of spent fuel - provides points that pose proliferation risks because material can be potentially diverted and used to produce weapons.

Reasons Against a Multinational Final Repository of Spent Fuel

- An international final spent fuel repository is a favourable solution for the nuclear industry to the problem of having to provide storage facilities at nuclear power plants, and thus making it possible to extend their operation time. Further, no need to seek a national solution for the final deposition of spent fuel saves the operator the trouble of dealing with the people living at potential sites.

- The nuclear industry and the states who supported the development of their nuclear industries get rid of the responsibility to tackle the problem of nuclear waste management.
- It is not fair to leave the nuclear legacy to people who were never asked, had no opportunity to resist and will have to pay the environmental, health and financial costs.
- This system requires transportation of spent fuel across Europe all the way to Siberia. Whether by train, ships or plane, this increases the well known problems of accidents and terrorist attacks.
- The potential reprocessing of the imported spent fuel brings about many risks: the risk of pollution due to the process, accidents in the facility , acquisition of weapons quality plutonium, and attacks on the facility.

This plan is mainly favourable for the nuclear industry in rich Western states, who can get rid of their nuclear waste. It cannot be considered a non-proliferation measure which should be the focus of the IAEA. More nuclear waste will be transported all over the world, more nuclear material in the form of fresh fuel will be given to countries which are not using nuclear energy yet, and their used fuel has to be transported to Siberia.

Footnotes

1. Russian Science and the World (Monthly Digest) - May 2001. URL:
<http://www.prometeus.nsc.ru/eng/science/scidig/01/may.ssi>

2. Keynote speakers during the event included **IAEA** Director General Mohamed El Baradei; Sergei Kirienco, Director of the **Russian Federal Nuclear Agency**; Anne Lauvergeon, Chairman of **AREVA** 's executive board; Pat Upton, CEO, **Enrichment Technology Company** Ltd.; Sam Nunn, former US Senator and NTI Co-Chairman; George Assie, Senior Vice President of **Cameco**; Jose Goldemberg, State Secretary of the Sao Paolo (Brazil); Shunsuke Kondo, Chairman of the **Japan Atomic Energy Commission**; Anil Kakodkar, Chairman, **Atomic Energy Commission of India**; and Susan Eisenhower, Chair of **The Eisenhower Institute**.

Literature

[Joint Convention, 1997]: Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, INFCIRC/546, 24 December 1997.

[IAEA, 2005] Multilateral Approaches to the Nuclear Fuel Cycle, Expert Group Report to the Director General of the IAEA, Vienna February 2005 -INFCIRC 640].

[NW 21.07.2005] Nucleonics week – July 21, 2005: Fuel banks, spent fuel management explored at Moscow conference.

IAEA. 22 March 2007. Talks Proceed on Proposed International Uranium Enrichment Centre Fact-Finding Discussions in Russia Focus on Site in Siberia. URL:
<http://www.iaea.org/NewsCenter/News/2007/russiataalks.html>

IAEA. 22 September 2006. Chairman 's Report on Assurances of Nuclear Supply & Non-Proliferation. URL: http://www.iaea.org/NewsCenter/News/2006/report_spevent.html