Annex 1
Technical Workshop on HEU Minimisation,
June 17 - 18, 2006

On the Minimisation of Highly Enriched Uranium (HEU) in the Civilian Sector
–
Workshop Report

Professor José Goldemberg (chair)
International Panel on Fissile Materials

More than 25 years ago, it was clearly realised that the widespread use of HEU in research reactors and other nuclear uses poses significant proliferation risks. This realisation led to the decision, taken by 59 countries, which participated in the International Fuel Cycle Evaluation, to agree that:

> "Effective measures can and should be taken to minimise the danger of nuclear weapons without jeopardising energy supplies or the development of nuclear energy for peaceful purposes."

This decision meant, basically, that enrichment levels in nuclear reactors be reduced to 20% or less. The urgency to act on the decision above was heightened more recently by concern about the threat of nuclear terrorism. It is felt that reducing this threat is consistent with broader international action on the Fissile Material Cut-Off Treaty (FMCT), effective implementation of resolutions of the Security Council, and the fulfilment of the objectives of the Nonproliferation Treaty, which will eventually lead to the elimination of all nuclear weapons in a fair and equitable fashion.

The task of the technical workshop was to update information on the minimisation of HEU in civilian use, and particularly review:

- The current status of HEU in civilian use
- Where can LEU successfully replace HEU today, and
- How can the production and use of HEU be further reduced in the future.

In the last two days, we have discussed a wide range of technical issues related to reduction and the eventual elimination of HEU use in the civilian sector. More than 100 experts from 41 countries participated in these discussions. As chairman of the meeting, I cannot be expected to summarize in detail what was discussed, debated and clarified, and I will only try to give my own impression of the main points raised.

1. Generally speaking, conversion of research reactors to the use of LEU fuel can be accomplished without significant loss of capability. Fuel change to LEU without further modifications may result in 5-10% decrease in neutron flux and corresponding experiment performance. Neutron flux can be optimized through core configuration, fuel assembly design, size of the core, and experimental positions. Experience has shown that an LEU configuration acceptable to operators can be found which has no significant decrease in fuel cycle and experiment performance. Substantial capabilities related to successful conversion, analysis and planning have been developed in many countries. Of the research reactors in existence 43 were converted from HEU to LEU and 43 more can be converted with available technology, and only a small number of facilities may require the continued use of HEU for a period of time.

2. Successful conversion of research reactors and accelerator-driven systems in Belarus, Canada, Chile, the Czech Republic, Ghana, the Netherlands, Romania, and South Africa were presented. Experience in designing new reactors for use in Argentina and Australia were also presented. The U.S. is committed to convert all of its domestic research reactors to LEU by 2014.

3. Special importance should be given to the high density fuel development and qualification effort, based on strong international collaboration, and recognizing that this effort is in a promising path to successfully develop and qualify the fuels necessary to convert those reactors for which conversion is presently not feasible.

4. Efforts by Argentina, Australia, and Indonesia to develop the use of LEU for radioisotope production were discussed. The conversion of radioisotope production, specifically ^{99}Mo, to LEU is technically feasible, and that remaining obstacles to conversion of this activity are chiefly of commercial nature. However, for countries starting new programs of isotope production, important advantages of using LEU targets were noted.

5. There is room for innovative technologies that could expedite minimising the use of HEU. There is clearly a role for more physical security measures in a number of countries to protect installations that use HEU or have been decommissioned.

6. Finally, the technical workshop recognized the important role played by the International Atomic Energy Agency in international efforts regarding HEU minimization and elimination as well as the achievement of the Reduced Enrichment for Research and Test Reactors (RERTR) program, and urged the IAEA to continue to support the efforts for HEU minimization and eventual elimination.