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**The 3<sup>rd</sup> International Forum on Nuclear Non-Proliferation**  
**Summary of Program Proceedings and Discussions**

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**The Nuclear Non-Proliferation Study Group**

**May 1998**

This Summary of Program Proceedings has been prepared by the Secretariat of the Nuclear Non-Proliferation Study Group. Panelists were not contacted regarding this summary. The Secretariat bears full responsibility of the wording of this summary. If you have any questions regarding this summary, please contact the Secretariat.

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# **The Third International Forum on Nuclear Non-Proliferation**

## **Program**

Date: February 23 - 25, 1998  
Place: Nadao Hall, Lobby Floor of the Shin-Kasumigaseki Building  
3-3-2, Kasumigaseki, Chiyoda-ku, Tokyo  
Organizer: Nuclear Non-Proliferation Study Group

**Basic Theme: Pursuing the compatibility of the peaceful use of nuclear energy and the maintenance of the non-proliferation regime**

### February 23 (Mon)

- 13:00 - 13:15    **Opening Address**  
*Toshiso Kosako, Chairman of Program Committee, Nuclear Non-Proliferation Study Group (Associate Prof., University of Tokyo, Japan)*
- 13:15 - 14:15    **Special Speech**  
- **The Issues and the Present State of Nuclear Energy in Japan -**  
*Yoshinori Ihara (Former Vice-Chairman, Atomic Energy Commission, Japan)*
- 14:30 - 17:00    **Session 1: The Peaceful Use of Plutonium**  
- The Necessity of the Peaceful Use of Plutonium  
- Japanese Policy for the Peaceful Use of Plutonium and World Trends  
*Moderator: John J. Taylor (Vice-President Emeritus, EPRI, USA)*  
*Panelist: Bertrand Barré (Director, CEA, France)*  
*Neville Chamberlain (Deputy Chairman, BNFL, UK)*  
*Petr Fomitchenko (RRC "Kurchatov Institute," Russia)*  
*Philippe Savelli (Deputy Director General, OECD/NEA)*  
*Hiroshi Iida (Editorial Writer, The Sankei Shimbun, Japan)*  
*Yoshimitsu Kajii (Senior General Manager, KEPCO, Japan)*

### February 24 (Tue)

- 09:30 - 10:30    **Keynote Speech**  
- **The Issues and the Significance of the NPT Regime -**  
*Jayantha Dhanapala (Under Secretary General for Disarmament Affairs, UN)*
- 10:30 - 12:30    **Session 2: The Issues and the Recent Situation of the Non-Proliferation Regime**

- Maintenance and Strengthening of the NPT Regime
- Nuclear Disarmament, CTBT, Cut-Off Convention, Strengthening of Safeguards

*Moderator: Mitsuru Kurosawa (Prof., Osaka University, Japan)*

*Panelist George Bunn (Prof., Stanford University, USA)*  
*Annette Schaper (Senior Research Associate, Peace Research Institute Frankfurt, Germany)*  
*Dingli Shen (Professor and Deputy Director, CAS, Fudan University, P.R.China)*  
*Nobuyasu Abe (Director General, MOFA, Japan)*  
*Masatsugu Naya (Prof., IIR, Sophia University, Japan)*  
*Jayantha Dhanapala (Under Secretary General for Disarmament Affairs, UN)*

**14:00 - 17:00      Session 3: The Current Energy Status in Asia and Nuclear Cooperation**

- Energy Conditions in the Asia-Pacific Region
- The Issues and the Progress of KEDO
- Nuclear Cooperation in East Asia

*Moderator: Donald L. Guertin (Director, The Atlantic Council, USA)*

*Panelist: Young-Jin Choi (Deputy Executive Director, KEDO)*  
*Seongwhun Cheon (Research Fellow, Korea Institute of National Unification, Korea)*  
*Yongping Wang (Vice-Director, China Institute of Nuclear Industry Economics, P.R.China)*  
*Soedjati Djiwandono (Member, Board of Directors, CSIS, Indonesia)*  
*Shunji Shimoyama (Senior Auditor, JAPCO, Japan)*  
*Tsutomu Imamura (Deputy Director General, STA, Japan)*

**February 25 (Wed)**

**09:30 - 17:15      Special Session: Disposition of Excess Weapons Plutonium**

**09:30 - 12:30      - View from the U.S. and Russia**

*Moderator: Neil Numark (President, Numark Associates, Inc., USA)*

*Panelist: Steven Aoki (Director, DOS, USA)*  
*Nikolai N. Egorov (Vice Minister, MINATOM, Russia)*  
*John J. Taylor (Vice-President Emeritus, EPRI, USA)*

14:00 - 18:00      - Approach to Russian Excess Weapons Plutonium Disposition

*Moderator:*        *Atsuyuki Suzuki (Prof., University of Tokyo, Japan)*

*Panelist:*         *Steven Aoki (Director, DOS, USA)*

*Thierry Dujardin (Executive Deputy Director, CEA, France)*

*Robert Gadsby (Director, AECL, Canada)*

*Akio Suda (Deputy Director-General, MOFA, Japan)*

*Kunihiko Uematsu (Vice-President, PNC, Japan)*

*Valentine Ivanov (Director, SSC RF, Research Institute of  
Atomic Energy, Russia)*

## INTRODUCTION

The 3rd International Forum on Nuclear Non-Proliferation was held on 23–25 February 1998 at the Nadao Hall of the Shin-Kasumigaseki building, in Tokyo, Japan. The Forum was organized by the Nuclear Non-Proliferation Study Group.

It was the goal of the Nuclear Non-Proliferation Study Group to create a Forum program that would be both interesting and informative. After some examination, the Study Group felt that the topics of most interest were the pursuit of the compatibility of the peaceful use of nuclear energy and the maintenance of the Non-Proliferation Regime. Another area receiving much attention as of late is the disposition of excess weapons plutonium.

To address these areas, the Forum was divided into three sessions and a special full day session which was devoted completely to the plutonium disposition issue. The first session tackled the peaceful use of plutonium. The second session discussed the issues and the recent situation of the Non-Proliferation Regime. The third session addressed the current energy status in Asia and possibilities for regional nuclear cooperation. The special session was divided into two sections: the U.S and Russian views regarding disposition, and the approach to Russian excess weapons disposition. The session panelists were comprised of individuals from ten countries and three international agencies.

The Forum opening address was given by Toshiso Kosako, Chairman of the Forum Program Committee. In his address, Dr. Kosako stated that the Non-Proliferation Study Group, an organizer of the Forum, was formed to research and discuss a variety of issues regarding nuclear non-proliferation and to promote the peaceful use of nuclear energy by making nuclear activities more transparent. This Forum is part of the Study Groups ongoing efforts.

Dr. Kosako's opening address was followed by a special speech on the issues and the present state of nuclear energy in Japan by Mr. Yoshinori Ihara, Former Vice-Chairman of the Atomic Energy Commission. In his speech Mr. Ihara gave a short history of Japan's commitment to the peaceful use of nuclear energy and then discussed some of Japan's goals for the future of the nuclear industry in Japan.

On the second day of the Forum, a keynote speech on the issues and the significance of the NPT Regime was given by Mr. Jayantha Dhanapala. Shortly before attending the Forum, Mr. Dhanapala was named as the new Under Secretary-General for Disarmament Affairs at the United Nations. In his speech Mr. Dhanapala stated that he felt that gatherings such as this Forum can "be most useful opportunities providing an informal forum for far-ranging, intellectually challenging and pragmatic exchanges of views with the aim of searching for solutions and testing new approaches."

The following are summaries of each session and the special and keynote speeches.

**Special Speech**

**Keynote Speech**



## **Special Speech:**

### **"The Issues and the Present State of Nuclear Energy in Japan"**

#### **Mr. Yoshinori Ihara, Former Vice-Chairman, Atomic Energy Commission**

In his speech Mr. Ihara gave a short history of Japan's commitment to the peaceful use of nuclear energy and then discussed some of Japan's goals for the future of the nuclear industry in Japan.

The following is a summary of Mr. Ihara's speech:

- In the mid 1950's Japan started research, development and utilization of nuclear energy, and established the Atomic Energy Basic Law. This Law stipulates that the development and utilization of nuclear energy in Japan shall be limited to peaceful purposes, and at the same time, prescribes that an Atomic Energy Commission shall be set up "for the purposes of carrying out the planned national policies on the research, development and utilization of atomic energy and of realizing the democratic operation of atomic energy administration."
- Although the path of nuclear energy development and utilization that Japan set out on since the time of establishing the Basic Law to the present has not always been flat and easy, when everything is said and done, the way progressed smoothly.
- The purpose for nuclear energy development in Japan is to ensure energy stability and to improve the quality of life for Japanese people.
- The basic policy that Japan should hold for the development and utilization of the nuclear energy contains the following:
  - (1) Development of a nuclear energy policy as a nation committed to peaceful use of nuclear energy,
  - (2) Establishment of a consistent system of nuclear power generation by light water reactors,
  - (3) Ensure progress in development of the nuclear fuel cycle on the basis of a clear future outlook, and
  - (4) Diversified development of nuclear science and technology and reinforcement of basic research.
- In addition to the duties demanded by the NPT regime, Japan will hold the principle that "Japan never holds surplus plutonium" as its own policy, improve the transparency for plutonium utilization plans, and clarify the present situation of plans both domestically and internationally.
- It is suggested to use plutonium as the MOX fuel in LWRs for the time being from the viewpoint of the establishment of technologies necessary for nuclear fuel recycling, and

on the basis of practical use and improvements of the system for the future fast breeder reactor age.

- It is the duty of our contemporary generation, who benefit from nuclear energy, to establish a disposal method for radioactive wastes, in particular the high-level radioactive waste.
- Roundtable Conferences were held and attended by a variety of participants (nuclear experts, researchers, local government leaders, the general public, nuclear critics, etc.) Discussions on nuclear energy were made from all possible aspects such as: 1) role of nuclear energy in Japan's energy supply, 2) public acceptance of nuclear energy with respect to public concerns for safety, and 3) the transition of Japan's presently affluent society into the next generation based not only on a stable and secure source of energy, but also upon worldwide and historical viewpoints.
- Based on information gained from the Roundtable Conferences, suggestions from moderators and examination results from the Advisory Committee for Energy of the Ministry of International Trade and Industry, at the beginning of 1997 the Atomic Energy Commission determined the "Regarding the Immediate Specific Measures for the Nuclear Fuel Cycle." In this determination it was confirmed that it is indispensable for Japan to smoothly develop the nuclear fuel cycle for the long term stable progress in nuclear energy generation.
- In March 1997, a fire and explosion accident occurred at the Bituminization Demonstration Facility at PNC's Tokai plant. The accident increased the anxiety and disbelief of the Japanese people with respect to nuclear energy and impacted future nuclear fuel cycle development.
- The Science and Technology Agency which is the supervisory authority of PNC urged the clarification of the cause of the Tokai accident, and at the same time established the PNC Reform Examination Committee to restructure PNC. As a result of discussions from the Committee, it was determined that PNC will be reorganized into a new organization.
- It was suggested by the roundtable moderator that a special committee regarding the fast breeder reactor should be established under the Atomic Energy Commission. In the report from these meetings it was stated that: "The fast breeder reactor can improve the utilization efficiency of uranium much higher than that of the light water reactors by recycling nuclear fuel number of times without disposing of it after one use. Moreover, the fast breeder reactor is capable of decreasing the burden of waste disposition, and therefore research has been carried out for a long period of time."
- Recently, Japan has decided to implement large-scale financial and administrative reforms. As for the nuclear energy administration, the Atomic Energy Commission and

the Nuclear Safety Commission, which currently are advisory organizations to the Prime Minister, they will be transferred to the newly established Cabinet Agency.

- In spite of Japan's principle, with respect to Japan's nuclear fuel cycle policy, there are concerns in some foreign countries that Japan will be armed with nuclear weapons sooner or later. This is the greatest misunderstanding for the following reasons:
  - (1) Psychological and historical reasons: Japanese people who experienced the atomic disasters at Hiroshima and Nagasaki abhor nuclear weapons. There is no logic in retaliation at all.
  - (2) Institutional reasons: Assurance of peaceful utilization has been held through the ensurance of peaceful utilization by the Atomic Energy Basic Law and the restrictions against diversion by the bilateral agreements and various systems such as IAEA safeguards.
  - (3) Realistic reasons: In Japan, there is no authority that is responsible for the production of nuclear weapons. There are no scientists or engineers who are willing to be engaged in the development of nuclear weapons. Attempts at changing this situation cannot evade the supervision of the mass media, which is totally against nuclear armament.
- In conclusion, it is necessary for Japan to progress with the development and utilization of nuclear energy. Nuclear energy is an important area of study in the field of science and technology and Japan must clarify what its needs from science and technology in the 21st century.

## **Keynote Speech:**

### **"The Issues and the Significance of the NPT Regime"**

#### **Mr. Jayantha Dhanapala, Under-Secretary-General for Disarmament Affairs, United Nations**

In his speech Mr. Dhanapala stated that he felt that gatherings such as this Forum can "be most useful opportunities providing an informal forum for far-ranging, intellectually challenging and pragmatic exchanges of views with the aim of searching for solutions and testing new approaches."

The following is a summary of Mr. Dhanapala's speech:

- The end of the Cold War has affected disarmament in two ways. It has created unprecedented opportunities for further progress concerning weapons of mass destruction. At the same time, it has led to the outbreak of new conflicts the control and resolution of which require a rethinking of established concepts and priorities in the disarmament field.
- In his program for reform the Secretary-General of the United Nations has clearly stated that nuclear disarmament and the question of weapons of mass destruction remain a priority. Recently, the United Nations re-established the Department for Disarmament Affairs to handle disarmament issues.
- National security and its defense are frequently invoked to justify the possession and use of arms notwithstanding the noble principles of the Charter of the United Nations and in particular Article 2, paragraph 4, abjuring the threat or use of force.
- The conclusion of verifiable treaties to eliminate or limit various categories of weapons, helps to circumscribe, in an equitable manner, the use of force in international affairs through the extension of the rule of international law. It has been and remains the most viable route to pursue.
- As long as nuclear weapons remain in the world's arsenals, efforts for their non-proliferation and elimination must continue.
- With respect to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), not only has the Treaty been maintained as the center piece or core of the global nuclear-non-proliferation regime in both its vertical and horizontal dimensions, its indefinite extension both reinforced and rendered permanent the international legal norm against the proliferation of nuclear weapons.
- An important lesson which can be drawn from the 1995 Review and Extension Conference is that successful, result-oriented multilateral diplomacy is indeed possible.
- Nuclear disarmament and general and complete disarmament remain to be fully achieved. The 1995 NPT Conference has helped to identify the way forward by setting

the parties three specific objectives under Nuclear Disarmament—a program of action. The three objectives are:

- (1) The completion of negotiations on “a universal and internationally and effectively verifiable Comprehensive Nuclear Test Ban Treaty (CTBT) no later than 1996.”

— Not only as this has been achieved, but to date the Treaty has actually been signed by 149 States and ratified by eight States. The achievement of the CTBT is a milestone on the road to make the world a safer and more secure place for generations to come.

- (2) The “immediate commencement and early conclusion of negotiations on a non-discriminatory and universally applicable convention banning the production of fissile material for nuclear weapons or other nuclear devices, in accordance with the statement of the Special Coordinator of the Conference on Disarmament and the mandate contained therein” (paragraph 4 (b) of Decision 2).” The conclusion of such a Treaty would also provide an essential foundation for the eventual achievement of nuclear disarmament.

— Although this is an enormous task, the Conference on Disarmament, the sole multilateral disarmament negotiating body, is best suited to build on the mandate that already exists and to start moving forward with negotiations as soon as possible.

- (3) The “determined pursuit by the nuclear weapon States of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goal of eliminating those weapons, and by all States of general and complete disarmament under strict and effective international control.”

— At the first session of the Preparatory Committee for the 2000 NPT Review Conference in April 1997, the five nuclear-weapon States in a joint statement reaffirmed their commitment to pursue systematic and progressive efforts to reduce nuclear weapons with the ultimate goal of eliminating them.

- Nuclear disarmament remains a priority task to be pursued vigorously by the international community. The implementation of the international community’s commitment to the irreversible process of nuclear disarmament represents one of the important challenges of our time.
- Recently, there has been very encouraging and important developments in regard to nuclear-weapon-free-zones. At the 1995 Conference, the NPT States parties stressed that the development of nuclear-weapon-free-zones, especially in regions of tension, such as the Middle East, as well as the establishment of zones free of all weapons of

mass destruction, should be encouraged as a matter of priority, taking into account the specific characteristics of each region.

- IAEA safeguards under the Treaty on the Non-Proliferation of Nuclear Weapons are an integral part of the international regime for non-proliferation and play an indispensable role in ensuring implementation of the Treaty. A significant step in further strengthening the effectiveness and improving the efficiency of the IAEA safeguards system was achieved in May 1997 with the adoption of the model Protocol Additional to Safeguards Agreements by the IAEA Board of Governors.
- The possibility of nuclear accidents, illicit trafficking and the threat of nuclear terrorism underline the need for concrete action. An important contribution in this regard was the Summit meeting on Nuclear Safety held in May 1996 in Moscow at which the G-7 and Russia have affirmed the necessity of ensuring the safety and security of nuclear material, in particular the safe management of fissile material, including material resulting from the dismantling of nuclear weapons and expressed their determination to combat nuclear trafficking.
- In conclusion, I must pay tribute to the important role played by non-governmental organizations not only with regard to nuclear non-proliferation but also with regard to disarmament in general. Their expertise and resources are being increasingly integrated into the various facets of human endeavors within and among States. Their publications, briefings, and seminars contribute to a better awareness of the issues and provide opportunities for understanding the perceptions of others and facilitating possible solutions to problems.

## **Session 1 : The Peaceful Use of Plutonium**

## **Session 1:**

### **The Peaceful Use of Plutonium**

The underlining theme of all panelists in session one was the continued growth in the demand for energy and how it would impact our energy choices. The general consensus among panelists was that nuclear energy could play an important role in providing energy for the future but that efficient plutonium management was needed to ensure both the efficient use of nuclear materials and the protection of these same materials from a non-proliferation aspect.

The moderator for this session was Mr. John Taylor, Vice-President Emeritus, Electric Power Research Institute (EPRI), U.S.A.

The following is a summary of each panelist's presentation:

- I. Mr. Philippe Savelli, Deputy Director of the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA), Paris, France.
  - Nuclear power is a proven technology and it can contribute significantly to a sustainable energy supply in the 21<sup>st</sup> century.
  - The management and peaceful use of plutonium do not raise major technical difficulties. Beyond technical, economic and safety issues, plutonium management has wider political and social aspects that have to be recognized.
  - Once-through strategies do not utilize the energy that can be extracted from plutonium contained in spent fuel. Reprocessing spent fuel and recycling fissile materials in thermal reactors can reduce significantly the amounts of plutonium remaining in non-reprocessed spent fuel.
- II. Mr. Hiroshi Iida, Editorial Writer, The Sankei Shimbun, Tokyo, Japan.
  - There is still concern regarding Japan's nuclear intentions. Many countries still feel that Japan will arm itself with nuclear weapons. To dispel this fear, Mr. Iida recommends that more foreign researchers be invited to work on the fast breeder R&D programs in Japan. This would increase the transparency of Japanese nuclear research.
  - The coverage of the nuclear industry by the mass media has been unfair with too many reports which do not state the entire story or are simply not accurate. All comments should be based on accurate and fair information, but in reality, this is not often the case. Mass media needs to reform itself with respect to its coverage of the nuclear industry.
- III. Mr. Neville Chamberlain, Deputy Chairman, British Nuclear Fuels plc (BNFL), U.K.
  - The recycling of fuel can play an important role in the management of plutonium for peaceful uses.



- Five key advantages to MOX fuel: 1) recycling plutonium is the only certain way of avoiding the potential for diversion, 2) plutonium itself is a valuable energy source, 3) by incorporating safeguards into the reprocessing operation the plutonium is more visible, thus decreasing the potential or opportunity for clandestine diversion, 4) recycling reduces both the amount of waste and the number of spent fuel elements that will require ultimate disposal, and 5) we will maintain and develop the skills and capabilities in the nuclear field.
- The 3 principal risks associated with the management of plutonium: 1) the risk of deliberate diversion of nuclear materials from civil to military use, 2) the risk of theft of nuclear materials by terrorists or other groups, and 3) the risk of closing off the nuclear power option. Increased effectiveness of international surveillance and safeguards can help decrease the risk of diversion. The fabrication and burning of MOX fuel will decrease the amount of materials available, thus decreasing the risk of theft. Nuclear materials exist and will continue to do so. They can best be controlled by ensuring that we maintain viable and peaceful outlets.

IV. Mr. Petr Fomitchenko, Head of Safety Physics Laboratory, Department of Physical & Technical Studies of Advanced Reactors, Kurchatov Institute, Moscow, Russia.

- Plutonium treatment problems are not only technical, ecological and economical, but also political, because they are directly connected with nonproliferation of nuclear weapons and social acceptability of nuclear power. In Russia, plutonium is viewed as valuable resource.
- For the large-scale and long-range implementation of nuclear power, a nuclear power system should satisfy at least the following requirements: cost effectiveness, sufficiency of resources, safety, acceptable environmental impact, and nonproliferation.
- Inclusion of excess weapons-grade fission materials into the fuel cycle of nuclear power could reduce terms and investments required for the creation of an efficient structure, ensuring the possibility for the nuclear power sector to reach its goal in energy supply.
- Utilization of excess weapons-grade plutonium in VVER-1000 reactors is a realistic, near-term option which should be undertaken in collaboration with other countries.

V. Mr. Yoshimitsu Kajii, Senior General Manager, Vice Chairman, General Office of Nuclear and Fossil Power Production, The Kansai Electric Power Co., Inc., Japan.

- Japan's nuclear policy is to reprocess spent fuel and recycle recovered plutonium and uranium. Spent fuel is a valuable quasi-domestic energy resource. Since Japan is low in natural energy resources, from the viewpoint of ensuring energy security, effective utilization resources, and waste reduction, establishment of the nuclear fuel cycle is important.

- From the point of view of electric utility companies, in order to use plutonium utility companies need the understanding and support of the public. Japanese utilities must continue to give safety their highest priority, and try to disclose information to the public.
- Fast Breeder Reactors are the most efficient users of uranium. Therefore, it is one of the most promising non-fossil energy options and we must continue research in this area. The use of MOX in light water reactors (LWRs) has been planned since the 1960s and utilization of MOX fuel in LWRs is the most feasible method of utilizing plutonium.

VI. Mr. Bertrand Barré, Director, Nuclear Reactor Directorate, Commissariat à l'Energie Atomique (CEA), France.

- In the future, the world will need all energy sources available, especially nuclear energy in order to meet energy demand.
- The French government has decided to abandon Superphenix, but plans to continue its present reprocessing-recycle policy, and to maintain the R&D program aimed at the long term development of the Fast Neutron Reactors (FNR).
- The use of MOX is routine in Europe. Advantages of MOX recycling: 1) saves natural uranium, 2) less waste disposal, 3) recycling is cost competitive, as the saving in uranium and enrichment costs balances more or less the excess in fabrication, and 4) MOX recycling keeps open and industrially viable the reprocessing option, which is the key to better uranium use in future FNR.
- Public acceptance and support of nuclear power in France has been good. The use of MOX fuel has not been an issue.

## Session 1: Discussions with Panelists and Forum Attendees

The moderator asked Mr. Chamberlain about BNFL's measures for reducing the stock of separated plutonium. Mr. Chamberlain described the measures' background by mentioning that the responsibility for plutonium management was transferred to BNFL upon privatization and said that even though combustion of the separated plutonium as MOX fuel was expected, specific measures were not yet decided.

Prof. George Bunn, Professor at Stanford University, U.S.A., pointed out that past energy demand projections did not match actual demand and inquired about the credibility of future energy demand projection figures provided by Mr. Chamberlain. Mr. Chamberlain said that he provided the figures based on a low demand scenario from a conservative standpoint.

Mr. Gunji, IEA of Japan Co., LTD, inquired about the difficulties of managing the international joint development project in Superphenix. Mr. Barré said that with respect to a joint development project the percentage of materials and labor provided should be equal to the ownership percentage. For example, a country who will own 25% of the completed project should provide 25% of the materials and labor for its development. However, coordination of these demands has been very difficult.

Dr. Kurosawa, Osaka University, asked Mr. Kajii about his explanation that "plutonium stocks in Japan would decrease after the year 2000," wondering about the prospect of this actually taking place. Mr. Kajii answered that although he was not in a position to meddle with any decision of the government, being only an employee of an electric power company, he himself would do his utmost toward achieving the goal. Utilities should support and follow commitments made by the government.

Regarding public acceptance of nuclear energy, the moderator mentioned the difficulty of explaining the technical aspect to the public, and asked for Mr. Iida's opinion, since Mr. Iida was in a unique position between nuclear engineers and the general public. Mr. Iida said that combining the viewpoints of the specialist engineer and the layman was very difficult and, citing the example of MOX fuel by pointing out the difference with regard to the acceptance of MOX fuel in Japan and Europe. Mr. Iida also commented on the current situation in Japan, saying that there was no consistency in the position of the government perhaps because of the "vertical division" of its organizations, and that some people in mass media only reported the information that supported their views and made reports as if it were possible to substitute nuclear energy with natural energy, such as solar energy.

Mr. Ihara, former Vice Chairman of the Atomic Energy Commission, argued against Mr. Iida's comments regarding the position of the government, saying that although Mr. Iida was right in his opinion about the safety measures for nuclear energy, there was consistency in government policies regarding the utilization of MOX fuel.

Mr. Iida added some comments for further explanation saying that when explaining things to the general public, it was important to present views in an easy-to-understand manner, and in this aspect the efforts so far by government personnel and those working for the nuclear industry were not yet good enough. Mr. Iida emphasized that these people should present explanations on why the use of plutonium is necessary in such a way that is much easier for the general public to understand.

Mr. Nakajima, a previous official of PNC, pointed out that media reports on the accident in the asphalt bituminization facility were incorrect by describing it as an "explosion in a reprocessing facility," which is a different facility but in the same complex. Mr. Iida agreed that the media reports were indeed incorrect and explained that the "Association to Think

About Media Reports on Nuclear Energy" was formed by opinion leaders representing various fields and has already started its activities without depending on any sponsors.

Mr. Naito (Japan Atomic Energy Research Institute) asked Mr. Barré about the background of his comment that "the French general public has an accurate understanding towards nuclear energy." Mr. Barré mentioned that such understanding seemed to stem largely from the two oil shocks experienced by France in 1957 and 1974 and that because of the need to outgrow its dependence on oil, there were serious discussions throughout the nation on the use of nuclear energy. Mr. Barré also noted that although he was not sure whether nuclear energy was really "loved" by the French general public, he felt it was generally accepted as a necessity.

**Session 2 : The Issues and the Recent Situation  
of the Non-Proliferation Regime**

## **Session 2:**

### **The Issues and the Recent Situation of the Non-Proliferation Regime**

Recently, the Non-Proliferation Regime has been strengthened through activities such as the generation of a Comprehensive Nuclear Test Ban Treaty (CTBT), U.S.–Russian cooperation on disarmament and disposition, and increased IAEA safeguards via its Program 93+2. However, progress is still needed, especially in the areas of materials management and disarmament.

Panelist suggestions on how to further strengthen the regime varied from progression on negotiations for a fissile material cut-off convention to the signing and ratifying of the Protocols Additional to Safeguards Agreements (IAEA's Program 93+2) to a treaty which would ban nuclear weapons completely.

The moderator for this session was Dr. Mitsuru Kurosawa, Professor, Osaka School of International Public Policy, Osaka University, Japan.

The following is a summary of each panelist's presentation:

- I. Prof. Masatsugu Naya, Professor, Institute of International Relations, Sophia University, Japan.
  - The non-proliferation regime has been strengthened in terms of the number of adherents to the NPT. The U.S. and Russia are making progress, via START I and II, towards disarmament. IAEA's Program 93+2 will increase safeguards.
  - The question now is whether or not further reinforcement of the present NPT/IAEA safeguards system really pays. Many countries have waived the nuclear option and only a few rogue states exist. Increased IAEA inspections might only force extra costs on most Non-nuclear Weapons States (NNWS) and may not actually deter those states who are determined to develop nuclear weapons.
  - We need a change of approach regarding the non-proliferation issue. I propose a treaty banning nuclear weapons. Nuclear Weapons States (NWS) would have to assume the following obligations: 1) no first use in general and non-use against NNWS, 2) complete a treaty governing the cut-off of the production of fissile material, and 3) continue disarmament talks to reduce nuclear force to the minimum level and make stockpiles transparent.
- II. Dr. Dingli Shen, Professor and Deputy Director, Center for American Studies, Fudan University, China.
  - The Chinese have contributed significantly to strengthening international nonproliferation regimes. China supported the indefinite extension of the NPT. China worked with other parties to achieve a Comprehensive Nuclear Test Ban Treaty

(CTBT) and was the second to sign the CTBT. China signed and ratified the Chemical Weapons Convention.

- In general, China has three objectives toward nuclear issues: 1) advancing nuclear disarmament, 2) preventing nuclear proliferation, and 3) promoting peaceful use of nuclear energy. China has set the following three principles regarding nuclear export: 1) what China exports shall be for used for peaceful purposes only, 2) IAEA safeguards should be applied to exports, and 3) exports should not be transferred to a third country without China's prior approval.
- China supports nuclear disarmament efforts and promotes more bilateral and multilateral agreements to accomplish disarmament. There is a possibility that China will join U.S. and Russian START negotiations. Stockpiled nuclear warheads of nuclear superpowers still need to be addressed. Fissile materials from dismantled warheads have to be made no longer weapons useable. Missile defense programs will also need review. All nuclear weapons states shall commit to no-first-use of nuclear weapons.

III. Dr. Annette Schaper, Senior Research Associate, Peace Research Institute, Frankfurt, Germany.

- The time is ripe for the introduction of regulatory measures in the NWS and for the creation of a fundamental, new concept of how to deal with fissile materials. At the center of disputes already during negotiations for a Fissile Material Cut-off Treaty (FMCT) mandate is its potential scope. Schaper submits the following Pu and HEU categories of utilization:
  1. military direct use material in operation nuclear weapons and their logistics pipeline,
  2. military direct use material held in reserve for military purposes, in assembled weapons or in other forms,
  3. military direct use material withdrawn from dismantled weapons,
  4. military direct use material considered excess and designated for transfer into civilian use,
  5. military direct use material considered excess and declared for transfer into civilian use,
  6. direct use material currently in reactors or their logistics pipelines and storage, and
  7. irradiated Pu and HEU in spent fuel from reactors, or in vitrified form for final disposal.

All of these categories and their materials should be transferred to civil use.

- Large quantities of materials are either still inside weapons or its eventual use is unknown. Only a small fraction has been placed under safeguards. Schaper proposes

several variations of an FMCT scope with different degrees of obligation, ranging from the ban of future production to the complete reduction of all military material.

- With respect to nuclear proliferation it is also important not only to detect the receiving end of sensitive technologies but also the supplying end. The goal of nuclear disarmament would be best served if universal full scope safeguards would be implemented. Safeguards promote discipline in material accountancy and promote international cooperation.

IV. Prof. George Bunn, Consulting Professor, Stanford University Center for International Security & Arms Control, U.S.A.

- Negotiations for a cut-off convention have long been stalled at the Geneva Conference on Disarmament. Recently, unilateral and bilateral NWS cooperation has made some progress in the disarmament area but these efforts are not enough.
- Recommendation: Have Japan invite governments (all NNWS, countries party to the NPT, the five NWS and the three threshold states) to send representatives to Tokyo to negotiate a cut-off convention. The cut-off treaty needs a leader. Japan is a strong leader in disarmament, a good host for international meetings (this Forum, COP3), is the most advanced country in nuclear technology, plus has the unique knowledge of the terrible consequences of nuclear war.
- Japan's invitation should outline the kind of cut-off convention it hopes to achieve—within broad limits. Unanimous agreement would be sought, but a two-thirds majority vote should be permitted. By Japan serving as host, Japan could promote the problem of discrimination in safeguards inspections between NNWS and NWS plus protect the non-weapons, peaceful use of nuclear materials.

V. Dr. Thomas E. Shea, Procedures and Support Section, Division of Operations A, Safeguards Department, IAEA.

\* Dr. Shea was not able to attend the Forum due to illness. His paper was summarized by the moderator of this session, Dr. Kurosawa.

- IAEA Program 93+2 will improve the Nonproliferation Regime. The IAEA safeguards system will be more effective at being able to detect steps underway by States in relation to the development of nuclear weapons, should such steps be taken.
- The first series of improvements in the Strengthened Safeguards System includes requirements for earlier notifications and information on construction of new facilities where inspections are carried out, access to and use of additional information regarding the nuclear activities within a State, and the adoption of advanced technologies including unattended assay systems which are integrated into the material transport systems in several Japanese plutonium facilities. The second series of improvements, which require additional legal rights, address limitations on access and requires States



to submit expanded declarations on nuclear-related activities and to accept controls on equipment and certain materials which could be used in the manufacture of nuclear weapons.

- Beyond the signing and ratifying of the Protocols Additional to Safeguards Agreements (Program 93+2), negotiations on a FMCT should be started. All States should make efforts to make their programs more transparent to the world. NWS should minimize the accumulation of stocks of separated plutonium.

VI. Mr. Nobuyasu Abe, Director-General for Arms Control and Scientific Affairs, Ministry of Foreign Affairs, Japan.

- The management of fissile material produced by the arms reduction is needed so that we may prevent the material and the technology and experts from falling into the wrong hands (rogue states, fanatic groups).
- Japan is committed to working towards a nuclear weapon-free world. In Japan's view, the NPT is the cornerstone of nuclear nonproliferation. But, we need to work on strengthening the NPT regime by strengthening and making more efficient the IAEA safeguards system in line with the latest IAEA "Program 93+2".
- The CTBT needs to be brought into force as soon as possible. Beyond the CTBT the next step to strengthen nuclear nonproliferation is a treaty to cut off the production of fissile material. A fissile material cut off treaty can greatly contribute to nuclear nonproliferation by literally cutting off supply of the essential ingredient of nuclear weapons to those countries trying to acquire nuclear weapons.
- Japan is committed to working with others on these issues. Japan has pledged money for the dismantlement projects in Russia and the other Former Soviet Union (FSU) republics including the construction of storage and disposal facilities, and the establishment of state accounting and control systems for nuclear materials. Japan is also firmly committed to the Korean Peninsula Energy Development Organization (KEDO) project and is playing a significant role in the construction of light water reactors in North Korea.

## Session 2: Discussions with Panelists and Forum Attendees

Prof. Bunn added his view to Mr. Dhanapala's comments, saying that the real intention was that "if the negotiations for the cut-off treaty proceeded smoothly at the Conference on Disarmament, it would be a welcome development, but if not, the negotiations could also be conducted elsewhere."

Mr. Abe expressed interest in Prof. Bunn's suggestion about conducting negotiations for the cut-off treaty outside the framework of the Conference on Disarmament, but pointed out

that how to ensure the participation of those countries with suspected nuclear activities in such negotiations would be a major challenge.

Mr. Fahmy, the Ambassador of Egypt to Japan, argued that the negotiations for the cut-off treaty should be conducted at the Conference on Disarmament and that even if there is no progress in the negotiations at the Conference they should not be conducted elsewhere. Mr. Fahmy also pointed out there was not enough transparency in developed nations, especially in the NWS, with regard to their use of nuclear materials. Developing nations need to know what NWS and NNWS are doing with these materials.

Prof. Bunn asked Dr. Schaper the following question: The CTBT is still not in effect, and if there were no more than 44 signatories in 1999, what kind of situation could be expected? Dr. Schaper said that although the CTBT was officially not in effect, it was, however, already effective and its repeal would be difficult. Dr. Schaper also pointed out that from now on there would be considerable pressure on the non-signatories to sign the treaty. Mr. Dhanapala mentioned that the importance of the CTBT taking effect lay in the effective operation of a verification system. He also pointed out that ratification of CTBT is currently being deliberated in the U.S. Senate and that progress is being made.

Mr. Watanabe, who was not affiliated with any organization, asked Mr. Dhanapala about the possible illegality of the sub-critical tests conducted by the U.S. Mr. Dhanapala said that the sub-critical tests did not violate any CTBT provision, but also said that he would refrain from making any comment on whether the experiment was against the spirit of CTBT.

Prof. Bunn asked Prof. Naya if his proposal for a "ban on the first use of nuclear weapons under the Law of War" was realistic and how the policy would be secured. Prof. Naya answered Prof. Bunn's question by stating that the main challenge regarding nuclear non-proliferation did not lie in the balance of power among nations or international politics, but in how to manage nuclear fissile materials and what kind of system should be established for this purpose. Prof. Naya also said, while conceding he was not a legal expert, that "the ban on the first use of nuclear weapons under the Law of War" was not as highly realistic to him as the Chemical and Biological Weapons Ban Treaty, and that what he had in mind was a ban on the first use in the traditional sense under the Law of War. Prof. Naya said that he was thinking of a double structure by also controlling existing nuclear weapons under a strict management system. Prof. Naya answered Mr. Abe's question by saying that not being able to secure non-first-use of nuclear weapons did not render legislation meaningless.

Mr. Takubo, Japan Congress against A- and H- Bombs, asked Mr. Abe about the position of the Japanese government regarding non-first-use of nuclear weapons. Mr. Takubo stated he heard of an opinion that the U.S. has not made a declaration of non-first-use because it was worried about the possibility of Japan's nuclear armament. Mr. Abe said that it was questionable whether observing the non-first-use rule was possible in case an

ultimate situation for self-defense came about, but he also noted that Japan depended on the U.S. for security and was not in a position to meddle with the position of the U.S. regarding this matter. Mr. Abe also said that the logic of not declaring non-first-use on the pretext of the threat of Japan's possible nuclear armament did not make sense.

Dr. Shen explained China's stand regarding non-first-use of nuclear weapons as follows: China will not use any nuclear weapons first and will only use them if attacked with nuclear weapons by any NWS. China will not use nuclear weapons against any NNWS.

Prof. Bunn responded to Mr. Takubo's comments by saying that although the opinion cited was clearly absurd, it was true that some Americans did express such an opinion. Regarding the attitude of the U.S. toward non-first-use of nuclear weapons, he stated that the following cases would be exceptions: (1) if the adversary nation in a conflict is an NWS, (2) if the adversary nation was not in good standing with or a signatory of the NPT, or (3) if the adversary nation allied itself with an NWS and attacked the U.S.

## **Session 3 : The Current Energy Status in Asia & Nuclear Cooperation**

### **Session 3:**

#### **The Current Energy Status in Asia and Nuclear Cooperation**

In general, energy needs in the Asia region will grow as population in the region grows. However, countries in the region are taking different approaches on how to keep pace with the anticipated energy demands. Some countries, such as China, are planning to include nuclear energy as a part of its future energy mix. Others, such as Indonesia, are interested in nuclear energy but are not actively pursuing research in this area.

On the issue of regional nuclear cooperation, a step by step approach was recommended by the majority of panelists. Since the use of nuclear energy varies widely in the region compounded with suspicions regarding the use of nuclear energy, it would be wise to begin some sort of regional cooperation. The goal of such a cooperation would be to increase the transparency of nuclear energy activities, to enhance working relationships, and to promote training and safety.

The moderator for this session was Dr. Donald L. Guertin, Director and Senior Research Fellow, The Atlantic Council of The United States.

The following is a summary of each panelist's presentation:

- I. Mr. Shunji Shimoyama, Senior Auditor, The Japan Atomic Power Co. (JAPCO), Japan.
  - The planned rapid development of nuclear power in Asia presents challenges both to the countries concerned and to the rest of the world. The Atlantic Council and the Committee for Energy Policy Promotion of Japan formed a study group of over 60 experts from around the world to review long-term energy goals/needs in Asia.
  - Recommendations: 1) Re-emphasis of the critical importance of a safety culture if nuclear power use is to be maintained and/or expanded, 2) Consideration of an Asian association of nuclear institutions and experts to enhance the effective management of nuclear power operations in the region, 3) Increased efforts by nuclear plant operators and governments to strengthen the role of the IAEA in helping prevent actions contributing to the proliferation of nuclear weapons, and 4) increased participation by non-Asian countries in Asian regional efforts to develop the peaceful use of nuclear power.
- II. Mr. Yongping Wang, Vice-Director of Nuclear Industry Planning Division, China Institute of Nuclear Industry Economics, China.
  - According to China's Agenda 21, there are three key issues in the overall strategies for sustainable development in China: 1) population control, 2) resources conservation, and 3) environment protection.
  - Energy production and consumption in China is still overwhelmingly relies on domestic resources and the market. Coal is still the main source of energy in China. The

dominant consumption of coal impedes growth in other energy areas. China's use of coal has resulted in environmental problems such as pollution and acid rain.

- Energy efficiency and energy conservation are the top keys to achieving the sustainable development goal of China. According to the Ninth Five-Year Plan and the overall strategic target of the plan to 2010, the growth rate of the Chinese economy should be kept in a high rate and the people's quality of life should also be improved.
- Nuclear power development in China is still at an initial stage with three units of 210 MW capacity in operation and eight units of 6600 MW capacity under construction in China's mainland. It is the goal of China to add nuclear to its mix of energy options for the future.

III. Dr. Seongwhun Cheon, Research Fellow, Korea Institute for National Unification, Korea.

- South Korea has suffered from the suspicions of other countries that believe the Republic of Korea (ROK) is secretly developing nuclear weapons. So, the ROK is cautious about any regional cooperation. Three main concepts are believed to be important in discussions of regional nuclear cooperation: 1) peaceful uses of nuclear energy, 2) cooperation, and 3) multilateralism. Every effort for regional nuclear collaboration should be strictly for anti-proliferation measures and focus on peaceful uses of atomic energy.
- There are five fundamental questions that will have to be clearly answered before cooperative steps can be taken.
  1. What is the relationship between multilateral nuclear cooperation and the Non-Proliferation Treaty? How will the NPT affect any cooperation?
  2. Is it possible for the countries in the region to reveal their interests faithfully to the other countries? This question is linked to the regional countries' suspicions of each other regarding nuclear intentions.
  3. In the Asia-Pacific region, what are the common interests the countries can discuss in the nuclear field? Only common interests can bring about cooperation.
  4. The extent of bilateral cooperation in the region provides us with some indicators that help us to predict the future of multilateral cooperation. Unfortunately, bilateral cooperation is not very active. Perhaps more bilateral cooperation should be formed first.
  5. Will multilateral cooperation have positive contributions to the improvements of North-South Korean relations?

IV. Dr. Young-Jin Choi, Deputy Executive Director, Korean Peninsula Energy Development Organization (KEDO).

- Why KEDO?—To avoid 3 Asian countries from going nuclear. But, this is not a "gift" to KEDO; its a quid-pro-quo relationship for all involved. The current U.S.

administration is actively supporting KEDO issues. Japan is contributing large amounts of money to the project. South Korea, even while facing its own financial crisis, is still committed to the project. KEDO can be seen as a stepping stone to greater regional cooperation.

- KEDO proved to be a very useful mechanism for inter-Korean dialogue, albeit with the U.S. as a third party. KEDO has been the single most important negotiating arm between North and South Korean. In fact, it has had to deal with issues beyond the construction of the LWRs, but also the nuclear option in general, inter Korean unification/interaction, and inter-regional cooperation.
- There are still problems that plague KEDO. First, North Korea is worried about its security. Its power has been based on its military might. This is a delicate area of negotiating. There have also been internal problems, especially financial ones. It is difficult to manage a project this large both with respect to finances and the politics involved.

V. Dr. Soedjati Djiwandono, Member, Supervisory Board and Board of Directors, Centre for Strategic and International Studies (CSIS), Indonesia.

- A Treaty on the establishment of SEANWFZ (Southeast Asia Nuclear Weapons Free Zone) was signed by the ASEAN heads of state/government at their 5<sup>th</sup> summit in Bangkok in December 1995. The main concern of the parties is regional peace and stability. The establishment of SEANWFZ is at this stage the only form of nuclear cooperation in Southeast Asia.
- The full significance of the Treaty is yet to be determined by the response of the nuclear powers, whether they will approve, recognize and respect it. Otherwise the value of a SEANWFZ would be no more than that of a declaratory nature. The nuclear powers, however, do not seem anxious to give up their strategy of nuclear deterrence.
- Cooperation in the use of nuclear energy for peaceful purposes in Southeast Asia is a long way off. The Southeast Asian nations are yet to resort to the use of nuclear energy for peaceful purposes. This is still an issue for the future. The possibility of establishing some mechanism of control over it, such as proposed ASIATOM or some other institution of similar nature, is nonetheless worth considering well in advance. For Southeast Asia, however, the establishment of such an agency may not be as urgent as it may be for Northeast Asia.

VI. Mr. Kenji Seyama, Director, International Affairs and Safeguards Division, Science and Technology Agency (STA), Japan.

- Japan has a keen interest in Asian cooperation. The Japan Atomic Energy Commission established the Advisory Committee on International Nuclear Cooperation which is discussing policies on international nuclear cooperation. The mission of the

Advisory Committee is: 1) Policies and measures on the cooperation with neighboring Asian countries, 2) Policies and measures on the cooperation with former Soviet Union and Central-Eastern Europe, and 3) Global Nuclear Non-Proliferation.

- To promote the discussion, in March 1997 the Advisory Committee established the Working Group on Regional Cooperation in Asia. Multilateral cooperation in Asia will be difficult due to the differences in social, economic and policy differences among the various countries. Nuclear energy is in different stages of development throughout the region. Plus the region contains both NWS and NNWS. Due to these complications it would be difficult to model a regional cooperation effort after EURATOM.
- Right now, Japan's economy is not very good. So, we must convince Japanese people that spending money for nuclear cooperation is important. Japan also must share its technology with others in order to improve nuclear management in the region; safety and security are important factors as well. In addition, the region needs to study both energy and environmental issues. Technological cooperation alone is not enough; training personnel is important as well.

### Session 3: Discussions with Panelists and Forum Attendees

Mr. Shimoyama said that although a lot of Japanese talked about the prospect of ASIATOM, there was no one definite "version" to the best of his knowledge. He also made an additional explanation, citing a suggestion by the Atlantic Council based on its research, that "the challenges should be tackled step by step and one by one, starting with the easier ones, in order to solve individual problems, in a bilateral or multilateral format as required."

Dr. Cheon responded to Mr. Shimoyama's statement by saying that a lot of Japanese involved have made suggestions about establishing an independent organization such as ASIATOM, whose objective would be complementing the functions of IAEA and promoting the peaceful use of nuclear energy in the region. Dr. Cheon himself has thought of such an organization a confidence-building measure, and he wanted to know if his thinking was different from Mr. Shimoyama's.

Mr. Shimoyama said that instead of thinking of ASIATOM as a complementary organization to IAEA and trying to establish large-scale operations, it would be better to start with whatever is possible to achieve. If, as a result of such activities a decision is reached for enhancing nuclear non-proliferation this would be an added benefit. Mr. Shimoyama emphasized that his way of thinking was not different from that of Dr. Cheon.

Mr. Kurihara, Nuclear Materials Control Center, made the following suggestion: The problem in the Asian region when talking about the possibility of cooperative efforts in the field of nuclear energy is the diversity of the concerns and interests of the countries involved.



Therefore, it would be best to divide Asia into two regions in accordance with their development stages in nuclear energy, one of these regions being Northeast Asia consisting of Japan, China, South Korea and North Korea, etc., with the focus on mutual support and confidence-building. Fostering mutual trust between South Korea and North Korea would be especially important.

Dr. Cheon responded to Mr. Kurihara's comment by saying that the most important challenge facing Northeast Asia was indeed fostering mutual trust and that efforts to dispel any unnecessary fears or suspicions were very important. Dr. Cheon said that this applied also to Japan, and cited his own example by mentioning that he himself used to have suspicions about Japan's activities concerning nuclear energy but these suspicions disappeared after having extensive conversations with knowledgeable Japanese and other people.

Dr. Schaper, Peace Research Institute—Frankfurt, Germany, cited the example of EURATOM in Europe and expressed her belief that the current situation in Asia is similar to the situation in Europe prior to the formation of EURATOM. Therefore, ASIATOM could contribute to changing the regional situation.

Dr. Djiwandono responded to Dr. Schaper's comment by saying that in some countries in the Asia Pacific region there was a sense of distrust towards other countries that is greater than the sense of distrust that existed in and around Germany after World War II, and that some countries also harbored a sense of distrust toward Communist countries. Dr. Djiwandono said that he was also of an opinion that it was important to slowly and focus on small projects which were more feasible.

Dr. Schaper responded to Dr. Djiwandono's view by saying that she felt there was a lack of understanding about what kind of problems Europe faced 50 years ago. The situations are actually more similar than many Asians appear to believe. Plus, it has taken many years to create an effective European cooperation and it will also take many years for Asian cooperation to become effective.

The moderator asked Mr. Seyama whether regional joint management of the radioactive waste was currently being studied at the Atomic Energy Commission. Mr. Seyama responded that there had never been an official discussion on the matter at the Commission and there was no official standpoint of the government on this matter either. Mr. Seyama stated that Japan's position on waste was that it should be managed by each country producing the waste in accordance to international standards such as IAEA. Mr. Seyama also mentioned that because of the execution last year of the waste management treaty, it was important for each country to participate in this treaty at an early stage.

The moderator further asked Mr. Seyama whether the budget for international cooperation and any specific recipient countries were included in the Atomic Energy

Commission's report. Mr. Seyama answered that although no specific decisions have yet been made, means for effective use of the budget were being studied.

The moderator, referring to an article in the Washington Post which reported that "KEDO was short of funds," asked Dr. Choi for comments on the matter. Dr. Choi said that, according to the Geneva Convention, KEDO's funds were to be mostly supplied by South Korea, followed by Japan and the U.S., with cooperation by other countries. Dr. Choi also said that 90% of the funds had already been raised, but the remaining 10% still needed to be raised.

Mr. Ipponmatsu, The Energy Research Center-Wakasa Bay, commented that North Korea's technology was at a very low level, drawing on his own impressions upon his visit to North Korea, and asked Dr. Choi whether North Korea really had the necessary capabilities to operate nuclear power plants. Dr. Choi agreed that North Korea's technology was indeed low, but said that North Korea was preparing a training and educational plan for ensuring safety and for training personnel. However, Dr. Choi also pointed out that North Korea currently does not have a Nuclear Regulatory Commission; reactors can not be turned over until there is a commission. Dr. Choi said that these were important challenges to be tackled, and that KEDO would address these challenges.

The moderator commented that there were many things to be learned from KEDO and that it was important, in general, not to start right away with a grand plan, but to make steady progress step by step. The moderator also pointed out that KEDO has now started addressing the questions of politics, energy, culture and non-proliferation among other concerns, and that the top KEDO official had been in the administrative field and was not an engineer, adding that problems may occur if decisions were made only by engineers.

The moderator asked Mr. Wang about China's current financial situation and the outlook on how to train and educate personnel. Mr. Wang replied, noting that this was his personal view, that the financial situation was currently at a very difficult stage and that the ambitious plan of the Chinese government had now slowed down. Mr. Wang also mentioned that there were problems in the training and education of personnel. Although reform efforts were being promoted, no progress was seen in the training and education of personnel. Mr. Wang cited international cooperation as an excellent means for training and educating personnel and said that this means was now being studied.

In conclusion, the moderator summarized the major questions in Asian regional cooperation into the following six points.

- (1) Implementation of any regional cooperation should come only after the coordination of common interests, the political will and other factors.
- (2) KEDO is an excellent example of regional cooperation in nuclear energy.

- (3) Decide the appropriate role of government and private sectors with respect to the regional organization.
- (4) The importance of preparing reports and establishing and implementing plans is even greater for governments than for private sector organizations.
- (5) Renovation is important for any organization, and restructuring is one viable option if things do not work out well. Although an organization in itself has significance, no organization is perfect.
- (6) In essence, the important thing is to create an environment in which people show an interest in these fields, and the system and organization are ultimately secondary means for utilizing the talent of the individuals involved.

**Special Session on the Disposition of  
Excess Weapons Plutonium**

## Special Session on the Disposition of Excess Weapons Plutonium

### Morning Session:

#### View from the U.S. and Russia

The goal of the morning session was to give an overview of the policy and status in the U.S. and Russia with respect to the disposition of excess weapons plutonium.

The moderator for this session was Mr. Neil Numark, President, Numark Associates, Inc., U.S.A.

The following is a summary of each panelist's presentation:

I. Dr. Steven Aoki, Director, Office of Regional Nonproliferation, Department of State, U.S.A.

- With the end of the Cold War, both the U.S. and Russia had substantial stockpiles of surplus weapons plutonium. As a result of a 1994 summit statement, experts from both countries began working together to examine options for managing and disposing of surplus plutonium.
- Some major steps forward were taken in 1996, with the Moscow Nuclear Summit and the subsequent Paris experts conference. At Moscow, the leaders of the G-8 countries agreed that it was vital for stockpiles of fissile material not longer needed for defense purposes to be "transformed into spent fuel or other forms equally unusable for nuclear weapons and disposed of safely and permanently." At the Paris conference, experts were able to agree that the most timely and technically viable option for disposition was the consumption of plutonium as mixed-oxide fuel in nuclear reactors, and that the immobilization of plutonium in glass or ceramic form, mixed with high-level radioactive waste, constituted a complementary option. They endorsed several on-going initiatives for bilateral and multilateral cooperation to develop these options.
- Three principal aspects of U.S. Pu management and disposition were covered by Dr. Aoki: 1) Policy basis for U.S. program, 2) activities to manage and dispose excess fissile material, and 3) current status of disposition.
- Policy: Pu management is important to the U.S. as it will help with the disarmament goal, strengthen the Nonproliferation Regime and help prove that excess weapons grade Pu is not available for reuse. The U.S. has declared 50 MT of Pu as excess and has formally announced that the U.S. will pursue a dual track option, MOX fuel and vitrification, with respect to its excess weapons origin plutonium (W-Pu). MOX usage is still controversial in the U.S. but the U.S. does not plan to pick one track over the other. Pursuing both tracks are seen as the best option for dealing with U.S. excess W-Pu.

- Storage: It has been recognized that any plan for disposing of surplus fissile materials will require secure storage for an interim period. The U.S. is currently researching site options which will be safe, cost effective and open to international inspections.
- Disposition is driven by nonproliferation in the U.S. Cooperation with other countries is important. The U.S. funds and supports a variety of cooperative activities. Disarmament in the U.S. and Russia must be seen as a parallel activity which supports nonproliferation.

## II. Dr. Nikolai Egorov, Vice Minister, MINATOM, Russia.

- The problems of plutonium management are not only technological, environmental and economical; there are also political problems since they are closely connected to the nuclear weapon non-proliferation issues and public acceptability of nuclear power.
- From the very beginning of the nuclear era in Russia, the option existed that the long term wide-scale nuclear power development would not be reasonable without significant increase of utilization efficiency of natural uranium resources and hence of plutonium utilization for energy production.
- Steps have been undertaken in Russia towards improving its plutonium management abilities. This activity is being developed under governmental control. In February 1998 Russia sent a verbal note to the General Secretary of the IAEA with notification that Russia was joining the guiding principles of plutonium management developed under the IAEA.
- The basis of the concept of weapon plutonium surplus and accumulating civil plutonium disposition are: 1) in the short term, during the period of reactor technology preparation for plutonium utilization reliable storage of this plutonium should be provided as a transient interim stage, and 2) in the long term, cost effective and environmentally safe efficient realization of plutonium power. The most important condition of both short and long term activities of plutonium handling is ensuring non-proliferation.
- Russian plans on weapon plutonium surplus management are based on the following key propositions:
  1. Weapon plutonium is a valuable energy material, which should be used in peaceful nuclear power.
  2. Weapon plutonium utilization is an indissoluble part of long-term Russian nuclear power development program connected with both modification of existing reactors and development of new reactor technologies, allowing to solve utilization tasks more effectively.
  3. The basis of Russian short-term programs for surplus W-Pu disposition is to ensure safe and reliable plutonium storage until its utilization in nuclear reactors.

4. Weapon plutonium utilization in MOX fuel for operating BN-600 and VVER-1000 reactors are considered as a primary option.
5. Weapon plutonium utilization rate acceleration is possible by means of new BN-800, VVER-640 reactors, and in perspective high temperature gas-cooled reactor (HTGR) construction.
6. Work on weapon plutonium utilization will take significant intellectual efforts, time, and considerable financial resources. Due to Russia's present economic situation, the realization of large-scale project is impossible without serious international assistance. Any surplus W-Pu disposition option which is connected with expenditures and a purely commercial approach to plutonium power utilization seems to be unrealistic, taking into account existing uranium fuel prices.
7. All international projects for W-Pu utilization should be based on a balance of interests between both for Russia and the world community.

III. Mr. John Taylor, Vice-President Emeritus, Electric Power Research Institute (EPRI), U.S.A.

- Storage in highly secure facilities is the first urgent step since the existence of tens of thousands of high enriched uranium and plutonium "pits" from the dismantled warheads poses a serious risk of diversion which must be minimized.
- The second essential step is the disposition of these materials in a form to assure that they will never again be returned to nuclear weapons. This step will bring the highest practical level of proliferation resistance, comparable to that of commercial spent fuel. The policy of no reuse is needed to make a global nuclear arms reduction regime a reality.
- Progress is being made. Up-grading excess weapons materials storage facilities both in Russia and the United States has been made. The U.S. Enrichment Corp. and the Russian Ministry of Atomic Energy have entered into a contract to dispose of the excess highly enriched uranium (HEU) from some 20,000 Russian warheads. This is consistent with the "swords to plowshares" concept.
- A study of technical options for weapons disposition was performed by an independent scientific U.S.-Russian Commission established by Presidents Clinton and Yeltsin. The Commission recommends a two-track approach similar to that in the U.S. DOE's Record of Decision be followed: utilizing surplus W-Pu as fuel in existing nuclear power reactors and immobilizing it with highly radioactive defense wastes. The amount of material disposed of in each track is to be determined by each country as each program progresses.
- Both countries should continue to declare excess plutonium and place it under IAEA safeguards. A plutonium management program should also be established.

Regulatory agencies in both countries should be funded so more work can be done in these areas. In addition to the U.S. and Russia, the international community should contribute to the financing of the disposition efforts.

- There are many programmatic uncertainties with regard to the Dual-Track program; some internal, some external. The internal uncertainties arise principally from unanticipated R&D results, construction costs and time underestimates, and delays in resolving environmental impact issues and obtaining the necessary licenses. The external uncertainties arise principally from the level of national priority and funding, legal challenges, regulatory changes, public acceptance, and the progress in negotiating agreements with Russia and other countries to assure a parallel and equitable effort.
- A broad consensus is needed on the importance and the means of disposing of excess weapons plutonium. DOE is making major efforts to gain the consensus of its stakeholders. The public does not see weapons disposition as an important and urgent problem. The viewpoint of the U.S. is that it is a problem, but the information is not reaching citizens. Agreements between the U.S. and Russia haven't been made yet. The public needs this in order to get behind the disposition program.
- The fuel cycle should not be an issue with regard to disposition. No country should have to give up its position on long-term issues of the future of nuclear energy and the nuclear fuel cycle.

#### **Special Session (morning): Discussions with Panelists and Forum Attendees**

The moderator asked for the panelists' comments regarding what kind of preparations would be needed for the conclusion of the agreement recommended by the U.S.-Russian Independent Science and Technology Commission. Dr. Aoki pointed out that this was a complicated problem and that it was necessary to solve political questions prior to the completion of the technical stage. Dr. Egorov said that although it was still too early to reach a decision on an agreement, keeping up the current efforts was important. Dr. Egorov also said that, regarding technical cooperation, signing would be possible only when a qualified committee prepared the necessary documents.

The moderator asked the panelists for a confirmation of the cited figure that the U.S. declared 50 tons as excess weapons-origin plutonium. Mr. Taylor stated that this was the view of the Independent Science and Technology Commission and that he hoped that this amount would increase as dismantlement activities increased. Dr. Egorov agreed with the figure. Dr. Aoki mentioned that from the viewpoint of arms control, the more the amount of disposition, the better, but actually the disposition of even 50 tons would be quite difficult.



The moderator asked for the panelists' comments regarding financial support. Mr. Taylor said that although an enormous amount of funds would be needed to solve this problem, it could be considered as inexpensive when thinking of the risk of nuclear weapons and the benefits to be brought about by their reduction, adding that the price of the U.S. efforts would be approximately two billion dollars and the price of the Russian efforts would be about the same. Mr. Taylor also said that although cash was indeed important, support in the form of materials was also possible, and that the amount needed in cash could be reduced by providing material support.

Dr. Egorov stated that the essential hurdle for Russia in the disposition of plutonium from dismantled nuclear weapons was the financial question. Dr. Egorov pointed out that two billion dollars was not an amount too high for the international community as a whole in terms of maintaining security. Although this amount of money was necessary for security, supplying two billion dollars on its own for this matter was simply impossible for Russia.

The moderator asked for the panelists' comments regarding the possibility of securing the cooperation of third party countries in this effort. Dr. Egorov said that Russia would appreciate if cooperation is provided by third party countries on this matter, in line with the non-proliferation principles and the IAEA provisions. Mr. Taylor pointed out that the Independent Science and Technology Commission was suggesting the means of expediting disposition (utilizing existing reactors and MOX fuel facilities) with the cooperation of third party countries, but that this suggestion was currently being ignored.

Dr. Schaper, Peace Research Institute—Frankfurt, Germany, asked about the period of time until surplus plutonium was to be placed under international management. Dr. Aoki answered that although discussions were going on between the U.S., Russia and IAEA, the details were not yet completed. Dr. Egorov said that similarly, the question of management, the question about conversion to MOX fuel and the means for making re-diversion impossible were currently being studied.

## **Special Session on the Disposition of Excess Weapons Plutonium**

### **Afternoon Session:**

#### **Approach to Russian Excess Weapons Plutonium Disposition**

The goal of the afternoon session was to discuss the various collaborations currently underway with the Russian government on the issue of the disposition of excess weapons plutonium in Russia.

A variety of technical options to dispose of the excess W-Pu were described. Throughout all the technologies mentioned there were two consistent themes: excess weapons materials should be disposed of in a way which would not allow any possibility for reuse and all material should be submitted to IAEA safeguards inspections.

The moderator for this session was Dr. Atsuyuki Suzuki, Professor of Nuclear Engineering, Department of Quantum Engineering and Systems Science, University of Tokyo, Japan.

The following is a summary of each panelist's presentation:

- I. Dr. Steven Aoki, Director, Office of Regional Nonproliferation, Department of State, U.S.A.
  - Many accomplishments with respect to disposition have already been made. A working relationship between the U.S. and Russia has begun and will continue. There is now more international consensus on technical options available and more research being done. There is a good degree of understanding in the field of disposition. Bilateral and multilateral programs are underway. Planning has begun for a demonstration and pilot scale plant for disposition work.
  - The U.S. has a plan already started in the area of disposition and is now searching for funding. Up till now, work in this area has mainly been in a laboratory research and planning mode, but in a few years we need to get beyond the study/planning stage. We need to start building pilot and demonstration plants.
  - Challenges: 1) to convince the government and the general public that the disposition project is important and should be funded, 2) a basic set of goals need to be agreed upon by both the U.S. and Russia in order to move ahead, 3) the U.S. and Russia can not finance this enormous project on its own; the international community will need to help.
- II. Dr. Thierry Dujardin, Executive Deputy Director, International Relations Division, Commissariat a l'Energie Atomique (CEA), France.
  - Why weapons origin Pu consumption in reactors is the best option:
    1. From the viewpoint of non-proliferation, the only solution is the downgrading of the isotopic quality of plutonium to a level practically unsuitable for military purpose.
    2. With respect to safeguards, the IAEA runs an efficient program on both fresh and spent fuels for LWRs.

3. Consumption in LWRs is the only solution which can be fully demonstrated at the most significant level on a short term basis. MOX use is a mature technology with indisputable industrial records.
  4. MOX is an asset. It is the only solution using the energetical content of W-Pu, thus gaining financial resources by selling electricity.
  5. With respect to the environment, MOX adds no new wastes and less disposal will be required. Plus, there is no possibility for reuse.
- The French government has several programs for collaborating with the Russian government on weapons disposition. Aide au Démantèlement des Armes nucléaires russes (AIDA) was established specifically to help the Russian government with warhead dismantlement. The AIDA/A program was created to supply radioprotection equipment, super containers, machine tools and storage buildings for hydrogenated materials. Another program called AIDA/MOX studies strategies for recycling of W-Pu, the manufacturing of MOX, the use of MOX with W-Pu in Russian reactors, and the future of MOX spent fuels.

III. Mr. Robert Gadsby, Director of the MOX Project, Atomic Energy of Canada Limited (AECL), Canada.

- Why CANDU MOX?:
  1. Extra MOX burning capacity to help accelerate plutonium disposition for the U.S. and Russia.
  2. Harmonizes with U.S. and Russian MOX solutions.
  3. Provides additional flexibility and further assurance of success, as part of an integrated program of international cooperation.
  4. Facilitates U.S.-Russian agreement.
  5. Provides parallel, irreversible, transparent draw down such that the plutonium is never again used for nuclear weapons.
- Atomic Energy of Canada Limited (AECL) has been working closely with the Russian Ministry of Atomic Power (Minatom) and the U.S. Department of Energy on cooperative feasibility studies for the CANDU MOX initiative. The recent U.S. DOE Record of Decision regarding the U.S. dual-track option for W-Pu disposal includes the fabrication of MOX fuel for CANDU reactors. The key conclusion of these feasibility studies is that the CANDU MOX option is technically feasible.
- There are many areas in which Japan can contribute to the CANDU MOX option. The Power Reactor and Nuclear Fuel Development Corporation (PNC) has experience in the design, construction, and operation of a MOX fuel fabrication plant for Fugen, a CANDU type reactor. PNC also has MOX equipment and component expertise.

IV. Mr. Akio Suda, Deputy Director-General for Arms Control and Scientific Affairs, Ministry of Foreign Affairs, Japan.

- At an international experts meeting in Paris which followed the Moscow Summit, the participating States reached a consensus on several points: 1) among all the surplus weapons fissile materials, the management of plutonium is a matter of particular importance, and the most suitable and technically feasible means of disposing of such plutonium is through its consumption in nuclear reactors, 2) immobilization of plutonium in glass or ceramic form is a possible complementary option, and 3) whichever option is selected, interim storage of surplus weapons fissile material is necessary until its ultimate elimination.
- Japan's policy towards disarmament follows three principles: irreversibility, transparency and efficiency. The term irreversibility means ensuring that the fissile material once designated not to be used for military purposes will not be used again for such purposes (no reuse). In order for surplus W-Pu to be managed safely and effectively, it is vital to ensure transparency by disclosing information such as the amount of plutonium involved, the term of management required and the physical and chemical form of such plutonium. To promote nuclear disarmament and to warrant nuclear non-proliferation, we should dispose of such surplus weapons plutonium as rapidly as possible and thus restrain its accumulation to a minimum level. When facilities become available, a priority should be given to the disposition of surplus W-Pu.
- Japan's contribution to the dismantlement effort: Japan is promoting a project to provide Russia with equipment to deal with emergencies that could arise during transportation of fissile materials. A storage facility for HEU and Pu from dismantled nuclear weapons is under construction in Mayak and Japan is trying to help the project by providing fissile material containers to be used in the facility. Japan has a lot of experience in the peaceful use of atomic energy and might be able to assist with the transformation of excess W-Pu into a material that is unattractive for military uses and the eventual consumption of this material in nuclear reactors.

V. Dr. Kunihiko Uematsu, Executive Vice President, Power Reactor and Nuclear Fuel Development Corporation (PNC), Japan.

- Japan has a lot of experience and expertise pertaining to the use of MOX fuel in nuclear reactors, vitrification technology for high level wastes, transportation of nuclear materials, and safeguards.
  1. With regard to MOX fuel, more than 400 MOX assemblies have been irradiated in the Joyo reactor and 600 MOX assemblies in the Fugen reactor. Approximately 150 tons of MOX fuel has been fabricated in Japan's three MOX fuel fabrication facilities.

Approximately 90 tons of MOX spent fuel from Fugen has been handled and stored securely.

2. The Tokai Vittrification Facility was constructed and has been in operation to vitrify high level waste from the Tokai Reprocessing Plant. Japan is currently building the next generation vitrification plant, the Rokkasho Reprocessing Plant.
  3. Japan also has much experience in land and maritime transport with respect to both fresh and spent fuel.
  4. Japan has accepted the IAEA full-scope safeguards inspections and has developed new technologies to improve safeguards.
- Japan has already worked with former Soviet countries in several areas. Japan worked on a leak detecting system with a microphone for RBMK reactors in Russia. Work was also done on a flow monitor system and materials accounting system of a BN350 reactor in Kazakstan.
  - Japan's approach to international cooperation is to put an emphasis on the fast reactor option while keeping VVER and CANDU options in mind, eliminate the duplication of activities with other countries, and to start cooperation with an approved budget as soon as possible. Japan is very interested in working in collaboration with other countries and wishes to join the international research efforts.

VI. Prof. Valentine B. Ivanov, Director, State Science Center, Russian Federation, Research Institute of Atomic Energy, Russia.

- Work on reactor grade plutonium involvement in the fast breeder reactors fuel cycle have been carried out at the Research Institute of Atomic Energy (RIAR) since the mid 1970s. Implemented at the RIAR facilities is an experimental fuel cycle based on the Pyroelectrochemical process of irradiated fuel reprocessing. Since 1996, when the Russia-U.S.A. agreement for activities in the area of military origin plutonium disposition began, RIAR has shown that the non-traditional fuel cycle technologies are extremely effective for metal to dioxide conversion and production of fuel elements from this granulate fuel by vibropacking.
- The pyroelectrochemical process of irradiated fuel reprocessing is a safe and flexible process and can be suitable for other products as well. Using the pyrometallurgical method on military origin Pu conversion to PuO<sub>2</sub> and its purification from gallium, the final product can be used for both vibropacked and pellet MOX fuel production. Wastes from this process can be vitrified in alumo-fluor-phosphate glasses; other products (recycled products, pyrographite units, etc.) could be reprocessed within same production process.
- It is necessary to use known, proven technologies for the disposition of weapons origin plutonium. Use of existing equipment and reactors is important from both the proven

technology stand point, but also with respect to reducing the costs of the disposition effort. Technology and R&D should not leap forward. Present technologies need to be taken into account before new technologies are rushed into.

#### **Special Session (afternoon): Discussions with Panelists and Forum Attendees**

The moderator asked for the panelists' opinions on the use of the fast reactor as an option to burn excess weapons-origin plutonium. Dr. Aoki said that the type of reactor did not really matter and that regardless of whether it was a light water or a fast reactor, practical and streamlined utilization of existing reactors was hoped for. Dr. Dujardin of France said that the management of plutonium was important and that he hoped the current momentum for the disposition of dismantled nuclear weapons would not be lost. Mr. Suda of Japan pointed out that circumstances vary according to each country and that the matter should be decided by each country, adding that what is important is to carry out the disposition of plutonium quickly and efficiently. Mr. Gadsby said that there are various reactor options and fuel manufacturing options, but the overall system should be structured so as to ensure that disposition would continue. Prof. Ivanov referred to the vibration compaction process and expressed hope that Japan would consider implementing this process because it enabled inexpensive, sure-fire development of fast reactors. Dr. Uematsu stated that it was important to utilize existing reactors.

The moderator then pointed out the fact that the MOX option seemed not to have gained the understanding of the general public, and asked for the panelists' comments on what would be important for promoting this option. Mr. Gadsby pointed out the necessity of making the general public become involved in the matter and of achieving progress in the direction acceptable to the general public. Dr. Aoki explained that the U.S. adopted the "Dual-Track Program" because it would be difficult to win support in the U.S. for a MOX-only option. Dr. Aoki also said that when reaching the stage of actually using MOX fuel, a variety of responses would be expected.

Mr. Taylor expressed concern about the marine transport of plutonium, but Mr. Suda emphasized that Japan is experienced in marine shipments and has an excellent safety record regarding this matter.

The moderator asked the views of the representatives of the U.S., Russia and France on the economic aspect of the MOX option. Dr. Aoki mentioned that burning surplus plutonium as MOX in existing reactors is unlikely to be economically self-sustaining, even if the plutonium component has zero cost. Mr. Gadsby of Canada pointed out that, rather than simple economics, the really important question was the mission of the Nuclear Weapons

States. What is their top priority: to dispose of the weapons with the least expensive or the fastest means?

Some other questions from the audience focused on the isotopic composition of Russia's dismantled nuclear weapons, the third party countries option, redundancy in the assistance provided to Russia, and other subjects.

In conclusion, the moderator emphasized that progress cannot be achieved on this matter without obtaining the understanding of the general public, and pointed out the importance, in this regard, of the conferences such as this Forum. The moderator also mentioned that it was pointed out at the G7 meeting of the Finance Ministers that Japan's policy measures were "too little and too late," and that it was time for Japan to think in earnest about what to do and how to do it so that Japan can support more international cooperation.