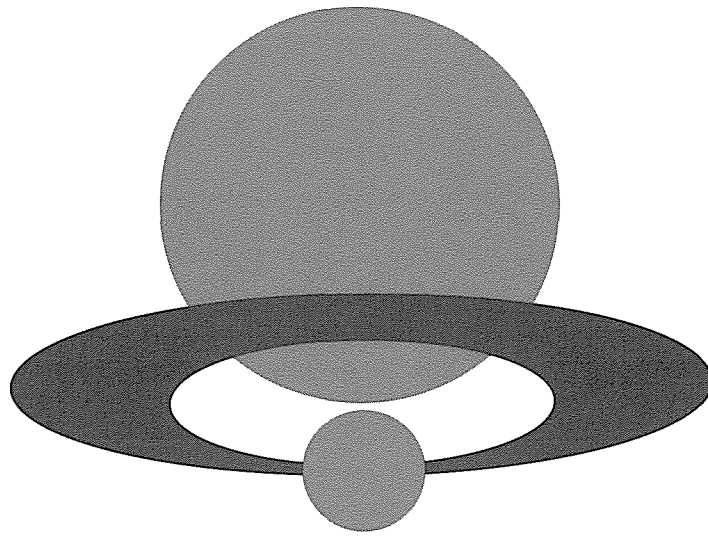


# The 27th JAIF ANNUAL CONFERENCE ABSTRACTS



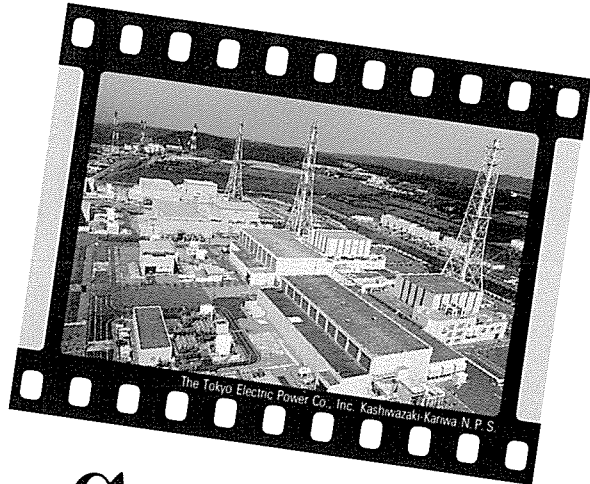
April 13–15, 1994

International Conference Center Hiroshima

Hiroshima, Japan

JAPAN ATOMIC INDUSTRIAL FORUM, INC.

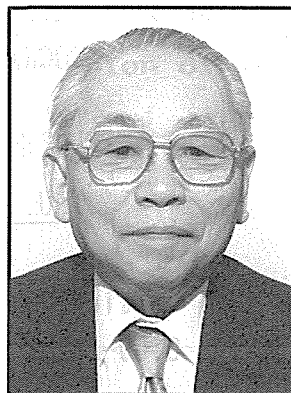
# Developing, Constructing and Servicing with the Most Advanced Technologies



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## **TOSHIBA**

For further information, contact: Nuclear Marketing Dept.,  
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Takashi Mukaibo  
Chairman, JAIF



Soichi Iijima  
Chairman  
Program Committee

## Basic Theme for the Conference

### **Toward Nuclear-Weapons-Free World --the Role of Peaceful Utilization of Nuclear Energy**

Over a half a century has passed since mankind discovered nuclear fission in 1938, and succeeded in controlling fission chain reaction in December, 1942. Peaceful utilization of nuclear energy has been greatly developed to the extent that nuclear power generation now provides about 17 percent of the total electricity produced in the world. On the other hand, unfortunate situations have been created since the U.S., Soviet Union and some other countries started production of nuclear weapons.

In this sense, the 27th conference in Hiroshima would be a remarkable event, as people involved in the nuclear field meet at the memorial city which suffered from atomic bombing. We truly hope to envisage clearly the impact of military use of nuclear energy and pray for ultimate abolition of nuclear weapons in the context of the 50-year history of nuclear energy development.

We have, on this occasion, invited Mr. R. Rhodes as a invited lecturer. He was awarded the 1988 Pulitzer Prize for General Nonfiction in 1988, for his book "The Making of the Atomic Bomb." His book "Nuclear Renewal," published in 1993, has been much talked about.

Ample time will be provided for thorough discussions among participants from Japan and overseas, as well as presentation by speakers and panelists, on various issues related to abolition of nuclear weapons and the peaceful use of nuclear energy. Peaceful utilization of plutonium, which has drawn much recent attention both domestically and internationally, will be a particular focus. The exchanges of opinions, and the offering of ideas and solutions, are sure to be spirited. At the same time, taking note of the recent tendency for children to show little interest in science, participants will address a variety of problems in the education of science and technology. There will be discussions on what is expected from Japan in regard to nuclear development in the Asian nations. And, after looking back at the history and conclusions thus far of investigations into radiation effects conducted at Hiroshima and Nagasaki, those results will be examined, along with a discussion of issues expected to arise in the future.

Using the opportunity afforded by the holding of this conference in Hiroshima, a special "Meeting with the People of Hiroshima" will be held, bringing together nuclear-related individuals from Japan and abroad, and citizens of Hiroshima.



THE 27TH JAIF ANNUAL CONFERENCE  
PROGRAM OVERVIEW

WED. APRIL 13

Opening Session  
9:00-12:40

Session 1  
14:30-17:30

Facing the Reality of  
Ultimate Abolition of  
Nuclear Weapons:  
The Message of Peaceful  
Use of Nuclear Energy

Welcome Reception  
18:00-19:30  
HIROSHIMA GRAND HOTEL

THU. APRIL 14

Session 2  
9:00-12:00

Nuclear Power and  
Plutonium

Luncheon  
12:10-14:20

ANA HOTEL HIROSHIMA

Film Show  
13:00-14:00

Session 3  
14:45-17:15

Education of Science and  
Technology, and Japan's  
Future

17:30-19:30  
Discussion together with  
the People of Hiroshima;  
the Significance and Role  
of HIROSHIMA

Himawari  
INTERNATIONAL CONFERENCE  
CENTER HIROSHIMA

FRI. APRIL 15

Session 4  
9:00-12:00

Development of Nuclear  
Power in Asia and the  
Role of Japan

Session 5  
14:00-17:00

Effects of Radiation:  
Study Results and Future  
Issues

Farewell Party  
17:15-18:45

Dahlia  
INTERNATIONAL CONFERENCE  
CENTER HIROSHIMA

**Basic Theme : Toward Nuclear-Weapons-Free World  
--the Role of Peaceful Utilization of Nuclear Energy**

April 13 (Wednesday)

**OPENING SESSION (9:00 - 12:40)**

Chairman:

Koki Tada  
President  
Chugoku Electric Power Co., Inc.

Remarks by Chairman of Program Committee

Soichi Iijima  
Chairman  
Program Committee  
Professor Emeritus  
Hiroshima University

JAIF Chairman's Address

Takashi Mukaibo  
Chairman  
Japan Atomic Industrial Forum, Inc.

Remarks by Chairman of Atomic Energy Commission

Satsuki Eda  
Minister of State for Science and Technology

Remarks by Governor of Hiroshima Prefecture

Yuzan Fujita  
Governor of Hiroshima Prefecture

**Invited Lectures:**

"The New Morning of the World"

Richard Rhodes  
Pulitzer Prize Laureate  
Author and Lecturer  
U. S. A.

<Break>

Chairman:

Joichi Aoi  
Chairman of the Board  
Toshiba Corporation

"Promoting the Peaceful and Preventing the Military Uses of Nuclear Energy"

Hans Blix  
Director General  
International Atomic Energy Agency

"Achieving Effective Regulation through the Application of Universal Principles"

Kenneth C. Rogers  
Commissioner  
U. S. Nuclear Regulatory Commission

"Nuclear Disarmament and Prospects of Nuclear Energy in Russia"

Viktor N. Mikhailov  
Minister for Atomic Energy of the Russian Federation

SESSION 1 (14:30 - 17:30)

**Facing the Reality of Ultimate Abolition of Nuclear Weapons:  
The Message of Peaceful Use of Nuclear Energy**

Chairman:

Kiyofuku Chuma  
Vice Chairman of Editorial Board  
Asahi Shimbun

**Keynote**

"The History and Future of Nuclear Disarmament"

Ryukichi Imai  
Senior Advisor  
Japan Atomic Industrial Forum, Inc.  
Former Ambassador to the Conference on Disarmament in Geneva

**Panel Discussion**

Panelists:

Yves Boyer  
Deputy Director  
CREST Ecole polytechnique  
France

Young Choi  
Senior Research Fellow  
Institute for Far Eastern Studies  
Kyungnam University  
Korea

J W L de Villiers  
Chairman  
Atomic Energy Corporation of SA-AEC  
South Africa

Daniel Ellsberg  
Director of Manhattan Project II  
Physicians for Social Responsibility  
U. S. A.

Takehiko Kamo  
Professor  
University of Tokyo

Naomi Shohno  
Professor Emeritus  
Hiroshima Jogakuin College

**Discussion with the Audience**

Note: "Discussion with the Audience" means discussion between the panel speakers and the audience. The audience is invited to exchange their views and make comments during each discussion.

**WELCOME RECEPTION 18:00 - 19:30**

BANQUET HALL "KUJAKU", 2F, HIROSHIMA GRAND HOTEL

April 14 (Thursday)

**SESSION 2 (9:00 - 12:00)**

**Nuclear Power and Plutonium**

Chairman:

Masao Nakamura  
Editorial Writer  
Yomiuri Shimbun

**Keynote**

"Plutonium and Civilization"

Yumi Akimoto  
Executive Vice President  
Mitsubishi Materials Corporation

**Panel Discussion**

Panelists:

Roger Hayes  
Director General  
British Nuclear Industry Forum, Inc.

Ryo Ikegame  
Executive Vice President  
Tokyo Electric Power Co., Inc.

Yasutaka Moriguchi  
Director for Nuclear Fuel Division  
Science and Technology Agency

Hiromasa Nakano  
Executive Director  
Power Reactor and Nuclear Fuel Development Corporation

Christopher E. Paine  
Senior Research Associate, Nuclear Program  
Natural Resources Defense Council  
U. S. A.

Jean-Louis Ricaud  
Vice President  
COGEMA  
France

Pierre Verbeek  
Special Adviser  
Synatom  
Belgium

**Discussion with the Audience**

**LUNCHEON 12:10 - 14:20**

BANQUET HALL "MANYO", 3F, ANA HOTEL HIROSHIMA

Remarks by Minister of International Trade and Industry  
Hiroshi Kumagai  
Minister of International Trade and Industry

Remarks by Mayor of Hiroshima City  
Takashi Hiraoka  
Mayor of Hiroshima City

**FILM SHOW 13:00 – 14:00**

PHOENIX HALL, B1F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

Latest films on "Hiroshima", and Japan's nuclear research and development activities will be presented to those who are not attending the Luncheon.

**SESSION 3 (14:45 – 17:15)**

**Education of Science and Technology, and Japan's Future**

Chairman:

Michinori Ohki  
Professor  
Science University of Okayama

**Keynote**

"Current status of Education in Science and Technology: A Problem"

Kenichi Fukui  
Director  
Institute for Fundamental Chemistry  
Professor Emeritus  
Kyoto University

**Panel Discussion**

Panelists:

Keiichi Takahashi  
Professor  
International Christian University

Shigekazu Takemura  
Professor  
Hiroshima University

Kazuko Tamura  
Editorial Writer  
Kyodo News Service

Yoshiro Tanaka  
Science Teacher  
Hiroshima Municipal Misuzu-ga-oka Senior High School

**Discussion with the Audience**

**(17:30 – 19:30)**

**Discussion together with the People of Hiroshima; the Significance and Role of "Hiroshima"**

International Conference Room "Himawari", B2F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

Moderator:

Kazuhisa Mori  
Executive Managing Director  
Japan Atomic Industrial Forum, Inc.

**Panel Discussion**

Panelists:



Teruaki Fukuhara  
President  
Hiroshima Prefectural Medical Association  
President of Japanese affiliate  
International Physicians for the Prevention of Nuclear War

Katsuko Kataoka  
Professor  
Hiroshima University

Yoshitaka Kawamoto  
Former Director, Peace Memorial Museum

Lee Sil Gun  
President  
Council of Atomic-Bombed Koreans in Hiroshima Prefecture, Japan

Akihiro Takahashi  
Director, Enterprise Division  
Hiroshima Peace Culture Foundation

Koji Fushimi  
Professor Emeritus, Nagoya University  
Former President, Science Council of Japan

Takashi Mukaibo  
Chairman, Japan Atomic Industrial Forum

Atsuyuki Suzuki  
Professor, University of Tokyo

Richard Rhodes  
Pulitzer Prize Laureate, Author and Lecturer

Naomi Shohno  
Professor Emeritus, Hiroshima Jogakuin College

Additional participants to be announced.

Note: This is the round-table discussion by the participants including those from people in the field of nuclear energy and people related to Hiroshima. The seats are available for 500 people.

April 15 (Friday)

**SESSION 4 (9:00 – 12:00)**

**Development of Nuclear Power in Asia and the Role of Japan**

Chairman:

Hiroshi Murata  
Vice Chairman  
Japan Atomic Industrial Forum, Inc.

**Keynote**

"The Role of Japan in its International Contribution, Past and Future"

Akira Hayashi  
Ambassador, Director-General for Arms Control and Scientific Affairs  
Ministry of Foreign Affairs

**Panel Discussion**

Panelists:

Djali Ahimsa  
Director General  
National Atomic Energy Agency (BATAN)  
Indonesia

Li Yulun  
Vice President  
China National Nuclear Corporation (CNNC)

Yong Kyu Lim  
President  
Korea Institute of Nuclear Safety

Junichiro Mukai  
Managing Director  
Japan Atomic Power Company

Tatchai Sumitra  
Dean, Faculty of Engineering  
Chulalongkorn University  
Thailand

Masaji Yoshikawa  
Vice President  
Japan Atomic Energy Research Institute

**Discussion with the Audience**

**SESSION 5 (14:00 – 17:00)**

**Effects of Radiation: Study Results and Future Issues**

Chairman:

Minoru Ohmura  
Chairman  
Hiroshima Peace Culture Foundation

**Keynote**

"Evaluation of Radiation Effects- From Results of Studies in the Hiroshima and Nagasaki"

Itsuzo Shigematsu

Chairman

Radiation Effects Research Foundation Hiroshima-Nagasaki, Japan

**Panel Discussion**

Panelists:

Chikako Ito

Deputy Director

Health Management and Promotion Center

Hiroshima A-bomb Casualty Council

Seymour Jablon

Former Expert

Radiation Epidemiology Branch

National Cancer Institute

U. S. A.

Colin R. Muirhead

Leader of Epidemiology Group

National Radiological Protection Board

U. K.

Masao Tomonaga

Professor

Nagasaki University

Satoru Ubuki

Associate Professor

Hiroshima University

**Discussion with the Audience****CLOSING REMARKS – HIROSHIMA APPEAL (17:00 – 17:15)**

Soichi Iijima

Chairman

Program Committee

Professor Emeritus

Hiroshima University

**FAREWELL PARTY (17:15 – 18:45)**

Large Meeting Room "Dahlia", B2F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

-memo-

April 13 (Wednesday)

OPENING SESSION (9:00 - 12:40)

**Invited Lectures:**

**To: JAIF 27TH ANNUAL CONFERENCE**

**From: Richard Rhodes**

The title of my paper will be **The New Morning of the World.**

**Summary:**

The end of the Cold War and the extensive dismantling of nuclear weapons by the superpowers mark the conclusion of the first phase of humankind's difficult adjustment to knowledge of how to release nuclear energy. Evidently nuclear energy cannot be used in war against opponents similarly armed or their clients. Nuclear weapons exert their influence politically rather than militarily; their political effectiveness makes moving toward a world without such weapons problematic, although the nuclear powers, driven by economic necessity, appear to be defaulting toward minimum deterrence, significantly reducing total world megatonnage and improving nuclear command and control. Logistic-curve studies predict that nuclear power and natural gas will be the next major sources of energy as coal and oil decline. Although public perception of nuclear energy as threatening continues to complicate expansion of nuclear power capacity in the U.S. and in western Europe outside France, major expansion is underway in South Asia. While a few second-rank nuclear powers in South Asia, declared and undeclared, appear determined to enlarge their stockpiles to bring their deterrents into quantitative balance, most increasing experience with nuclear energy in peace and war appears to promise a less dangerous, less polluted and more prosperous future.

*Promoting the Peaceful and Preventing the Military Uses  
of Nuclear Energy*

*Hans Blix  
Director General  
International Atomic Energy Agency*

*Opening Session, Annual Conference of Japan Atomic Industrial Forum*

*Hiroshima, 13 April 1994*

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**Summary**

The spectre of nuclear war between great powers, which has haunted the world ever since the bombs fell on Hiroshima and Nagasaki, is at last losing its grip on us. There is a new world agenda. Those who work in the nuclear field must contribute their thinking and expertise especially to two vitally important items on this agenda: the elimination of nuclear weapons and the safe and greater use of nuclear energy for health, development and environmental protection.

At long last we have reason for some optimism about the elimination of nuclear weapons. The US and Russia have agreed to drastically reduce the number of nuclear warheads. Today the discussion is about how to control and use the HEU and the Pu from the dismantled weapons and about a worldwide verified cut-off of any further production of nuclear material for weapons. The discussion is further about a complete nuclear test ban and about a universalization and unlimited extension of commitments to nuclear non-proliferation. Although much attention is inevitably focussed on remaining and new threats of proliferation,

*e.g.* in the Middle East, South Asia and DPRK, and the risks of an illegal trade in nuclear material and know-how from the former Soviet Union, we should be encouraged by some notable progress. Argentina and Brazil have accepted comprehensive safeguards verification and the Tlatelolco Treaty for a nuclear-weapon-free Latin America may soon enter into force. South Africa has adhered to the NPT and become the first State to roll back from a nuclear weapon status. Algeria has recently declared its intention to adhere to NPT, and the road seems open to a treaty making Africa, too, a nuclear-weapon-free zone. States of the former Soviet Union are progressively accepting comprehensive safeguards.

All the measures eliminating the military use of nuclear energy must be effectively verified. The nuclear community must get used to high levels of transparency and the IAEA must take on such new inspection activities as States may ask it to perform and are willing themselves to accept. Our long-term goal must be a world in which no single nation possesses nuclear weapons.

To enable the world safely to employ nuclear energy in medicine, agriculture and industry is the other main item to be tackled by the nuclear experts of the world. They must work to develop new nuclear techniques and to improve existing ones, making them safer, cheaper and easier to use. They must also speak up and share with the public the knowledge and confidence which they have acquired as professionals.

It is paradoxical that in spite of a deep concern about a possible climate change linked to excessive emissions of CO<sub>2</sub> from the burning of fossil fuels, most additional power in the world today is planned to be based on coal and gas. Only in the dynamically developing East



Asia is the option of further expansion of nuclear power now very actively pursued. Its success and further development here is of primary importance for a cost-effective, safe and reliable expanded energy supply in this part of the world. Its success in East Asia is also of signal importance to tell the world that in nuclear power there is already today a major environmentally benign source of energy.

ACHIEVING EFFECTIVE REGULATION  
THROUGH THE  
APPLICATION OF UNIVERSAL PRINCIPLES

PRESENTED BY

COMMISSIONER KENNETH C. ROGERS  
U. S. NUCLEAR REGULATORY COMMISSION

AT THE

27TH JAPAN ATOMIC INDUSTRIAL FORUM  
ANNUAL CONFERENCE IN HIROSHIMA, JAPAN

APRIL 13-15, 1994

ABSTRACT

The speaker will describe the experience of the U.S. Nuclear Regulatory Commission in efforts to improve regulatory effectiveness, the practices that have developed during these efforts, and the universal principles supporting those practices. Effective nuclear safety regulation involves much more than technological decision making. To achieve its primary regulatory objective, regulation must involve many multi-dimensional aspects including:

- Development and maintenance of a broad base of knowledge.
- Establishment of an early and active dialogue with the stakeholders, including the public.
- Consideration of the resource requirements and impacts associated with regulation.
- Ensurance of the timeliness of regulation.
- Frequent assessment of the regulatory infrastructure, and revision as necessary.

Effective regulation results in an environment that fosters self-assessment and the quest for excellence among those regulated. The speaker will also provide examples of the application of the universal principles including descriptions of specific regulatory actions and processes.

Nuclear Disarmament and Prospects of Nuclear Energy in Russia

Viktor N. Mikhailov  
Minister for Atomic Energy  
of the Russian Federation

April 13 (Wednesday)

**SESSION 1 (14:30 - 17:30)**

**Facing the Reality of Ultimate Abolition of Nuclear Weapons: The Message of Peaceful Use of Nuclear Energy**

Nuclear power accounts for 17 percent of the total electricity generation worldwide. Yet the existence of nuclear weapons taints efforts at peaceful utilization, and is a major hinderance to the sound development of nuclear energy for mankind. Today, we will consider how existing nuclear weapons can be reduced to zero level, and what efforts should be made to ensure that peaceful nuclear technologies are not misused in the new development of weapons. Invited lectures will be given at the opening session, which will provide the framework for our discussions. Opening a new page of the 21st century, we will also reconsider the unhappy reality of the existence of nuclear weapons, even as we seek the realization of full nuclear disarmament, including a comprehensive test ban for nuclear weapons. In this context, we will evaluate the Nuclear Non-Proliferation Treaty (NPT), which has played a key role in efforts toward the non-proliferation of nuclear weapons up until now; and will address the future of the NPT, including numerous problems related with it, prior to the NPT review conference to be held a year from now.

**WELCOME RECEPTION 18:00 - 19:30**

BANQUET HALL "KUJAKU", 2F, HIROSHIMA GRAND HOTEL

## The History and Future of Nuclear Disarmament

Ryukichi Imai

Senior Advisor

Japan Atomic Industrial Forum

How will nuclear disarmament develop in future? What will happen to the nuclear weapons possessed by the United States and the former Soviet Union? How will China and France respond? How should we deal with Israel, India, Pakistan, South Africa, and North Korea (Democratic People's Republic of Korea)? These issues are extremely uncertain. In addition, there is an issue of the extension of Non-Proliferation Treaty of Nuclear Weapons (NPT), which will be discussed at the meeting to be held in 1995. It is difficult to answer these questions definitively at the moment. There is also a question of whether we can leave the present situation as it is, in the light of that the five permanent members of the U.N. Security Council represent the five nuclear powers. In my speech, I will present the problems and describe the status quo, and I would also like to refer to the nuclear issues, since it may be considered that these issues have been distorted throughout the cold war of almost 50 years.

### 1. Changes in Concept and Scope of Nuclear Weapons

Substantial "technical progress" has been made since nuclear weapons were first used for attacking Hiroshima and Nagasaki in August 1945 (though it is very much questionable whether this can be called "progress" or not). There are big differences between the atomic bombs dropped on Hiroshima and Nagasaki and nuclear weapons of these days which are subject to ban and reduction under the 1991

U.S.-Soviet START treaty. This is because the latter have gone through the subsequent changes in design, manufacture and experiments.

-- First two atomic bombs.

-- Dry hydrogen bomb which appeared in 1953's Bikini nuclear test.

-- Small and light nuclear bombs loaded on long-range ballistic missiles, which came to light after launching of a Sputnik in 1957.

-- Compact warheads and multiple independently targeted reentry vehicles (MIRV), by which missiles could hit targets with more accuracy.

-- Development of the command system, such as man-made satellites and radar, used for the selection of targets and strategic commands.

-- Safety and permissive action link in controlling tens of thousands of nuclear warheads.

-- Control of radiation effects of warheads in nuclear war, etc.

Today's discussions on non-proliferation of nuclear weapons tend to treat equally all the nuclear weapons, from extremely primitive nuclear explosive devices, to extremely sophisticated warhead systems which make most of high technology. Nuclear weapons nations do not make enough efforts to clarify these differences.

## 2. Changes in Mechanism and Aim of International Control of Nuclear Weapons

In the early stages of the nuclear age, nations recognized confusion brought by this new energy, and tried to exert an international control urgently, considering the future. The U.S.-Soviet cold war, which started in 1945, was intensified by the existence of nuclear weapons. Consequently, it changed the issue of international control of nuclear weapons from "the global matter to be addressed by the whole mankind" to "an element of the cold war".

-- Concerns of Niels Bohr, et al., and the negative response from U.S. authorities.

-- The international control proposed by Oppenheimer, Acheson and Lilienthal was presented to the United Nations as "Baruch Proposal" in 1946.

-- Proposal by Eisenhower advocating peaceful use of nuclear energy in 1953 and establishment of International Atomic Energy Agency (IAEA); internationalization of knowledge of nuclear energy, special fissionable material, utilization of radiation, etc.; U.N. Geneva Conference on peaceful use of nuclear energy; and revision of the 1954 U.S. Atomic Energy Act.

-- Initial IAEA safeguards (INFCIRC 66) and confidentiality of commercial secrets.

-- Russel/Einstein declaration in 1955 and PUGWASH conference.

-- Article 3 of 1968 NPT and 1970 Safeguards Committee (INFCIR 153).

-- Nuclear power generation after oil crises, and meaning of plutonium and INFCE.

-- Physical protection and common safety standards.

-- Global propagation of information on nuclear weapons, and the history and management of nuclear weapons (Smice Report, homemade atomic bombs, Nuclear Weapons Databook).

### 3. Arms Reduction after World War II

When the United Nations Charter was prepared, the nations did not recognize the existence of nuclear weapons and their potential, or U.S.-Soviet confrontation and the cold war between the East and the West. It took some time before the international community realized these two problems and a connection between them and began to take actions. During this time, a number of serious mistakes were committed. The turning point of the argument lies in the recognition

that it is not physically possible to carry one million tons of TNT gunpowder with bombers and attack factories and military facilities in cities, but it is possible to attack them by loading one megaton of warheads on intercontinental ballistic missiles (ICBM). The concept of war, armaments, military guards, etc. have changed, and the scope and method for arms reduction also have undergone a great change.

-- U.S.-Soviet confrontation and beginning of the strategy of massive retaliation.

-- Initial U.N. arms reduction talks. Comprehensive Program of Disarmament. Negative Security Assurance. No first use.

-- Changes in targets for a nuclear attack and formation of deterrent, and the era of MAD (mutual assured destruction).

-- The Partial Test-Ban Treaty (1963)

-- Non-Proliferation Treaty of Nuclear Weapons (1970)

-- Flexible Response

-- SALT II, invasion into Afghanistan, collapse of detente.

-- NATO dual decision in 1970 and Geneve arms reduction talks

-- Denouncement of nuclear wars at the Geneve summit meeting in 1985

-- INF Treaty, START Treaty, collapse of the former Soviet Union, control of nuclear weapons possessed by the former Soviet Union, and reduction of conventional forces in Europe (CFE).

#### 4. Uncertain prospects of nuclear disarmament

Even though massive expansion in armaments was denounced by both U.S. and U.S.S.R., the world has not yet reached an agreement on how to control nuclear weapons in future, or how to achieve a new order. The major problems are shown in the following list. The important task for Japan would be to take an initiative in solving those problems. In the light of the national policy of "abolishing nuclear



weapons" has tended to lead to "negation of the existence of nuclear weapons altogether and ignorance of matters which need to be resolved".

-- Effectuation of Lisbon Protocol: Reduction of nuclear weapons under the START Treaty was applied to four republics: Russia, Ukraine, Belarus and Kazakhstan, and the latter three republics joined NPT as non-nuclear weapons states.

-- Specific measures will be provided to decrease the total number of nuclear warheads possessed by U.S. and Russia to 3,000 by the year 2003, and international verification will be carried out. These measures include disposal, storage and utilization of 200 tons of weapons-grade plutonium possessed by both countries, conversion into civilian industry of nuclear weapons industry covering 100,000 employment, decontamination of areas contaminated by radiation (submarines, etc.), disposal of high-level waste, etc.

-- Satisfactory explanation should be made as to what strategy will have control over each 3,000 warheads possessed by U.S. and Russia in the year 2003, and how China and France will participate in the dialogue of nuclear disarmament. China has developed strategic nuclear weapons, deferring modernization of the army. France has maintained its independent defense program in Western Europe, by deploying nuclear missiles which do not reach the former U.S.S.R.

-- In what way will the United States materialize substantial reduction of war expenditure? How will U.S., Russia and China control and curtail exports of highly developed conventional weapons? How should we control so-called "dual use technology" on the international level? What should COCOM, London Guide Line, and MTCR (missile technology) be dealt with in future?

-- CTB (comprehensive ban on nuclear tests) will be handled by Geneva Arms Reduction Conference, but what progress can we expect to achieve

by the year of 1995 when a meeting is to be held to discuss the extension of NPT? How many nations can obtain nuclear weapons without nuclear tests? What scale of weapons industry will be needed for U.S., Russia and China to maintain the nuclear weapons system? Will the development of new warheads ever stop?

-- What are the prospects of security with regard to the NATO area, Central Europe, Russia, Central Asia, the Middle East, Eastern Asia, and the western hemisphere?

#### 5. Post-Cold War Structure and Involvement of Japan

Recently, it has been drawing people's attention whether Japan will be a permanent member of the U.N. Security Council.. This issue has begun to take a concrete form, as Japanese contributions to U.N. now account for 12.5% of the total, the second largest amount next to U.S. At the same time, the world is paying attention to how Japan will contribute to collective security under Chapter 7 of the U.N. Charter and to what extent Japan will participate in peace keeping operations not stipulated by the Charter (especially PKF). Japan will need to take a lead in dealing with issues in which Japan has not been very interested or about which Japan has not been required to express its opinion. Haiti, Abkhaz, and Sarajevo issues are some of them. Also, with regard to arms reduction, Japan has merely insisted on abolishing nuclear weapons without substantial contributions. In future, however, Japan will need to play an active role in dealing with the matters mentioned in Section 4, including disposal of nuclear weapons (contributing by way of funds and technology), and providing specific measures for utilization and control of plutonium. The era has come when the world would not be satisfied with the explanation that Japan takes a non-nuclear policy.

April 14 (Thursday)

SESSION 2 (9:00 - 12:00)

## Nuclear Power and Plutonium

The reprocessing of spent fuel and full utilization of recovered plutonium are important facets of Japan's nuclear efforts, which aim to make the best use of nuclear power for the long period, taking advantage of its excellent reliability and safety, and the small impact it has on the environment. On the use of plutonium and the development of fast breeder reactors (FBRs), both of which are at the core of Japan's nuclear-fuel-recycling policy, it is essential for Japan to obtain a complete understanding, both domestically and internationally, and this is now a critical time in that respect. In this session, after reconfirming the necessity and significance of nuclear fuel recycling, we will discuss various problems and solutions in continuing the policy of reprocessing and recycling, such as avoiding the accumulation of excess amounts of plutonium and the significance of the use of plutonium for light water reactors (LWRs).

## Plutonium and Civilization

Yumi Akimoto

Executive Vice President

Mitsubishi Materials Corp.

Gold and Plutonium. The images harboured by modern society of these two elements are poles apart. Despite, in the same way as gold has affected the history of mankind over the past three thousand years, so too will plutonium, an element with great hidden power, sustain human civilization in the future.

Unfortunately for plutonium, the first targeted use of its enormous energy was the slaughter of the people of Nagasaki. However the Aztec and Mayan civilizations also met with their destruction because of gold. Any substance, be it gold or plutonium, can be an angel or a devil depending on the people who use it.

Plutonium is an element with condensed energy. Compared to the same weight of coal, it can produce several million times more energy. The influence that a million fold difference can exert on civilization has already been demonstrated in today's information society. We have elucidated the complicated structure of genes and are closing in on the mysteries of life, and the fact that we are able to know in an instant the happenings around the world is thanks to this million fold technical innovation.

The level of innovations accomplished in an information society have become possible in the field of energy by the use of plutonium. However unlike shapeless information, since it is an energy that has greater direct relevance to people's lives, the public's aversion to its million fold potential is extremely strong. During these hundred and score years, there has been a great transformation in Japanese people's form of transport from riding in a basket to passenger jet planes. The ratio of the powers of these two vehicles barely exceeds million fold.

When the world was born four point six billion years ago, plutonium came together with gold from outer space; over time the plutonium decayed with radiation, leaving nothing more than a trace now. Uranium  $^{238}$  also belongs to the group of radioactive elements; it has no usage worth but has a much longer life, with roughly half remaining since the time the earth was created.

Nuclear reactors can perform the feat of turning this uranium into the valuable energy resource of plutonium while in the process of producing energy. The dream of alchemists in the middle ages was first realized in nuclear reactor technology.

Through nuclear technology, mankind for the first time in history obtained an energy resource which is not constrained by the workings of the biosphere. The thinly spread capricious rays of the sun are fixed and turned into a resource through the cycle systems of biosphere on the earth. Wood, charcoal, coal, oil – all are the fruit of this. Hydro energy is also flows in line with this system and so it too cannot be unrelated to biospheric cycle systems.

The amount and quality of fruits that man can draw from these resources the biosphere is certainly not enough to sustain our evolving and expanding civilization. While accomplishing economic growth at a wondrous speed, the various countries of Asia have also a similar explosive increase in population. We do not have the right to force endurance on the people of developing countries who demand the same level of happiness as those in developed countries, nor do we have the right to rob children of their existence. The development of a system for the peaceful use of nuclear energy is an obligation of developed countries.

As the classification of the history of mankind into periods such as the stone, bronze and iron shows, the use of underground resources which overcame limits imposed as an element of the biosphere was an inevitable factor with the advances in civilization. Originally it was gold, but from the next century plutonium will be the underground resource which stands at this peak.

When nuclear technology which revived plutonium in the 20<sup>th</sup> century, brings the million times potential into reality as a system of peaceful use technology in the 21<sup>st</sup> century, civilization will ride the wave of a new paradigm and greatly extend its tolerance so that the conditions for further advancement will be prepared. In order to do this the nuclear world must firstly free itself from luxury dependence on enriched uranium with efforts into achieving a plutonium recycling system; cease trying to warm itself with a match when there is a huge pile of firewood available,

Will nuclear energy disappear in the waves of history as a temporary measure leaving the heavy debt for our descendants, or will it become the basis of energy in the 21<sup>st</sup> century playing an important role in sustaining civilization – the key to this question is PLUTONIUM.

-memo-

-memo-

April 14 (Thursday)

**LUNCHEON 12:10 - 14:20**

BANQUET HALL "MANYO", 3F, ANA HOTEL HIROSHIMA

**FILM SHOW 13:00 - 14:00**

PHOENIX HALL, B1F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

Latest films on "Hiroshima", and Japan's nuclear research and development activities will be presented to those who are not attending the Luncheon.



-memo-

-memo-

April 14 (Thursday)

SESSION 3 (14:45 - 17:15)

**Education of Science and Technology, and Japan's Future**

The developments of science and technology during the past half-century have been remarkable -- not least in the nuclear field. New science and technologies, while, they can bring happiness and prosperity; they might also jeopardize entire societies and human existence itself. For Japan, which has so far enjoyed the benefits of scientific and technological advancement, to deal with an even more advanced science and technologies in the future, must provide an educational system that inspires students to become interested in science and engineering at an early stage, which will foster keen scientific minds capable of working with the most sophisticated technology. In this session, people in the field will review problems occurring in the science and technology of education with respect to modern developments. With children these days -- the next generation to carry Japan's future -- showing little interest in science, participants will discuss what is missing from the current educational system, and what can be done to solve these problems.

Current Status of Education in Science  
and Technology: A Problem

Kenichi Fukui

Science was born in the interface of "nature" and "human nature," to provide the technology that satisfies desires. Science and technology have stimulated each other, causing each to accelerate its development, and have led to a science-and-technology society unprecedented in its sophistication. No one would deny the benefits -- comfort and convenience, the elimination of hunger and disease -- that human beings have enjoyed. Education had played a major role in the realization of such a society; yet, because the motives and objectives of the educational effort have corresponded in the main with the human wish to clarify natural mysteries, difficulties hidden in the educational process have not been clearly revealed.

There is, however, an inherent instability attached to education in the advanced science-and-technology society, caused by various restrictions stemming from the finiteness of the earth and the uniqueness of nature. Accelerated developments in science and technology have also accelerated the consumption of natural resources and energy -- and human desires -- which are not consistent with the finiteness of the earth. A very high level of science and technology is required to solve associated problems, including exhaustion of natural resources and environmental deterioration, while still meeting accelerating human demand. This will, in turn, require a very high level of education, imposing a much heavier burden on science-minded young

people than ever before. In addition, during this century, scientific studies have revealed essential features of nature through discovery of the principles of quantum theory, relativity and life. As a result, it is no exaggeration to say that most work in advanced scientific and technological fields in this century is dependent on the special features of nature represented by those three concepts. It is also becoming clear that science, which must contribute to solutions to the difficult problems human beings will have to face, should be based on those three concepts as well as enter more deeply into the fundamental questions posed in nature, beyond the range to be logically deduced from those concepts. The realization of this will be helpful in inspiring and encouraging young students, but, sometimes, could also make them hesitate to leap into careers in science and technology.

As living creatures, human beings evolve hereditarily, but scientific history is not yet long enough to encompass a genetically engineered acceleration of human scientific ability. Accordingly, in order for human beings to keep pace with technological developments, which occur irrespective of the biological ability to assimilate them, extraordinary effort is required. Human beings also have the biological capacity to react negatively to a worsening of the global environment by technology. This aspect works as a restrictive factor in the irresponsible promotion of technological development. In the future, therefore, scientific and technological education cannot be driven only by humanity's instinctive tendencies toward nature, but will require new motivation for the promotion of

scientific and technological development.

Human beings have believed in the universal value of science and technology, and that development would unconditionally bring benefits to themselves. The government has bannered the theme of "Establishing a nation on a scientific and technological base," with the expectation of economic returns from scientific and technological endeavors. Accelerated developments in science and technology have, however, brought a non-uniformity of civilization to the earth. Before being able to correct that, human beings have to deal with other problems, such as environmental deterioration, shortages of resources and foods, and the explosive increase in population. It is now clear that the direction of scientific and technological promotion should be changed to encompass a more global view. We are beyond the time when a nation should seek to dominate the world through its scientific and technological power. Values in science must also change, from convenience and comfort to global protection; from the prolongation of life to the prevention of disease for keeping health; and from "economics almighty" to spiritual fulfillment - - all of which will provide young people interested in scientific careers with motivation appropriate and responsive of the changes of the times.

In order for humanity to enjoy the fruits of future scientific education, it is important that the cultural aspects of the indirect educational environment be fostered -- commonly, the working conditions, both physical and financial, of the scientists and engineers. Then, it is necessary that the whole of society appreciate and encourage those young people brave enough to undertake the challenges of science and technology, which are

becoming ever more difficult and advanced; who wish to correct the imbalances and strains; and who will become fighters for the protection of the earth. In nurturing such important human resources -- in order to educate them effectively -- it is necessary to fully utilize their individuality. Those, for example, who possess sufficient intuition, or a logical way of thinking, should be led to develop those abilities. Continuing, strengthening, even expanding current uniform methods of scientific and technological education, which tend only to fill students with knowledge, will merely make them components of the science-and-technology society at its present level, serving to maintain that, but will not be effective in producing scientists and engineers who will be the protectors of the earth, or the benefactors of humanity.

It should go without saying that scientific and technological education must be addressed in at least the foregoing two respects in the future.

April 14 (Thursday)

(17:30 - 19:30)

**Discussion together with the People of Hiroshima;  
the Significance and Role of "Hiroshima"**

International Conference Room "Himawari", B2F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

It has been almost 50 years since the atomic bombing of Hiroshima. Although the city has been reborn as a modern international center, its citizens have endured great suffering. Taking the opportunity afforded by JAIF's annual conference, nuclear-related individuals from Japan and abroad will meet with citizens of Hiroshima, to consider the significance and role of "Hiroshima" -- in the past, the present, and the future -- through discussion of the bombing, attitudes toward nuclear power, and the prospects for peaceful utilization hereafter.



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April 15 (Friday)

SESSION 4 (9:00 - 12:00)

## Development of Nuclear Power in Asia and the Role of Japan

While nuclear-power development has slowed down in many Western nations, it is accelerating in much of Asia as the 21st century draws nearer. Large-scale nuclear-energy projects have been announced by Japan, South Korea and China, while Indonesia and certain other countries are in various stages of preparation. Sound development of nuclear energy in the Asian region, where more than half the world's population are inhabited, is of great significance in terms of securing stable electricity supplies for the future, as well as conservation of global resources and the environment. Today, we will discuss the pursuit of efficient development of nuclear energy in Asia, the securing of operational and managerial safety, the handling of radioactive waste, and the linkage between peaceful use and nuclear non-proliferation. Measures to smooth and facilitate the various development efforts, and also Japan's role in them, will be discussed.

The Role of Japan in its International Contribution, Past and Future

Akira Hayashi  
Ambassador, Director-General for  
Arms Control and Scientific Affairs

-memo-

April 15 (Friday)

SESSION 5 (14:00 - 17:00)

**Effects of Radiation: Study Results and Future Issues**

Nuclear-related safety measures must be based on accurate scientific data on the effects of radiation on the human body. In Japan, investigations into radiation effects have been conducted, with the cooperation of affected citizens, over the period of almost 50 years since the atomic bombings of Hiroshima and Nagasaki. The results of these investigations represent the most complete scientific information of their kind in the world, and are important basic data for the recommendations of the International Commission on Radiological Protection (ICRP). In this session, the history of the Hiroshima and Nagasaki investigations on radiation effects, and conclusions thus far, will be summarized. Those results will be discussed, together with issues expected to arise in the future. Other investigative information will also be presented, including data gathered following the Chernobyl Accident.

## Evaluation of Radiation Effects – From Results of Studies in Hiroshima and Nagasaki

Itsuzo Shigematsu

Chairman, Radiation Effects Research Foundation

It is well known that atomic bombs were dropped over Hiroshima and Nagasaki in August 1945 for the first time in human history. The enormous energy of the bombs consisted of blast (50% of total energy), heat (35%), and radiation (15%, 5% from initial radiation and 10% from residual radiation).

Immediate deaths by the atomic bombing were mostly attributable to the blast and heat. Acute deaths due to massive exposure to radiation occurred within four months after the bombing. Immediate and acute deaths in Hiroshima and Nagasaki are estimated to total about 1/3 of the populations of the two cities at that time of 330,000 and 250,000 people, respectively. The number of those injured is also estimated to be about the same as that of the deaths in the two cities.

The U.S. government established in 1947 the Atomic Bomb Casualty Commission (ABCC) in Hiroshima and Nagasaki to conduct a long-term follow-up study of the health effects of atomic radiation. In 1948, branch laboratories of the Japanese National Institute of Health were attached to ABCC, by which the Commission became a U.S.-Japan joint organization, but 95% of the total budget was borne by the American side. In 1975, however, the current Radiation Effects Research Foundation (RERF), which is equally funded by both countries, succeeded to the ABCC project.

ABCC established in 1950 a population for follow-up consisting of 120,000 people, 94,000 exposed to the bomb and 26,000 nonexposed, in Hiroshima and Nagasaki. A study of life span and causes of death is being continued on about sixty percent of the original population who are still alive, and thanks to the Japanese family registration system "Koseki", information is obtained on almost all deaths occurring in the population. Pathological study with emphasis on autopsy was once conducted actively to confirm the causes of death.

On the other hand, biennial health examinations have been conducted since 1958 on a subcohort of 20,000 individuals to elucidate the state of morbidity among atomic bomb survivors. Studies of those exposed in utero and of the children of atomic bomb survivors, special studies of cancer and circulatory diseases, and immunological studies are also conducted.

An important effort that has been made together with the health studies mentioned above is the estimation of the individual radiation doses of all study participants. It is no exaggeration to say that most of the efforts made to date have been directed to this dosimetry. After a number of revisions, individual radiation doses based on DS86 (Dosimetry System 1986) are now used. By DS86, the contribution of neutrons is smaller than by the T65D (Tentative 1965 Dose) used in the past, which means that the cancer risk per unit dose is higher by the new dosimetry system.

In summary, the results of our follow-up studies show that occurrence of acute deaths from massive exposure to more than several grays of radiation ended within four months after the bombing. Leukemia (excluding chronic lymphocytic leukemia) started to increase two or three years after the bombing, reached a peak around six years after the bombing, and thereafter decreased to about the same level as that of nonexposed individuals.

Excessive mortality from solid tumors, such as breast, thyroid, colorectal, stomach, and lung cancers, became evident around 10 years after the bombing, and an increasing tendency is observed even now, almost 50 years after the bombing. A significant difference in mortality has been observed between the exposed and nonexposed groups for leukemia in particular among the cancers with exposure to even a dose of 0.2 Gy.

A recent finding is that excessive mortality from cardiovascular diseases and several other chronic diseases is suggested among those exposed to 1.5 Gy or more. The magnitude of excess is smaller than cancer, but the tendency to increase seems to have started prior to 30 years after the bombing.

Besides mortality, health disorders apparently related to radiation include cataract, hyperparathyroidism, delayed growth and development of those exposed in childhood, chromosome aberrations, and somatic cell mutations, and small head size and mental retardation are seen among those exposed in utero (mainly among those exposed during eight to 15 weeks after gestation). On the other hand, no significant difference has been seen between the exposed and nonexposed groups in terms of chronic lymphocytic leukemia, uterine cancer, osteosarcoma, and infertility. Furthermore, no difference has been observed between the children of exposed individuals and those of nonexposed individuals in terms of congenital abnormality, leukemia, chromosome aberrations, and other findings.

As atomic bomb survivors advance in age, health effects unknown to date may surface. In addition, those who were young at the time of the bombing are now reaching cancer-prone age. Taking these facts into consideration, we should carefully continue health surveillance of atomic bomb survivors. Furthermore, we should not be satisfied with the results obtained thus far concerning genetic effects; we should continue our efforts using more sophisticated technology. For the study of late health effects in atomic bomb survivors, confirmation of negative findings is as important as positive findings.

In conclusion, I would like to express my appreciation for the cooperation that the atomic bomb survivors have extended to us to date.



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April 15 (Friday)

CLOSING REMARKS - HIROSHIMA APPEAL (17:00 - 17:15)

FAREWELL PARTY (17:15 - 18:45)

Large Meeting Room "Dahlia", B2F, INTERNATIONAL CONFERENCE CENTER HIROSHIMA

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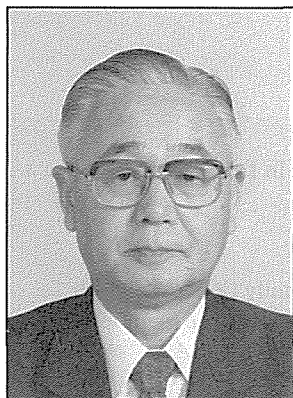
Brief Personal History  
of  
Chairmen, Speakers, and Panelists

Member List of the Program Committee for the 27th JAIF Annual Conference  
(In Alphabetical Order)

- Chairman: Soichi Iijima  
Professor Emeritus, Hiroshima University
- Members: Yumi Akimoto  
Executive Vice President, Mitsubishi Materials Corporation
- Mamoru Akiyama  
Professor, University of Tokyo
- Kiyofuku Chuma  
Vice Chairman of Editorial Board, Asahi Shimbun
- Kunio Hamada  
Executive Managing Director, Hitachi, Ltd.  
Chairman, Nuclear Energy Policy Planning Committee  
Japan Electrical Manufacturers' Association
- Emiko Honda  
Vice President, Consumers' Association of Hiroshima
- Ryo Ikegame  
Executive Vice President, Tokyo Electric Power Co., Inc.
- Koichi Ikeuchi  
Executive Vice President, Chugoku Electric Power Co., Inc.
- Takao Ishiwatari  
President, Power Reactor And Nuclear Fuel Development Corporation
- Hajime Karatsu  
Professor, Tokai University
- Ryoju Katsube  
Journalist
- Masafumi Kitayama  
Professor, Hiroshima Institute of Technology
- Mitsuru Kurosawa  
Professor, Osaka University
- Noboru Kuroyanagi  
Senior Managing Director, Federation of Electric Power Companies
- Hiroshi Murata  
President, Japan Atomic Energy Relations Organization
- Itsuzo Shigematsu  
Chairman, Radiation Effects Research Foundation
- Mamoru Sueda  
Executive Director, Committee for Energy Policy Promotion
- Shigeo Suehiro  
Executive Adviser, Sumitomo Marine & Fire Insurance Co., Ltd.
- Yoshihiko Sumi  
Director & Executive Vice President, Kansai Electric Power Co., Inc.
- Naomi Syono  
Professor Emeritus, Hiroshima Jogakuin College
- Miyako Takagi  
Professor, Toyoko Gakuen Women's College
- Kazuko Tamura  
Editorial Writer, Kyodo News Service
- Observers: Wataru Imanaka  
Executive Editor, Chugoku Shimbun
- Yoshitaka Kawamura  
Deputy Director General, Ministry of Foreign Affairs
- Toru Namiki  
Deputy Director General, Agency of Natural Resources and Energy  
Ministry of International Trade and Industry
- Toshio Okazaki  
Deputy Director General, Science and Technology Agency

## OPENING SESSION

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Koki Tada

Date/Place of Birth : March 18, 1923 in Yamaguchi Prefecture

Education:

1947 Kyusyu University, B. A. majoring in Laws

Career:

1947 Entered The Chugoku Electric Distribution Co., Ltd

1951 The Chugoku Electric Powers Co., Inc. (Reorganized)

1972 Deputy General Manager, President Office

1973 Deputy General Manager, Planning Dept.

1974 Deputy General Manager, General Planning Dept.

1977 Director and General Manager, Planning Dept.

1979 Managing Director and General Manager, Planning Dept.

1981 Executive Vice President

1989- President

†



Soichi Iijima

Date of Birth : November 28, 1922

Academic & Professional Career:

1946 Graduated in Medicine at Nagoya Imperial University

1947-52 Studied pathology at postgraduate course of Nagoya University

1961 Professor of Pathology at Hiroshima University

1969-77 President of Hiroshima University

1978 Professor of Pathology at Nagoya University

1980 Dean of Medical School of Nagoya University

1981-87 President of Nagoya University

1988-91 Senior Consultant of the Department for General Affairs of Aichi Prefecture

1975-87 Member of Council on University Foundation, Ministry of Education

1977-83 Member of Central Council on Education, Ministry of Education

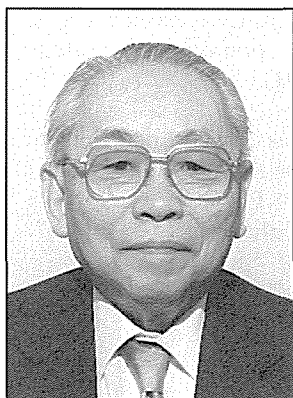
1984-87 Member of National Council on Educational Reform, Government of Japan; Chairman of Higher Education Division etc.

At Present:

President of Aichi Arts Center

Honorary Professor of Nagoya University

Honorary Professor of Hiroshima University etc.



Takashi Mukaibo

Date of Birth : March 24, 1917

1939 B. S. in Engineering, the University of Tokyo

1947-54, 1958-59 Associate Professor of the University of Tokyo

1954 Ph. D. in electrochemistry, at the University of Tokyo

1954-58 Science Attaché, Embassy of Japan in USA

1959-77 Professor of the University of Tokyo

1968-69 Dean, the Faculty of Engineering, the University of Tokyo

1977-81 President, the University of Tokyo

1981-91 Acting Chairman, Japan Atomic Energy Commission

1992- Chairman, Japan Atomic Industrial Forum, Inc.

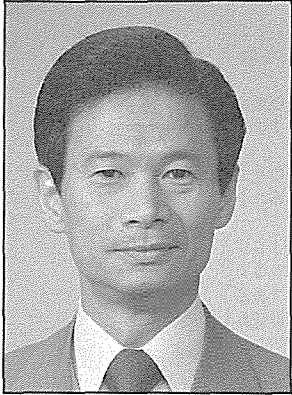
1983- President, Japan Association of Engineering Education

1985- President, Japan Society for Science Policy and Research Management

1989- President, Engineering Academy of Japan

Awards: Order of Gorkha Dakshin Bahu, First Class, His Majesty a Government of Nepal (1977); Comendatore Al Merito Bella Republic Italiana (1980); Ordem Nacional do Cruzeiro do Sul, Brasil (1982); the Henry de Wolf Smyth Nuclear Statesman Award, American Nuclear Society and American Atomic Industrial Forum (1984); Ordem de rio Branco (Grande Oficial), Brasil (1988); the First Class Order of the Sacred Treasure (1989), etc.





Satsuki Eda

Date and Place of Birth : May 22, 1941 in Okayama Prefecture

Education:

- 1960 entered the University of Tokyo
- 1965 passed the Law Examination
- 1966 graduated from Faculty of Law, the University of Tokyo
- 1969 entered the University of Oxford and read for the Deploma in Law on the Right to a Hearing in English Administrative Law.
- 1971 got the Deploma in Law

Vocation:

- 1968 The associate judge (the Tokyo District Court, the Chiba Family Court etc.)
  - 1977 The one of the party Representatives, the Socialist Citizens' league The member of the House of Councillors
  - 1978 The Vice-President, the United Social Democratic Party (U. S. D. P.)
  - 1983 Elected to the member of the House of Representatives
  - 1985 The President of the U. S. D. P.
  - 1992 The leader of the new policy study group "SIRIUS"
  - 1993- The Minister of State for Science and Technology, Government of Japan
- 



Yuzan Fujita

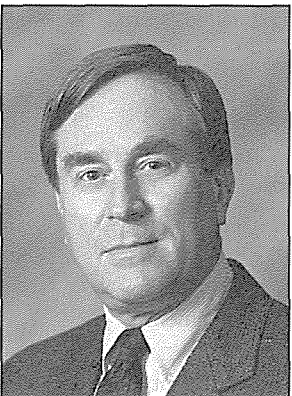
Date and Place of Birth : April 19, 1949 in Hiroshima

Education :

- 1972 Graduated from Keio University, Faculty of Commercial Science

Work Experience:

- 1972 Mitsui & Corpo Ltd. (During his service, he was sent to Australia as a trainee and to the United States as a resident officer.)
  - 1982 Secretary to Mr. Masaaki Fujita, previous President of House of Councillors
  - 1989 Elected as a Member of House of Councillors
  - 1993 Elected as the Governor of Hiroshima Prefecture
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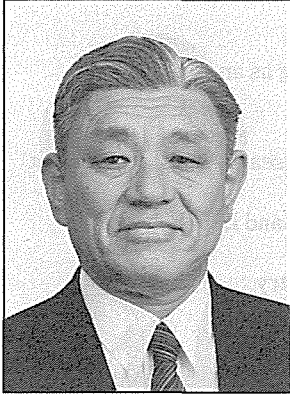


Richard Rhodes

Mr. Richard Rhodes was born 4 July 1937 in Kansas City, Kansas, USA. He earned a B. A. in history cum laude from Yale university in 1959 and received an honorary Doctorate of Humane Letters from Westminster College, Fulton, Missouri, in 1988.

A novelist and independent historian, he has published twelve books, including "Nuclear Renewal", "A Hole in the World", "Farm" and "The Making of the Atomic Bomb", which won the 1987 U. S. National Book Award for Nonfiction and the 1988 Pulitzer Prize for General Nonfiction. He is presently finishing "The Making of the Hydrogen bomb", scheduled for publication in 1995.

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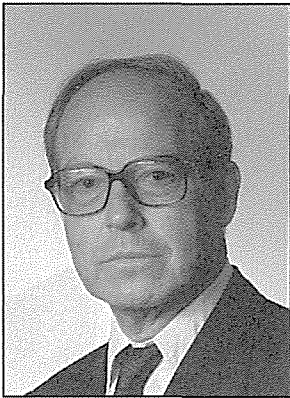


**Joichi Aoi**

Date of Birth: March 30, 1926  
Educational : Graduated from Faculty of Engineering,  
Tokyo University in 1948

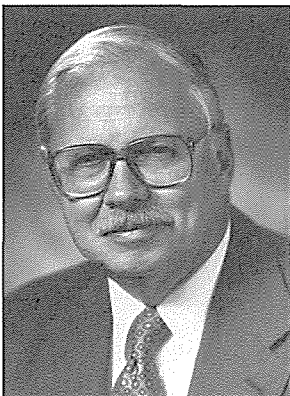
Career:

1948 Joined Toshiba Corporation  
1970 Chief Engineer, Heavy Apparatus Division  
1978 Director & Assistant Group Executive, Nuclear Energy  
1981 Managing Director & Sector Executive Heavy Duty Electrical Business Sector  
1982 Senior Managing Director & Sector Executive Heavy Duty Electrical Business Sector  
1984 Executive Vice President  
1987 President and Chief Executive Officer  
1992- Chairman of the Board



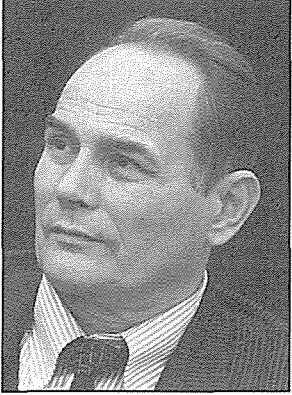
**Hans Blix**

Dr. Hans Blix was appointed Director General of IAEA in 1981.  
Born in Uppsala, Sweden in 1928. He studied at the University of Uppsala and Columbia University, and received his Ph. D. at Cambridge.  
In 1959 he became Doctor of Laws at the Stockholm University and in 1960 was appointed associate professor in international law.  
From 1963 to 1976, Dr. Blix was Head of Department at the Ministry for Foreign Affairs and served as Legal Adviser on International Law. In 1976 he became Under-Secretary of State at the Ministry for Foreign Affairs in charge of international development cooperation. He was appointed Minister for Foreign Affairs in October 1978.  
He has written several books on subjects associated with international and constitutional law and was leader of the Liberal Campaign Committee in favour of retention of the Swedish nuclear energy program in the referendum in 1980.  
He was re - appointed for a fourth term of office of four years by the IAEA General Conference in September 1993.  
Honor: Doctorate from Moscow State University (1987)  
Award: Henry de Wolf Smyth Award (Washington D. C., 1988)



**Kenneth C. Rogers**

Kenneth C. Rogers was sworn in for a second five - year term as a member of the Nuclear Regulatory Commission on June 12, 1992. Before his first - term nomination by President Reagan and confirmation by the Senate in 1987, Dr. Rogers served as president of Stevens Institute of Technology for 15 years. He joined Stevens in 1957 following research appointments at Cornell University. At Stevens he served the college as a professor, head of the physics department, dean of the faculty and acting provost before becoming its president in 1972. In 1987 he was designated President Emeritus at Stevens. A physicist by training, Dr. Rogers' technical areas of expertise include plasma physics, particle accelerators, optical spectroscopy, elementary particle physics and nuclear instrumentation. Dr. Rogers is a member of numerous professional societies, including the American Physical Society and the American Nuclear Society. He has served as a Director of the Public Service Enterprise Group (formerly Public Service Electric and Gas Company of New Jersey) and was a charter member of the Board of Director's Nuclear Oversight Committee. He received a bachelor of science degree in physics from St. Lawrence University (1950) and a master of arts degree in physics (1952) and doctor of philosophy degree in physics (1956) from Columbia University. He was awarded an honorary doctorate degree by St. Lawrence University in 1983 and by Stevens Institute of Technology in 1987.



Viktor N. Mikhailov

Date/Place of Birth: February 12, 1934 in Moscow

Education:

1958 Graduated from the Moscow Institute of Physical Engineering as an Nuclear Theoretical Physicist

Career:

1958 Engineering, and later Head of Scientific Div. , All-Union Research and Development Institute on Experimental Physics

1969 Head of Div. , Deputy Director, and then Director, Research and Development Institute on Impulse Technology

1988 Deputy Minister, USSR Ministry of Atomic Power and Industry

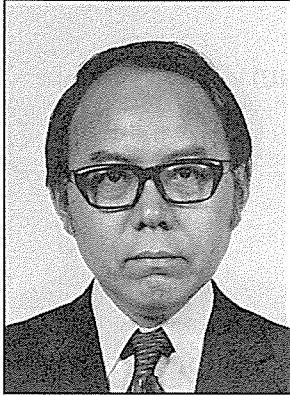
1992- Minister, Ministry of the Russian Federation for Atomic Energy

He has a Doctorate in technical sciences.

He is Professor decorated with state awards and prizes.

## SESSION 1

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Kiyofuku Chuma

Date/Place of Birth : Aug. 22, 1935, Kagoshima City, Kagoshima, Japan

Education:

Graduated from The Tokyo Metropolitan University in 1960

Career:

1960 Joined the Asahi Shimbun,

1963-79 Political News Writer

1979-82 Deputy Chief Editor of Political News Section

1883-84 Visiting Scholar of the Center for International Studies,  
Massachusetts Institute of Technology

1984-90 Senior Staff Writer

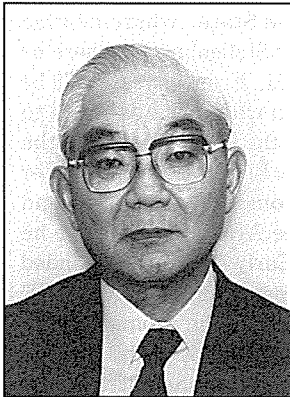
1986- Editorial Writer

1990- Deputy Chairman of Editorial Board

Books:

"The Politics of Japanese Re-armaments", "The Illusion ; It has no happened the World War in 1985", "Military Expenditure"

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Ryukichi Imai

Born in Tokyo

Education:

University of Tokyo (M. S. in mathematics), Dr. Eng. (nuclear engineering), Harvard University (M. A. ), Fletcher School of Law and Diplomacy (A. M. )

Career:

Science Reporter, Asahi Shimbun

General Manager, Engineering, Japan Atomic Power Co.

Ambassador Extraordinary and Plenipotentiary, Ambassador of Japan to Kuwait, Conference on Disarmament (Geneva), Mexico

Counsellor, Atomic Energy Commission

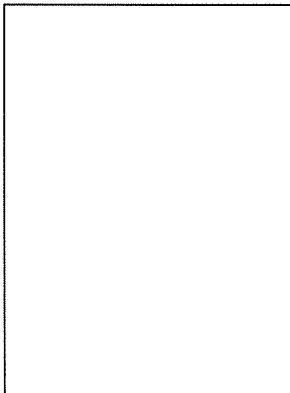
Senior Advisor, Japan Atomic Industrial Forum

Distinguished Scholar, International Institute for Global Peace

Visiting Professor, Sophia University

Authorship: Science and Nation, Nuclear Safeguards (IISS Adelphi paper), Nuclear Power and International Politics, Nuclear Energy and Nuclear Proliferation (Westview), Disarmament II (OG & H), Nuclear Disarmament Post Cold War Management of Nuclear Weapons (1992) and others

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Yves Boyer

Date and Place of Birth : October 9, 1950 in Blois

Educated at the Institut d'Etudes Politiques, Paris and Paris-Panthéon University

1978 Deputy general secretary, Sofresa, Paris

1980 Bureau des Etudes Strategiques et des Negociations Internationales,  
Secretariat General de la Defense Nationale, Paris

1982 Defence consultant and research associate,  
International Institute for Strategic Studies, London

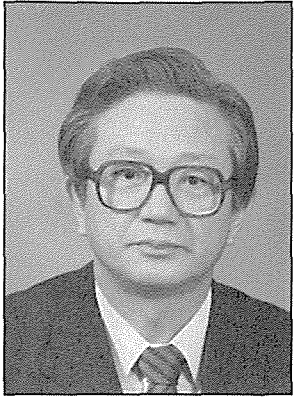
1983 Senior researcher, Institut Francais des Relations Internationales, Paris

1986 Research fellow, Woodrow Wilson Center, Washington DC

Present- Deputy director of CREST-Ecole polytechnique, Paris

Professor at the Army Academy (since 1986) and at the French Staff College (since 1992), Member of the board of the Centre d'Analyse de la Securite Europeenne (CASE), Member of ESAN (European Security Analysis Network), Editor of Les Cahiers du CREST

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Young Choi

Date/Place of Birth: Oct. 20, 1932, Seoul

Education:

1954-58 Dept. of Political Science, Seoul National University (SNU)

1958-60 Dept. of Political Science, Graduate School, SNU

1962-65 Dept. of Political Science, Graduate School, Ph. D.  
Course, SNU

1977 took Ph. D. Degree (Political Science), SNU.

Senior Research Fellow:

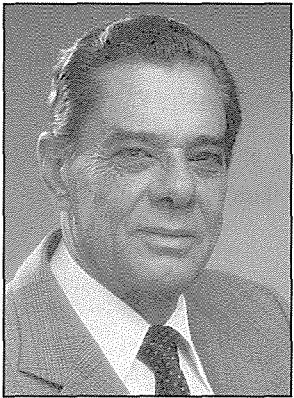
1962-69 Instructor, Assistant Prof. Seoul City University

1969-79 Assistant and Associate Prof., National Defense University

1979-90 Professor and Director-General, Institute of Foreign Affairs and National Security, MOFA

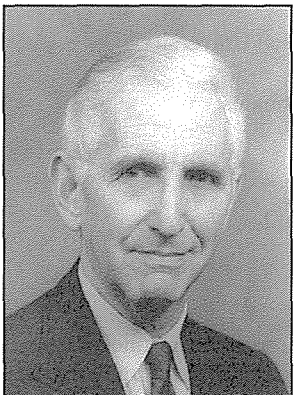
1991 Director, Institute of Int'l Peace and Security

1992- Senior Research Fellow, Institute for Far Eastern Studies, Kyungnam University



J.W.L. de Villiers

He was born on 27 October 1929 in Smithfield in the Orange Free State, where he also matriculated. He received his university training at the University of Stellenbosch, where he obtained the degrees B. Sc. in 1949, and M. Sc. (Cum Luade) in 1951. From 1952 to 1958 he was employed at the Council for Scientific and Industrial Research where he advanced to head of the Mass Spectrometry Division. In 1957 he also obtained the D. Sc. degree at the University of Stellenbosch. In 1958 he became a bursar of the Atomic Energy Board and after a period of further training and research at such notable institutions as the Argonne and Brookhaven National Laboratories in the USA, he returned to the AEC in 1962. Here he advanced to Director of the Reactor Development Division in 1967. Early in 1970, he founded his own undertaking, but in March 1972 he returned to the field of research and joined UCOR as head of the Safety Division. In June 1973 he became Vice - President of the Atomic Energy Board, and Deputy President in 1976. In 1979 he was appointed President of the AEB in which capacity he also served as Chairman of the Board. With the establishment of the Atomic Energy Corporation of SA Ltd on 1 July 1982 he was appointed as Executive Chairman of the Corporation. On 1 January 1987 he was appointed Chief Executive Officer and Chairman of the Management Board of the Corporation, and on 1 January 1990 he was appointed as non-executive chairman.



Daniel Ellsberg

Dr. Daniel Ellsberg was born in Chicago in 1931.

Upon graduating from Cranbrook High Schok as a valedictorian, he earned a scholarship to Harvard University. Dr. Ellsberg earned his B. A. (summa cum Laude, Phi Beta Kappa) in 1952 and attended Kings College, Cambridge, on a Woodrow Wilson Fellowship from 1952-53. He received his Ph. D in Economics from Harvard University in 1962, and was a member of the Society of Fellows, Harvard University (1957-59).

At present, he is the Project Director of Manhattan Project II, at Physicians for Social Responsibility in Washington, DC. He lectures worldwide on the issues of nuclear non - proliferation and No first Use.



Takehiko Kamo

Date of Birth : April 3, 1942

Education:

Ph. D. in Political Science, Yale University. Degree awarded 1977.

M. A. in Philosophy, Yale University. Degree awarded 1973.

M. A. in Political Science, Waseda University. Degree awarded 1969.

B. A. in Political Science & Economics, Waseda University. Degree awarded 1966.

Academic Careers:

Visiting Professor to Tokyo University, 1988-1989.

Visiting Research Scholar to Yale University, London School of Economics, 1982-83.

Visiting Fellow to Institute of Developing Economics in Tokyo, 1979-82.

Visiting Professor to School of Law, Chuo University in Tokyo, 1975-82.

Fulbright Grantee to Yale University, 1970-73.

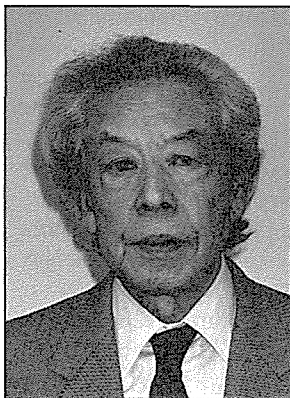
Employment:

Professor of International Politics, Faculty of Law, The University of Tokyo, from 1989.

Professor of International Politics, Waseda University, 1981-1989.

Associate Professor of Political Science, Waseda University, 1976-1981.

Assistant Professor of Political Science, Waseda University, 1974-1976.



Naomi Shohno

Born on November 19, 1925 in Yamagata-Gun, Hiroshima-Prefecture, Japan.

Education : graduated in October, 1947 in physics course, Faculty of Science at the Kyushu Imperial University. After working as a science assistant at the university and also at the Hiroshima Literature and Science University for a while, in April, 1951 appointed to be a lecturer at the Theoretical Physics Institute, Hiroshima University. Later, serving as an assistant professor at the Institute for some time, appointed assistant professor of the Hiroshima Jogakuin College in April, 1953. Appointed to be Professor of the college in April, 1961. From April, 1961, having been continuously in such positions as the Head of Registrar's Office, Chief Librarian and chief of Education Course, in March, 1991, became a Professor Emeritus of the college. In the meantime, having been serving at the Peace Science Studies Center as a guest professor up to date.

Doctorate Degree : Received the Degree of Science from the Hiroshima Literature and Science University in April, 1961.

Books published : "Nuclear Radiation and Atomic Disease" published in 1975 (under joint authorship with Professor Soichi Iijima). "The Legacy of Hiroshima-1st Past, Our Future"

(Japanese version) published in 1984 by Shincho Book Co. (English version) published in 1986 by Kosei Publishing Co. Granted 11th "International Publishing Culture Award" in 1987. Many other books have been published so far written in collaboration with other authors.

Books edited :

"Toward Total Abolition of Nuclear Weapons and Comprehensive Disarmament - A Request to the Secretary-General of the United Nations" published in 1976 by Hiroshima-shi and Nagasaki-shi. "Real State of Exposure and Exposed Victims - A Report to the 1977 NGO Symposium on Exposure-related Issue" published in 1978. "Exposed Structures in Hiroshima - A Survey Report in memory of 45 years after Exposure" published in 1990, etc.

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## SESSION 2

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Masao Nakamura

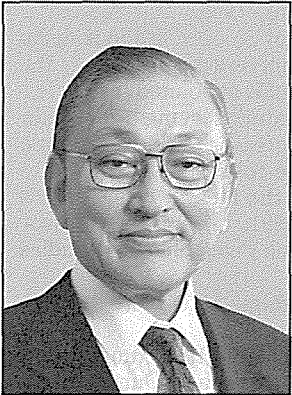
Date of Birth: April 1, 1933  
Present Title: Editorial Writer, The Yomiuri Shimbun (Japan)  
Discipline, Special Field:  
Science and Technology Policy

Education:  
Kyushu Institute of Technology (1955)

Occupational History:  
1955-59 Engineer, the Tokyo Metropolitan Government  
1959- Joined The Yomiuri Shimbun  
1983- Editorial Writer, The Yomiuri Shimbun  
(Member, Transport Technology Council)  
(Member, Industrial Technology Council)

Publications:  
Genshi Ryoku to Kankyo (Nuclear Power and Environment), ed. and co-author, The Yomiuri Shimbun Sha, Tokyo, 1975  
Kisho Shigen (Meteorological Resources), Kodan Sha, Tokyo, 1976  
Kisho Keizai Gaku (meteorological Economics), PHP Institute, Tokyo, 1982  
Nihon wo Sasaeru Hito to Gijutsu I, II (People and Technology that Support Japan), co-author, Bungei Shunju Sha, Tokyo, 1985  
Koronbusu no Tamago (Columbus' Egg), Kodan Sha, Tokyo, 1987

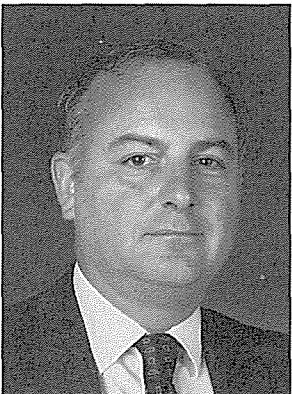
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Yumi Akimoto

Dr. Akimoto is chief executive vice president of Mitsubishi Materials Corp. Simultaneously, he serves as the first executive vice president of Mitsubishi Nuclear Fuels Co. Dr. Akimoto received his B. S. and Dr. Sc. (Ph. D. equivalent) degrees from Tokyo Bunrika University (presently Tsukuba University) in physical chemistry. Most of Dr. Akimoto's career has been with MMC. He spent almost twenty years at Central Research Laboratory of the corp. with works related to nuclear fuel cycles, electronic materials production and new metals refining. During this period, he was sent as a visiting scholar at Lawrence Radiation Laboratory Berkeley, University of California for two years of micro chemical works on actinide elements. In recent fifteen years, Dr. Akimoto devoted himself to establishment of nuclear fuel cycle business until his recent promotion from prior position as senior managing director and general manager of Nuclear Energy Division. He also served as a lecturer at the University of Tokyo for many years. Dr. Akimoto is a fellow and counselor of Atomic Society of Japan and a member of American Nuclear Society. He is serving as a member of specialists' committee for Atomic Energy Commission of Japanese Government and also is a member of Engineering Academy of Japan. He received the Award for Distinguished Research Works from Powder Metallurgical Society of Japan.

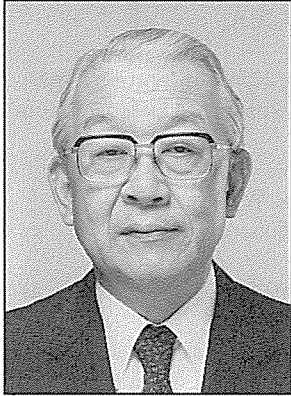
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Roger Hayes

Roger Hayes, born 15 February 1945, read economics and sociology at London University. He obtained a masters Degree in International Political Economy from USC in California USA. He began his career in the Communications Industry in 1967 as a Young & Rubicam advertising trainee, which was followed by a stint as a Reuters Economics correspondent in Paris during the later 60's and early 70's. He gained his formative experience in public relations/public affairs with the large American firm Burson Marsteller specializing in Corporate Affairs for multi-national corporations and governments, travelling extensively. During nearly a decade with BM he was involved both with British politics via the Britain in Europe' campaign and as a founder of the Tory Reform Group and eight years with the International PR Association (IPRA) where he ended up as Secretary-General of the Geneva based organization. His main interest has been in education and training and raising standards around the world. During the 80's he held 3 in-house posts, firstly as Corporate Communications Director of Thorn EMI PLC and following a brief period during which he developed and sold his own PR consultancy, Hayes - Macleod, (which won the best new consultancy award), was appointed Vice President Public and Government Affairs Ford of Europe. He is now full-time Director General of the British Nuclear Industry Forum. He is also non-Executive Chairman of Carma International, a research firm he co-founded, a Director of Matrix, the Corporate and Public Affairs counselling firm, a volunteer advisor of the Prince of Wales Business Leaders Forum and the United Nations Development programme.

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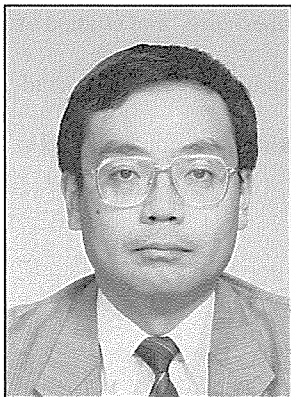
Ryo Ikegame

Date of Birth : October 3, 1927

Education: 1952, Graduated from the Electrical Engineering  
Division, Engineering Department of the Tokyo University

Occupation:

- 1952 Entered the Tokyo Electric Power Co., Inc.
  - 1979 General Manager, Nuclear Power Plant Construction Department
  - 1981 Superintendent, Fukushima Daiichi Nuclear Power Station
  - 1983 Director, Deputy General Manager of Nuclear Power Development Center
  - 1985 Director, Deputy General Manager of Nuclear Power Administration  
Deputy General Manager of Engineering Research & Development Administration
  - 1986 Managing Director, General Manager of Nuclear Power Administration
  - 1991- Executive Vice-President
- Other Major Post:
- 1992 Chairman, Committee for nuclear power development, The Federation of Electric  
Power Companies



Yasutaka Moriguchi

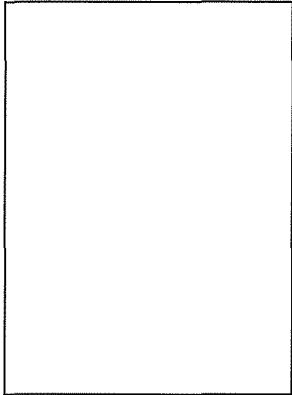
Date of Birth : December 6, 1951

Education:  
Tokyo University, Master of Engineering

Occupation:

- 1976 Entered Science & Technology Agency
  - 1983 Deputy Director, Nuclear Fuel Division, Atomic Energy Bureau
  - 1987 Deputy Director, Policy Division, Atomic Energy Bureau
  - 1989 Director for Atomic Energy Utilization, Atomic Energy Bureau
  - 1990 First Secretary, Permanent Mission of Japan to the International  
Organizations in Vienna
  - 1993 Counselor, Permanent Mission of Japan to the International Organizations in Vienna
  - 1993 Director for International Cooperation, Atomic Energy Bureau
  - 1993- Director, Nuclear Fuel Division, Atomic Energy Bureau
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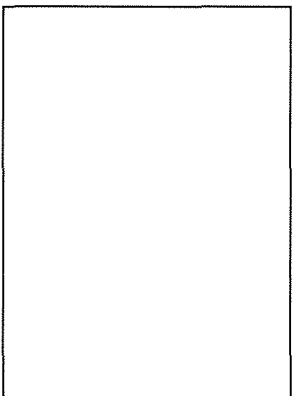
Christopher E. Paine

Date and Place of Birth : August 18, 1951, Baltimore, Maryland, U. S. A.  
Education : Harvard College, B. A, 1974  
1993- Chair, Fissile Material Working Group, Campaign for the Nonproliferation Treaty  
1991- Senior Research Associate, Nuclear Program, Natural Resources Defense Council, Washington, D. C. , U. S. A  
1987-91 Legislative Assistant for Atomic Energy and Arms Control, Office of Sen, Edward M. Kennedy, United States Senate, Washington, D. C.  
1985-86 Staff Consultant for Nuclear Nonproliferation Policy, Subcommittee on Energy Conservation and Power, U. S. House of Representatives.  
1983-85 Senior Policy Analyst and Washington Director, Physicians for Social Responsibility  
1981-83 Staff Assistant for Arms Control, Federation of American Scientists, Washington, D. C.  
1979-80 Research Fellow, Council on Economic Priorities, New York, N. Y.  
1976-79 Research Associate, Pacific Studies Center, Palo Alto. CA.  
1973-75 Staff writer, MIDDLE EAST REPORT, Cambridge, MA.



Jean-Louis Ricaud

Mr. Ricaud was born in 1952, he graduated from Ecole Normale Superieure, and studied at Ecole des Mines.  
1978 joined COGEMA and has been working as member of the top management at the headquarters in Paris.  
1983 became director of La Hague reprocessing services (UP2), and was deeply involved in the construction of UP3 plant.  
1988 Vice-president of SGN  
1992- Vice-President, COGEMA

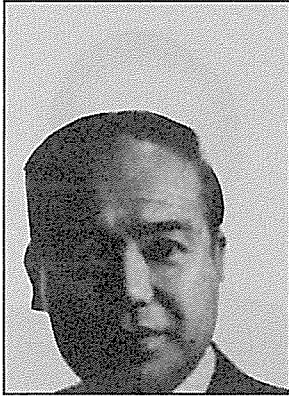


Pierre Verbeek

Mr. Pierre Verbeek graduated as a civil engineer in physics from the University of Louvain (Belgium) in 1973. After spending a year as a research assistant at the same university he joined Belgonucleaire, where he worked on mechanical design studies for fast breeder reactor cores. In 1977 he joined Synatom S. A. (Societe Belge des Combustibles Nucleaires), where, as member of the Fuel Supply Department, he has been in charge of uranium, conversion and enrichment studies and negotiations until 1991. Mr. Verbeek is presently Special Adviser, reporting to the General Manager.

# LUNCHEON

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Hiroshi Kumagai

Date of Birth : June 25, 1940

1964 Graduated from Hitotsubashi University (Faculty of Sociology)

1977 First elected to the House of Councillors

1983 First elected to the House of Representatives

1984 Deputy Director, Agriculture and Forestry Division, Policy Research Council, Liberal Democratic Party (LDP)

1985 Parliamentary Vice-Minister, Economic Planning Agency

1986 Deputy Chairman, Diet Affairs Committee, LDP

1988 Director, Labor Division, LDP

1989 Deputy Director-General, Election Bureau, LDP

1990 Head Whip, Justice Committee, House of Representatives Director, Home Affairs Division, LDP, etc.

1991 Member, Justice Committee, House of Representatives Deputy Secretary - General, LDP

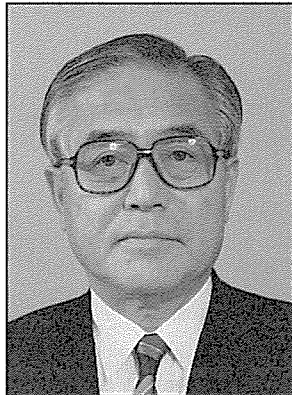
1992 Deputy Chairman, Policy Research Council, LDP

1993 Whip, Audit Committee, House of Representatives

Deputy Chairman, Public Relations Committee, LDP

Joined the newly established Japan Renewal Party

Minister of International Trade and Industry



Takashi Hiraoka

Date of Birth : December 21, 1927

Education:

1952 Graduated from the Faculty of Literature, Waseda University

Work Experience:

1952 Employed by The Chugoku Shimbun (newspaper publishing company)

1975-82 Executive Editor

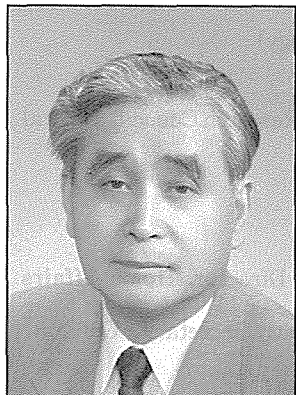
1982 Joined The Chugoku Broadcasting Co. as Executive Director

1986-90 President, The Chugoku Broadcasting Co.

1991 Elected as the Mayor of Hiroshima City

## SESSION 3

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Michinori Oki

Date of Birth : March 30, 1928

Education:

B. S. University of Tokyo, 1950

Ph. D. University of Tokyo, 1953

Academic Appointments:

1950-55 Assistant, Tokyo Metropolitan University

1953-55 Post-Doctoral Work, University of Illinois

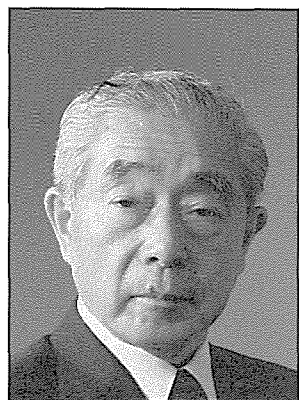
1956 Associate Professor, Tokyo Metropolitan University

1956-62 Associate Professor, University of Tokyo

1962-88 Professor, University of Tokyo

1988- Professor, Okayama University of Science

Honors: The Chemical Society of Japan Award for Young Chemists (1953), The Chemical Society of Japan Award (1980), The Chemical Society of Japan Award for Chemical Education (1982), National Medal of Purple Ribbon (1990)



Kenichi Fukui

Date and Place of Birth : October 4, 1918 Nara Prefecture, Japan

1941 A. B. in Engin., Kyoto Imperial University.

1948 Ph. D. in Engin. (Chemistry), Kyoto University.

1943-45 Lecturer, Kyoto Imperial University.

1945-51 Assistant Professor, Kyoto (Imperial) University.

1951-82 Professor, Kyoto University (Faculty of Engin. ; Dept. of Hydrocarbon Chemistry).

1962 The Japan Academy Prize.

1970 Member, International Academy of Quantum Molecular Science (France).

1971-73 Dean, Fac. Engin., Kyoto University.

1981 Co - recipient, the 1981 Nobel Prize in Chemistry (with Roald Hoffmann, Cornell University, Ithaca, N. Y., USA).

1981 Full Member, European Academy of Arts, Sciences and Humanities.

1982 Professor Emeritus, Kyoto University.

1982-88 President, Kyoto Institute of Technology.

1983 Foreign Honorary Member, American Academy of Arts and Sciences.

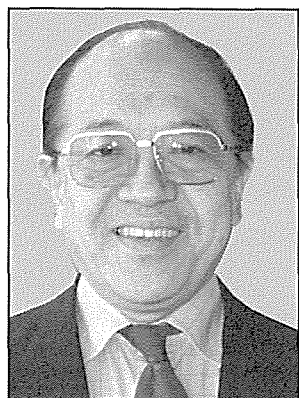
1983 Member, the Japan Academy.

1985 Full Member, Pontifical Academy of Sciences.

1988 Professor Emeritus, Kyoto Institute of Technology.

1988- Director, Institute for Fundamental Chemistry.

1988- Chairman, Heiankyo 1200th Anniversary Memorial Foundation.



Keiichi Takahashi

Date of Birth : May 31, 1931

Education:

1949-54 University of Tokyo (B. Sc. in Zoology)

1954-56 University of Tokyo (M. Sc. in Zoology)

1960 University of Tokyo (D. Sc. in Zoology)

Career:

1956-68 Instructor, University of Tokyo Instructor

1960-62 Research Fellow, Bedford College, University of London

1968-73 Associate Professor, University of Tokyo

1973-92 Professor, University of Tokyo

1992- Professor, International Christian University

Current Council/Committee Membership:

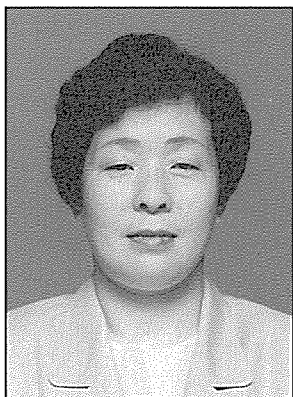
Science Council of Japan : Member, Special Committee on Life Science and Social Issues ; Chairman, Committee for Science Education ; Member, Committee for Zoological Science ; Member, Committee for the History of Science ; Expert Member, Space Utilization Committee



Shigekazu Takemura

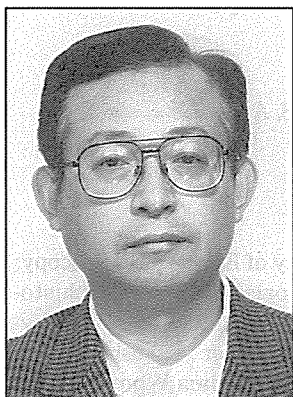
Date and Place of Birth : February 24, 1936 in Shiga prefecture  
Educated at Hiroshima University and Graduate School, Hiroshima University  
1966 Lecturer, Niigata University  
1968 Researcher (Curriculum), Ministry of Education, Culture and Science  
1977 Associate Professor, Hiroshima University  
At present Professor, Hiroshima University (Ph.D. Education)

Subcommittee, Council for Science Education ; Council for Science and Technology and Vocational Education ; International Program Council, International Center for Advancement of Scientific Literacy, Chicago Academy of Science, U. S. A. ; World Council of Curriculum and Instruction, Executive Committee etc.



Kazuko Tamura

Date and Place of Birth : Born in Tokyo, 1940  
1962 Graduated from Ochanomizu Women's University  
1962 Joined Kyodo News Service  
1967 Science desk writer  
1982 Deputy editor  
1989 Science editor  
1992- Editorial writer (Science and technology, Environment, Medicine)

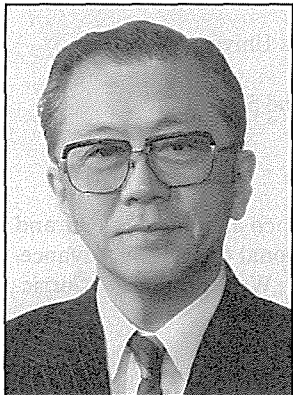


Yoshiro Tanaka

Date and Place of Birth : June 6, 1951 in Hiroshima  
1974 Graduated from Dept. of Chemistry, Faculty of Science,  
Hiroshima University  
Science Teacher of Hiroshima Prefectural Mihara High School  
1988- Science Teacher of Hiroshima Municipal Misuzu-ga-oka Senior High School

## Discussion Together with the People of Hiroshima

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Kazuhisa Mori

Date and Place of Birth : January 17, 1926 in Hiroshima  
Education : Graduated from the Kyoto University, Faculty of Science, Dept. of Physics in 1948  
Occupation Record :  
1948-1956 Publisher Chuokoron-sha, Inc.  
1956-1965 The Electric Power Development Co., Ltd.  
1956- Japan Atomic Industrial Forum, Inc.  
1963-1965 Manager Programming Division, Tokyo Channel 12 TV Ltd.  
1965- Director, Nuclear Safety Research Association  
1978- Executive Managing Director, JAIF.  
Other Positions :  
1972- Managing Director, Thermal Aquaculture Development Society of Japan  
1975- Director, Marine Ecology Research Institute  
1975- Director, Nuclear Materials Control Center  
1976- Vice President, Japan Atomic Energy Relations Organization  
1984- Counselor, Power Reactor and Nuclear Fuel Development Corporation  
Official Position :  
1985- Special Member, Advisory Committee for Energy, Ministry of International Trade and Industry  
1986- Special Member, Atomic Energy Commission  
1986- Special Member, Nuclear Safety Commission

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Teruaki Fukuhara

Date of Birth : January 1, 1926  
1950 Graduated from Hiroshima University School of Medicine  
1959 Ph. D. in Medicine  
1961 Doctor, Chugoku Rosai General Hospital  
1967 Opened Fukuhara's Private Clinic (Orthopedics)  
1971 Member of the Board of Directors, Hiroshima City's Medical Association  
1974 Permanent Member of the Board of Directors, Hiroshima Prefectural Medical Association  
1982 President, Hiroshima City's Medical Association  
1992- President, Hiroshima Prefectural Medical Association  
President of Japanese Affiliate,  
International Physicians for the Prevention of Nuclear War (IPPNW)

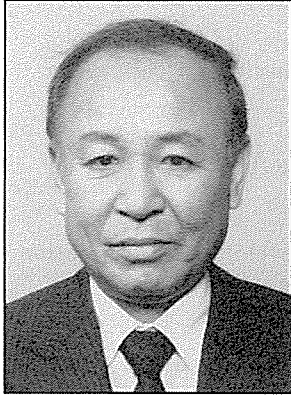
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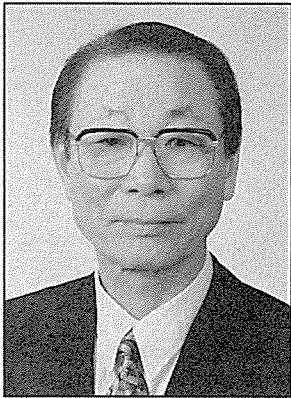
Katsuko Kataoka

Date and Place of Birth : March 24, 1944 in Hiroshima  
1968 Graduated from Hiroshima University School of Medicine  
1973 Ph. D. (in Medical Science) (Hiroshima University)  
1974 Research Associate in Roswell Park Memorial Institute, U. S. A.  
1976 Associate Professor in Shiga University of Medical Sciences  
1981- Professor in Hiroshima University School of Medicine  
Specialty : Histology and Cytology  
Academic and Social Activities :  
Council Member : Japanese Society of Anatomists ; Japanese Society of Electron Microscopy ; Japanese Society of Histochemistry and Cytochemistry. Editorial Board : Acta histochemica et cytochemica. Working Group Member : Japanese Affiliate of International Physicians for the Prevention of Nuclear War (IPPNW). Council Member : Hiroshima City Foundation of History and Science Education. Vice - President : Hiroshima Women Physicians' Association, etc.

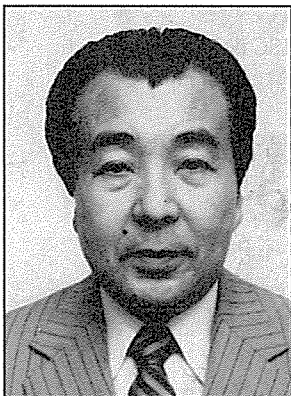
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Yoshitaka Kawamoto



Lee Sil Gun

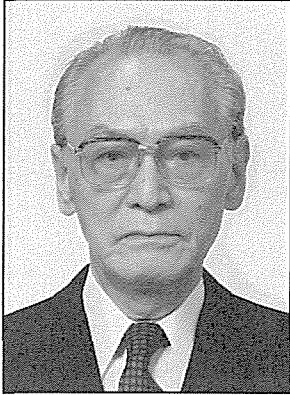


Akihiro Takahashi

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## SESSION 4

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Hiroshi Murata

Date of Birth : March 10, 1915

Education :

1937 Graduated from Mechanical Course, Ryojun (Port Arthur) Institute of Technology

Career :

1958 First Secretary, Embassy of Japan in U. K.

1963 Director General, Resources Bureau, Science and Technology Agency (STA)

1964 Director General, Planning Bureau, STA

1964 Director General, Atomic Energy Bureau, STA

1967 Executive Director, Power Reactor and Nuclear Fuel Development Corporation (PNC)

1978 President, Japan Atomic Energy Research Institute (JAERI)

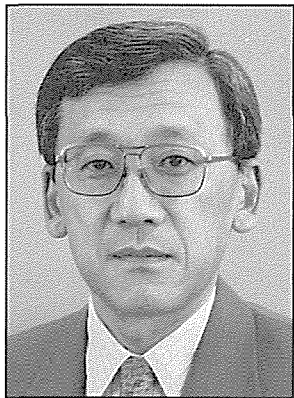
1981 President, Nuclear Safety Research Association

1983 President, Nuclear Safety Technology Center

1987- President, Japan Atomic Energy Relations Organization

Other Major Positions : Vice Chairman, Japan Atomic Industrial Forum Inc. (JAIF) ; Chairman of the Steering Committee, International Nuclear Cooperation Center, JAIF ; Special Adviser, JAERI etc.

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Akira Hayashi

Date of Birth : December 22, 1941

1964 Graduated from The University of Tokyo (Faculty of Law)

Joined Foreign Service

1966 Japanese Embassy in France

1968 Treaties Bureau, Ministry of Foreign Affairs (MOFA)

1971 Economic Affairs Bureau MOFA

1974 Japanese Embassy in Vietnam

1975 Japanese Embassy in France

1977 Deputy Budget Examiner, Budget Bureau, Ministry of Finance

1979 Senior Assistant for Economic Cooperation, Aid Policy Division,

Economic Cooperation Bureau, MOFA

Private Secretary to Foreign Minister

1980 Director, First Resources Division, Economic Affairs Bureau, MOFA

1982 Director, Policy Planning Division, Research and Planning Bureau, MOFA

1983 Counsellor, Japanese Embassy in China

1986 Director, Aid Policy Division, Economic Cooperation Bureau, MOFA

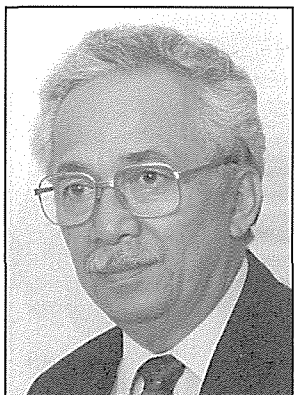
1988 Director, Financial Affairs Division, MOFA

1990 Consul-General in Atlanta, U. S. A

1992 Deputy Director-General, Economic Affairs Bureau, MOFA

1993- Ambassador, Director-General for Arms Control and Scientific Affairs

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Djali Ahimsa

Date of Birth : May 31, 1931

1957 Graduated from Institute of Technology, Bandung with MSC degree.

1958 Attended International Institute of Nuclear Engineering, Argonne National Laboratory, USA.

1961-64 Project Leader for Construction of Bandung Reactor Research Center.

1964-68 Director of Bandung Reactor Research Center.

1968-84 Dept. of Safeguards, IAEA

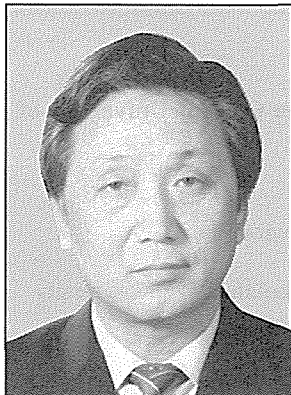
Country Officer for Far East Area, IAEA.

Later Head of Standardization Section, IAEA.

At present:

Director General, National Atomic Energy Agency, Indonesia.

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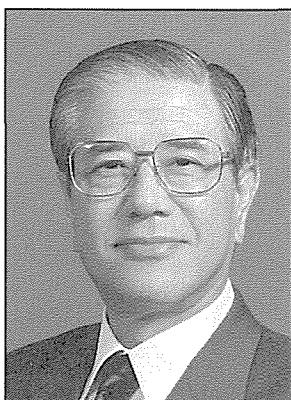


Li Yulun

Date of Birth : March 28, 1940

Place of Birth : Luanxian County, Hebei Province

- 1964 Graduated from Pept., Tsinghua University (Reactor Engineering)
- 1964-82 Assistant research professor, associate research professor China Institute of Atomic Energy (CIAE), China National Nuclear Corporation (CNNC)
- 1982-87 Dr. -Ing, University of Stuttgart in Germany  
Visiting Scientist (Alexander Von Humboldt Stiftung)
- 1987-91 Research Professor, Deputy Director, Department of Reactor Engineering, Assistant President of CIAE, CNNC  
Deputy president of CIAE, CNNC
- 1992 Deputy Director, Director, Department of Nuclear Power, CNNC
- 1993- Vice President, CNNC  
Vice Chairman/Vice Minister, China Atomic Energy Authority (CAEA)



Yong Kyu Lim

Date of Birth: August 23, 1933

- 1952 B. Sc., Electrical Engineering, Seoul National University
  - 1958 Graduate School, University of Michigan, U. S. A.
  - 1971 Ph. D. in Nuclear Engineering, Seoul National University
  - 1976 Director-General, Technical Cooperation Bureau, Ministry of Science and Technology (MOST)
  - 1979 Director-General, Science Promotion Bureau, MOST
  - 1981 Commissioner, Atomic Energy Commission, MOST
  - 1985 Auditor-General and Adjunct Professor of Nuclear Eng. Dept., Korea Advanced Institute of Science and Technology
  - 1990 Vice President, Korea Institute of Nuclear Safety
  - 1993- President, Korea Institute of Nuclear Safety
- Membership :
- 1993- President, The Korea Nuclear Society; Board of Directors, The Korea Atomic Industrial Forum, Inc.; Vice President, The Korean Federation of Science and Technology Societies; IAEA, Nuclear Safety Standards Advisory Group Member



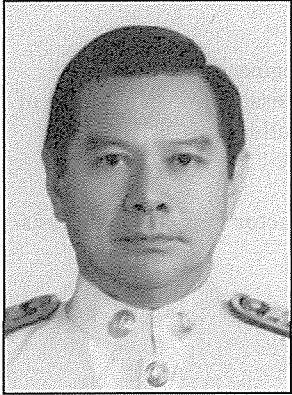
Junichiro Mukai

Date of Birth : February 14, 1936

Career :

- 1960 Graduated from Kyoto Institute of Technology. Engineering and Design
  - 1962 Joined the Ministry of International Trade and Industry (MITI)
  - 1979 Director, Nuclear Power Safety Administration Division, ANRE
  - 1980 Senior Officer for Power Development Planning, Planning Bureau, Economic Planning Agency
  - 1982 Director, Thermal Power Division, ANRE
  - 1984 Director-General, Public Utilities Department, Osaka Bureau of MITI
  - 1986 Senior Executive Officer for Development Programs, General Coordination Department, Agency of Industrial Science and Technology (AIST)
  - 1987 Deputy Director-General for Technological Affairs, AIST
  - 1988 Deputy Director-General, Agency of Natural Resources and Energy (ANRE)
  - 1991 Executive Adviser, The Sumitomo Marine & Fire Insurance Co., Ltd.
  - 1993- Managing Director, Deputy Executive General Manager, Projects Development Headquarters, The Japan Atomic Power Company
-





Tatchai Sumitra

Date of Birth : 19 May 1942

Place of Birth : Bangkok

Education :

1969 Dr. Ing. in Electrical Engineering with Nuclear Power Option, University of Genova, Italy

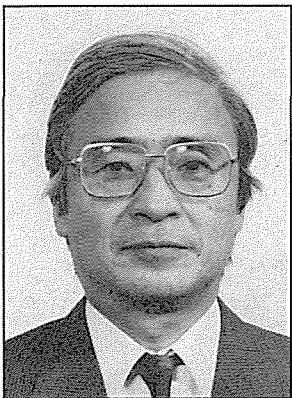
Position :

1991- Dean, Faculty of Engineering, Chulalongkorn University

1985-91 Head, Department of Nuclear Technology, Faculty of Engineering, Chulalongkorn University

1970-85 Lecturer/Associate Professor, Faculty of Engineering, Chulalongkorn University

1969-70 Engineer, Electricity Authority of Thailand.



Masaji Yoshikawa

Date and Place of Birth : October 15, 1933 in Tokyo, Japan

Academic History :

1956 Bachelor of Science (physics), the University of Tokyo

1958 Master of Science (physics), the University of Tokyo

1961 Ph. D. (physics), the University of Tokyo

Professional History :

1961 Research Associate, Department of Physics, the University of Tokyo

1963 General Atomic, San Diego, Calif., U. S. A.

1971 Senior Scientist, JAERI (moved to Japan)

1975 Head, Office of Large Tokamak Development

1984 Director, Department of Large Tokamak Development

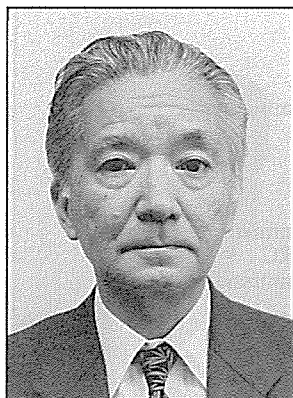
1988 Director General, Naka Fusion Research Establishment

1989 Executive Director

1993 Vice President

## SESSION 5

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Minoru Ohmuta

Date of Birth : September 1, 1930  
1953 Graduated from the faculty of literature, Hiroshima University  
1953 Joined Chugoku Shimbun-sha (Chugoku Newspaper Company)  
1963 Deputy Head of Editorial Department, Tokyo Branch  
1966 Deputy Head of Arrangement Section, Editorial Department  
1968 Head of General Affairs Section, General Affairs Department  
1970 Head of Personal Section, General Affairs Department  
1974 Deputy Head of General Affairs Department  
1977 Deputy Head of Editorial Department (in charge of commentary)  
1979 Head of Secretariat, Hiroshima Prefectural Encyclopedia Publication Board  
1983 Assistant Chief, Editorial Committee  
1986 Chief of Editorial Committee (Equal to director of a Department)  
1989 Member of Directors, Chief of Editorial Committee  
1990 Executive, Chief of Editorial Committee  
1992 Joined Hiroshima Peace Culture Foundation

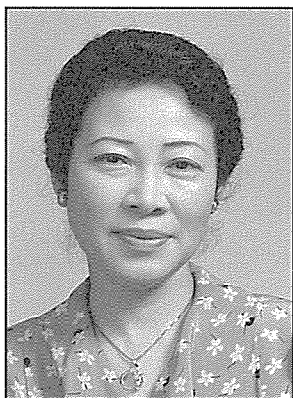
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Itsuzo Shigematsu

Date of Birth : November 25 1917  
Educational history:  
1941 Graduated from Faculty of Medicine, the University of Tokyo (M. D.)  
1952 Conferred degree of Doctor of Medical Sciences (Dr. Med, Sci.)  
1955 Conferred degree of Master of Public Health (M. P. H. ) from Harvard School of Public Health  
1992 Fellow of the Royal College of Physicians of London (FRCP)  
Occupational history:  
1942-46 Research Associate, Department of Internal Medicine, University of Tokyo Hospital, Tokyo  
1947-61 Researcher and Chief, Division of Chronic Infectious diseases, Department of Epidemiology, Institute of Public Health (IPH), Tokyo  
1962-66 Professor of Public Health, Kanazawa University School of Medicine, Kanazawa  
1966-81 Director, Department of Epidemiology, IPH  
1981- Chairman, Radiation Effects Research Foundation, Hiroshima, and Professor Emeritus, Institute of Public Health, Tokyo  
1984- Visiting Professor of Public Health, Showa University School of Medicine, Tokyo  
Major activities : Member, Expert Advisory Panel of World Health Organization (WHO); Member, Group to Review Nuclear War and Health Consequences, WHO; Member, Senior Committee on Environment and Health, WHO; Member, International Commission on Radiological Protection (ICRP); Chairman, International Advisory Committee of the Chernobyl Project, International Atomic Energy Agency (IAEA); Chairman, Radiation Council, Prime Minister's Secretariat; Chairman, Research Committee on A - bomb Health Effects, Ministry of Health and Welfare; President, Hiroshima International Council for Health Care of the Radiation-Exposed (HICARE)

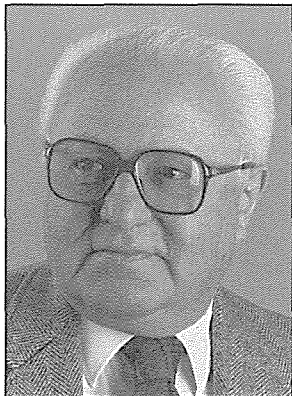
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Chikako Ito

Date of Birth: October 9, 1939  
Educational and Professional History:  
1964 Graduated from Hiroshima University School of Medicine  
1970 Appointed chief, Department of Medicine, Hiroshima A-bomb Survivors Health Management Center  
1986 Appointed part - time research associate, Department of Medicine, Radiation Effects Research Foundation  
1988 Appointed diplomate in internal medicine, Japanese Society of Internal Medicine  
1989 Appointed Deputy Director, Health Management Center, Hiroshima A - bomb Casualty Council  
1991 Appointed secretary, Hiroshima International Council for Health Care of the Radiation-Exposed (secretary responsible for drafting medical care brochure)  
1991 Appointed member of Atomic Bomb Survivors Medical Care Deliberative Council, Ministry of Health and Welfare  
1993 Appointed consultant, Department of Medicine, Radiation Effects Research Foundation

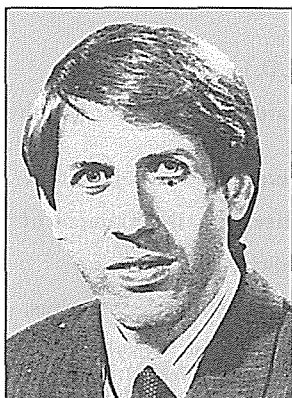
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Seymour Jablon

Date of Birth : June 2, 1918  
Education history :  
1939 B. S. , College of City of New York  
1940 M. A. (Mathematics), Columbia University  
1941 Graduate Study Mathematics, Mathematical Statistics, Columbia University  
1947 Graduate Study in Mathematics, Columbia University  
Occupational history :  
1941-42 Statistician, New York State Department of Labor  
1946-47 Statistician, U. S. Bureau of Labor Statistics  
1960-63 Chief, Statistics Department, Atomic Bomb Casualty Commission  
1963-68 Associate Director, Medical Follow-up Agency, NAS-NRC  
1968-71 Chief, Statistics Department, Atomic Bomb Casualty Commission  
1977-87 Director, Medical Follow-up Agency, NAS-NRC  
1987-90 Expert, Radiation Epidemiology Branch, Division of Cancer Etiology, National Cancer institute  
1991- Visiting Director, Radiation Effects Research Foundation  
Committees, etc :  
1979- Chairman, National Council on Radiation Protection and Measurements Committee 59, Evaluation of Human Radiation Exposure Experience  
1980-87 Dose Assessment Advisory Group, Department of Energy  
1987-90 Committee on the Biological Effects of Ionizing Radiation, NAS-NRC

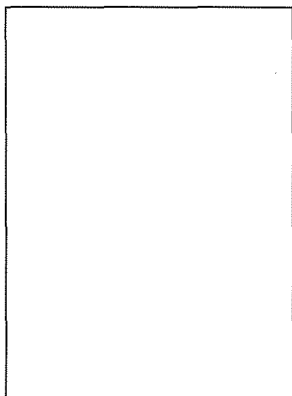
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Colin R. Muirhead

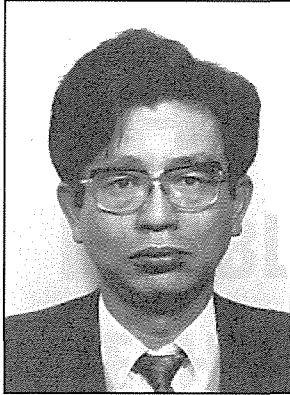
Date of Birth : September 9, 1957  
Place of Birth: Kingston-upon-Hull, United Kingdom  
Education:  
1976-79 B. Sc. Mathematics (1st Class Honours)  
1979-80 M. Sc. Statistics (with distinction)  
1980-83 Ph. D. Statistics  
(All received whilst at Imperial College, University of London)  
Occupation:  
1980-83 Research Assistant at Imperial College  
1983- Member of Epidemiology Group at National Radiation Protection Board  
1988- Leader of Epidemiology Group, NRPB

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Masao Tomonaga

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Satoru Ubuki

Date of Birth: August, 1945

Place of Birth : Kure City, Japan

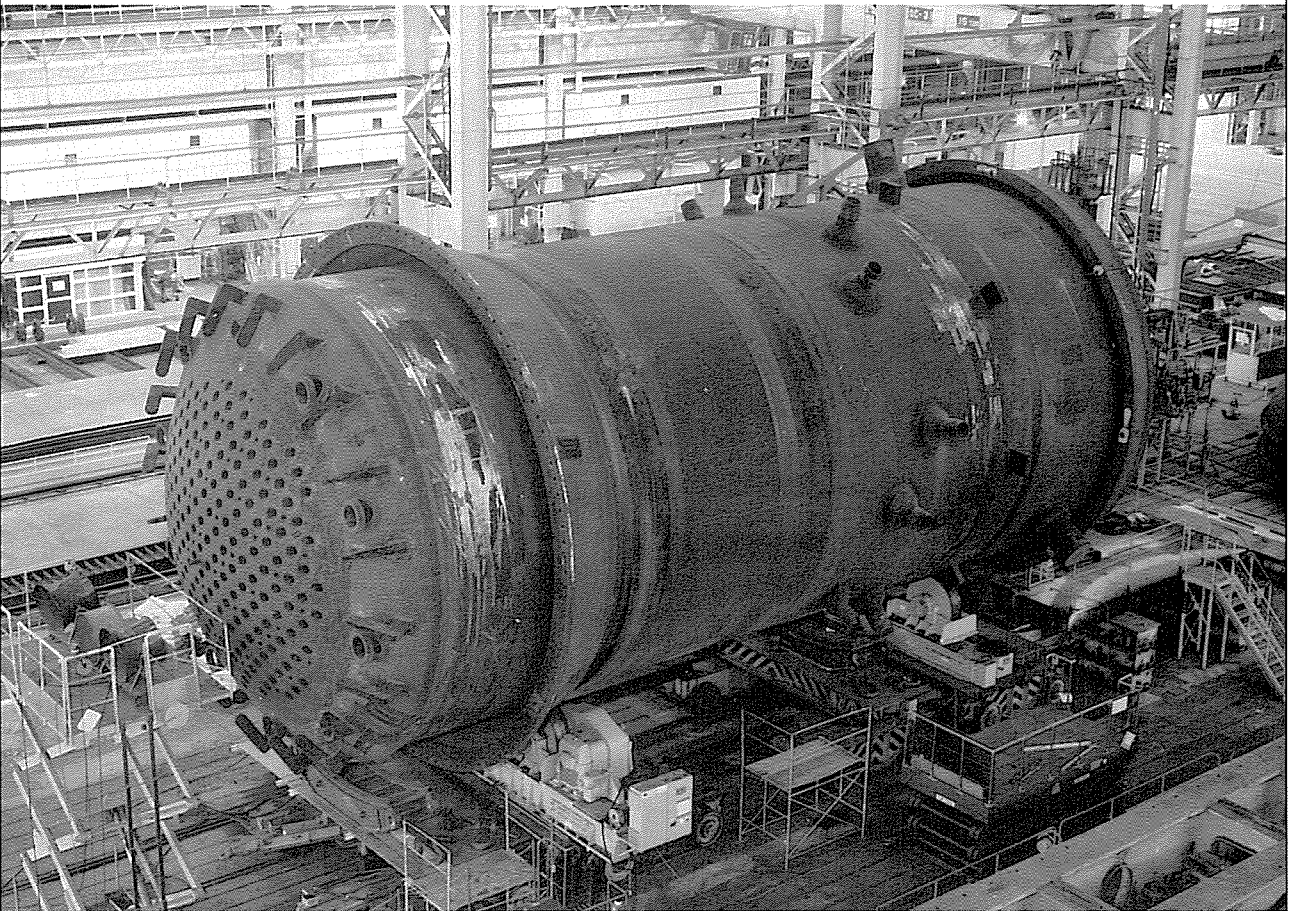
1965-69 Kyoto University, Faculty of Letters, B. A.

1970-76 Supervisor, Editorial Office of History of Hiroshima, Hiroshima Pref.

1976-89 Research Associate, Data and Specimens Center of Atomic Bomb Disaster attached to Research Institute for Nuclear Medicine and Biology, Hiroshima University

1989- Associate Professors, Data and Specimens Center of Atomic Bomb Disaster, attached to Research Institute for Nuclear Medicine and Biology, Hiroshima University.

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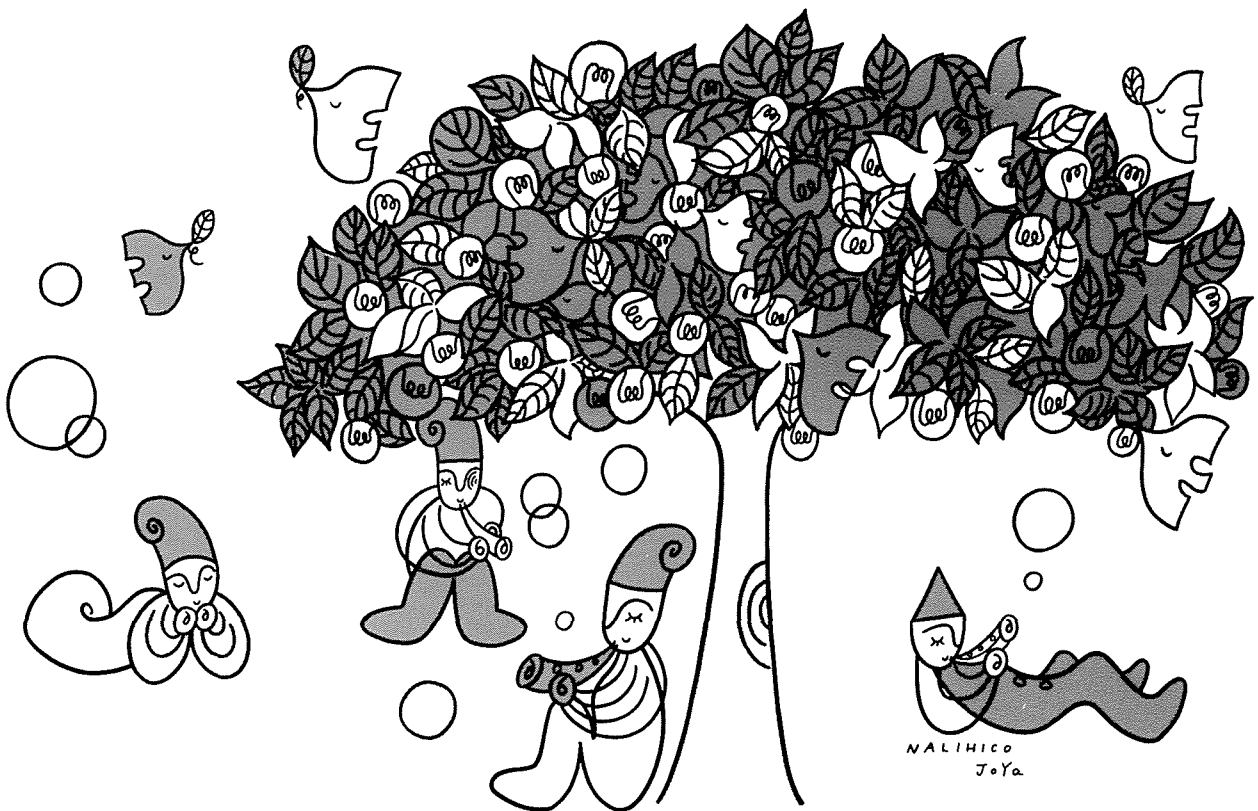
Head Office: New Ohtemachi Bldg., 2-1, Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan  
Tel: Tokyo 03 (3279) 5441 Fax: 81-3-3273-8047 Telex: 0222-3096 JGCTOK J

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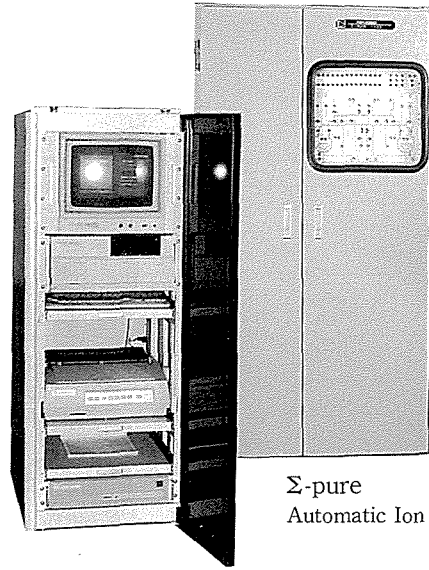
あたりまえすぎるほど自然に、  
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この大切な電気が、需要家の皆様に  
安全で、確実に届けられるために、  
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electricity safely and reliably to your home.  
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FAX ● Tokyo (03) 3473-5473  
Tokyo Blanch Office ● Telephone (03) 3440-3625  
Osaka Blanch Office ● Telephone (06) 203-3493  
Nagoya Blanch Office ● Telephone (052) 581-6201

Genden Engineering Services & Construction Company  
Planning Promotion Department  
03-3216-2868  
Ohtemachi BLDG. 1-6-1  
Ohtemachi Chiyoda-ku Tokyo Japan 100

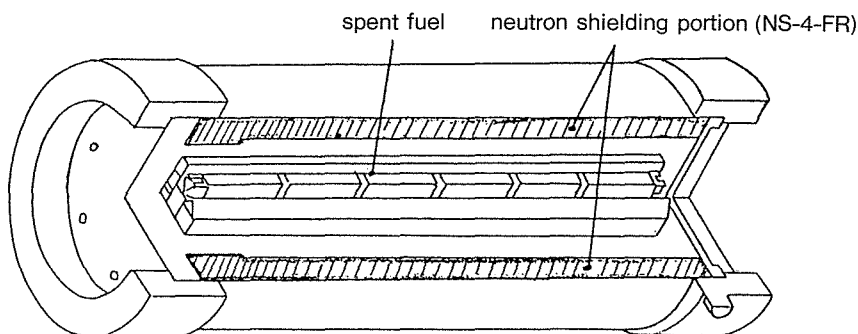


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And, NS-4-FR will be a very suitable material for neutron shielding of the spent fuel shipping cask.

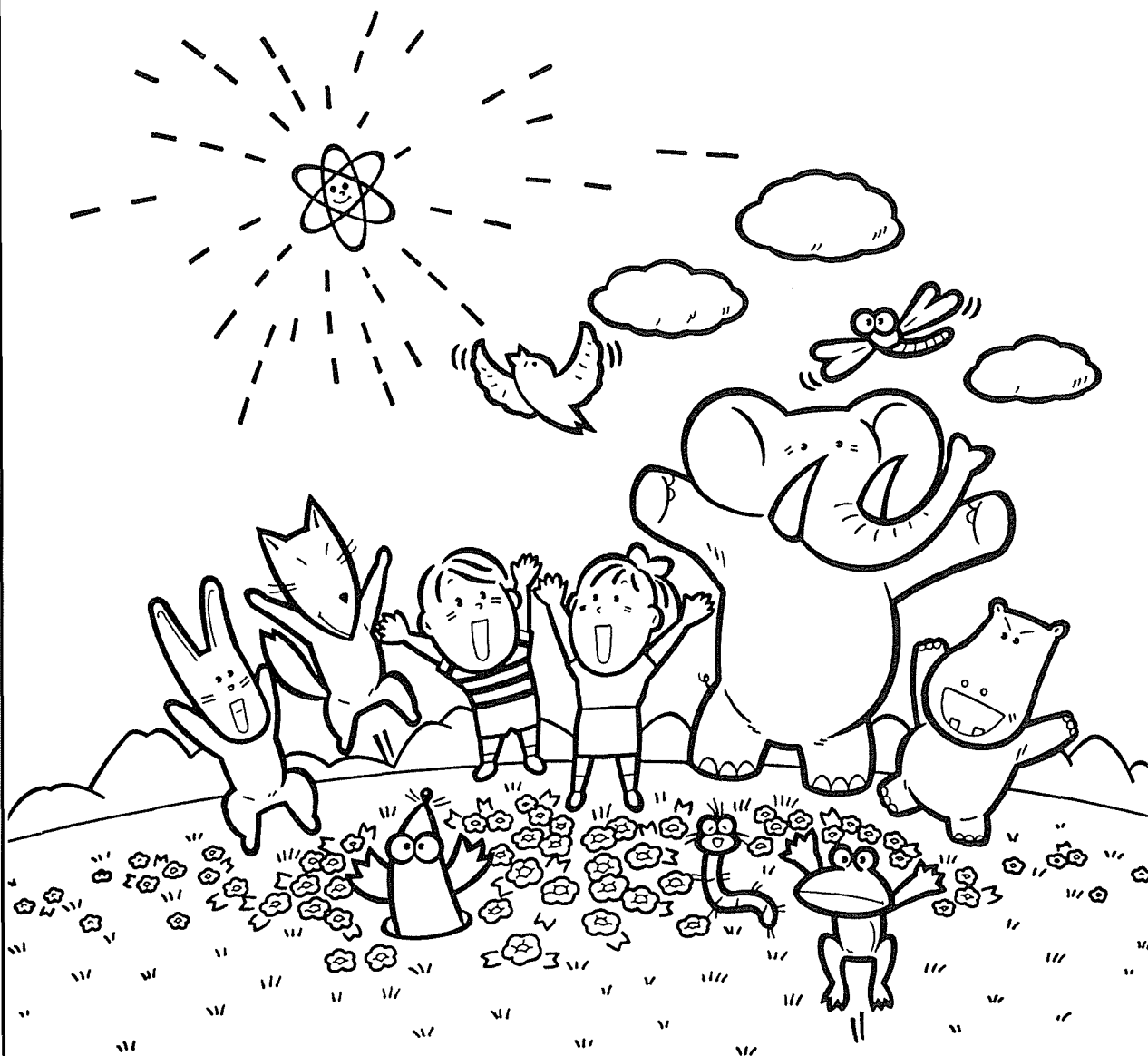
- Example: Application for the Spent Fuel Shipping Cask





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Nuclear Energy Systems Headquarters:

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## HITACHI

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Hitachi America, Ltd.: New York, U.S.A. Tel: (914) 332-5800 Hitachi Europe Ltd.: London, U.K. Tel: (628) 585000