

# he 26th JAIF ANNUAL CONFERENCE

# ABSTRACTS



# April 14–16, 1993 Pacifico Yokohama Conference Center Yokohama, Japan

JAPAN ATOMIC INDUSTRIAL FORUM, INC.



About 50 years ago mankind first generated nuclear power. It was an experiment. It worked. Commercial power generation began. And plants became increasingly complex.

Today the evolution is unceasing. But as our knowledge of nuclear energy increases, the trend is towards simpler systems that employ natural forces. Because, like the sun, nuclear energy occurs in nature. The way we are thinking at Hitachi, it's simply power from nature.



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Takashi Mukaibo Chairman, JAIF



Hajime Karatsu Chairman Program Committee

#### Basic Theme for the Conference

#### Nuclear Energy --- for the Earth's Future

The end of the Cold War between the East and West, the movement toward nuclear disarmament around the world and other rapid changes in the international environment are increasing the necessity for Japan to make an active international contribution not only in the field of nuclear energy but in all other sectors of life as well. With the leaders of major industrial nations expected in Tokyo for the summit meeting in July this year, there is a growing concern for Japan's positive response in the political and economic aspects of the world.

These circumstances will be reflected in our annual conference as we are preparing to discuss, from a planetary point of view, the role of nuclear energy in maintaining the integrity of the global environment and the world security of energy. Japanese and other authorities and specialists will be invited to give lectures and make discussions on various tasks in the peaceful use of nuclear energy. In particular, Professor Lovelock will be invited from Britain to deliver a special lecture on his Gaia Hypothesis, a proposition that earned him worldwide attention. After participating as consultant in the NASA program for the exploration of life on Mars, he suggested that the earth has been functioning and evolving on a living organism.

Participants and speakers from within Japan and outside will be allowed sufficient time for frank discussions on themes in the Japanese Long-Term Program for the Development and Utilization of Nuclear Energy. The focus will be on the recycling of plutonium as a controversial topic in Japan and other countries. Nuclear technology in terms of reliability engineering designed to pursue equipment safety will be another theme for discussion. We will also try to find out about the evaluated effects of the Chernobyl accident that have been produced to date. An international debate on how to make international nuclear nonproliferation equal to the new situation will be held to explore for the ways and means of maintaining and strengthening the international nuclear non-proliferation regime.



# THE 26TH JAIF ANNUAL CONFERENCE Program overview

#### WED. APRIL 14

Opening Session 9:00-13:15

Session 1 14:30-18:15

Directions about Japan's Nuclear Future

JAIF Chairman's Reception 18:30-20:00 Large Meeting Room Conference Center, 3F Pacifico Yokohama

#### THU. APRIL 15

Session 2 9:00-12:00

Why Plutonium Now?

Luncheon 12:15-14:15 Large Meeting Room Conference Center, 3F Pacifico Yokohama

Film Show 13:00-14:00 Main Hall Conference Center, 1F Pacifico Yokohama

Session 3 14:30-18:00

Nuclear Technology --from a Reliability Engineering Viewpoint

#### FRI. APRIL 16

Session 4 9:00-12:30

Seven Years After the Chernobyl Accident --What is the Real Truth?

Session 5 14:00-17:30

Ways of International Nuclear Non-Proliferation --Meeting the New Situation

#### Basic Theme

Nuclear Energy --- for the Earth's Future

WEDNESDAY, APRIL 14

#### OPENING SESSION 9:00 - 13:15

- Chairman: Masao Tani President Hokuriku Electric Power Co.
- Remarks by Chairman of Program Committee Hajime Karatsu Chairman Program Committee Professor Tokai University
- JAIF Chairman's Address Takashi Mukaibo Chairman Japan Atomic Industrial Forum, Inc.
- Remarks by Chairman of Atomic Energy Commission Mamoru Nakajima Minister of State for Science and Technology
- Special Lecture: "A Planetary View of Nuclear Power" James E. Lovelock Fellow of the Royal Society, UK
- Chairman: Shozo Shimomura President Japan Atomic Energy Research Institute
- Invited Lectures: "International Co-operation for the Safe and Peaceful Use of Nuclear Power" Hans Blix Director General International Atomic Energy Agency
- "Nuclear in the United States: The Challenge of Change" E. Gail de Planque Commissioner U.S. Nuclear Regulatory Commission
- "Nuclear Power in Russia: Today and Tomorrow" Viktor N. Mikhailov Minister for Atomic Energy of the Russian Federation

Chairman: Kiyoshi Nozawa President Japan Nuclear Fuel Limited "The Status and Prospects for Nuclear Power Development in China" Jiang Xinxiong President China National Nuclear Corporation "Prospects for Nuclear Energy in France and the Research Programme on the Back-End of the Fuel Cycle" Yannick d'Escatha Deputy Administrator General Commissariat à l'Energie Atomique France SESSION 1 14:30 - 18:15 Directions about Japan's Nuclear Future Chairman: Takamitsu Sawa Professor Director, Institute of Economic Research Kyoto University Keynote "Issues on Long-Term Program for the Development and Utilization of Nuclear Energy" Mamoru Akiyama Professor University of Tokyo Panel Discussion Panelists: Mamoru Akiyama Professor University of Tokyo Yoichi Fujii-e Professor Director, Research Laboratory for Nuclear Reactors Tokyo Institute of Technology Edward D. Fuller President Elect American Nuclear Society Colette Lewiner President European Nuclear Society Hajimu Maeda Director Kansai Electric Power Co., Inc. Commentators: Edison C. Brolin Acting Assistant Secretary for Nuclear Energy U. S. Department of Energy

Iyos Subki Deputy Director General National Atomic Energy Agency Indonesia

#### Discussion with the Audience

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

JAIF CHAIRMAN'S RECEPTION 18:30 - 20:00 LARGE MEETING ROOM, CONFERENCE CENTER, 3F, PACIFICO YOKOHAMA

THURSDAY, APRIL 15

#### SESSION 2 9:00 - 12:00 Why Plutonium Now?

Chairman: Hiroyuki Torii Editorial Writer Nihon Keizai Shimbun

#### Keynote

Hiroto Ishida Director General Atomic Energy Bureau Science and Technology Agency

#### Panel Discussion

Panelists: Tadao Ishibashi Attorney at Law

> Tokio Kanoh Director Tokyo Electric Power Co.

Saburo Kikuchi Director Policy Planning Division Power Reactor and Nuclear Fuel Development Corp.

Shiro Segawa Science Writer The Mainichi Newspapers

#### Discussion with the Audience

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

#### LUNCHEON 12:15 - 14:15

LARGE MEETING ROOM, CONFERENCE CENTER, 3F, PACIFICO YOKOHAMA

Remarks by Minister of International Trade and Industry Yoshiro Mori Minister of International Trade and Industry

Special Lecture

"Kokoro to Kotoba (Heart and Word)" Jun Eto Literary Critic Professor Keio University

#### FILM SHOW 13:00 - 14:00 MAIN HALL, CONFERENCE CENTER, 1F, PACIFICO YOKOHAMA

Latest films on Japan's nuclear research and development activities will be presented to those who are not attending the Luncheon. Films are in Japanese only.

<u>SESSION 3 14:30 - 18:00</u> Nuclear Technology --- from a Reliability Engineering Viewpoint

Chairman: Ryoju Katsube Journalist

Keynote

"Nuclear Technology and Reliability Engineering" Hajime Karatsu Professor Tokai University

Panel Discussion

Panelists:

Masanori Ozeki President Railway Technical Research Institute

Ayatomo Kanno Professor Science University of Tokyo

Masao Nakamura Editorial Writer The Yomiuri Shimbun

Masaharu Fujitomi Director Nuclear Power Safety Administration Division Agency of Natural Resources and Energy Ministry of International Trade and Industry

Shojiro Matsuura Executive Director Japan Atomic Energy Research Institute Commentator: Mr. Jürgen A. Paleit Managing Director URENCO Limited

#### Discussion with the Audience

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

#### FRIDAY, APRIL 16

SESSION 4 9:00 - 12:30

Seven Years After the Chernobyl Accident --- What is the Real Truth?

Chairman: Eizo Tajima President Nuclear Safety Research Association

#### Keynote

"Evaluation of Effects of the Chernobyl Accident" Atsushi Kuramoto Professor Director, Research Institute for Nuclear Medicine and Biology Hiroshima University

#### Panel Discussion

Panelists:

Eugene P. Ivanov Director Research Institute of Hematology and Transfusion Ministry of Public Health Belarus

Goro Koide Commentator, Science and Technology NHK (Japan Broadcasting Corp.)

Atsushi Kuramoto Professor Director Research Institute for Nuclear Medicine and Biology Hiroshima University

Gillian K. Reeves Statistical Epidemiologist Imperial Cancer Research Fund Cancer Epidemiology Unit UK

Anatoly F. Tsyb Academician of Russian Academy of Medical Science Director of Radiological Science Center

#### Discussion with the Audience

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

#### <u>SESSION 5 14:00 - 17:30</u>

## Ways of International Nuclear Non-Proliferation --- Meeting the New Situation

Chairman: Mitsuro Donowaki Ambassador for Arms Control and Disarmament

#### Keynote

"Ways of International Nuclear Non-Proliferation" Ryukichi Imai Senior Counselor Japan Atomic Industrial Forum. Inc. Former Ambassador to the Conference on Disarmament in Geneva

#### Panel Discussion

Panelists:

Ishfaq Ahmad Chairman Pakistan Atomic Energy Commission

Hans Blix Director General International Atomic Energy Agency

Hubert de La Fortelle Director International Relations Division Commissariat à l'Energie Atomique France

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

Benjamin Sanders Executive Chairman Programme for Promoting Nuclear Non-Proliferation

#### Discussion with the Audience

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

#### WEDNESDAY, APRIL 14

OPENING SESSION 9:00 - 13:15

Special Lecture

Invited Lectures

#### A planetary view of nuclear power.

by James E. Lovelock

Space exploration let us see the Earth from outside, something never seen before. We saw a stunning vision of a beautiful blue white sphere that has grown to become an icon almost religious in significance. We also had, through scientific instruments, a top down view of our planet, something holistic and unusual in the world of modern science.

That sight of the Earth from space changed science and philosophy and let us see the consequences of our presence and how we were changing the surface and the atmosphere. That spectacle, so different from the dead planets Mars and Venus, led me to see the Earth as a self regulating system, an entity made of the living organisms and their material environment tightly coupled. This is Gaia theory, a view that comes from science, even if not yet generally accepted. It is a theory that predicts a different future, one where sudden nonlinear changes in the environment are possible. Conventional wisdom, by contrast, predicts changes proportional to pollution and disturbance and these give a false impression that environmental change is progressive but reversible. If I am right and the climate and the environment are regulated, we are now usurping this natural function and in ignorance. We and our livestock are now so numerous as to use 40% of the total carbon photosynthesised. The use of power from fossil fuel combustion, and the destruction of natural ecosystems to provide farm land, was harmless when there were only one billion people. Now we are so many these acts threaten all of us and the contemporary biosphere. We are making unprecedented changes in the composition of the land surface and the atmosphere, and we do not know the consequences. Scientists who make predictions of the future climate and pattern of the Earth do so with computer models that include little more than the gases of the air. They do their best, but will freely admit that their models of the Earth rarely includes clouds, the ocean and the ecosystems. They do not yet know how to include them. Today predictions of the future may be little more than guesses; we have to use them for they are all we have. When we act, or do nothing, let us think of ourselves as part of, or partners in, a delightful super-organism that is the Earth. If we take this planetary view then it is the Earth, not humankind, that comes first. The climate and the air we breathe are not some accidental consequence of geochemistry, they are the properties of the super-organism. In the future we shall need to use technology wisely and with circumspection, and in it nuclear power must have an important place.

"International Co-operation for the Safe and Peaceful Use of Nuclear Power"

Speech by Hans Blix, Director General, IAEA at JAIF Annual Conference, 14 April 1993

Summary

Safe and peaceful use of nuclear power are twin, fundamental goals for the nuclear community, for the IAEA and the world at large. In both respects, 1993 presents a series of vital opportunities that must not be missed.

As regards safety, there is never room for complacency. In a gratifying trend, use of both the IAEA's safety-related services and of the International Nuclear Event Scale is widening and increasing. Work that has begun on an international safety convention is continuing, but a number of differences as to scope and modalities remain to be reconciled among States currently negotiating the extent of common ground.

One region of the world - Eastern/Central Europe and the former Sovict Union - continues to give rise to particular concerns from a safety viewpoint, but many initiatives are underway to assist with improvements. This is important, since such help is overdue and nuclear is clearly going to continue playing a major role in the energy mix of many countries throughout this region.

Among the various bodies playing a role to differing degrees - in addition to the IAEA - are the G-7, the G-24, the Commission of the European Communities, the European Bank for Reconstruction and Development, the European Investment Bank, the World Association of Nuclear Operators, the World Bank, and lately the United Nations Economic Commission for Europe and the United Nations Development Programme (UNDP); this is in addition to a wide range of bilateral initiatives and "twinning" arrangements. The IAEA has set up a data bank to record all of this activity to provide an overview for decision-makers, helping thereby to detect possible duplication or omissions.

Momentum is gathering, but an immense task lics ahead in this vast region at a time when donor countries are facing many calls on often increasingly limited resources. The IAEA for its part will continue its diagnostic work beyond the VVER-440/230s to encompass ultimately various aspects of the VVER-440/213s, the VVER-1000s and the RBMKs.

Turning to the task of ensuring the continuing peaceful use of nuclear power, nonproliferation has been much in the news of late - in relation to Iraq, North Korea and South Africa, for example, as well as to the States of the former Soviet Union and to the controversial issue of plutonium, at which a "fresh look" is currently being taken within the IAEA. While there has been much good news - including the negotiation of START-1 and START-2, the nuclear test moratorium, auguring well for the 1995 Conference on the Non-Proliferation Treaty - the revelations about the clandestine nuclear programme in Iraq raised the issue of how to identify non-declared installations. The denial of access to locations in the DPRK for safeguards inspection and that country's notice of withdrawal from the NPT raise grave issues.

Experience in Iraq has accelerated a strengthening of IAEA safeguards in a number of areas, including the sharing of additional information from outside sources on possible undeclared materials, activities or sites; the reaffirmed right to seek special inspections of such sites; and the introduction of a voluntary - and hopefully one day universal - scheme to report to the IAEA the export and import of nuclear materials, specified equipment and certain relevant non-nuclear materials for a data base. Thus, Iraq may prove to be a salutary lesson, if the necessary consequences are drawn.

There is the imminent prospect of a significantly increased inspection workload for the IAEA in the ex-USSR, Latin America and elsewhere. To some extent this may be compensated by manpower freed up by a new work-sharing agreement with EURATOM in respect of EURATOM Member States. If the Agency were to be entrusted with special duties in verifying the peaceful use of weapons-usable material resulting from disarmament or otherwise, this would constitute new challenges and require new resources.

Through continuing and intensified international co-operation - both in safety and nonproliferation - the benefits for mankind of nuclear power as a major, environmentally friendly and readily available source of energy can be successfully assured in decades to come.

#### NUCLEAR IN THE UNITED STATES: THE CHALLENGE OF CHANGE

Dr. E. Gail de Planque, Commissioner United States Nuclear Regulatory Commission

The continued peaceful use of nuclear energy and nuclear materials depends critically on protecting the public in all countries around the world from any harmful effects of radiation. The nuclear community of today is a small world, and must work together to meet the challenges before us, the challenges of our ever changing environment.

In the United States, there have been many changes in the past few years, creating challenges for society as a whole as well as for the nuclear community. Among these changes was the enactment last October of the Energy Policy Act of 1992, codifying a National Energy Strategy for the United States. This statute affects such major nuclear issues as plant licensing, advanced reactors, uranium enrichment, and high-level radioactive waste. The full effect of challenges arising from these changes will take some time to unfold.

Also of note in 1992 was the U.S. Supreme Court decision that ruled unconstitutional the "Take Title Provision" of the 1985 Low-Level Radioactive Waste Policy Amendments Act. This provision obligated states to take legal title to, and possession of, low-level waste from generators within their jurisdiction or be liable for all damages if disposal facilities were not provided by either the state or a compact on January 1, 1996. The potential impact of this high court ruling on low-level waste management and thus on the nuclear community is still unclear.

Changes are also occurring as the United States moves from the Bush to the Clinton administration. A hint of possible changes came when President Clinton delivered his address to Congress on February 17, 1993. In this address he proposed a new energy consumption tax, levied according to energy content as measured in British Thermal Units (BTUs). He also stated his intention to reduce research funds for certain advanced reactors. However, at this juncture it is too soon to tell how these proposals will materialize and how the new administration will actually shape energy policy as it relates to nuclear power.

Meanwhile, the U.S. Nuclear Regulatory Commission is moving ahead in the areas of license renewal, new reactor design certification, low-level and high-level waste storage and disposal, and decontamination and decommissioning.

While the U.S. is facing the challenge of change on the homefront, the global situation continues to evolve, impacting the U.S. along with the rest of the international nuclear community. International challenges include those arising from political change in the Former Soviet Union and Eastern Europe, the attempt to establish internationally accepted levels of safety through an International Nuclear Safety Convention, the effort to ensure adequate and effective safety and safeguards programs through the International Atomic Energy Agency and all its member states, and the issues facing all nations regarding nuclear waste.

While change may bring challenge, from challenge often springs strength and commitment. Together, the countries of this world must face the challenge of change and work together to ensure that peaceful uses of nuclear energy and nuclear materials are available for the benefit of humankind and the environment.

#### SUMMARY of the report "Nuclear Power in Russia: Today and Tomorrow"

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

After several years of comparative uncertainty of prospects of nuclear power in Russia, following Chernobyl accident and transformation of political and economic systems of the country, by now rather clear milestones of its further development have shaped out. These objective milestones are subject to the existing economic and ecological situation.

The program of economic reforms in Russia should be based on reliable energy supply for all elements of industrial and economic complex, that is impossible to provide without a clear concept of state energy policy, including sound long-term goals, for a large country like Russia.

The concept of nuclear energy production development defines its position and role in the energy and fuel complex of the country, directions of its development and poses practical tasks, based on strategic long-term goals.

This concept should be considered as a flexible strategy of the branch development, periodically specified, planned to be practically implemented as a Minatom Complex program of nuclear energy production development in the Russian Federation by the year of 2010.

In spite of the modest impact (3%) in the energy balance of the country, nuclear power currently occupies key positions in a number of most important electric and energy systems of Russia and in the prospect will be the most economically expedient source of energy in many regions. Taking into account the known advantages of nuclear energy, the share of electricity production applying nuclear sources of energy can be increased in the average up to 30% for Russia on the whole, and to 50% for its European part.

It is evident that further sound development of nuclear energy production requires unconditional safety of operating NPPs and designing new generation of reactors, making maximum use of their ecological and economic advantages. Creation of such high safety level plants is a national task of an important social and economic significance.

In the framework of this program development of branch energy production will be carried out in the scope, required to compensate NPP facilities being exhausted and to substitute the number of exhausted thermal solid fuel plants' units with the total comparatively low increase of NPP's capacity. The established capacity of nuclear power plants should be increased from 20 GW in 1992 to 27.5 GW in 2000 and up to the level of 40.0 GW in 2010, providing production of 260 billion kW/h. The critical forecasted characteristics of the program envisage three different variants of its financial backing, including those with the maximum utilization of non-budget sources. Taking into consideration the real state of atomic energy production and economy of Russia, the program is divided into following stages:

- 1993-2000: during this "imposed", "renovation" period upgrading of operating power units and enhancement of their safety will take place, followed by unsubstantial increase of NPPs' capacity due to construction works started earlier. To provide for the sound development of the nuclear energy production on the second stage, the first one will include designing and construction of pilot power units of new generation ("with upgraded safety") on the bases of existing technologies. By the end of this stage small capacity pilot power units will have been constructed to provide energy supply for remote and inaccessible regions.

- 2000-2010: this stage is characterized by capacity increase through new generation power units. This is the beginning of a systematic process of decommissioning units, that have exhausted their project resources.

Post-2010 stage is considered large-scale nuclear energy production period. Its technological basis will be prepared during the previous stage with respect to the status of fuel supply and ecological problems.

The text of the program contains critical measures to ensure safety of the nuclear energy production. NPPs staff training, implementation of the necessary R&D complex, development of experimental research basis, international, social and legal activities.

The expert analysis confirmed technical ability of the branch to implement the complex program provided the unconditional safety of nuclear energy production development is ensured.

It is necessary to note that the program in question is already being practically implemented: at the end of 1992 the Government of the Russian Federation has adopted a decree, which actually constitutes the program of NPP's construction in Russia to the year of 2010. Implementation of this program is planned to be carried out in strict correspondence with the existing legislation of the Russian Federation concerning environment protection, public opinion and with concept of local and regional state authorities to construct nuclear energy facilities in their territory. The positive conclusion of the State Ecological Examination body is required to adopt any technical project of construction of a NPP.

The named Decree slows down stagnation in the branch, demonstrates available possibility of adoption safe and saving energy sources with nuclear fuel application in the energy producing system of the country. It provides the permanent development of atomic energy production, combining evolutionary enhancement of existing and development of new, perspective technologies.

#### THE STATUS AND PROSPECTS FOR NUCLEAR POWER DEVELOPMENT IN CHINA

JIANG Xinxiong

President China National Nuclear Corporation April 1993

#### ABSTRACT

A brief introduction is given, at first, to the status of nuclear power generation in China since 1980's, in which the emphasis is put on the progress of Qinshan NPP, a prototype 300 MW (e) PWR project, and Daya Bay NPP, a commercial  $2 \times 900$  MW (e) PWR as a JVC project between the mainland of China and Hong Kong. A general description follows on the program for development of nuclear energy in China around the year 2000, including Qinshan phase II  $2 \times 600$  MW (e) PWR project, which has already been started this year with the detailed design and the site excavation. Meanwhile, upgrading and expansion of the nuclear fuel cycle, which was initiated in 1950's, are parallelly being carried on to meet the demand of nuclear power generation. The introduction is concluded with a briefing on the national policy for development of nuclear energy and ensurance of nuclear safety.

A light is shed upon, in the following part, the efforts for China to strengthen its international cooperation in the field of nuclear energy and nuclear safety since 1980's, as well as the contribution made to the NPT based upon the national "further reforming and more open policy", i. e. the policy of enhancing international cooperation on the basis of self-reliance for development of nuclear power, the policy of not advocation, encouraging or going in for nuclear proliferation and the principle for nuclear import and export. A sincere wish is expressed before the end that China is willing to promote its international cooperation with foreign countries for developing nuclear energy, and ready to make its due contribution to the benefit of mankind.

### PROSPECTS FOR NUCLEAR ENERGY IN FRANCE AND THE RESEARCH PROGRAMME ON THE BACK-END OF THE FUEL CYCLE

J.A.I.F. 93 by Yannick d'ESCATHA

Deputy Administrator General

COMMISSARIAT A L'ENERGIE ATOMIQUE - FRANCE

The guiding lines of the French energy policy are, besides a rational utilization of energy, a competitive and largely independent capacity of energy production taking into account the preservation of nature. Nuclear energy meets these conditions particularly well and some fifty pressurized water reactors provide the country with 75 % of its electricity requirements.

PWRs will still make the bulk of the next generation of French reactors at the beginning of the next century whereas fast reactors could be used to burn plutonium and later to cope with foreseeable limitations in natural resources.

Beyond the N4 model which is under construction or planned in a short term, the new PWRs will be developed in an European framework : the European Utility Requirements and the French-German EPR project (European Pressurized water Reactor).

The French strategy involves a complete fuel cycle industry and relies mainly on the reprocessing of spent fuels which allows complete closure of the fuel cycle. At this time, 5000 tons of spent fuel have been reprocessed in La Hague and 1700 blocks containing high level wastes vitrified.

However due to the delay in introducing FBR in the economical context and to public acceptance problems regarding plutonium and radwaste, different ways are tested to regulate the plutonium stockpile and to improve the management of high level long-lived radwastes.

In this context, the reactors should ensure optimum plutonium consumption and produce a minimum amount of long-lived wastes. Plutonium recycling in existing PWRs is applied since 1987 at a rate of 30 percent MOX assemblies in the core of 900 MWe reactors. Today five units are loaded with this fuel. Melox, the Cogema's Marcoule plant under construction, with a 120 t MOX a year capacity, will bring the possibility of loading sixteen units, even more if needed.

High level waste management and disposal have now to be solved in the framework of the December 1991 law which sets up guiding lines for R&D in this area and foresees to choose in fifteen years the best solution for a possible underground final disposal.

As to low level waste, a new storage center with a 1 million m<sup>3</sup> capacity has been opened by ANDRA (Agence Nationale pour la Gestion des Déchets Radioactifs) near Soulaines (Centre de Stockage de l'Aube).

In preparing the future, CEA, the national R&D organization devotes an important part of its studies to the back-end of the fuel cycle.

As to plutonium recycling in existing PWRs, the CEA is supporting the fabrication of MOX fuel and studying the improvement of MOX performances. Moreover, now PWR fully loaded with MOX are investigated and the CAPRA project will determine the bost way to increase the plutonium consumption in fast neutron reactors.

The SPIN programme -for SeParation and INcIneration- includes studies on advanced reprocessing techniques and on ways of incinerating long-lived wastes as minor actinides (Np, Am, Cm) and few fission products. Superphenix should contribute to such a demonstration in addition to the Phenix experiments.

Extensive studies are also underway in relation with ANDRA concerning possibilities of temporary or retrievable waste storages and underground laboratories.

#### WEDNESDAY, APRIL 14

SESSION 1 14:30 - 18:15

#### Directions about Japan's Nuclear Future

The Atomic Energy Commission has decided to revise its Long-Term Program for the Development and Utilization of Nuclear Energy formulated in June, 1987. The commission has been in review since September, 1992. This session is intended to discuss ways for development and progress of nuclear energy in Japan. In other words, the position of nuclear energy and its role in Japan, including measures to be taken for promoting research and development, international cooperation, the development of nuclear fuel cycle, and the management of high level radioactive waste will be among the themes for discussion. Participants will be invited to join in the debate and it is hoped that their opinions and ideas would help broaden this new program spectrum.

Discussion with the Audience

JAIF CHAIRMAN'S RECEPTION 18:30 - 20:00

LARGE MEETING ROOM, CONFERENCE CENTER, 3F, PACIFICO YOKOHAMA

#### Issues on Long-Term Program for the Development and Utilization of Nuclear Energy

#### Mamoru Akiyama Professor, the University of Tokyo

Although Japan is not blessed with its own energy resources nor vast levels of land due to its natural environmental conditions, it realized a high degree of social, economic, and cultural prosperity on the basis of industrial production capability of a high level in the modern times and has maintained it to the present. In order for Japan, which has a high population density, to continue developing, it can be said essential to secure and improve technological capability and appropriate supply of energy resources.

Now, if we see the entire world, we realize that creative developments in academic disciplines, culture, industry, social structure, lifestyles, etc. can be expected in the near future that accompany a rapid progress in advanced informatization. On the other hand, however, we are now in the situation where there is a greater concern for environmental degradation on the global scale and more intense conflicts in international politics and economy entailed by the North-South problem and multiracial issues.

Bearing these elements in mind, Japan has to secure energy resources and maintain and improve advanced industrial production in order to continue its development. From now to the future, it is essential for Japan to introduce creative scientific technology to the world and cultivate philosophy and theories that lead to new world view and system of values. It is strongly desired of Japan to make a great contribution to mitigation and solution of global and long-term problems through positive participation in efforts to construct more rational international frameworks of various kinds. It is also thought to be an international obligation that Japan has to bear.

Nuclear energy brings about vast advantages in terms of energy and radiation use. Many countries have taken the lead in its development and utilization, which have led the most advanced science and technology in any period of time since nuclear energy became a subject of science. In Japan also nuclear energy development and utilization have been steadily promoted under Long-Term Program for the Development and Utilization of Nuclear Energy.

However, recent critical aggravation in global environmental problems, confusion in the scenes of international politics after the Cold War, and a greater concern for nuclear proliferation signify a new situation that has never been experienced. On the other hand, a further consideration should be given to countermeasures against several issues in Japan, for instance, the aging society, the trend among students to avoid working for engineering and manufacturing arena, and difficulties in nuclear power plant siting. The current, ongoing review of the Long-Term Program is based on a point of view which is broader and more flexible than before. Fundamental issues pointed out in the review process from a long-term point of view include: 1)establishment of nuclear energy as a key energy source (involving prospect and role of nuclear energy, development of next-generation reactors, and smooth promotion of sitings) 2) comprehensive development strategy based on a long-term outlook (involving fast breeder development, plutonium use, and disposal of radioactive waste), and 3) enhanced promotion of fundamental science and technology (involving reinforcement of fundamental research, cultivation of frontiers in nuclear energy, and promotion of leading projects.)

Basic issues cited in terms of an international point of view include: 1) nuclear non-proliferation and the role therein (involving effort toward higher that Japan should play transparency in nuclear energy development in Japan, positive contribution to maintenance and reinforcement of the nuclear nonof fast breeder proliferation regime, and flexible use technology) and 2) the role Japan should play as an advanced country in nuclear technology (involving contribution to ensuring nuclear power safety on an international level and cooperation with developing countries). Fundamental issues cited from a point of view for obtaining understanding and reliance by the people include: 1) promotion of understanding by the people (involving coexistence of nuclear energy and local communities), 2)fostering of trust by the people (involving positive achievements of safe operation and of nuclear energy development), and 3) compilation of a plan that is understood and supported (involving the open Long-Term Program).

Above all, on the premise that the peaceful use and safety of nuclear energy are assured toward the future, major issues in smooth promotion of nuclear energy uses by countries of the world from a global point of view and under international mutual understanding include an international grand design for nuclear energy development and utilization based on a long-term point of view, use and control of plutonium, and technology and system for ensuring safety of nuclear energy facilities. Moreover, in order to obtain an understanding of and support for nuclear energy by greater number of people, it is important to emphasize a а fully attractive thoroughly that nuclear energy has science, potentiality and an extremely important role for culture, and social activities in general, through implementation of leading and fundamental R & D programs and educational and the light of globalization activities. In propagational closer effective nuclear energy, and more concerning а international cooperation is essential for efforts related to examination of what issues. addition, deeper those In regulations should be like international standards and constitutes an urgent agenda. The review of the Long-Term Program for the Development and Utilization of Nuclear Energy is going on mainly over fundamental views on important issues indicated above. Needless to say, quantitative analysis and assessment based on the current system and regime are being conducted earnestly at the same time. In the Session 1, I would like to raise issues by presenting several specific issues and opinions taken from those processes.

#### THURSDAY, APRIL 15

SESSION 2 9:00 - 12:00

#### Why Plutonium Now?

The Japanese program for utilization and development of plutonium is making progress, including quantities to be handled and transported. There are strong arguments for and against the use of plutonium. Using plutonium or not is a question of crucial importance because it is the key to determining whether or not nuclear power can contribute to achieving the stability of a long-range supply of energy. Its comparison with other materials and energy sources will be made in an approach to the question "What is plutonium?" as this opens the debate in this session. Potential risks including its toxicity, possible diversion to other applications, etc., methods of its management, its economic performance, and the way information should be supplied will be discussed, with a view to promoting public understanding of plutonium.

#### Keynote for Session 2

Hiroto Ishida Director General, Atomic Energy Bureau Science and Technology Agency [MEMO]

#### THURSDAY, APRIL 15

LUNCHEON 12:15 - 14:15

LARGE MEETING ROOM, CONFERENCE CENTER, 3F, PACIFICO YOKOHAMA

Special Lecture

Jun Eto Literary Critic Professor, Keio University [MEMO]

THURSDAY, APRIL 15

SESSION 3 14:30 - 18:00

#### Nuclear Technology --- from a Reliability Engineering Viewpoint

Knowledge and knowhow are indispensable for the advancement of technology. But information, if supplied, is not clear enough for the people to understand how advancements have been made, what experience has been gained from it, and what merits have been found in technological development. Of all advanced technologies, nuclear is most typical of this tendency. This session is intended to see how people can be supplied with accurate information and led to have a more correct understanding of nuclear technology. What nuclear technology is in terms of reliability engineering and how accidents and failures should be discussed hopes viewed will be in of offering further and failures. clarification accidents on the notions of Eventually, outstanding problems in nuclear technology will come to light in a bid to discuss ideas for the assurance of reliability.

Discussion with the Audience

#### Nuclear Technology and Reliability Engineering

Hajime Karatsu Tokai University Tokyo

Safety was the first issue of nuclear technology up till today, and fruitful result was brought by study and improvement from the viewpoint of "Safety First".

On the other hand, in the field of space development, aeronautics, electronic engineering, reliability engineering has been developed for the purpose of improving maintainability and also eliminating hazardous trouble caused by human error.

Products made in Japan have been well known all over the world for their excellent quality, and Quality Management activity received fame as the methodology for attaining high quality products. However, at the same time, reliability engineering should be known as it plays an important role for manufacturing high quality goods.

The Reliability Engineering Association of Japan (REAJ) is quite active in stimulating the manufacture of reliable products and also opening symposiums several times every year.

The missions of reliability engineering and safety engineering are the same, in realizing the decrease of failure rate. However, the targets of each are different. In reliability engineering, reducing failure rate is the means and not the final target. That is improvement of operation rate, which means that the machine is sure to work well.

So, many specific methods developed. One of them is redundant design engineering. In the case of aeronautical engineering, dual or triple systems of engine control and navigation are installed in the airplane for avoiding fatal states by accidental failure of machines. Easy to replace design is requested to make down time as short as possible.

In the aeronautic field, frequency of human errors has become the highest rate among all troubles. For overcoming human error, human engineering and foolproof systems have been developed and introduced everywhere. We can say that accumulated knowledge learned from accidents of the past have brought the safety of the plane today.

Reliability technology requests the system to work well even if any component might fail. Actually, all aircrafts, computers and satellites operate satisfactorily, with no problem today.

From the standpoint of reliability engineering, we can learn much more from nuclear technology. Invaluable merit can be gained by docking the two technologies. In the case of nuclear power station, safety might be realized by shutting down all equipments when there is trouble. However, the airplane must land safely at an airport when any failure takes place in the sky. We cannot be sure to make a machine with absolutely no failure. But, from the viewpoint of reliability engineering, we are satisfied if we can avoid an accident under any failed state

Japanese newspapers often report as an accident whatsoever slight a failure is brought up. The concepts "accident" and "failure" are different inherently. The Shinkansen(Super Express Train) is the safest railway in the world because there has been no accident since operation has started in 1964. A damaged car does not always cause an accident. The terms "damage" and "accident" are also different in meaning.

So, I would like to suggest to introduce reliability engineering to the nuclear technology. The knowhow which has been accumulated from failure analysis of many accidents will be valuable to us for realizing high reliable operation of nuclear power station.

Technology, inherently, is a battle against grey and uncertain areas. In scientific analysis, new knowledge is valuable, which can discriminate white or black by analyzing ambiguous phenomena. On the contrary, in the field of technology, we cannot wait for the time to clear up "yes" or "no". We must go on with the work even if reason is under the state of ambiguity.

Statistical analysis has been developed as the method of coping with uncertain and ambiguous phenomena. Dr.R.A.Fisher, engineer of the Royal Agricultural Laboratory of U.K., developed "Design of Experiment" to handle observed data given by agricultural experiment. Following the concept of statistical analysis, Dr.Walter A.Schewhart of Bell Laboratory gave an idea of Statistical Quality Control for detecting optimum point of making things. Reliability engineering followed the methodology of statistics for the purpose of pointing out the optimum of manufacturing process.

We should make effort to realize stable and reliable operation of nuclear power station by gathering every kind of knowledge possible. [MEMO]

#### FRIDAY, APRIL 16

SESSION 4 9:00 - 12:30

### Seven Years After the Chernobyl Accident --- What is the Real Truth?

Seven years after the Chernobyl accident, there is still a information as diverse range of to the human-body and environmental impact of radioactive materials released after the accident. Even in the former-Soviet Union. the results of technical report on International Chernobyl Project have not been explained to the public yet. This is due to the fact that conflicting pieces of information on the evaluated effects of the Chernobyl accident have left people wondering what the truth really is. This session will try to find out what is regarded as detrimental concerning the effects of the accident. Probing into the background to what is responsible for the confusion, it will attempt to make clear what the real truth is and what response will be required in the future.

Discussion with the Audience
#### Evaluation of Effects of Chernobyl Accident

Atsushi Kuramoto Director Research Institute for Nuclear Medicine and Biology Hiroshima University

On 26 April 1986, a serious accident occurred at the Chernobyl nuclear power plant in the former Soviet Union. This was an unprecedent unclear power plant accident in the sense that an enormous amount of radioactive substances was released into the environment.

In October 1989, three years and a half after the accident, the former Soviet government requested the International Atomic Energy Agency (IAEA) to carry out an international project in which experts will study effects of the accident on environment and residents in the areas adjacent to Chernobyl. The major purpose of the project was to make an overall evaluation of the appropriateness of the actions taken by the Soviet government to protect the residents from the adverse effects of radioactive substances.

In response to this request, the International Advisory Committee (IAC) chaired by Dr. Itsuzo Shigematsu, Chairman, Radiation Effects Research Foundation, was established, and under its direction, an extensive survey was initiated in May 1990. Today, I will present a general overview of the results of the International Chernobyl Project that was conducted for about one year, a report of which was compiled and published in May 1991, and then touch the survey of radiation health effects among the residents of the exposed area, in which I was involved, and reports from various institutions on the health effects during the seven years after the accident.

The Project report consists of five chapters, "Historical Description," "Environmental Contamination," "Radiation Exposure of the Population," "Health Impact," and "Protective Measures," in each of which a detailed analysis is provided. On "Environmental Contamination," the report goes as follows: "Measurements and assessments carried out under the Project provided general corroboration of the levels of surface contamination for caesium as reported in the official maps that were made available to the Project. Analytical results from a limited set of soil samples obtained by the Project teams corresponded to the surface contamination estimates for plutonium but were lower than those for strontium. The concentrations of radionuclides measured in drinking water and food from the areas investigated were significantly below guideline levels for radionuclide contamination of food moving in international trade and in many cases were below the limit of detection. The analytical capabilities of Soviet laboratories appeared to be adequate."

Assessments of the other items are summarized as follows:

"Radiation Exposure of the Population": "The official procedures for estimating doses were scientifically sound. The methodologies that were used were intended to provide results that would not underestimate the doses. For independent measurements of external exposure for the Project, 8,000 film badge dosimeters were distributed to residents of seven settlements. Ninety per cent of the results were below the detection limit of 0.2 mSv for a two-month exposure period. This result is in agreement with what would be expected on the basis of calculational models.

Doses from incorporation of caesium in the first four years after the accident were estimated on the basis of measurements of incorporated caesium, including both <sup>134</sup>Cs and <sup>137</sup>Cs. The procedure for estimating doses from these measurements is in accordance with that used in the independent evaluations made under the Project. Independent Project estimates for the surveyed contaminated settlements were lower than the officially reported dose estimates."

"Health Impact": "Field studies were undertaken of continuous residents of rural surveyed contaminated settlements [with surface contamination higher than 555 kBq/m<sup>2</sup> (15 Ci/km<sup>2</sup>) due to caesium] and surveyed control settlements of 2,000 to 50,000 persons, using an age matched study design. Adverse health effects attributed to radiation have not been substantiated by these studies. On the basis of the doses estimated for the residents of the contaminated settlements (excluding those evacuated living within 30 km from the unclear power plant and those engaged in decontamination work), it was found that the doses were not high enough to predict any future increase over the natural incidence of all cancers or hereditary effects."

"Protective Measures": "In those cases in which the Project teams were able to assess early actions taken by the authorities, it was found that the general response of the authorities had been broadly reasonable and consistent with internationally established guidelines prevailing at the time of the accident. The protective measures taken or planned for the longer term, albeit well-intentioned, generally exceed what would have been strictly necessary from a radiological protection viewpoint."

#### FRIDAY, APRIL 16

SESSION 5 14:00 - 17:30

### Ways of International Nuclear Non-Proliferation --- Meeting the New Situation

The cold war has ended, but the world is still searching for ways of disposing of nuclear weapons. In two years' time we will decision of whether to extend the Nuclear face the Non-Proliferation Treaty (NPT) or not. East Asian nations, as well as developed countries, are pushing ahead with their programs for the peaceful use of nuclear energy. As the worldwide movement of nuclear disarmament has gathered momentum, nuclear material to be extracted from dismantled nuclear weapons are increasing. The ways toward international nuclear non-proliferation are now important in a sense different from what they were previously. In this session, the significance and role of the NPT will be reviewed, as it is intended, from considerations of continuing the treaty into the years beyond 1995, to discuss ways and means of maintaining and strengthening the international nuclear nonproliferation regime.

Discussion with the Audience

### Ways of International Nuclear Non-Proliferation

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

Member List of the Program Committee for the 26th JAIF Annual Conference

> (in alphabetical order) as of March 31, 1993

Chairman Hajime Karatsu Professor Tokai University

Members Kiyofuku Chuma Deputy Chairman, Editorial Board The Asahi Shimbun

> Fusako Fujiwara Columnist

Kiyoshi Fushiya Executive Vice President Japan Nuclear Fuel Limited

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

Kumao Kaneko Professor Tokai University

Michiko Miyamoto Associate Professor Chiba University

Hiroshi Murata President Japan Atomic Energy Relations Organization

Masao Nakamura Editorial Writer The Yomiuri Shimbun

Kojiro Nishina Professor Nagoya University

Kenjiro Ogata Adviser to the President The Bank of Tokyo, Ltd.

Marino Osami Manager Japan Consumers' Association

Hidetake Sawa Journalist Hiroshi Sekimoto Professor Tokyo Institute of Technology

Shozo Shimomura President Japan Atomic Energy Research Institute

Mamoru Sueta Executive Director The Committee for Energy Policy Promotion

Yoshihiko Sumi Senior Managing Director The Kansai Electric Power Co., Inc.

Atsuyuki Suzuki Professor The University of Tokyo

Isamu Takagi Executive Director The Federation of Electric Power Companies

Yasumasa Tanaka Professor Gakushuin University

Yasumasa Yahagi Chairman Nuclear Energy Policy Planning Committee The Japan Electrical Manufactures' Association

Observers Masao Kawai Deputy Director-General The United Nations Bureau Ministry of Foreign Affairs

> Kazuki Okimura Deputy Director-General Science and Technology Agency

Shigeo Suehiro Deputy Director-General Agency of Natural Resources and Energy Ministry of International Trade and Industry

### BRIEF PERSONAL HISTORY

OF

### CHAIRMEN, SPEAKERS, PANELISTS, AND COMMENTATORS

### OPENING SESSION



Date/Place of Birth: November 16, 1924 in Toyama Prefecture Education:

1946 Graduated from Kyoto University, Faculty of Economics Career:

- 1947 Entered Hokuriku Electric Distribution Co., Ltd.
- 1951 Hokuriku Electric Power Company (reorganization)
- 1963 Manager, Planning Div., Planning Dept., Head Office
- 1972 General Manager Planning Dept., Head Office
- 1974 Director and General Manager, Planning Dept.
- 1979 Managing Director
- 1981 Executive Vice President, Deputy General Manager, Plant Siting and Environment Protection Operation
- 1987- President

Masao Tani



Hajime Karatsu

Professor, Tokai University Trustee of Tokai University Educational System

Date of Birth: January 9, 1919

Education: Graduated from University of Tokyo, Faculty of Engineering in 1942 Career:

- 1948 Entered Nippon Telegraph and Telephone Public Corporation
- 1961 Entered Matsushita Communication Industrial Co., Ltd.
- 1978 Managing Director, Member of the Board
- 1984 Technical Adviser, Matsushita Electric Industrial Co., Ltd.
- 1986 Professor of Research & Development Institute, Tokai University
- 1990 President of Tokai University Fukuoka Junior College
- 1992 Trustee of Tokai University Educational System

Public Service:

Member, Industrial Structural Council, MITI Member, Industrial Technology Council, MITI Award: Deming Prize



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.
  - *chanman, japan Ronne medstrari orum, me*.
- 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); Commondatore 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 Official), Brasil (1988); the First Class Order of the Sacred Treasure (1989), etc.



Mamoru Nakajima

Date/Place of Birth: December 23, 1935 in Nagano Prefecture
Education:
1960 Graduated from Faculty of Economics, the Chuo University
Personal History:
1976 Elected to a member of the House of Representatives
1985 Parliamentary Vice-Minister of Construction
1990 Chairman, Standing Committee on Construction, House of Representatives
1991 Chairman, Standing Committee on Local Administration, House of Representatives

1992- Minister of State for Science and Technology,

a member of the House of Representatives (H. R.)

Elected five times since 1976 (Liberal Democratic Party - LDP)

- a member of the Council for Science and Technology (CST) The CST is the advisory body to the Prime Minister to serve as supreme deliberative council on science and technology policy in Japan
- Chairman, the Atomic Energy Commission (AEC)

The AEC is the advisory body of policy planning and decision making of research, development and utilization of nuclear energy in Japan

Chairman, the Space Activities Commission (SAC)

The SAC is the advisory body of policy planning and decision making of space development in Japan



James E. Lovelock

- Date/Place of Birth: July 26, 1919 in the UK
- 1941 graduated from Manchester University
- 1948 received the Ph. D. degree in medicine from the London School of Hygiene and Tropical Medicine
- 1959 received the D. Sc. degree in biophysics from London University
- 1961 Professor of Chemistry at Baylor University College of Medicine in Houston, Texas (-1964)
- 1964 visiting professor, first at the Univ. of Houston and then at the Univ. of Reading in the UK.
- 1974 Fellow of the Royal Society
- 1982- council member of the Marine Biology Association
- 1986 president of the same association (-1990)

Three Books on the Gaia Hypothesis: Gaia: a new look at life on Earth (1979), The Ages of Gaia (1988), Gaia: the practical science of planetary medicine (1991)

Awards:

CIBA Foundation Prize for research in Ageing; Tswett Medal for Chromatography (1975); American Chemical Society's award for Chromatography (1980); silver medal and prize of the Plymouth Marine Laboratory (1986); Norbert Gerbier Prize of the World Meteorological Organization (1988); the first Amsterdam Prize for the Environment by the Royal Netherlands Academy of Arts and Sciences (1990); honorary Doctorates in Science from the University of East Anglia (1982); Exeter University (1988); Plymouth Polytechnic (1988); and the University of Stockholm (1991); He was made a C. B. E. by the Queen in 1990.



Date of Birth: July 29, 1928

### Education:

1951 Graduated from the University of Tokyo (Electrical Engineering) Career:

- 1951 Ministry of International Trade and Industry
- 1968 Director, Research Div., Planning Bureau, Science and Technology Agency (STA)
- 1969 Director, Reactor Regulation Div., Nuclear Safety Bureau, STA
- 1974 Director, Personnel Div., Minister's Secretariat, STA
- 1976 Director General, Standards Dept., Agency of Industrial Science and Technology
- 1978 Counselor, Minister's Secretariat, STA
  - 1979 Deputy vice-Minister, STA
- 1981 Director General, Planning Dept., STA
- 1983 Deputy Minister for Science and Technology, STA
- 1984 Vice-Minister for Science and Technology, STA
- 1987 Adviser to the Minister of State for Science and Technology
- 1987 President, the Japan Information Center of Science and Technology
- 1991- President, Japan Atomic Energy Research Institute



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.

Honor: Doctorate from Moscow State University (1987)

Award: Henry de Wolf Smyth Award (Washington D. C., 1988)



E.Gail de Planque

Place of Birth: Orange, New Jersey (American) Education:

1967 B. S. in mathematics from Immaculate College

1973 M. A. in physics from New Jersey Institute of Technology

1983 Ph. D. in environmental health science from New York University

Career: Dr. E. Gail de Planque was sworn in as a member of the United States Nuclear Regulatory Commission on December 16, 1991.

She served for five years as the Director of the United States Dept., of Energy's Environmental Measurements Laboratory (EML) in New York City which she joined in 1967. EML, a direct descendant of the Manhattan Project, is particularly renowned for its long – standing global radiation fallout programs as well as for research on radiation dosimetry, radon, and radiation problems associated with nuclear facilities and weapons testing.

She is a member of the National Council on Radiation Protection and Measurements, the Health Physics Society, and the American Nuclear Society (ANS) of which she served as President 1988-89. She has also served as President of the Pacific Nuclear Council and was a charter signatory for the International Nuclear Societies Council, established in 1990.



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.



Kiyoshi Nozawa

Education:

- 1947 B. E., Faculty of Economics, University of Tokyo Career:
- 1947 Entered Kanto Electric Distribution Co., Ltd.
- 1951 The Tokyo Electric Power Co., Inc. (TEPCO)
- 1972 Deputy General Manager, Nuclear Power Plant Dept., TEPCO
- 1974- Deputy General Manager, Nuclear Power Plant Construction Dept., and then Deputy General Manager, Transmission and Transformation Facilities Construction Administration, TEPCO
- 1979 Director and Deputy General Manager of the same Administration
- 1980 Managing Director and General Manager of the same Administration, TEPCO
- 1985 Vice Chairman, The Federation of Electric Power Companies Director, TEPCO
- 1991 Vice Chairman, Japan Nuclear Fuel Service Company, Ltd. Vice Chairman, Japan Nuclear Fuel Industries Co., Inc.
- 1992 President, Japan Nuclear Fuel Limited



**Jiang Xinxiong** 

Date/Place of Birth: July 6, 1931 in Zhejiang Province Education:

1952 Graduated from University Tianjin Nankai Career:

- 1952 Technician, Head of Technician and Deputy Director of Technical Division in Jixi Mining Machinery Factory of the Coal Ministry
- 1958 Engineer, Senior Engineer, General Manager of Lanzhou Enrichment Plant
- 1982 Vice Minister of Mining of Nuclear Industry
- 1983 Minister of Ministry of Nuclear Industry
- 1988- President of China National Nuclear Corporation (CNNC)



Yannick d'Escatha

Mr. d'Escatha was appointed Deputy Administrator General of Commissariat à l'Energie Atomique (French Atomic Energy Commission) on September 14, 1992.

Mr. d'Escatha, who is 45, is a graduate of Ecole Polytechnique (1966) and Ingénieur au Corps des Mines. In 1972, he was appointed Professor at Ecole Polytechnique and Ecole des Mines and ENSTA (1971-77). His works and research at the Mechanics Laboratory of Ecole Polytechnique have made him a leading specialist in Fracture Mechanics. Mr. d'Escatha's publications gave him an Academy of Sciences Award in 1982.

He joined the Nuclear Industry when appointed Head of the Control Office for Nuclear Construction where he was in charge of State Technical Control (1978-81).

In 1982 he joined TECHNICATOME, a subsidiary of CEA, specialized in Nuclear Propulsion and became Director for the Cadarache and Aix en Provence plants. In 1987, he was appointed Deputy Director General of TECHNICATOME. In 1990–92, he was appointed Director of Advanced Technologies, a newly created Department within CEA.

### **SESSION 1**



Takamitsu Sawa



Mamoru Akiyama

Date of Birth: August 23, 1935
Education:
1958 Graduated from Dept. of Mechanical Engineering, University of Tokyo Career:
1958 Joined Japan Atomic Energy Research Institute (JAERI)
1963 Lecturer, University of Tokyo
1964 Associate Professor, University of Tokyo
Research Specialties: Nuclear Engineering, Nuclear Safety
Member of following Societies: JNS, ANS, JSME, ASME, etc.
Other Activities:
Member, Advisory Committee of Nuclear Power Technology, MITI Member, Advisory Committee of Nuclear Safety, STA
Member, Revision Committee for Long Term Program of Nuclear Development and Utilization, AEC



Yoichi Fujii⁻e

Date of Birth: October 17, 1935

Education:

1963 Graduate School of University of Tokyo

Received a Doctor of Engineering

Career:

- 1968 Assistant Professor, Dept, of Nuclear Engineering, Faculty of Engineering, Osaka University
- 1980 Professor, Institute of Plasma Physics, Nagoya University
- 1986 Professor, Laboratory for Nuclear Reactors, Tokyo Institute of Technology

1989 Director, Laboratory for Nuclear Reactors, Tokyo Institute of Technology Member:

Committee on Examination of Reactor Safety (Nuclear Safety Commission) Special Committee on Safety Researches on Nuclear Facility, Safety Standards of Reactor, and Emergency Plans around Nuclear

Facilities



Edward D. Fuller

President-Elect, American Nuclear Society Date/Place of Birth: April 16, 1941 in Berkeley, California Education: BA Physics, San Jose State University (1962). MS Nuclear Engineering, Stanford University (1964) Career:

Currently employed as Senior Vice President and Director of Strategic Planning, TENERA; Los Gatos, California. Prior to joining TENERA in 1991, he founded and directed Associated Project Analysts for five years. Was Vice President of S. Levy Inc. for eight years and with General Electric for 18 years. Supports utility regulatory programs, safety review programs and consults on management effectiveness. He has worked with many utilities throughout the U.S. in helping them overcome significant regulatory issues. Has authored numerous papers on nuclear fuel, nuclear system performance and organizational assessment.



Colette Lewiner

#### Education:

Graduated from the Ecole Normale Supérieure and obtained a doctoral degree by "Abnormal Hall Effect in Semiconductors" Career:

- 1979 Joined Electricité de France (EdF) as Chief Executive Assistant to the Utility's Research and Development Director.
- 1982 Moved to the International Trade Division, where she was responsible first for fuel oil and then uranium and enrichment purchases in EdF's Fuel Department.
- 1987 Manager of EdF's Fuel Department, which is a dominant force on the international uranium and nuclear services markets
- 1988 Assistant Director of EdF, with responsibility for the Marketing Development Dept.
- 1989 Set up the Development and Commercial Strategy Division, becoming EdF's first woman director.
- 1992 President of the European Nuclear Society (ENS) (1992-94), Vice Chairman of the Cogema Group and Managing Director of SGN (Société Générale pour les Techniques Nouvelles), a subsidiary of Cogema and Technip

She has written a book on nuclear power plants that was published in the "Que sais-je?"series in 1988.



#### Date of Birth: August 29, 1935

Education: Received B. S., in Electrical Engineering from the University of Tokyo Professional Career in the Kansai Electric Power Co., Inc.:

- 1958 Entered the Kansai Electric Power Co., Inc.
- 1977 Manager of Transmission Line Construction Section
- 1979 Deputy General Manager of Nuclear Fuel Dept.
- 1983 General Manager of Nuclear Fuel Dept.
- 1987 Senior General Manager in charge of Nuclear Fuel Dept.
- 1989- Director in charge of Nuclear Planning Dept. and Nuclear Fuel Dept.

Hajimu Maeda



Present Post:

Acting Assistant Secretary for Nuclear Energy, and also Deputy Assistant Secretary for Civilian Reactor Development, U.S. Department of Energy

Education:

1959 B. S. degree in Civil Engineering, Tufts University

- 1961 Graduated from Pittsburgh Bettis Reactor Engineering School
- 1972 M. S. degree Mechanical Engineering, George Washington University Career:
- 1959- Naval Reactors Div., US Atomic Energy Commission
- 1974- Vice President, Burns and Roe Enterprises, Inc.
- 1987- Management Consultant
- 1988- Deputy Director for Technical Operations and Head, Office of Special Projects, Princeton Plasma Physics Laboratory

Edison C. Brolin



lyos R. Subki

- 1938 Born on January 19, 1938 in Jakarta, Indonesia
- 1962 Graduated from Institute of Technology Bandung (Engineer-degree in Physics)
- 1965 M. Sc. in Nuclear Engineering from Pennsylvania State University, USA
- 1965- Chief, Reactor Operations, Bandung Nuclear Center, National Atomic Energy Agency (BATAN), Indonesia
- 1968- Head, Reactor Div., Bandung Nuclear Center, BATAN
- 1976- Director, Bandung Nuclear Center, BATAN
- 1978-84 Chairman, BATAN's Multipurpose Research Reactor and Supporting Laboratories
- 1981- now Deputy Director General for Assessment of Nuclear Science and Technology, BATAN

### SESSION 2



Hiroyuki Torii

Date of Birth: July 17, 1942
Education:
1967 Graduated from University of Tokyo
1969 Master of Engineering, University of Tokyo
Career:
1969 Entered Nihon Keizai Shimbun
1969-1976 Scientific News Correspondent
1976-1982 Industrial News Correspondent
1982-1984 Scientific News Correspondent
1984- Senior Fellow, Nikkei Industry Research Institute (NIRI), Editor-in-chief of Nikkei High Tech Report (Japanese edition)



Hiroto Ishida

Date/Place of Birth: September 16, 1941 in Ishikawa Prefecture

- 1964 Bachelor of Engineering, the University of Tokyo
- 1964 Joined Science and Technology Agency (STA)
- 1977 Secretary to the Minister of State for Science and Technology
- 1979 Director for Policy Research, Planning Bureau, STA
- 1982 Counsellor, Embassy of Japan in USA
- 1985 Director, Nuclear Fuel Div., Atomic Energy Bureau (AEB), STA
- 1987 Director, Policy Div., AEB, STA
- 1988 Director, Finance Div., Minister's Secretariat, STA
- 1989 Deputy Director General, Minister's Secretariat, STA
- 1990 Deputy Director General, AEB, STA
- 1991- Director General, AEB, STA



1945 Born in Mutsu City, Aomori Prefecture

- Activities Related to Japan Federation of Bar Associations
- 1972 Admitted to Bar Association
- 1987 Vice Chairman, Committee on Pollution and Environment (-1972)
- Activities Related to the National Diet
- 1986 "Comments on Revision of Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Nuclear Reactor Regulations Law)" for Science and Technology Committee of the House of Representatives
- 1988 "Comments on Revision of Nuclear Reactor Regulations Law" for Science and Technology Committee of the House of Representatives, "Comments on Revision of Nuclear Reactor Regulations Law" for the Special Committee for Science and Technology of the House of Councilors

Publications:

"Report on Reserch and Studies on Proposed Nuclear Fuel Cycle Facility" (1987) ;"Report on Research and Studies on Proposed High Level Radioactive Waste" (1991)

Others:

He has made six times of visit to USA for study and research of nuclear fuel cycle and legal aspect and has been involved in activities on Atomic Agreement between USA and Japan.



Tokio Kanoh

#### 1935 Born in Tokyo

1957 Graduated from Faculty of Law, the University of Tokyo. Entered the Tokyo Electric Power Co., Inc.

1964 Graduated from Dept. of Economics, Keio University Present:

- 1987- Executive Member, the Japan National Committee on Pacific Economic Cooperation
- 1989- Director, Deputy Executive General Manager, Nuclear Power Headquarter, Tokyo Electric Power Co., Inc.
- 1992- Member, Steering Committee, GETT (Global Economic and Technological Transitions), IIASA (International Institute for Applied Systems Analysis) Chairman on Minerals and Energy Forum

In the meantime, served as: Visiting Lecturer, University of Tokyo; Vice Chairman, Experts' Meeting on Energy Conservation, Information, and Education, International Energy Agency; Research Member, Information System Research Work Group, Fiscal & Financial Research Institute, Ministry of Finance; etc.

Major Books:

"Japan's Energy Strategy", "Energy Update", "Review on Pacific Cooperation Activities", "Nuclear, Now Clear", "Energy Strategy in 1990s"





Date/Place of Birth: May 1, 1954 in Okayama Prefecture Education:

1977 Graduated from College of Arts and Sciences, the University of Tokyo Career:

- 1978 Joined the Mainichi Shimbun (Newspaper)
- 1987 Science writer, the Mainichi Shimbun
- 1992- Registered the science and technology writers' club in STA

In charge of global environment, computer, atomic energy issues Publications: "The Science of Credit Card" etc.

Shiro Segawa

### LUNCHEON

	Born	on July 14, 1937 in Ishikawa Prefecture, Japan
	1960	Graduated form Waseda University with degree in commerce
	1969	First Elected to the House of Representatives
	1975	Vice-Minister, Prime Minister's Office
	1977	Parliamentary Vice-Minister, Secretariat of the Cabinet
	1978	Director, Education Div., Liberal Democratic Party (LDP)
	1979	Deputý Secretary-General, LDP
	1981	Chairman, Committee on Finance (House of Representatives)
	1983	Minister of Education
	1984	Deputy Secretary-General, LDP (reappointed)
		Chairman, Special Committee on Sports Promotion, LDP
	1986	Chairman, Special Committee on Education Reform, LDP
		Acting Chairman, Policy Research Council, LDP
	1987	Chairman, National Organization Committee, LDP
Yoshiro Mori	1990	Chairman, Research Commission on the Education System, LDP
	1991	Chairman, Rules and Administration Standing Committee, Diet
		Chairman, Policy Research Council, LDP
	1992	Minister of International Trade and Industry



Jun Eto

Date/Place of Birth: December 25, 1932 in Tokyo

Literary Critic and Professor of Comparative Literature and Culture, Keio University

1957 B. A. in English, Keio University

1974 Doctor of Letters in Comparative Literature, Keio University

Teaching and Literary Career:

- 1963 Visiting Lecturer (Japanese Literature), Princeton University (-64)
- 1964- Literary Critic, Asahi Shimbun
- 1967- Managing Editor, Kikan Geijutsu (Art Quarterly)
- 1971-90 Associate Professor, and then Professor of Comparative Literature and Culture, Tokyo Institute of Technology
- 1974 Senior Associate Member, St. Antony's College, Oxford University

1990- Professor Emeritus, Tokyo Institute of Technology

1992- Professor, Keio University

Membership: Managing Director of Japan Writers' Association, Director of Japan P. E. N. Club, Member of Japan Art Academy, Director of Japanese Comparative Literature Association

Publications: "Natsume Soseki, A Critical Study", "Kobayashi Hideo, A Critical Biography", "Soseki to sono Jidai (Soseki and his Times), etc.

Prize: Shincho Literary Prize (1962), Noma Literary Prize and Kikuchi Kan Prize (1975), Japan Academy of Art Prize for all the works hitherto published (1976), Yoshida Shigeru Prize (1978)

### SESSION 3



Ryoju Katsube

#### Journalist

- 1931 Born in Shimane Prefecture
- 1954 Graduated from Dept. of American and English Literature, Aoyama Gakuin University. Joined NHK (Japan Broadcasting Corp.)
- 1977-News Caster of "News Center 9"
- 1979-TV Caster of "NHK Special", TV Caster of the programs on oil, nuclear energy, food, high-technology, computers, etc.
- 1988 Retired from NHK and joined NHK Enterprises
- 1993 Retired from NHK Enterprises

#### Publications:

- "The Antarctica"
- "Nuclear Power"
- "Food-Warning from the Earth"

"The Profile of Japan as the Big Country of Technology"

- "Food-the subject for this country"
- "Computer Change the World"



Masanori Ozeki

Date of Birth: January 29, 1924

- Education:
- 1946 Graduated at the University of Tokyo
- Professional Career:
- 1946 Entered Ministry of Transportation
- 1972 Director, Electrical Dept. Japan National Railways (JNR)
- 1975 Executive Director, JNR
- 1979 Joined Hitachi Ltd.
- 1983 Executive Director, Hitachi Ltd.
- 1985 Chairman, Information Processing Society of Japan
- 1987 President, Railway Technical Research Institute
- 1988 Director, International Federation for Information Processing
- 1991 Member of Science Council of Japan
- Honors:
- 1977 Conferred a Medal with Purple Ribbon for his achievements in developing a comprehensive railway passenger reservation system
- 1979 Cited from the Institute of Electronics and Communication Engineers of Japan
- 1988 Cited from Information Processing Society of Japan, Cited in a Letter of Thanks from the Institute of Electrical and Electronics Engineers (IEEE, U. S. A.)
- 1990 Conferred a Personal Prize for his contributions to the office automation



Avatomo Kanno

Qualification: Consulting Engineer (Production control) in 1964 Career: Electric Communication Laboratory, Nippon Telegraph & Telephone Corp. (-60)

Date/Place of Birth: April 1, 1929 in Iwate Prefecture Degrees: Doctor of Engineering in 1968 (Tohoku University)

- 1960-75 Chief Researcher, Manager of Design Dept. and QA Dept., Hitachi Ltd.
- 1975-81 Professor, Dept. of Computer Science, Faculty of Engineering, Iwate University
- 1981- Professor, Dept. of Management Science, Faculty of Engineering, Science University of Tokyo
- Research Interest:

Project Management of Software Production, Quality Software Production, System Reliability/Maintainability, CWQC, Systems Engineering, Operations Research, Quality Assurance Technology

Member of:

The Institute of Electronics, Information and Communication Engineers (Chair person of Technical group on Reliability); Information Processing Society of Japan; The Japanese Society for Quality Control (Director); The Operations Research Society of Japan; Japan Industrial Management Association; Japan Society for Software Science Technology; Deming Prize Committee

Chairman of JUSE-SPC (Software Production Control) Committee (80-)





Date/ Place of Birth: October 17, 1949 Education: 1969-73 Bachelor in Mechanical Engine 1978-80 MBA Multinational Enterprise

1992- present

- 1969-73 Bachelor in Mechanical Engineering from Waseda University
  1978-80 MBA Multinational Enterprise & Finance Major, Wharton Graduate School, University of Pennsylvania
  Career:
  1973- Joined Ministry of International Trade and Industry (MITI)
  1982- Assistant Director, Nuclear Power Safety License Div., MITI
  1983- Assistant Director, Planning Div., MITI
  1984- Principal Administrator, IEA/OECD
- 1987- Head, Technology Promotion Office, MITI
- 1988- Director for Development, Agency of Industrial Science and Technology, MITI
- 1990- Director, Dept. of Public Utilities, Kyushu Bureau of MITI

Masaharu Fujitomi

Director, Dept. of Nuclear Power Safety Administration Div., MITI



Shojiro Matsuura

Date of Bi	rth: November 20, 1935
Education	: A start and the start and
1958 B.S	Applied Physics, Faculty of Engineering, Kyoto University
1960 M.S	S. Kyoto University
Profession	al Career:
1960-1961	Assistant, Dept. of Nuclear Physics, Kyoto University
1961-	Japan Atomic Energy Research Institute (JAERI)
1961-	Dept. of Power Demonstration Reactor Construction, JAERI
1963-	Dept. of Power Demonstration Reactor, JAERI
1969-	Office of Power Demonstration Reactor Development, JAERI
1976-	Principal Scientist, JAERI
1977-	Head, Office of Power Demonstration Reacto Development, JAERI
1985-	Director, Dept. of Reactor Engineering, JAERI
1986-	Director, Office of Planning
1989-	Deputy Director General, Tokai Research Establishment, JAERI

1993- Executive Director, JAERI



Date/Place of Birth: July 12, 1944 in Thorn, on the river Vitula Education: Graduated with MBA from Cologne University, Germany and B. Sc. (Econ.) from London University, England During 1966 stayed in Japan as an exchange student at Tokyo University and in industry Career: Has been with the Urenco Organization in various functions since 1970 1970- Uranit GmbH, Germany 1973- Joined Urenco Limited (the marketing company of the Urenco) 1975- responsibly involved in marketing of uranium enrichment services worldwide

Jürgen A. Paleit

1983- Executive Director of Urenco Limited

1991- Managing Director of Urenco Limited

Award:

The Cross of the Order of Merit of the Federal Republic of Germany in recognition of his contribution to international relations (1986)

### SESSION 4



Eizo Tajima



Atsushi Kuramoto

Date/Place of Birth: January 18, 1932 in Okayama Prefecture Education:

- 1953 57Kyoto University School of Medicine
- 1957 M.D., Kyoto University
- 1958-65 Postdoctoral Course in Medicine and Traineeship in Hematology at Kyoto University

Doctor degree of Medical Science in Immunohematology at Kyoto University 1966

1968-70 Research Associate in Hematology, Brown University Institute for Life Sciences, U.S.A.

Professional Career:

1970-Assistant Professor, Dept. of Medicine, Research Institute for Nuclear Medicine and Biology, Hiroshima University

1976 -Professor and Chairman, Dept. of Medicine, Research Institute for Nuclear Medicine and Biology, Hiroshima University

Director, Health Service Center, Hiroshima University 1978-88

1989-Director, Research Institute for Nuclear Medicine and Biology, Hiroshima University



Eugene P. Ivanov

Date/ Place of Birth: January 21, 1939 in Belarus License:

Professor, Doctor of Medical Science, General Hematologist Education and Career:

- Graduated from Medical Institute in Minsk 1962
- Post-graduate training course 1962-
- Chief, Dept. of Clinic Hematology and Laboratory Hemostasis, Belarus Research 1965 Institute of Hematology and Transfusion
- 1970 Assistant Professor, Clinic Laboratory for Diagnostic
- 1974 Professor at the same laboratory
- 1978 Head of Hematology and Transfusiology, Belarus Institute for Postgraduate Training of Doctors

1988-present:

Director, Belarus Institute of Hematology and Blood Transfusion, Ministry of Public Health; Head of Dept. of the Clinical Hematology for Post-graduate Training of Doctors; and also President, the Belarus Society of Hematologists and Transfusiologist.

In 1977-91 while working in Belarus, Professor Ivanov was studying as research fellow in UK, USA, Italy and Germany. He is now involved in some international research programs regarding the Chernobyl Accident. He also wrote numerous theses and reports on this accident.





Gillian K. Reeves

Born in 1	London
Educatio	on:
1983-86	Kings College London, University of London
	B. Sc (Joint Honours) Mathematics and Chemistry
1986-90	Imperial College, University of London
1986-87	MSc Statistics, Diploma of Imperial College
1987-90	Ph. D. Statistics
Occupat	ion: Statistical Epidemiologist
Career:	
1990-	Imperial Cancer Research Fund, Cancer Epidemiology Unit, Radcliffe Infirmary,
	Oxford, UK
	Born in Educatio 1983-86 1986-90 1986-87 1987-90 Occupat Career: 1990-



Anatoly Tsyb

He was born on January 21, 1934 in Poltava region (Ukrainian nationality). Education:

- 1951-57 Medical faculty, the Uzhgorod State University
- 1959-61 Clinical intern of medical faculty of the Uzhgorod University, Ukraine
- 1961-64 Post-graduate, The Research Institute of Medical Radiology of USSR Academy of Medical Science (AMS USSR)
- 1964 Scientific degree Candidate of Medical Sciences
- 1978 Scientific degree Doctor of Medical Sciences
- 1979 Professor
- 1986 Alternative member of AMS USSR
- 1991 Academician of Russian Academy of Medical Sciences (RAMS)

Occupation : radiologist

Professional Career:

- 1957-61 Head physician of district hospital, Ukraine
- 1961-78 Junior, Senior Researcher, Head of the Department at the Research Institute of Medical Radiology, AMS USSR
- 1978-present

Director of Medical Radiological Research Center, RAMS, Obninsk

### SESSION 5



Mitsuro Donowaki

- 1932 Born in Tokyo
- 1953 Passed Higher Diplomatic Service Examination
- 1954 Graduated from the University of Tokyo, Faculty of Law and Entered Ministry of Foreign Affairs (MOFA)
- 1969 Special Assistant to the Director-General, American Affairs Bureau, MOFA Director, Analysis Div., Research and Analysis Dept. MOFA
- 1973 First Secretary, Embassy in the USA
- 1974 Counsellor, the same Embassy
- 1975 Counsellor, Embassy in the People's Republic of China
- 1978 Minister, the same Embassy Deputy Director-General, Research and Planning Dept., MOFA Deputy Director-General, European and Oceania Affairs Bureau, MOFA 1979
- 1982 Consul-General at Honolulu, USA
- 1984 Director-General, Latin American and Caribbean Affairs Bureau, MOFA
- 1986 Ambassador Extraordinary and Plenipotentiary to Nigeria
- 1989 Ambassador Extraordinary and Plenipotentiary to the Conference on Disarmament
- 1992 Ambassador for Arms Control and Disarmament



Rvukichi 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 Adelpji 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



Ishfaq Ahmad

Date/Place of Birth: November 3, 1930 in Gurdaspur, Pakistan Occupation: Chairman, Pakistan Atomic Energy Commission (PAEC) Education:

- 1949-51 Master of Science from University of Punjab, Lahore (Pakistan) 1954-58
  - Doctor of Science from University of Montreal, Canada
- Career:
- 1952-60 Lecturer, Government College, Lahore
- 1960-66 Senior Scientific Officer, PAEC
- 1967-69 Secretary, PAEC
- Director, Atomic Energy Centre, Lahore 1969-71
- Director, Pakistan Institute of Nuclear Science and Technology, PAEC 1971-76
- 1976-88 Member (Technical), PAEC
- Senior Member, PAEC 1988-91
- Chairman, PAEC 1991-

He is currently serving on the Executive Committee of National Commission for Science and Technology which is the apex body for S&T policy and programmes in the country. He is also on the Board of Governors of Pakistan Science Foundation, National Institute of Elec-tronics and several other scientific and educational institutions in Pakistan. He was elected Fellow of the Pakistan Academy of Sciences in 1983 and decorated with Sitara-i-Imtiaz in 1990. His scientific interests cover several areas of theoretical and experimental nuclear physics, and has a large number of research papers to his credit.



- 1984-86 Minister-Counsellor at the same Embassy
- 1986-87 Chargé de mission with Mr. André Giraud, Minister of Defense
- 1987-91 Ambassador to the Republic of Korea



Born on January 17, 1927 in Amsterdam (the Netherlands) Education: political and international administration at Amsterdam Municipal Univ., and Columbia Univ., (M. A., 1950) and international law at Amsterdam Municipal Univ. (1954) 1954-1955 private law practice Career: 1955 Joined Dutch Ministry of Foreign Affairs 1958 Seconded to the secretariat of IAEA in Vienna Seconded to the United Nations (UN) 1961 1965 Safeguards Dept. of IAEA Publication "Safeguards against Nuclear Proliferation" at Stockholm 1975 1977 Joined Disarmament Centre of UN 1978 first secretary, UN Advisory Board on Disarmament Studies 1983-87 Director, Information and Studies Branch, Dept. for Disarmament Affairs, UN 1980 Deputy Secretary-General of the second NPT review conference

- Benjamin Sanders
- 1985 Secretary-General of the third NPT review conference 1987 Founded with Prof. J. Simpson, the Programme for Promoting Nuclear Non-Proliferation (PPNN)
- 1987-present Executive Chairman of same and Editor of its Newsbrief







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R. AOKI	SENIOR MANAGER	TOSHIBA CORPORATION
S. AOKI	PROFESSOR EMERITUS	TOKYO INSTITUTE OF TECHNOLOGY
S. AOKI	STANDING AUDITOR	NUCLEAR FUEL INDUSTRIES, LTD.
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1. T	HAKAIA	DIRECTOR, DEPUTY GENERAL MANAGER	MIISUBISHI A
к.	HAMADA	EXECUTIVE MANAGING DIRECTOR	HITACHI, LTD
ŝ.	HAMAGUCHI	SPECIAL TECHNICAL ADVISER	KANSAI ELECT
К.	HAMAZAKI	MANAGING DIRECTOR	JAPAN ATOMIC
ç.	HANAGATA	CHAIRMAN	TOKYO DENKI
г. к		PRESIDENI MANAGING DIRECTOR	
s.	HANDA	MANAGING DIRECTOR	CBS CO., LTD
Μ.	HANZAWA	GENERAL MANAGER	MAEDA CORPOR
R.	HARA	PRESIDENT	SEIKO INSTRU
K.	HARADA	DEPUTY GENERAL MANAGER	MITSUBISHI H
r. T	HARIMA	MANAGING VICE-DIRECTOR	TODEN KOCVO
Ŷ.	HASE	TECHNOLOGY EXECUTIVE	TOSHIBA CORP
н.	HASHIMOTO	CHIEF FELLOW SPECIALIST	TOSHIBA CORPO
Ţ.	HASHIMOTO	DEPUTY GENERAL MANAGER	CHUGOKU ELEC
ч. к	HASHIMUIU	SPECIAL ASSISTANT	CHURL FLECTR
M.	НАТА	MANAGER	KYUSHU ELECTI
s.	HATTORI	VICE PRESIDENT	CENTRAL RESE.
s.	HATTORI	GENERAL MANAGER	KANSAI ELECT
N.	HAYAKAWA	DIRECTOR	POWER REACTE
Υ. Δ	HAYASE	DEPUIY GENERAL MANAGER	UKYU ELEUIR
M.	HAYASHI	GENERAL MANAGER	CHUBU ELECTR
Μ.	HAYASHI	COMMISSIONER	ATOMIC ENERG
<u>s</u> .	HAYASHI	PRESIDENT & GENERAL MANAGER	KAWASAKI HEA
Г. т	HAYASHI	DIRECTUR, EXECUTIVE GENERAL MGR.	EBARA CORPOR
T.	HAYASHI	DEPILTY GENERAL MANAGER	HITACHI ITD
ĸ.	HAYATA	MANAGER	MITSUBISHI A
Υ.	HIEDA	GENERAL MANAGER	HOKURIKU ELE
М. Т	HIGUCHI		CHUGOKU ELEC
1. A		MANAULK FYRCHTIVE VICE DDECIDENT	KYUSHU ATOMI
T.	HINEO	CORPORATE ADVISER	MITSURISHI H
M.	HINOKI	SENIOR MANAGING DIRECTOR	KURIHALANT C
Κ.	HIRAI	GENERAL MANAGER	CHUBU ELECTR
Υ.	HIRAI	MANAGING DIRECTOR	TAIHEI DENGY

STRY OF INTERNATIONAL TRADE & INDUSTRY ELECTRIC POWER CO. INSTITUTE OF TECHNOLOGY **REACTOR & NUCLEAR FUEL DEVELOPMENT CO.** KOGYO CO., LTD. IAKA CORPORATION ICE & TECHNOLOGY AGENCY ELECTRIC POWER CO. STRY OF INTERNATIONAL TRADE & INDUSTRY IO CHUBU COMPANY LTD. EN KOGYO INC. AL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY EAR POWER ENGINEERING CENTER BA CORPORATION ATOMIC ENERGY RESEARCH INSTITUTE RNATIONAL CONSTRUCTORS CO., LTD. AL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY KU ELECTRIC POWER CO. AR ENGINEERING LTD. RAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY DA SAFETY APPLIANCE CO., LTD. IU ELECTRIC POWER CO. **CORPORATION** NKO CO., LTD. NUCLEAR FUEL LIMITED CHI, LTD. HOKURIKU AREA OPERATION **LYCEUM** NULCEAR FUEL LIMITED UNIVERSITY DENKI KOMUSHO CO., LTD. **BA CORPORATION** OMO ATOMIC ENERGY INDUSTRIES, LTD. IA JAPAN CO., LTD. BISHI CORPORATION U ELECTRIC POWER CO. SPACE UTILIZATION PROMOTION CENTRE BISHI ATOMIC POWER INDUSTRIES, INC. ELECTRIC POWER CO. CHI, LTD. I ELECTRIC POWER CO. ATOMIC POWER CO. DENKI KOMUSHO CO., LTD. DAIICHIKIGYO CO. AR POWER ENGINEERING CENTER 0., LTD. CORPORATION INSTRUMENTS INC. BISHI HEAVY INDUSTRIES, LTD. **REACTOR & NUCLEAR FUEL DEVELOPMENT CO.** KOGYO CO. BA CORPORATION **BA CORPORATION** KU ELECTRIC POWER CO. **REACTER & NUCLEAR FUEL DEVELOPMENT CO.** ELECTRIC POWER CO. IU ELECTRIC POWER CO RAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY I ELECTRIC POWER CO. REACTER & NUCLEAR FUEL DEVELOPMENT CO. ELECTRIC POWER CO. IALANT CO. ELECTRIC POWER CO. IC ENERGY COMMISSION SAKI HEAVY INDUSTRIES, LTD. CORPORATION IN ADVANCED TECHNOLOGY CO. CHI, LTD. JBISHI ATOMIC POWER INDUSTRIES, INC. IKU ELECTRIC POWER CO. KU ELECTRIC POWER CO. IU ATOMIC INDUSTRIAL CONFERENCE U ELECTRIC POWER CO. JBISHI HEAVY INDUSTRIES, LTD. ALANT CO. ELECTRIC POWER CO. I DENGYO KAISHA, LTD.
ORGANIZATION

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NAME		TITLE
Μ.	HIRAKAWA	DIRECTOR
Ч. М	HIRAKAWA	MANAGING DIRECTOR
T.	HIRANO	VICE-MINISTER
Ĥ.	HIRANUMA	DEPARTMENT MANAGER
Υ.	HIRAOKA	SPECIAL STAFF
Т. М	HIRASAWA	CENERAL MANAGER
Y.	HIRATA	GENERAL MANAGER
Â.	HIRAYAMA	MANAGER
M.	HIRONAGA	MANAGER
1.	HIRONAKA	MANAGEK SECRETARV CENERAL
H.	HIROSE	PRESIDENT
H.	HIROSE	PROFESSOR
М.	HIROSE	MANAGING DIDECTOR
Y. R	HISAMOTO	MANAGING DIRECTOR
Ŷ.	HISATOME	AUDITOR
Τ.	нојо	
1.	HORI	PRESIDENT SDECIAL ASSISTANT
A.	HORIUCHI	MANAGING DIRECTOR
M.	HORIUCHI	GENERAL MANAGER
ş.	HORIUCHI	VICE PRESIDENT
А. v	HOSHIKAWA	GENERAL MANAGER
к. Е.	HOSHINO	ASSISTANT MANAGER
ĸ.	HOSHIZAWA	RESEARCH ADVISOR
Α.	HOSOMI	MANAGER
M. M	ICHIHASHI	GENERAL MANAGER
R.	ICHIKAWA	EXECTIVE DIRECTOR
Η.	IDA	PRESIDENT
M. V		DEPUTY MANAGER
к.	IIDA	PRESIDENT
K.	IIDA	ADVISER
Y.	IIDA	CHAIRMAN
S. н	I I J I MA	DIRECTOR, GENERAL MANAGER
Ŷ.	іјїсні	MANAGING DIRECTOR
Μ.	IKE	ASSISTANT GENERAL MANAGER
К. v		DEPUTY GENERAL MANAGER
R.	IKEGAME	EXECUTIVE VICE PRESIDENT
Ι.	IKEKITA	DEPUTY GENERAL MANAGER
I.	IKEMOTO	GROUP LEADER
Y.	IKENAGA	IECHNICAL MANAGER DEPUTY MANAGER
Â.	IKEOKA	ber of i manader
R.	IKUTA	ADVISOR
1. K		PRESIDENT
R.	IMAI	RESEARCHER
Τ.	IMAI	GENERAL MANAGER
<u>Т</u> .	IMAIZUMI	EMERITUS PROFESSOR
1. K.	IMAUKA IMASHIMIZU	DIRECTOR
S.	IMOTO	
M.	IMURA	DEPUTY GENERAL MANAGER
н. Т		CHAIKMAN Sur Manager
M.	INAHATA	EXECUTIVE MANAGING DIRECTOR
K.	INOUE	ADVISER
ĸ. K	INCUE	GENERAL MANAGER
M.	INOUE	GROUP MANAGER
<u>s</u> .	INOUE	
$\frac{1}{v}$		MANAGING DIRECTOR
M. I	PPONMATSU	MANAGER, SPECIAL ASSINGMENT
Т.	IRIE	SENIOR GENERAL MANAGER
Н. т	ISEKI	MANAGER
Ĥ.	ISHIDASHI	DIRECTOR-GENERAL

THE JAPAN ELECTRICAL MANUFACTURERS' ASSOCIATION TOKYO ELECTRIC POWER CO. URANIUM ENRICHMENT MACHINERY, LTD. SCIENCE & TECHNOLOGY AGENCY HITACHI, LTD. SCIENCE & TECHNOLOGY AGENCY JAPAN NUCLEAR FUEL LIMITED FUJI ELECTRIC CO., LTD. JAPAN ENERGY LAW INSTITUTE JGC CORPORATION HITACHI, LTD./CHUBU AREA OPERATION CHUGOKU ELECTRIC POWER CO. KANSAI ATOMIC CONFERENCE, THE NUCLEAR FUEL TRANSPORT CO. TOKYO WOMAN'S CHRISTIAN UNIVERSITY KANDEN KOGYO INC. JAPAN POWER ENGINEERING AND INSPECTION CORPORATION JAPAN NUCLEAR SECURITY SYSTEM CO., LTD. NUCLEAR POWER ENGINEERING CENTER JAPAN ENERGY ASSOCIATION POWER REACTER & NUCLEAR FUEL DEVELOPMENT CO. JAPAN NUCLEAR FUEL LIMITED HAZAMA CORPORATION NUCLEAR SAFETY TECHNOLOGY CENTER TOKYO ELECTRIC POWER CO. SHIKOKU ELECTRIC POWER CO. CHUBU ELECTRIC POWER CO. CENTRAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY SHIKOKU ELECTRIC POWER CO. SUMITOMO HEAVY INDUSTRIES, LTD. THE HOUSE OF COUNCILLORS NUCLEAR SAFETY RESEARCH ASSOCIATION URANIUM ENRICHMENT MACHINERY, LTD. TOKYO ELECTRIC POWER CO. ATOMIC ENERGY COMMISSION JAPAN ATOMIC POWER CO. TODA CORPORATION MITSUBISHI HEAVY INDUSTRIES, LTD. JAPAN NUCLEAR FUEL LIMITED JAPAN NUCLEAR FUEL LIMITED URANIUM ENRICHMENT MACHINERY, LTD. TOSHIBA ENGINEERING & CONSTRUCTION CO., LTD. CHUBU ELECTRIC POWER CO. SHIKOKU ELECTRIC POWER CO. TOKYO ELECTRIC POWER CO. TOSHIBA ENGINEERING CO. CENTRAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY SUMITOMO METAL INDUSTRIES, LTD. KANSAI ELECTRIC POWER CO. KANSAI ELECTRIC POWER CO. NIHON KENSETSU KOGYO CO., LTD. INSTITUTE OF ENERGY ECONOMICS, JAPAN, THE RESEARCH OFFICE OF THE STANDING COMMITTEE ON SCIENCE & TECHN JAPAN ATOMIC INDUSTRIAL FORUM JAPAN ATOMIC POWER CO. TOKYO UNIVERSITY TOSHIBA CORPORATION MINISTRY OF INTERNATIONAL TRADE & INDUSTRY KANSAI ELECTRIC POWER CO. JAPAN INDUSTRIAL POLICY RESEARCH INSTITUTE KANSAI ELECTRIC POWER CO. JAPAN ATOMIC ENERGY RELATIONS ORGANIZATION OKANO VALVE MFG, CO. CENTRAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY SATO KOGYO CO., LTD. MITSUBISHI HEAVY INDUSTRIES. LTD. HOKURIKU ELECTRIC POWER CO. KURIHALANT CO. MITSUBISHI ATOMIC POWER INDUSTRIES, INC. KANSAI ELECTRIC POWER CO. JAPAN ATOMIC POWER CO. MITSUBISHI CORPORATION **ISHIBASHI LAW OFFICES** SCIENCE & TECHNOLOGY AGENCY

NAME		TITLE	ORGANIZATION
M.	ISHIDA	MANAGER	TOKYO ELECTRIC POWER CO.
K.		ADVISER	PNC ENGINEERING SERVICE CO.
H.	ISHII	MANAGER	TOKYO ELECTRIC POWER CO.
ĸ.	İSHİİ	SUPER INTENDENT	SHIKOKU ELECTRIC POWER CO.
Κ.	ISHII	DIRECTOR, ADVISORY STAFF	TOKYO ELECTRIC POWER CO.
М.	ISHII	PROFESSOR	AZABU UNIVERSITY
M.		CHIEF ENGINEER	ISHIKAWAJIMA-MAKIMA HEAVY INDUSIKIES UU.
з. т	ISHII	GENERAL MANAGER	MITSUBISHI HEAVY INDUSTRIES, LTD.
Ť.	ISHII		SCIENCE & TECHNOLOGY AGENCY
Υ.	ISHII	DEPUTY GENERAL MANAGER	SUMITOMO CORPORATION
Н.	ISHIKAWA	DRAFFICCAR	
M. T		PRUFESSUR CENEDAL MANACED	HUKKAIDU UNIVERSIIY FRADA CORDORATION
M.	ISHIO	MANGING DIRECTOR	KANSAL ATOMIC CONFERENCE, THE
H. I	SHIWATARI	SECRETARY GENERAL	FIRST ATOMIC POWER INDUSTRY GROUP
T. I	SHIWATARI	PRESIDENT	POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO.
<u>N</u> .	ISHIZAKI	VICE OUT DRAN	JAPAN NUCLEAR FUEL LIMITED
· 1 •		VICE CHAIRMAN FYFCHTIVE DIRECTOR	JAPAN NULLEAK SECUKITY SYSTEM CU.,LID. Nucifar Materiai control center
ŝ.	ISO	VICE PRESIDENT	TOKYO KYUEI CO.
Ŷ.	ISO	PRESIDENT	NIPPON ADVANCED TECHNOLOGY CO.
<u>Y</u> .	ISO	PRESIDENT	TOKYO KYUEI CO.
T.	ISOMURA	UFFICIAL MANAGING DIDECTOR	MINISTRY OF FUREIGN AFFAIRS
T.	ITAI	MANAGER	TOHORIL FLECTRIC POWER CO
J.	ITAKURA	GENERAL MANAGER	TOKYO ELECTRIC POWER CO.
Ť.	ITAKURA	MANAGING DIRECTOR	JAPAN ATOMIC POWER CO.
<u>A</u> .	ITO	ASSISTANT MANAGER	TOKYO ELECTRIC POWER CO.
E. u		DEPUTY GENERAL MANAGER	MARUBENI CUKPUKATIUN CHURU CENSHIDVOVU VONDANVAT
н. К.		MANAGING DIRECTOR	JAPAN NUCLEAR FUEL LIMITED
M.	ÎTO	GENERAL MANAGER	TOSHIBA CORPORATION
Ν.	ITO	MANAGING DIRECTOR	TODEN KOGYO CO.
$S_{T}$	ITO	GENERAL MANAGER	TOHOKU ELECTRIC POWER CO.
I. N	IWAI	ADVISER	JAPAN AIUMIC PUWER CU. HOKKAIDO FIFCTRIC POWFR CO
T.	IWAI	SENIOR OFFICER	TOHOKU ELECTRIC POWER CO.
Υ.	IWAKOSHI	ADVISER	JAPAN ATOMIC POWER CO.
н.		MANAGER	MITSUBISHI ATOMIC POWER INDUSTRIES, INC.
ъ. к	IWANAGA	SEUTION MANAGER MANAGER	THE JAPAN FIECTRICAL MANUFACTURERS' ASSOCIATION
M.	IWASAKI	MANDER	HIROSHIMA CITY
Ν.	IWASAKI	DIRECTOR	KOYO DENKI
S.	IWASAKI	MANAGER	TOSHIBA ENGINEERING CO.
Y.	IWASAKI	SUPFRINTENDENT	LAPAN ATOMIC POWER CO
Ŷ.	IWAYA	MANAGER	MITSUBISHI HEAVY INDUSTRIES, LTD.
Τ.	IZAKI	GENERAL MANAGER	FUJI ELECTRIC CO., LTD
A.		DEPUTY SENIOR DIRECTOR	POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO.
D.		MANAGER Director deputy general manager	MITSURISHI ATOMIC POWER INDUSTRIES INC
ĸ.	JINNO	SECRETARY	JAPAN ENERGY ASSOCIATION
J.	MUKAI	EXECUTIVE ADVISER	SUMITOMO MARINE & FIRE INSURANCE CO., LTD.
$S_{\nu}$	KADOTA	CHIEF ENGINEER	MITSUBISHI HEAVY INDUSTRIES, LTD.
Y.	KADOWAKI	GENERAL MANAGER	MITSURISHI HFAVV INDUSTRIFS, ITD
Ť.	KAGAYAMA	ADVISER	JAPAN ATOMIC POWER CO.
Κ.	KAGE	CHAIRMAN	NANMEI KOSAN K.K.
A.	KAJITANI	MANAGER	CHUGOKU ELECTRIC POWER CO.
N. H	KAKIHANA	DIRECTOR & GENERAL MANAGER PROFESSOR EMERITUS	TORVO INSTITUTE OF TECHNOLOGY
ĸ.	KAMADA	SECTION CHIEF	SHIKOKU ELECTRIC POWER CO.
н.	KAMEGAWA	EXECUTIVE VICE-PRESIDENT	JAPAN NUCLEAR FUEL LIMITED
Н.	KAME I	CHAIRMAN OF THE BOARD	NIPPON NUCLEAR FUEL DEVELOPMENT CO., LTD.
п. Т	KAMISAWA	MANAGEK DEPHTY GENERAL MANAGER	ISHIKAWAJIMA-HAKIMA HEAVY INDUSTRIES CU. HOKURIKU FLECTRIC DOWER CO
Ŷ.	KAMIYAMA	MANAGER/SENIOR RESEARCH ENGINEER	TODA CORPORATION
М.	KAN	SECTION MANAGER	SHIKOKU ELECTRIC POWER CO.
Н. т	KANAGAWA	GENERAL MANAGER	TOKYO ELECTRIC POWER CO.
и. М.	KANAMORI	ERESIDENT DEPUTY GENERAL MANAGER	DITAUDI, LIU. POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO
H.	KANEDA	MANAGING DIRECTOR	JAPAN NUCLEAR FUEL LIMITED
Н.	KANEKO	DEPUTY DIRECTOR	POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO.
к.	KANEKO	GENERAL MANAGER	FEDERATION OF ELECTRIC POWER COMPANIES

ORGANIZATION

NAME		TITLE
Ķ.	KANEKO	PROFESSOR
Δ.	KANNO	PROFESSOR
T.	KANO	DIRECTOR
M.	KANZAKI	DIRECTOR
н.	KARATSU	PROFESSOR
н.	KASHIHARA	DIRECTOR
н.	KASUGA	ADVISEK
A.	KAIAGISHI	ASSISTANT MANAGER
Δ.	KATO	PRESIDENT
ĸ.	KATO	DEPUTY GENERAL MANAGER
ĸ.	KATO	RESEARCHER
Μ.	KATO	MANAGER
Τ.	KATO	DIRECTOR
Y.	KATO	SENIUK CHIEF ENGINEEK
ү. р	KATSUBE	
S.	KATSURAGI	TECHNICAL ADVISER
к.	KAWABATA	DEPUTY DIRECTOR
T.	KAWADA	EXECUTIVE MANAGING DIRECTOR
Α.	KAWAHARA	DIVISION MANAGER
D.	KAWAHARA	MANAGING DIRECTOR
Τ.	KAWAHITO	STANDING AUDITOR
1.	KAWAI	MANAGEK Seniod Manaced
п. v	KAWAKAMI	PROFFSSOR
M.	KAWAKAMI	DEPUTY GENERAL MANAGER
S.	KAWAKAMI	DEPUTY GENERAL MANAGER
s.	KAWAKATSU	MANAGING DIRECTOR
Υ.	KAWAMURA	PRESIDENT
Κ.	KAWASAKI	VICE PRESIDENT
Y.	KAWASAKI	ASSISTANT MANAGER
1. T	KAWASHIMA VIRE	SENIUR ADVISER
T.	KIDO	VICE PRESIDENT
ŝ.	KIJIMA	GENERAL MANAGER
M.	KIKKAWA	DIRECTOR GENERAL
s.	KIKUCHI	DIRECTOR
Y.	KIMURA	DIRECTOR & GENERAL MANAGER
S.	KINBARA	SENIOR EXECUTIVE DIRECTOR
M. T	KINUSHIIA	UNIEF EXPERI
H.	KISAKI	COORDINATOR
A.	KISHI	STAFF MANAGER
Τ.	KISHIDA	GENERAL MANAGER
Υ.	KISHIMOTO	DIRECTOR
U.	KISHINO	MANAGING DIRECTOR, GENERAL MANAG
M.	KITADA	DIRECTOR/EXECUTIVE VICE-PRESIDE
M	KIIAGAWA	PROFESSOR
г. К	KITAMIRA	DEDUTY CENERAL MANAGER
T.	KITAMURA	GENERAL MANAGER
Ŷ.	KITAURA	GENERAL MANAGER
Υ.	KIYOHARA	
Ţ.	KIYOKAWA	GENERAL MANAGER
R.	KIYOSE	PROFESSOR
н.	KOBAYASHI	DEPUTY GENERAL MANAGER
ĸ.	KOBAVASHI	SENIOR DEDUTY CENEDAL MANACER
M.	KOBAYASHI	DIRECTOR MANAGER
Μ.	KOBAYASHI	omborou, mmoun
ş.	KOBAYASHI	REGULAR AUDITOR
s.	KOBAYASHI	DEPUTY GENERAL MANAGER
ა. ა	NUBAYASHI	BUARD DIRECTOR
з. Т	KOBAVACUT	GENERAL MANAGEK
Ť.	KOBAYASHI	UDINERAL MANAGER
Τ.	KOBORI	DEPUTY DEPARTMENT MANAGER
Κ.	KODAMA	PRESIDENT
Κ.	KODAMA	DEPUTY GENERAL MANAGER
ї. Т	KOIDA	MANAGING DIRECTOR
Ġ.	KOIDA	DIRECTOR
Ň.	KOIKF	CENERAL MANAGED
s.	KOIKE	CENERAL MANACER

GENERAL MANAGER

TOKAI UNIVERSITY TOSHIBA CORPORATION SCIENCE UNIVERSITY OF TOKYO TOKYO ELECTRIC POWER CO. JAPAN ELECTRIC POWER INFORMATION CENTER TOKAI UNIVERSITY/RESEARCH & DEVELOPMENT INSTITUTE POWER REACTER & NUCLEAR FUEL DEVELOPMENT CO. NIPPON NUCLEAR SERVICE CORPORATION ATOM TRASPORT SERVICE LTD. TOKYO ELECTRIC POWER CO. JAPAN NUCLEAR FUEL CONVERSION CO., LTD TOHOKU ELECTRIC POWER CO. RESEARCH OFFICE OF THE STANDING COMMITTEE ON SCIENCE & TECHN CENTRAL RESEARCH INSTITUTE OF ELECTRIC POWER INDUSTRY JAPAN NUCLEAR SECURITY SYSTEM CO., LTD. HITACHI, LTD. HITACHI WORKS SCIENCE & TECHNOLOGY AGENCY JOUNALIST JAPAN RESEARCH INSTITUTE, LTD. THE SCIENCE & TECHNOLOGY AGENCY NIPPON NUCLEAR FUEL DEVELOPMENT CO., LTD. HITACHI, LTD. NUCLEAR FUEL INDUSTRIES, LTD. TOKYO ELECTRIC POWER CO. SHIKOKU ELECTRIC POWER CO. TOSHIBA CORPORATION KANAGAWA UNIVERSITY ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO. CHUGOKU ELECTRIC POWER CO. JAPAN NUCLEAR FUEL LIMITED NUCLEAR POWER TRAINING CENTER, LTD. KANDENKO CO., LTD. CHUBU ELECTRIC POWER CO. NUCLEAR MATERIAL CONTROL CENTER NATIONAL PUBLIC RELATIONS CO. SUMITOMO ATOMIC ENERGY INDUSTRIES, LTD. TOKYO ELECTRIC POWER CO. INTERNATIONAL CONFERENCE CENTER HIROSHIMA POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO. CHUBU ELECTRIC POWER CO. NIPPON ADVANCED TECHNOLOGY CO. TOSHIBA ENGINEERING CO. SCIENCE & TECHNOLOGY AGENCY TOKYO ELECTRIC POWER CO. TOHOKU ELECTRIC POWER CO. KANSAI ELECTRIC POWER CO. POWER REACTOR & NUCLEAR FUEL DEVELOPMENT CO. ER ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO. INT KANSAI ELECTRIC POWER CO. UNIVERSITY OF OSAKA PREFECTURE POWER REACTER & NUCLEAR FUEL DEVELOPMENT CO. KANSAI ELECTRIC POWER CO. MITSUBISHI HEAVY INDUSTRIES, LTD. YURTEC CORPORATION CHUGOKU ELECTRIC POWER CO. MITSUBISHI HEAVY INDUSTRIES, LTD. TOKAI UNIVERSITY JAPAN ATOMIC POWER CO. JGC CORPORATION KANSAI ELECTRIC POWER CO. PECHINEY JAPON RADIOACTIVE WASTE MANAGEMENT CENTER JAPAN NUCLEAR SECURITY SYSTEM CO., LTD. MITSUBISHI HEAVY INDUSTRIES, LTD. FBR ENGINEERING CO. TAKENAKA CORPORATION KAWASAKI HEAVY INDUSTRIES, LTD. ELECTRIC POWER DEVEROPMENT CO., LTD. HITACHI, LTD. CHUGOKU AREA OPERATION JAPAN POWER ENGINEERING AND INSPECTION CORPORATION TOSHIBA ENGINEERING CO. OHBAYASHI CORPORATION MITSUBISHI NUCLEAR FUEL CO. NHK HOKKAIDO ELECTRIC POWER CO. NITSUBISHI RESEARCH INSTITUTE, INC.

ORGANIZATION

NAME		TITLE
Ү. Н	KOIKE	MANAGING DIRECTOR MANAGER
<u>М</u> .	KOIZUMI	DEPUTY GENERAL MANAGER
Τ.	KOIZUMI	CHIEF ENGINEER
Κ.	KOJIMA	
I. R	KOKUBO	DIRECTOR, GENERAL MANAGER
I.	KOKUBU	DIRECTOR
ĸ.	KOKUBU	DIRECTOR
н.	KOMADA	DEPUTY MANAGER
Y.	KOMAKINE	DIVISIUN MANAGEK MANAGING DIDECTOR
s.	KOMATSU	PROJECT MANAGER
Ĥ.	KOMOU	MANAGER
Μ.	KONAKA	
s.	KONDO	PROFESSOR
	KONDO	DIRECTOR
Ŷ.	KONDO	PRESIDENT
Т.	KONISHI	PRINCIPAL ENGINEERING MANAGER
Y.	KOREI	PRESIDENT
1. K	KUSAKA	DEPUIY GENEKAL MANAGER RESEARCHER
Ĥ.	KOUYAMA	LECTURER
М.	KOZEKI	DEPUTY DIRECTOR
<u>М</u> .	KOZUKA	MANAGER
K.	KUDO	DEDUTY DIRECTOR-CENERAL
т.	KUDO	MANAGER
Ŷ.	KUMAOKA	GENERAL MANAGER
Ţ.	KUMATOR I	CHAIRMAN OF BOARD OF DIRECTORS
1.	KUME	PRESIDENT
к.	KUNITA	MANAGING DIRECTOR
Ĥ.	KURA	DEPUTY GENERAL MANAGER
<u>J</u> .	KURAMOCHI	MANAGING DIRECTOR
T.	KURAMOCHI	DEPUTY DIRECTOR
1 • 1 •	KURAMOTO	PROFESSOR, DIRECTOR
M.	KURAMOTO	EXECUTIVE MANAGING DIRECTOR
Υ.	KURASHIGE	DIRECTOR
H.K		DIRECTOR & GENERAL MANAGER
L. H.	KURIHARA	FXFCHTIVE DIRECTOR
T.	KURIHARA	DIRECTOR
Υ.	KURIHARA	GENERAL MANAGER
Н.	KURODA	PRESIDENT
M.	KURODA	MANAGEK Deputv general Manager
Ť.	KURODA	MANAGING DIRECTOR, GENERAL MANA
Τ.	KURODA	GENERAL MANAGER
Y.	KURODA	MANAGER
з. У.	KUSUMOTO	MANAGER
ĸ.	KUWABARA	MANAGING DIRECTOR
Μ.	KUWABARA	DIRECTOR
S.	KUWABARA	DEPUTY GENERAL MANAGER
З. А.	MACHIDA	DIRECTOR
s.	MACHIDA	GENERAL MANAGER
Υ.	MACHIDA	MANAGER
н. с	MAEDA	
т.	MAEDA	DEPUTY GENERAL MANAGER
Ŷ.	MAEDA	DEPUTY GENERAL MANAGER
F.	MAEKAWA	DIRECTOR, GENERAL MANAGER
Y. v	MALKAWA	VICE PRESIDENT
K.	MAJIMA	DIRECTOR & GENERAL MANAGER
H.	MAKI	CHIEF ENGINEER
М.	MAKI	MANAGER
N. M	MAKIMURA	PRESIDENT
K.	MAMIYA	DIRECTOR
Ä.	MANO	PRESIDENT
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Y. NISHIKAWA K NISHIMUDA	AUDITOR DEPUTY GENERAL MANAGED	JAPAN ATONIC POWER CO.
K. NISHINA	PROFESSOR	NAGOYA UNIVERSITY

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<u>N</u> .	NOGUCHI	GENERAL MANAGER
н.	NOHMI	ADVISOR
к. Т	NOJIMA	DIRECTOR, DEPUTI GENERAL MANAGER
Ť.	NOMURA	CHAIRMAN OF THE BOARD OF DIRECTOR
Ŷ.	NOMURA	SECRETARY
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Ν.	OGAWA	ASSISTANT TO GENERAL MANAGER
к.	OGINO	PRESIDENT
ы.	ΟΗ-ΗΑΤΑ	DIRECTOR
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Α.	OHATA	
<u>Т</u> .	OHBA	GENERAL MANAGER
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Ť.	OHGAMI	DEPUTY GENERAL MANAGER
н.	OHISHI	EXECUTIVE VICE PRESIDENT
Ţ.	OHISHI	DEPARTMENT MANAGER
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Å.	OHKI	PROFESSOR
Μ.	OHKUBO	DIRECTOR
Y.	OHKUBO	MANAGER
н. к	OHKURA	MANAGING DIRECTOR
Т.	OHMURA	DIRECTOR
Τ.	OHMURA	GENERAL MANAGER
Ε.	OHNO	DIRECTOR
S. т	OHNO	KESEAKUHEK MANACING DIRECTOR
T.	OHNO	DIRECTOR
Ť.	OHNO	GENERAL MANAGER
н.	OHNUMA	GROUP LEADER
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Y.	OHSUGA	ASSISTANT GENERAL MANAGER
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Μ.	OHTAKA	
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Κ.	OHTSUKA	GENERAL MANAGER
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Ñ.	OKADA	STAFF MEMBER
s.	OKADA	
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HOGURIKU ATOMIC INDUSTRIAL CONFERENCE JAPAN ATOMIC POWER CO.

## LIST OF PARTICIPANTS IN THE 26TH JAIF ANNUAL CONFERENCE -AS OF APRIL 8.1993

NAM	E	TITLE	ORGANIZATION
M.	OKAMURA	GENERAL MANAGER	MITSUBISHI HEAVY INDUSTRIES, MINISTRY OF FOREICN AFFAIRS
х. м	OKAMUKA	CENEDAL MANACER	MINISTRI OF FOREIGN AFFAIRS
VI.	OKANO	DEPUTY GENERAL MANAGER	KANSAI ELECTRIC POWER CO.
Ŷ.	OKAYA	MANAGER	MITSUBISHI ELECTRIC CORPORATI
Α.	OKAZAKI	DEPARTMENT MANAGER	NEWJEC INC.
K.	OKAZAKI	ASSOCIATE DIRECTOR	JGC CORPORATION
M.	OKAZAKI	MARKETING EXECUTIVE	TOSHIBA CORPORATION
J.	OKI	DEPUTY GENERAL MANAGER	CHUGUKU ELEUIKIC PUWEK CU.
N.	OKIMURA	DIRECTOR	SCIENCE & TECHNOLOGY AGENCY
к.	OKUDE	MANAGING DIRECTOR	MITSUI & CO., LTD.
Ŷ.	OKUI	GENERAL MANAGER	JAPAN NUCLEAR FUEL LIMITED
s.	OKUMURA	MANAGING DIRECTOR	JAPAN NUCLEAR FUEL CO., LTD.
Τ.	OKUNO	DEPUTY MANAGER	FEDERATION OF ELECTRIC POWER
A.	ONO	GENERAL MANAGER	MIISUI & CU., LID.
1. U	OHTERA	DIRECTOR	IADAN NUCIFAR FUEL IMITED
к.	ОТОНА	DIRECTOR, DEPUTY GENERAL MANAGER	TOKYO ELECTRIC POWER CO.
Ŷ.	O Z A K I	ALDERMAN	KASHIWAZAKI CITY
Ÿ.	OZAKI	DIRECTOR	CENTRAL RESEARCH INSTITUTE OF
Μ.	OZEKI	PRESIDENT	RAILWAY TECHNICAL RESEARCH IN
R.	ROBIN	PRESIDENT	CEZUS-JAPON
5. V	SABA	ADVISEK IU INE BUAKD Dedutv Didectod	SCIENCE & TECHNOLOCY ACENCY
M.	SAEKI	MANAGING DIRECTOR	KIMAGAI GUMI CO., LTD.
I.	SAITO	MANAGER	MITSUBISHI ELECTRIC CORPORATI
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s.	SAITO	MANAGER	TOHOKU ELECTRIC POWER CO.
Y.	SAITO	PRESIDENT	INSPECTION DEVELOPMENT CO., LT
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M.	SAKUTA	PROFESSOR	NIHON UNIVERSITY
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Κ.	SANO	CHIEF ENGINEER	KAJIMA CORPORATION
М.	SANO	MANAGING DIRECTOR	JAPAN NUCLEAR SECURITY SYSTEM
A.	SANTO		OF OUR LETRY PROFILE OF ACCOUNT
к. т	SARUHASHI	EXECUTIVE DIRECTOR DIDECTOR CENERAL MANACER	GEUCHEMISIKY KESEAKCH ASSULIA
A.	SASAKI	DEPUTY GENERAL MANAGER	MITSUBISHI CORPORATION
G.	SASAKI	AUDITOR	SUMITONO ATOMIC ENERGY INDUST
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Υ.	SASAKI	TECHNICAL ADVISER	YAZAKI CORPORATION
Y.	SASAKI	DIRECTOR	JAPAN ATOMIC POWER CO.
п. ч	SASAU	ADVISEK DIDECTOD-CENEDAI	NIHUN UNIVERSIIY
E.	SATO	DEPUTY GENERAL MANAGER	TOHOKI ELECTRIC POWER CO.
Ĥ.	SATO	GENERAL MANAGER	MITSUI & CO., LTD.
Н.	SATO	ASSISTANT SENIOR GENERAL MANAGER	OHBAYASH1 CORPORATION
н.	SATO	DEPARTMENT MANAGER	HITACHI, LTD. OMIKA WORKS
К. <i>К</i>	SATO	ASSISTANT MANAGER	CHUGOKU ELECTRIC POWER CO.
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ĸ.	SATO	MANAGING DIRECTOR	URANIUM ENRICHMENT MACHINERY.
K.	SATO	SENIOR STUFF	POWER REACTOR & NUCLEAR FUEL
Κ.	SATO	MANAGING DIRECTOR	KAJIMA CORPORATION
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N.	SATO	ASSISTANT MANAGER	TOKYO ELECTRIC POWER CO.
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K. WATANABE DIRECTOR, DEPUTY EXECUTIVE OFFICER MARUBENI CORPORATION	H. WATANABE	DEPUTY GENERAL MANAGER	CHUBU ELECTRIC POWER CO.
	K. WATANABE	DIRECTOR, DEPUTY EXECUTIVE OFFICER	MARUBENI CORPORATION

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