



**“Information and Education in Nuclear Science and Technology
in Pacific Nuclear Council Member Countries”**

**Final Report of the Pacific Nuclear Council Task Group
Prepared by Dr Clarence J. Hardy, Task Group Leader**

14 March 2008

**For Presentation to the Pacific Nuclear Council Meeting
Seoul, Republic of Korea, 18 April 2008**

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“Information and Education in Nuclear Science and Technology in Pacific Nuclear Council Member Countries”

Final Report of the Pacific Nuclear Council Task Group

Executive Summary

Background - The members of the Pacific Nuclear Council (PNC) were concerned in 2004 at the effectiveness of presentation of public information and the extent of education in nuclear science and technology in view of the greater interest being shown in many countries in constructing new nuclear power plants and in other nuclear applications. The PNC therefore set up a new Task Group within its existing Working Group on Public Information and Outreach. The mandate of the Task Group was to review the presentation of public information and education in nuclear science and technology in PNC member countries and to prepare a report for the PNC. This report was also intended to provide recommendations on ways to improve the presentation of public information and education in this field and on ways to answer criticism in a more effective way.

Preparation of the Report - Dr Clarence Hardy, then PNC Vice-President, was appointed Leader of the Task Group, and PNC member organisations nominated eight members to assist in the review of information and education and in the preparation of this Report. Dr Hardy presented progress reports on the work at PNC meetings in 2005, 2006 and 2007 and a paper reviewing progress at the 15th Pacific Basin Nuclear Conference in Sydney on 15-20 October 2006. A Draft Report was discussed by members of the Task Group in October 2007 and by PNC members at the PNC meeting in Washington on 10 November 2007. The PNC approved the Draft Report and asked Dr Hardy to prepare the Final Report including any updated information from members of the Task Group for approval by the PNC meeting in Seoul on 18 April 2008.

The Need for Improved Presentation of Information and Education - There are now clear signs of a revitalisation of the world nuclear industry with construction underway of new nuclear power stations in the Asia/Pacific Region, Europe and North America. If the plans to construct the 34 new nuclear power stations and over 70 in the planning stage are realised then there will be an increasing need to assure the public that these, and existing nuclear power plants, can be operated safely and economically and that nuclear waste can be managed safely.

In addition to the need for improved presentation of information to the public, there will be an increasing demand for trained professional, technical and industrial support staff in many countries to ensure that new plants can be constructed on time and within budget. Whilst some countries have maintained good education opportunities in nuclear science and technology over the last 20 years, others have not and will now need to address the education of professional, technical and industrial support staff to ensure that new nuclear power and fuel cycle plants can be built in a timely way.

Recommendations - The professional scientific societies and industrial trade organisations which are members of the PNC should assist in the **presentation** of factual and up-to-date information on important nuclear issues in the form of brochures and position papers made available not only to their members but also to the general public and to government departments involved in the fields of nuclear science and technology. These PNC organisations should also encourage governments in their countries to support **education** in nuclear science and technology in every possible way. The PNC should continue to support its current Working Groups on Codes and Standards, Advanced Nuclear Reactors, Radioactive Waste Management, and Public Information and Outreach, and encourage them to review major issues in their areas and publish reports.

Detailed information from PNC member organisations and websites to access this information are provided in Attachment 2. Suggested answers to issues of public concern are given in Attachment 3. The members of the Task Group listed in Attachment 1 are thanked for their contributions.

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1. Objectives of the Task Group

To review the presentation of public information and education in nuclear science and technology in Pacific Nuclear Council (PNC) member countries and to prepare a report to the PNC. This report is intended to provide recommendations on ways to improve the presentation of public information and education in this field and on ways to answer criticism in a more effective way.

2. Background to the PNC Working Group and Task Group

2.1 The Working Group on Public Information and Outreach

The PNC has had a Working Group on Public Information and Outreach for many years. The mandate of this Working Group is to share information on how to promote public acceptance of nuclear energy for peaceful uses. This mandate includes the exchange of information on public acceptance programs, experiences and public opinion trends in the various PNC member organisations and in other non-member countries, particularly in the Pacific region. The mandate includes understanding and allaying the public's concerns with respect to peaceful applications of nuclear energy and other peaceful applications of nuclear science and technology. The mandate also includes helping to organise technical sessions at the biennial Pacific Basin Nuclear Conferences in the field of public information and education and assisting the Working Group on Radioactive Waste Management in developing public information on radioactive waste management.

2.2 The Task Group on Information and Education in Nuclear Science and Technology in PNC Member Countries

The PNC agreed at its meeting in Washington on 14 November 2004 to set up a new Task Group on "Information and Education in Nuclear Science and Technology in PNC Member Countries" following the initiatives of Professor Yasumasa Tanaka (now deceased) of Japan, former Chair of the PNC's Working Group on Public Information and Outreach, and Dr Clarence Hardy, then Vice-President of the PNC. The objectives of the Task Group are provided at the beginning of this page.

The PNC approved a set of recommended procedures for the work of the Task Group at its meeting in Seoul on 15 May 2005 and appointed Dr Hardy as the Leader of the Task Group. PNC member organisations were then invited to nominate members of the Task Group to assist in the preparation of the report. A list of the members is provided in Attachment 1.

The members provided Dr Hardy with information from their own and other organisations in their countries during 2005-2007. Dr Hardy presented progress reports to PNC meetings in Tsukuba, Japan, on 9 October 2005; Toronto, Canada, on 11 June 2006; Sydney, Australia, on 15 October 2006, and Boston, USA, on 23 June 2007. Dr Hardy also presented a progress report in a paper to the 15th Pacific Basin Nuclear Conference in Sydney, 15-20 October 2006, which enabled a wider audience to see the progress of the Task Group.

Dr Hardy prepared the Draft Report of the Task Group for discussion by members of the Task Group in October 2007. The members of the PNC approved the Draft Report at the PNC meeting in Washington on 10 November 2007, and asked Dr Hardy to prepare the Final Report including any updated information for approval at the PNC meeting in Seoul on 18 April 2008.

3. The Need for Information Presentation and Education in Nuclear Science and Technology

The accident at Chernobyl in the Ukraine in 1986 had a significant effect on public opinion about the safety of large nuclear power stations and the wisdom of increasing the number of nuclear power stations in the world.

In 1971 there were 116 nuclear power plants in operation in 17 countries and 124 under construction. In 1986 there were 397 nuclear power plants in operation in 28 countries and another 100 under construction. A total of 281 nuclear power plants were added in that period of 15 years (nearly 20/year). In 2007 there are 439 nuclear power plants in operation in 30 countries with 34 under construction and over 70 planned. Only 40 nuclear power plants were constructed in the 21 years from 1986 to 2007 (2/year). This illustrates the concern by the public, by utilities and by many governments, at the consequences of having another accident like Chernobyl although many experts advised that it was extremely unlikely to happen again.

There are now clear signs of a revitalisation of the world nuclear industry with construction underway of new nuclear power stations in Finland and France and ambitious plans to construct new nuclear power stations in China, India, Russia and the USA. If the plans to construct the 34 new nuclear power stations and over 70 in the planning stage are realised then there will be an increasing need to assure the public that these, and existing nuclear power plants, can be operated safely. In addition, there will be an increasing demand for trained professional, technical and industrial support staff in all of the countries involved to ensure that these plants can be approved and constructed on time and within budget.

This revitalisation will need improved public information presentation to avoid lengthy and costly public intervention or opposition in approval hearings by national governments and by national regulatory organisations. Whilst some countries have maintained good education opportunities in nuclear science and technology over the last 20 years, others have not and will now need to address the education of professional, technical and industrial support staff to ensure that new nuclear power plants and fuel cycle plants can be built in a timely way.

The conclusion of the members of the PNC over two years ago was that it was an appropriate time to review the presentation of public information and education in nuclear science and technology in order to address these issues and to provide constructive recommendations. This report is the result of that initiative.

Responding to Public Concerns

There are several concerns by members of the public at the existing level of nuclear power in the world and the likely expansion of the industry in the near future. These concerns were expressed after the accident at Chernobyl and after the terrorist activities in New York and other cities in recent years. The five major issues are identified as:

- safety of nuclear power reactors;
- economics of nuclear power for electricity;
- management of radioactive wastes;
- proliferation of nuclear weapons and potential terrorism; and
- whether there is enough uranium to make the industry sustainable.

It is important that persons in the member organizations of the PNC have answers to these issues as part of their provision of public information and suggested answers are presented in Attachment 3.

4. Review of Information Presentation in Nuclear Science and Technology

It is clear from the information provided by the members of the Task Group that some PNC member organisations, government departments and electricity utilities in their countries have well-funded and effective methods of presentation of information on nuclear power to the public and also, in some countries, information on non-power applications of nuclear technology, eg in medicine, industry, agriculture, etc. Some PNC member organisations and utilities do not have such well-funded methods and yet some are considering introducing nuclear power and they need to reassure their public that it will be safe and economic.

Some countries have major organisations which provide information through websites and public documents (brochures and videos, etc) and some have held major public inquiries into nuclear power and fuel cycle facilities over many years. At these inquiries and license applications to construct plants, the public usually is able to obtain relevant information and make submissions for or against the proposals. Recent examples of these opportunities for provision of information and involvement of the public have been, for example, in hearings of the US Nuclear Regulatory Commission to approve upgrading of nuclear power plants and the new Construction and Operation Licenses being applied for by utilities. In Australia there were three major government inquiries in 2006 to consider uranium mining, processing and nuclear power, and large numbers of submissions were received from the public as well as government departments and companies. Major discussions involving the public were held in Canada in the lead up to the announcement in 2006 that Ontario would revitalise its nuclear power industry. References to these and other examples of the presentation of information to the public are given in Attachment 2, A-R.

5. Review of Education in Nuclear Science and Technology

Similarly to the situation with information presentation discussed above, some PNC member organisations have well-funded and effective nuclear education programs in their countries not only for professionals (first degree, masters and doctorate programs), but also for technical and industrial support persons and the public. However, some PNC member organisations do not have such nuclear education programs and yet some of these countries are considering introducing nuclear power with its need for professionals and others at all levels from initial planning, for license applications and for the construction of plants.

It is recognised that some PNC member countries now considering introducing nuclear power have undertaken the building up of professionals and technical support staff for many years in national research laboratories, and Indonesia is a good example. Other PNC member countries have many professional and technical staff engaged in nuclear research but little experience in the nuclear power field. Australia is a good example with many professional and technical staff undertaking research at the Australian Nuclear Science and Technology Organisation, but very few have had experience in the nuclear power or nuclear fuel cycle fields. There is no university offering a course in nuclear engineering in Australia since the last such course was closed over 20 years ago.

Some PNC member countries have continued to offer courses on nuclear engineering and other nuclear-related subjects, eg radiation protection, in universities and technical institutes over the last 20 years because they have continued construction of nuclear power plants and fuel cycle facilities, eg. China, Japan and Korea. In contrast, courses in these subjects are only now being revitalised in countries like the USA because of the growing interest in new

nuclear power construction and in fuel cycle research programs, eg. the Global Nuclear Energy Program (GNEP).

Several universities in PNC member countries are becoming increasingly involved in these new programs and consequently can justify offering courses in these nuclear subjects. In Australia, by contrast, there is only uranium mining and processing at present and these fields require professional and technical staff which have undertaken courses in geology, mining and chemical engineering, not in nuclear engineering. The lack of a nuclear industry in Australia requiring staff experienced in nuclear engineering has therefore led to the universities not being able to justify offering courses in this field over the last 20 years.

6. Recommendations for Improvement in Information Presentation and Education in Nuclear Science and Technology

- (1) **Information Presentation** - The professional scientific societies and industrial trade organisations which are members of the PNC should assist in the presentation of factual and up-to-date information on important nuclear issues in the form of brochures and position papers made available not only to their members but also to the general public and to government departments involved in the fields of nuclear science and technology. These organisations should also support public lectures in major cities to assist in providing information to the public. These organisations should make formal submissions to any government inquiries or regulatory inquiries on the applications to construct new nuclear plants in their countries.
- (2) **Education** - The professional scientific societies and industrial trade organisations which are members of the PNC should encourage governments and utilities in their countries to support education on nuclear science and technology and the provision of travel grants to enable students and staff of educational institutions to travel overseas to obtain information in major countries now operating and constructing new nuclear power plants and other nuclear facilities.
- (3) **PNC Working Groups** - The PNC should continue to support its current Working Groups on Codes and Standards, Advanced Nuclear Reactors, Radioactive Waste Management, and Public Information and Outreach, and encourage them to review major issues in their areas. The Working Groups should be encouraged to set up new Task Groups where they can identify important issues to be addressed and the Task Groups should provide deadlines for the delivery of their Reports.

7. Future Plans

The Draft Report was approved by the PNC at its meeting in Washington on 10 November 2007. The Final Report was prepared incorporating the comments received on the Draft Report and, if approved by the PNC at its meeting in Seoul on 18 April 2008, will be published on the PNC website. The approved Report will then be available to the PNC member organizations to distribute electronically or as hard copies to interested organisations and persons in their countries.

ATTACHMENT 1.

List of Members of the Task Group

Dr Clarence Hardy (Leader)	Australian Nuclear Association	hardycj@ozemail.com.au
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Dr Changxin Liu	Deputy Secretary-General, Chinese Nuclear Society	lcx@ns.org.cn
Dr David Yao	Director, Planning, AEC, & NEST, Taipei	dyao@aec.gov.tw
Prof. Joocho Whang	Kyung Hee Univ, Korea	joochowhang@khu.ac.kr
Prof. George Bereznai	Ontario Institute of Technology	george.bereznai@uoit.ca
Ms Claudia Lemieux	Canadian Nuclear Association	lemieuxc@cna.ca
Ms Mimi Limbach	Potomac Communications (USA) and ANS Public Information Committee	mlimbach@pcgpr.com
Ms Kaori Takada	FEPC, Japan	takada@fepc.or.jp

The current Co-chairs of the Working Group on Public Information and Outreach are:

Ms Mimi Limbach	Potomac Communications (USA) and ANS Public Information Committee	mlimbach@pcgpr.com
Ms Junko Ogawa	Japan Atomic Power Co. and Chair, AESJ Public Information Committee	junko-ogawa@japc.co.jp

ATTACHMENT 2.

Summaries of Information Provided to the Task Group by PNC Member Organisations and Others

A summary of the information provided by members of the Task Group for PNC member organisations and other organisations is provided in a series of Attachments which include lists of the key topics and information on websites from which more detailed information can be obtained. The Leader of the Task Group also obtained some information from other sources, eg. the IAEA, the OECD/NEA, the World Nuclear Association and others in the field. The information is listed as follows:

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A. American Nuclear Society	7
B. Australian Nuclear Association	9
C. Canadian Nuclear Society and others	11
D. Chinese Nuclear Society, Beijing, China	15
E. Indonesian Nuclear Society	16
F. Japan Atomic Industrial Forum and Atomic Energy Society of Japan	17
G. Korean Nuclear Society and Korean Atomic Industrial Forum	18
H. Mexican Nuclear Society	20
I. Nuclear Energy Society of Taipei, China	21
J. Russian Nuclear Society	26
K. International Nuclear Societies Council (INSC)	27
L. International Atomic Energy Agency (IAEA)	27
M. OECD/Nuclear Energy Agency (NEA)	27
N. Asian and European Networks	28
O. International Journal on Nuclear Knowledge Management	28
P. Radiochemistry Society	28
Q. World Nuclear Association	29
R. World Nuclear University	33

ATTACHMENT 2 A.

Summary of Information Provided to the Task Group from the ANS and Others

Introduction

The American Nuclear Society (ANS) is a non-profit non-government organisation with headquarters in Chicago and which has had a considerable influence on the provision of nuclear information and education since its establishment in 1954. It is one of the founding members of the PNC. Details of its organisation and activities can be obtained from its website at www.ans.org.

ANS now has a membership of over 10,000 engineers, scientists, educators and administrators and represents the interests of over 1,600 companies, educational institutions and government agencies. On the educational side, it provides teacher workshops, an “Ask an Expert” service, and advertises nuclear careers. It publishes “Nuclear News”, a journal which attracts international interest, and provides fact sheets on its website on many topics on nuclear energy and its many applications.

The Nuclear Energy Institute (NEI, www.nei.org) is an institute fostering and encouraging the safe use and development of nuclear energy and provides a range of services to the nuclear industry. It is interested particularly in policy issues.

Government departments involved in the provision of nuclear information are the US Department of Energy’s Office of Nuclear Energy (www.ne.doe.gov) and the US Nuclear Regulatory Commission (USNRC, www.nrc.gov). The Electric Power Research Institute (EPRI, www.epriweb.com) is also a useful source of information.

American Nuclear Society Information (website – www.ans.org)

The comprehensive website should be accessed for detailed information particularly on its public information and education material.

The ANS monthly publication “Nuclear News” presented a major section on “Training and Education” in its February 2007 issue, pages 21-39. An article discussed an ANS special committee report on the need for federal funding of nuclear education in the USA. This committee was set up by the ANS President following a US Department of Energy fiscal 2007 budget submission which stated that “Federal assistance (for nuclear education) is no longer necessary and proposed the termination of the University Reactor Infrastructure and Education Assistance Program. The report entitled “Nuclear’s Human Element: Defining the Federal Government’s Role in Sustaining a Vibrant US University-Based Nuclear Science and Engineering System for the 21st Century” is available at the ANS website: www.ans.org/pi/fine The several articles not only discussed the situation in the USA but also included an article on recent progress in UK universities to provide postgraduate training in nuclear science and technology.

Two useful additional US sites which are components of the National Science Digital Library (<http://nsdl.org>) funded by the National Science Foundation are:

- (1) The Alsos Digital Library for Nuclear Issues (<http://alsos.wlu.edu>); and
- (2) Nuclearpathways.org (<http://nuclearpathways.org>) with a search engine providing students, professionals and the public access to widely based nuclear information.

Nuclear Energy Institute (NEI) Information
(From website – www.nei.org)

Statement of Purpose from NEI Bylaws

"The purposes of the Institute are to foster and encourage the continued safe utilization and development of nuclear energy to meet the nation's energy, environmental and economic goals and to support the nuclear energy industry by providing:

"Policy direction on critical issues, including regulation, legislation, congressional awareness/acceptance, waste, transportation, and other critical activities;

"A unified nuclear energy industry approach to address and resolve nuclear regulatory issues and related technical matters to facilitate high levels of reliability and economic efficiency in nuclear power plant operations;

"Advocacy and representation before the Congress, Executive Branch agencies, regulatory bodies, and state policy forums;

"Accurate and timely information to policy makers, the public and other constituencies to promote acceptance and recognition of nuclear energy's role in the nation's supply of safe, secure, dependable, and economic electric energy;

"Assistance to the nuclear energy industry with regard to state issues such as environmental considerations and rates; and

"Encouragement to educational institutions to promote education in nuclear energy disciplines. . . ."

Detailed information on NEI Programs should be obtained from its website.

ATTACHMENT 2 B.

Summary of Information Provided from the Australian Nuclear Association

Introduction

The Australian Nuclear Association (ANA) is a non-profit non-government organisation whose members are individuals interested in promoting the peaceful uses of nuclear energy. It is a member of the PNC. The ANA holds monthly technical meetings in association with The Institution of Engineers Australia, holds national conferences every two years, and periodically hosts international conferences, eg. the 15th Pacific Basin Nuclear Conference, Sydney, 15-20 October 2006. It also publishes a bimonthly newsletter "Nuclear Australia" and occasional technical papers. The ANA has bilateral cooperation agreements with a number of overseas nuclear societies to promote the exchange of information. Two ANA members, Dr Peter Airey and Dr Gerhardt Lowenthal, have had a textbook on "Applications of Radioisotopes and Radiation" published by Cambridge University Press recently and this is a major contribution for teachers and students.

The Australian Nuclear Science & Technology Organisation (ANSTO) is the government's agency responsible for nuclear science and technology. It has a website at www.ansto.gov.au to provide information on all of its activities including research, education and public and international relations. ANSTO also manages the Australian Institute for Nuclear Science & Engineering (AINSE) which has all of the Australian universities as members and which supports research in many applications of nuclear science and engineering. All of these universities have staff and students undertaking some type of research involving nuclear materials or radiation but no university currently offers undergraduate courses in nuclear science and engineering. ANSTO has produced a CD-ROM "Nuclear Science in Society – A science resource for Australian teachers and students in years 7-10".

The Australian government also provides nuclear information regularly to the public through its Departments and two agencies, the Australian Radiation Protection and Nuclear Science Agency (www.arpansa.gov.au), which is a regulatory agency, and the Australian Safeguards and Non-Proliferation Office (www.asno.dfat.gov.au).

The Uranium Information Centre (UIC) in Melbourne (www.uic.com.au) is supported by the uranium companies through The Australian Uranium Association (AUA) (www.uau.com.au) to provide information on all aspects of nuclear energy and its applications. The website has a wide range of briefing papers. The UIC has published many editions of a book "Nuclear Electricity" which is a suitable textbook for teachers and students at all levels. This book has recently been revised and reprinted with the support of the World Nuclear Association.

Lists of Information provided to the public over the last 30 years by the ANA, UIC, government departments and industry

Uranium Industry

Briefing Papers from The Uranium Information Centre (www.uic.com.au)

The Ranger Uranium Environmental Inquiry (major public inquiry on the proposal to mine uranium in an environmentally sensitive area)

Inquiry into the Nuclear Fuel Cycle (major government public inquiry)

List of presentations on uranium and the nuclear fuel cycle to public meetings and government inquiries by officers of the Australian Nuclear Association (ANA)

Research

Public inquiries on the proposal to build a research reactor by the Australian Nuclear Science & Technology Organisation (ANSTO) (www.ansto.gov.au)

Public exhibitions and presentations by ANSTO

Report of Public Inquiry into Health of Workers at the Research Laboratories of ANSTO

Radioactive Waste Management

Public information provided by Government Department responsible for waste management

Public Inquiries into Siting of National Low Level Waste Repository

Briefing Papers from The Uranium Information Centre (www.uic.com.au)

Education and Training

List of National & International Conferences held by the ANA

Sponsorship of School Projects by the ANA

List of Conferences held by ANSTO

List of Conferences by the Australian Institute of Nuclear Science & Engineering (AINSE)

List of Training Courses by ANSTO

CD ROM “Nuclear Science in Society – A science resource for Australian teachers and students in years 7-10” from ANSTO

Book “Nuclear Electricity” for schools from The Uranium Information Centre

Universities

List of Universities within the Australian Institute of Nuclear Science and Engineering carrying out nuclear research. The Australian National University in Canberra is now offering a degree course for a Master of Nuclear Science commencing from 2007. The University of Sydney is considering offering a new course of Master in Applied Nuclear Science in 2008.

Media

Summary of media activity in recent years on nuclear issues

Books

“Enriching Experiences: Uranium Enrichment in Australia, 1963-1996”, by Clarence Hardy, published by Glen Haven Publishing, Peakhurst, NSW 2210, Australia, 1996. ISBN 0 646 29063 0

“Atomic Rise and Fall: The Australian Atomic Energy Commission- 1953-1987”, by Clarence Hardy, published by Glen Haven Publishing, Peakhurst, NSW 2210, Australia, 1999; ISBN 0 9586303 0 5.

Non-nuclear Industry

Textbook on “Practical Applications of Radioactivity and Nuclear Radiations” (by two ANA members, Dr Peter Airey and Dr Gerhardt Lowenthal, published by Cambridge University Press, 2001, ISBN 0 521 55305 9 hardback)

Information provided by Dr Clarence Hardy

ATTACHMENT 2 C.

Summary of Information Provided to the Task Group from the CNS/CNA

Introduction

A large amount of information is available on websites operated by government organizations, the Canadian nuclear industry and Canadian universities. The two major non-profit non-government associations are the Canadian Nuclear Society (CNS) (www.cns-snc.ca) and the Canadian Nuclear Association (CNA) (www.can.ca), both of which are members of the PNC.

The CNA developed, and was in the sixth year of implementation in 2006, of a detailed program to provide bi-lingual information (English and French) on nuclear energy to decision makers, government officials, politicians, the media and the public. The communications function in 2006 included: an electronic newsletter, a website, quarterly public opinion polling, media relations, nuclear fact sheets, economic analysis, speaking engagements and a national TV advertising program. Some industry and government nuclear centres have discontinued public tours since the 9/11 incident, but some Canadian utilities are still operating visitor centres as part of their community and media outreach programs. The CNA plans to develop an even stronger communications function post-2006 to deal with the increasing interest by the media and the public since the government of Ontario announced in June 2006 a new nuclear refurbishment and construction program. Further information is available at www.cna.ca.

Other major organizations in Canada which contribute significantly to provision of nuclear information and education are:

- Atomic Energy of Canada Ltd (www.aecl.ca)
- Energy Council of Canada (www.energy.ca)
- Cameco Corporation (www.cameco.ca)
- Cogema Resources Inc. (www.crc.ca)
- Denison Mines Inc. (www.denisonmines.ca)
- Bruce Power Inc. (www.brucepower.ca)
- Ontario Power Generation (www.opg.ca)
- MDS Nordion (www.mds.nordion.ca)
- Nuclear Waste Management Organisation (www.nwmo.ca)
- Canadian Nuclear Safety Commission (www.nuclearsafety.gc.ca)
- CANTEACH (www.canteach.candu.ca)

A number of Canadian universities:

- École Polytechnique
- McMaster University
- New Brunswick (<http://www.unb.ca/>)
- Queen's University (www.queensu.ca/)
- Royal Military College (<http://www.rmc.ca/>)
- University of Ontario Institute of Technology (<http://www.uoit.ca/EN/index.html>)
- University of Saskatchewan
- University of Toronto (<http://www.utoronto.ca/uoft.html>)
- University of Waterloo (<http://www.uwaterloo.ca/>)
- University of Western Ontario (<http://www.uwo.ca/>)

Information provided by Professor George Bereznai,

Canadian Communications Program 2006 The Canadian Nuclear Association (CNA)

The CNA entered its fifth year in 2006 of implementing a strategic national communications program to promote the benefits of nuclear energy targeting primarily decision-makers, government officials, politicians, the media and the Canadian public.

After almost ten years of not having an industry communications function, the Canadian nuclear industry decided to re-establish a credible bilingual core communications function to serve the industry as the voice of the nuclear industry in Canada.

In 2006 the core communications function included: electronic newsletter, a website, quarterly national public opinion polling, media relations, nuclear fact sheets, economic analysis and on-going energy research, CNA President national speaking engagements, the coordination of third party experts including Patrick Moore, the co-founder of Greenpeace who manages a grassroots pro-nuclear coalition and website, distribution of pocket-size nuclear fact handbooks and a national television advertising program.

The CNA and its members have not in over a decade been involved in educational curriculum based programs targeting schools or teachers in any sustained or national way. In 2006, no nuclear organization in Canada was doing curriculum based work other than at a local level.

The nuclear industry does however support engineering cooperative educational programs and grants and is now developing a human resource strategy to address labour shortages and training for future nuclear expansion. In 2003 a new Ontario University developed an undergraduate nuclear engineering program in anticipation of the much needed staffing challenges for the future.

Industry operators of nuclear facilities also have closed public tours at nuclear facilities post 9/11 and some nuclear organizations like Atomic Energy of Canada has permanently closed their visitor's centres. Other utilities like Ontario Power Generation, Bruce Power, Hydro Quebec and New Brunswick Power operate visitor centres as part of their community relation and media outreach programs.

While progress has been made on the communications front in terms of the CNA establishing an infrastructure to deal with communications issues and keeping track of public opinion, the country still remains equally divided in terms of its support for using nuclear energy for electricity generation. However in Ontario growing support for nuclear energy refurbishment and new build is developing as the province deals with threats of brownouts during summer periods and the industry invests in nuclear advertising and communications.

As the CNA enters its sixth year in its strategic communications program, it will have to be mindful of the continuing debate on nuclear energy as part of Canada's future energy mix. In 2006 the Government of Ontario made its decision on the future electricity generation mix for the province and at the same time Canada re-examined the Kyoto treaty and how it will help to reduce future greenhouse gas emissions.

As energy issues become more prominent, the CNA and the industry will continue to occupy greater media space through television advertising and media reports as it puts its case forward for refurbishments of nuclear plants and new nuclear construction.

As part of the debate on nuclear energy The Nuclear Waste Management Organization established by the Federal Government in 2002 by an act of Parliament mandated to examine options for longterm management of used nuclear fuel submitted its report to the government in December 2005 recommending shorterm on site storage and longterm geological disposal. The federal government has yet to respond on the report as of May 15, 2006.

The timing for the nuclear industry is opportune to make its business case through objective third party economic analysis building on new technology, successful projects, and contribution to clean air and greenhouse gas emission reduction (which it will continue to get the go ahead for nuclear refurbishment and new nuclear construction.?)

Communications strategy for 2006 and beyond:

- 1) Develop an even stronger core communications function to deal with an increase in media, anti-nuclear groups and government interests
- 2) Establish new communications vehicles to reach younger people and the future generation of decision-makers who will be adults by the time the industry is ready to refurbish and build new nuclear reactors.

Core Communications Program

- Public opinion polling and analysis
- Economic analysis for nuclear energy and other energy generation for comparative purposes
- Research and information on nuclear facts and issues
- Dissemination of bilingual communications materials and publications and electronic newsletters.
- Website
- Pro-active media relations
- Briefing Program for elected officials
- Sponsorships of more high profile events to promote messages, provide speaking opportunities, networking and positive industry profile
- Partnerships, seminars, speakers bureau, workshops, annual conference

Public Educations and Outreach

- Ontario based television advertising in 2006 replaced Website and print advertising (2002-2004) in highly targeted opinion leader targeted newspapers like the Globe and Mail (this probably means CNA will no longer advertise in G&M)
- Third party expert advocacy and grass roots coalition for nuclear support

Note: The industry does not support an education program targeting educational institutions and educators for budgetary reasons nor is the industry or its members involved in public exhibits outside of business and their immediate communities. (except for Canadian Museum of Science and Technology in Ottawa)

The combined effect and linkages between the industry core program, the television advertising and member communications activities has resulted in increased public support for nuclear with the media, greater awareness, understanding and acceptance of nuclear issues by the public and more favorable public policy decisions in Ontario and New Brunswick.

The CNA Communications function included a member based Communications Committee and a budget of 5 million dollars in 2006.

Detailed Public Survey information was available from Website Statistics and Tracking Surveys by IPSOS Reid in Ontario in April 2006 and Nationally in Jan 2006.

Information provided in 2006 by Ms Claudia Lemieux, CNA
For additional information see the website: www.cna.ca

Updated Information on CNA Program for 2008

In 2008 the Canadian Nuclear Association will launch a cross-curricular material program on the fundamentals of nuclear science for science teachers and students in grades 9 through 12. A second audience is parents and those members of the public who want to learn more about the nuclear industry and radiation.

This modular web-based nuclear science program offers a number of courses with clear information in everyday language about the civil and medical applications of nuclear energy and emphasizes on safety and management of radiological materials.

The focus of the material presented is on eight key sections: History of the Nuclear Industry in Canada; Atomic Theory; Radiation and its Sources; Ionizing Radiation; Biological Effects of Radiation; Nuclear Technology at Work; Safety in the Nuclear Industry; and Careers in the Nuclear Industry.

The lessons will be delivered as a series of attractive web-based units incorporating a variety of instructional media which will include graphics, short videos, Adobe Flash animations, hands on activities and question sheets offered in either Microsoft Word or Adobe Acrobat. Each part is designed to capture student interest and engage the student in learning.

Teachers of specific areas of study are free to explore and choose particular units and activities of interest for use with their students.

The nuclear curriculum will be developed and reviewed by experts in the nuclear industry and assessed by teachers of specific subject areas. specialists in the various high schools in physics, chemistry, biology, general science, environmental science, world history and technology.

Science curriculum officers from all Canadian provinces and territories are involved at the on-set of course development to ensure that the content meets science curriculum standards and to ensure nation wide participation.

Additional information provided in 2008 by Ms Claudia Lemieux, CNA

ATTACHMENT 2 D.

Summary of Information Provided to the Task Group from the Chinese Nuclear Society, Beijing

Introduction

In the nuclear field in China, there are five areas involved: government, industry, institutes, universities, and society. The industry and society are involved with the information presentation to the public, through brochures, lectures, visits, media papers, etc.

The institutes and universities are involved with nuclear education, mainly for university students, not for primary school, secondary school, nor for non-professionals.

In China, the main professional society in the nuclear field is the Chinese Nuclear Society, Beijing, with its about 50 divisions, branches, and committees. The name list for Chinese industry, universities and institutes is provided below:

Government

- China Atomic Energy Authority
- National Nuclear Safety Administration

Society

- Chinese Nuclear Society

Main Industry Corporation

- China National Nuclear Corporation
- China National Nuclear Engineering Corporation
- China Guangdong Nuclear Power Corporation

Nuclear Power Plant

- Qinshan Nuclear Power Complex (Qinshan Phase I, II, III)
- Daya Bay Nuclear Power Plant
- Ling Ao Nuclear Power Plant
- Lianyungang Nuclear Power Plant

Research

- China Institute of Atomic Energy
- Nuclear Power Institute of China

Uranium Industry

- China Jinyuan Uranium Company

Radioactive Waste Management

- China Qingyuan Environment Technology Company

Education /Universities

- Tsinghua University
- Beijing University
- Shanghai Jiaotong University
- Xi'an Jiaotong University

Media

- Xinhua Press

Information provided by Dr Changxin Liu, CNS

ATTACHMENT 2 E.

Summary of Information Provided to the Task Group from the Indonesian Nuclear Society

Introduction

The Indonesian Nuclear Society was formed relatively recently and is now a full member of the PNC. Many of its members are employed at the National Nuclear Energy Agency of Indonesia (BATAN), which is an institution directly responsible to the President. BATAN has had a long history in nuclear research and is now actively involved in introducing nuclear power into the country. The mission of BATAN is to carry out research and development on all aspects of nuclear energy for power and non-power applications, and to train a professional and technical work force in this field. Its website can be accessed at: www.batan.go.id/en2006 for english readers.

Information provided from the BATAN website.

ATTACHMENT 2 F.

Summary of Information Provided to the Task Group from the Japan Atomic Industrial Forum and the Atomic Energy Society of Japan

Introduction

The two major non-profit organizations in nuclear science and technology in Japan are the Japan Atomic Industrial Forum (JAIF, www.jaif.or.jp) and the Atomic Energy Society of Japan (www.aesj.or.jp), both of which are members of the PNC. The government's main policy agency is the Atomic Energy Commission (www.aec.jst.go). Other important organizations are the Federation of Electric Power Companies (www.genko.jp/english), the Nuclear Waste Management Organisation (NWMO, www1.japan-society.or.jp) and CRIEPI (www.criepi.denken.or.jp).

JAIF - The JAIF organizes a major national three-day nuclear conference each year to enable leaders of the world nuclear community to meet in Japan to assist in formulating nuclear policy. It also organizes a Japan Conference on Radioisotopes and Radiation every two years in cooperation with the AESJ and the Japan Radioisotope Association.

JAIF is also involved in extensive international cooperation and is a co-founder of the International Nuclear Forum and the Forum for Nuclear Cooperation in Asia. (FNCA). JAIF compiles and distributes extensive information on many nuclear topics and, in particular, publishes "Atoms in Japan" (in English), "Nuclear Power Plants in the World" and is involved in the World Nuclear News Network (NucNet) in an agreement with the European Nuclear Society.

Information from the website of the Atomic Energy Society of Japan

(See www.soc.nii.ac.jp/aesj and email address: atom@aesj.or.jp)

Mission of AESJ – Promotion of research and development in the peaceful uses of nuclear energy for contribution to human society.

Foundation : February 1959.

Branches: The head office is in Tokyo with eight active branches in Japan.

Membership: Honorary members – 13; Regular members – 7,300; Student members: 492; Supporting member companies – 302.

Annual Membership Fee: Regular member – 10,000 yen; Student member – 5,000 yen.

Board of Directors: President; Vice-Presidents – 2; Directors – 13.

Technical Divisions: 14.

Annual Revenue in 2001: 394,000,000 yen.

Major work: The AESJ holds regular technical meetings and publishes a technical journal – The Journal of Nuclear Technology.

ATTACHMENT 2 G.

Summary of Information Provided to the Task Group from the Korean Nuclear Society and the Korea Atomic Industrial Forum

Introduction

The two major non-profit nuclear organizations in Korea are the Korean Atomic Industrial Forum (**KAIF**, www.or.kr) and the Korean Nuclear Society (KNS, www.nuclear.or.kr) and both are members of the PNC.

The KAIF is strongly supported by the large Korean nuclear industry and provides its members and others with information including publishing a weekly newsletter, the monthly “Nuclear Industry”, the annual “Nuclear Energy Yearbook” and “Nuclear Power Plants in the World”. The KAIF also holds a major annual conference and cooperates with the NucNet information project.

The Korean Nuclear Society has over 2,000 members from all fields in industry, government academia and research institutes. It holds regular meetings and conferences, publishes academic journals and generally promotes nuclear education. It also provides Internet Home Pages for the public.

Korea Atomic Industrial Forum Information (From website – www.kaif.or.kr)

The Korea Atomic Industrial Forum, Inc. (**KAIF**) was established in 1972 as a private, non-profit organization being dedicated to the promotion of the peaceful uses of nuclear energy in Korea. **KAIF**'s main objective is to create a link between and among the organizations having an interest in the nuclear industry and establish a joint approach to the development of nuclear industry. To fulfill its task, KAIF performs the following :

KAIF organizes conferences and seminars, such as topical meetings, meetings between members and international meetings.

KAIF works to promote the coordination for international activities involving its member organizations, but is not charged with responsibility for domestic public relations.

KAIF organizes training courses for those from the member organizations.

KAIF produces and distributes specialized publications and other informative materials to members and others concerned.

KAIF carries out studies on the general and specific topics related to nuclear matters and fact-finding research on behalf of the nuclear industry.

KAIF offers the scholarships and educational materials to the students in nuclear engineering departments in close cooperation with colleges and universities, and also awards prizes to those who have performed outstanding work in this field.

KAIF provides and articulates the concerted views of industry on nuclear matters on which government authorities are looking to nuclear industry for advices.

Information from the website of the Korean Nuclear Society (www.nuclear.or.kr)

The Korean Nuclear Society (KNS) was established in 1969 for the purpose of contributing to the development of nuclear science and technology, pursuing academic and technological progress, and promoting cooperation between the members.

KNS, as a non-profit scientific organization, consists of regular, special and student members and now has about 2,000 members from all the nuclear fields in industry, academic institutions and research institutes.

KNS has performed various activities to meet its mission such as:

- Hosting academic conferences and lectures

- Publishing academic journals

- Promoting cooperation in the use of nuclear science and technology

- Conducting research, consultation and evaluation projects in nuclear technology

- And providing scholarships to support young students.

Responding to the request of the information age, KNS has also run Internet Homepages. It is hoped these homepages could provide the members with various services and also the public with information on understanding nuclear energy.

The KNS welcomes recommendations on the direction of the Society's development and welcomes any questions about the Society. Contact can be through email or the electronic bulletin board.

ATTACHMENT 2 H.

Summary of Information Provided to the Task Group from the Mexican Nuclear Society

Introduction

The Mexican Nuclear Society (www.sociedadnuclear.org.mx) is a member of the PNC, provides nuclear information to the public, and publishes a journal “Mexico Nuclear” containing technical papers by members. It also holds meetings to provide information to schools.

Two major educational establishments offer nuclear related programs: the National Autonomous University of Mexico – College of Engineering (www.lairn.fi-p.unam.mx) and the National Polytechnic Institute – School of Physics and Mathematics (www.nuclear.esfin.ipn.mx).

The government organizations involved in nuclear energy are: The National Nuclear Research Institute (**ININ**, www.inin.mx) which publishes a journal “Contacto Nuclear” on its research, and the Regulatory Commission (www.cnsns.gob.mx).

The Electric Power Utilities Laguna Verde Nuclear Power Plant publishes a booklet of general information on nuclear power and operates a Visitor Information Centre (www.cfe.gob.mx).

Information provided by Prof. Juan Luis Francois, SNM, Mexico jfl@fi-b.unam.mx

ATTACHMENT 2 I.

Summary of Information Provided to the Task Group from the Nuclear Energy Society of Taipei, China

Introduction

The Nuclear Energy Society of Taipei (NEST), China is a member of the PNC. It is the home for seven nuclear related societies and associated professionals, and serves as a joint representation of its members to participate in international nuclear communities. The seven member societies include the Chung Hwa Nuclear Society (CHNS, <http://www.chns.org>), the Taiwan Section of the American Nuclear Society (ANS-TS), the Radiation Protection Association (RPA, www.rpa.org.tw), the Association of Radiologic Technologists (ART, www.artroc.com.tw), the Radiological Society of R.O.C. (RSROC, <http://www.rsroc.org.tw/>), the Society of Nuclear Medicine (SNM, <http://www.snm.org.tw/>) and the Society for Therapeutic Radiology and Oncology (CSTRO, <http://www.cstro.org.tw/>). All of these organizations provide educational and training programs each year and some provide on-the-job training.

The official government organization responsible for nuclear energy is the Atomic Energy Council (AEC, www.aec.gov.tw) which provides extensive publications including Annual Reports and other reports in English. It also operates 75 sites with electronic video walls to provide information to the public.

The state-owned nuclear utility is the Taiwan Power Company (TPC, www.taipower.com.tw) which provides publications to the public and operates two Visitor Centres. At the North Visitors Centre it received 148,957 visitors in 2006. As of Sept 30, 2007, it had cumulated 112,198 visitors for the year. At the South Exhibition Building, it had 164,785 visitors in 2006, and 151,781 visitors during Jan.~Sept. 2007.

The main research institutes are 1) the National Tsing Hua University (NTHU, www.nthu.edu.tw) which has re-established its nuclear graduate program Institute of Nuclear Engineering and Science, and 2) the Institute of Nuclear Engineering Research (INER, www.iner.gov.tw) of the AEC, which provides nuclear related training.

See below for detailed information provided by Dr David Yao, AEC, & NEST, Taipei dyao@aec.gov.tw.

Regulatory Body

Atomic Energy Council (AEC) (<http://www.aec.gov.tw>)

Publications

- Annual Reports (2005 also in English; 2006 Chinese only)
- The Nuclear Environmentalist – monthly newsletters (10,000 copies/issue)
- Introduction to the Atomic Energy Council (in both Chinese and English, rev. 2007)
- Radiation in Daily Life
- Stories of the Atom from Postal Stamps (2006)
- Nuclear Scientists (2007)
- The Manual on Public Protection against Dirty Bombs
- Ionizing Radiation Protection Act, Nuclear Emergency Response Act, Nuclear

Materials and Radioactive Waste Management Act, Nuclear Reactor Facility Regulation Act (in both Chinese and English) and their associated regulations

Media Exposure

Held press conferences and issued news releases.

Arranged the Minister and high officials for interviews with the media.

Media exposure of AEC totalled over 100 times (news, articles and reports).

Undertakings for Openness and Transparency

Conducted major revision of the website of AEC and its affiliated agencies.

Received 954 visitors (in 159 groups) at AEC's Nuclear Safety Duty Centre since its opening in 2003.

Through 75 sites of electronic video walls in Taiwan, broadcasted nuclear safety information periodically and emergency preparedness information during the two months prior to the annual nuclear emergency exercise.

Broadcasted or published nuclear safety related information via television, radio, print media as well as printed matters for various conferences or annual meetings in the nuclear community.

Interaction with the public

Participated in the annual "Taipei International Environmental Protection & Energy Expo" (2005, 2006).

Participated in atomic energy and radiation exhibitions in the National Science and Industrial Museum (2007).

Every year in recent years, replied about 700 email inquiries from the public, and distributed about 10,000 volumes of AEC publications upon request.

Utility

Taiwan Power Company (TPC) (<http://www.taipower.com.tw>)

Publications (mostly by the Nuclear Backend Management Department)

Taipower Nuclear Monthly

Lungmen Project News letter

The Environmental Radiation Monitoring for the Lan-Yu Low-Level Radioactive Waste Storage Facility (in 2004, 2005 and 2006, respectively)

The Construction Program of the Dry Storage Facility of Spent Nuclear Fuel for the 1st Nuclear Power Plant

Radioactive Waste"

The Final Disposal Program of Low-Level Radioactive Waste and the Site Investigation

The Construction Program of the Dry Storage Facility of Spent Nuclear Fuel for the 1st & 2nd Nuclear Power Plants

Q&A for Spent Nuclear Fuel Dry Storage

Q&A for the Final Disposal of Low-Level Radioactive Waste

Q&A for Lanyu Low-level Radioactive Waste Storage Facility

Introduction to the Nuclear Backend Management Department, Taiwan Power Company

New edition of "Radiation MiniCyclopedia - Human body and Radiation

Thinking about Radioactive Waste

Learn from others - Experience of Rokkasho Village in Japan

Collection and Analysis of Information on Nuclear Backend Management

Construction Program of Spent Nuclear Fuel Dry Storage Facilities for the First & Second Nuclear Power Plants

Energy Topics

Lanyu - the Safe and Secured Low-Level Radioactive Waste Storage Facility

Final Disposal Facility for Low-Level Radioactive Waste – Introduction to the International Technology Development
Final Disposal Facility for Low-Level Radioactive Waste – A Safe and Good Neighbor
Spent Nuclear Fuel Dry Storage Facilities for the First & Second Nuclear Power Plants – Safe, Clean and Visible
Natural Analogue of Nuclear Waste Disposal
Final Disposal Facility for Low-Level Radioactive Waste – What is It? (VCD)
Mr. Tsuchida Hiroshi, Former Mayor of Japanese Rokkasho Village, Talks about Their Experience (VCD)
Construction Program of Spent Nuclear Fuel Dry Storage Facilities for the First Nuclear Power Plants (VCD)
Lanyu – Dancing in the Primitive and the Modern (VCD)
Low-Level Radioactive Waste Volume Reduction Centre, Nuclear Backend Management Department, Taiwan Power Company (VCD)
Spent Nuclear Fuel Dry Storage/Low-Level Radioactive Waste Volume Reduction Centre (VCD)

Research Institutes

The National Tsing Hua University (NTHU) (<http://www.nthu.edu.tw>)

Publications

Annual Reports (2006 in both Chinese and English)
Proceedings of the Probabilistic/Quantitative Risk Assessment Workshop (2006)
Proceedings of the East Asia Forum on Radwaste Management Conference (2006)

Education

NTHU re-established its Institute of Nuclear Engineering and Science which was once renamed as non-nuclear for the past ten years, during which time nuclear engineering related graduate programs are conducted under the Department of Engineering and System Science.

The Institute of Nuclear Energy Research (INER) of AEC (<http://www.iner.gov.tw>)

Education and Training

Full-semester courses on nuclear related subjects are offered for senior and graduate students at NTHU by a team of senior research staff at INER through special inter-institute arrangements.

Member Societies of NEST

The Chung Hwa Nuclear Society (CHNS, <http://www.chns.org>)

Publications

Radiation in Our Everyday Life
Learn about Radiation
Get to Know It and Don't Be Afraid of It —A General Talk about Nuclear Power
New World, New Taiwan —World will Be More Beautiful With Nuclear Power
Learn about Radiation and Nuclear Waste
Learn about Radiation

Education and Training

Provided material of nuclear and radiation safety for exhibition and demonstration in high schools (2007)
Conducted two 2-day summer camps on nuclear related subjects for school teachers (2007)

Public Outreach

Two one-day excursion “Introducing Radiation and Nuclear Power” for school children and parents and for 40 female opinion leaders (conducted in 2007 by WIN Taiwan, <http://www.wintaiwan.org>)

The Radiation Protection Association (RPA) (<http://www.rpa.org.tw>)

Publications

Ionizing Radiation Protection (textbook)
Applied Ionizing Radiation Protection (A)&(B)
The Journey of Radiation
The History of Radiation Protection
Training Materials for Radiation Detection of Steel & Iron Constructing Materials (Version 4)
China-Taiwan Radiation Protection Terms Comparison
Pregnancy and Medical Radiation (Chinese Translation of ICRP84)
Interventional Procedures-Avoiding Radiation Injuries (Chinese Translation of ICRP85)
Radiation Protection Technical Manuals: (I) Basic; (II) Dosimetry; (III) Applied Health Physics

Training Courses

Training Course for Radiation Protection Personnel (108h)
Training Course for Senior Radiation Protection Personnel (144h)
Training Courses for Radiation Protection Personnel (Advanced, 36h)
Training Course for Operators of Radioactive Materials or Equipment Capable of Producing Ionizing Radiation (For Certificate of Radiation Protection) (36h)
Training course for Operators of Radioactive Materials or Equipment Capable of Producing Ionizing Radiation (18h)
Training course for Personnel Engaged in Radiation Detection of Steel & Iron constructing Materials
Other Lectures on Radiation Safety

Others

Please refer to the following websites for education programs, training courses and conferences by the respective association/society:

Association of Radiologic Technologists (ART) (<http://www.artroc.com.tw>)
Radiological Society of R.O.C. (RSROC, <http://www.rsroc.org.tw/>)
Society of Nuclear Medicine (SNM, <http://www.snm.org.tw/>)
Society for Therapeutic Radiology and Oncology (CSTRO, <http://www.cstro.org.tw/>)

ATTACHMENT 2 J.

Summary of Information Provided to the Task Group from the Russian Nuclear Society

Introduction

The Nuclear Society of Russia has been a member of the PNC since 2002 and made a major contribution to the technical program at 15PBNC in Sydney in October 2006 together with the major Russian industrial company TENEX. The Russian Research Centre at the Kurchatov Institute has had a long involvement in nuclear research and applications of nuclear technology and many of its senior staff are members of the Russian Nuclear Society. The Kurchatov Institute provides postgraduate studies leading to doctorates in specialised areas of nuclear science and technology.

The Youth Department of the Russian Nuclear Society (YDRNS) was established in 1995. It is very active in encouraging young nuclear scientists and engineers to meet to promote the peaceful uses of nuclear science and technology, and it holds annual conferences and networks extensively with nuclear scientists and engineers in many countries. Its history and development can be seen on its website: www.nucleaus.ru/en/about_ydrns.html

Nuclear.Ru was set up in 1999 as an independent information source in Russia specializing in reporting on the nuclear industry. It can be accessed at www.nuclear.ru or by email at info@nuclear.ru. Nuclear.Ru presents on its web pages a complete catalogue of enterprises and organizations of the Russian Federation Ministry for Atomic Power (Minatom).

ATTACHMENT 2 K.

Summary of Information Provided to the Task Group from the INSC

Introduction

The International Nuclear Societies Council (INSC) is a non-profit non-government organization incorporating nuclear societies worldwide and most of the member societies in the PNC are also members of the INSC. The INSC also has a Working Group to address the issues of nuclear information and public outreach. Cooperation will be maintained between the INSC and the PNC by Dr Hardy being a member of this INSC Working Group as well as Leader of the PNC Task Group.

ATTACHMENT 2 L.

Summary of Information Provided to the Task Group from the IAEA

Introduction

The IAEA held a conference “Managing Nuclear Knowledge – Strategies and Human Resource Development” in Saclay, France, on 7-10 September 2004. The Proceedings published by the IAEA in 2005 is available from the IAEA. The IAEA has also contributed to the topic recently in several publications which can be accessed at the website: www.iaea.org The IAEA has an extensive list of publications on all aspects of nuclear science and technology.

The IAEA held an International Conference on Knowledge Management in Nuclear Facilities in Vienna on 18-21 June 2007 and the IAEA’s International Nuclear Information System (INIS) and the Nuclear Knowledge Management Section is actively promoting nuclear knowledge management. A five day IAEA Asian Regional Workshop in Managing Nuclear Knowledge was held in Tokyo from 22-27 October 2007 (see IAEA website: <http://www.iaea.org/inisnkm/index.html> for details of these conferences).

ATTACHMENT 2 M.

Summary of Information Provided to the Task Group from the OECD/NEA

Introduction

The OECD/Nuclear Energy Agency published a study in 2000 on “Nuclear Education and Training – Cause for Concern” and the conclusions and recommendations can be accessed from its website: www.nea.org

The main recommendations were:

- We must act now
- The strategic role of governments
- The challenges of revitalisation of nuclear education
- The need for vigorous research and maintaining high quality training
- The benefits of collaboration and sharing best practices.

A review of the work of the NEA over the last 50 years was published in the American Nuclear Society’s “Nuclear News” for February 2008, pps. 27-33. It was written by Dr Gail Marcus, former Deputy Director-General of the NEA (2004-2007).

ATTACHMENT 2 N.

Summary of Information Provided to the Task Group from Asian and European Networks

Introduction

Several new initiatives have been started in Asia, Europe and North America, particularly networks;

Asian Network for Education in Nuclear Technology (ANENT)
Canadian Universities Network of Excellence in Nuclear Engineering (UNENE)
UK Nuclear Training and Education Consortium (NTEC),
World Nuclear University (WNU)
European Nuclear Education Network (ENEN)

The American Nuclear Society and the European Nuclear Society set up CONTE (Conference on Nuclear Training and Education) and NESTet (Nuclear Engineering, Science & Technology – Education and Training). These have attracted considerable attention recently for their conferences and programs. The last major conference (CONTE 2007) was sponsored by the ANS Education and Training Division with CONTE and NESTet and was held in Jacksonville, Florida on 4-7 February 2007 with the title “An International Forum on Nuclear Energy Training and Education and Workplace Issues facing a Renewed Nuclear Energy Option”. A CD of the Proceedings can be obtained from the ANS. The next similar conference (CONTE 2008) will be held in Budapest, Hungary, from 4-9 May 2008 (**see www.nestet2008.org**)

The European Nuclear Society (ENS) has organized for many years conferences known as **Public Information Materials Exchange (PIME)** and the last one was held in Milan, Italy, on 11-15 February 2007. A report on the meeting was published in Nuclear Engineering International, March, 2007, pages 38-39.

ATTACHMENT 2 O.

Summary of Information Provided to the Task Group from the International Journal on Nuclear Knowledge Management

A new Journal was established in 2004: the International Journal on Nuclear Knowledge Management, published by Inderscience Publishers (**www.inderscience.com**).

ATTACHMENT 2 P.

Summary of Information Provided to the Task Group from the Radiochemistry Society (www.radiochemistry.org)

This Society organizes regular training courses in radiochemistry, mainly in the USA, and details can be found at: **<http://training.radiochemistry.org>**

ATTACHMENT 2 Q.

Summary of Information Provided to the Task Group from the World Nuclear Association website: www.world-nuclear.org

Objectives

The World Nuclear Association is the global private-sector organization that seeks to promote the peaceful worldwide use of nuclear power as a sustainable energy resource for the coming centuries. Specifically, the WNA is concerned with nuclear power generation and all aspects of the nuclear fuel cycle, including mining, conversion, enrichment, fuel fabrication, plant manufacture, transport, and the safe disposition of spent fuel.

The WNA serves its Members by facilitating their interaction on technical, commercial and policy matters and by promoting wider public understanding of nuclear technology. This dual role can be stated as follows:

- To serve as the pre-eminent global forum and commercial meeting place for those engaged in providing the world's largest source of safe, economic and environmentally friendly energy; and
- To provide a respected information service on nuclear energy and to speak pro-actively on behalf of nuclear energy amongst policymakers, opinion leaders, the media and the public.

Activities and Services

The essential role of the World Nuclear Association is to facilitate commercially valuable interaction among its Institutional Members.

Ongoing WNA working groups, consisting of representatives of Institutional Members and supported by the London-based Secretariat, share information and develop analysis on a range of technical, trade and environmental matters. These subjects include:

- nuclear fuel production
- industry economics
- nuclear trade issues
- radiological protection
- 'nuclear event' definition
- transport
- waste management and decommissioning
- sustainable development and climate change
- security of the international nuclear fuel cycle
- safe and sustainable uranium stewardship
- global strategies on public education and public policy

A premise of all WNA Working Groups and WNA strategy development is a fundamental point embodied in the WNA Charter of Ethics: that nuclear energy is not a competitor of 'renewable' technologies such as wind and solar power, but rather a needed partner in meeting the world's vast and expanding need for clean energy.

When meeting to discuss industry issues, WNA members are cautioned to avoid any topic that could potentially create even the impression of an attempt to set prices or engage in other anti-competitive behaviour. Accordingly, topics not discussed in WNA meetings include terms of specific contracts; current or projected prices for products or services; allocation of markets; refusals to deal with particular suppliers or customers; or any similar matters that might impair competition within any segment of the nuclear industry.

A principal function of the WNA Secretariat is to provide information services to Members, policy makers, the media and the public. Two websites are used - one for Members only, the other for the general public at www.world-nuclear.org. Much of the information from WNA working groups is adapted for posting on the public website.

On the public website, the Secretariat's aim is to maintain the best available non-technical source of information on the global nuclear industry. The WNA website presents news, reference documents, and a wide range of educational and explanatory papers. The guiding philosophy is to achieve impeccable accuracy and to let the facts speak for themselves. In this spirit, the Secretariat welcomes feedback from website users.

In addition to steadily updating its website information, the WNA Secretariat produces occasional printed publications to fill identified needs in the realm of public advocacy and understanding.

Backing up WNA information services is a specialist library at WNA headquarters in London. The WNA library is open to individuals by telephone appointment. Enquiries can be made via email.

The WNA's Annual Symposium in London provides a Member forum, spotlights the role of the WNA's worldwide Affiliates and serves as a platform for distinguished speakers from throughout the world nuclear industry. The Annual Symposium usually provides the occasion for the presentation of one or more WNA Awards for '*Distinguished Contribution to the Peaceful Worldwide Use of Nuclear Energy*'.

In 2002, the WNA award was given to the World Association of Nuclear Operators (WANO) and those responsible for its creation.

In 2003, the award went to the 'Atoms for Peace' vision offered by President Dwight Eisenhower to the United Nations General Assembly in 1953. To celebrate the 50th anniversary of that historic initiative, WNA plaques were presented to three organizations that are the custodians of that vision: the Eisenhower Institute, the International Atomic Energy Agency, and the new World Nuclear University.

In 2004, the award went to Spain's Loyola Palacio for her strong leadership as Energy Commissioner in the European Union.

In 2005, the award was presented to Women in Nuclear (WIN). The award was accepted on behalf of WIN by WIN-Global president Junko Ogawa of Japan.

In 2006, the award was presented to Dr Peter Ell and Dr Michael Phelps for their pioneering work in the area of nuclear medicine. The WNA's own Director of Communications, Ian Hore-Lacy, was also honoured for his services to public information on nuclear energy.

In 2007, both Dr Mohamed Elbaradei and the secretariat of the IAEA and Dr James Lovelock received the WNA award.

In working to improve wider understanding of nuclear energy, the WNA Secretariat maintains cooperative links with a variety of national and regional nuclear associations and advocates.

WNA 'Independent Affiliates' comprise diverse nuclear-related organizations that have decided on affiliation with the WNA as a symbolic act of partnership:

- professional organizations with an international membership and a specific focus of interest;
- national or regional commercially-based membership organizations;
- national nuclear societies; and
- citizens' organizations supporting nuclear power as a key clean energy option.

As the term 'Independent Affiliate' implies, WNA affiliation entails neither financial obligation nor implications for an organization's independence.

At its annual Symposium the WNA spotlights the activities and achievements of key WNA Affiliates and their contribution to nuclear affairs worldwide. For Affiliates who can benefit from the assistance, the WNA provides website support services at no charge.

WNA Affiliates include:

- Environmentalists for Nuclear Energy (EFN)
- International Chernobyl Centre (ICC)
- International Youth Nuclear Congress (IYNC)
- Joan Pye Project
- NSnet (Nuclear Safety Network)
- Supporters of Nuclear Energy (SONE)
- Uranium Information Centre (UIC)
- Women in Nuclear (WIN-Global)

Nationally oriented Affiliates include:

- American Nuclear Society
- Australian Nuclear Association
- Austrian Nuclear Society
- British Energy Association
- British Nuclear Energy Society
- (British) Nuclear Industry Association (NIAUK)
- Bulgarian Atomic Forum
- Bulgarian Nuclear Society
- Canadian Nuclear Association
- Chinese Nuclear Society
- Czech Nuclear Society

- Finnish Nuclear Society
- Finnish Youth for Nuclear Energy
- French Nuclear Society
- German Atomic Forum
- Indian Nuclear Society
- Italian Nuclear Association
- Japan Atomic Industrial Forum
- Japanese Atomic Energy Society (AESJ)
- Kazakh Nuclear Society
- Korean Nuclear Society
- Polish Nuclear Society
- Romanian Nuclear Energy Association (AREN)
- Russian Nuclear Society
- Slovak Nuclear Society
- Spanish Nuclear Society
- Swedish Nuclear Society
- Swiss Nuclear Society
- Ukrainian Nuclear Society.

Funding

Accredited to the United Nations, the WNA is an independent, non-profit organization, funded primarily by membership subscriptions.

ATTACHMENT 2 R.

Summary of Information Provided to the Task Group from the World Nuclear University website: www.world-nuclear.org

THE WORLD NUCLEAR UNIVERSITY

MISSION: The mission of the World Nuclear University (WNU) is to strengthen the international community of people and institutions so as to guide and further develop:

- The safe and increasing use of nuclear power as the one proven technology able to produce clean energy on a large global scale; and
- The many valuable applications of nuclear science and technology that contribute to sustainable agriculture, medicine, nutrition, industrial development, management of fresh water resources and environmental protection.

Through a worldwide network that coordinates, supports and draws on the strengths of established institutions of nuclear learning, the WNU will promote academic rigour and high professional ethics in all phases of nuclear activity, from fuel and isotope supply to decommissioning and waste management.

While looking to the future, the WNU will strengthen capabilities to manage, and responsibly dispose of, the waste legacy of early weapons and power programmes in compliance with rigorous standards of custodianship and environmental protection.

A Transnational Network of Cooperation

The WNU network – spanning some 30 nations and coordinated from a small headquarters – will comprise highly regarded universities and research centres with strong programmes in nuclear science and engineering.

The WNU's main function will be to foster cooperation among its participating institutions – seeking synergies and mutual benefit while setting and enforcing high academic standards.

A key role will be to facilitate “distance learning” techniques that make courses at any WNU university available to students throughout the network.

Within each country, a lead institution or consortium will “pilot” that country's participation, and will encourage and facilitate involvement by other institutions in the WNU partnership.

Value-Added from a Core Faculty

While coordinating this far-reaching institutional network, the WNU headquarters will build a small core faculty embodying world-class expertise.

This centralised asset will enable the WNU to introduce a unifying global dimension to nuclear studies by:

- Facilitating development of standard curricula

- Designing courses with strong international content:
 - Operational safety and performance
 - Radiological protection
 - Nuclear reactor engineering and fuel cycle technology
 - Industry economics
 - The non-proliferation regime and safeguards
 - Probabilistic risk analysis
 - Nuclear trade law, licensing and regulation
 - Liability and insurance
 - Nuclear transport
 - Clean-up, decommissioning and waste management
 - Nuclear applications in agriculture, medicine, hydrology and environmental protection
 - Innovation in a nuclear-renewables-hydrogen economy.

All WNU courses – whether conducted within the curricula of member institutions, in summer school sessions, or eventually in a WNU-sanctioned Master’s Degree program – will embody state-of-the-art knowledge. Some will be sponsored or certified through the IAEA and NEA; some will be shaped by WANO to fortify the global nuclear safety culture.

Assembling a highly experienced core faculty will, as an ancillary benefit, provide a prestigious team that can be used selectively to educate and advise influential non-experts, including policymakers, environmentalists, international development officials and media professionals.

A Broad and Evolving Agenda

The WNU’s founding supporters – inter-governmental and private sector – reflect the full breadth of the global nuclear industry and its associated structures of standards and oversight. The WNU will maintain close links to these founding bodies but will retain full independence.

In operation, the WNU’s philosophy will be one of exploration, as its academic, industry and governmental supporters and participants collaborate in a creative search for effective cooperation. The WNU’s initial agenda will include these elements:

- Coordinate curricula for common advantage
- Explore the harmonising of degrees & credentials transnationally
- Promote exchanges of students & faculty
- Facilitate distance learning
- Build scholarship support (corporate, governmental, philanthropic)
- Assess and respond to the challenge of knowledge preservation
- Collaborate with:
 - Industry and other end users to promote performance excellence and to help tailor educational work to practical needs

- WANO on instruction, for business leaders and plant operators, designed to fortify the global nuclear safety culture
- IAEA to promote knowledge preservation, the ethic & technologies of non-proliferation & safety, and nuclear applications in sustainable development
- NEA and IAEA to promote innovative reactor design and fuel-cycle research (stressing proliferation resistance, inherent safety, economics and reduced waste)
- Create a respected multilingual information service
- Assemble a core faculty to:
 - Shape summer-school courses stressing “global” subjects
 - Develop a WNU Master’s degree
 - Offer expert-led familiarisation sessions for policy and opinion makers
- Operate a global human resources pool
- Orchestrate WNU “alumni” as champions of nuclear science and technology.

The WNU’s structure of governance – a Board of Governors, a Council of Advisers and an Academic Council – will produce a balance of perspectives and interests. The WNU agenda will evolve to emphasise proven successes and emerging priorities.

Founding, Funding and Leadership

The WNU was founded on 4 September 2003 in London, in a ceremony commemorating the 50th anniversary of President Eisenhower’s historic “Atoms for Peace” speech to the United Nations General Assembly.

A vision that transcended its Cold War origins, the “Atoms for Peace” initiative gave birth to the IAEA to institutionalise the harnessing of science and cooperative diplomacy to reap the fruits of nuclear knowledge for the benefit of all humankind. The WNU will give new vitality to this work in the century ahead.

The WNU’s four “Founding Supporters” are the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NEA) of the OECD, the World Association of Nuclear Operators (WANO), and the World Nuclear Association (WNA).

The WNU will be funded through a non-profit corporation, to which industry and philanthropic donors will be invited to contribute, and will seek programmatic support from the IAEA and national governments.

To lead the World Nuclear University, the WNU’s initial participants and its Founding Supporters agreed by consensus on two persons, each a pre-eminent statesman and institution-builder in the nuclear realm:

Chancellor: Hans Blix (IAEA Director General-Emeritus)

Chairman of the Board: Zack Pate (WANO Chairman-Emeritus).

Substantial Value from a New Global Institution

Although primarily a “virtual” institution, the new WNU mechanism of trans-national cooperation will serve as a powerful worldwide stimulus to the building of:

- Nuclear knowledge and skills
- High international standards in academics, ethics and operational performance
- Enhanced public understanding as needed to support sound global policy.

The WNU network will thereby provide continuing substantive value to its constituent members, to the rapidly globalising nuclear industry, and to national governments seeking to strengthen the technical and political foundations for nuclear science and engineering.

In the 21st century, Atoms-for-Peace means Atoms-for-Sustainable-Development. The World Nuclear University will be a dynamic force for progress in meeting this global imperative.

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ATTACHMENT 3.

Issues of Public Concern and Suggested Brief Answers

There are several concerns by members of the public at the existing level of nuclear power in the world and the likely expansion of the industry in the near future. These concerns were expressed after the accident at Chernobyl and after the terrorist activities in New York and other cities in recent years. The five major issues can be identified as:

- safety of nuclear power reactors;
- economics of nuclear power for electricity;
- management of radioactive wastes and plutonium;
- proliferation of nuclear weapons and potential terrorism; and
- whether there is enough uranium to make the industry sustainable.

It is important that persons in the member organizations of the PNC have answers to these issues as part of their provision of public information and suggested brief answers are presented in this Attachment.

Safety of Nuclear Power Reactors

Nuclear power has a very good safety record compared with other industrial and energy-producing processes. There have been only two major accidents in its 40 year history, Three Mile Island in the USA in 1979 and Chernobyl in the Ukraine in 1988. The Chernobyl accident was a large and devastating accident caused largely by operator error, a lack of safety culture and poor design. It killed 31 persons immediately and the argument has raged ever since as to how many of the general public died over a period of time. The numbers of hundreds of thousands dying of cancer are completely untrue according to international studies. It has often been said that such an accident, if it happened in western reactors, would not have large off-site consequences. This is best shown by the Three Mile Island accident in the USA in 1979 in which the core melted down and destroyed the reactor but not one person was killed and there were no off-site effects.

Economics of Nuclear Power for Electricity

Several recent studies have shown that nuclear power is economic in comparison with coal power in many countries unless cheap coal and gas are available close to load centres. Examples of coal and gas being cheaper are the western States of the USA, some parts of Canada and Russia, western parts of China and eastern Australia. **In contrast, nuclear power is cheaper than coal in Japan, Korea and in many European countries, which have to import a large proportion of their energy resources.** Also these cost comparisons include all of the external factors for nuclear, such as the cost of waste disposal and decommissioning the reactors, whereas the cost of waste disposal and health problems are not including in calculating coal costs, because CO₂ and health costs cannot be calculated easily.

Management of Nuclear Wastes and Plutonium.

There is a solution to nuclear waste disposal that is accepted and recommended by most nuclear scientists and engineers who are knowledgeable in the field. This is the deep geological disposal of either spent nuclear fuel or the waste from reprocessed nuclear fuel. This can be done safely and economically. The major problem is getting approval for a suitable site in any country with a democratically elected government and an impartial legal

system. There is enormous scope for a minority of anti-nuclear activists to delay a proposed plan legally for decades and this has happened in the USA, Japan and Germany in particular. Nuclear plant siting is no different to the siting of a new airport, a new motorway or a new dam.

As to plutonium, said by anti-nuclear activists to be the most dangerous element on earth, the facts are very different. The fear of plutonium arose after its use in the atomic bomb dropped on Nagasaki. Plutonium is generated in all nuclear power stations and has been used safely for over 40 years. About 65-75% of all nuclear power is generated by the fission of uranium-235 atoms in new nuclear fuel. The remaining 25-35% of the heat and power is generated by the fission of plutonium atoms. Hence plutonium is being used safely today in over 400 nuclear power stations. There are many more substances on earth that are more dangerous.

Nuclear Proliferation and Terrorism

It is claimed by anti-nuclear groups that nuclear power, uranium mining and nuclear research are directly linked to nuclear weapons and nuclear proliferation is inevitable. Tens of thousands of nuclear weapons have been manufactured in the last 50 years, but only two have ever been used in war. The abandonment of the Cold War between the super powers has led to a rethink in military strategy and the realisation that the number of nuclear weapons is not the most important factor in the future for defence of a country. As a result, large numbers of nuclear weapons are being decommissioned and the material they contained (both uranium-235 and plutonium) is being fed into the peaceful nuclear power industry or being disposed of as waste. A few states may try to develop nuclear weapons for political reasons, but they can do this without having a nuclear power program. They can develop effective and cheaper biological weapons of mass destruction if they want to.

Is there enough uranium to make the industry sustainable ?

A relatively recent criticism of the nuclear industry is that if it is expanded in the near future there will not be enough low cost uranium to make the industry sustainable over the long term. This criticism shows that the technology of exploration and mining a mineral, whether it is oil, gas, uranium, copper, gold, etc, is not understood. When a mineral is first discovered and put to use, its price is high. This encourages exploration and as more of the mineral is discovered its price usually falls. Uranium is a good example as its low price in the last 20 years has not encouraged new exploration, or political constraints, as in Australia, have reduced exploration activity in a very prospective country. The recent higher price for uranium has now encouraged exploration in many countries.

The official resource estimates by the IAEA and OECD/NEA (2005) have shown that there is about two million tonnes of uranium known in the lowest cost category and an additional 2.6 million tonnes in a next higher cost category. The present world demand for the 349 operated plants is about 50,000 te/year. The existing resources would be sufficient for at least 80 years and this assumes only once-through use of the fuel. If reprocessing and recycle is practised the known low cost resources would last longer. If the resources in an even higher cost category are entered into the calculation, then known resources would last over 100 years at double the installed capacity. One advantage of uranium as a fuel compared with oil, coal and gas, is that the cost of electricity produced is not very sensitive to the price of uranium.