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Nuclear Power Newsletter

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Contents

- Workshop on Issues for the Introduction of Nuclear Power 1
- Message from the Director 2
- The Nuclear Energy Series Documents: Structure and the Process 3
- Nuclear Power Plant Operation 5
- Strengthening Nuclear Power Infrastructures 8
- Technology Developments and Applications for Advanced Reactors 11
- New Staff in Nuclear Power Division 16
- Current Vacancy Notice for Professional Posts in Nuclear Power Division 17
- Meetings in 2007 17

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Workshop on Issues for the Introduction of Nuclear Power

A Workshop on *Issues for the Introduction of Nuclear Power* was held on 4-6 December 2006 at IAEA headquarters in Vienna, Austria. The workshop was cosponsored by the Governments of several countries. It was attended by over one hundred participants from 43 Member States (MS).

The workshop was aimed at providing an initial sensitisation of countries to the range of issues that they need to address in preparation for nuclear power. It was clear from the discussions and feedback after the meeting that this had been achieved, at least for many of the country participants. It was noticeable that several of the experienced countries also felt that they had obtained valuable information about the full range of issues discussed during the meeting.

The objectives of the Workshop were to enable participants to discuss a wide range of infrastructure issues, to enable participants to review the issues related to infrastructure requirements from their national perspectives, and to enable the IAEA to better understand the needs and concerns of interested countries.

The three day meeting contained presentations from both Member States and IAEA staff on a broad range of topics related to the introduction of nuclear power. Presentations on the experience from established nuclear programs were provided by representatives from Member States from Japan, the Republic of Korea, the Russian Federation, and China; physical infrastructure and international cooperation were presented by the Russian Federation, Canada, the Republic of Korea, and the USA; the regulatory framework and safety were presented by France and the Czech Republic; finance and economics were presented by Finland; technology and human resources were presented by the USA, Japan, and India; and international initiatives were presented by the USA, the Russian Federation, and France.

The IAEA staff made presentations on the various energy options; the legal framework; nuclear security; safeguards; public perception; and available technology, strategic planning, and appropriate timescales.

Questionnaires, which gave Member States an opportunity to comment on the workshop topics, were collected at the beginning of the meeting, during each breakout group and at the end of the workshop.

Member States were given a chance to comment on the issues or the workshop in the breakout sessions.

Some country participants questioned the security of supply of nuclear fuel and asked whether the current fuel suppliers would be able, or prepared, to provide guarantees of supply in the future.

The information and experience from this workshop will be valuable to help develop Regional projects. Several countries have also indicated interest in future workshops in infrastructure issues. Participants stressed their wish to ensure Agency support through advice and training on a wide range of issues discussed at the workshop.

A Consultancy was held immediately after the workshop, to take advantage of the discussions during the workshop and to prepare for the draft Guidance document *Milestones in the Development of a National Nuclear Power Infrastructure*. The questionnaires were reviewed and also provided information for the Guidance document.

A CD will be available which will contain the presentations, questionnaires summaries, and discussion summaries.

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Message from the Director

Welcome to the first Newsletter of the Division of Nuclear Power for 2007.

Since the first issue of the Newsletter, we have accumulated experiences which have led to continuous improvements in the style and substance of the newsletter. The Newsletter's purpose is to keep nuclear professionals in Member States informed of developments in the Division of Nuclear Power. Although the focus is always on the last three months' achievements, we also often include articles on specific topics not necessarily linked with developments during the last three months. For example, in this issue, I describe the Nuclear Energy Series of Documents. Since the Series was launched in early 2006, its structure and the process of preparation and approval have been established by the Department of Nuclear Energy's Document Coordination Team. The Newsletter also looks to the future by listing forthcoming meetings, describing planned activities, and posting vacancy notices.

In 2007, there will be four important conferences which the Division of Nuclear Power is organizing or involved heavily in organizing activities. They are:

- Special symposium for the IAEA's 50th Anniversary: *Global Challenges for the Future of Nuclear Energy, and the IAEA* (Aomori, Japan , 11 April 2007);
- International Conference on *Non-Electric Applications of Nuclear Power: Seawater Desalination, Hydrogen Production, and Other Industrial Applications* (Oarai, Japan, 16-19 April 2007);
- 2nd International Conference on *Nuclear Power Plant Life Management* (Shanghai, China, 15-18 October 2007);
- 8th IAEA-FORATOM Joint Workshop on *Effective Implementation of Management System* (IAEA-HQ, 13-16 November 2007).

You are encouraged to participate in these Conferences, and you will be able to find additional information in this Newsletter or on IAEA's web page (www.iaea.org). In addition to these, we are in the initial planning phase for a workshop for participation of experts from both industrialized and developing countries considering the nuclear power option with focus on milestones for infrastructure preparation.

Within the budget constraints, we are required to focus more and more our activities and use of resources on areas with the highest expectations of delivery from Member States. In the Division of Nuclear Power, these areas are nuclear power plant life management, response to rising expectations for nuclear power, and innovation. The conferences planned for 2008-2009 are focused on these areas.

If I may talk a bit more on response to rising expectations, the IAEA recognized that an almost equivalent number of countries as that of countries operating nuclear power are now considering introduction of nuclear power as one of the options to meet future energy demand. As you may know, China and India already have ambitious nuclear expansion plans in place. The motivation for expanding or introducing nuclear power is based on concern over

fossil fuel price, security of energy supply and protection of the environment. Infrastructure building in those new countries is key for safe, secure and reliable operation of nuclear power.

The IAEA has published more than 20 guidelines since the early 1980s to support those programmes and is producing additional documents such as milestone documents to describe what needs to be done by what stage. To assist Member States' planning, we have established an inter-departmental nuclear power support group to provide coordinated assistance.

However, we have to say that the expansion will depend on many factors including those listed below, and current operator's diligence and vigilance in safe operation are important pre-requisite for successful expansion:

- Diligence and vigilance in safe operation of the current fleet;
- Continued vigilance in safeguards;
- Economic competitiveness, Financing arrangement;
- Implementation of waste disposal;
- Public perception;
- Individual nation's policy on environment, security etc.

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The Nuclear Energy Series Documents: Structure and the Process

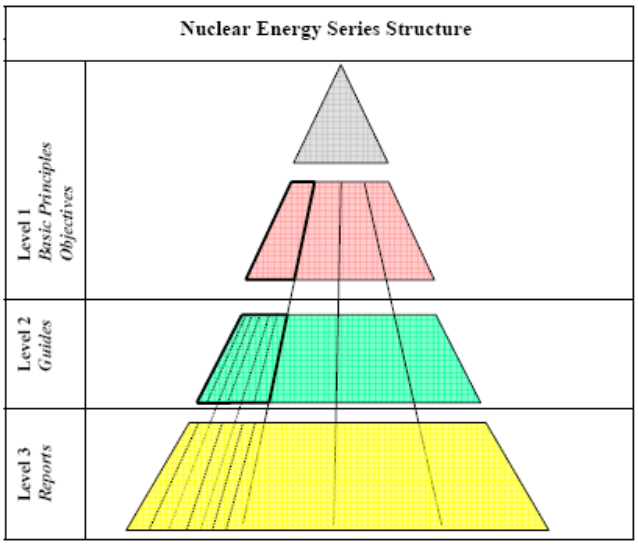
Background

The IAEA has implemented a document series called Nuclear Energy Series (NES, See Nuclear Power Newsletter of June 2006). The NES documents helps Member States in effective use of available information, enables more consistent documents to be produced in a more effective manner, recognises the significance of key documents, and has better alignment with other IAEA publications. It is envisaged that different Member States have different needs in support of their efforts in the use of nuclear technology. Member States without nuclear power programmes need information and guidance on the availability, benefits and costs of different technologies, but others with nuclear power programmes need information relevant to maintaining and improving operational effectiveness and technological development in line with the best international experience. The Nuclear Energy Series documents will satisfy both types of needs.

The NES and the established process increase the consistency, effective use and recognition of selected nuclear energy documents. The NES incorporates relevant existing documents, add structure and visibility and systematically fill important gaps, where necessary.

Structure of NE Series Documents

The structure of the NES allows systematic analysis of existing documents and help to identify the gaps and areas not covered. Based on analysis, some of the existing documents (IAEA-TECDOCs, TRSs, etc) will be revised/upgraded and will be integrated into the Nuclear Energy Series, as appropriate. The missing documents, if any, will be developed, so as to fit in the structure. This

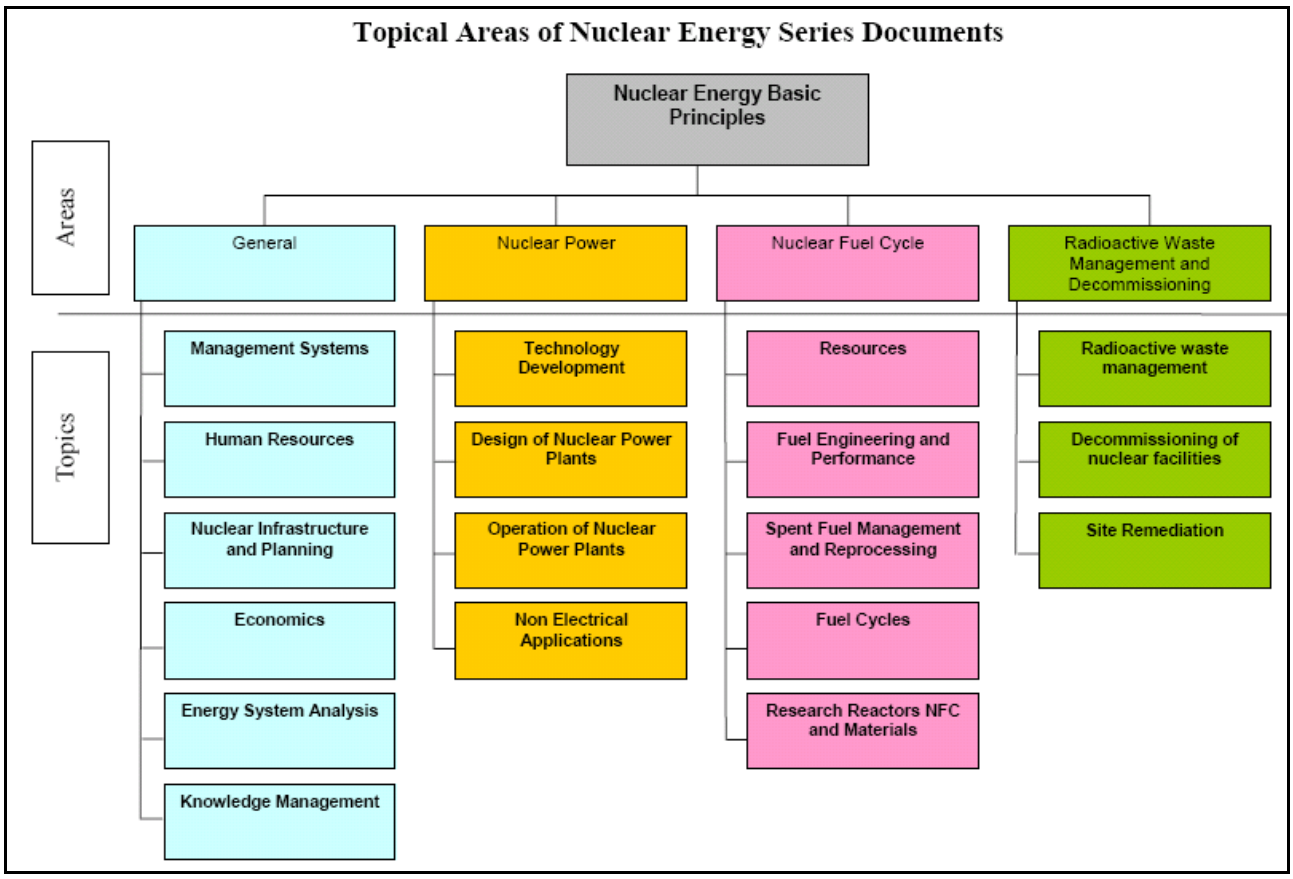


will not include documents that relate to a single Member State, or summarize one single meeting result or have a simple report nature, which will continue to be produced as documents and publications outside this Series.

The Nuclear Energy Series structure will consist of three levels (1) Basic Principles and Objectives, (2) Guides and (3) Reports and cover four major areas:

- general, cross cutting topics;
- nuclear power;
- nuclear fuel cycle;
- radioactive waste management and decommissioning.

The Nuclear Energy Basic Principles manifests and describes the rationale, and vision for the peaceful use of nuclear energy. The document will identify the basic principles which nuclear energy systems must satisfy to



fulfil nuclear energy's promise in meeting growing global energy needs - specifically:

- Peaceful use;
- Safety;
- Environment;
- Beneficial use;
- Efficient resource use;
- Technology development.

Nuclear Energy Objectives describe what needs to be considered and to be achieved in various areas at different stages of implementation. The nuclear energy objectives documents identify the objectives which should be pursued in order to assure that the basic principles are satisfied.

In the various areas, the objectives will be briefly and concisely define the strategies and issues and topics that need to be addressed to satisfy the basic principles, and provide an overview of means for achieving the objectives, without describing the details.

General (NG):

- Management systems;
- Human resources;
- Nuclear Infrastructure and planning;
- Economics;
- Energy System Analysis;
- Knowledge Management.

Nuclear Power (NP):

- Technology development and innovation for future nuclear plants;
- Design of nuclear power plants;
- Construction, commissioning and operation of nuclear power plants;
- Non-electrical application.

Nuclear Fuel (NF):

- Natural Uranium and Thorium resources;
- Fuel engineering and performance;
- Spent fuel management;
- Advanced and innovative fuel cycles;
- Research reactor fuel cycle and materials.

Radioactive Waste Management and Decommissioning (NW):

- Radioactive waste management;
- Decommissioning of nuclear facilities;
- Site remediation.

Nuclear Energy Guides describe how to achieve the objectives relating to various topics. Each area will contain several topics.

Nuclear Energy Reports provide technical background in the various areas and topics. These documents would enable the Member States to understand the status of different developments in the specific topics worldwide.

Preparation Process

In order to manage the preparation process a coordination team document coordination team (DCT) was established. The team was created to establish, maintain and improve the documentation structure through the established process. The main functions of the DCT:

a) Establishment of the basis for document process

The DCT created its terms of reference which identifies the steps, responsibilities, methods of external reviews and time frame for the preparation of each document recognising the existing practices where these are effective.

b) Plan for document development

Technical officer (TO) prepares a document preparation proposal (DPP). This will define the milestones, a preliminary table of contents, interfaces with other existing or planned IAEA documents and the proposed timescale of document production.

c) Peer review of the documents

The DCT reviews the DPPs before initiation of document preparation and will recommend approval of the initiation of the document by the TO or return the DPP to the originator (phase 1).

At a point before completion, the DCT will review and comment the document draft and, if deemed necessary, request external review (phase 2). This will include ensuring consistency and overall interface with other high level IAEA documents, such as Nuclear Energy Series and IAEA Safety Standards documents, checking areas that may cut across the whole Agency. The DCT chair will decide the extent of the review and the reviewers. The DCT may comment on the quality of the draft document and will have the right not to recommend processing a document further if issues or concerns are identified, but the ultimate responsibility for the document rests on the line of command.

The final draft will be reviewed by the DCT before submission to the Publications Committee (phase 3).

d) Interface with other IAEA document preparation organizations

Coordination of each Department's efforts with the other Departments of the IAEA and international organizations is established. This will include the Agency's Publications Committee, the Steering Committee on Safety Standards if relevant, and other Departments' DCTs, as appropriate. The DCT will invite representatives of these organisations to participate in DCT's meetings, as observers.

e) Interface with external document review bodies.

Conclusions

The Nuclear Energy Series and the established preparation process will enable the department of Nuclear Energy to

- Provide a visible structure of documents;
- Improve credibility, through structured external review, as necessary;
- Continuity of documents through established preparation and review process and renewal/revision period;
- Standard approach to document preparation;
- Improved recognition of NE documents; and,
- Provide an underlying basis for supporting TC and regular budget activities.

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Nuclear Power Plant Operation

Instrumentation and Control Systems

An IAEA national workshop on *Instrumentation and Control (I&C) Cable Ageing* was held in Veracruz, Mexico, on 15-19 January 2007, followed by a technical visit to the Laguna Verde NPP. The agenda of the workshop included presentations on the qualification and aging management of safety related I&C cables, low and medium voltage power cables, environmental qualification, sample tests, accelerated ageing, uncertainties, standards, ageing mechanisms, and diagnostic methods. 35 participants from Mexico, Argentina, and Brazil attended the workshop.

A consultants meeting was held on 13-16 February 2007 in Vienna to further develop the draft IAEA-TECDOC titled *Security of Information and I&C Systems at Nuclear Facilities*. The meeting, co-organized with the IAEA Office of Nuclear Security, was attended by ten experts from eight countries. The objective of the technical document is to provide guidance to personnel

designing, implementing, and managing digital I&C and information systems and networks at nuclear facilities. The document identifies and analyses threats, with focus on sabotage and insider threat, and corresponding vulnerabilities. Since digital I&C systems and information management systems using information networks have been widely applied at nuclear facilities, effective solutions must be in place to protect the confidentiality, integrity, and availability of all digital systems.

An IAEA national workshop on *Developing the Prototype Digital I&C System of Argentina's CAREM Reactor's Protection System* was held in Bariloche, Argentina, on 19-23 February 2007. The agenda of the workshop included both technical and managerial areas, such as operation, diagnostics, and maintenance of digital I&C; Qualification of commercial-off-the-shelf (COTS) components in NPP reactor protection and control systems; On-line condition monitoring, detecting software errors, testing, licensing, and maintenance of digital I&C systems; Experience and good practices in managing digital I&C modernization projects in NPPs.

The IAEA's representative took part in the work of the second SCAP cable ageing working group meeting organized by OECD/NEA on 1-2 March 2007 in Issy-les-Moulineaux, France. The purpose of the workshop was to establish an international data/knowledge base on cable ageing mechanisms, inspection, testing, repair, replacement, environmental qualification, and regulatory requirements. The cooperation between IAEA and NEA on this area will further promote the international dissemination of good practices in NPP cable ageing management.

The following three IAEA technical meetings will be held in the first half of 2007:

The 21st Meeting of the IAEA Technical Working Group on Nuclear Power Plant Control and Instrumentation (TWG-NPPCI) will be held on 23-25 May 2007 in Vienna, Austria. The objectives of the Technical Working Group Meeting are (1) to exchange information on national and international I&C projects in nuclear power plants, (2) to advise the IAEA on future activities related to NPP I&C; and (3) to review the Agency's on-going activities and documents under preparation related to NPP I&C. As an increasing number of NPPs enter into I&C modernization projects related to power uprates and licence renewals, sharing international practices of Member States are becoming more imperative. Representatives from 30 Member States and three international organizations are expected to attend.

An IAEA technical meeting on *Increasing Power Output and Performance of Nuclear Power Plants by Improved Instrumentation and Control Systems* will be held on 29-31 May 2007 in Prague, Czech Republic. The meeting will be organized by the IAEA and hosted by I&C Energo a.s. The purpose of the meeting is to discuss practical ways and solutions to implement improvements in I&C components and systems leading to increased power output and improved performance of nuclear power plants.

An IAEA technical meeting on *Common-cause Failures in Digital Instrumentation and Control Systems of Nuclear Power Plants* will be held on 19-21 June 2007, in Bethesda, Maryland, USA. The meeting will be co-hosted by the US NRC, EPRI, NEI, and DOE. The purpose of the meeting is (1) to provide an international forum for the exchange of information on the occurrences, prevention, and susceptibility of common-cause failures in digital instrumentation and control systems, (2) to discuss counter measures, such as the use of redundancies and defence-in-depth-and-diversity (D3) principles to prevent common-cause failures, and (3) to review the draft of a related IAEA technical document under development.

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Nuclear Power Plant Maintenance

On 22-26 January 2007, IAEA TC project CPR/4/028: *Validation of the Technology of In-service Inspection and Non-destructive Testing for Nuclear Power Plants* held its first coordination meeting in China. There were 18 official, managers and specialists from the IAEA, China's government and regulatory body, NPPs, ISI institutes and international experts participating in the meeting.

Chinese government official said the government was committed to setting up a national system of In Service Inspection Qualification (IQ) in 2-3 years. And domestic organizations introduced their ISI experience and research accomplishments about IQ. Then, the IAEA presented its safety guide about IQ. IQ is already a best practice of NPP to improve the effectiveness of ISI.

Following this, the international experts lectured on the international experience of IQ, two major IQ methodologies, and proposed many suggestions about the pros and cons of various schemes of IS system , which China may wish to pay attention to during its start-up stage of the IQ system. Finally the meeting worked out a project plan of the IAEA sponsored activities.

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NPP Life Management

The technical meeting (TM) on *Power Uprate and Side Effects in Nuclear Power Plants* was held at Oskarshamn in Sweden on 12-15 February 2007. A total of 76 participants from 18 countries participated in the meeting and 28 papers were presented. The purpose of the TM is to provide an international forum to share recent technical knowledge and experience relating to the good practices for the management of power uprate and to share lessons learned related to side effects on power uprate issues in nuclear power plants. The TM consists of four technical sessions besides opening and closing sessions. Those are:

- Session 1: Overview & guidance for power uprate;
- Session 2: Technical issues;
- Session 3: Management issues;
- Session 4: Regulatory aspects.

The meeting of Technical Working Group on Life Management of NPPs (TWG-LMNPP) on *Plant Life Management for Long Term Operation (PLiM–LTO)* was held at Vienna on 21-23 February to share the information on PLiM–LTO activities since last 2005 meeting and prepare the recommendations for the PLiM–LTO activities and directions to be implemented in 2010- 2011. A total of 25 delegates from 18 countries and 2 international organizations were participated in TWG meeting and each delegate reported his national report on PLiM for LTO. The scientific secretary, K.S. Kang reported the achievements since 2005 and planning activities for 2007-2009. The new IAEA policy on PLiM -LTO was presented by C. R. Clark and new Term of Reference (ToR) to be applied for 2009 TWG meeting was presented by Director, A. Omoto. A lot of recommendations were raised during meeting. Finally all recommendations were categories into 4 groups and an international symposium as below and prioritized to fill the gaps and update current technical documents:

- Programme level;
- Technological aspects (engineering part and Research part);
- Human resource management aspects;
- Regulatory aspects;
- 3rd Int. Sym on PLiM in 2011.

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Databases to Support NPP Performance

A consultants meeting on *Development of Component Reliability and Initiating Events Database* was held at the IAEA Headquarters in Vienna on 15-18 January 2007. The purpose of the meeting was to come up with a methodology to extend the Power Reactor Information System (PRIS) so that it can facilitate initiating event (IE) frequency calculations. Additionally a concept for exchange of experience with component reliability database and reliability data sharing was discussed.

It was recommended to extend the existing outage coding system in PRIS by an initiating event code. This extension can be applied only to unplanned scrams (automatic as well as manual). The extended PRIS will effectively identify initiating events for calculating realistic IE frequencies from worldwide shared data. A method how to extend an outage coding system for a scram has been developed.

The meeting participants also agreed, that an international meeting with a topic of exchange of experience of using on-site component reliability data collection systems with focus on the benefits and technical achievements in relation to the application of reliability data, especially in maintenance activities, would be useful, and it would facilitate the MS understanding of usefulness and need for multi-purpose plant specific component reliability data collection systems at the NPPs.

On the initiative of UNESA a training course on *PRIS* was held in Madrid, Spain, on 22-23 January 2007. The purpose was to provide lectures on the PRIS structure and

data collection process to discuss with PRIS data reporters all questions and problems related to PRIS data. The participants came from all operating Spanish nuclear power plants and also one person from Lithuania attended the course.

During one and half day several lectures on PRIS structure, concept and application have been provided. The main focus was on demonstration of the PRIS-WEDAS system. It is a web-based application for on-line data entry.

Training of PRIS data providers and discussion of problems they have with data reporting is the most efficient way how to maintain data quality in PRIS. Participants from nuclear power plants evaluated PRIS as a powerful tool for plant performance analyses and international benchmarking.

On 18-21 December 2006 a training course on *Power Reactor Information System (PRIS)* was held at the Tarapur NPP, India. The objective of the training course was to familiarise the participants with PRIS structure and outputs and to provide training how to report PRIS data using PRIS-WEDAS and how to use PRIS for evaluation of nuclear power plant performance by international comparison and benchmarking.

The Nuclear Power Corporation of India, Ltd. (NPCIL) had appointed particular staff members from its individual nuclear power plants, who had to serve as

PRIS data providers at their respective stations. Twenty three individuals from NPP participated in the meeting. In addition to lectures provided by IAEA experts and IO, question and answer sessions were held following each of these lessons.

The workshop meeting was divided into three modules:

- In the general module, the participants received broad overview of trends in nuclear energy, which has been followed by PRIS concept, its main components and outputs.
- In the data entry module, the workshop participants were informed in details of all PRIS elements, their structure, data reporting requirements and data reporting means.
- In the PRIS output module, the participants were explained the definitions of all performance indicators currently used in PRIS and they were familiarised with all PRIS applications and publications allowing to enter and use the data stored in the PRIS database.

All the modules were complemented by working group sessions. In the sessions, the participants could present their own plants and actual experience with PRIS and, as the most important part of the workshop they were provided an opportunity to practice the knowledge obtained from the respective lectures and work with the PRIS application WEDAS.

At the end of the training course the participants expressed satisfaction with the course and determination to use PRIS in practice.

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Strengthening Nuclear Power Infrastructures

Relevant support to the nuclear power infrastructure development is accomplished through the development of detailed practical guidance made available through the publication of technical documents. The list of publications goes back to 1980, when a guidebook on *Manpower Development for Nuclear Power* was issued. It was followed by another 18 publications produced until today on infrastructure subjects. These subjects include a broad spectrum of issues related with nuclear power planning, financing, electrical grid, engineering and science education, competitive strategies, bid invitation and evaluation, management and other aspects. These publications are available as electronic files included in a CD that can be provided upon request to the Department of Nuclear Energy.

The recent publication (see Newsletter December 2006) IAEA-TECDOC-1513 on *Basic Infrastructure for a Nuclear Power Project*, issued in June 2006, provides initial guidance on the infrastructure that a country needs to develop in order to ensure that it is prepared for the

Planned new NE publications on Nuclear Infrastructure and related existing publications

New planned NE Guide on Nuclear Infrastructure and Planning	Related existing / new publications
Milestones in implementing nuclear infrastructure Status: in development (first draft). Issue: 2007	- IAEA-TECDOC-1513, 2006: Basic infrastructure for a nuclear power project - IAEA-TECDOC-1522, 2006: Potential for sharing nuclear power infrastructure - IAEA-TECDOC-279, 1988: Nuclear power management - Technical Reports Series No. 266, 1986: Engineering and science education for nuclear power - Technical Reports Series No. 200, 1982: Manpower development for nuclear power
Nuclear power plant project management Status: planning. Issue: 2008-2009	- IAEA-TECDOC- (issue planned 2007): Managing the first nuclear power plant project - IAEA-TECDOC-1259, 2001: Nuclear power programme planning - IAEA-TECDOC-279, 1988 : Nuclear power management - Technical Reports Series No. 217, 1982: Guidebook on the introduction of nuclear power
Introduction of nuclear power: main issues Status: planning. Issue: 2008-2009	- IAEA-TECDOC-1123, 1999: Strategies for competitive nuclear power plants - RPS: STI/PUB-1050 RN: 29018205, 1998: Choosing the nuclear power option: Factors to be considered - Technical Reports Series No. 353, 1993: Financing arrangements for nuclear power projects in developing countries - Technical Reports Series No. 298, 1989: Guidebook on research and development support for nuclear power - Technical Reports Series No. 281, 1988: Developing industrial infrastructures to support a programme of nuclear power - STI/PUB/777, 1987: Promotion and financing of nuclear programmes in developing countries - Technical Reports Series No. 271, 1987: Introducing nuclear power plants into electrical power systems of limited capacity - Technical Reports Series No. 245, 1985: Energy and nuclear power planning in developing countries - Technical Reports Series No. 241, 1984: Expansion planning for electrical generating systems - Technical Reports Series No. 224, 1983: Interaction of grid characteristics with design and performance of nuclear power plants

New planned NE Report on Nuclear Infrastructure and Planning	Related existing / new publications
Assessment methodology for the implementation of infrastructure milestones. Status: planning. Issue: 2008	- IAEA Safety Standards Series No. NG-G-3.1 (issue planned 2007): Milestones in implementing nuclear infrastructure
Preparation and evaluation of bids for nuclear power plants. Status: planning. Issue: 2008	- Technical Reports Series No. 204, 1981: Technical evaluation of bids for nuclear power plants - Technical Reports Series No. 275, 1987: Bid invitation specifications for nuclear power plants - Technical Reports Series No. 396, 1999: Economic evaluation of bids for nuclear power plants - IAEA-TECDOC- (issue planned 2007): Managing the first nuclear power plant project
Restarting delayed nuclear power plant projects Status: in development: Issue: 2007	- IAEA-TECDOC-1110, 1999: Management of delayed nuclear power plant projects - IAEA-TECDOC-279, 1988 : Nuclear power management
Technical support for the introduction of nuclear power Status: planning. Issue: 2009	- Technical Reports Series No. 298, 1989: Guidebook on research and development support for nuclear power - Technical Reports Series No. 281, 1988: Developing industrial infrastructures to support a programme of nuclear power
Experience in sharing nuclear infrastructure Status: planning. Issue: 2009	- IAEA-TECDOC-1522, 2006: Potential for sharing nuclear power infrastructure

introduction of a nuclear power plant. Another recently published IAEA-TECDOC-1522 on *Potential for Sharing Nuclear Power Infrastructure between Countries*, October 2006, describes areas where countries may be able to achieve the required level of infrastructure by sharing resources and facilities. Work is continuing with the preparation of further guidance on nuclear infrastructure. A consultants meeting was held in February 2007 to review the first draft of a guidance document, targeted to be finalized in June 2007, on Milestones in the Development of a National Nuclear Power Infrastructure for Member States to plan, operate, and maintain safe and reliable nuclear power plants, and to assist the IAEA to prioritize its support to Member States. This document will supplement the previously mentioned IAEA-TECDOC-1513 on the Basic Infrastructure for a Nuclear Power Project, and will allow Member States to assess the level of their present readiness to introduce nuclear power and to determine the magnitude of their required additional commitment. The IAEA can also assess and help Member States to prioritise their activities and achieve the peaceful use of nuclear power in a safe, secure and technically sound manner.

Experience shows that the time between an initial policy decision by a State to consider nuclear power up to the

start of its first nuclear power plant is about 10 to 15 years. The proper management of the wide scope of project activities during this period represents a major challenge for the involved governmental, utility, regulatory, supplier and other supportive organizations. The main focus is to ensure that the project is implemented successfully from a commercial point of view while remaining in accordance with the appropriate engineering and quality requirements, safety standards and security guides. A guide document on Managing the First Nuclear Power Plant, finalized and submitted for publication in February 2007, provides an introductory overall description of the main project management activities and gives the references to the related detailed guidance. The target audience is the decision makers, advisers and senior managers in the governmental organizations, utilities, industrial organizations and regulatory bodies in the countries desiring to launch the fist nuclear power plant project.

A consultants meeting held on 5-7 February 2007 reviewed a draft document on *Guidance for Restarting Delayed Nuclear Power Plant Projects* and discussed modifications in the content for completion. The document focus on assisting to strengthening the owner's functions for completing the delayed project after the decision for restarting is adopted. The document's content includes practical methodologies and examples of successful practices. The work plan for finalizing the document foresees the submission for publication during the second half 2007.

As mentioned earlier, several guidance publications on planning and managing nuclear power projects were issued by IAEA since 1980. After their publication new developments affecting aspects of nuclear power have taken place and additional knowledge and experience have been collected. The IAEA embarked on restructuring, updating and further developing its more than 20-year guidance in order to address the actual needs of Member States and to reflect the changing social and commercial environment which the application of nuclear energy must now be considered. These activities are directed to provide guidance on developing and strengthening national and regional nuclear power infrastructures.

Other envisaged future activities related with infrastructure include the following:

- The changing global environment is likely to influence the infrastructure necessary for construction and operation of nuclear power plants. Depending on the Member States' needs, issues such as financing arrangements for capital intensive nuclear power plants, international design approval, harmonization of codes and standards, and assurance of fuel cycle services would need to be addressed;
- The issues of investment risk related to nuclear power will be considered, and a review of how the perceived investment risk can be reduced by improvements in international infrastructure and co-operation will be investigated;
- The development of a national capability through the establishment of the appropriate technical infrastructure to support nuclear power provides a potentially significant benefit to national development. This will be investigated in order to assess the comparative risk and benefits from the application of nuclear energy.

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A consultants meeting was cooperatively convened by the Division of Nuclear Power and the Planning and Economic Studies Section of the Department of Nuclear Energy on 19-20 February. Experts from suppliers, banking organizations and a potential recipient country participated in the Consultancy to provide the Agency's staff with the benefit of experience and expertise in the field of financing nuclear power plants and managing the associated commercial and regulatory risks. The information provided will be used in the process of drafting Agency's response to a Resolution of the IAEA's 50th General Conference, which was convened in September 2006. This Resolution [GC(50)/RES/13B (item 9)] requested the Director General to present to the 51st session of the General Conference in 2007, a report on innovative means of financing nuclear power as an option for meeting the energy needs of interested developing countries.

At the Consultancy Meeting, key questions were discussed on:

- What, if anything, is necessarily special about financing nuclear power?
- What is necessarily difficult about financing nuclear power – or any other large projects – in developing countries?
- What is not enough with conventional financing instruments for financing nuclear power plants in developing countries?

The meeting discussed many factors such as importance of Government commitment and support to nuclear power programmes to reduce uncertainty and risk, and variations on the application of conventional financing tools.

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Human Resources, Training and Improvement of Performance

The role of adequate human resources for achieving the objectives in the field of nuclear energy - particularly, for safe and efficient functioning of a nuclear facility during various phases of its life cycle, or for carrying-out a nuclear activity - cannot be overestimated. A guide on the topic of human resources is planned within the Nuclear Energy Series. The objective of this guide is to provide fundamental guidance for addressing the human element in the field of nuclear energy, to ensure its safe, efficient, and reliable use. The purpose of this guide is also to communicate a message to all stakeholders of the nuclear industry on the importance of the adequate human resources for safe and efficient operation of the nuclear industry and on the essential activities to be undertaken in order to reliably supply the competent workforce. A consultants meeting to discuss the strategic vision for this guide was conducted on 26 February – 01 March 2007 at IAEA Headquarters. The consultants from Canada, Germany, the Russian Federation, Spain and the USA - from government nuclear energy agency, the site operating various nuclear research and waste management facilities, regulatory body, nuclear power plant, research institute, technical support and training organization - and IAEA staff, took part in the meeting. Further discussions on management of human resources, personnel training, and improvement of human performance are planned at a technical meeting on 14-18 May 2007 at the IAEA.

Contact: A.Kazennov@iaea.org.

Technology Developments and Applications for Advanced Reactors

Common User Criteria and Actions for Development and Deployment of Nuclear Power Plants for Developing Countries

Responding to the General Conference Resolution (GC(50)/RES/13B), INPRO (International Project on Innovative Nuclear Reactors and Fuel Cycles) started a new activity called *Common User Criteria and Actions for Development and Deployment of Nuclear Power Plants for Developing Countries*. The purpose of this activity is to improve understanding between technology users and holders by conveying users' common needs to technology holders and subsequently to consider necessary actions together to fulfil the needs. In the first phase of this activity, common user criteria (CUC) will be developed to define common characteristics needed by potential users of new plants in developing countries. CUC will cover general technical and economic characteristics of desired nuclear reactor plants and associated services and support.

The overall plan was presented to the 10th INPRO Steering Committee meeting in December 2006. The first few steps involve visits to several typical potential user countries for detailed discussions with various stakeholders in the countries and to develop a draft of CUC. The draft CUC would then be reviewed with all developing countries potentially interested in new nuclear plants to refine and finalize the CUC. The draft CUC would then be reviewed with all developing countries potentially interested in new nuclear plants to refine and finalize the CUC. A detailed review of the first few steps of this activity was performed during a consultancy meeting held on 5-7 February 2007 in Vienna, Austria. 16 external experts from 9 countries participated in the meeting. The meeting recommended 8 candidate countries to be visited, which represent a variety of typical characteristics of potential user countries.

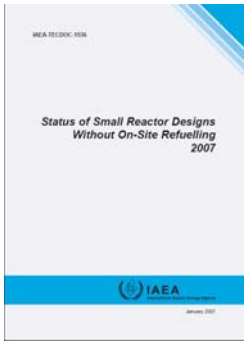
The meeting also reviewed a set of questionnaires to be sent to those 8 countries prior to the visits, which covers broad issues regarding introduction of nuclear power plants.

Upon an agreement with each country, the INPRO team will visit countries individually from April to June 2007. A report documenting CUC is expected to be delivered by the end of 2007 following the submission of a status report to 51st General Conference in September 2007. It is further planned that the second phase of the activity,

identification of necessary actions to be taken by technology holders and users jointly to fulfil the needs of new users of nuclear power technology, will be conducted in 2008.

Contact : M.Moriwaki@iaea.org.

Common Technologies and Issues for SMRs



A new report was published as IAEA-TECDOC-1536 *Status of Small Reactor Designs without On-site Refuelling*. The report identifies possible common criteria for small and medium nuclear power reactors that "meet grid sizes and economic requirements of developing countries, have very long-lifetime cores, are easily safeguardable, are protected robustly against attempts at sabotage or theft, avoid the use of fissile materials suitable for use in a nuclear weapon or other nuclear explosive device and are safe against accidents that may produce catastrophic consequences reactors", in line with the **GC(50)/RES/13/5(b)**, providing an input for further INPRO activity defined by the **GC(50)/RES/13/5(c)**. A similar report for small and medium sized reactors with conventional refuelling schemes was published as IAEA-IAEA-TECDOC-1485 in March 2006. These two reports cover nearly all technological options developed and examined worldwide for reactors of the indicated category.

A new Energy Series Report *Review of Passive Safety Design Options: SMRs* was approved for preparation by the Document Coordination Team of the Department of Nuclear Energy. For this report, a common outline for description of passive safety design options (PSDO) was defined, and structured descriptions of such options for 10 representative SMR concepts were prepared by the designers and re-iterated up to the pre-final draft versions. Common chapters for the report were partially prepared by international experts and discussed/amended at the IAEA technical meetings in June and October 2006. All activities for this task are performed in cooperation with the Department of Nuclear Safety. The report is planned to be submitted for publication by the end of this year.

The Document Coordination Team of the Department of Nuclear Energy has approved the preparation of yet another Nuclear Energy Series Report, titled *Approaches to Assess Competitiveness of SMRs*. The report will present the state-of-the-art in models taking into account all factors that could affect SMR competitiveness, including those related to economies of scale, design, construction schedule, unit timing, learning and financial risks for investments spread over time. A detailed work plan has been developed and 10 original papers from Member States were collected. Cooperation with the NE/PESS was established. The report is due in 2008.

A CRP on *Small Reactors without On-site Refuelling* is ongoing with 16 participating institutions from 9 Member States. Benchmark problem definition was completed and benchmarking and data exchange and analysis was carried out within water cooled and lead/lead-bismuth cooled reactor CRP groups; several draft chapters for final reports were prepared; and further milestones were reached in the development of a generic methodology to revise the need for relocation and evacuation measures unique to NPPs with innovative SMRs. CRP web page was updated and currently displays all major outputs produced during 2006. The next RCM is scheduled for June 2007 and is under preparation currently.

A series of case studies was devised and initiated to address considerations of SMR competitiveness for different applications. Work plan has been elaborated and coordinated with all targeted participants; actual activities have been started for several items of the work plan. Inter alia, the study will include the following topics: (i) development of a country-independent model to examine and quantify the needs for SMRs in countries or certain regions of countries; (ii) analysis of design and deployment strategies for SMRs, including development of a model taking into account all time-dependent economic factors affecting the SMR competitiveness and case studies for different SMRs under a variety of different applications.

Under a Technical Cooperation programme, a support to an interregional TC project is being provided in organizing a workshop on *Steps in Conducting Technology Assessment for Water Cooled Reactors* to be convened tentatively in October 2007.

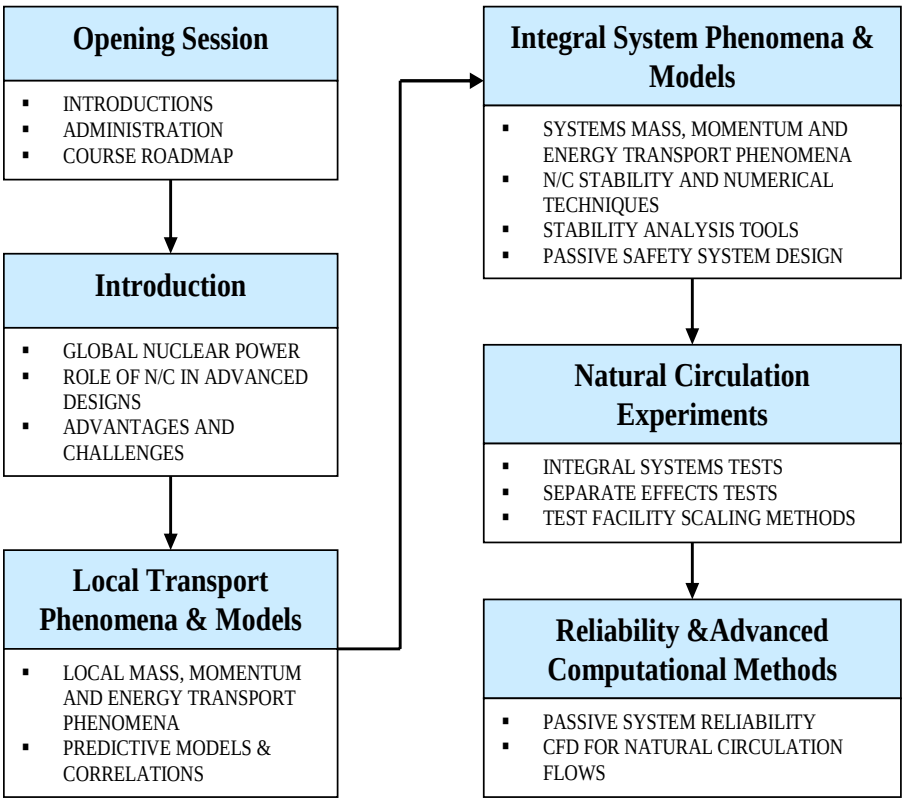
Contact: V.V.Kuznetsov@iaea.org.

Advances in Water Cooled Reactors for Improvement in Economics and Safety

Training Course on Natural Circulation in Water Cooled Nuclear Power Plants

The second IAEA Training Course/Workshop on *Natural Circulation in Water Cooled Nuclear Power Plants* will be held on 25-29 June 2007, at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

Passive safety systems based on natural circulation are key to several evolutionary water-cooled designs and



Training Course Roadmap

many innovative water-cooled reactor designs. Some designs also utilize natural circulation to remove core heat during normal operation.

The IAEA fosters international cooperation in examining natural circulation for removal of core heat under normal operation and accident conditions, and to provide cooling of the containment. Several organizations worldwide are collaborating in an IAEA Coordinated Research Programme on *Natural Circulation Phenomena, Modelling and Reliability of Passive Systems that Utilize Natural Circulation*. This activity is building on other recent IAEA activities on passive safety systems, thermo-hydraulic relationships and experimental tests and qualification of analytical methods to address thermo-hydraulic phenomena, and valuable information from research projects on natural circulation and passive system reliability within the European Commission is being contributed.

This Training Course on Natural Circulation in Water-Cooled Nuclear Power Plants utilizes information, results and expertise shared through these various activities, and especially the current IAEA Coordinated Research Project on *Natural Circulation Phenomena, Modelling and Reliability of Passive Systems that Utilize Natural Circulation*.

The objective of the Training Course is to provide participants with instruction on: (1) natural circulation during reactor start-up and operation, methods of analyses and governing equations, passive system initiation and operation, flow stability, scaling laws for experiments; (2) phenomena that influence natural circulation (e.g. behaviour in large pools of liquid, effects of non-condensable gasses on condensation heat transfer, condensation on containment structures, behaviour of containment emergency systems, thermo-fluid dynamics and pressure drops in various configurations, steam-liquid interaction, gravity driven cooling and accumulator behaviour, liquid temperature stratification, behaviour of emergency heat exchangers and isolation condensers, stratification and mixing of boron, core makeup tank behaviour); (3) experimental databases for these phenomena; and (4) methodology for determining the reliability of passive systems that utilize natural circulation.

To receive a participation form, please contact the following: J.Cleveland@iaea.org or J.H.Choi@iaea.org. More information can be found at the IAEA website http://www.iaea.org/NuclearPower/Education/NaturalCirculation/.

The Role of HWRs in the Sustainable Utilization of Fissionable Resources

The first consultants meeting of an IAEA International Collaborative Assessment (ICA) on *The Role of HWR in the Sustainable Utilization of Fissionable Resources* was conducted successfully in Mumbai, India on 11-13 December 2006. In this CM, ICA activities in the next two years leading to its completion were planned in detail. The objective of the ICA are to identify design,

engineering and technological advances, including fuel cycles synergisms among various reactor types, that can enhance the role of HWR in improving the utilization of fissionable resource and to supplement other reactor design types in minimizing the overall spent-fuel. Identification of challenges to the materialization of these necessary advances, as well as possible solutions and R&D needs to overcome the challenges are also important parts of the ICA activities. Two more CMs have been planned with the next one in October 2007. The last CM is tentatively set in October 2008 to finalize a Level 3 NE Series report that will document the findings from the ICA.

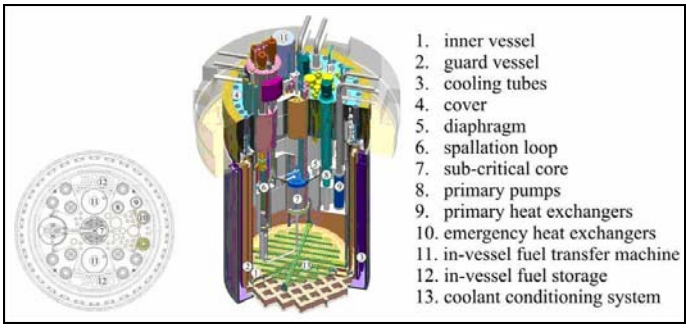
Contact: R.Sollychin@iaea.org.

Advances in Fast Reactors and Accelerator Driven Systems

Activities are conducted with the advice and support of the Technical Working Group on Fast Reactors (TWG-FR), addressing all technical aspects of FR and ADS research and development, design, deployment, operation, and decommissioning. The following summarizes recent progress and plans:

With the help of senior Russian scientists, the project has prepared the draft of the publication *Status Report on Lead and Lead-Bismuth Cooled Fast Reactors*. This draft was submitted to an international group of peer reviewers who have delivered a comprehensive review report. The Project convened a consultants meeting (Vienna, 13-14 November 2007) with the contributors to the Status Report and an outside specialist in which the reviewers' conclusions and recommendations were discussed, and agreement was reached on changes to the draft status report. Updated contributions will be prepared by the end of February 2007, permitting submission of the Status Report to the Agency's Publications Committee in the first half of 2007.

The Project has convened the 3rd Research Coordination Meeting (RCM) of the IAEA Coordinated Research Project (CRP) on *Studies of Advanced Reactor Technology Options for Effective Incineration of Radioactive Waste*, in Chennai, India, hosted by the Indira Gandhi Centre for Atomic Research (IGCAR). The CRP will be terminated at the end of 2007. The overall objective of the CRP is to increase the capability of Member States in developing and applying advanced technologies in the area of long-lived radioactive waste utilization and transmutation. Twenty institutions from 15 Member States and one international organization participated in this CRP. The CRP concentrated on the assessment of the transient behaviour of various transmutation systems. For a deep assessment of the transient and accident behaviour, the analytical capabilities have to be qualified. This comprises the nuclear data base, static neutronic and coupled fluid dynamic/neutronic codes, thermal-physical data of the transmuter fuels and various coolants and thermal-hydraulic methods. This qualification is mandatory in view of the fact that the margins for the safety relevant neutronics parameters are becoming small in "dedicated" transmuter systems. A major effort of the CRP consisted in the benchmarking of steady state core configurations and on transient/accident simulations focusing on the phenomena and effects relevant to various critical and sub-critical systems. Where available, experiments have been considered in the benchmarking exercise. The benchmarking effort between the codes and nuclear data used for the analyses helped to specify the range of validity of methods and identified requirements for future theoretical and experimental research. The main thrust of work was on 'long timescale' effects of transients in the ms – s range, initiated by perturbations of the core and/or the external neutron source. The comparative investigations covered burner reactors and transmuters both containing fertile and fertile-free, so-called "dedicated fuels" (as an example, the figure below shows cross-cuts of the lead-bismuth eutectic cooled MYRRHA ADS). These reactors are loaded with differing amounts of Minor Actinides. The systems were designed either as neutronically critical or sub-critical (hybride) with an external neutron source. The neutron spectra of the reactors extend from low thermal to fusion energy levels. Further, both systems with solid fuels and molten salt fuels were compared. The solid fuel systems investigated covered the impact of various coolants from sodium to heavy liquid metals and gas.



Cut-views of the proposed MYRRHA ADS (Credit: SCK•CEN, Mol, Belgium)

For the transient analysis of such transmuters, besides neutronics and thermal-hydraulics, the fuel issue itself was of significant importance. For a general assessment and comparison, the safety coefficients (prompt feedback effects like the Doppler effect, thermal fuel expansion, the delayed feedback from clad, coolant and other core constituents and finally the kinetics parameters) were determined for the individual systems. In a second step

transient analyses were performed which reflected the generic behaviour of the various reactors types. Issues as the transmutation potential, burn-up behaviour and decay heat of minor actinides bearing fuels were also investigated. The RCM reviewed all results, identified remaining discrepancies, decided on activities to resolve them, and started work on the draft of the final CRP report.

Visit: http://www.iaea.org/inisnkm/nkm/aws/fnss/.
Contact: A.Stanculescu@iaea.org.

Advances for Gas Cooled Reactors

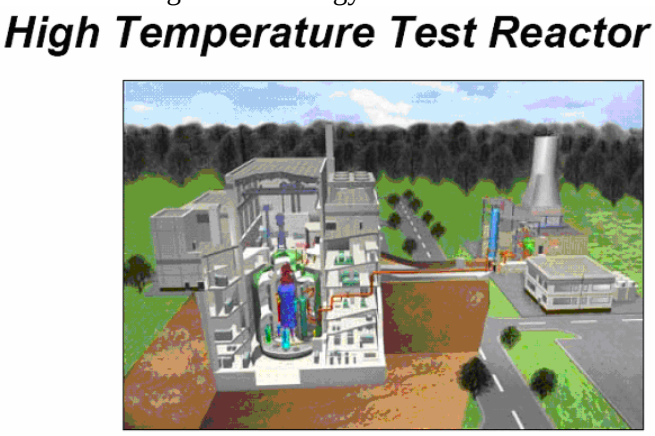
The 20th Meeting of Technical Working Group on Gas-Cooled Reactors, 15-17 January 2007, VIC, Vienna.

The IAEA continued its activities on Gas Cooled Reactors (GCR). The Technical Working Group on GCR convened its 20th Meeting during the period of 15-17 Jan. 2007 in the VIC, Vienna, Austria. The meeting objective was to review current status of the HTGR through coordinated research projects (CRPs), information exchange and educational training. One of these CRPs is the current one on benchmarking codes used in HTGR core physics and thermal-hydraulics (CRP-5). With the participation of 12 international institutes, the CRP has made use of data from HTR-10, HTTR, ASTRA and the South African pebble bed micro model (PBMM) facilities, in addition to PBMR & GT-MHR calculations. The CRP will be completed before the end of 2007. An IAEA-TECDOC is to be prepared which will include results of the pending benchmarks. Another CRP was CRP-6 which focused on advances in coated fuel particle technology, including design and fabrication, irradiation and testing, performance modelling as well as quality assurance and licensing issues. 13 institutes are currently participating in the CRP. This CRP is scheduled to be completed by the end of 2008. Meanwhile, a new CRP (CRP-7), on potential of nuclear power for process heat applications has been launched in 2006 and it examines high-temperature and low temperature process heat applications, including hydrogen production and seawater desalination. In the area of information exchange, cooperation continues with the HTR-TN network on the HTR bi-annual conferences, the last being HTR-2006, held in Sand ton, South Africa (October 2006). In the area of educational training, a training course was sponsored by the IAEA Technical Cooperation Department and hosted by ICTP, Trieste, Italy (July 2006). 22 scientists and engineers, mostly from developing countries, participated in the course.

Contact: I.Khamis@iaea.org.

Advances for Non-Electric Applications

Non-electric applications of nuclear power are globally gaining more momentum than ever. The main interest focuses on nuclear seawater desalination and hydrogen production. New applications of nuclear energy such as coal gasification, recovery of oil from tar sand or sweetening by adding hydrogen to food and other industries are being considered. As a result, the IAEA is actively taking a leading role in many activities including international conferences and meetings which will take place in the year 2007. The IAEA is planning to hold the international conference on *Non Electric Applications of Nuclear Power: Seawater Desalination*, hydrogen production and other industrial applications during the period of 16-19 April 2007 in Oarai, Japan. In addition, the IAEA is also planning to hold an Advisory Meeting with internationally recognized nuclear hydrogen experts during 9-11 July 2007 in Vienna, Austria. The objective of the meeting is to provide guidlines on the development of software to evaluate the economics of hydrogen production using nuclear energy.



Courtesy of Alan E. Waltar Hydrogen Production from Nuclear Energy, 2003

Another IAEA activity concerning non-electric applications of nuclear power, is the newly approved Coordinated Research Proposal on *Advances in nuclear power process heat applications*.

The CRP has become active in 2007. It will address the technical and economic aspects for coupling advanced designs of nuclear reactors such as high temperature gas cooled reactors to process heat applications. In particular, it will focus on the hydrogen production and seawater desalination applications. Other challenges related to nuclear process heat applications, however, are to be addressed e.g. safety of coupling or integrated systems, material and process technologies and the economic merits of the overall systems.

Contact: I.Khamis@iaea.org.

New Staff in Nuclear Power Division

CHOI, Jong Ho

Mr. Choi has recently taken up duties in the Nuclear Power Technology Development Section as a nuclear engineer where he will assist in formulating and implementing the Agency's technology development activities for heavy water reactors (HWRs) and cooperate in related technical issues for other reactor design concepts. Mr. Choi's previous assignment was with the Korea Power Engineering Company (KOPEC) as a principal researcher, with recent previous assignments as supervisor of a radiation safety analysis group and an HWR analysis group. Mr. Choi has a Master of Engineering degree in nuclear engineering and over 20 years of experience in the nuclear field, mainly in HWR design and safety but also with experience in PWR safety. He has international experience through employment at KWU in Germany, and through an assignment to AECL, Canada.

Contact : J.H.Choi@iaea.org.

KHAMIS, Ibrahim

Mr. Khamis has recently taken up duties in the Nuclear Power Technology Development Section as a nuclear engineer where he will assist in the formulation and implementation of the Agency's activities dealing with technology development and economic aspects of advanced nuclear reactors and their non-electrical applications. Mr. Khamis has a Bachelor of Science Degree in Mechanical Engineering from Aleppo University, Syrian Arab Republic, Master and Ph.D. degrees in Nuclear Engineering from the University of Arizona, Tucson, Arizona, USA and more than 15 years of experience in the nuclear engineering field, including R&D, the last 4 years as Head of the Nuclear Engineering Department of the Atomic Energy Commission of the Syrian Arab Republic.

Contact : I.Khamis@iaea.org.

LYNCH, Patrick Daniel

Mr. Lynch has recently taken up duties in the Nuclear Power Engineering Section as a JPO where he will assist in the implementation of the International Symposium on Nuclear Power Plant Life Management to be held in Shanghai, China, on 15-18 October 2007. Mr. Lynch has completed his MS in applied intelligence in May 2005 and thereafter worked as an intern in safeguards in the Satellite Imagery Analysis Unit.

Contact : P.Lynch@iaea.org.

PHILLIPS, Jerry Harold

Mr. Phillips has recently taken up duties in the Division of Nuclear Power where he will assist in the implementation of the Agency's activities on infrastructure. Mr. Phillips was a reactor operator on small shipboard reactors, has a Bachelor of Science Degree in materials engineering from North Carolina State University, Masters Degree in metallurgical engineering from the University of Pittsburgh and a Ph.D. from the University of Tokyo. Mr. Phillips has extensive experience in nuclear science and technology involving research and development as well as design, maintenance, risk analysis, and operation of nuclear power plants (for both light water and fast reactors). He helped develop the American Society of Mechanical Engineers' approach for Risk-informed Inspection of pipes in a commercial nuclear power plant.

Contact: J.Phillips@iaea.org.

YOON, Heanjoo

Mr. Yoon joined the Nuclear Power Technology Development Section as a cost free expert to participate in the International Coordinating Group for INPRO. Mr. Yoon has a Ph.D. in mechanical engineering from the Univeristy of Leeds. His previous assignment was as assistant secretary to the president for information, science & technology working on national S&T policy and related national R&D projects as well as national nuclear R&D projects. Mr. Yoon has over 20 years of experience in the nuclear field mainly R&D, evaluations as well as international cooperation activities with China and UN organizations.

Contact : H.Yoon@iaea.org.

Current Vacancy Notice for Professional Posts in the Nuclear Power Division

Below is the list of current vacancies in the division of Nuclear Power, IAEA. Applications from qualified women and candidates from developing countries are encouraged.

Nuclear Engineer working on Gas Cooled Reactors

As part of a team led by the Head of Nuclear Power Technology Development Section, the nuclear engineer develops and implements the Agency's activities on technology development and application for gas cooled reactors (GCR).

For more information:
http://recruitment.iaea.org/vacancies/p/2007/2007_006.html.

Nuclear Engineer working on Nuclear Power Infrastructure

As part of a team led by the Head of Nuclear Power Engineering Section, the nuclear engineer develops and implements the Agency's activities on nuclear power infrastructure.

For more information:
http://recruitment.iaea.org/phf/apply.asp.

How to Apply

All applicants must complete and submit an application by post or by using the on-line job application form accessible here.
http://recruitment.iaea.org/phf/mainpage.asp

Meetings in 2007

Start Date	End Date	Title	Location	Country
15-Jan	19-Jan	RCM of the CRP on studies of innovative reactor technology options for effective incineration of radioactive waste	Chennai	India
15-Jan	17-Jan	Meeting of the Technical Working Group on Gas Cooled Reactors (TWG-GCR)	Vienna	Austria
06-Feb	08-Feb	TM to reinforce the development of attitudes and professionalism of NPP personnel	Vienna	Austria
12-Feb	15-Feb	TM on Power Uprate and Side Effects of Power Uprate	Oskarshamn	Sweden
21-Feb	23-Feb	TM on National NPP Life Management Programmes for Long Term Operation (TWG-LMNPP)	Vienna	Austria
19-Mar	23-Mar	TM on management systems	Vienna	Austria
26-Mar	28-Mar	RCM of the CRP on review and benchmark of calculation methods for structural integrity assessment of reactor pressure vessels during pressurized thermal shocks	Budapest	Hungary
11-Apr	11-Apr	Special Symposium for the IAEA 50th Anniversary: Global Challenges for the Future of Nuclear Energy and the IAEA	Aomori	Japan

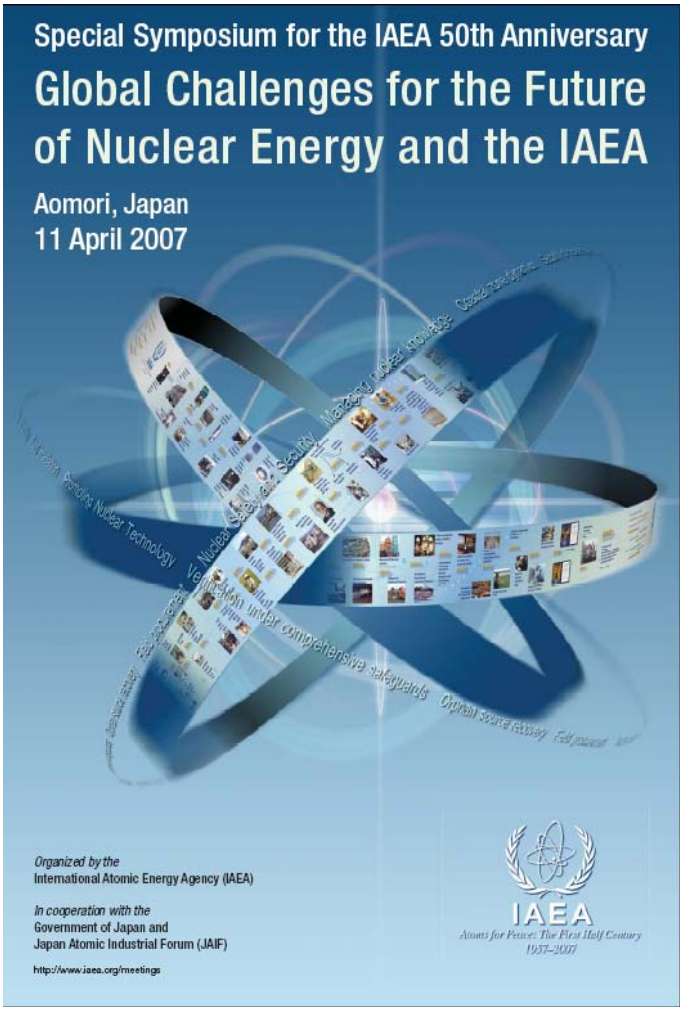
Start Date	End Date	Title	Location	Country
16-Apr	19-Apr	International Conference on Non-electric Applications of Nuclear Power: Seawater Desalination, Hydrogen Production and other Industrial Applications	Oarai	Japan
23-Apr	26-Apr	RCM of the CRP on analyses of and lessons learned from the operational experience with fast reactor equipment and systems	Vienna	Austria
23-Apr	27-Apr	International Conference on the Challenges faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety	Aix-en-Provence	France
14-May	18-May	TM on effective management of NPP personnel training to increase organizational performance	Vienna	Austria
14-May	18-May	Meeting of the Technical Working Group on Fast Reactors (TWG-FR)	Tsuruga/Kyoto	Japan
23-May	25-May	Meeting of the Technical Working Group on Nuclear Power Plant Control and Instrumentation (TWG NPPCI)	Vienna	Austria
24-May	25-May	TM on preparation of the International Symposium on Nuclear Power Plant Life Management (CN-155)	Shanghai	China
29-May	31-May	TM on Increasing Power Output and Performance of NPPs by Improved I&C Systems	Prague	Czech Republic
29-May	31-May	TM for the external review of the Guidance Document on Infrastructure Milestones for the Introduction of Nuclear Power	Vienna	Austria
04-Jun	08-Jun	RCM of the CRP on small reactors without on-site fuelling	Vienna	Austria
04-Jun	06-Jun	TM of the International Desalination Advisory Group (INDAG)	Vienna	Austria
13-Jun	15-Jun	Meeting of the Technical Working Group on Advanced Technologies for Light Water Reactors (TWG-LWR - organized jointly with TWG-HWR)	Vienna	Austria
13-Jun	15-Jun	Meeting of the Technical Working Group on Advanced Technologies for Heavy Water Reactors (TWG-HWR; organized jointly with TWG-LWR)	Vienna	Austria
18-Jun	22-Jun	RCM of the CRP on Conservation and application of HTGR technology: Advances in HTGR fuel technology	Vienna	Austria
19-Jun	21-Jun	TM on Common-cause failures in digital Instrumentation and Control (I&C) Systems of NPPs	Rockville	United States of America
25-Jun	29-Jun	Workshop on Natural Circulation in Water-Cooled Nuclear Power Plants	ICTP Trieste	Italy
02-Jul	04-Jul	11th INRPO Steering Committee Meeting	Vienna	Austria
02-Jul	04-Jul	Advisory meeting with nuclear hydrogen experts	Vienna	Austria

Start Date	End Date	Title	Location	Country
3-Jul	6-Jul	TM on methods for the replacement of main components (steam generator, reactor vessel head, reactor internal)	Vienna	Austria
10-Sep	13-Sep	RCM of the CRP on natural circulation phenomena, modelling and reliability of passive systems which utilize natural circulation	Vienna	Austria
11-Sep	14-Sep	TM on implementing and licensing digital I&C systems and equipment in NPPs	Halden	Norway
24-Sep	28-Sep	RCM of the CRP on Potential of High-Temperature Gas-Cooled Reactors (HTGRs) in Process Heat Applications	Vienna	Austria
24-Sep	28-Sep	TM on Lessons Learned from Large Modernization Projects in I&C Systems	Chatou	France
01-Oct	03-Oct	TM on Water Chemistry of Nuclear Power Plants (NPPs)	Moscow	Russian Federation
08-Oct	11-Oct	TM on Country Nuclear Power Profiles	Vienna	Austria
15-Oct	18-Oct	International Symposium on Nuclear Power Plant Life Management	Shanghai	China
15-Oct	18-Oct	TM to review options to break the economy of scale for SMRs	Vienna	Austria
22-Oct	26-Oct	DEEP User Group meeting	Gran Canaria	Spain
29-Oct	02-Nov	TM on integration of analog and digital instrumentation and control (I&C) systems in main control rooms of in Nuclear Power Plants (NPPs)	Toronto	Canada
29-Oct	09-Nov	Workshop on Nuclear Power Plant Simulators for Education	Trieste	Italy
05-Nov	09-Nov	TM/Workshop on Milestones for Nuclear Power Infrastructure Development	Vienna	Austria
12-Nov	16-Nov	RCM of the CRP on Analytical and Experimental Benchmark Analyses of Accelerator Driven Systems (ADS)	Rome	Italy
13-Nov	16-Nov	8th IAEA-FORATOM Joint Workshop: IAEA Safety Standards on Management Systems	Vienna	Austria
19-Nov	30-Nov	Workshop on technology and applications of accelerator driven systems	Trieste	Italy
03-Dec	05-Dec	12th INPRO Steering Committee Meeting	Vienna	Austria
10-Dec	13-Dec	TM on Integrated Nuclear Desalination Systems	Cadarache	France
TBD	TBD	TM on the Update of the User Manual for INPRO Methodology	Vienna	Austria
TBD	TBD	TM on the Development of Recommendations for Infrastructure Changes to Support the Deployment of INS	Vienna	Austria
TBD	TBD	TM on the Preparation of Country Profiles on Innovative Technology Developments	Vienna	Austria

Start Date	End Date	Title	Location	Country
TBD	TBD	TM on Comparison of Simulation Results for Severe Transients in Heavy Water Reactors	TBD	TBD
TBD	TBD	RCM of the CRP on testing of thermo-hydraulics codes for super-critical water-cooled reactors (SCWRs)	TBD	TBD
TBD	TBD	RCM of the CRP on the identification of competitive technological options for SMRs	TBD	TBD
TBD	TBD	TM on Development of Benchmarking Processes for Economic Performance Indicators	Vienna	Austria
TBD	TBD	TM on pro-active management monitoring	Vienna	Austria
TBD	TBD	TM on the harmonization of safety standards of management systems	Vienna	Austria
TBD	TBD	TM to disseminate good practices on training and performance of NPP maintenance personnel and contractors	TBD	TBD
TBD	TBD	TM on the development of the INPRO methodology to take into account experience of INS assessment in member states and to include breakthrough potential of some INSs to meet INPRO user requirements	Vienna	Austria
TBD	TBD	TM on the update of the user manual for INPRO methodology	Vienna	Austria
TBD	TBD	TM on the development of recommendations for infrastructure changes to support the deployment of INS	Vienna	Austria
TBD	TBD	TM on the facilities used for development and testing of innovative technologies in Member States	Vienna	Austria
TBD	TBD	TM on case studies on planning and analysis of possible future role of innovative nuclear fuel cycle technologies in global, regional and national context	Vienna	Austria
TBD	TBD	TM on Comparison of Simulation Results for Small-Break Loss-of-Coolant Accidents in Heavy Water Reactors	TBD	TBD
TBD	TBD	TM on the implementation of fast reactor data retrieval and knowledge preservation activities	TBD	TBD
TBD	TBD	TM on the preparation of a technical document on emerging designs and deployment challenges of modular HTGR plants	TBD	TBD

Special Symposium for the IAEA 50th Anniversary: Global Challenges for the Future of Nuclear Energy and the IAEA

11 April 2007 Aomori, Japan



The Special Symposium for the IAEA 50th Anniversary Global Challenges for the Future of Nuclear Energy and the IAEA will be held on 11 April 2007 in Aomori, Japan.

The objective of the symposium is to review the 50 years history of the activities of the IAEA and the current status of nuclear power and fuel cycle in the world and discuss the future vision regarding development and safety of nuclear power and fuel cycle and international cooperation.

The following main topics will be covered:

- Nuclear Power and Fuel Cycle;
- Nuclear Safety and Security;
- Non-proliferation;
- National, Regional, IAEA's Challenges for the Future.

Those attending the symposium are expected to include:

Government officials: senior policy makers at the ministerial level; persons from regulatory bodies and their technical experts; Persons responsible for the operation and the manufacturing of nuclear installations and their experts: and Researchers for development and safety of nuclear power and fuel cycle.

The symposium programme will be based on the following approach:

- An opening session will set the conference objectives and provide background information on the 50 years history and the present main activities of the IAEA.
- A sequence of topical sessions will examine the relevant issues. The major activities of the IAEA will be introduced by senior officials of the IAEA. Some senior officials and experts will provide national activities and their insights for the future. Time for comment and discussion will be provided.
- Round table discussion will provide an opportunity for a more intensive exchange of views on important issues with the audience.
- The symposium chairperson will summarize the principal observations made during the symposium.

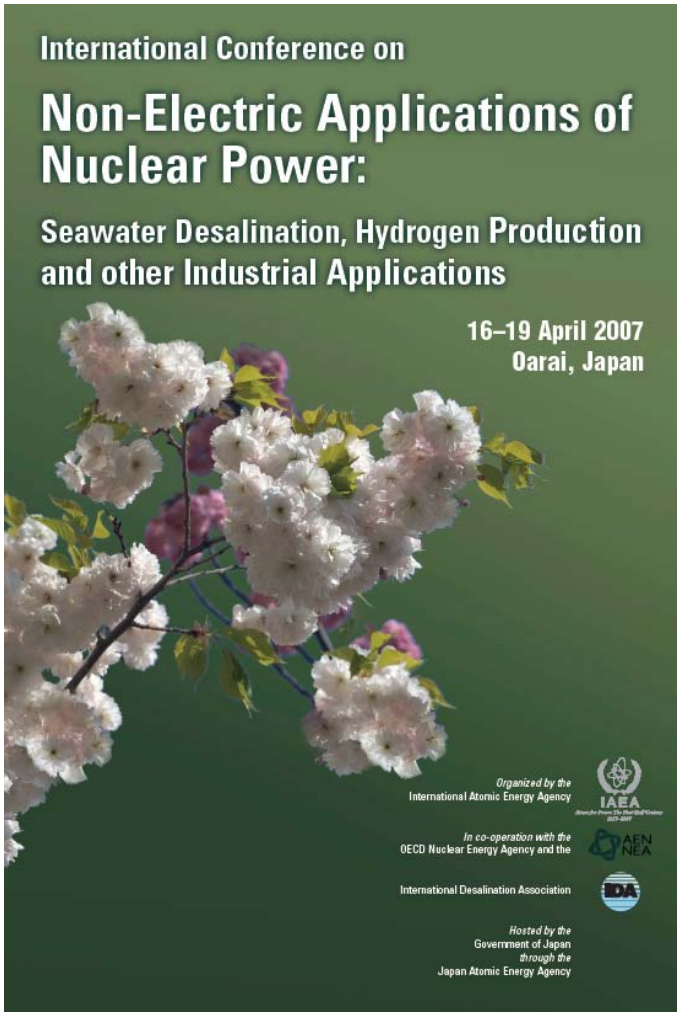
A preliminary programme of the symposium is available on the symposium web site:

http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=161.

Contact: A.Omoto@iaea.org.

International Conference on Non-Electric Applications of Nuclear Power: Seawater Desalination, Hydrogen Production and other Industrial Applications

April 16-19, 2007 Oarai, Japan



The International Conference on Non-Electric Applications of Nuclear Power will be held in Oarai, Japan (April 16-19, 2007).

The objective of the conference is to update information on research and development work related to:

- Advances in nuclear hydrogen production and coupling to nuclear power plants;
- Advances in nuclear desalination and coupling to nuclear power plants;
- Advances in other nuclear process heat applications;
- Economic Assessment of process heat applications using alternative energy sources.

The conference will consist of plenary sessions for topical areas deemed of general interest. Parallel sessions may be arranged for more detailed technical issues, related to specific applications such as hydrogen, desalination and other topics. There will be keynote presentations by invited speakers at the opening session and a panel at the closing session. Efforts will also be made to organize a poster session in addition to oral presentations.

All persons wishing to participate in the conference are requested to register in advance on-line. In addition they must send a completed participation form and if relevant, the paper submission form and the grant application form through the competent official authority (Ministry of Foreign Affairs or national atomic energy authority) to the IAEA.

Participants will be accepted only if the Participation Form is transmitted through the competent official authority of a Member State of the IAEA or by an organization invited to participate. Participants whose official designation has been received by the IAEA will receive further information on the conference approximately three months prior to the conference. This information will also be posted on the conference website .

Please visit the IAEA conference web page regularly for new information regarding this conference:

http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=152.

Contact: I.Khamis@iaea.org.

8th IAEA – FORATOM Joint Workshop

Nov. 13-16, 2007 Vienna, Austria

The IAEA and FORATOM are organizing the 8th joint workshop in Vienna on 12-16 November 2007. The topic of this workshop is Effective Implementation of Management Systems.

The IAEA has published a new set of safety standards on management systems. These standards are GS-R-3 *The Management System for Facilities and Activities* and GS-G-3.1 *Application of Management Systems for Facilities and Activities*. In the new set of safety standards the more appropriate term 'management system' is used instead of 'quality assurance', to encompass all activities necessary to enable effective management and not just those identified through the restricted application of traditional quality assurance. It will integrate all management processes and activities into one coherent system so as to enable the organization to achieve its purpose and mission, such as safety, quality, environmental and business management system requirements, whilst maintaining the paramount focus on safety. The new standards are also aimed at all nuclear facilities and activities from nuclear power generation to the safe use of radioactive sources.

When developing the new set of IAEA Safety Standards for Management Systems it was recognized at an early stage that with an integrated approach to management systems it was necessary to include the aspect of culture. With an integrated approach, the aspects of the management system that define processes and practices need to be combined with people's values, attitudes and behaviours in order for the organization to fully reach it's goals and objectives. The management system will both influence and be influenced by the overall culture of the organization.

The new set of Safety Standards on Management Systems were approved and were published in September 2006. Since they will introduce a new conceptual approach to management systems it is beneficial to hold a workshop to launch the concepts and to raise understanding and awareness.

The expected objectives of the workshop are:

- Promote the integration of safety, quality, environment, health and business areas into one single management system;
- Introduce the new set of IAEA safety standards on management systems;
- Identify management system weaknesses as major contributors to failures;
- Provide a forum for information exchange on national and international policies, strategies and practices on application of effective management systems.

The following topics will be addressed during the workshop:

- Management system deficiencies as a major contributor to unwanted events;
- Integration of safety, equality, environment, health and business areas into one single system:
- Grading of the application of management System requirements:
- Management attitude, culture and ethics.

Contact: P.Vincze@iaea.org.

Call For Papers

2nd International Symposium on PLiM

Your participation is requested at the 2nd International Symposium on Nuclear Power Plant Life Management (PLiM) to be held on 15-18 October 2007 in Shanghai, China. Please plan on participating in the technical sessions by submitting an abstract by April 30 2007

It promises to be a venue for the exchange of the latest technical advancements, operational experiences and managerial issues on Nuclear Power Plant Life Management for Long Term Operation from all over the world.

Please visit the web for submitting abstracts and for the latest information on the PLiM symposium http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=155 and send your abstract to plim@iaea.org

In cooperation with the
EC Joint Research Centre (EC/JRC)
OECD Nuclear Energy Agency (OECD/NEA)

Hosted by the
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through the
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China National Nuclear Corporation (CNNC)

http://www.iaea.org/meetings

IAEA International Atomic Energy Agency

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