IAEA International Atomic Energy Agency

Nuclear Power Newsletter

News from the Division of Nuclear Power
Vol. 7, No. 3, September 2010

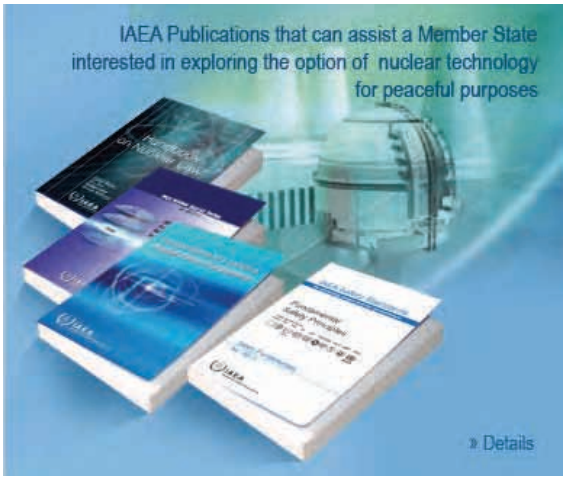
ISSN 1816-9295

http://www.iaea.org/NuclearPower/

Contents

Division of Nuclear Power
Department of Nuclear Energy, IAEA
PO Box 100, Vienna International Centre
1400 Vienna, Austria
Tel : +43 1 2600 22751

Strengthening Support to Countries Introducing Nuclear Power



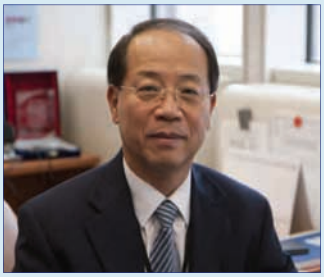
The Integrated Nuclear Infrastructure Group (INIG) was established by the IAEA Director General, effective July 1. Its objective is to manage activities related to the introduction of nuclear power in Member States and to improve coordination within the IAEA of integrated services. The establishment of INIG allows the IAEA to better implement the comprehensive approach to nuclear power development described in the Milestones publication.

INIG will facilitate implementation of this approach and provide a catalogue of services available to Member States in the early stages of infrastructure development. This catalogue, when finalized, will be made available via the IAEA website and can be used by Member States to assist in the planning of TC activities, including the next TC cycle in 2012–2013.

In addition to the launching of the Integrated Nuclear Infrastructure Review (INIR), another means for strengthening support to countries introducing nuclear power is in the establishment of a Technical Working Group (TWG) for Nuclear Power Infrastructure. This TWG will be composed of experts from countries introducing nuclear power and those with operating experience. It will provide means for ensuring that the IAEA programme is aligned with the priority needs of Member States and a forum for information sharing and coordination of bilateral assistance and IAEA activities. The first meeting of the TWG will be in November 2010.

Continued on page 2

Message from the Director



Welcome to the September 2010 Newsletter of the Division of Nuclear Power. There was an organizational change within the Division in July 2010, after a long preparation process.

The Integrated Nuclear Infrastructure Group (INIG) has been officially established to coordinate and harmonize technical activities within the IAEA in order to better support those Member States considering embarking on new nuclear power programmes. Ms. Anne Starz is the first Group Leader of INIG. Congratulations on the new birth of the Group, wholly dedicated to supporting newcomer countries. A Technical Working Group on Nuclear Power Infrastructure (TWG NPI) is being formulated under the Division of Nuclear Power, with about 20 members from vendor countries and newcomer countries. The first meeting of the TWG NPI is scheduled to be held in the first week of November 2010.

It has been a slow quarter since a number of the staff have enjoyed their summer vacations. Major activities in this quarter are the preparations of the 54th General Conference and Programme and Budget 2012–2013. There might be some reduction of the budget in the Programme Cycle of 2012 and 2013 compared to 2011. However, we will try our best to continue to provide quality services to Member States.

The Second Divisional Retreat in 2010 was held for two days in the second week of June, in which 13 staff from different sections attended. Those two days were very warm, unlike the normal Austrian weather of the season. All of the attendees actively participated in the discussions. Many ideas and suggestions on how to improve cooperation were identified and brought forward, especially with an emphasis on the Programme and Budget Formulation for 2012–2013, but also on our overall aim for improved team work.

I would like to congratulate three recipients of the **IAEA Merit Award** in our Division for outstanding performance in 2009 namely: Ms. Mary Mathews, Ms. Choghik Baghdoyan, and Mr. Ibrahim Khamis.

In this newsletter, the family of Mr. Ludovit Kupca from the Nuclear Power Engineering Section is introduced as “nuclear family” because all family members are currently working in the field of nuclear power. As was done in the June Newsletter, Ms. Albane Godard from France, Mr. Jupiter Pane from Indonesia, and Mr. Yuri Busurin from Russian Federation introduce their home towns in this Newsletter.

I would like to introduce five new staff who joined our Division during the first half of 2010, Mr. Don Kovacic from the USA, Mr. Hadid Subki from Indonesia, Mr. Yuri Busurin from Russia, Mr. Jupiter Pane from Indonesia, and Mr. Nelson Kochappan from India . Mr. Kovacic is working on nuclear infrastructure, Mr. Subki on small and medium reactors (SMRs), Mr. Busurin on INPRO, Mr. Pane on pre-feasibility study, and Mr. Kochappan on administration. I believe they will do their best to support Member States in their responsibilities.

Jong Kyun Park

J.Park@iaea.org

Strengthening Support… continued from page 1

Using a matrix approach, the newly established INIG will be responsible for implementing all previous activities; bringing into the project the wide range of technical competence needed to support Member States’ efforts to introduce nuclear power. Its main functions will be to create annual action plans with the section heads from relevant sections, to improve data management and information sharing on the large number of infrastructure-related activities, and to facilitate the technical aspects of TC projects in cooperation with colleagues from inside the NE department and from other departments. INIG has been formed from the previous infrastructure team of the Nuclear Power Engineering Section. Additional IAEA staff are expected to join the group soon.

Three INIR missions were conducted in 2009 in Jordan, Vietnam and Indonesia, and two more are being planned for the fourth quarter of 2010. An INIR mission can be conducted when making a knowledgeable decision for nuclear power, and in preparation for the bidding process.

Contact: A.Starz@iaea.org

Supporting Nuclear Power Plants

Promoting Public Understanding and Acceptance of Nuclear Energy

On 27 July 2010, Mr. Yury Sokolov, IAEA Deputy Director General for Nuclear Energy and Mr. Jae Hwan Rhee, Chairperson of the Korea Nuclear Energy Foundation (KNEF), signed a Practical Arrangement to support cooperation and promotion of the public's understanding and acceptance of the peaceful use of nuclear energy in IAEA Member States.

The IAEA and KNEF are increasing their ongoing collaboration. Through the recently signed Practical Arrangement, both organizations have agreed to enhance the collaboration of the two organizations in supporting Member States considering embarking on or those expanding a nuclear power programme. "This practical arrangement will provide the foundation to share Korea´s rich experience in public understanding and acceptance with IAEA Member States, both newcomer and operating nuclear power countries," stated Mr. Yury Sokolov.

Cooperation will be bolstered in three areas: development of a social model for promoting public acceptance of the peaceful use of nuclear energy; research on the social and psychological effect of launching a new nuclear power programme; and support for the next generation of nuclear professionals. In particular, countries considering embarking on a new nuclear power programme will receive support. Collaboration could result in jointly organized technical meetings, publishing joint reports and implementing IAEA technical cooperation or review missions. Under this arrangement, the Department of Nuclear Energy intends to develop additional mentoring programmes for infrastructure preparation and construction management for expanding nuclear power plants. The Republic of Korea´s technical competence and experience will be shared through these programmes with other IAEA Member States.

"I remember the early stages of the nuclear power program in my country," stated Mr. Jae Hwan Rhee. "Now it is our turn to help the newcomers in the nuclear industry. We are ready and willing to help, hand in hand with the IAEA with following activities: Cooperation with the 'International Nuclear Energy Olympiad for Next Generation, Cooperation with the 'Nuclear Power Plant Symposium for Public acceptance and Cooperation with cultural exchange programs and voluntary activities of

Project Management during Construction of Nuclear Power Plant

A technical meeting was held in China, on project management during construction on nuclear power plants, June 2010. The purpose of the technical meeting was to provide an international forum for sharing recent technical knowledge and experience related to construction, and to review the draft publication material for the project management during construction in nuclear power plants. The meeting was hosted by the Shanghai Nuclear Engineering Research and Development Institute (SNERDI). As of end of June 2010, a total of 61 units are under construction including 24 units from China, 11 units from the Russian Federation, 6 units from the Republic of Korea, and 4 units from India.

Technical committee members to prepare guidelines

The following issues were discussed based on various NPP's construction experiences:

- Planning and scheduling a new build, it is necessary to recognize that circumstances are quite different from 1970s when most of the currently operating plants were constructed.
- Vendors and their sub-contractors have lost valuable knowledge and skills when experienced experts have retired, and also new types of competence are needed for new technologies. Thus vendors need to establish new sub-contractor networks from companies with proven skills.
- Clear understanding of the safety requirements is essential to avoid surprises during construction. Understanding of regulatory practices is essential for successful project implementation. For ensuring smooth progress of the project, all parties (vendor, owner (utility) and regulator) should be familiar with the licensing, regulatory oversight, and inspection practices in the vendor country and in the customer country.

- Preparedness of all parties must be ensured before starting the project implementation. In order to avoid delays and difficulties in the project implementation, it is necessary allocate enough time to the planning stage and in assessing the preparedness of each party before starting construction. Inadequate completion of design and engineering work prior to starting construction is detrimental to implementation of the project in a targeted schedule:
- For ensuring good management of the subcontractor chains, it is important that in each call for sub-contracts, the vendor clearly indicates and emphasizes the nuclear specific practices. If the nuclear specific practices are not recognized and understood by the sub-contractors at the time of signing the contract, difficulties can be expected at a later stage.
- If design work is conducted by different organisations and in different places (or even in different countries), good coordination and communication is vital for a successful outcome.
- Qualification of a new construction or manufacturing method may take time if it is not done before the project start. In one instance, new advanced safety features are not easily implemented and new welding solutions are a challenge during reactor pressure vessel manufacturing, and additional evaluation and some repair welding were needed.

Contact: K-S.Kang@iaea.org

Common Challenges on Site Selection for Nuclear Power Plants

A technical meeting on Common Challenges On Site Selection for Nuclear Power Plants was organized by and held at the IAEA in July 2010. The meeting was coordinated by the Departments of Nuclear Energy (NE) and Nuclear Safety (NS) with the participation of 46 individuals from 25 countries. The objective of the meeting was to emphasize the need to secure suitable NPP sites and discuss relevant IAEA publications and required activities necessary for a comprehensive selection process of nuclear power sites.

Participants of the meeting on common challenges

The meeting was also intended to further strengthen the networking among countries (newcomer, expanding and nuclear power States), and sharing international experience on the subject matter. The meeting consisted of plenary sessions as well as group sessions under which considerations, needs and challenges were discussed in-depth, lessons were shared and recommendations were made both to States and the IAEA. The meeting achieved its objectives, especially as a platform for facilitating exchange of information and experience about approaches for considering siting activities. Several recommendations were made which will lead to further improvement of the IAEA support to Member States. The importance of an integrated IAEA assistance on nuclear power siting was made clear, including expert missions and evaluation services, as well as evaluation software, planning tools, etc. This will require a holistic consideration of all issues including safety, security, engineering and cost, environmental, legal, social and economic.

Contacts: V.Nkong-Njock@iaea.org

Coordination with Member States

Member States that are planning for a first nuclear power plant often receive assistance from several sources. Some examples include IAEA technical cooperation, Government-to-Government bilateral agreements, international consultants and others. Member States have an interest in optimizing the benefits of such assistance and have requested the IAEA to foster information sharing among assistance providers and recipients.

The concept of 'soft coordination' has been developed to promote such interactions, whereby the IAEA can play a role in facilitating exchange of information and coordination while respecting the bilateral or commercial relationships among the parties. Country specific soft coordination arrangements were established between Jordan, France and the IAEA. Jordan requested the IAEA to bring together JAEC, JNRC, and AFNI (France) for the purpose of sharing information, coordinating support events, harmonizing efforts, and maximizing benefits. At the beginning stage, the soft coordination will include human resource development, stakeholder involvement, management/project management, electrical grid, regulatory infrastructure and financing. Later stages may expand to include additional partners of Jordan. A meeting was organized in June 2010 to discuss the modalities of country specific soft coordination which will be finalized in the 3rd quarter of 2010.

Contact: A.Starz@iaea.org

8th International Seminar on WWER Horizontal Steam Generators

More than 60 papers by specialists from 13 states and international organizations were presented at the 8th International Seminar held in Podolsk, Russian Federation. Topics such as life management and operational experience, water chemistry, structural integrity, design issues, repair and mitigation techniques used and applied on WWER horizontal steam generators were discussed during the seminar. Mr. Kupca presented a paper on Steam Generator Ageing Management and also served as a Co-Chairman for the opening Plenary Session. At the seminar, it was mentioned several times that all new WWER horizontal steam generators (SGs) might be operated for up to 60 years of long term operation (LTO). That means, with respect to the known degradation mechanisms that are being developed and present at known critical locations, e.g. inter- and transgranular stress corrosion cracking on tubing, that most emphasis should be put on the use of new materials and design dimensions that will ensure enough safety and engineering parameters that will allow operations of selected current and future WWER SGs for the extended lifetime (LTO). Many assets of the horizontal design of a steam generator have been clearly shown and include technical, engineering, and economic benefits. Such designs enable operation of this core component for a long time, without a need to replace it. Regarding reliability, safety and performance, it is predictable that this proven design shall be able to compete with other designs which are being used by all the key players worldwide.

Contact: L.Kupca@iaea.org

Preparation of a Feasibility Study on Nuclear Power in Jazour- Libya

At the request of the government of Libya, an expert mission was sent to Jazour, Libya to support the preparation of a feasibility study on the use of nuclear energy for electricity generation in Libya. The main objectives of the mission were to provide a platform for exchanging information, to give an overview of issues to be addressed in the feasibility study and to share experience on how to perform the feasibility study.

Nuclear power has been included as an option in the Libyan Government energy policy. Active preparations have been led and implemented by the Libyan Atomic Energy Establishment in the past two years. The report on energy planning and the nuclear law will be issued end of this year. The guideline on site survey for nuclear power project will be completed early next year.

Expert mission to Jazour-Libya

Contact: XP.LI@iaea.org

Developments of the Power Reactor Information System

A consultants meeting on Developments of the Power Reactor Information System (PRIS) was held in May 2010 at the IAEA to discuss areas for improvement in the PRIS-Statistics application which provides end users with practical tools for relevant data analysis. The objective of this meeting was to discuss recommendations for PRIS development and activities in 2010 and 2011 and to discuss in details PRIS-Statistics reports and PRIS website improvements and get feedback regarding reports implemented within the 2009 PRIS project. The participants formulated several statements and recommendations which will be presented at the PRIS technical meeting in October 2010.

Contact: J.Mandula@iaea.org

Advanced Surveillance, Diagnostics, and Prognostics Techniques Used for Health Monitoring of Systems, Structures, and Components in NPPs

The 3rd research coordination meeting on the above Coordinated Research Programme (CRP) was held in June 2010 in Richland, Washington, USA, and hosted by the Pacific Northwest National Laboratory (PNNL). This CRP integrates and further develops certain existing monitoring and diagnostics techniques for NPPs in an international multi-disciplinary environment. The results help to meet the needs for advanced surveillance, diagnostics, and prognostics to support existing plants, their life extensions and power uprates, and future plant designs. The meeting participants further developed the CRP report and evaluated the results of various benchmark analyses in the areas of: (1) Reactor signal noise analysis, (2) Acoustic and vibration monitoring, (3) Prognostics and structural material integrity and (4) Instrument and equipment condition monitoring.

Contact: O.Glockler@iaea.org

Review Service for Instrumentation and Control Systems in NPPs

The Independent Engineering Review of I&C Systems (IERICS) was established in 2009 with the aim of conducting peer reviews of I&C design documents, implementation processes, prototype I&C systems, and actual systems already deployed in operating NPPs. The IERICS mission is conducted by a team of international experts from various complementing technical areas. The review is based on appropriate IAEA publications, such as Safety Guides and Nuclear Energy Series Reports, and the mission's findings are summarized in a mission report, including a list of recommendations, suggestions, and identified good practices.

The review is not intended to be a regulatory inspection or an audit against international codes and standards. Rather, it is a peer review aimed at improving design and implementation procedures through an exchange of technical experiences and practices at the working level. The IERICS mission is applicable at any stages of the life cycle of I&C systems in NPPs.

The key objectives of the IERICS Mission are to:

- Assess the design approach, principles, and procedures of the System under Review.
- Identify existing or potential design, operational, and licensing related issues or concerns of the System under Review.
- Propose measures to address issues identified.
- Identify any outstanding good practice that could be a benefit to other NPPs.
- Facilitate exchange of experience.

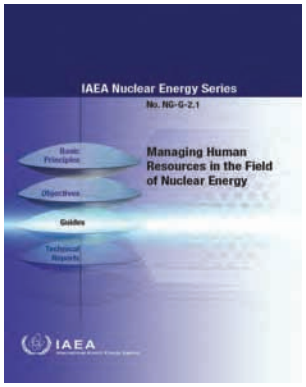
In order to fulfill these objectives, the IERICS Mission aims to:

- Provide the counterpart with an objective opinion, with respect to international standards and practices, of the design and design practices related to the System under Review;
- Provide the counterpart with recommendations and suggestions for improvement in areas where performance may appear to fall short of recognized international good practices.
- Provide key staff at the counterpart organization an opportunity to discuss their practices with experts who have experience with other practices in the same field.
- Provide the counterpart with recognition of their good practices identified during the course of the review.
- Provide experts of the counterpart organization, expert reviewers from Member States and the IAEA staff with opportunities to broaden their experience and knowledge of their field.

The first IERICS Mission was implemented at the Doosan Heavy Industries & Construction Company, in the Republic of Korea, reviewing the prototype of the advanced digital I&C systems designed for APR-1400 NPPs. The second IERICS Mission will be held in Ukraine to review design and implementation process of new digital I&C systems installed for the reactor protection, control, and monitoring functions in all Ukrainian NPPs.

Contact: O.Glockler@iaea.org

Human Resources – Key to Success



The role of adequate human resources for achieving the objectives in the field of peaceful use of nuclear energy cannot be overestimated. That is why one of the first guides published within the IAEA Nuclear Energy Series was Managing Human Resources in the Field of Nuclear Energy NG-G-2.1 (2009).

The IAEA Division of Nuclear Power provides comprehensive support to the IAEA Member States in all main areas of the development of a training system. Assistance is provided for establishing effective training programmes using a systematic approach to training (SAT) for all categories of personnel including operations, maintenance personnel, engineering and technical support personnel, management staff, instructor and contractors.

Two examples are Belarus and Ukraine. A successful project for Belarus on the development of human resources for the new nuclear power programme aimed at achieving the following outcomes:

- Develop ongoing capability of the Belarus managers to introduce a nuclear power programme in the country in safe and sustainable manner;
- National policy for managing human resources for the nuclear power programme established and introduced by the Belarus senior managers;
- Develop capabilities of the Belarus technical universities in providing education needed for introduction of a nuclear power programme;
- Belarus counterparts' capacity to establish a comprehensive training system for the first NPP significantly increased; and,
- Belarus counterparts have become 'intelligent customers', in particular, through using the IAEA safety standards, guidance on nuclear infrastructure, recommendations on integrated management of human resources, and associated best international practices.

Another example is the successfully completed project for Ukraine which is operating NPPs, implementing a long term operation programme and expanding its nuclear power programme by building new units. This project demonstrates a wide range of IAEA assistance:

- Improving the process of identifying training needs and evaluating training;
- Development of a national concept on personnel training;
- SAT-based training procedures and training material;
- Training of managers, instructors, and operations and maintenance staff;
- Improvement of on the job training;
- Development and supply of training tools (multimedia e-learning systems, mock-ups, physical models);
- Upgrade of maintenance training system at the Zaporozhzhie NPP (the largest NPP in Europe);
- Implementation of a pilot project on knowledge management at the Zaporozhzhie NPP;
- Involvement of Ukrainian managers and specialists in the networks on human resource development and training.

Contact: A.Kazennov@iaea.org

INPRO

The First 10 Years of INPRO: Sustainable Nuclear Energy for the 21st Century

The International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) was initiated during the 44th IAEA General Conference in 2000. In September 2010, the IAEA will mark the 10th anniversary of INPRO, and a decade of fostering the movement to create sustainable nuclear energy systems worldwide, in a festive event to be held during the 54th IAEA General Conference (20–24 September 2010). IAEA Director General Mr. Yukiya Amano and high level representatives from Member States will speak at this event to be held on 20 September 2010, at 14:00 in the Rotunda of the VIC. In addition, on the occasion of INPRO's 10th anniversary, a technical session will be held on 22 September 2010, 15:00 – 17:00, at the IAEA Library (F0147). A new IAEA video film highlights 10 years of INPRO from the perspective of INPRO members and includes a statement by the IAEA Director General – see the transcript below.

Statement by The IAEA Director General

Mr. Yukiya Amano

"The International Project on Innovative Nuclear Reactors and Fuel Cycles – INPRO – was established to help ensure that nuclear energy is available to contribute – in a sustainable manner – to meeting the energy needs of the 21st century.

Mr. Yukiya Amano, IAEA Director General

INPRO brings together technology holders and users so that they can consider what national or international action is necessary to achieve innovations in nuclear reactors and fuel cycles.

INPRO is now 10 years old. I congratulate the 31 Members of INPRO and the INPRO Group at the IAEA on this important anniversary.

In particular, I wish to acknowledge the contributions of the Member States which have joined INPRO in the past ten years and to thank donor countries for their financial, human resources and other contributions. They have shown faith in the idea that innovation and cooperation in nuclear technology will contribute to meeting the long term energy needs of the world.

In the course of its development, INPRO has received high level recognition from policy leaders including the G8, the technical community and IAEA Member States, expressed in several resolutions of the IAEA General Conference. To mention just a few examples of its work:

- INPRO has developed a methodology to thoroughly assess all aspects of innovative energy systems.
- It has completed collaborative studies that estimate the benefits of coordinating national nuclear power expansion programmes.
- Finally, the GAINS project, which stands for *Global Architecture of Innovative Nuclear Systems based on Thermal and Fast Reactors including Closed Fuel Cycles*, analyses how different countries' nuclear power expansion strategies might mutually reinforce each other. Fourteen countries, plus the European Commission, are participating.

INPRO also works well with other international initiatives such as the Generation IV International Forum.

INPRO has developed into a well-recognized and focused multilateral project. Its results and products are available to all IAEA Member States. Participating in collaborative projects and studies offers Member States an opportunity of 'learning by doing' as they investigate issues of sustainable nuclear energy deployment.

I am pleased with the progress being made by INPRO and I am confident that it will have a successful future."

Assisting Member States in Long Range Nuclear Energy Programme Planning and Strategy Development

The IAEA offers Member States tools and methods to support long term energy planning and assessing nuclear energy systems, in its efforts to ensure that nuclear energy is available to contribute, in a sustainable manner, in meeting the energy needs of the 21st century. These tools include computer models devoted to energy system analysis and planning, indicators for sustainable energy development, and the INPRO methodology for building long range nuclear energy system strategies, e.g. through Nuclear Energy System Assessment (NESA).

Panel Discussion during the Interregional Workshop on Long-Range Nuclear Energy Programme Planning and Strategy Development, IAEA, 14-17 June 2010.

In June 2010, over 60 representatives from 35 Member States came together at the IAEA to learn about the integrated use of these tools and methods for national energy and nuclear energy planning and development, listen to feedback from Member States which had applied the IAEA energy planning models and undertaken NESAs, share experiences and lessons learned and identify needs for support from the IAEA.

Opening the Interregional Workshop on Long Range Nuclear Energy Programme Planning and Strategy Development, Mr Y. Sokolov, IAEA Deputy Director General and Head of the Department of Nuclear Energy emphasized that countries should ensure that any use of nuclear energy is beneficial, responsible and sustainable. To achieve this they should take a holistic approach and consider their long term commitment when developing a national nuclear power programme.

Addressing the workshop participants on the last day of the meeting, Ms A.M. Cetto, IAEA Deputy Director General and Head of the Department of Technical Cooperation, gave some examples of TC activities in the sustainable development of nuclear energy around the world. She also stressed that energy is central to sustainable development und could be considered as the missing Millennium Development Goal.

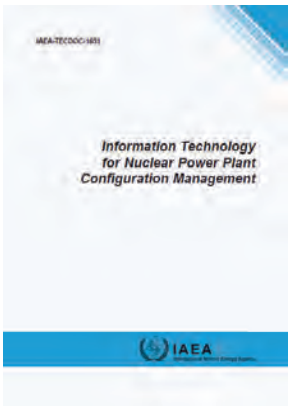
Representatives from developing countries, especially those who are not INPRO members, were able to familiarize themselves with the large range of aspects that have to be taken into account when establishing a nuclear energy system. The approach of coupling the assessments for an optimal energy mix and evaluating a planned nuclear energy system was considered very useful. All participants highlighted also the value of direct feedback from the representatives of Argentina, Armenia, Croatia, Jordan, Lithuania, Nigeria, and Vietnam as users of the tools covered by the Workshop.

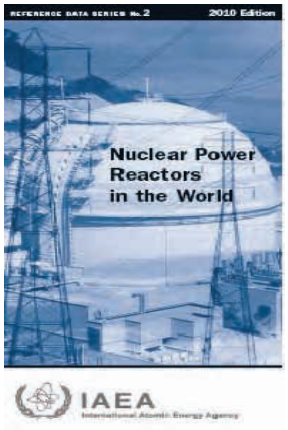
The Interregional Workshop on Long Range Nuclear Energy Programme Planning and Strategy Development, held at the IAEA in June 2010, was jointly organized by the INPRO Group and the Planning and Economic Studies Section (PESS) of the IAEA Department of Nuclear Energy, and supported by the IAEA Department of Technical Cooperation. It was one of the key elements of an IAEA interregional project to promote technology development and the application of future nuclear energy systems in developing countries (INT/4/142).

Contact: Frank Depisch: F.Depisch@iaea.org
Ahmed Irej Jalal: A.Jalal@iaea.org

New Publications

- Information Technology for Nuclear Power Plant Configuration Management





- Nuclear Power Reactors in the World-2010 Edition

- Operating Experience with Nuclear Power Stations in Member States in 2009

Technology Development of Nuclear Reactors

The IAEA Advanced Reactor Information System ARIS

Member States, both those considering their first nuclear power plant and those with an existing nuclear power programme, are interested in having access to the most up to date information about all available nuclear reactor designs as well as important development trends. To meet this need, the department has developed ARIS (the Advanced Reactors Information System), a web-accessible database that provides Members States with comprehensive and balanced information about all advanced reactor designs and concepts. ARIS includes reactors of all sizes and all reactor lines, from evolutionary water cooled reactor designs for near term deployment, to innovative reactor concepts still under development such gas cooled and fast reactor designs or small and medium sized reactors. ARIS allows users to sort and filter the information based on a variety of relevant criteria, thus making it easy to capture the general trends and to identify the differences between the diverse designs and concepts.

The data stored in ARIS is compiled by the department based on the information provided by the developers of each reactor design/concept, and harmonized to result in an unbiased and easy to use source of information. Although the depth of the reactor descriptions may vary depending on the level of development of the various concepts, ARIS includes reports on nuclear steam supply system, safety concept, plant performance, proliferation resistance, spent fuel and waste management, as well as a complete list of technical data. The information is updated whenever there is any significant change on a specific design. The ARIS is accessible from the IAEA public website at aris.iaea.org.

Email: ARIS@iaea.org

Water Cooled Reactors

Water cooled reactors (WCRs) have been singled out as the most likely technology to be deployed worldwide in the near and middle term. There is an agreement in the nuclear community that WCRs still have a very important role to play for the remainder of the century. In this context, the recent meetings of the Technical Working Groups on Advanced Technologies for Light Water Reactors and Heavy Water Reactors (the TWG-LWR and the TWG-HWR) encouraged the IAEA to foster and support the role of WCRs as a bridge technology towards newer nuclear technologies, such as fast breeder reactors, that are not yet commercially available. Furthermore, the need for WCRs to evolve and adapt to future needs, being able to provide a diverse mix of energy products (electricity, process heat, water, hydrogen, energy for transportation, etc) was strongly emphasized.

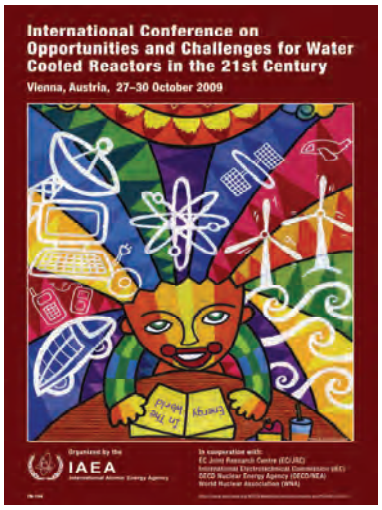
Following these suggestions, the IAEA organized several key events where the world experts exchanged information and collaborated to compile a more accurate picture of the current situation and prospects of WCRs worldwide.

The IAEA International Conference on Opportunities and Challenges for Water Cooled Reactors in the 21st Century took place at the IAEA Headquarters in Vienna, Austria in October 2009 sought to be all-inclusive, bringing together the policy, economic and technical decision makers and the stakeholders in the nuclear industry such as operators, suppliers, engineers, researchers, educators, managers, government officials and regulators to discuss the latest trends and forecasts for WCRs. More than 260 participants, representing 54 Member States and 4 international organizations registered and a total of 132 papers were presented.

In November 2009, 45 specialists who represented fuel vendors, nuclear utilities, research and development institutions and regulatory authorities from 20 Member States met in Villigen, Switzerland, to review the current status in the development of fuel pellet materials and to explore recent improvements in fuel rod designs for light and heavy water cooled power reactors at the Technical Meeting on Improved Pellets and Advanced Fuel Designs for WCRs.

Another extremely successful and energizing meeting, where world experts were given the opportunity to engage in very vibrant technical discussions and a sense of community was developed, was the Technical Meeting on Heat Transfer, Thermal Hydraulics and System Design for Supercritical Pressure Water Cooled Reactors , Pisa, Italy in July 2010.

The IAEA continues its efforts towards fostering Member States cooperation in science based technology development activities, including three ongoing collaborative research projects (CRP) and two International Collaborative Standard Problems (ICSP). The newest of these projects is the ICSP on Integral PWR Design Natural Circulation Flow Stability and Thermo-hydraulic Coupling of Primary System and Containment during Accidents that was kicked-off in March 2010, and will use the the experimental facilities at Oregon State University (OSU) to benchmark numerous computer codes used by 15 institutes from 7 countries.



The IAEA has recently completed a publication entitled Construction Technologies for New Nuclear Power Plants, which assimilates global experience from a variety of recent large construction projects and includes comprehensive descriptions of all construction methods including their advantages and disadvantages, and a discussion of best practices and lessons learned. To launch this study, the WCRs Group is organizing a series of workshops to make aware potential users about the information contained in the document. To facilitate participant travel, the workshops will be divided in three regions: the Americas, Europe & Africa, and Asia. The first of these workshops will take place in the USA, Charlotte, North Carolina in August 2010. The target audience are US utilities interested in new nuclear construction, as well as utilities and construction companies in other countries in the Americas (Argentina, Brazil, Canada, Chile, Colombia, Mexico, Uruguay, etc).

Contact: Sama Bilbao y León (S.Bilbao@iaea.org)
Jong Ho Choi (J.H.Choi@iaea.org)

Fast Reactors and Accelerator Driven Systems

IAEAs activities in the field of advanced fast neutron systems research and technology development are implemented within the framework of the Technical Working Group on Fast Reactors (TWG-FR). At the 43rd Annual Meeting of the TWG-FR (hosted by SCK·CEN, Mol, in May 2010 in Brussels, Belgium), the TWG-FR members discussed and agreed upon the detailed strategy and common activities for ongoing budget cycle, the timeframe of the Planning & Budget 2012–2013 and beyond.

Member States' interest was strong for back-to-back topical technical meetings on In-service Inspection and Repair of Liquid Metal Cooled Fast Reactors, and Advanced Sodium Heated Steam Generators and Sodium/Gas Heat Exchangers for Fast Reactors to be held in 2011. Member States' TWG-FR representatives also supported two new CRP proposals, viz. The Source Term for Radioactivity Release under Fast Reactor Core Disruptive Accident (CDA) Situations and Optimum Plant Parameters for Metallic Fuel and MOX Fuelled Fast Reactors.

CEFR, View of the Reactor Hall (courtesy of CIAE, 2010)

As for P&B 2012–2013 activities, TWG-FR Member States' representatives have put forward a series of proposals for topical technical meetings (e.g. Core Catcher: Design Criteria and Concepts; Advances in Sodium Instrumentation: Neutronics, Flow, Temperature Measurements; and Advances in Sodium Fire Studies), as well as for CRPs (e.g. on the highly instrumented Safety Tests Conducted in EBR-II to demonstrate fast reactor safety in the event of pump trips without reactor SCRAM, and on Primary Pump Seizure Under Seismic Excitations). The TWG-FR members also recommended publishing two monographs, *viz.* on Severe Accident Management in Fast Breeder Reactors and on Sodium Aerosol: Sources, Effects and Analysis. Last but not least, addressing young generation's concerns was considered to be an important issue, and the TWG-FR members are recommending to convene a Young Generation Event on the topic Challenges and Opportunities in Fast Reactor Science and Technology in conjunction with the 2011 TWG-FR meeting.

Within the framework of the IAEA Technical Cooperation project Enhancing the Capabilities of National Institutions Supporting Nuclear Power Development, a Workshop on Codes and Standards for Sodium Cooled *Fast Reactors* was held at China's Centre of Regulation and Standards for Nuclear Power (ISNI) in Beijing in July 2010. Experts from India, Japan, Russian Federation and the IAEA provided comprehensive assessments of codes and standards developments for sodium

cooled fast reactors addressing safety criteria, materials, design, and construction topics. The timeliness and relevance of this Workshop is underlined by an important milestone met by the Chinese fast reactor development program: on 21 July 2010 at 9:50 AM the first criticality of the China Experimental Fast Reactor (CEFR) was achieved.

CEFR is a 65 MW(th)/20 MW(e), bottom supported, pool type, sodium cooled experimental fast reactor, located about 40 km from downtown Beijing, adjacent to the China Institute of Atomic Energy (CIAE). The first core is fuelled with enriched uranium dioxide, but at equilibrium CEFR will be fuelled with mixed uranium-plutonium dioxide. CEFR has two main pumps and two loops for the primary and secondary circuit, respectively. The water-steam tertiary circuit is also a two-loop circuit, with the superheated steam incorporated into one single pipe connected to the turbine. CEFR's mission is twofold: to provide the fast neutron test bed for fast reactor fuel and structural materials development, and to accumulate operating experience in support of China's fast reactor development program.

For more information see www.iaea.org/inisnkm/nkm/aws/fnss/index.html Contact a.stanculescu@iaea.org

Collaboration with GIF on Operational and Safety Aspects of Sodium Cooled Fast Reactors

Experts from Generation IV International Forum (GIF) member countries with fast reactor development programs, i.e. France, Japan, Republic of Korea, the Russian Federation, and the USA, and from China, India, the European Commission's Joint Research Centre and the OECD/Nuclear Energy Agency met in June 2010 at the IAEA to exchange information on safety related fast reactor operational experience, various national safety approaches for the next generation of sodium cooled fast reactors (SFRs), and ongoing and planned R&D in this field.

The specialists participating in this workshop presented the national analytical, scientific and operational based rationales introduced in, and safety criteria applied to the designs of SFRs, as well as respective approaches for improvements. The presentations were based on analyses, experiments, the licensing experience, and on safety-related operational and construction experiences.

Topics discussed during the meeting included: passive, inherent, active or hybrid safety approaches; economics of SFR and its competitiveness; safety issues linked to sodium; methodology and modeling; approaches to severe accidents (prevention versus mitigation) and deterministic versus probabilistic approaches.

IAEA-GIF Meeting (from left): P. Lyons (DOE, USA); Y. Sagayama (GIF Chairman, JAEA, Japan); J. Bouchard (CEA, France, Workshop Chairperson); R. Beatty and A. Stanculescu (Scientific Secretaries, IAEA)

The main outcome of the workshop is an improved understanding of safety issues of SFR, based on the comprehensive information contained in over 30 presentations from seven countries. This, in turn, will support the 'fine tuning' of national research and technology development programmes, and improve the prospects of SFR deployment that would be acceptable to both utilities and regulatory bodies.

The IAEA will capture the presentations and discussion at the workshop in a document as working material. Moreover, it was suggested to produce — with the help of an ad-hoc expert group — an IAEA publication summarizing areas of convergence and divergence with regard to SFR safety issues, namely safety approaches such as goals and priorities based on insights, analyses, experimentation and licensing experience, design philosophy and technologies to meet those goals, and safety approaches as far as licensing efforts are concerned. The participants recommended organizing, under the IAEA umbrella, two follow-up workshops, on SFR decay heat removal issues and on sodium technology.

Contact: R. Beatty, INPRO; R.Beatty@iaea.org;

A. Stanculescu, NPTDS; A.Stanculescu@iaea.org

Gas Cooled Reactors

Final Research Coordination Meeting for the CRP on Advances in HTGR Fuel

The sixth (final) research coordination meeting of the CRP on Advances in HTGR Fuel Technology was held in May 2010. The CRP officially completed in December 2009 with the main objectives being to discuss the round-robin exercise on particle characterization and the accident benchmark, and to review the IAEA–TECDOC and to incorporate new results into the IAEA–TECDOC which will be completed in October 2010.

As part of the CRP, participating members received samples of TRISO coated particles to perform quality control (QC) measurements for a benchmarking exercise. The samples in this study were all produced on zirconia spheres as a surrogate material for the uranium bearing fuel kernel. Four of the participating organizations supplied these surrogate fuel samples. The sample suppliers were (1) the B&W in the USA, (2) the KAERI in Republic of Korea, (3) PBMR Ltd in South Africa, and (4) the ORNL in the USA. Characterization of these particles was carried out by all participants for each set of samples and the results were compared. Good agreement was observed between the results. The CRP also consisted of two excises, investigation of fuel performance during normal operation and during accident conditions.

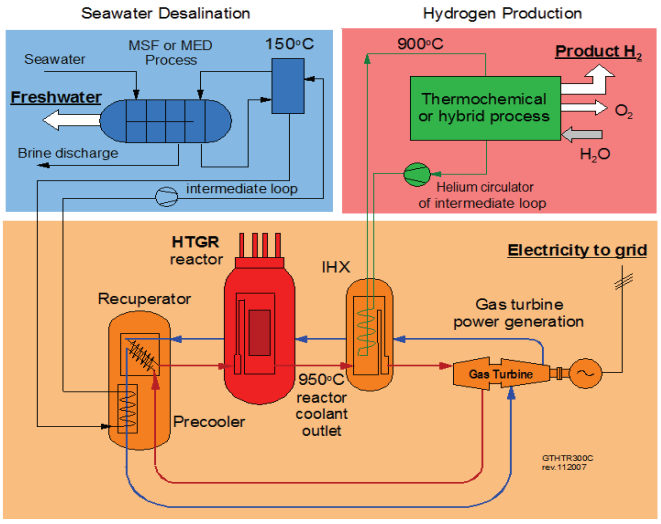
Consultants Meeting on Uncertainty Analysis in HTGR Neutronics, Thermal-hydraulics and Depletion Modeling

This consultants meeting took place June 2010 and was a response to the recommendations from the meeting of the Technical Working Group on Gas Cooled Reactors (TWG-GCR), February 2009. The meeting recommended that two designs should be considered for analysis in this CRP, namely, pebble-bed and prismatic designs. It was also recommended that the MHTGR 350MW(th) design represents the prismatic type and the HTR-Module-type design will represent the pebble-bed. Benchmark problems consisting of cell physics problems, lattice physics problems, core physics as well as coupled neutronics-thermal-hydraulics problems will be developed for both reactor types. Working groups for both designs were formed to start drafting the benchmark specifications for further discussions amongst the interested participants. To date, eight Member States have indicated their interest in participating in the CRP. The next meeting will be held in Prague, Czech Republic October 2010, in conjunction with the HTR2010 Conference.

Contact : B.M.Tyobeka@iaea.org

Non-Electric Applications of Nuclear Power

Nuclear process heat technology developments have thus far been led by the nuclear energy industry with limited involvement of the process heat industry, and very recently the misalignments becoming evident. Indeed, technological advancements in the field of high temperature gas cooled reactors have successfully enabled positioning such reactors in related-industries to process heat applications. This understanding is advantageous for long term energy infrastructure planning and for readiness of the industry for nuclear process heat. The experience with nuclear power for the heat and steam market in the low temperature range could well be extended, in near future, to areas of other process heat applications such as desalination, district heating, and tertiary oil recovery. However, a broader deployment of nuclear heat sources is needed in the higher-temperature heat/steam range. Currently, a significant potential for nuclear energy is given in the petro/chemical industries including hydrogen production and liquid fuels for the transportation sector.



Cogeneration using High Temperature Gas Cooled Reactor

The IAEA has reflected the new trend of rising expectation of nuclear power in its programme by putting emphasis on assistance to countries planning to introduce nuclear power or intend to expand their capacities. The IAEA and the nuclear community would have three priorities to ensure that:

- Nuclear energy is used safely, securely, and with minimal proliferation risk especially when used for process heat applications; namely to produce electricity, district heating, desalination or hydrogen production;
- Continued technological innovation are pursued for improved economic viability;
- Needs of developing countries are taken into account.

To achieve this, various technical publications are under preparation such as Status of Hydrogen Production using Nuclear Power, Advanced Process Heat Applications of Nuclear Power, Management for Efficient Water Use/Consumption in NPPs, and Environmental Impact Assessment of Nuclear Power . Other issues such as the analysis of cogeneration options (for electricity generation and water desalination or hydrogen production) as an integral part of feasibility studies for NPPs is being planned.

Contact: I.Khamis@iaea.org

My Hometown

In this edition of My Hometown, NENP introduces:

A Taste of Paris, *By **Albane Godard***

My adoptive hometown, Paris, is difficult to describe without using too many clichés. As one of the most popular tourist destinations in the world, it has a lot of nicknames: from city of lights to city of love through city of cooking or city of strikes!

Above all, Paris is full of secrets and hidden places coming from its long and tormented history which will still surprise me even after several years spent in the city. As an example, let me bring you to a one-day tour in this uncommon Paris.

You can start, with a croissant in your hand, by following the traces of Amelie Poulain, this famous character of the French movie "Amelie" from Pigalle to the Basilique du Sacré Coeur through the uphill streets of Montmartre. The view from the Sacré Coeur is always breathtaking (especially after the stairs you just climbed) but nothing compared to the specific atmosphere of the neighbourhood behind. There, you have to wander until you find the Montmartre vineyards or some old cabarets like Le Lapin Agile. They are probably the best definition of what we call La Bohème.

Then you can get back in the centre by taking the metro from Abbesses, one of the only two remaining original metro entrances in Paris, to Palais Royal. The unique entrance of this station has been designed by the sculptor Jean-Michel Othoniel with coloured glass beads.

With a walk in the Palais Royal garden you may discover the surprising Shiseido's house of perfume that will amaze your eyes as well as your nose. Then take a walk with your beloved one on the Pont des Arts to hang a "love padlock" on the bridge. Don't forget to throw the key into the Seine, that will bring you luck! It's then time to follow the Seine and the Bouquiniste stalls, where you can find an old poster or a crazy postcard, all the way to Notre Dame. Don't queue for the church but for the towers, stage of Quasimodo's story and of a beautiful view of Paris roofs.

Finally, if you are careful in the street Saint André des Arts, you will find a charming passage dating back to the 1600s where the oldest restaurant in Paris still stands, Le Procope, along with small shops and one of my favourite tearooms: La Jacobine. Its amazing Aztec hot chocolate and homemade cakes will make you love Paris forever… Bon appétit!

__Albane Godard__ is a nuclear engineering analyst in the Integrated Nuclear Infrastructure Group

Serpong, Indonesia, *By **Jupiter Pane***

Serpong, South Tangerang City is my hometown. I have lived there since I was young, when not many people lived in this rural area. The environment was really so green. However, since this city has been chosen as a centre of research and technology in Indonesia, the growth of the city has been rapid. Many activities, offices, settlements and parks have been developed, making Serpong a new scientific, and still green, city. One of the most popular business settlement areas is called Bumi Serpong Damai (Earth of Peace Serpong).

A centre of research and technology development in Indonesia, called PUSPIPTEK, has most of the research and technology development in various fields concentrated here, including the nuclear research centre area. This large nuclear research area was established originally for preparing human resources and technology for developing the first nuclear power plant in Indonesia. Every day I drive to my office in PUSPIPTEK, passing by the city park, Taman Kota. It takes only 15 minutes to get to my office. During the weekend I also enjoy fishing in the fishing area in the park.

The city is not too far from Jakarta, the capital of the Republic of Indonesia, and they are connected through an outside ring highway of Jakarta.

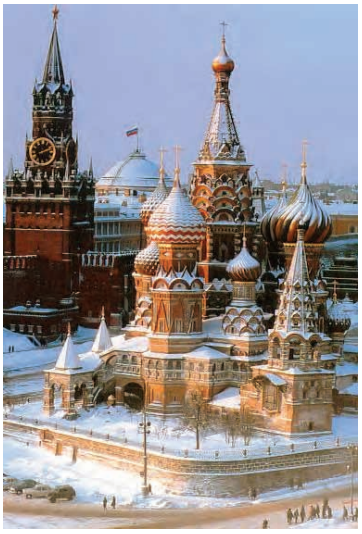
As the capital city of a country with 230 million people, inhabiting five large islands: Sumatra, Jawa, Kalimantan, Sulawesi, Irian, and another 17,000 separate medium and small islands, Jakarta has become the most important and interesting metropolitan city in Indonesia. The Taman Mini Indonesia Indah Park (which translates to A Beautiful Indonesia in Miniature) represents all the cultures of Indonesia and is in east Jakarta. The distance between Jakarta and Serpong is about 30 km, but it is easy to get to most of the important and scenic areas of Jakarta. It is really enjoyable to live in the scientific and green area of Serpong, and have easy access to the Capital City of Indonesia.

__Jupiter Pane__ is a cost-free expert in the Nuclear Power Technology Development Section.

Moscow, The Russian Federation

By __Yuri Busurin__

Moscow, the capital of the Russian Federation is my home town. Here are some fact about Moscow, from the past and of today. The city is named after the river Moskva. The origin of the name is unknown, although several theories exist. One theory suggests that the source of the name comes from an ancient Finnic language and means ‘dark’ and ‘turbid’. The first Russian reference to Moscow dates back to 1147. Moscow is the seventh largest city in the world. As of 1 January 2010, the population of Moscow is 10 562 099. 49 bridges span the Moskva River and its canals today within the city's limits. A landmark is the Cathedral of Basil the Blessed, a Russian Orthodox cathedral erected on the Red Square in Moscow in 1555–1561. The cathedral was built on the order of Tsar Ivan IV of Russia to commemorate the capture of Kazan and Astrakhan.



Cathedral of Basil the Blessed, Red Square, Moscow

Kuskovo was the summer country house and estate of the Sheremetev family. Built in the mid-18th century, it was originally situated several miles to the east of Moscow but now is part of the East District of the city. It was one of the first great summer country estates of the Russian nobility, and one of the few buildings near Moscow that is still preserved. Today the estate is the home of the Russian State Museum of Ceramics, and the park is a favorite place of recreation for Muscovites.

There are 3 000 451 private cars in Moscow today. The total length of arterial roads, streets, and passages amounts to 4139.4 km. The Moscow Underground, known as ‘Metro’, transports 2 392 200 000 passengers each year with 13 metro lines and 180 passenger stations.

Today Moscow has become a major business and financial city in Russia, Europe and in the world. The International Business Centre, also referred to as Moscow-City, is the commercial district of central Moscow.

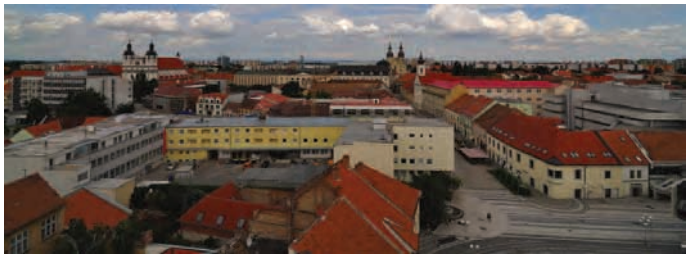
Moscow has 9 railway terminals, and 8 800 km of railway lines run through the city, the ‘Moscow Railway’. 594 600 000 passengers use the railway system per year; including 539 300 000 suburbanites. 70 000 000 tons of cargo are transported per year. Three airports, Domodedovo, Sheremetyevo and Vnukovo, handle 41 100 000 passengers and 321 000 tons of freight per year.

The annual energy consumption in Moscow amounts to 80 712 300 Gcal of heat energy and 47 383 000 000 kWh of electrical energy. The total volume of used fresh water is 1547.7 million m^3, including 1403.7 million m^3 of drinking water. Snow cover typically begins at the end of November and melts by mid-March.

__Yuri Busurin__ is a cost-free expert from the Russian Federation in the INPRO Group.

A Nuclear Family

Today everyone raves about knowledge transfer and management. Here's the story about walking in my father's shoes and working in the nuclear business. The story began in 1963, when my father decided to move to Bratislava to study solid state physics and electrical engineering. At that time, more than 30 nuclear power reactors were already in operation worldwide, though the real boom was temporarily still at designers' offices and in tomorrow's agenda. He met a girl named Maria and a year later he began to work in Bohunice, where at that time the first power reactor was almost complete. The family knowledge transfer was just beginning.



Trnava, hometown of the whole family

Since 1972, when the A1 plant started to produce its first megawatts, I was raised in small town called Trnava, 15 km from the Bohunice NPP, and 50 km from Bratislava. Although it started as a small town, many people arrived and stayed because of new employment opportunities, which has more than doubled the number of residents. A decision to study the same branch at the same university and faculty was partly due to future possibilities to work in this business, which was providing resources for many local folks, as well as any question frequently asked was answered, giving me the knowledge which mostly resulted in passing exams easier. Yet, I was surprised when my younger sister Kristina stepped into the same shoes and appeared at the university campus two years after I got there. Later, she met my classmate Marian and now they are raising the third generation of potential nuclear family members.

Kristina and Marian

Kristina is an enthusiastic young woman, who as a child presented her first poster on nuclear power generation at primary school. Her desire for nuclear knowledge led her into the local organizational teams of the Board of the European Students of Technology and later, into the Slovak Nuclear Society – Young Generation section who organized the first International Youth Nuclear Congress in Bratislava in 2000. Now, proud of her nuclear family roots, she works as a project manager dealing with the decommissioning issues in Bohunice. Her current priorities are her sons Viliam and Michal to whom she daily transfers nuclear knowledge. She found the word "steam generator" to be almost perfect for learning the letter "r", which in Slovak is quite difficult to pronounce correctly (children always say "l" instead "r", it's easier). Her spouse Marian has been working at the regulatory authority for more than 13 years as an expert in thermal hydraulic analyses (he was an IAEA staff member, as a consultant, from Sept 2009 to August 2010).

Ludovit Kupca Senior: the core of the family

My father has been working in the research institute as the head of the structural analysis department since 1971. Activities include managing programmes dealing with the ageing degradation of plant safety related components.

He is a member of an international group of experts for radiation damage of materials. As a visiting professor at university in Trnava, he gives lectures on material science, metallurgy, metallography, microscopy, testing of materials, irradiation embrittlement and real experience with ageing degradation at the nuclear power plant. I think that now he can be really proud what he had accomplished in his family business.

Maria Kupcova: The reactor of the family

She is our beloved mother and a fine example of a completely independent woman. A civil engineer graduate of the University of Bratislava. She started her private business in 1991, currently working in the area of monitoring the stability of some plant structures and spent fuel pool. Thanks to her continuing support, my sister's family and I still live comfortably in our own apartments which were designed by her.

Without her contributions it would be much more difficult to achieve the current family 'trademark'. She has been supportive of all of us and she is a source of inspiration regarding working hard for the business needs, and for her family as well. She is the living proof that for (and behind) almost any important decision or result, you will find a woman who is the real hard-working organizer, providing all of the vital family backup.

***Ludovit Kupca** is a nuclear engineer in the Nuclear Power Engineering Section*

Vacancy Notice for Professional Posts in the NENP Division

New vacancy notices are available on the IAEA webpage addressing

https://personnel.iaea.org/apps/phflink/p_vacancies.asp.

Section Head (P5): Nuclear Power Technology Development Section

Vacancy No. 2010/087 Post 13264 Application deadline: 20 September 2010

The Section Head leads the activities related to nuclear power technology development, reports to the Division Director, and is supported by approximately 15 staff members. The operating environment is dynamic, participative and interactive with inputs received from the Board of Governors, the General Conference, policy- and decision-makers, and technical counterparts in Member States and the international development community.

http://recruitment.iaea.org/vacancies/p/2010/2010_087.html

Team Leader (P5) : Water Reactor Technology Development

Vacancy No. 2010/089 Post 13145 Application deadline: 20 September 2010

The Team Leader manages the activities in a specific nuclear power field, reports to a Section Head and is supported by an average of 3-5 staff members. As a member of the Section led by the Section Head, the Team Leader manages, coordinates and supervises the IAEA's projects in water reactor (light and heavy water) technology under the guidance from the Section Head and the leadership of the Director.

http://recruitment.iaea.org/vacancies/p/2010/2010_089.html

Team Leader (P5): Fast Reactor Technology Development

Vacancy No. 2010/090 Post 13282 Application deadline: 30 September 2010

The Team Leader manages the activities in a specific nuclear power field, reports to a Section Head. As a member of the Section led by the Section Head, the Team Leader manages, coordinates and supervises the IAEA's projects in fast reactor technology under the guidance from the Section Head and the leadership of the Director.

http://recruitment.iaea.org/vacancies/p/2010/2010_090.html

Nuclear Engineer (INPRO) (P-4)

Application deadline: 06 September 2010

The Nuclear Engineer works as member of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) Group, within the Department of Nuclear Energy, and reports to the INPRO Group Leader and the INPRO Programme Liaison Officer.

http://recruitment.iaea.org/vacancies/p/2010/2010_085.html

Impressum

Nuclear Power Newsletter
Vol. 7, No. 3, September 2010

The Nuclear Power Newsletter is prepared by the Division of Nuclear Power, Department of Nuclear Energy

Vienna International Centre, PO Box 100, 1400 Vienna, Austria
Printed by the IAEA in Austria, September 2010

10-35671