IAEA International Atomic Energy Agency

Nuclear Power Newsletter

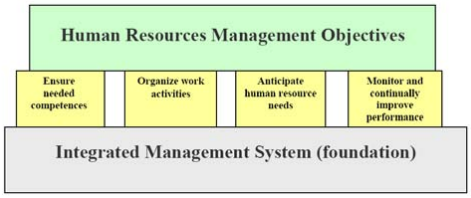
A Newsletter of the Division of Nuclear Power
Vol. 5, No. 2, June 2008

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

Contents

Division of Nuclear Power
Department of Nuclear Energy
IAEA
P.O. Box 100
Wagramer Strasse 5,
A-1400 Vienna, Austria
Tel : +43 1 2600 22751
Fax: +43 1 2600 29598

Human Resources – a Key for Success



A reliable supply of competent workforce is one of the biggest challenges for the entire nuclear power industry, whether you are a new entry into the world of Nuclear Power or a mature operating organization. An integrated and comprehensive approach is needed to react to this challenge.

Read more on page 2.

Meeting on Master Curve Approach to Monitor Fracture Toughness of Reactor Pressure Vessels in NPPs

The coordinated research project (CRP) is a continuation of previous successful CRPs on resolving technical issues associated with application of the master curve (MC) approach to reactor pressure vessel (RPV) integrity assessment. The 3rd RCM was held at IAEA Headquaters from 7- 11 April 2008.

Read more on page 4.

INPRO Collaborative Projects make further progress

Further progress can be reported on three INPRO Collaborative Projects. Basic agreement was reached on the central project GAINS (on future global architectures of nuclear systems); a new project – COOL – was initiated (on heat removal from liquid metal and molten salt coolants at high temperatures) and the on-going project PRADA (on proliferation resistance) made further progress, in cooperation with GIF.

Read more on page 10.

Natural Circulation: training courses and R&D coordination

Natural circulation systems are key to many evolutionary and innovative water cooled reactor designs. The IAEA is actively supporting Member States in addressing this issue through a Coordinated Research Project, through a new publication, and through training courses.

Read more on page 13.

Human Resources – a Key for Success

A reliable supply of competent workforce is one of the biggest challenges for the entire nuclear power industry, whether you are a new entry into the world of Nuclear Power or a mature operating organization. An integrated and comprehensive approach is needed to react to this challenge (Fig. 1).

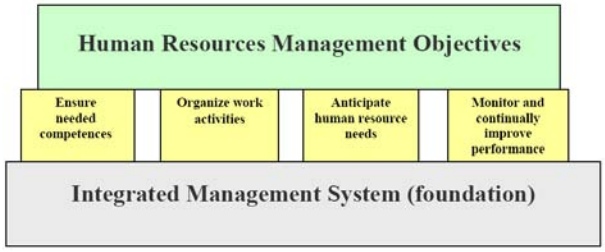


Figure 1 Human resource management objective

The nuclear field, comprising industry, government authorities, various regulators, research and development organizations, and educational institutions, relies heavily on a specialized highly trained and motivated workforce for its sustainability. Entering the nuclear power world provides a major challenge for the Industry and Regulators due to the need to develop human resources and to ensure competent workforce for a safe and effective performance of the new commissioning and operating organization. Even for mature organizations, an ageing workforce, declining student enrolment and the risk of losing accumulated nuclear knowledge and experience are already serious challenges that influence the management of human resources in the nuclear field. Management of human resources requires particular attention in the field of nuclear energy, both because of the high standards of performance expected in this field, and the considerable time needed to develop such specialists.

The IAEA, and its Nuclear Power Division, in particular, pay due attention to the support to Member States in acquiring and effective use of human resources for the entire cycle of nuclear facilities, including those countries embarking on a new programme. Two new Nuclear Energy Series reports –NG-T-2.2 'Commissioning of Nuclear Power Plants: Training and Human Resource Considerations' and NG-T-2.3 'Decommissioning of Nuclear Facilities: Training and Human Resource Considerations' – were published recently; and a new report 'Workforce Planning for New Nuclear Power Programmes' is being prepared.

Several information resources maintained by the IAEA serve for preservation and transfer of knowledge, including ENTRAC http://entrac.iaea.org that is actively used by the industry managers and specialists as well as by young generations and will be expanded with information for new Member States requiring information for Human Resource Management.

In the Division of Nuclear Power, a Technical Working Group on Training and Qualification has been reorganized to focusing on the Management of Human Resources, to expand its scope to areas including educational aspects and human resources management as a whole.

Figure 2. A meeting of the IAEA Technical Working Group on Human Resources, 19-21 May 2008, IAEA headquarters

Contact: A.Kazennov@iaea.org, or T.Mazour@iaea.org.
Visit: http://entrac.iaea.org.

Message from the Director

Welcome to the June 2008 Newsletter of the Division of Nuclear Power.

Responding to the Member States' needs, especially those from countries considering embarking on nuclear power or to expand from a small number of units continue to be the Division's top priority in this year. Currently we have 10 national and 2 regional Technical Cooperation (TC) Projects to support these Member States, and this number will triple in the next TC Programme cycle starting from 2009.

The Nuclear Energy Series Guide 'Milestones in the Development of a National Infrastructure for Nuclear Power' (NG-G-3.1) was published in 2007 September, and in less than a year it became a very popular and well read document with a very large number of copies distributed, and its contents have been referred to in many presentations at national and international meetings. Subsequent to this, NENP has several guidance documents in the pipeline or planned to support

countries considering embarking on nuclear power. Among them is 'Workforce Planning for New Nuclear Power Programmes' to be published next year.

In today's environment, we recognize strong needs for us to address issues of (a) aging workforce and smooth transition to the new generations; (b) human resources development for safe, reliable and effective operation & maintenance of nuclear power in countries considering embarking on nuclear power or expanding from a small number of units; and (c) reducing human errors which can cause incidents. Development of human resources in countries embarking on nuclear power or considering ambitious expansion would benefit from international cooperation and by using information in ENTRAC and other networks such as ANENT (Asian Network for Education in Nuclear Technology: http://anent-iaea.org), which provide exchange of information and materials for education and training, exchange of students and teachers, and distance training. Also, in the IAEA an inter-departmental group called Training & Education Support Group was established to provide coordinated support to Member States and to share information in the house.

The editing group of this Newsletter is committed to continuous improvement by receiving feedback and by leaning from good practices. From this letter, we introduced a front page giving an outline of key articles. We are continuously trying to improve the articles to focus on new developments and substance, and we also try to reduce the number of pages. Your kind feedback benefits us for further improvement.

Contact: A.Omoto@iaea.org.

News from Nuclear Power Engineering

NPP Instrumentation and Control Technologies

A Technical Meeting on Lessons Learned in Large Modernization Projects in Nuclear Power Plant Instrumentation and Control (I&C) Systems was held in IAEA Headquarters on 6-9 May 2008. The need to upgrade and modernize I&C systems became more apparent as the lifetime of NPPs is extended through license renewal processes and the existing I&C systems cannot continue to support the plant throughout its extended lifetime. A nuclear power plant that operates for 60 years could outlive its original I&C system by a factor of three, shifting first from analog to digital I&C systems, and then subsequently to even more advanced digital I&C systems. The meeting discussed many of the related issues, such as, (1) drivers, constrains, and benefits of I&C modernization; (2) project design and implementation; (3) testing, commissioning, and licensing new systems. The meeting was attended by forty-two experts from utilities, regulators, and vendors from 26 countries delivering 25 presentations. The meeting also included panel discussions and breakout sessions where the main issues of I&C modernizations projects were identified and discussed. The CD proceedings of the meeting will be available on the I&C website http://www.iaea.org/NuclearPower/IandC/.

The first Research Coordination Meeting (RCM) of the new Coordinated Research Programme (CRP) on Advanced Surveillance, Diagnostics, and Prognostics (SDP) Techniques Used for Health Monitoring of Systems, Structures, and Components in Nuclear Power Plants (NPPs) was held in IAEA Headquarters on 27-30 May 2008. Twenty-two experts from ten countries attended the meeting. The scope of the 3-year research project and its work schedule has been established.

Participants of the Technical Meeting on Lessons Learned in Large Modernization Projects in Nuclear Power Plant Instrumentation and Control Systems

The scope of the CRP includes methods and systems used in the field of reactor noise analysis, on-line monitoring, and diagnostics. Research activities focus on the development and applications of the following areas:

- Detecting and characterizing reactor core instabilities and estimating reactivity feedback coefficients
- Measurement of vibration of core internals: detector tubes, fuel assemblies, and core barrel motion via neutron flux fluctuations
- Vibration monitoring of main coolant pumps, reactor pressure vessels, steam generators, coolant pipes, sensing lines, turbine components, and transformers
- Coolant and moderator flow diagnostics, flow oscillations, and detecting blockage
- Estimating in-core coolant velocity based on temperature and flux noise measurements
- Demonstrations of use of wireless sensors for vibration monitoring of equipment
- Loose parts monitoring in primary and secondary side loops

- Acoustic leakage monitoring, estimating rate of leak, and acoustic monitoring of motor and air operated valves
- Monitoring the structural integrity of reactor systems
- On-line condition monitoring; In-situ response time estimation of flow/pressure transmitters, thermo-couples and RTDs
- Anomaly localization and unfolding, anomaly detection of instrument channels, detectors, and associated electronics
- Data acquisition systems; digital signal processing; advanced modeling techniques.

The IAEA is organizing a workshop on 'Neutron Fluctuations, Reactor Noise, and Their Applications in Nuclear Reactors' from 22 to 26 September 2008, at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. The purpose of the workshop is to provide the participants with the knowledge of fundamental theories, equations, relationships, and applications of stochastic processes taking place in nuclear reactors. The workshop will be conducted by international experts involved in the education, research, and application aspects of the subject.

The 1st workshop on 'Applications of Field-Programmable Gate Arrays in Nuclear Power Plants' will be hosted by Electricitée de France in Chatou, France, on 8-10 October 2008. The workshop will introduce the FPGA technology and its applications in various industries. Emphasis will be given to the following topics: applications in safety systems of NPPs, licensing, available products, and lessons learned in I&C modernization projects using FPGA technology.

For further details, please visit the website: http://www.iaea.org/NuclearPower/IandC/.

Contact: O.Glockler@iaea.org.

Integrated NPP Life Cycle Management

The 3rd Research Coordinated Meeting (RCM) on Master Curve Approach to Monitor Fracture Toughness of Reactor Pressure Vessels in Nuclear Power Plants

The coordinated research project (CRP) is a continuation of previous successful CRPs on resolving technical issues associated with application of the master murve (MC) approach to reactor pressure vessel (RPV) integrity assessment. The 3rd RCM was held at IAEA Headquarters from 7-11 April 2008. Overall objectives of CRP include:

- Better quantification of fracture toughness issues relative to testing surveillance specimens for application to RPV integrity assessment, and
- Development of approaches for addressing MC technical issues in integrity evaluation of operating RPVs.

Since the first a kick-off meeting held on 20-22 October 2004 to discuss organization of a new CRP all planned meetings and activities were done successfully with great supports of EC-JRC providing test material and NRI (Czech) machining and distributing test material to 12 organizations for round robin experimental test. Three time research coordinated meetings have done in KFKI, Hungary (first RCM), FZD Germany (second RCM) and Vienna (third RCM). The purpose of the 3rd Research Coordinated Meeting (RCM) is to finalize the research results of CRP since the first RCM held in 2005 and prepare the final technical report as results of the CRP. A total of 22 specialists from 12 MS and an International Organization participated in the 3rd RCM.

Finite Element Round Robin calculation on test specimen size, geometry, and constraint

Finite element modelling is an important tool to support experimental studies aiming at understanding and clarifying bias/constraint/geometry issues. Ten research organizations contributed to a finite element round robin in the framework of the consolidation of analytical tools needed to support loss of constraint issues in the application of the master curve. In total four different codes (listed in below table) were used.

Code	Number of users part 1	Number of users part 2	Version
ABAQUS	6	5	6.3 to 6.7
ANSYS	2	2	8.1 and 9.0
MSC.MARC	2	2	2005 R2
SYSTUS	1	1	2006

Impact Fracture Toughness Round-Robin experimental Exercise using Precracked Charpy Size Specimens

There were only limited differences between laboratories with some differences due to software specific issues, participants no following the specifications, and a user effect seen when the same finite element code produces different results. For round robin, it is found that the ANSYS code produces systematically higher forces. Remaining differences for the other finite element codes are very small and less than 3%.

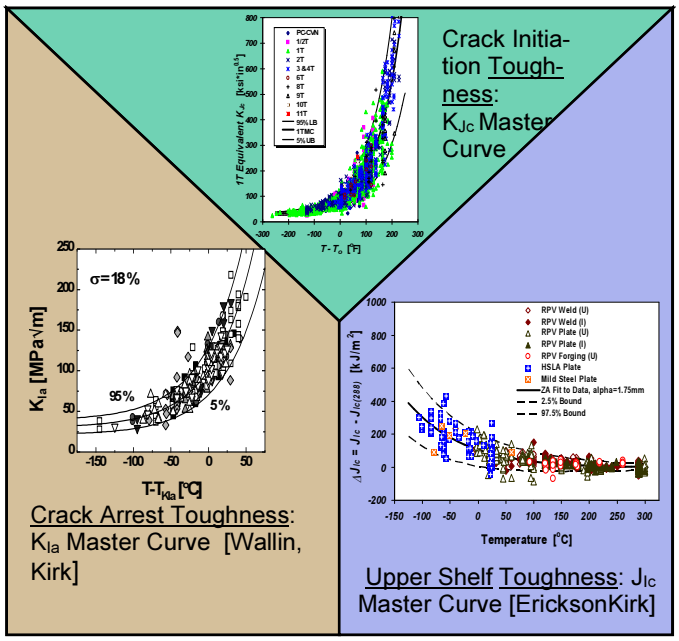
Impact Fracture Toughness Round-Robin experimental Exercise (RRE) using Precracked Charpy Size Specimens

Twelve organizations signed up for the round-robin exercise; each of them received from JRC Petten 10 precracked and side-grooved Charpy specimens of JRQ material (plate 8JRQ44). Each participant sent his results using the data reporting Excel spreadsheets format. Each participant tested 10 specimens. Except for one laboratory (which appears to have force calibration problems), the results supplied by the participants are very consistent and show reasonable scatter. The master curve approach has proven to be fully applicable to impact fracture toughness measurements obtained in the ductile-to-brittle transition region.

Master curve shape

The aim was to collect such existing, available test data from the participants which could help to clarify this issue qualitatively, i.e. how severe this issue is and how, and in which cases, it possibly should be taken into account. The collected data therefore represents mostly results from plants surveillance programs. Besides this low-flux data, some results from Research reactor irradiations accomplished in other research programs are included.

The CRP results will be issued in late 2008.



Master curves exist for Crack arrest (KIa), Upper shelf (JIc) and Crack initiation toughness (KJc). Also, systematic relationships exist between these various toughness quantities.

Contact: K.Kang@iaea.org.

Workshop on Stress Corrosion Cracking (SCC) under the Regional Technical Cooperation Project RLA4021

Within the framework of the Regional Technical Cooperation Project RLA4021, 'Cracking and Structural Integrity of Components in Light Water Reactors', a workshop on 'Stress Corrosion Cracking (SCC)' was held from 5 to 8 May 2008 at Veracruz in Mexico. The objective of the workshop was to exchange information on practices and R&D programmes performed by Member States relating to inter-granular stress corrosion cracking (IGSCC) including primary water stress corrosion cracking (PWSCC) and irradiated assisted stress corrosion cracking (IASCC) and on current practices to prevent, mitigate and repair SCC damages. Three experts from USA, France and Japan were invited for the workshop.

The workshop was co-organized with the IAEA and the counterparts in Mexico, i.e. National Institute of Nuclear (ININ) and Comision Federal De Electricidad (CFE). 44 participants attended the workshop. To accomplish the workshop objective, the three internal experts provided presentations on the following subjects,

- Basic mechanisms of IGSCC, PWSCC and IASCC;
- Methods how to measure and understand SCC issues;
- Operational experience;
- Inspection, assessment, prevention/mitigation, repair/replacement methods.

The workshop provided important information on SCC mechanisms, practical information and concrete examples of activities to cope with SCC issues.

Workshop participants at Veracruz in Mexico, 5-8 May 2008

Contact: T.inagaki@iaea.org, K.Kang@iaea.org

Water chemistry for WWER Nuclear Power Plants

On 4-6 March 2008, the 3rd consultants meeting was held in Vienna to resolve all the issues as related to the comments from Russia and other interested MS. The final draft 'Water chemistry for WWER Nuclear Power Plants' was agreed. It is expected to be published in late

2008. This IAEA guidance document will help harmonize approaches to managing and controlling water chemistry of WWER and improve WWER water chemistry performance. Four experts from Czech Republic, France, Slovakia were invited for the meeting.

Chemistry control is one of the most important disciplines and activities in NPP operation. WWERs are in operation in a number of Eastern European and Asian countries. Due to the development history, they have different national capabilities and in a number of cases different circuit chemistry guidelines, criteria and philosophies on control and management of water chemistry. The position with WWER guidelines is that there are only a limited consensus view among the different countries on the correct chemistry controls to apply, and in some cases the views may be very different and at odds with each other.

In contrast with this position, there is a more 'unified' approach in PWRs. There are three major sets of chemistry guidelines: the Electric Power Research Institute (EPRI) guidelines, the VGB PowerTech standards and the Électricité de France (EDF) specifications. It is believed that harmonized approaches to water chemistry of WWER would be helpful and experience of PWR water chemistry could be learnt to improve WWER water chemistry performance.

Guidance for Risk Informed In-Service Inspection (RI-ISI) under development

On March 10-12, 2008, the 2nd CS meeting was held in IAEA Headquarters, Vienna to develop a guidance document on risk-informed in-service inspection (RI-ISI) of piping systems of NPP. This meeting has expanded the outline of document, which was agreed in the previous meeting of last year.

Six experts from Belgium, Czech Republic, Finland, Sweden, the USA and Energy Institute of European Commission-Joint Research Centre (EC-JRC) were invited for the meeting.

This document will inform managers, ISI supervisors, and lead ISI engineers of NPPs and technical support organizations with regard to the technology. It describes RI-ISI process, application status, technological issues, and on-going development activities. It will be helpful for regulator staff related to ISI program.

In order to find out the current status of the technology in NPP-operating countries, a questionnaire will be sent out to collect the information and opinions of the industries and regulators in the 2nd quarter of 2008.

The 3rd consultants meeting is planned on 22-24 September 2008 in Vienna to resolve all the issues and finalize the document.

Contact : h.cheng@iaea.org, o.glockler@iaea.org

Documents reviewed and test piece finger-printed, ready for the first-time practical trial of In-Service Inspection Qualification in China

On 1-4 April 2008, an expert mission for TC Project CPR/4/028: 'Validation of the Technology of In-Service Inspection/Non-Destructive Testing for NPP' was performed in Wuhan, China. The main objectives of the meeting were to review the qualification documents recently produced by the different Chinese organizations and to plan the next phase of the work which includes the practical trials.

There were 26 people from 4 NPPs, 4 ISI institutes, 1 ISI equipment vendor, 1 TSO of nuclear safety authority, two international experts and one IAEA officer. The meeting reviewed 4 methodology documents of inspection qualification adapted from the European Nuclear Inspection and Qualification (ENIQ) guidance publications by Research Institute of Nuclear Power Operation (RINPO), 2 IQ documents for the dissimilar metal weld pilot study by RINPO, and 5 documents prepared by the 3 ISI institutes.

At the same time, the IAEA test piece has been finger-printed at Swedish Qualification Center, producing a set of ultrasonic test data and interpretation results. The test piece and the finger print information will be shipped to China soon and used as standard test results.

With the documents and test piece being ready for the next phase for the practical trials, the open trial for equipment and testing procedure is scheduled on September 15-24, 2008 and the blind trial for inspection personnel in November 2008.

Review meeting participants in Wuan, China, 1-4 April 2008

During this project, China will cooperate and intercommunicate widely with relative international companies or organizations in the field of validation of ISI technique, through scientific visit, training course and expert service, and learn from their advanced validation technique and experience; and China will set up a validation committee of ISI techniques and a

validation centre of ISI techniques, and obtain the basic validation ability of ISI techniques.

Contact h.cheng@iaea.org, o.glockler@iaea.org.

Databases to Support Nuclear Power

Within the TC project RER/9/87 'Harmonisation of PSA and PSA Applications' the regional workshop on Reliability Database for WWER NPPs was organised at the Scientific and Engineering Centre for Nuclear and Radiation Safety (SEC NRS) in Moscow from 10 to 14 March 2008.

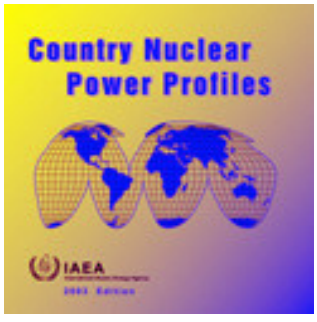
The workshop was attended by 38 participants from 8 countries of the region and three invited experts from Switzerland, Sweden and Netherlands and one IAEA staff member. Invited experts provided information about experience with IE database in Switzerland and Sweden. Expert from EC-Joint Research Centre (EC-JRC) presented activities related to analyses of ageing factors in component reliability. Participants have got also a detail presentation about PRIS and a concept for implementation of IE data into this database.

Last two days were mainly dedicated to the working group sessions. Participants were divided into 3 working groups with the following tasks:

- WG 1: To make an agreement on the generic list of initiating events for WWER-1000
- WG 2: To add new data in an IAEA database for WWER-440
- WG 3: To discuss common framework for a database which will be developed for WWER component reliability data.

Contact: J.Mandula@iaea.org.

Country Nuclear Power Profiles 2007 Edition



The 2007 edition of Country Nuclear Power Profiles (CNPP) was issued on CD-ROM and Web pages. It updates the country information, in general, to the end of 2006 for 39 countries. The CNPP is updated based on information voluntarily provided by participating IAEA Member States. Participants include the 30 countries that have operating nuclear power plants, as well as nine countries having past or planned nuclear power programmes (Bangladesh, Egypt, Indonesia, the Islamic Republic of Iran, Italy, Kazakhstan, Poland, Turkey, and Vietnam).

For the 2007 edition, 21 countries provided information to the IAEA to update their profiles. For the 18 other countries, the IAEA updated the profile statistical tables on nuclear power, energy development, and economic indicators based on information from IAEA and World Bank databases.

Overall, the CNPP reviews the organizational and industrial aspects of nuclear power programmes in participating countries, and provides information about the relevant legislative, regulatory and international frameworks in each country. It compiles the current issues in the new environment within which the electricity and nuclear sector operates, i.e. energy policy, and privatization and deregulation in these sectors, the role of government, nuclear energy and climate change, and safety and waste management, which differ from country to country.

For further details, please visit the website: http://www-pub.iaea.org/MTCD/publications/PDF/cnpp2007/pages/index.htm

Contact: S-K.Cho@iaea.org.

Management Systems

Enhancement and Continual Improvement of Management Systems (CIMS Service)

The IAEA has developed a service to provide assistance to organizations striving to enhance and continually improve their management system based on self-assessments. The service is based on the IAEA safety standards for management systems (GS-R-3; GS-G-3.1 and DS349).

A first workshop was held with the Chilean Nuclear Energy Commission, CCHEN in 2006 in order to establish the stage of development towards an integrated management system and to train an assessment team in how to perform a self-assessment of their management system and safety culture.

Workshop participants in Santiago Chile, 12-16 May 2008

A follow-up workshop was held in 12-16 May 2008 with the purpose to assist CCHEN in developing an action plan for improvements based on the results of the self-assessment. The senior management team and the assessment team participated in the workshop, which

resulted in the identification of and a plan for the necessary improvement actions to be taken.

Contact: k.dahlgren@iaea.org.

IAEA Technical Meeting Further needs in the Area of management systems - Safety culture, leadership and preoperational stages of nuclear project

A Technical Meeting was held in Vienna 1-4 April 2008-05-22 on management system. The objective of the Technical Meeting was to discuss the application of the new IAEA Safety Standards on Management Systems with a special focus on leadership and safety culture and the implementation of management systems in relation to the construction of nuclear facilities. The Nuclear Energy Series and its management system supporting document were presented and discussed. The complete set of presentation and additional documents can be found in ENTRAC web site: http://entrac.iaea.org.

TM participants in Vienna 1-4 April 2008

Contact: k.dahlgren@iaea.org or p.vincze@iaea.org.

A Latin American regional meeting on Application of Effective Management Systems

A regional workshop was organized in San Carlos de Bariloche, Argentina 15-18 April 2008. The purpose of the workshop was to promote IAEA safety standards on management systems (GS-R-3, GS-G-3.1. and DS349) and to provide information on practical strategies for making the transition from traditional quality assurance (QA) or quality management (QM) based approaches to integrated management systems based on the latest IAEA requirements and guidance, in operating organizations. The workshop was attended by 35 participants from countries of Latin America and discussed the following topics:

- The latest IAEA management system safety standards – e.g., GS-R-3, GS-G-3.1, and DS349
- The benefits of a coherent, integrated management system
- The current status of implementation of management systems in Member States of the Latin American region
- Safety culture, organizational culture and management systems
- Safety culture and the management of events
- The responsibilities of senior management
- How to manage the transition to the new IAEA requirements and guidance, including practical examples
- How to enhance or improve an existing management system

The complete set of presentation and additional documents can be found in ENTRAC web site: http://entrac.iaea.org.

Workshop participants in San Carlos de Bariloche, Argentina 15-18 April 2008

Contact: p.vincze@iaea.org.

The safety Standard Committees approved DS349

Radiation Safety Standard Committee, Waste safety Standard Committee and the Nuclear Safety Standard Committee approved DS349 (Application of management system in nuclear installations) to for submission to the Safety Standard Commission in March April 2008. Ds349 will be submitted to the CSS in September 2008, and it is expected to be published early 2009.

Contact: p.vincze@iaea.org

Regulatory oversight of management systems

A second meeting was held in Vienna, 5-9 May 2008 on 'Regulatory oversight of management systems' with the purpose to develop a guidance document on how regulators can promote, verify and enforce compliance with the requirements for management systems as stated in the IAEA requirements and guides for management systems (GS-R-3, GS-G.3.1 and DS349). The document accomplishes this by providing guidance that helps a regulatory body develop a consistent and effective process for regulatory oversight of integrated management systems. A draft guidance document was produced, as well as a draft describing a tool for inspection of management systems.

Contact: k.dahlgren@iaea.org, a.nicic@iaea.org.

Strengthening Nuclear Power Infrastructures

A new Nuclear Energy Series (NE) technical report publication is under development directed to provide an approach for Evaluation of National Nuclear

Infrastructure Development Status. The aim is to help planning the work steps necessary for a consistent development of the national nuclear infrastructure. This Report will be: a) based on the milestones approach presented by the NE publication NG-G-3.1: Milestones in the Development of a National Infrastructure for Nuclear Power, and b) directed to provide the criteria which can be used either for Member State's self evaluation of its infrastructure status or for an external review if requested. The first draft was issued in February 2008 and circulated for review and comments from external experts as well as staff from IAEA. A consultancy meeting held 16-18 April 2008 reviewed and resolved the comments on the first draft and provided recommendations for completion. It is planned to finalize and issue the new NE Series report in the last quarter 2008.

Contact: I.Facer@iaea.org, N.Pieroni@iaea.org, A.Starz@iaea.org

A consultancy to prepare a first draft of a report on Responsibilities and Competencies of a Nuclear Energy Programme Implementing Organization (NEPIO) was held April 21st and 22nd. The consultants emphasized that the head of the NEPIO would have an important role and would need to be carefully chosen, and that the NEPIO's work should be focused on deliverables. A working draft is expected by the end of June. This work is closely related with and complementary to the development of a NE Series technical report on the Competencies of the Owner-Operator, which will be completed this year.

Contacts: A.Starz@iaea.org; X.Li@iaea.org

The changing global environment of increasing energy consumption and need for energy security is influencing the type of and means for obtaining the resources (material, human and financial) necessary for nuclear power projects. The effects of issues such as financing arrangements for capital intensive plants, international design approval/evaluation, harmonization of codes and standards, and assurance of fuel cycle services need to be considered. The development of a NE Series report on Issues Improving Prospects for Financing Nuclear Power Projects has been initiated. The Report will provide a review and practical approaches on the effects of infrastructure developments and other related topics upon reducing investment risks, and the possible actions that may improve prospects for financing nuclear power projects. A Technical Meeting will be implemented on July 23-25, 2008 in Vienna, Austria to review the final draft..

Contact: X.Li@iaea.org.

Work started in the development of a NE Series report on Invitation and Evaluation of Bids for Nuclear Power Plants. The objective is to provide integrated and updated practical guidance on preparation and evaluation of bids for nuclear power plants with the state of the art information. A Consultants Meeting was organized on May 14-16, 2008 to prepare the outline and the work plan for development. The first draft is scheduled by end of October 2008. The scope of this Report will address the preconditions and infrastructure issues and the relationship with the Milestone 2 (NE publication NG-G-3.1) which need to be addressed for bidding process, the bid invitation specification, and the technical and economic evaluation of bids. Target users are decision makers, advisers, senior managers and staff involved in bidding process in the governmental, utilities and industrial organizations in countries initiating or extending nuclear power programmes.

Contact: X.Li@iaea.org.

Workshop participants in Buenos Aires 17-20 March 2008

Taking into account the number of NPP projects with several years delay in their original schedules (DNPPs), the IAEA has being collecting information for development of guidance on necessary management actions to preserve the capability for resuming work and completing DNPPs when conditions permit. The results have been published in the recent NE Series NP-T-3.4 Restarting delayed nuclear power plant projects (2008). In addition, management workshops, directed to identify the subject areas where exchange of experience among Member States can be mutually beneficial in identification of problems and successful management of the completion of DNPPs, were organized approximately every two years. The 5th workshop on Managing the Completion of Delayed Nuclear Power Plant Projects was held 17-20 March 2008 in Buenos Aires and Atucha II NPP site, organized by IAEA in cooperation with Nucleoeléctrica Argentina S.A. (NA-SA), Argentina. The workshop was designed for senior managers or representatives, directly responsible for DNPP activities in nuclear utilities, design, technical support and regulatory organizations. A total of 22 participants from 8 countries took part in the workshop. The main topics regarding DNPPs included: human resources issues,

driving factors to resume construction, managerial challenges, experiences and lessons learned. The funds for this activity under Technical Co-operation Project ARG/4/090 were provided by the host country organization NA-SA.

Contact: K.Kang@iaea.org; N.Pieroni@iaea.org.

Work started on the preparation of a Technical Meeting/workshop on Evaluation of Nuclear Power Infrastructure Development, scheduled 10-12 December 2008 in Vienna. This is a follow-up of the Technical Meetings/workshops in Vienna on 'Milestones for Nuclear Power Infrastructure Development' and 'Issues for the Introduction of Nuclear Power' held at the IAEA's headquarters in November 2007 and December 2006 respectively. This Technical Meeting/workshop is an opportunity for Member States to exchange views on the most important infrastructure issues and discuss:

- a new NE -Technical Report on evaluation of the national nuclear infrastructure development status, and
- a new NE -Technical Report on the responsibilities and competencies of nuclear power implementing organizations.

It is expected that over 100 participants from about 40 Member States will attend.

Contact: I.Facer@iaea.org, N.Pieroni@iaea.org, A.Starz@iaea.org.

Improvements in Training and Performance of NPP Personnel

A report, within a Nuclear Energy Series publications, on Improving Human Performance in Nuclear Facilities, is being developed currently. This report is intended to elaborate recommendations included in the Nuclear Energy Series Guide 'Managing Human Resources in the Field of Nuclear Energy', that is planned to be prepared for publication in 2008. The purpose of the report on Improving Human Performance in Nuclear Facilities is to provide support to nuclear facility managers in managing human resources to sustain and improve nuclear facility performance. A consultants meeting to further develop this report was conducted at the IAEA from 19 to 23 May 2008; three consultants (from South Africa, the UK and the USA) were involved to assist in further development of the report. This publication will provide line managers with a framework and tools for achieving excellent human performance within an overall performance improvement model. The emphasis of application is on the performance of individuals and leaders. Those organizations that have good examples of improving human performance are invited to contribute conveying their good practices to the responsible officer Alexey Kazennov A.Kazennov@iaea.org

The IAEA is developing a new Nuclear Energy Series report on 'Achieving excellence in maintenance personnel performance through training and other management initiatives'. The adequate performance of maintenance personnel and quality of their training are the important sources for the enhancing safety and increasing efficiency of the nuclear facilities. The first consultants meeting to discuss the content of the report was held from 5 to 9 of May 2008 at IAEA headquarters. Six consultants from France, Hungary, Spain, Ukraine and the USA, and the IAEA staff from the Department of Nuclear Energy and Department of Nuclear Safety and Security, took part in the meeting. In due course of developing the report, a survey will be administered to the nuclear facilities and training organizations to collect good practices. Those who are interested to contribute, please contact Alexey Kazennov A.Kazennov@iaea.org.

News from Nuclear Power Technology Development

Coordination of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO)

New INPRO Collaborative Project: Investigation of technological challenges related to the removal of heat by liquid metal and molten salt coolants from reactor cores operating at high temperatures (COOL)

The next generation of nuclear reactors will need to incorporate innovative approaches to further enhance their reliability and safety as required for large scale deployment in different regions of the world. An important feature of these reactors will be the use of coolants at temperatures much higher than those achieved in existing reactor designs, particularly in conjunction with the production of hydrogen and other non-electrical applications. It has been concluded that in order to address the wide range of issues concerning the design and safety of high and very high temperature nuclear reactors it would be cost beneficial to gather several competent research institutes from all over the world into joint studies and coordinated research projects geared toward the resolution of these issues. This is the premise underlying the INPRO COOL Cooperative Project (CP) as originally proposed by India, to engage institutions from around the world in a coordinated effort

to investigate the cooling of nuclear reactor cores operating at high temperature (between 600-1000°C and beyond) with a focus on liquid metals and molten salts.

The kick-off meeting for the INPRO COOL CP (previously called IND2), entitled 'Investigation of technological challenges related to the removal of heat by liquid metal and molten salt coolants from reactor cores operating at high temperatures', took place on April 23-25, 2008 at IAEA headquarters in Vienna, Austria. Representatives from India, the Czech Republic and Russia gathered to evaluate the very detailed terms of reference and the implementation plan and to express their commitment to the project. The specific objectives of the COOL CP were defined as:

1. To establish the properties of high temperature coolants (liquid metal, molten salts), establish their thermal hydraulic relationships and investigate issues related to natural circulation of such coolants. High temperature coolants need to be studied from the point of view of their applications in high temperature reactors (HTR) and very high temperature reactors (VHTR), accelerator driven systems (ADS), molten salt reactors (MSR) and advanced fast reactors (FR). It was proposed that a reliable database of such coolants, in the temperature regime of interest, be compiled and established with respect to thermo-physical properties and thermo-hydraulic relationships. In addition, the various aspects related to natural circulation for these coolants should be identified. Finally, the validation of CFD codes and their internal models and correlations versus experimental data will also be carried out.

2. To address the various issues related to handling high temperature coolants, such as plugging of leakages, phase change behaviour, handling of active and non-active coolants, etc.

3. To evaluate the compatibility of components in intimate contact with high temperature coolants for prolonged service and to establish guidelines for their design. This includes special components that would perform the functions of valves, heat exchangers, pumps, fuel handling systems, level detectors, flow-meters, etc, which need to provide reliable operation while being exposed to high temperature coolants for extended durations.

4. To develop a methodology for high temperature coolant chemistry on-line monitoring and control.

5. To foster the transfer of knowledge and cooperation in the subject area among countries and institutions: Documentation and publication of results, enhancement of databases, dissemination of information and exchange of experience among various institutions and Member States, conducting training and technical courses, etc.

Participants agreed that even though India's project proposal and implementation plan were truly comprehensive and well thought-out, it was also necessary to perform a detailed literature review to assess if there are additional studies and/or knowledge gaps that need to be included within the scope of the project. As a consequence, it was proposed to invite several Member States and institutions from all over the world that could contribute and benefit from the activities of the COOL CP to participate in the whole or parts of the project, including the initial knowledge gap assessment. Furthermore, the COOL CP project is seeking synergies with other activities of the IAEA, such as those of the Technical Working Group on Fast Reactors (TWG-FR). This scoping and preparatory stage of the project is expected to be concluded by July 2008, and work on the project will commence immediately afterwards.

Contact: S.Bilbao@iaea.org.

Addressing proliferation resistance: Proliferation Resistance: Acquisition/Diversion Pathway Analysis (PRADA)

In expectation of a nuclear 'renaissance' and for a reduction of the associated proliferation risks, over the last few years the international community has conducted substantial work on the proliferation resistance of future nuclear energy fuel cycles and related facilities. The two most widely accepted approaches for assessing the proliferation resistance of nuclear energy systems have been developed by two international nuclear energy development programs, INPRO and GIF (Generation IV International Forum). These programs have taken different but related approaches to evaluating proliferation resistance. The necessity of 'harmonization' of these two approaches has been recognized among experts of the two programs.

Following the IAEA/INPRO/GIF coordination meeting held in February 2008 (see last newsletter), experts and representatives from the IAEA/INPRO and GIF discussed follow-up actions at a topical meeting 7-9 May, 2008. A 'white paper' on the harmonization of two methodologies is now being jointly prepared to answer the following questions:

1. What are the similarities between two approaches?
2. What are the differences between two approaches?
3. Who are the users, how will the results be used?
4. What is the compatibility of the two methods?
5. What is the future common work for harmonization?

Under INPRO, proliferation resistance is addressed specifically under Collaborative Project PRADA (Proliferation Resistance: Acquisition/Diversion Pathway Analysis). A consultants meeting on PRADA was held from 5-6 May at IAEA headquarters. PRADA is using and developing the INPRO methodology related to User Requirements (UR) 4: multiplicity and robustness of barriers against proliferation. The first aspect requires an acquisition/diversion pathway analysis and PRADA will address the issues in reference to the DUPIC (Direct Use of Spent PWR Fuel in CANDU) fuel cycle. Outputs such as a recommendation for the assessment procedure for the above mentioned User Requirement are expected. The Republic of Korea is the proponent country of this project and will provide the demonstration case study using the DUPIC fuel cycle.

At the meeting, Stage 1 of the three-year project was prepared, focussing on elements of approach and procedure of the selection of the prospective pathways. It was agreed that, as planned in the project Terms of Reference, a coarse pathway analysis must be done first during Stage 1, and detailed modelling, if necessary, must come at a later stage of the project, Stage 2. The next meeting on PRADA will be held 24-26 November 2008 in Vienna.

Contact: H.Chayama@iaea.org.

Global Architecture of Innovative Nuclear Systems based on thermal and fast reactors including a closed fuel cycle (GAINS) progress

The INPRO Collaborative Project GAINS (Global Architecture of Innovative Nuclear Systems based on thermal and fast reactors including a closed fuel cycle) made further progress with a consultants meeting held 9-11 April, 2008.

Participants in the GAINS meeting, 9-11 April 2008, IAEA

Basic ideas of the Terms of Reference were discussed and the participants reached consensus on the Implementation Plan clarifying the main activities to be developed, how to be addressed, milestones for its completion and corresponding responsibilities.

Pillars of the project are the estimations of nuclear energy demand along the century for Convergent and Heterogeneous world growth (activity that is being performed under the leadership of the IAEA/PESS), the analysis -with existing codes- of relevant nuclear energy systems having the highest potential for deployment, and the establishment of an specification for adequate modelling tools, in order to address the development needs of the existing ones.

17 representatives from 10 countries attended the meeting together with 3 observers plus about 15 IAEA-INPRO representatives.

The main achievements of the meeting include the following:

- Basic agreement on the content of the CP TOR, part of which is the Implementation Plan. Wording is being completed after the meeting.
- Short term schedule of activities, which basically consist on the estimations of nuclear energy demand; the identification of the representative set of scenarios for the analysis (nuclear energy systems) – including the corresponding set of parameters for its characterization and the most relevant indicators to be calculated-, and the preparation of a summary document regarding the main characteristics and development needs of the existing modelling tools.

Synergies with other Collaborative Projects related to nuclear scenario development and with the INPRO activity on Common User Considerations were also discussed. A Scientific and Technical Committee constituted mainly by the participants holding nuclear technology, was established to facilitate the implementation of the project. The participants emphasized the importance of the project in contributing to the development of the activities, indicating that they would represent a clear benefit for their countries. Japan accepted the invitation to host the next meeting during the last week of October 2008.

Activities under GAINS are coordinated also with activities under the OECD/NEA project 'Transition scenarios from thermal to fast reactors'. The IAEA participated, as observer, in the second NEA ad hoc meeting on that project.

Contact: V.Usanov@iaea.org, P.Villalibre@iaea.org.

INPRO addressing innovative fuel cycle options

Under INPRO Task 4: Institutional and Infrastructure issues, the concept of leasing nuclear fuel in order to

strengthen the nuclear weapons non-proliferation regime is being addressed.

Contact: Y.Busurin@iaea.org.

Thermal-Hydraulics of Innovative Reactor and Transmutation Systems

The International Workshop on Thermal-Hydraulics of Innovative Reactor and Transmutation Systems (THIRS) was held on April 14-16, 2008 at Forschungszentrum Karlsruhe, Germany in cooperation with the IAEA. The main objectives of the workshop were to provide a platform for the international community to exchange information about research programs and research results and to identify common issues of future R&D. The workshop was attended by more than 60 participants including many young researchers and PhD students from 16 countries and international organizations. During the workshop thermal-hydraulics was clearly recognized as a key research subject in the development of different innovative reactor and dedicated transmutation systems. Although different systems differ from each other with respect to coolant, flow channel structure and thermal-hydraulic parameters, some common challenging thermal-hydraulic issues were identified, which are not yet or only partly covered in related national R&D programs or in the framework of international initiatives, but which need to be addressed for the successful development of theses systems.

Contact: J.Kupitz@iaea.org.

Technology Advances in Water Cooled Reactors

Natural Circulation: Phenomena, Modelling and Reliability of Passive Systems based on Natural Circulation

Natural circulation systems are key to many evolutionary and innovative water cooled reactor designs. The IAEA is conducting this Coordinated Research Project Natural Circulation Phenomena, Modelling and Reliability of Passive Systems that Utilize Natural Circulation to enhance understanding of natural circulation phenomena and models in water-cooled reactors and to examine the factors that influence the reliability of passive safety systems that utilize natural circulation.

The participating organizations are: the Barilochi Research Centre of CNEA (Argentina), CEA Cadarache (France), FZR (Germany), BARC (India), ENEA and University of Pisa (Italy), JAEA (Japan), KAERI (Republic of Korea), Gidropress (Russian Federation), IVS (Slovakia), University of Valencia (Spain), PSI (Switzerland), Oregon State University, Purdue University and Idaho State University (United States of America) and the European Commission JRC Institute for Energy (the Netherlands).

A report on 'Passive Safety Systems and Natural Circulation in Advanced Water Cooled Nuclear Power Plants' is in an advanced stage of preparation. The aim of this publication is to describe passive safety systems in a wide range of advanced water cooled nuclear power plant designs with the goal of gaining insights into the system design, operation, and reliability. The passive safety systems proposed to remove the decay heat from the core after a reactor scram are classified into: pre-pressurized core flooding tanks, elevated tank natural circulation loops, gravity drain tanks, passively cooled steam generator natural circulation, passive residual heat removal heat exchangers, passively cooled core isolation condensers, and sump natural circulation. The passive safety systems designed to remove heat from the containment are classified into: containment pressure suppression pools, containment passive heat removal/pressure suppression systems, and passive containment spray systems. All the passive safety systems in selected advanced water cooled reactors are classified according to the type and identified related phenomena which have been studied in the CRP.

A consultants meeting was convened at IAEA-HQ, Vienna in April 2008 to review the draft report. The meeting reviewed the comments from review team, updated the draft version and identified further work to add scientific value. It was suggested to receive a review from the designer for each specific design to confirm the information is correct and most up-to-date.

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

Courses on Natural Circulation in Water Cooled Nuclear Power Plants

The IAEA Course on Natural Circulation in Water Cooled Nuclear Power Plants will be held on:

- 19-23 May 2008, at Idaho Falls in Idaho, USA (hosted by the Idaho National Laboratory), and
- 23-27 June 2008, at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

The objective of the 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.

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

Technology 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 fast neutron systems research and technology development, design, deployment, operation, and decommissioning. The following summarizes recent progress and plans:

In collaboration with the Nuclear Data Section of IAEA's Division of Physical and Chemical Sciences, the Project has conducted the joint IAEA/ICTP Workshop on 'Nuclear Reaction Data for Advanced Reactor Technologies (Trieste, Italy, 19 – 30 May 2008). The workshop provided training and information exchange for nuclear physicists, nuclear engineers, and other users of Nuclear Data for advanced technological applications. Starting from the facilities and techniques used for the experimental determination of basic Nuclear Data quantities, through the evaluation procedures and creation of reliable nuclear reaction data libraries, the lectures focused on providing the most recent developments and results in the field. A series of lectures, prepared by two IAEA (NPTDS) staff and two outside lecturers addressed the application of, and further nuclear data needs in relation to advanced reactor technology activities.

On 16 May 2008, a consultants meeting with Senior Advisors from France, India, Japan, the Russian Federation and the USA on the preparation of the IAEA 'International Conference on Fast Reactors and Closed Fuel Cycle - Challenges and Opportunities' (7 – 11 December 2009) was held in Vienna. The Senior Advisors are assisting the IAEA in the preparation of this event. The outputs of the consultants meeting were a preliminary outline of the topical structure of the conference and the list of the experts who will be asked to join the International Scientific Programme Committee.

The project is collaborating with and has participated in meetings related to the two INPRO Collaborative Projects GAINS and COOL.

The project has prepared the paper 'IAEA Coordinated Research Project (CRP) on Analytical and experimental Benchmark Analyses of Accelerator Driven Systems', which was accepted for oral presentation at the PHYSOR 2008 Conference (Interlaken, Switzerland, 14 – 19 September 2008).

The project has conducted, in the period covered by this Newsletter, two major meetings, viz. the 41st meeting of the TWG-FR (Vienna, 26 – 29 May 2008), and the Second Research Coordination Meeting of the IAEA Coordinated Research Project on 'Analyses of, and Lessons Learned from the Operational Experience with Fast Reactor Equipment and Systems' (Vienna, 20 – 23 May 2008). Results and outcomes of these meetings will be reported in the next issue of the Newsletter.

Participants in the TWR-FR meeting, IAEA, 26-29 May 2008

For more information see http://www.iaea.org/inisnkm/nkm/aws/fnss/index.html

Contact: A.Stanculescu@iaea.org.

Common Technologies and Issues for Small and Medium Sized Reactors

Final draft of a new Nuclear Energy Series (NES) report titled 'Passive Safety Design Options for SMRs' has been accepted by the Document Coordination Team of the Department of Nuclear Energy (DCT NE) at its meeting on 22 April 2008. The document is being submitted for publication taking into account the comments received from the Department of Nuclear Safety and Security. The report presents review of the passive safety design features for the ten representative concepts of small and medium sized reactors (SMRs) against IAEA Safety Standards and Guides, with a focus on the defence in depth strategy. The preparation of this report was mentioned with satisfaction in the IAEA

General Conference resolution GC(51)/RES/14/B2(k) of September 2007.

A series of case studies to assess competitiveness potential of SMRs in different applications is being continued from the budget cycle of 2006-2007. The highlights of this year's effort include parametric case studies using the Present Value Capital Cost Model (PVCC) developed by Westinghouse Electric Company (USA), as well as case studies for verification of the Open Model developed by Politecnico di Milano in cooperation with the ENEA (Italy). The Open Model incorporates basic approaches developed to assess economic and investment characteristics of nuclear power plants and provides for the incorporation of any new developments, once they emerge and become available. The studies would cover both distributed and concentrated deployment strategies for SMRs and larger reactors under a variety of interest rates, construction durations, and other factors affecting competitiveness in economics and investments. On the total, eleven proposals for case studies on competitive applications of SMRs, to be performed in 2008, have been collected from India, Japan, the Russian Federation, and the USA. The participants and observers to this activity have performed ranking of the proposals. Their intermediate results and conclusions will be discussed at a dedicated IAEA technical meeting to be convened on 1-4 July 2008 in Vienna.

The Coordinated Research Project (CRP) 'Development of Methodologies for the Assessment of Passive Safety System Performance in Advanced Reactors' (2008-2011) is collecting applications from research institutions in member states for research agreements and research contracts. There is no specific deadline for applying to this project; however, in June 2008 the first round of formal evaluations will carried out. This CRP aims on development of a common analysis-and-test approach to assess performance of passive safety systems. Such an approach could facilitate design optimization and safety qualification of the future advanced reactors, contributing to their enhanced safety levels and improved economics.

A CRP 'Small Reactors without On-site Refuelling' after its 3 initial years has undergone an internal IAEA review and was approved for continuation for one more year. The final research coordination meeting is scheduled for 3-7 November 2008. Preparation of materials for the final report is in progress for (i) development of a generic methodology to revise the need for relocation and evacuation measures unique to NPPs with innovative SMRs; (ii) design and technology development for LWRs with coated particle based fuel; and (iii) design and technology development for lead cooled, lead-bismuth cooled, and molten salt cooled reactors, see Fig. 1. Cooperation is in progress with the Expert Group on Lead-Bismuth Technology of the Working Party on Scientific Issues of the Fuel Cycle of the Nuclear Science Committee of OECD/NEA. In April 2008, two participants of the CRP 'Small Reactors without On-site Refuelling' have submitted their calculations results for Phase1 of the HELIOS benchmarking exercise, conducted by the OECD/NEA and based on the results of the natural convection tests performed in the HELIOS lead-bismuth loop at the Seoul National University of the Republic of Korea.

Contact: v.v.kuznetsov@iaea.org.

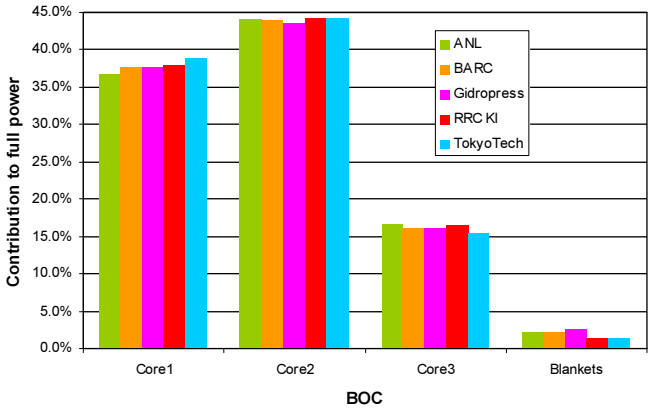


Figure. 1 Power in regions at the beginning of the cycle for the RBEC-M Pb-Bi cooled reactor depletion benchmark originally proposed and calculated within the CRP 'Small Reactors without On-site Refuelling'

Nuclear Desalination Systems

The Technical Meeting of the DEEP Users' Group was held in IAEA Headquaters, Vienna, 8-9 April 2008. The technical meeting was aimed at: re-examining all thermal and RO plant models in DEEP, correcting any necessary formula or panel related to DEEP code, and discussing preliminary draft of quality assurance document for DEEP development. Seven experts from seven Member States attended the meeting and at the closing of the meeting recommended to distribute benchmark problem and data to as many DEEP users as possible (including Industrial companies and other R&D research Institutes), once received, analyse results of benchmarking calculations with respect to the references cases prepared. (To be done by a designated expert), and discuss results of analysis in one or more consultancies. It was also recommended that three immediate corrections are made before starting DEEP validation. They include correction of the formula for the calculation of IDC in fossil fuelled systems with fossil fuel price escalation, revision of the basic data for the power plants and the desalination

plants, and performing calculations using DEEP with Rankine and other cycles.

INDAG to become a TWG on Nuclear Desalination

In line with the efforts to unify and update the Terms of Reference for the Technical Working Groups in the Department of Nuclear Energy, it is suggested to rename INDAG to the 'Technical Working Group on Nuclear Desalination' (TWG-ND). The new name is also reflected in the following Terms of Reference. The TWG-ND, is currently being established.

The functions of the TWG -ND are:

a) To provide advice and guidance, and to marshal support in their countries for implementation of the IAEA's programmatic activities in the area of nuclear seawater desalination;

b) To provide a forum for information and knowledge sharing on national and international programmes development in the area of nuclear desalination;

c) To act as a link between the IAEA's activities in specific areas and national scientific communities, delivering information from and to national communities;

d) To provide advice on preparatory actions in Member States and the IAEA's activities in planning and implementing coordinated research programmes, collaborative assessments and other activities as well as the review of the results on nuclear desalination demonstration projects;

e) To develop and/or review selected documents from the Nuclear Energy Series, assess existing gaps and advise on preparation of new ones, in the scope of their field of activity;

f) To identify important topics for discussion at SAGNE and contribute to status reports, technical meetings and topical conferences in the field of nuclear desalination;

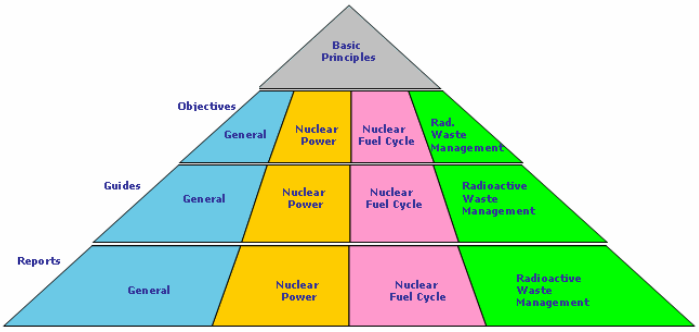
g) To encourage participation of young professionals, as appropriate, in IAEA activities.

Members of the TWG on Nuclear Desalination shall be appointed by the Deputy Director General, Department of Nuclear Energy, following consultation with the respective national authorities or organizations. Members of the TWG on Nuclear Desalination:

- Shall be recognized experts in nuclear seawater desalination having extensive links with national technical communities;
- Are to serve for a standard length of four years;
- Shall participate in the Group in their personal capacity and shall provide as appropriate views on national policies and strategies in the technical field;
- May as appropriate bring experts to provide additional information and share experience in the meetings of the TWG.

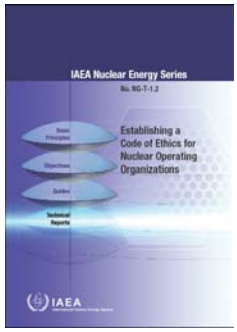
Contact: I.Khamis@iaea.org.

Nuclear Energy Series Documents



Clickable map on the IAEA webpage:
http://www.iaea.org/OurWork/ST/NE/NESeries/ClickableMap/

At this moment there are 6 published Nuclear Energy Series documents: Web Harvesting for Nuclear Knowledge Preservation (NG-T-6.6), Commissioning of Nuclear Power Plants: Training and Human Resource Considerations (NG-T-2.2), Decommissioning of Nuclear Facilities: Training and Human Resource Considerations (NG-T-2.3), Restarting Delayed Nuclear Power Plant Projects (NP-T-3.4), Establishing a Code of Ethics for Nuclear Operating Organizations (NG-T-1.2),



Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)

The full text of the publications can be also downloaded from the clickable map.

(http://www.iaea.org/OurWork/ST/NE/NESeries/ClickableMap/)

The Basic Principles of NE Series were approved by SAGNE and will be submitted for publication in June. Presently there is large number of documents in preparation: the four Objectives (for areas of General, Nuclear Power, Fuel Cycle and Radioactive Waste management), 4 Guides (for the topics of Human resource management, Decommissioning, Radioactive waste management and Nuclear knowledge management) and 89 Technical reports.

Contact: p.vincze@iaea.org.

New Staff in the Division of Nuclear Power

SUEHIRO, Minemasa

Mr. Suehiro (Japan) has recently taken up duties in the Nuclear Power Technology Development Section as a nuclear engineer where he will assist in the implementation of the IAEA's EB activity 'Study to enhance public knowledge on the issues relevant to the use of nuclear power'. Mr. Suehiro has around 14 years of experience in the nuclear power industry, including research, safety, nuclear fuel and the promotion of science and technology cooperation with foreign countries which are trying to introduce nuclear energy using international cooperation. He has over 4 years experience at the director's level - at the National Institute for Material Science, the International Trade Policy Bureau (METI) and as Director for International Exchange Promotion at the Science and Technology Bureau of MEXT.

Contact: M.Suehiro@iaea.org.

NKONG-NJOCK, Vincent

Mr. Nkong-Njock (Cameroon) has recently taken up duties in the Nuclear Power Engineering Section as a member of the Infrastructure and Planning Team, where he will assist in the implementation of the IAEA's activities on nuclear power planning methodologies in the area of infrastructure and support activities related to direct assistance and advice to Member States. Mr. Nkong-Njock holds a series of degrees from France, including a Master of Sciences in Energy, Production, Electricity and Automation as well as advanced doctorate in Nuclear Engineering. He has over 15 years of working experience in the field of nuclear energy with seven of those in the IAEA, working as a Programme Management Officer in the department of technical cooperation.

Contact: V.Nkong-Njock@iaea.org.

Internships at the Division

The IAEA accepts a limited number of interns to provide interns with the opportunity to gain practical work experiences in line with their studies or interests, and expose them to the work of the IAEA and the United Nations as a whole and to benefit the IAEA´s programmes through the assistance of qualified students specialized in various professional fields.

Based on the programme, 5 interns are working in the division of nuclear power. Their profiles are introduced shortly.

Interns with a mentor in the division: Sohaib MUNIM, Anne-Isabelle CASSET, Vladimir ANASTASOV, Oszvald GLOCKLER (Mentor), Jarrett FARNITANO, and Zain SHAMSI from left.

Mr. Jarrett Farnitano, USA

Education summary: B. Eng. - Computer and Systems Engineering (in progress)

Duration of internship: 3 months

Task: provide support to PRIS database

Mr. Zain Shamsi, USA

Education summary: B. Eng. - Electrical Engineering (in progress)

Duration of internship: 3 months

Task: Research literature on applications of instrumentation and control technologies and compile a summary document

Mr. Sohaib Munim, Australia

Education summary: B. Eng. - Electronics Engineering

Duration: 5 months

Task: Research literature on applications of instrumentation and control (I&C) technologies, certain devices and solutions used in digital I&C upgrades, and compilation of a summary document.

Mr. Vladimir Anastasov, The Former Yugoslav Republic of Macedonia

Education summary: M.Sc. - Environmental Sciences and Policy; B.Sc. - Mech. Engineering - Thermoenergy

Duration: 6 months

Task: Study the social and environmental impacts of nuclear desalination in a variety of aspects. Based on this study, to develop a methodology (based on the existing strategic environmental assessment or environmental impact assessment methodologies) that can be used to assess nuclear desalination

Ms. Anne-Isabelle Casset, France

Education summary: Master - Mechanical and Industrial Engineering; B. Sc. - physics

Duration: 6 months

Task: Review of existing relevant data on heat transfer for modelling a decay heat removal system for liquid metal reactors under an INPRO Collaborative Project; prepare an initial draft plan for conducting an International Collaborative Standard Problem (ICSP) within the Collaborative Project.

For internship programmes, please visit: http://www.iaea.org/About/Jobs/internships.html.

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.

Technical Head (Infrastructure and Planning)

As a member of the team led by the Section Head and as lead technical expert, the Technical Head guides, coordinates, and supervises the IAEA's projects on infrastructure and planning for the introduction of nuclear power programmes within the Nuclear Power Engineering Section in the Division of Nuclear Power.

The Technical Head is: (1) a team leader who plans, directs, coordinates and supervises the activities on infrastructure support for Member States interested in nuclear power, planning and support for Member States' first nuclear power project and development of future nuclear infrastructure arrangements in accordance with Member States' needs, and who monitors their implementation; (2) a substantive expert contributor who manages and contributes to projects of particular complexity and/or sensitivity; (3) a scientific secretary to international scientific meetings related to the future application of nuclear power who as such oversees preparation and editing of scientific reports, manuals, proceedings and other scientific publications; and (4) a coordinator of inter-agency collaborative projects within the UN system who reviews and provides systematic overviews and prepares technical documentation and papers for discussions.

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

Upcoming Meetings in 2008

Start Date	End Date	Title	Location	Country	Scientific Secretary
03 Jun	05 Jun	Preparatory meeting for the International Conference on Opportunitites and Challenges for Water Cooled Reactors in the 21st Century	VIC	Austria	Kang, Ki Sig
23 Jun	27 Jun	Workshop on Natural Circulation Phenomena and Modelling in Water-Cooled Nuclear Power Plants	ICTP Trieste	Italy	Cleveland, John
01 Jul	03 Jul	RCM of CRP on advances in nuclear power process heat applications	VIC	Austria	Khamis, Ibrahim
01 Jul	04 Jul	TM to coordinate case studies on competitiveness of small and medium sized reactors (SMRs) in different applications	VIC	Austria	Kuznetsov, Vladimir
08 Jul	11 Jul	TM on HTGR design and technology - economics modelling	VIC	Austria	Tyobeka, Mzubanzi Bismark
10 Jul	11 Jul	13th INPRO Steering Committee Meeting	VIC	Austria	Rao, Atambir Singh
22 Jul	25 Jul	RCM of CRP on heat transfer behaviour and thermo-hydraulics code testing for supercritical water cooled reactors	VIC	Austria	Cleveland, John
23 Jul	25 Jul	TM on Issues Improving Prospects of Financing Nuclear Power	VIC	Austria	Li, Xiaoping
28 Jul	30 Jul	TM on information exchange on advances in nuclear desalination technologies	VIC	Austria	Khamis, Ibrahim
28 Jul	30 Jul	TM on information exchange on advances in integrated nuclear desalination systems	VIC	Austria	Khamis, Ibrahim
25 Aug	27 Aug	RCM on review and benchmark of calculation methods for structural integrity assessment of reactor pressure vessels during pressurized thermal shocks	VIC	Austria	Kang, Ki Sig
25 Aug	28 Aug	TM on non-electric applications of nuclear energy	Seoul	Korea, Republic of	Khamis, Ibrahim
01 Sep	04 Sep	TM on objectives of design and technology development for innovative SMRs	VIC	Austria	Kuznetsov, Vladimir
01 Sep	03 Sep	TM on the Status of Hydrogen Production	VIC	Austria	Khamis, Ibrahim
01 Sep	03 Sep	Advisory meeting with nuclear hydrogen experts	VIC	Austria	Khamis, Ibrahim
16 Sep	19 Sep	Workshop on Best Practices on Heavy Water Reactor Operation	Toronto	Canada	Choi, Jong-Ho
22 Sep	25 Sep	RCM of the CRP on Benchmark Analyses of Sodium Natural Convection in the Upper Plenum of the MONJU Reactor Vessel	VIC	Austria	Stanculescu, Alexander
22 Sep	26 Sep	Workshop on neutron fluctuations, reactor noise, and their applications in nuclear reactors	ICTP Trieste	Italy	Glockler, Oszvald
24 Sep	26 Sep	RCM of CRP on 'Control Rod Withdrawal and Sodium Natural Circulation Tests performed during the PHENIS End-of-Life-Experiments'	VIC	Austria	Stanculescu, Alexander

Start Date	End Date	Title	Location	Country	Scientific Secretary
02 Oct	03 Oct	TM on HTGR economic analysis	Washington D.C.	USA	Tyobeka, Mzubanzi Bismark
06 Oct	09 Oct	Workshop on Steps for Conducting Nuclear Power Plant Technology Assessments	VIC	Austria	Sollychin, Rayman
13 Oct	17 Oct	TM on Maintaining and Operating the Power Reactor Information System (PRIS) database and its products	VIC	Austria	Mandula, Jiri
15 Oct	16 Oct	TM of in-service inspection qualification bodies for NPPs/ 3rd International Workshop of Qualification Bodies	VIC	Austria	Glockler, Oszvald
20 Oct	23 Oct	TM on Design Features of Advanced Sodium Cooled Fast Reactors with Emphasis on Economics	VIC	Austria	Stanculescu, Alexander
20 Oct	23 Oct	TM to initiate preparation of a report on competitiveness considerations for small and medium sized reactors (SMRs) in different applications	VIC	Austria	Kuznetsov, Vladimir
03 Nov	06 Nov	RCM of CRP on natural circulation phenomena, modelling and reliability of passive systems that utilize natural circulation	VIC	Austria	Choi, Jong Ho
03 Nov	07 Nov	RCM of CRP on Small Reactors without On-site Refuelling	VIC	Austria	Kuznetsov, Vladimir
03 Nov	06 Nov	TM on the impact of digital instrumentation and control (I&C) technologies on the operation and licensing of nuclear power plants	Beijing	China	Glockler, Oszvald
10 Nov	14 Nov	RCM of CRP on conservation and application of HTGR technology	VIC	Austria	Tyobeka, Mzubanzi Bismark
17 Nov	20 Nov	TM to review the TECDOC 'Options to enhance proliferation resistance and security of NPPs with innovative SMRs'	VIC	Austria	Kuznetsov, Vladimir
24 Nov	28 Nov	TM on fuel handling systems of sodium cooled fast reactors	Kalpakkam	India	Stanculescu, Alexander
10 Dec	12 Dec	TM to develop a comprehensive report on the international status and prospects of nuclear power	VIC	Austria	Facer, Robert Ian

IAEA International Atomic Energy Agency

Nuclear Power Newsletter
Vol. 5, No. 2, June 2008

08-22721

Wagramer Strasse 5, P.O. Box 100, A-1400 Vienna, Austria

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

Printed by the IAEA in Austria, June 2008