

# **PROGRESS REPORT**

(November 2003 – October 2004)

**EXTRABUDGETARY PROGRAMME  
ON THE SAFETY OF NUCLEAR INSTALLATIONS  
IN THE SOUTH EAST ASIA, PACIFIC AND FAR EAST COUNTRIES**

INTERNATIONAL ATOMIC ENERGY AGENCY

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**International Atomic Energy Agency**  
**Extrabudgetary Programme (EBP) on the Safety of Nuclear Installations**  
**in the South East Asia, Pacific and Far East Countries**

**PROGRESS REPORT**

November 2004

**I. INTRODUCTION**

This report describes the activities implemented from November 2003 until October 2004 and those further planned for 2004. Activities implemented from April 2003 to October 2003 were presented earlier in the PROGRESS REPORT, EBP-ASIA-140, which was distributed to all participating countries November 2003.

**II. ACTIVITIES IMPLEMENTED FROM NOV. 2003 TO OCT. 2004**

**II.1. PROGRAMME MANAGEMENT**

**II.1.1. Technical Meeting**

A Technical Meeting (TM) was convened by the IAEA to review progress and further activities of EBP. The plenary meeting was held from 9 to 11 December 2003 and attended by 29 representatives from 12 countries.

Bilateral consultation meetings between the IAEA and representatives from the 6 countries in the region were held on 8 December to discuss national activities for 2004.

At the plenary meeting, following agenda items were presented and followed by discussion:

- Review of the EBP Activities;
- Review of ANSN Activities;
- ISE and Future Assistance Needs;
- Strategy for 2004 and beyond; and
- Work Plan for 2004.

The meeting report (EBP-ASIA-143) was distributed to all members of EBP and is available on the Asian Programme Management Database (APMD).

**II.1.2. Asian Nuclear Safety Network (ANSN)**

*(i) Steering Committee*

At the Technical Meeting of EBP in December 2003, the establishment of a Steering Committee (SC) to coordinate the implementation of the ANSN was endorsed and China offered to host the first SC meeting.

The Beijing Institute of Nuclear Engineering (BINE), which operates the China ANSN Hub, hosted the meeting 22 – 26 March 2004 at Beijing, China. Thirty-eight (38) participants from eleven (11) countries attended the meeting.

The Terms of References for the SC were adopted and Mr. T. Yokoyama, Executive Advisor, Japan Nuclear Energy Safety Organization (JNES), was designated by the IAEA as Chairman of the SC.

Three topical groups (TGs) established dealing respectively with: Education and Training (E&T) to be chaired by Japan; Safety Analysis to be chaired by Korea; and Operational Safety to be chaired by China. A fourth TG on Safety Culture has been proposed by Korea. Further consultation will be made to avoid duplication with the activities of the Forum of Nuclear Cooperation in Asia. An IT Support Group was also established and will be initially coordinated by the IAEA. The mission and composition of the TGs have been agreed. The TG on E&T, the TG on Safety Analysis and the IT Support Group have started their activities.

Bilateral discussions have been conducted between the IAEA and participating countries to identify specific needs for the IAEA assistance related to the establishment of National Centres.

Technical and coordination matters related to the full implementation of the ANSN have been discussed and an action plan for 2004 was agreed upon. Results will be reported to the EBP Technical Meeting in Vienna in December 2004. The establishment of the SC is an important step towards ensuring ANSN ownership to the participating countries and its sustainable future operation. This is of utmost importance for the long-term operation and sustainability of the ANSN.

*(ii) Topical Group Meeting on Safety Analysis*

The first meeting of the TG on Safety Analysis was hosted by the Korean Institute of Nuclear Safety (KINS) and was held 20-23 April 2004 at Daejeon, Korea.

The objective of the meeting was to provide a forum for an exchange of experience in the area of safety analysis and to discuss how to maintain and improve the knowledge acquired during the workshops on Safety Analysis Methodology and Use of Computer Codes held in 2001 and 2002.

One staff member of the IAEA, nine participants from China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam and five from KINS attended the meeting. Mr. Andong Shin, KINS tentatively played a role of a coordinator for this topical group.

This meeting included:

- An overview of the ANSN Hub and Topical Group;
- Suggestions for the active utilization of the ANSN Hub;
- A review of the workshops in 2001 and 2002;
- An exchange of experience in safety analysis, including computer code calculation;
- Discussion on national activities in safety analysis in 2004; and
- Discussion of future activities in the Topical Group on Safety Analysis.

To facilitate the active participation in and utilization of the ANSN Hub on Safety Analysis, a contact person for each country was selected and all the participants in the meeting agreed to provide useful information on reactor design and safety issues in

each country for inclusion in the Hub. The participants agreed to encourage other people in their countries interested in the safety analysis of research reactors to join the ANSN Hub/National Centers and to share information and experience within the framework of the ANSN.

The next meeting is scheduled to be held in March or April 2005 and will constitute a combination of the workshop on safety analysis with the offline meeting on the Topical Group on Safety Analysis.

*(iii) IT Support Group Meeting*

ANSN consists of independent decentralized but interconnected computer systems developed by the participating Member States and the IAEA. Development of such a complex computer network requires a very close coordination. For this reason, a committee, the Information Technology Support Group (ITSG), consisting of key information technology personnel, was created.

The first meeting of this group meeting was hosted by the Nuclear Energy Control Board of Indonesia (BAPETEN) and was held 07 - 10 June 2004 at Jakarta, Indonesia. The purposes of this meeting were; to agree on software development priorities and timeframes; to decide on the implementation methodology; to resolve certain quality related issues; to introduce ANSN concepts and technical aspects to the National Centers and to assess and plan technical assistance to National Centers in developing their IT systems. Specific technical and advisory assistance were also provided to the IT staff in Indonesia.

Twelve IT experts participated in this meeting. They are representatives on IT development from each ANSN National Center, Hub and the IAEA.

Presentations were given by all National Centers (Indonesia, Malaysia, Philippines and Vietnam). This was done to provide an overview of the existing IT infrastructures and the expectations for establishing IT systems that will support the national knowledge management efforts. Individual meetings were held with each of the participants from the National Centers to assess the necessary IAEA technical assistance. Subsequently a tentative plan for the technical assistance in 2004 and 2005 was made.

All Hubs (China, Korea, Japan and IAEA) gave presentations on the current status of development and each gave a presentation on experiences, lessons learned and specific advice on how to establish a National Center. The essence of the presentations will be consolidated in a special document outlining best practices including hardware, software and human resource requirements. This will serve as a good preparation tool for the National Centers before engaging in the actual development work.

Possible software implementation options were demonstrated and discussed for the outstanding work of ANSN. The discussions concluded with an agreement on a work plan and an implementation methodology that meets the requirements of all centers.

General and specific quality control issues related to the ANSN content were discussed. It was agreed to implement a stricter quality control and to use automated checking to the extent possible. However, content quality also very much depends on human intervention and hence it was also agreed that quality assurance procedures at

each Hub should be enforced. A guidelines document for data entry was reviewed and improved.

The meeting gave the National Centers a very important introduction to the implications and benefits of establishing a computer based knowledge management system. Furthermore, it was very encouraging to see that the National Centers are now getting increasingly interested and involved in the ANSN activities.

*(iv) Topical Group Meeting on Education and Training*

The first meeting of the TG was hosted by JNES and was held 02 - 03 September 2004 at Tokyo, Japan.

The major purpose of the TG on Education and Training (E&T TG) is to collect information on events and relevant knowledge available in the area of E&T and to make a quality checking on the material before it is uploaded to ANSN. Since this was the first meeting, the major purpose was launch of E&T TG under the framework of ANSN by discussing work scope and plans of this group.

The last two days of the Regional Workshop on Education and Training for Nuclear Safety implemented under the frame of EBP were dedicated to this meeting. Participants to the Workshop from 10 member countries (China, France, Germany, Indonesia, Japan, Korea, Malaysia, Philippines, Thailand and Vietnam) attended this meeting.

Mr. F. Kudo from JNES, who was designated as a Coordinator of E&T TG at the first ANSN SC, chaired the meeting. He presented several proposals for future activities such as the uploading of materials already available through the APMD and a caravan to promote the ANSN in Member States.

Issues identified during the meeting include:

- Some of the participants of the meeting were not fully familiar with ANSN and not clear about their specific responsibilities. Moreover it was not clear for some of them if they will be the contact point for follow-up activities;
- There was a very unequal level of understanding of the structure of the database and how to use it;
- Some IT problems observed during the coordinator's presentation presented full demonstration of the network;
- Relevant organizations in the field of education and training from countries with established hubs and national centres are still insufficiently involved in the ANSN activities;
- From the materials uploaded by different hubs it became clear that a quality control system for entering data should be agreed upon and implemented in all the hubs; and

### **II.1.3. Database**

The new web version of the database (renamed APMD = Asian Programme Management Database) was released in February 2004 to registered users. The new features are a complete new page design consistent with the Asian Nuclear Safety Network, a full text search and a direct link to the IAEA Technical Co-operation database TC-PRIDE. The APMD continues to present the basic information on activities supported by the extrabudgetary programme (titles, dates, venues,

objectives, status, technical officers, outside experts, national counterparts and results) as well as bilateral agreements, summary and mission reports, training material, Country Nuclear Safety Profiles (CNSPs) and Nuclear Safety Action Plans (NSAPs).

It is continuously being updated and available for registered users via internet.

#### **II.1.4. Integrated Safety Evaluation (ISE)**

The ISE is a self-assessment process by which Member States can evaluate their safety practices against IAEA nuclear safety standards. It was agreed at the Technical Meeting (TM) of November 2002 that the ISE report would be the main tool for the Member State and the IAEA to prioritise activities and assistance requests.

Initial ISE reports were presented at the December 2003 TM. Reports will be revised annually to address the progress achieved in each country on the following topics:

- Legal and governmental framework for safety
- Safety of research reactors
- Education and training
- Nuclear power plant safety (China only)

To assist in the process, the IAEA Secretariat prepared a guidance document in early 2003, entitled “Guidelines for ISE of Nuclear Installations” (EBP-ASIA 120).

In 2004, the IAEA developed additional training material to further instruct participants in the purpose, scope, and methods to be used in the ISE process. In particular, the package instructs participants on how to perform the self-assessments and evaluate progress in meeting international safety norms. The training package consists of a viewgraph package and a related text. The package has already been used at EBP workshops.

Also in 2004, most of the Country Nuclear Safety Profiles (CNSP) were updated by the IAEA Secretariat and submitted to the Member States for review. The CNSP provide descriptions of Member State nuclear safety structures, including the governmental organizations and legislation that make up the regulatory framework of the nuclear safety regime, as well as institutionalised safety practices in the Member State nuclear facilities. The CNSP provide descriptive supplement to the analysis in the ISE.

The respective countries are invited to present up-dated ISE results at the TM in December 2004.

## **II.2. REGIONAL ACTIVITIES**

### **II.2.1. Development of Education and Training Materials**

The Agency continues to implement the Strategy for Education and Training in Nuclear Safety aiming to achieve sustainable education and training programmes in Member States.

An essential element of the strategy consists in the preparation of training materials to support local instructors in the organization and conduction of training events. Training materials are being prepared under the format of textbooks, packages for course organization and distance learning tools.

### *Textbooks*

A textbook is a reference text for all topics included in a specific course. In the period covered by this report (November 2003 – October 2004) three new titles were issued:

- EDF Nuclear Power Plant Operating Safety Handbook;
- Technology and Safety of TRIGA research reactors; and
- EDF Memento de la Radioprotection en Exploitation (in French only).

These materials are available through the Agency web site and under the ANSN in HTML and PDF formats.

### *Packages for Course Preparation*

These packages consist of a set of documents that assists training centres to organize a course on a specific topic and help lecturers to prepare their presentations. The package contains a manual on organizing courses, viewgraphs with associated text and reference material. The following titles were issued in 2004:

- PSA level 2
- Research Reactor Ageing and Self-assessment Methodology
- Safety Assessment of Nuclear Power Plants to Assist Decision Making
- Ageing Management of Nuclear Power Plants Components Important to Safety

These materials are available upon request or can be downloaded directly from the ANSN.

### *Computer Based Tools*

With the increased availability of personal computers, many staff trainees have access to a computer in the workplace and this has stimulated the development of computer-based tools. A series of multi-media titles, consisting of videos and synchronized PowerPoint slides, based on the IAEA safety standards and other relevant documents were started in 2003. Thirteen titles were issued in 2004:

- Modifications to Nuclear Power Plants, NS-G-2.3
- Fire Safety in the Operation of Nuclear Power Plants, NS-G-2.1
- Code of Conduct on the Safety of Research Reactors, 2004
- Seismic Design and Qualification for Nuclear Power Plants, NS-G-1.6
- Site Evaluation for Nuclear Installations, NS-R-3
- Core Management and Fuel Handling for Nuclear Power Plants, NS-G-2.5
- External Human Induced Events in Site Evaluation for Nuclear Power Plants, NS-G-3.1
- Regulatory inspection of nuclear facilities and enforcement by the regulatory body, GS-G-1.3
- Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants, NS-G-2.2
- Periodic Safety Review of Nuclear Power Plants, NS-G-2.10
- Organization and staffing of the regulatory body for nuclear facilities, GS-G-1.1
- The Operating Organization for Nuclear Power Plants, NS-G-2.4
- Meteorological Events in Site Evaluation for Nuclear Power Plants, NS-G-3.4

These materials are available upon request.

### **II.2.2 Translation and Utilization of the Materials for Training**

The participating countries, which organize the national training activities, can be supported to translate and distribute the relevant materials at the training activities.

After the successful completion of the first National Basic Professional Training Course in Indonesia, ten reports translated for the course have been uploaded into BAPETEN's ANSN portal web page and for further utilization by Indonesian professionals.

The National Basic Professional Training Course on Nuclear Safety was implemented from 8-19 November by VAEC, Vietnam. Four IAEA safety-related documents related to the course topics have been translated into the national language by the national trainers in Vietnam and distributed to the course participants.

Those translated materials in the format of electronic files will be uploaded on VAEC web page for further utilization in Vietnam.

### **II.2.3. Regional Standard Safety Culture Workshop**

Date: 10 - 14 November 2003

Place: Daejeon, Republic of Korea

Objective and results:

The objective of the workshop was to give senior managers within the regional group an understanding of the concept and practical principles of Safety Culture and how this can be developed through the management of safety. Following the workshop, participating countries are expected to develop and implement action plans for their own Safety Culture Enhancement Programmes (SCEPs), in cooperation with other members of the regional group.

An IAEA team, consisting of five external experts and one IAEA staff member, was formed to prepare and deliver the workshop material. Overall, the concepts described in the IAEA TECDOC 1329 (Safety Culture in Nuclear Installations) were used as a guiding reference for the presentation material. 24 participants from China, Indonesia, Malaysia, Philippines, Thailand and Vietnam were participated the WS.

The workshop was well received by all participants. The training objectives were realized using a combination of presentations by the IAEA team and group discussions on the topics. The participants demonstrated a high degree of commitment and willingness to actively participate in the activities. An Outcome Statement for use in action plan development was prepared.

Regional Group representatives unanimously agreed to form a Safety Culture Forum for implementation under the Asian Nuclear Safety Network (ANSN). IAEA Safety Culture Services, which are available to the Regional Group organizations, were discussed and the countries represented will consider these for integration with their action plan.

### **II.2.4. Regional Workshop on Preservation of Research Reactors in Shutdown State and Decommissioning**

Date: 02 - 06 February 2004

Place: Tokai-mura, Japan

**Objective and results:**

The objective of this workshop was to assist owners, operators and regulators of research reactors currently in an extended shutdown state and other persons involved in decision making for future facility use, either continue operations or permanently shutdown the facility for decommissioning.

Two external experts and one IAEA staff member provided lectures. The Workshop had 19 full-time participants from 6 countries (China, Indonesia, Malaysia, Philippines, Thailand and Vietnam). The participants came from regulatory bodies and operating organizations, and were, generally, senior staff with managerial responsibilities in the area of research reactor safety.

The presentations were structured around two themes, Extended Shutdown and Decommissioning of Research Reactors. For both themes the IAEA guides were presented followed by external experts' introduction of experiences in these fields. Based on the French reactor TRITON a practical exercise on decommissioning was conducted. Finally the participants presented each country's present situation and future perspectives.

At the closing session, it was proposed to create a thematic group in the near future to evaluate the progress in this area. The group should be organized within the framework of the ANSN.

**II.2.5. Regional Training Course on Train the Trainers in Nuclear Safety**

Date: 19 April - 07 May 2004

Place: Argonne, IL, USA

**Objective and results:**

The objective of the course was to provide training to national trainers in the methodology of training, course organization, and in the use of the various training materials that have been developed by the IAEA for training in nuclear safety. This training is part of the IAEA's strategy for education and training in nuclear safety to ensure that a sustainable programme is established in Member States and that the knowledge gained from the IAEA training events is effectively disseminated in the home countries of participants.

Seventeen participants attended the training course, representing eleven countries including Indonesia and Vietnam. Since the training course was jointly held with the IAEA's Technical Co-operation Project (PER/9/061), participants from nine countries other than EBP member also attended. The participants represented regulatory bodies and their TSOs (7), operating organizations and their TSOs (4), universities and technical institutes (5), and government (1).

The training course was conducted over a three-week period. During the first week, the Systematic Approach to Training (SAT) was presented. In the second week, the emphasis was on demonstration of the IAEA safety training materials, discussion of the use of simulators in education and training, a visit to the training centre and full scope simulator of a large NPP operating organization, and discussion of training in the Japanese regulatory body. Additional topics related to distance learning and knowledge sharing networks. The third week included a visit to a university research reactor used for education and training, as well as further discussion of regulatory

body training practice (USNRC), and networking. In addition to the lectures presented by invited speakers, the participants were asked to make a brief presentation on their national education and training program and experiences. As a final exercise, the participants were asked to work in teams to develop a new approach to the Basic Professional Training Course in Nuclear Safety in which part is taught as a national course and part as a regional course.

### **II.2.6. Regional Workshop on Education and Training for Nuclear Safety**

Date: 30 August - 03 September 2004

Place: Tokyo, Japan

Objective and results:

The objective of this workshop was to exchange information on results of IAEA evaluation of nuclear safety education and training and specific needs of the countries in the region, and to explore means to enhance regional co-operation.

The Workshop had 30 full-time participants from 10 countries (China, France, Germany, Indonesia, Japan, Korea, Malaysia, Philippines, Thailand and Vietnam). The participants came from regulatory bodies, operating organizations and universities, and were, generally, senior staff with managerial responsibilities in the area of education and training. The lecturers were six external experts and two IAEA staff member.

The workshop was opened by a presentation on the IAEA strategic plan for education and training and an overview of the resources available in the IAEA. A newly prepared training material on the safety of TRIGA type research reactors was presented and discussed.

Member States presented the status of the education and training programmes in nuclear safety in their respective countries. The presentations followed a structure defined in a guideline distributed to the participants in advance. The main part of the presentations addressed the “Advisory Review Mission on Education and Training” conducted in 2002 and the actions taken to implement the recommendations provided. Training plans for 2004 and 2005 were also presented. On the third day afternoon the participants were divided in three sub-groups to identify common needs on training for regulatory bodies, operating organizations and academic training. Each group’s results were summarized and presented in the last session of the day.

The last two days of the workshop were dedicated to the ANSN Topical Group on Education and Training. (Please see II.1.2.(iv))

### **II.2.7. Regional Training on Application of the Guidance in the Code of Conduct on the Safety of Research Reactors**

Date: 13 - 24 September 2004

Place: Argonne, IL, USA

Objective and results:

The objective of this training was to provide assistance in understanding and applying the guidance offered in the Code of Conduct on the Safety of Research Reactors. Argonne National Laboratory organized this training workshop.

All of the EBP participating countries were represented in the total of 17 participants. The first lecture covered the IAEA Safety Standards and other Agency documents that should be particularly useful in applying the Code of Conduct. At the next lecture, suggestions for applying a graded approach to application of the Code, including criteria that could be used in assessing the hazard potential of a reactor and suggestions for provisions for which grading is appropriate were presented. In addition, IAEA Safety Services that are available to Member States to support their application of the Code were discussed. This lecture included the IRRT, INSARR and Education and Training Review Services, IRSRR and INES, expert missions, training materials and training events.

Conduct of training events and development of training material will provide a way to disseminate the guidance in the Code and promote its use. Such events should enhance its beneficial effects and help focus attention in Member States to applying the guidance.

## II.3. NATIONAL ACTIVITIES

### II.3.1. China

#### (i) *Risk Analysis Report for Core Start-up without Neutron Source*

Date: 03 - 07 November 2003

Place: Tianwan NPP, Lianyungang, China

The purpose of the mission was to review the documentation provided by Jiangsu Nuclear Power Corporation (JNPC) to the IAEA on initial criticality of Tianwan NPP without neutron source and to provide JNPC with comments and recommendations for a safe start up of the plant.

The scope of the mission included the review of the neutron physics model used to predict the boron concentration for the critical condition of the core, the assessment of the risk associated with the first criticality taking into consideration all possible initiating events with potential effect on the reactivity of the core, and the assessment of the actuation of the reactor protection system with respect to sensitivity of instrumentation, safety set points and delay of the actuation.

Three external experts and one IAEA staff member formed the review team. Numerous Chinese experts from JNPC and the National Nuclear Safety Administration (NNSA) supported by Russian experts formed the counterpart.

Approximately 15 issues were discussed during the review meeting. An issue form was prepared for each safety issue. Comments and recommendations prepared by the review team were also discussed and clarified with the Counterpart. The draft mission report was prepared on site, presented and handed to JNPC on the last day of the Mission.

The information contained in the documents provided to the IAEA was considered generally good and the technical details appropriate for the purpose. No serious safety concerns were raised during the review. The review team made some

recommendations on practices of start up such as effective control and measurement of boron concentration in coolant.

*(ii) Workshop on Risk-informed Inspection Activities*

Date: 03 - 06 November 2003

Place: NNSA, Beijing, China

Objective and results:

The purpose of the workshop was to provide an overview of the risk informed regulation concept under implementation in a number of states and discuss details of the latest developments in the field of risk informed regulatory inspections.

A team of three external experts and one IAEA staff member held this workshop at NNSA Headquarters. The workshop was attended by more than 40 participants from NNSA senior management and professional staff, design and engineering consultant organizations, NPP operator and utility organizations who have had some experience in the performance of Probabilistic Safety Assessment (PSA) and were interested to learn how the insights from such analyses can be used to optimise the regulatory body inspection activities.

The IAEA staff member presented information on experience gained so far with the implementation of risk informed regulation concept worldwide making emphases on the problem areas and issues which need further development, while the external experts presented very detailed information how they risk informed inspection programme had been developed and is currently implemented.

Several discussions were held on the selection of risk informed performance indicators, the establishment of indicator thresholds to distinguish between different level of performance, as well as development of response actions matrix which takes into consideration the value of performance indicators and significance of the inspectors' findings. The discussions held helped participants to better understand the way in which PSA insights can be used to support decision making on safety matters and will facilitate NNSA to establish a regulatory position on this issue.

The high interest of Chinese participants in the subject was demonstrated by their active participation in discussions and debates and sharing their opinion on the way PSA insights should be used in China.

*(iii) Workshop on WWER Horizontal SG Tubing & Primary Composite Material Pipe Examination Technology*

Date: 16 - 21 November 2003

Place: RINPO, Wuhan, China

Objective and results:

The purpose of this mission was to give lectures on examination requirements, practices, experience and technology of eddy current testing (ECT) for steam generator tubing and ultrasonic examination for primary composite material pipe. Chinese participants were requested to understand the technology and standards, and work out the PSI/ISI strategy for Tianwan NPP.

Twenty-three experts from China, Czech Republic, USA and the IAEA participated in the Workshop, which was hosted by the Research Institute of Nuclear Power Operations (RINPO).

The following topics were addressed by presentations and discussions during the Workshop:

- Steam generator (SG) operating experience, Tianwan NPP status;
- Code requirements;
- Design and materials;
- Approaches to in-service inspection (ISI) qualification;
- ISI qualification of SG tubing and dissimilar welds;
- SG tubing examination techniques; and
- Dissimilar welds examination techniques.

It is recommend exploring possibilities to assist China in connection with Tianwan plant and to some extent with other plants and include in the ongoing/planned IAEA activities for China the following topics:

- Development and implementation of the qualification of ISI;
- Risk informed ISI and maintenance; and
- SG integrity technology including:
  - development of water chemistry recommendations for both the primary and secondary portions of the steam generator;
  - recommendations for best practices concerning tube integrity; and
  - recommendation for inspection of the steam generator shell.

*(iv) International Peer Review of PSA (IPSART) for Qinshan Nuclear Power Plant*

Date: 01 - 10 December 2003

Place: Qinshan NPP (Phase-I), Haiyan, China

Objective and results:

The objective of the mission was to perform a review of the Level-1 Internal Events PSA completed recently for Qinshan NPP (Phase-I).

The IAEA review team consisted four external experts and one IAEA staff member. The IAEA TECDOC 832 "IPERS Guidelines for the International Peer Review Service" was used for review. The review uses two different and complementary approaches: the first one consists of surface checks of the total study regarding completeness, consistency and coherence of the overall model, and the second one consists of detailed spot checks. Discussions between the experts and PSA team members ensured state-of-the-art knowledge transfer and that all experts' comments were understood by the PSA team.

The mission started with a presentation on "Overview of IAEA Safety Services and IPSART Mission Objectives and Procedure". It was followed by a presentation of the counterpart on major plant design features and PSA results. The rest of the first week was fully dedicated for intensive review work. A half-day plant walk-down was also performed.

A draft mission report comprising all the review findings was compiled and forwarded to the counterpart.

The IAEA IPSART mission identified a significant effort of the plant management and the PSA team to develop a comprehensive PSA model of the operating plant unit and establish a capable internal PSA team. The plant has a strong commitment to develop a “Living” PSA model and use the PSA in the risk-informed decision-making process dealing with safety-related plant modifications and operational applications. The plant managers showed a strong interest to feedback the review findings and invite a Follow-up IPSART Mission.

(v) *Pre-OSART Mission to TNPP (Postponed from 2003)*

Date: 26 January – 12 February 2004

Place: Tianwan NPP, Lianyungang, China,

Objective and results:

The objective of the mission was to review operating practices in the areas of Management Organization and Administration; Training and Qualification; Operations; Maintenance; Technical Support; Radiation Protection; Chemistry; Emergency Planning and Preparedness and Commissioning. The plant is under commissioning and the review was focused on the operating organization including commissioning activities that influence the future safe operation of TNPP. A review of Safety Culture has been integrated into the review.

The team was composed of seven external experts and three IAEA staff. During the mission, the team reviewed many of the plant's programs and procedures in depth, examined indicators of the plant's performance, observed work in progress and held in-depth discussions with plant personnel.

The conclusions of the Pre-OSART team are based on the plant's performance compared with the IAEA Safety Standards and good international practices.

Although it is recognized that formal ownership of many areas of the plant still rests with the contractors, the Pre-OSART team concluded that the lack of accountability within parts of the JNPC workforce is hindering the development of the authorities that will be required to exert to ensure safety in nuclear operations. It is expected, however, that this problem will be resolved as the JNPC team gain further nuclear operating experience. A commendable start has also been made towards resolving this issue by the actions taken for developing a learning organization. This effort, and other initiatives for advancement of practical management skills, should be encouraged.

The Pre-OSART team concluded that the managers of TNPP have adopted the safety messages “Safety First, Quality First” as a tool to continuously improve the operational safety at the plant. The team found good areas of performance.

TNPS management expressed a determination to address the areas identified for improvement and indicated a willingness to accept a follow up visit in about eighteen months.

(vi) *TNPP PSA Level 2 (postponed from 2003)*

Date: 23 - 27 February 2004

Place: Tianwan NPP, Lianyungang, China

### Objective and results:

The objective of this mission was to review the PSA level 2 methodologies, the dominant containment failure sequences, their frequencies, and the radioactive source term related to releases to the environment. This review followed earlier two reviews of the Level 1 PSA, which were carried out on November 1999 and November 2000.

St. Petersburg Atomenergoproect (SPAEP) is responsible for carrying out the PSA for Tianwan NPP. A Level-2 PSA models deals with severe accident progression from the onset of core damage to potential radioactive releases from the containment. Tianwan NPP is the first NPP in the world with a core catcher. Therefore the Level 2 PSA poses new methodological challenges.

A team of six external experts and one IAEA staff member carried out the review during a period of five days. Eight experts from the Russian PSA team were available to provide additional information. The PSA team and senior staff from Tianwan NPP attended the meetings. In addition six staff from NNSA and its supporting organisation the Nuclear Safety Centre (NSC) participated as observers.

Since Tianwan NPP was still under construction, some system configurations were subject to change and operating procedures, in particular, severe accident procedures had not yet been fully developed. Thus, the PSA models some of these aspects whereas others were not yet included. The main results of the review were summarized at an exit meeting and a draft report was left with the counterpart.

The new advanced passive designs pose particular challenges for PSA analysis due to the low probabilities and the importance of phenomenological aspects. At present, the results of the Level 2 PSA are indicative only of the safety level of the plant. A follow-up review will be necessary after the improvements have been incorporated.

In addition, many staff from the regulatory body attended the meeting. At present, NNSA is reviewing the Level 1 PSA, making use of the results of the earlier IAEA missions. The next step will be to review the Level 2 PSA. Thus, the mission was also of benefit to the regulatory body.

### *(vii) Preparatory Meeting for the Follow-up IRRT Mission*

Date: 31 March - 02 April 2004

Place: NNSA, Beijing, China

### Objective and results:

The objective of this meeting was to discuss on preparation of the Follow-up International Regulatory Review Team (IRRT) Mission to China with NNSA. In response to a Full-Scope IRRT mission that took place in October 2000 at NNSA, a Follow-up IRRT Mission was requested by NNSA to review the progress that has been made regarding the implementation of recommendations and suggestions.

A date for the Follow-up Mission has to be assigned either at the end of September or in November/December. It was decided that the IAEA should make accordant proposals as soon as possible depending on the availability of the designated experts. The team should consist of a team leader and four external reviewers. Regarding the participation of an observer NNSA bids Japan welcome to nominate a Japanese observer to the envisaged Follow-up Mission in Beijing.

Agreement was reached on the preparation and the scope of the mission. It was confirmed that the requested mission should cover the same subject areas that were under review during the preceding IRRT mission in October 2000.

*Note: Just after the Preparatory Meeting, the date of the Follow-up Mission was postponed from 24 November to 03 December 2004.*

*(viii) Workshop on Management and Assessment of SG Lifetime*

Date: 05 - 09 April 2004

Place: RINPO, Wuhan, China

Objective and results:

The objective of this workshop was to provide assistance for related experts in China to keep the SGs of PWR and CANDU type NPPs in safe and reliable operation. The Workshop was held at RINPO, which has a long history of SG research, design and maintenance and is selected as the key interface with the IAEA for this Workshop.

Twenty-seven participants attended the Workshop. In addition to RINPO, almost all NPP SG ageing management related organizations in China took part in the Workshop, including experts from NPPs in operating stage.

Four external experts and one IAEA staff member prepared lecture materials. At the last minute, one expert from USA could not make the Workshop but the team members presented all of his materials. Topics of Lectures are:

- Ageing management of NPP in general;
- Operation experiences (troubles) and failure mechanisms of SG;
- Design basis documentation of SG;
- Ageing management of SG;
- Operation of SG;
- Inspection of SG;
- Maintenance and repair of SG; and
- Regulatory practice on operation, inspection and maintenance of SG.

There were following four presentations from China:

- Research Programme on Ageing Management of SG at RINPO;
- Life Management of SG at Qinshan Phase-I NPP;
- Water Chemistry Existing Condition and Improving Intention of SG by Qinshan Phase-I; and
- Ageing and Life Management of SG at Daya Bay and Ling Ao NPP.

After each presentation from China, consultation sessions were held based on questionnaire prepared in advance by the above organizations.

Based on the discussions during the Workshop, Ageing Management Assessment Team (AMAT) type mission to Daya Bay NPP or Qinshan Phase-I NPP is recommended in order to improve ageing management of NPP as these plants are already 10 years in operation. During such a mission, specific attention should be paid on the review of ageing management of SG at the NPP.

*(ix) Workshop on Maintenance and Periodic Testing Programme with ISI Review (postponed from 2003)*

Date: 21-25 June 2004

Place: Tianwan NPP, Lianyungang, China

Objective and results:

The objective of this workshop was to give lectures for personnel of the Tianwan NPP on the implementation of maintenance and surveillance (periodic testing) programmes at nuclear power plants.

A team of two external experts and one IAEA staff member conducted the workshop during a period of five days at the premises of Training Centre of Tianwan NPP. Nineteen participants, fifteen of who were from Tianwan NPP, one from Daya Bay NPP and three from Qinshan Phase-II NPP attended the workshop.

The IAEA staff member delivered the introductory lecture on the surveillance and maintenance programmes at NPP based on the recently published IAEA Safety Guide NS-G-2.6, Maintenance, Surveillance and In-Service Inspection of Nuclear Power Plants. The IAEA staff member also presented two more lectures on the maintenance and surveillance challenges at nuclear power plants worldwide based on the findings of OSART missions (OSMIR data base). The presentations of the external experts were focussed on national approaches in surveillance and maintenance practices. Specific lectures were delivered on the safety aspects of maintenance, risk oriented maintenance approach and optimization of maintenance, optimization of outages and challenges to maintenance in WWER-1000 plants.

At the request of Tianwan NPP personnel, specific items were discussed during the workshop on some critical maintenance items at Tianwan NPP. These items included sensitive areas for thermal ageing due to thermo-hydraulic effects and the known diagnostic systems for thermal ageing, detection systems for small leaks and ISI of bare steel liner of the containment susceptible to corrosion.

Tianwan NPP is currently at the commissioning stage and the surveillance and maintenance programme and relevant procedures are in the process of development. Thus, the need to continue the transfer of know-how in this field is obvious. In particular, the interest of Tianwan NPP is to gain additional information on ageing management, especially ageing induced by thermo-hydraulic effects. Specific interest was expressed concerning the detection of small leaks and the detection systems implemented at Kozloduy NPP.

The maintenance programme currently includes preventive and corrective factors, which now tends to move towards prevention as a dominant factor for a long-term perspective. In this connection the condition monitoring system is currently in the process of establishing a method to define the most sensitive items to be included in the maintenance programme.

*(x) Workshop on Practical Aspects of ISI Qualification - Approaches in Europe and the U.S.*

Date: 28 June - 2 July 2004

Place: NRI, Prague, Czech Republic

Objective and results:

The objective of this workshop was to provide specific information on the practical implementation of ISI qualification programme based on the practical aspects of implementing the qualification for methodology outlined in the IAEA report, 'Methodology for Qualification of ISI Systems for WWER NPPs' (IAEA-EBP-WWER-11).

Nuclear Research Institute, Rez, (NRI) hosted this workshop. Eighteen experts from China (NPPs, RINPO, NNSA, TSOs and China Atomic Energy Authority), NRI, the Pacific Northwest National Laboratory (PNNL), USA and the IAEA participated in the workshop.

The Workshop addressed the issues as planned, i.e.:

- Developing the detailed scope of the qualification process;
- Developing the qualification procedure;
- The role of a technical justification;
- Evaluation and documentation of qualification results; and
- Results of applying the qualification process.

The discussions at the workshop confirmed that the implementation and use of the state-of-the-art practices and approaches are at rather different level in member states. This should be considered in planning future activities. The IAEA should assist member states in providing a forum for exchange of experience, and in promoting the implementation of safety related state-of-the-art practices (ISI qualification, risk informed ISI, etc.).

Follow-up activities should be focused on risk informed ISI, and on assistance in setting up and conducting a qualification pilot study. This effort should be further complemented with activities carried out on a regional basis also involving Japan and Korea.

*(xi) WS on Organization and Management of Refuelling Outage and Unplanned Outage*

Date: 11 - 15 October 2004

Place: Qinshan Phase-II NPP, Haiyan, China

Objective and results:

The objective of this workshop was to provide a forum for the exchange of information and experience in planning and execution of both planned and unplanned maintenance outages.

The workshop was presented by one staff member of the IAEA experienced in operational safety issues, together with three international experts from USA, Finland and Japan, experienced in planning, scheduling and executing outages at Nuclear Power Plants. 39 participants from QNPC (Qinshan Phase I), NPQJVC (Qinshan Phase II), TQNPC (Qinshan Phase III), Tianwan NPP and DayaBay NPP attended the workshop.

The IAEA staff member presented the agency programme for revision and development of Safety Standards and then the requirements of safety guide on Maintenance, Surveillance and In-service Inspection in NPPs, relevant to outage

management. Further presentations by the IAEA team were related to managing safety during outages (based on TECDOC-1315: Nuclear Power Plant Outage Optimisation Strategy), safety culture in maintenance (based on the draft Safety Reports Series “Safety culture in the maintenance of nuclear power plants”) and maintenance performance indicators (based on the draft “Indicators for Management of Safe Outage Optimisation in Nuclear Power Plants”).

The workshop consisted of national presentations on the following topics: determination of maintenance strategy; establishment of maintenance organization and interface relationship; organization, control, information feedback and coordination during outage execution period; handling of forced outage situations; equipments re-qualification; resource management of outage activity; long term outage planning management; tools and methods to perform outage planning; optimization of outage planning; management and coordination of multi-unit outage activities.

The maintenance philosophies used in the countries that provided lecturers covered a broad range of approaches with respect to preventive and corrective maintenance. The methods used for planning, scheduling and managing outages also showed different approaches. This enable the workshop participants to select optimum solutions for their own plants.

Participants appreciated the presentations on the relevant parts of the IAEA Safety Standards Programme and the TECDOC on “Nuclear Power Plant Outage Optimization Strategy”.

*(xii) WS on Ageing Management of Reactor Pressure Vessel (Including Oxidation Operation)*

Date: 18 - 22 October 2004

Place: Qinshan Phase-I NPP, Haiyan, China

Objective and results:

The purpose of this workshop was: to emphasize the role of the ageing/life management programmes of the reactor pressure vessel (RPV) in assuring a safe and reliable NPP operating cycle; to provide information from the IAEA guidelines and other guidance documents for ageing/life management programmes of RPV; to provide good practices, national and international policies and strategies in ageing/life management programme of RPV; to provide information on oxidation operation during shutdown period in PWRs; and to exchange information on current relevant activities in Chinese NPPs, especially Qinshan Phase-I NPP.

The IAEA mission consisted of four external experts from France, Japan, Korea and USA and one IAEA staff member. 34 Chinese participants joined the workshop, about 24 for ageing management of RPV and others for oxidation operation. They are from Qinshan Phase-I and II NPP, Daya Bay NPP, Nuclear Power Institute of China, China Institute of Atomic Energy and Shanghai Nuclear Engineering and Research Institute.

On the first and second day of this workshop, the IAEA staff member introduced relevant IAEA activities, especially about TECDOC 1120 on ageing management of PWR RPV and its draft addendum and external experts made their presentations.

On the third day, participants from Qinshan Phase-I NPP also made a presentation about their ageing management programme. The experts and participants discussed the current status and future tasks of the programme.

The last day, the oxidation operation during shutdown was discussed. A participant from Qinshan Phase-I NPP explained their current practice and status and then mission members made presentations about practices of their plants. A lot of questions were raised from Chinese participants.

Since Chinese NPPs have just started their ageing management programme, they are anxious to get information about practices in other member states. All participants showed positive interests in the workshop. About the ageing management programme of the Qinshan Phase-I RPV, the experts provided comments and suggestions.

### **II.3.2. Indonesia**

#### *(i) Follow-up of Seismic Safety Recommendations to the TRIGA II Bandung and Kartini Research Reactors*

Date: 03 - 05 November 2003

Place: Bandung, Indonesia

Objective and results:

The objective of this mission was to follow-up of the recommendations on seismic safety provided by the previous follow-up INSARR mission to the TRIGA-II (Bandung) and Kartini (Yogyakarta) research reactors, carried out in 11-15 March 2002.

One IAEA staff member and two external experts composed the IAEA team. The mission took place in Bandung at the Triga-2000 premises. The mission carried out a thorough review of the seismic hazard developed for the Bandung research reactor. The conclusion was presented at exit meeting, in Bandung. The IAEA team applied the new Safety Guide on “Seismic hazard evaluation for Nuclear Power Plants” (NS-G-3.3).

The IAEA team noted that some work has been implemented since 2002 following the IAEA recommendations, particularly in the collection of geotechnical data at the site through additional investigations. Contemporaneously, a research team has been set up, in charge of the development of the seismic hazard for the Bandung site. The same team may operate at Yogyakarta starting next year. However, Kartini issues have not been addressed at the mission due to the very preliminary stage of the relevant analysis.

The assessment of the seismic capacity of structures, systems and components will be reasonably completed at Bandung by 2004. A final review mission of the seismic issue should be planned not earlier than 2005 and only after completion of the seismic assessment. Documentation in English should be available to support the review by international experts.

Adequate competences are available in Bandung for a state-of-the-art completion of the required analyses.

It is recommended that the resources already trained by the IAEA under the Muria project (INS/9/021) be closely involved in this study.

*(ii) Radiological Consequences to the Environment during Normal Operation and Accident of RSG-GAS*

Date: 03 - 05 November 2003

Place: Bandung, Indonesia

Objective and results:

The purpose of this mission was to follow-up on the recommendations provided by previous follow-up INSARR mission to the RSG-GAS (Serpong) research reactor, carried out in 10-14 June 2002.

One IAEA staff member and two external experts composed the IAEA team. The mission took place in Bandung at the Triga-2000 premises.

The mission carried out a thorough review of the radiological dispersion studies carried out for the Bandung and Serpong reactor. The IAEA team applied the Safety Guide on the "Radiological Dispersion" (NS-G-3.2).

The translation into English of the relevant Safety Analysis Report Chapters (12 and 16) has been completed. However, significant resources have not been allocated for the improvement of the dispersion analysis.

A final review mission of the dispersion analyses for Bandung RR could be planned only after completion of the analyses and revision to the SAR being made available. Documentation in English should be available to support the final review by international experts.

*(iii) National Training Course on the In-service Inspection of Research Reactor*

Date: 06 - 16 July 2004

Place: Serpong, Indonesia

Objective and results:

This training course was conducted jointly between National Nuclear Energy Agency (BATAN) Serpong, Jakarta, and the IAEA at the Centre for Development of Research Reactor Technology, Serpong, Indonesia. This training course is also follow-up activity of the National Training Course on Ageing Management for Research Reactor, which took place July 14-22, 2003.

Twenty-three participants attended the entire training course. The training course included: theoretical lectures, practical work and presentation of inspection equipment. In the first week, two external experts of the IAEA team provided lectures. In the second week of the training course, an IAEA staff lectured 9 subjects:

- Integrated Safety Assessment of Research Reactors;
- Code of Conduct on the Safety of Research Reactors;
- Safety Requirements of Research Reactors;
- Incident Reporting System of Research Reactors (IRSRR);
- Results from Visual Inspection;
- Example of Electrochemical Experiments to determine the corrosion current;

- Example of calculation methods to estimate the penetration rate in the alloy materials;
- Maintenance, Periodic Testing and Inspections; and
- Documentation retrieval from IAEA WebPages.

The staff from BATAN will be able to implement the knowledge gained from previous related course and this last one and to elaborate the Ageing Management Program for their research reactors. As soon as this program will be developed, the IAEA may provide further assistance to BATAN, for a national training course on Inspection Practice.

Local experts performed some of the lectures related to inspection equipments. Most of the lectures provided by local experts were written in English.

The organiser requested to the trainees to answer a test questionnaire at the beginning and at the end of the training course. The evaluation of the answers shows an increase of 37% of the knowledge of trainees on ISI subjects. This approach may be applied to other training courses as an indicator of training efficiency.

*(iv) The 2nd National Basic Professional Training Course on Nuclear Safety*

Date: 19 - 30 July 2004

Place: Jakarta, Indonesia

Objective and results:

A national basic professional training course was organized to train senior staffs of BATAN and BAPETEN (the Nuclear Energy Control Board) on nuclear safety. This training was designed for the purpose of enhancing their knowledge of nuclear safety and helping participants to develop necessary skills and techniques in executing their tasks and in applying nuclear safety standards. During the training, each participant was expected to complete a basic assessment of nuclear safety. The first course was implemented from 25 August to 05 September 2003 and this course was the second one. Based on the review of results from the first course, a curriculum of this course was improved.

A unique aspect of the course was that, except for one IAEA staff member, Indonesian lecturers presented the lectures in the national language. Good use was made of national resources in organizing and presenting the course. Several IAEA Standards and other documents were translated by the Indonesian lecturers into local language for use in the Course, with Agency support.

There were 20 participants in the class, 10 each from BATAN and BAPETEN. An IAEA staff member presented lectures on the IAEA Safety Programs, Standards and Services, and on the Code of Conduct on the Safety of Research Reactors. In several cases, it was recognized that material provided in previous 'Train the Trainer' courses and in the Basic Professional Training Course given in 2001 for the EBP countries were used by Indonesian lecturers.

At the level of fundamentals, it was observed that Indonesia is well on the way to having a sustainable education and training program using their own resources. The number of young people in the class indicates an expanding program. It seems likely that the basic education and training will continue to be needed, at least in the near term. Continued support for education and training programs in nuclear safety is

clearly necessary. It is believed that there is progress in providing training material and in training the trainers, but a continued effort is needed. More emphasis on specialized training, with reliance on national resources for basic subjects may be appropriate.

(v) *National Training Course on Water Chemistry of Nuclear Reactor System*

Date: 30 August ~ 03 September 2004

Place: Serpong, Indonesia

Objective and results:

The main objective of the course was to enhance the knowledge on water chemistry of research reactors, improve the water chemistry management for the Indonesian research reactors (RR), and provide introductory knowledge on NPP water chemistry.

Twelve lecturers, including one IAEA staff member, two external experts from Japan and Korea and nine local lecturers delivered 47 sessions of lectures over the period of 9 days. Approximately 35 people attended the course, ranging from the reactor operators/technicians to reactor managers from three different reactors. During the course following lectures and discussion were implemented:

- Brief on IAEA's documents on Water Chemistry and Wet Storage of Spent Fuel from RRs.
- Examine the interaction of different RR materials with water, durability and corrosion, influence of water chemistry and other factors on research reactor materials degradation.
- Discuss RR Primary Water Quality and Specifications and Analytical Control of Primary Water Chemistry Quality.
- Describe Conditioning and Maintenance of Reactor Water Quality and Corrosion Surveillance Programmes.
- Provide basic understanding of water chemistry that affects corrosion in the reactor internal components, nuclear fuel and cooling systems. In particular, address effects of several factors on the development and growth of corrosion.
- Introduce NPP water chemistry for cooling systems, illustrating Japanese examples of BWR and PWR.
- Discuss Indonesian reactor operation experiences and problems associated with ageing.
- Introduction to the latest Non-Destructive Testing equipment.

Throughout the course the audience actively participated in discussions and asked questions. In some cases, an insufficient command of English kept the attendants from being more involved in discussions.

Based on the discussions held along the course, implementation of a water quality programme is strongly recommended for Indonesian RR operators. This programme should include all aspects of water management, from the raw water reservoir and secondary system to the primary circuit water quality. Laboratory quality control procedures and techniques and sampling guidelines should be properly addressed.

(vi) *Review Mission on Legislation and Regulation*

Date: 27 September - 01 October 2004

Place: BAPETEN, Jakarta, Indonesia

Objective and results:

The objective of the mission was to assist authorities of the Indonesian Nuclear Energy Regulatory Agency (BAPETEN) in reviewing the legislative framework for the present and future programme for the peaceful uses of nuclear energy in Indonesia. The specific objective of the mission was to review the existing Act No. 10, 1997 on Nuclear Energy, and to make recommendations for enhancing legal arrangements for nuclear safety and radiation protection consistent with IAEA safety standards and current international practice.

The IAEA team consisted of one external expert from USA and one IAEA staff member. The mission was conducted jointly with the IAEA Office of Legal Affairs within the framework of the TC Project RAS/9/023 "Legislation for Safe and Peaceful Nuclear Applications". The mission was conducted at the headquarters of the BAPETEN. The programme consisted of presentations, a seminar and discussions on Act No. 10, 1997 and associated Government Regulations.

The IAEA team noted that the current Act No. 10 on Nuclear Energy has provided an adequate legal basis for the regulatory control of nuclear energy and ionizing radiation in the Republic of Indonesia. However, to be consistent with recognized international practice and to implement Indonesia's international legal commitments, there is a need to promptly revise the Act to clarify certain basic regulatory functions and to remove some apparent gaps in coverage. In particular, priority attention will need to be given to the areas of nuclear security, emergency preparedness and the completion of domestic procedures for adherence to relevant international instruments already signed by Indonesia.

### **II.3.3. Malaysia**

(i) *National Training Course for Regulatory Supervision of a TRIGA RR*

Date: 19 - 30 July 2004

Place: Malacca, Malaysia

Objective and results:

The purpose of this training course was to train staff of the Atomic Energy Licensing Board (AELB) in carrying out inspections according to the IAEA standards and international practices.

This training course was organized and conducted by AELB from 19 to 30 July, with presentations predominantly by national lecturers. The IAEA team, consisting of one IAEA staff member and an external expert from USA lectured during the second week of the course.

Twenty-one staff members of AELB attended the national training course. Several of the participants were relatively young persons who joined the AELB quite recently. The course programme consisted of lectures/presentations, discussions, work group exercises, and the drafting of regulatory guidelines for the certification/re-certification of research reactor operators. The presentations were made by national lecturers from

AELB (including some of the participants), MINT, the National University of Malaysia, and the IAEA team. The course programme was based on the programme of the Basic Professional Training Course of the IAEA.

Prior to concluding the course, one full day was devoted to preparing a first draft of regulatory guidelines for the certification/re-certification of research reactor operators.

The discussions showed the importance of having an effectively independent regulatory body for regulatory supervision and control of the nuclear facilities. This is also important in the context of the Convention on Nuclear Safety, the Code of Conduct on the Safety of Research Reactors, and striving for excellence in nuclear safety.

The participation in the work group exercises was quite active and the discussions were quite lively. National courses of this nature are beneficial to the newcomers to an organization like AELB and help the staff that has participated in the IAEA activities to better pass on their knowledge. This was also underlined by the results of a test and an evaluation at the end of the course. However, this course has shown that the IAEA guidance is still required in establishing the programme and syllabus for such courses, and for providing lectures on the IAEA safety standards, the Convention on Nuclear Safety, and the Code of Conduct on the Safety of Research Reactors. This would contribute towards a better awareness and understanding of the IAEA safety standards, and foster their use and application.

#### **II.3.4. Philippines**

##### *(i) Establishment of the Preliminary Decommissioning Programme of the PRR-1*

Date: 21-25 June 2004

Place: Philippines

Objective and results:

The purpose of this mission was to provide assistance to the Philippines Nuclear Research Institute (PNRI) on preliminary planning for decommissioning of the Philippine Research Reactor (PRR-1), which was shutdown in 1988 due to a leak in the spent fuel storage pool liner. The reactor has not resumed operation due to aging related issues and seismic concerns. Despite the long time since the reactor's shutdown, no decision has been taken on the re-start of operation or the implementation of decommissioning. The need for decommissioning planning was recognized by the counterpart and resulted in an invitation to the IAEA to provide decommissioning expertise.

The mission consisted of two Agency staffs and presented lectures on the management of decommissioning projects and the regulatory requirements for decommissioning. Considerable discussion resulted from these presentations and the participants gained a better appreciation of the decommissioning process. Approximately 20 individuals participated in these discussions.

The counterpart was made aware of Agency publications related to the decommissioning process and selected safety standards and technical publications concerning decommissioning planning were given to the counterpart.

Additional technical assistance is needed to ensure that the decommissioning of the PRR-1 is performed in a safe and effective manner.

*(ii) Expert Mission to Review the Legal and Governmental Infrastructure for Nuclear Safety*

Date: 9 - 13 August 2004

Place: PNRI, Manila, Philippines

Objective and results:

The purpose of this mission was to review the regulatory activities in Philippines and to exchange information and experience with respect to the regulation of nuclear safety in the following predetermined topic areas: legislative and governmental responsibilities; authority, responsibilities and functions of the regulatory body; organization of the regulatory body; and development of regulations and guides.

An IAEA team of two experts, who are one IAEA staff member and one external expert from Australia, visited PNRI to conduct a review of the legal and governmental infrastructure for nuclear safety. This expert mission used the Guidelines for International Regulatory Review Teams (IRRTs), IAEA Services Series No. 8, September 2002, to conduct the review and report the results.

Discussions covered the existing regulatory infrastructure, the associated activities of the PNRI, alternatives for the future of PNRI's research reactor facility, which has been in a state of extended shutdown since 1988, and its regulatory control.

Recommendations were mostly concerned with the measures necessary to establish a comprehensive legislative framework for the regulatory control of nuclear facilities including those of PNRI and, in relation to the nuclear research reactor PRR-1, the independence of the regulatory body from the operating organisation.

Philippines was the only country participating in EBP, which had not yet requested an IAEA mission to review the LGI for nuclear safety. Philippines should use the results of this mission for updating their ISE report, which is one of the expected inputs for the annual TM on EBP in December 2004. This would be the first step towards addressing the deficiencies identified by this mission.

*(iii) Establishment of the Quality Assurance Programme (QAP) for PNRI and for the PRR-1*

Date: 27 September - 08 October

Place: Manila, Philippines

Objective and results:

The purpose of this mission was to assist the PNRI in the establishment of a management system (MS) including the quality assurance programme (QAP) and to monitor current status of PRR-1.

The mission consisted of two external experts and one IAEA staff member. The mission was conducted as a workshop with very intensive participation from the local personnel and with presentations and coaching by the experts. The first week was dedicated to discuss with the PNRI staff members, the basis of the management system, using the TECDOC (DD818) currently under development for operating

organizations of research reactors. The second week an Ad-hoc group from PNRI led by one external expert was dedicated to the development process of the Management System for the PNRI. The external expert managed the development process skilfully and with efficiency to the great satisfaction of all participants.

During the second week it was evident that the strong sense of ownership developed by the Ad-hoc group; the work done during that period was: developed a gradual process applicable by PNRI for the establishment and implementation of the management system; established the milestone schedule for the whole development process; defined composition of management system project group; discussed related issues (audit requirements, human resources, business unit within MS, certification ISO standards); draft Mission Report and an Executive Summary left to the PNRI.

The strong commitment and active participation of all the people from the PNRI and the expertise and dedication of the selected experts ensured the obtained rewarding results:

- The PNRI Director issued a Policy Order on 07 October 2004 to implement the management systems in the institute (with a dead line October 2006).
- A project group was created at the PNRI and the Deputy Director of the PNRI was appointed as Project Leader.
- A realistic management system development process was created.

The following recommendations were provided to the PNRI:

- Harmonize and standardize the elements of Management Systems that already exist at the PNRI.
- Top management (Director + Senior staff) continue demonstrating the commitment for the implementation of the system, through coaching, workshops and accomplishing the milestones.
- Make provisions to disseminate the implementation of the project among the various stakeholders of the Institute.

### **II.3.5. Thailand**

#### *(i) Refresher Training Course on Nuclear Safety*

Date: 26 - 30 July 2004

Place: Bangkok, Thailand

Objective and results:

The purpose of this training course was to provide refresher training to personnel from the regulatory and operating organizations of Thailand in safety fundamentals and basic knowledge needed to enhance nuclear safety.

The course was attended by 17 participants including 6 staff members of the BNSR (the Bureau of Nuclear Safety Regulation), 5 from the Reactor and Nuclear Technology Operation Program of the OAP (the Office of Atoms for Peace), 2 each from the Electricity Generating Authority of Thailand and the Department of Nuclear Technology of Chulalongkorn University, and 2 from other organizations. In addition,

several operator trainees joined the course for lectures on reactor physics and thermal-hydraulics.

An IAEA staff member, an external expert from Korea and 8 local lecturers gave the lectures. An IAEA staff member delivered lectures on the Agency's research reactor safety program, standards and services, on the Code of Conduct on the Safety of Research Reactors, and on the requirements for site evaluation and design based on the new Safety Requirements for Research Reactors (DS272, NS-R-4). An external expert from Korean, who was recruited through the ANSN Topical Group on Safety Analysis, presented lectures on the basic principles of nuclear safety, safety assessment and safety analysis. Local lecturers presented the balance of the program such as nuclear legislation and regulatory framework in Thailand, design and siting for new RRs, operational limit, safety culture and radiation protection. Some material from the IAEA training events was used.

The recruitment of an external expert through the ANSN Topical Group on Safety Analysis represents a first step towards greater regional involvement facilitated by the ANSN. The upcoming Workshop on Education and Training and formation of a Topical Group on Education and Training should further this regional involvement.

### **II.3.6. Vietnam**

There were no national activities implemented for Vietnam from November 2003 to October 2004.

## **III. WORK PROGRAMME FOR 2004 (NOV. – DEC. 2004)**

### **III.1. PROGRAMME MANAGEMENT**

#### **III.1.1. Technical Meeting**

The next Technical Meeting (TM) will take place in Vienna on 06 - 09 December 2004. The objective of the meeting is to evaluate EBP achievements to date and to agree on the strategy and scope of work for 2005 and beyond. ANSN activities, which have entered full implementation in 2004, will be also evaluated.

Each recipient country shall be invited to present a progress report on the Integrated Safety Evaluation (ISE) and future assistance needs.

#### **III.1.2. ANSN Topical Group Coordinators' Meeting**

ANSN Topical Group Coordinators' Meeting is scheduled 09 - 10 December 2004 in Vienna after the Technical Meeting. The objective of the meeting is to discuss the implementation of the ANSN work plan, which shall be agreed at the TM, including activities of Topical Groups for 2005 and beyond.

### **III.2. REGIONAL ACTIVITIES**

There are no work programmes scheduled in November and December 2004.

### III.3. NATIONAL ACTIVITIES

#### III.3.1. China

(i) *Qinshan CANDU Living PSA and Risk Monitor Development, PSA Application Case Study*

Date: 08 - 12 November 2004

Place: Qinshan Phase-III NPP, Haiyan, China

Objective:

As the CANDU designer, Atomic Energy Canada Ltd. (AECL) has submitted the Qinshan CANDU design phase PSA model to TQNPC. TQNPC has made the decision to develop Qinshan CANDU Living PSA and Risk Monitor model to support the implementation of risk-informed and performance based decision-making. TQNPC expects that IAEA can assist TQNPC in the field of Living PSA and Risk Monitor model development, and can assist TQNPC to perform some PSA

(ii) *Assess Implementation of IRRT Recommendation*

Date: 23 November – 03 December 2004

Place: NNSA, Beijing, China

Objective:

The objective of this mission is to assess and evaluate the progress of implementation of the recommendations and suggestions of the previous full IRRT mission conducted October 2000.

#### III.3.2. Indonesia

(i) *Review of the Reactor Building Structure Assessment*

Date: 01 - 04 November 2004

Place: Yogyakarta, Indonesia

Objective:

Building of the Bandung TRIGA reactor has been constructed since 1963, and there is no comprehensive civil structure document about it. There are analyses related to the reactor safety that need the civil structure data in order to complete the SAR of Bandung RR. P3TKN-BATAN will recompile and complete the civil structure document in cooperation with Bandung Institute of Technology through laboratorial testing. The document is planned to be finished by August 2004. Assistance from the IAEA is needed to verify the document.

(ii) *Regional Workshop on Reactor Thermal Hydraulics Safety Analyses of TRIGA 2000 Reactor (ANSN Topical Group)*

Date: 29 November - 10 December 2004

Place: Bandung, Indonesia

**Objective:**

to provide fundamental thermal hydraulics in safety analysis - to provide practical use of the computer codes (e.g., RELAP5, PARET, etc.) in safety analysis - to train for application of the codes to TRIGA 2000 reactor.

**III.3.3. Malaysia***(i) Expert Mission on Safety Analysis (ANSN Topical Group related activity)*

Date: 01 - 05 November 2004

Place: AELB, Malaysia

**Objective:**

The ANSN Topical Group on Safety Analysis will provide a forum for the continued exchange of information and documentation among specialists dealing with safety analysis of research reactors. On the other hand, the Group can provide a support for an individual organization to improve its practical knowledge and skill on safety analysis. This expert mission is carried out based on the request from the Atomic Energy Licensing Board (AELB) for this objective under the frame of the ANSN Topical Group.

*(ii) National Training Course on Re-qualification Course for Operating Personnel*

Date: 29 November - 10 December 2004

Place: AELB, Malaysia

**Objective:**

The objective of this training course is to provide refresh training to the Operating Personnel from Malaysian Research Reactor. The training course includes theoretical lectures as well as training on practice activities (e.g. control rods calibration). Also one afternoon is reserved for evaluation and comments concerning the draft regulation on Draft Guidelines for Certification/Re-certification of Reactor Operators, issued by Malaysian regulatory body.

*(iii) Establishment of a Management System (QA Programme for the Operating Organization and the Research Reactor)*

Date: 29 November - 03 December 2004

Place: AELB, Malaysia

**Objective:**

The objectives of this mission are to identify needs and develop an action plan for improvement of a management system for the PUSPATI TRIGA (RTP) research reactor.

**III.3.4. Philippines**

There are no work programmes scheduled in November and December 2004.

### **III.3.5. Thailand**

(i) *Refreshment Workshop for Reactor Operators on Radiation Protection, OLC and Safe Utilization of RRs*

(to be combined with National Training on Fire Protection for Research Reactors)

Date: 22 - 26 November 2004

Place: Thailand

Objective:

The objective of this workshop are to provide the essential fire safety knowledge to be applied by research reactor operators and to perform fire hazard analysis, to review the Radiation Protection Programme that should be applied in RRs and to review the definition of the OLCs research reactors with emphasis on the surveillance and administrative requirements. All the subjects were identified during the Mission held in 2003 and consolidated in the ISE presented by the national counterparts.

### **III.3.6. Vietnam**

(i) *National Basic Professional Training Course on Nuclear Safety (postponed from 2003)*

Date: 08 - 19 November 2004

Place: Vietnam

Objective:

The objectives of this training course are to strengthen fundamental knowledge of operators and engineering staff at the Dalat research reactor, to introduce modern principles of reactor and facility safety and to improve operational safety and emergency response at the Dalat reactor.

#### IV. CONTRIBUTIONS 2004

<b>Country</b>	<b>Contributions</b>
China	1 cost free expert
France	1 cost-free expert
Germany	1 cost-free expert
Japan	1,381,481 US\$ (*)
Korea	in kind (**)
USA	100,000 US\$
	1 cost-free expert

\* includes 2 cost-free experts from Japan

\*\* hosting training events in Korea

## TABLE OF WORK PROGRAMME FOR 2004

### IAEA Management

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>ANSN</b>													
Steering Committee	Beijing			22-26									
Topical Group Coordinators' Meeting	Vienna												09-10
Topical Group (Safety Analysis)	Daejeon, Korea				20-23								
Topical Group (Education and Training)	Tokyo									02-03			
IT Support Group Meeting	Jakarta						07-10						
<b>Coordination</b>													
Progress Report	Vienna											xx	
Technical Meeting	Vienna												06-09
<b>Country profile/action plan</b>													
Update CNSP/NSAP	Vienna												
<b>Database</b>													
Updating of database	Vienna												
<b>ISE</b>													
Development of training package	Vienna						30						

### Work Programme for 2004

#### Regional

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Training</b>													
Development of education and training materials	Vienna												
Translation and utilization of the materials for training	Vienna												
Regional Workshop on Preservation of Research Reactors in Shutdown State and Decommissioning	JAERI/Japan (Tokai-mura)		02-06										
Regional Training Course on Train the Trainers in Nuclear Safety	ANL/USA				19-7								
Regional Workshop on Education and Training for Nuclear Safety	Tokyo								30-03				
Regional Training on Application of the Guidance in the Code of Conduct on the Safety of Research Reactors	ANL/USA									13-24			

### Work Programme for 2004

#### China, Expert Mission

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Expert Missions</b>													
Pre-OSART Mission to TNPP (postponed from 2003)	TNPP	26-	-11										
TNPP PSA Level 2 (postponed from 2003)	TNPP		23-27										
Preparatory Meeting for the follow-up IRRT mission	NNSA			31-	-2								
Qinshan CANDU Living PSA and Risk Monitor Development, PSA Application Case Study	Q-3 NPP											08-12	
Assess Implementation of IRRT Recommendation	NNSA											23-	-03
Important Items Surveillance Management and Results Evaluation (to be implemented 1Q of 2005)	Q-2 NPP												
<i>Improvement of Conditional Based Maintenance of Safety Related Valves for NPP in China (postponed to 2005)</i>	RINPO												
<i>Emergency Operation Procedure for TNPP (postponed from 2003, waiting EOP documents, postponed to 2005)</i>	TNPP												

1st Qtr.  
2005

### Work Programme for 2004

#### China, Training

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Training</b>													
Workshop on Management and Assessment of Steam Generator (SG)	RINPO				05-09								
WS - Maintenance and Periodic Testing Programme with ISI Review (postponed from 2003)	TNPP						21-25						
WS on Practical Aspects of ISI Qualification - Approaches in Europe and the U.S.	NRI, Prague						28-2						
WS on Organization and Management of Refuelling Outage and Unplanned Outage	Q-2 NPP										11-15		
WS on Ageing Management of Reactor Pressure Vessel (Including Oxidation Operation)	Q-1 NPP										18-22		
WS - Improvement of Accreditation System and Method for NPP Licensed Operators' Training and Qualification (to be implemented Jan. 2005)	RINPO												24-28 Jan. 2005
WS - Engineering Managers Professional Development Seminar (to be implemented Mar. and May 2005)	Q-3 NPP and Canada												Jan. & May 2005
Seminar on Operating Procedures Applied in Digital Nuclear Power Plants (to be implemented 1Q 2005)	TNPP												1st Qtr. 2005

WS on the Practical Aspects of Risk Informed ISI - The relationship between ISI Qualification and Risk Informed ISI (to be implemented 1Q 2005)	China (further coordination needed)													1st Qtr. 2005	
<i>Workshop on Application of Network Technology in Nuclear Training (postponed to 2005)</i>	BINE														
<i>WS - Introduction and Advisory on the IAEA Standards (postponed to 2005)</i>	NNSA														
<i>WS on Quality Assurance (QA) of Regulatory Body (postponed from 2003, postponed to 2005)</i>	NNSA														

## Work Programme for 2004

### Indonesia

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Expert Missions</b>													
Review Mission on Education and Training in Nuclear Safety	Jakarta												
Review Mission on Legislation and Regulation	Jakarta									27--1			
Review of the Reactor Building Structure Assessment	Bandung											01-04	
<i>Review Mission on Safety Analysis of Kartini Reactor (postponed to 2005)</i>	Yogyakarta												
<i>Review Mission on Detail Design of I&amp;C System of Kartini Reactor (postponed to 2005)</i>	Yogyakarta												
<b>Technical visits</b>													
Advisory Mission on ISE													
<b>Training</b>													
National Training Course on the In-service Inspection of Research Reactor	Serpong							06-16					
The 2nd National Basic Professional Training Course on Nuclear Safety	Jakarta							19-30					
National Training Course on Water Chemistry of Nuclear Reactor System	Serpong								30--9				
Regional Workshop on Reactor Thermal Hydraulics Safety Analyses of TRIGA 2000 Reactor (ANSN Topical Group)	Bandung											29--10	

### Work Programme for 2004

#### Malaysia

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Expert Missions</b>													
Review Mission on SAR													
Establishment of a Management System (QA Programme for the Operating Organization and the Research Reactor)	Kuala Lumpur											29-	-3
<i>Expert Mission to Review the Draft Atomic Law (postponed to 2005)</i>													
<b>Technical visits</b>													
Advisory Mission on ISE													
<b>Training</b>													
National Training Course for Regulatory Supervision of a TRIGA RR	Malacca							19-30					
Expert Mission on Safety Analysis (ANSN Topical Group)												01-05	
National Training Course on Re-qualification Course for Operating Personnel												29-	-10

## Work Programme for 2004

### Philippines

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Expert Missions</b>													
Establishment of the Preliminary Decommissioning Programme of PRR-1	PNRI, Quezon City						21-25						
Expert Mission to Review the Legal and Governmental Infrastructure	Manila								09-13				
Establishment of the Quality Assurance Programme for PNRI and for the PRR-1	PNRI, Quezon City									27-	-8		
<b>Technical visits</b>													
Advisory Mission on ISE													
<b>Training</b>													
<i>National Basic Professional Training Course on Nuclear Safety (postponed to 2005)</i>	<i>Philippines</i>												

## Work Programme for 2004

### Thailand

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Expert Missions</b>													
Expert Mission to Review the ministerial Regulations on Safety of Research Reactor (postponed from 2003)													
<i>Advisory Mission on the Establishment of a Quality Assurance Programme for OAP and for the Research Reactors (postponed to 2005)</i>													
<b>Technical visits</b>													
Advisory Mission on ISE													
<b>Training</b>													
Refresher Training Course on Nuclear Safety	Bangkok							26-30					
Refreshment Workshop for Reactor Operators on Radiation Protection, OLC and Safe Utilization of RRs	Bangkok											22-26	

### Work Programme for 2004

#### Vietnam

Activity	Place	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Expert Missions</b>														
Follow-up IRRT (to be implemented 1Q 2005)														1st Qtr. 2005
Follow-up Mission to Assist in Reviewing a Draft Atomic Law and Relevant Documents (to be implemented 1Q 2005)	Hanoi													1st Qtr. 2005
<i>Updating of Dalat Research Reactor SAR (postponed to 2005)</i>	Dalat													
<b>Technical visits</b>														
Advisory Mission on ISE														
<b>Training</b>														
National Basic Professional Training Course on Nuclear Safety (postponed from 2003)	Dalat													08-19