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PROGRESS REPORT
(October 1999 - March 2000)

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

**International Atomic Energy Agency
Vienna, Austria**

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

March 31, 2000

I. INTRODUCTION

Activities implemented from April to September 1999 have been presented earlier in the report, EBP-ASIA-20, which was provided at the Advisory Group Meeting (AGM) held on 18-20 October 1999. Therefore this report describes only the activities implemented from October 1999 until March 2000 and further activities planned for 2000.

In addition, this report presents on going actions for preparing Nuclear Safety Action Plans for future IAEA activities including the EBP Phase III (2001-2002).

II. ACTIVITIES IMPLEMENTED FROM OCTOBER 1999 TO MARCH 2000

II.1. PROGRAMME MANAGEMENT

II.1.1. Database

The database for the EBP activities has been expanded and currently it includes for each activity, the objective, the results achieved, the associated reports, the planned activities, the Country Nuclear Safety Profiles (CNSPs), relevant IAEA Technical Co-operation (TC) projects, and bilateral agreements and projects. The database has been revised continuously and will be released twice a year to the countries involved in the EBP. A CD-ROM containing the database is being made available to the countries participating in the EBP along with this Progress Report.

II.2. REGIONAL ACTIVITIES

II.2.1. Training Workshop on the Safety of Research Reactors (Safety Analysis Report)

Date: 25 October - 5 November 1999

Place: Tokai-mura, Japan

Objective and results:

The objective of this workshop, hosted by the Japan Atomic Energy Institute (JAERI), was to provide training on the role and contents of the Safety Analysis Report (SAR) for research reactors to professionals who are involved in safety regulation.

The workshop was attended by 15 engineers/professionals from four countries and ten lecturers including two experts from the IAEA. The lectures by Agency staff included the present status and future programme on research reactor safety, the documents under preparation and already published by the Agency on research reactor safety, the INSARR services and the future implementation of the Incident Report System for Research Reactors (IRSRR). Lectures included the preparation of the SAR (SS No. 35-G1) and PSA methodology. The participants were satisfied with the contents of the workshop and commented that training on more practical topics such as simulation of a SAR review, PSA for research reactor, safety analysis using the computer codes should be provided by the Agency in the future and the same type of national workshops should be organized in each country, if necessary.

II.2.2. Consultants Meeting on Safety Analysis Methodology and Computer Code Utilization

Date: 29 February - 3 March 2000

Place: Vienna

Objective and results:

The objectives of this meeting were: to develop a detailed training programme on safety analysis and computer code usage, to identify host organizations where training is to be conducted and to discuss the availability of required computer software.

A detailed planning document was prepared including the scope of 4 workshops, the identification of computer codes to be used and the training material required. The programme will be presented at the AGM in November 2000, and is proposed to last until 2002. The first workshop is planned for November 2000.

II.2.3. Workshop on Nuclear Safety Information for Decision Makers

Date: 6-7 March 2000

Place: Kuala Lumpur, Malaysia

Objective and results:

This workshop, which was originally planned for November 1999, was postponed to 2000 as requested by the host organization in Malaysia.

The objective of the workshop was to provide decision makers with information and basic knowledge on nuclear safety, and to exchange experiences and identify issues in the field of nuclear safety communication with the public:

- what is nuclear safety;
- what are the Government's necessary commitments;
- what are the main issues in a specific country;
- how to implement public information and consultations;

- examples and experiences from other countries.

The workshop was attended by 15 participants from the 6 countries receiving EBP assistance, including two congressmen from Viet Nam and Philippines and two journalists. Five lecturers, including a French Member of Parliament and two IAEA staff, delivered important information on nuclear safety and public acceptance. The importance of this workshop for the host country was demonstrated by an official opening ceremony attended by the Science, Technology and Environment Minister. The participants, who entered into active debate after each presentation, were very satisfied with the contents of the workshop mentioning the importance of safety culture, transparency and good communication with the public. They also appreciated the possibility to learn from each other. It has been requested to have further activities in that topic of public acceptance at national level taking into account the specificity of each participating country.

II.2.4. Preparatory Visit for the Training Workshop on Nuclear Power Plant Siting

Date; 6-8 March 2000

Place: Jakarta, Indonesia

Objective and results:

The objective of this visit was to prepare the Training Workshop on Nuclear Power Plant Siting to be held on 3-14 April 2000 at Jakarta and Muria, Indonesia.

All issues related to management of the workshop, including the arrangement of the workshop, the programme, the site visit to Muria, were discussed and confirmed with the National Atomic Energy Agency (BATAN), host organization of the workshop.

II.2.5. Tutorial Modules for Strengthening Nuclear Safety Knowledge

The purpose of the tutorial modules is to facilitate the training of junior professionals using the state of the art technology for distance learning. The first tutorial module in CD-ROM was released to all countries involved in the EBP in February 2000. It provides an overview of the fundamental safety principles. It is for use as a quick reference on nuclear safety terminology and will be useful for enhancing nuclear safety knowledge of professional staff in countries receiving IAEA experts missions. Work under way includes:

- preparation of tutorials on reactor neutronics and thermal hydraulics for internet and CD-ROM use;
- video tutorial on the Functions of the Regulatory Body (20 minutes)

II.3. NATIONAL ACTIVITIES

II.3.1. China

(i) Seminar on Living PSA and PSA Applications

Date: 18-22 October 1999

Place: Beijing, China

Objective and results:

The main objective of the seminar was to provide comprehensive information on the concept of living Probabilistic Safety Assessment (PSA) and the possible use of PSA for different applications.

In this seminar the professional staff of the organizations responsible for planning, implementing and reviewing PSA applications were able to learn the multiple uses and applications of Probabilistic Safety Assessment. The attendees to the seminar became familiar with the techniques and methodologies for the use of PSA in different contexts and for different applications.

(ii) Experts' Mission to Review Component Integrity including LBB to Lianyungang NPP

"Lianyungang NPP" was recently renamed to "Tianwan NPP"

Date: 15-19 November 1999

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to review the solutions adopted in the AES-91 design to address the safety issues of leak before break (LBB), reactor pressure vessel (RPV) and steam generator, which were previously identified for the WWER-1000/320 NPPs.

The methodology for LBB and the scope of its application proposed by the designer are comparable to other approaches supplied or being developed for modern operating plants. The design adopted for the pressure boundary equipment of this plant has been improved and resolves previous weakness in the sensitivity of the near core weld of the RPV by lowering the specified content of Ni, P and S. Regarding the steam generator, the design solutions adopted are expected to prevent degradation experienced in the past.

The mission provided recommendations on developing the monitoring and surveillance programme, and on optimising the material selection for the secondary circuit in a way that prevent potential corrosion.

(iii) Experts' Mission to Review Containment Design and Systems for Lianyungang NPP
"Lianyungang NPP" was recently renamed to "Tianwan NPP"

Date: 15-19 November 1999

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to peer review the double wall containment system for the WWER-1000/428 reactor. The containment systems were reviewed for the first time by an IAEA team and no previous specific IAEA reports were available. According to the specific request of the Chinese delegation, the review was limited to the features to cope with the severe accidents.

Because of the partial and selected information that was made available to the review team, and the limited time, it was not possible to express a definitive and fully justified evaluation on the overall containment systems design and performance under design basis accidents and severe accidents. However, it is the common view of the experts that the proposed containment systems are in compliance with the IAEA design safety requirements.

Several assumptions on performance of structures and systems under severe accidents need to be more clearly specified and demonstrated by tests and analysis.

(iv) Experts' Mission to Review Modifications of Safety Systems & Components for Lianyungang NPP

"Lianyungang NPP" was recently renamed to "Tianwan NPP"

Date: 15-19 November 1999

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to review the solutions adopted in the AES-91 design to address the safety issues previously identified for the WWER-1000/320 NPPs. The review focused on selected aspects raised during the evaluations carried out by the Chinese specialists, and considered the current international practice for advanced reactors of evolutionary design.

This review was based on the IAEA issue book for the WWER-1000/320 plants (IAEA-EBP-WWER-05) and the overall light water reactor issue book (IAEA-TECDOC-1044).

In the area of systems, fourteen of the overall fifteen safety issues were discussed (Severe accident management was treated in EBP-ASIA-26). For the issue related to sump clogging the previous four recommendations remain, because no new solution was presented.

As previously concluded (EBP-ASIA-01), the general design solutions of the model WWER-1000/428 NPP (AES-91) in the field of safety systems reflect the current international engineering practice.

The design of safety systems has been further improved, including the air conditioning system of the main control room, and the main steam isolation and safety valve stations. The issue concerning control room ventilation redundancy has been solved.

The solution adopted for the main steam valve station is now a conventional arrangement. This raised some comments concerning the proof of sufficiency of this solution. The possibility of installation of an isolation valve in front of the safety valves, as well as the necessary safety valve blowdown capacity should be investigated.

(v) Preparatory Visit for the IRRT Mission in 2000

Date: 16-17 November 1999

Place: Beijing, China

Objective and results:

The objective of this visit was to prepare for an IRRT mission, which is planned for 2000.

It was confirmed that this will be a full scope IRRT mission covering the regulatory body activities related to nuclear safety. The team will consist of a team leader from the IAEA Secretariat and six reviewers. It was agreed that the mission will be conducted during September or October 2000.

(vi) Experts' Mission to Review Design Modifications of Fuel Assemblies for Lianyungang NPP

“Lianyungang NPP” was recently renamed to “Tianwan NPP”

Date: 22-26 November 1999

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to peer review the design modifications of the fuel with focus on the new fuel assembly design to ensure reliable control rod insertion.

The peer review was primarily limited to the fuel assembly mechanical and material design and the core design. Particular emphasis was placed on the features of the fuel assembly design and core design that could adversely impact the performance of the fuel and the reactor core.

The mechanical design of the advanced fuel assembly in the Tianwan NPP was reviewed. A special emphasis was put on clarifying the reasons behind the design changes

compared to the standard WWER-1000 fuel assembly and control rod designs. The justification of the new design features by testing and calculational analyses was also checked.

The core design review focused on issues of "low leakage" and its impact on vessel fluence. The Tianwan NPP is designed with a 40 year pressure vessel lifetime. One of the key parameters impacting the lifetime is the integrated neutron fluence received by the pressure vessel. This in turn is dependent on the neutron leakage at the periphery of the core. To achieve the objective of ageing management, it is a common industry practise to use "low leakage" loading patterns to minimise neutron leakage, especially for reloads, using once-burnt and twice-burnt fuel assemblies in the core periphery.

(vii) Experts' Mission to Review the Lianyungang PSA

"Lianyungang NPP" was recently renamed to "Tianwan NPP"

Date: 22-30 November 1999

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to carry out a review of the preliminary Tianwan Level 1 PSA for internal initiating events, with the purpose of assessing the adequacy of the treatment of important technological and methodological issues in the study.

The review team concluded that:

- Additional detailed documentation is required in many areas to support the intended uses of the PSA, to facilitate future reviews and updating and upgrading (living PSA).
- Additional modelling is required in a number of areas.
- Model revisions and corrections are recommended.

The Chinese side requested the IAEA mission to perform a second review of the Level 1 PSA in 2000 after the recommendations are implemented by the plant designers.

(viii) Review Mission on Specific Design Considerations for the CEFR and Follow-up Mission

Date: 29 November - 9 December 1999

Place: Beijing, China

Objective and results:

The objective of this mission was to review the following items to support NNSA's safety assessment of China's Experimental Fast Reactor (CEFR): reactor shut down system, siphon devices in sodium purification system, reactor vessel integrity, monitoring system for fuel failure and other seismic considerations. A follow-up to the previous IAEA review mission carried out November 1998 was implemented together.

There were a few improvements in the design safety of CEFR since the previous mission. However, the design still has many deficiencies in comparison with the international practices related to the defence-in-depth concept. Some important aspects of safety design remained unclear due to lack of information. The review team prepared additional recommendations to those of the previous mission.

Verification of the CEFR safety design appeared to rely heavily on that of the Russian BN reactor, therefore work for CEFR still remains in many areas.

Independent assessment (confirmation calculations) by BINE and cross-check calculations based on relevant international experiments are strongly recommended to assure capability and reliability of safe reactor shutdown, residual core heat removal, and leak-tightness of the primary containment. Further consideration should be placed on the current list of potential initiation events leaders in the severe accidents area, acceptance criteria, evaluation approach and the rather optimistic estimate of the radioactive release to the public.

The significant weak points of CEFR identified by the review can be summarized:

- defence-in-depth consideration,
- basic strategy of accident classification,
- verification of applied computer codes, and
- independent assessment of the PSAR.

(ix) Experts' Mission on Emergency Action Levels of NPPs

Date: 10-14 January 2000

Place: Beijing, China

Objective and results:

The objective of this experts' mission was to give guidance and exchange ideas on the development of plant specific emergency classification schemes for PWR, WWER and CANDU reactors and their implementation and integration in the overall emergency response system. Discussions, examples and small exercises were used to demonstrate the development and use of an emergency classification scheme.

The Chinese experts were provided with the IAEA-TECDOCs 953 and 955, the IAEA Working Material on emergency classification schemes for WWER and CANDU reactors as well as handouts of all presentations. Lectures on the IAEA approach on emergency preparedness and response, the concept of emergency classification and the IAEA guidance on emergency classification were presented. An overview of emergency planning and preparedness was given by the Chinese counterparts. Detailed presentations on the implementation of emergency actions levels for PWR, WWER and CANDU reactors were given by the experts and discussed with the participants. During the last part of the workshop trial cases for the development of emergency action levels were done. For that purpose the participants formed working groups for each reactor design and worked out emergency action levels for given emergency entry conditions. Staff from the operational Chinese PWRs benefited most from the workshop because they could develop, together with the experts,

actual emergency entry conditions and emergency action levels for their plants. General guidance on emergency classification and the development of emergency action levels was given for design of reactors (WWER and CANDU) still under construction. The Chinese experts and authorities are looking closely to the IAEA's guidance on the subject and are also actively implementing new guidance on this subject.

(x) Workshop on NPP Project Management

Date: 24 January - 4 February 2000

Place: Madrid, Spain

Objective and results:

The objective of the workshop was to exchange information and experiences on the topics of training, simulation and operations support. The workshop was managed and arranged by Empresarios Agrupados in Madrid, Spain and it was addressed to six senior managers from CNNC (China) with different professional backgrounds.

The workshop programme covered the management practices, as applied in Spain, including engineering and design, procurement, construction management, testing and startup and support to plant operation. Both technical and financial management were addressed. Several lectures were provided on Nuclear Safety and Licensing Management, placing clear emphasis on the systematic approach to be followed. The importance of defining codes and standards and of identifying the design and licensing bases of the project startup was pointed out.

The workshop was fully financed by the Spanish contribution to the EBP.

(xi) Preparatory Mission on I&C Conceptual Design for Tianwan NPP

Date: 28 February - 3 March 2000

Place: Beijing, China

Objective and results:

The objective of this mission was to discuss on the fundamental objectives of the peer review mission, the objectives and scope of the I&C systems important to safety to be peer reviewed, the information and documentation to be provided to the IAEA in advance of the mission and the dates and location of the mission.

NNSA has completed the review on the PSAR and the review by Jiangsu Nuclear Power Corporation (JNPC) of the conceptual design of the I&C systems important to safety will be completed by the end of May 2000.

The results of the reviews conducted by JNPC and NNSA will be structured by JNPC according to the contents of the IAEA Safety Standards.

JNPC will provide the IAEA with the review results and the NNSA report by the middle of July 2000.

On the basis of these reports, the IAEA will conduct a Peer Review Mission from 25 to 29 September 2000. The mission will be conducted in Germany to facilitate easy access to the design documentation and permit a larger participation of the German experts.

II.3.2. Indonesia

(i) Experts' Mission for Improving SAR of Serpong MPRR in Indonesia

Date: 29 November - 3 December 1999

Place: Serpong, Indonesia

Objective and results:

The main purpose of this experts' mission was to provide advice and assistance on how to improve the safety analysis report (SAR), through exchange of experience and knowledge between the staff of the National Atomic Energy Agency (BATAN) and the 30MW Multi Purpose Research Reactor (MPRR) centre at Serpong.

The review focused on the identification of specific issues related to safety analysis reports and assessing the implementation status against the recommendation made by previous mission in 1998 and the assumption and method for the safety analysis. Various sections should be added to the draft SAR to include information on:

- the organization and responsibilities for the commissioning of the MPRR;
- a summary with the description of the tests conducted;
- appropriate reference for the tests, results and other relevant documents related to the commissioning of the MPRR.

(ii) Experts' Mission to Review Emergency Preparedness with Respect to International Experience

Date: 6-10 December 1999

Place: Jakarta, Indonesia

Objective and results:

The objective of this mission was to provide an independent assessment of the preparedness to respond to nuclear/radiological emergencies, to identify areas which should be improved to meet international standards, and to provide advice on ways improvements might be achieved.

The IAEA Team agreed the new regulatory structure will permit the early development of an emergency management programme based on the experience of other nations and international organisations. Several priorities for the Indonesian programme have been identified, including:

- identify the organisations responsible for the critical tasks contained in TECDOC 953;
- formalize co-ordination mechanisms at all levels, including on-site/off-site, among local response organisations, and co-ordination among the various levels of government;
- request assistance from the IAEA for fellowships to learn and experience emergency planning and response practices in other countries.

In addition, it is suggested that at an appropriate time, for example in two years, a follow up mission should be requested to the IAEA to measure the progress accomplished.

II.3.3. Malaysia

(i) Experts' Mission to Review Organization of AELB

Date: 9-13 November 1999

Place: Kuala Lumpur

Objective and results:

The objective of this experts' mission was to review Malaysia's regulatory body practices, and exchange information and experience with respect to the regulation of nuclear safety.

Discussions covered the existing regulatory infrastructure, the associated activities and the future plans to extend the licensing regime to the research reactor facility at the Malaysian Institute for Nuclear Technology Research (MINT). The experts found that there is a comprehensive legal basis and an established regulatory body to which the necessary functions and responsibilities have been assigned. Recommendations and suggestions were mostly concerned with the measures necessary to license the research reactor. These recommendations were concerned with the need to develop a programme for future licensing activities; the need to ensure that MINT retains primary responsibility for safety when it is licensed; the need to preserve the independence of the regulatory body; and the need to decide on the regulatory approach to be adopted for the licensing of the research reactor at MINT. Other recommendations and suggestions were made to strengthen the capabilities of the regulatory body to perform its current duties and a number of good practices were identified.

(ii) Technical Visit to Review Nuclear Safety Action Plan

Date: 8-9 March 2000

Place: Kuala Lumpur, Malaysia

Objective and results:

The objective of this visit was to discuss the future EBP activities including Programme Scope for Phase III and the detailed assistance based on the results of the questionnaires, which was sent to elicit the opinions of the country.

This technical visit allowed the IAEA staff and his Malaysian counterparts to clarify the planned activities for the rest of 2000 – especially the experts mission to MINT scheduled in May – and to prepare the work plan for the next phase in 2001 and 2002.

Concerning the review of the emergency preparedness, it was decided to wait for the regional workshop in Thailand in August before defining the exact assistance expected from the Agency.

The Nuclear Safety Action Plan, based on the recommendations of the IRRT and also on the results of the INSARR mission of 1997 has been approved. It has been agreed on the necessity to reinforce the power of AELB, especially with regard to MINT.

II.3.4. Philippines

(i) Pre-mission to Evaluate the Situation of the Research Reactor

Date: 24-28 January 2000

Place: Quezon City, Philippines

Objective and results:

The objective of the mission was to discuss the present status of the reactor systems and to conduct technical discussions on the needs for a possible return to operations of the PRR-1. Pursuant to the Agreement signed between the Philippines, the USA and the IAEA, the mission also performed a visit to verify the application of the Agency Safety Standards and to assess the authorities to enhance the safety of the PRR-1.

The mission concluded that the reactor does not present an undue risk to the public in its present condition. However, much efforts to improve the safety are needed for returning to operation from the present extended shutdown. For the case that the authorities decide to request an INSARR mission to the Agency aimed to the return to operations, the following items should be prepared:

- a detailed identification and preparation of the documentation applicable to the facility;
- at least a conceptual engineering of the modifications and improvements on the systems of the research reactor;

- definition on the regulatory supervision and on the organization and qualification of the operating group;
- adequate housekeeping and the measures for the extended shutdown established.

In the case of returning to operation it is reminded of the need to fulfil the article 3 Annex B of the Agreement which requests the communication at least 60 days prior of any operation mentioned there, including the loading of fuel in the reactor.

II.3. 5. Thailand

(i) National Seminar on Regulatory Function

Date: 22-26 November 1999

Place: Bangkok, Thailand

Objective and results:

The objective of this seminar was to present international experiences in matters related to the establishment and to the functions of a nuclear regulatory body. The contents of the seminar included topics such as: organization and staffing of the regulatory body; licensing process and assessment; inspection and enforcement; development of regulations and guides; safety culture; emergency preparedness.

The seminar was organized jointly by the IAEA and the Office for Atomic Energy for Peace (OAEP) and attended by 47 participants who were officially registered by the OAEP. Technical contents and guidance provided in the seminar including the quality of distributed handouts were highly appreciated by the participants. During the seminar future IAEA activities in the framework of the EBP in Thailand were discussed and it was recommended that Thailand should join the Nuclear Safety Convention and the INES system to increase the opportunity to collect information on the status and plans in other countries.

II.3.6. Viet Nam

(i) Technical Visit to Review Nuclear Safety Action Plan

Date: 10-13 March 2000

Place: Hanoi, Viet Nam

Objective and results:

The objective of this visit was to discuss the future EBP activities including Programme Scope for Phase III and the detailed assistance based on the results of the questionnaires, which was sent to elicit the opinions of the country.

At the meeting, the mission presented the strategy for developing the Country Specific Action Plans and received a presentation from VAEC in terms of a plan to enhance the regulatory body. In addition, three activities planned during 2000 were discussed and the

contents of latter two activities for the safety of Dalat Research Reactor (DRR) should be discussed at the National Training Course on Nuclear Safety Analysis of Research Reactor, which will be held from 3 to 7 April 2000.

III. WORK PROGRAMME FOR 2000 (April - December 2000)

III.1. PROGRAMME MANAGEMENT

Activities are being implemented based on the Work Programme for 2000 (Annex 1).

III.1.1. Advisory Group Meeting

The next Advisory Group Meeting (AGM) will take place from 30 October - 1 November 2000 in Vienna. A CD-ROM of the database including results of all activities until October 2000 will be made available at the AGM.

III.2. REGIONAL ACTIVITIES

III.2.1. Training Workshop on Nuclear Power Plant Siting

Date: 3-14 April 2000

Place: Jakarta and Muria, Indonesia

Objective and contents:

This workshop, which was originally planned in November 1999, was postponed to 2000 because of insufficient nominations. As a result of rescheduling, about thirty experts will participate in the workshop.

The objective of this workshop, which is hosted by the National Atomic Energy Agency (BATAN), Government of Indonesia, is to provide an overall treatment of issues related to nuclear power plant siting. This covered mainly aspects related to natural and man-induced external hazards, dispersion of radioactive effluents in the atmosphere and the hydrosphere, emergency preparedness feasibility considerations including the demographic conditions. A special topic included deals with public opinion related to site selection. A site study visit to Muria will be included.

III.2.2. International Training Course on Regulatory Aspects and Safety Documentation of Research Reactors (organized by TC)

Date: 8-26 May 2000

Place: Argonne National Laboratory (ANL), Argonne, Illinois, USA

Objective:

The purpose of this course, which is organized by the IAEA in co-operation with the Government of USA, is to help regulatory staff members, designers, and operators of research reactors in countries now operating research reactors, or which are in the process of installing new research reactors or licensing old reactors, to have a better understanding of international standards and requirements for research reactor safety and regulation, and to provide insight from experience gained in developed countries on the actual regulatory work. The EBP will provide financial support to five professionals from the countries participating in the EBP to attend the course.

III.2.3. Training Workshop on the Safety of Research Reactors (Operational Safety)

Date: 6-17 November 2000

Place: Tokai-mura, Japan

Objective:

This workshop, which will be organized by the IAEA in co-operation with the Government of Japan through the Japan Atomic Energy Institute (JAERI), is designed to provide training on operational safety for research reactor for personnel involved in safety regulation. The workshop will be open to 24 participants from the six countries.

III.2.4. Workshop on Institutional Requirements for the Development of Nuclear Power: Conditions for Safety

Date: 2-3 November 2000

Place: Vienna

Objective and contents:

A country embarking on a nuclear power programme needs to develop a regulatory infrastructure at an early stage. The regulatory infrastructure requirements need to be factored also into the decision to start up a nuclear power programme. The objective of this workshop is to provide information from the experiences gained in other countries in building up such an infrastructure, noting that different countries have followed different approaches.

The workshop is directed towards relatively high level governmental officials of countries considering to embark on a nuclear power programme. However, the information might be of useful also for countries in adjusting their regulatory infrastructure to new requirement and challenges.

It is expected that the members of the Advisory Group from the 6 countries should attend the workshop.

III.2.5. Workshop on Safety Methodology and Computer Code Utilization (1)

Date: November 2000

Objective and contents:

The objective of this workshop is to bring participants to the same level of knowledge in reactor neutronics and thermal-hydraulics.

The IAEA will make available to the selected participants course material for self study in neutronics and thermal-hydraulics. The material will consist of basic theory exercises, and solutions and will be distributed in a format appropriate for distance learning (e.g., videos, CD-ROMs) along with textbook material in some cases. The course material will be delivered to the participants by the IAEA at least three months before the first training workshop. The duration of the first workshop will be two weeks and will take place in the Fall of 2000. The IAEA will consult with Japan and Korea to agree on the institution to host this and the following workshops.

Syllabus includes: review of reactor physics concepts and thermal hydraulic concepts; introduction to functional reactor system design; format and contents of Safety Analysis Reports; introduction to SAR review and safety assessment; introduction to thermal-hydraulics and accident codes; introduction to radioactive inventory and containment performance.

III.2.6. Development of Tutorial Modules

Tutorial modules are being developed and are scheduled for completion:

- Reactor Neutronics July 2000;
 - Reactor Thermal Hydraulics August 2000;
 - Video Tutorial on Regulatory Functions May 2000

III.3. NATIONAL ACTIVITIES

III.3.1. China

(i) Scientific Visit on Radiation Protection during Outage of NPP in Japan

Date: 17-28 April 2000

Place: Tokyo, Ohi and Kashiwazaki-Kariwa, Japan

Objective:

This scientific visit (SV) was originally planned to implement in 1999 and postponed to April 2000.

The objective of the SV, which is organized by the Government of Japan through Nuclear Power Engineering Corporation (NUPEC), is to improve the radiation protection during NPP outage through visiting facilities in Japan and discussion with Japanese experts.

Funding is from the contribution of Japan to the EBP.

(ii) Experts' Mission to Peer Review the Assessment of the RPV PTS Analysis and Ageing Related Issues Justification for Tianwan NPP

Date: 26-30 June 2000

Place: Moscow, Russia

Objective:

The objective of this experts' mission is to carry out a peer review of the assessment of the approaches taken by the plant designer/supplier to address issues related to reactor pressure vessel (RPV) pressurized thermal shock (PTS) analysis and ageing (such as irradiation embrittlement, and thermal ageing monitoring and assessment) for Tianwan NPP. The peer review will also contribute to the development of local expertise needed to deal with aspects important to safety for these issues. It is expected that 4-5 outside experts and 1 IAEA staff will participate in the peer review. Russian experts and Chinese experts from NNSA, JNPC and other organizations, such as BINE and SNERDI will participate.

(iii) Experts' Mission to Peer Review the Assessment of the RPV Strength and Fatigue Analyses for Tianwan NPP

Date: November 2000

Place: Moscow, Russia

Objective:

The objective of this experts' mission is to carry out a peer review of the assessment of the RPV strength and fatigue analyses including vessel head and reactor internals. The peer review will be carried out by a team of outside experts (2 to 3) and 1 IAEA staff within approximately 3 to 4 days at the reactor designer, OKB Gidropress. It is expected that approximately 2 Chinese experts will also participate in the review.

In addition to the above 2 activities on RPV integrity of Tianwan NPP, it is planned to organize an experts' mission on reactor components seismic analysis early in 2001.

(iv) Workshop on Periodic Safety Review (PSA) of Qinshan NPP

Date: 22-26 May 2000

Place: Qinshan, China

Objective:

The objective of this workshop is to support the Qinshan NPP capability to conduct the 1st Periodic Safety Review (PSR) in the near future. The contents of the workshop will consist of presentation of the IAEA safety guide and best practices in implementing PSR, practical training of the selected PSR disciplines, discussion and formulation of the follow-up activities.

(v) Workshop on Fire Safety

Date: 19-23 June 2000

Place: Qinshan, China

Objective:

The objective of this workshop will be to train plant personnel to enhance NPP safety from the fire protection point of view. In this regard, the IAEA could provide practical guidance for:

- combustible control;
- testing of fire detection and suppression systems;
- fire fighting in NPPs

(vi) Workshop on Severe Accident Policy

Date: 26-30 June 2000

Place: Beijing, China

Objective:

The objective of this workshop will be to provide international experience for NNSA to develop policy statements and requirements on: safety goals; severe accident; and PSA.

(vii) Experts' Mission to Peer-review the I&C Conceptual Design for Tianwan NPP

Date: 25-29 September 2000

Place: Erlangen, Germany

Objective:

The objective of this mission is to peer review the I&C conceptual design for Tianwan Nuclear Power Plant (TNPP), including the following topics:

- selected aspects raised during the reviews carried out by the Chinese counterparts and structured according to the IAEA safety standards;
- the compliance of proposed design solutions with concepts, principles and requirements established nationally and internationally for future reactors to be built;
- the adequacy of proposed design solutions compared with international practice;
- the comments and recommendations made during previous IAEA activities related to TNPP.

(viii) IRRT Mission to the Regulatory Body

Date: 9-20 October 2000

Place: Beijing, China

Objective:

The purpose of this IRRT Mission is to review the effectiveness of the regulatory body and to exchange information and experience in the following areas, legislative and governmental responsibilities; authority, responsibilities and functions of the regulatory body; organization of the regulatory body; the authorization process; review and assessment; inspection and enforcement; development of regulations and guides as well as emergency preparedness. A final report will be prepared by the team with the intention to stimulate regulatory body's management and staff to consider ways and means of enhancing performance.

(ix) Second Review Mission on Level 1 PSA Revised Report for Tianwan NPP

Date: 6-10 November 2000

Place: Moscow, Russia

Objective:

The objective of this mission is to review the adequacy of assumptions, analysis methods, input data, the credibility of analysis outcomes, and implementation of IAEA's recommendation and comments raised by the Review Mission of November, 1999.

A prerequisite for the mission is the completion of the reviewed PSA report including the IAEA recommendations and submission of the report to the IAEA at least 2 months before the mission date.

(x) Workshop on Self-assessment of Operational Safety at Qinshan NPP

Date: not yet defined

Place: Qinshan, China

Objective:

The objective of this workshop is to provide Qinshan plant managers with techniques and expertise in the effective self assessment of operational safety within their areas of responsibility. The workshop will comprise of lectures and field exercises and will leave the managers with a plan to follow for the future.

III.3.2. Indonesia

(i) Workshop on Nuclear Safety and Risk Assessment

Date: 1-5 May 2000

Place: Jakarta, Indonesia

Objective:

The objective of this workshop is to strengthen the technical competence of the regulatory body and to set up a nuclear safety and risk assessment programme, including probabilistic and deterministic methods.

(ii) Experts' Mission on Integrated Regulatory Inspection and Enforcement Programme

Date: 5-9 June 2000

Place: Jakarta, Indonesia

Objective:

The objective of this mission will be to assist Nuclear Energy Control Board (BAPETEN) to enhance the technical capability of staff involved in the regulatory inspection and enforcement programme. The contents of the activity will consist of providing information and practical training regarding regulatory inspection and enforcement.

(iii) Experts' Mission to Review Existing Research Reactor Safety Modifications

Date: 21-25 August 2000

Place: Jakarta, Indonesia

Objective:

The objective of this mission will be to review and re-assess the following modifications of the research reactors:

- current upgrade from 1 MWth to 2 MWth of a TRIGA MARK II which has been operated more than 30 years;

- full upgraded I&C of a 250 MWth TRIGA MARK II which was assembled partly by BATAN and has been operated nearly 20 years.

III.3.3. Malaysia

(i) Experts' Mission to Provide Guidance for the Preparation of Safety Analysis Report

Date: 22-26 May 2000

Place: Kuala Lumpur, Malaysia

Objective:

The objective of this mission is to provide guidance for the preparation of a new safety analysis report for the TRIGA PUSPATI research reactor.

(ii) Experts' Mission to Review Emergency Preparedness with Respect to International Experience and to Implement an Exercise

Date: not yet defined

Place: Kuala Lumpur, Malaysia

Objective:

As a party to the Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the case of a Nuclear Accident for Radiological Emergency, Malaysia is obliged to implement the requirements of these conventions. The objective of this mission is to enhance the capability of personnel in order to successfully implement the obligations.

III.3.4. Philippines

(i) Experts' Mission to Evaluate the Situation of the Research Reactor

Date: not yet defined

Place: Manila, Philippines

Objective:

The mission is to evaluate the overall safety status of the facility which has plans to return to operation after twelve years of extended shutdown. In the previous fact-finding mission conducted in January, the mission made specific recommendations. During the mission, the implementation status of recommendations from the previous mission will be reviewed. The mission team will consist of four experts (two IAEA staff and two external experts).

III.3.5. Thailand

(i) Pre-IRRT Mission for the OAEP

Date: 26-30 June 2000

Place: Bangkok, Thailand

Objective:

The objective of the Pre-IRRT Mission in Thailand is to review the legal basis, organization, staffing, performance in basic activities (review and assessment, inspection and enforcement) and other selected areas of national regulatory body - Office of Atomic Energy for Peace (OAEP). The basis for the review will be IAEA recommendations for the area of governmental organization and good national practices. Recommendations and suggestions should assist in enhancement of performance of OAEP. The mission will be composed of 4 experts (2 outside, 2 IAEA staff).

(ii) Experts' Mission on Radiological Assessment Review of the TRR-2 Reactor at ONRC

Date: 21-25 August 2000

Place: Bangkok, Thailand

Objective:

The main purpose of this mission is to support OAEP staff for conducting and reviewing the radiological consequence analysis for TRR-2. The mission will give technical guidance on analysis methodology and review procedures for this assessment.

III.3.6. Viet Nam

(i) Scientific Visit to US

Date: May 2000 (10 days)

Place: USA

The purpose of this scientific visit is to learn functions of an independent and competent regulatory body: functions of nuclear safety supporting institutes; safety culture and activities of vendors and owners in the US.

Funding is from the US contribution to the EBP.

(ii) National Training Course on Nuclear Safety Analysis of Research Reactor

Date: 3-7 April 2000

Place: Hanoi, Viet Nam

Objective:

This training course is prepared with the view of improving and expanding knowledge and common understanding on research reactor safety for regulatory body and operating group in Viet Nam. During the national seminar, topics regarding research reactor safety will be presented by three lecturers. The target group of this training are the regulatory body, the operating group, university and industries related with nuclear facilities.

(iii) Workshop on Regulatory Inspection for Dalat Research Reactor (DRR)

Date: 2-6 October 2000

Place: Hanoi or Dalat (to be determined by the Vietnamese counterpart), Viet Nam

Objective:

The objective of this workshop is to provide to the Vietnamese Regulatory Authority staff comprehensive and detailed information on the practices and experience with the licensing and regulatory inspections of research reactors and relevant IAEA safety standards. The workshop will consist of presentations by the experts on selected topics and discussions focused on particular licensing and inspections activities for DRR. The attendees to this workshop are expected to enhance their capabilities for safety inspection of the DRR.

As this workshop has close relation with the following Experts' Mission to Advice on Review and Assessment of the SAR of the DRR, combination of these two activities will be considered.

(iv) Experts' Mission to Advice on Review and Assessment of the SAR of the DRR

Date: 6-10 November 2000

Place: Hanoi, Viet Nam

Objective:

The objective of this mission is to assist Dalat Research Reactor Centre to prepare the safety analysis report for DRR. The mission will provide technical support to prepare safety analysis report and comply with the Agency's safety guide for preparation of safety analysis report for research reactor. The mission team will consist of four experts (two IAEA staff and two external experts).

IV. PROGRAMME BUDGET

IV.1. COSTS

For the implementation of the activities planned for 2000, the following costs have been estimated.

Co-ordination Activities (AGM, Database)	US\$ 50,000
Regional Activities	US\$ 218,000
National Activities	US\$ 365,000
Staff Costs	2 Professionals
	3 Supporting Staff

In addition, there are four cost-free experts respectively from France (1), Germany (1), Japan (2) and the IAEA staff working in the programme.

IV.2. CONTRIBUTIONS

The following countries have provided cash and/or in-kind contribution for activities in 2000.

Japan	US\$ 913,000 *
France	1 cost-free expert
Germany	1 cost-free expert
Spain	US\$ 60,000
USA	US\$ 200,000 (amount still to be confirmed)

* excludes 2 cost-free experts from Japan

V. PREPARATION OF NUCLEAR SAFETY ACTION PLANS

V.1. BACKGROUND

The Advisory Group for the EBP convened in October 1999 recommended that recipient countries should provide feedback on the usefulness of the activities performed under the EBP and propose improvements, if identified. The programme scope of Phase III (2001-2002) and the assistance to each country in the region should be discussed in the next Advisory Group Meeting (AGM) to be held in October 2000. Before September 2000, the IAEA Secretariat should prepare Action Plans for each country including the scope of the assistance and a proposal for the activities to be implemented from 2001 to 2002.

V.2. CONTENTS OF THE ACTION PLAN

A Nuclear Safety Action Plan will be prepared for each country including the following items:

- analysis and identification of nuclear safety assistance needs in the country based on the Country Nuclear Safety Profile (CNSP);
- evaluation of past activities under the EBP and their efficiency;
- policy for future assistance, including target fields, topics and facilities, based on the results of IRRT and/or INSARR mission and other assistance activities;
- proposal of activities from 2001 to 2002, including objective, type of assistance, details of topics and expected impact.

V.3. VIEWPOINTS OF MAKING ACTION PLAN

At the AGM in October 1999, the IAEA Secretariat proposed two principal elements for the Phase III; a training programme on the use of computer codes and an example of a comprehensive assistance programme to enhance the regulatory body. These elements should be considered in developing the actual Action Plans.

The SAP should be developed through discussions with each country. The discussions should be based on a draft of the Action Plan prepared by the IAEA Secretariat, self-evaluation of the participating organizations in the country, and requests for assistance.

New and important topics, such as management of radioactive waste or spent fuel in nuclear installations and radiation protection in the facilities, will be included in the discussions with each country.

V.4. CONSULTATION WITH THE COUNTRIES

The IAEA Secretariat has sent questionnaires to elicit the opinions of the countries about the usefulness of past EBP activities, and also to gather information from the countries about future project priorities and specific requests for Phase III as well as comments on improvement of the IAEA's programme.

The IAEA Secretariat started to visit each country to discuss needs and to finalize the Action Plan, based on the results of the questionnaires and a preliminary Action Plan prepared by the IAEA Secretariat. Technical visits to China, Indonesia, Philippines and Thailand will be conducted as indicated in the work plan.

The main purposes of the missions are as follows:

- to discuss answers to the questionnaires;
- to discuss future strategy and needs;
- to revise the contents of the Country Nuclear Safety Profile (CNSP), if needed.

After the discussion, the draft of the Action Plan will be completed and submitted to the AG participants before the next meeting in October 2000.

Annex 1

WORK PROGRAMME FOR 2000

Work Programme for 2000

General activities

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Co-ordination													
Progress Report	Vienna						31						
Advisory Group Meeting	Vienna												30-01
Databases													
Database release (CD ROMs)	Vienna						31						

Work Programme for 2000

Regional activities

06-Apr-00

Activity		Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training														
Tutorial on Safety Fundamentals (CD ROMs)		Vienna	31											
CS on safety analysis methodology and computer code utilization		Vienna	29	-03										
Regional Workshop on Nuclear Safety Information for decision makers		Kuala Lumpur												
Training Workshop on NPP siting		Jakarta												
International training course on reg. aspects & safety documentation of research reactors (TC)		Argonne												
Video tutorial on the functions of the Regulatory Body		Trnava												
Tutorials on reactor neutronics and thermal hydraulics f. internet and CD-ROM use		Sao Paulo												
Workshop on safety methodology and computer code utilization			xx											
WS on institutional req. for development of nuclear power: Conditions for safety		Vienna												
Training course on safety of research reactors (Operational Safety)		Tokai-mura												
Expert missions														
Preparatory visit for the training workshop on nuclear power plant siting		Jakarta												
			06	-08										

Work Programme for 2000

China

06-Apr-00

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRRT service													
IRRT mission to the regulatory body	Beijing												09--20
Training													
Workshop on periodic safety review (PSR)	Qinshan												22--26
Workshop on fire safety	Qinshan												19--23
Workshop on severe accident policy	Beijing												26--30
Expert missions													
Accident source term for Tianwan NPP	Beijing	10--14											
Emergency action levels of NPPs	Beijing		29--03										
Preparatory mission on I&C conceptual design for Tianwan NPP	Beijing												26--30
Technical visit	Beijing												
Peer review assessment of RPV PTS analysis&ageing related issues justification f. Tianwan NPP	Moscow												
Peer review the I&C conceptual design for Tianwan NPP	Erlangen												25--29
Peer Review the assessment of the RPV strength and fatigue analyses for Tianwan NPP	Moscow												xx--xx
Second Review of level 1 PSA revised report for Tianwan NPP	Moscow												06--10
Group training													
Workshop on NPP project management	Japan	24--04											
Scientific visit on radiation protection during outage of NPP													17--28

Work Programme for 2000
Indonesia

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training													
Workshop on nuclear safety and risk assessment	Jakarta												
		01--05											
Expert missions													
Technical visit	Jakarta												
Review integrated regulatory inspection & enforcement programme (for RR)	Jakarta												
Review existing research reactor safety modifications (Triga Mark II, Bandung)	Jakarta												
		03-14											
		05-09											
		21-25											

Work Programme for 2000													
Malaysia													
Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Expert missions													
Review emerg. prep. with respect to international experience and implement an exercise	Kuala Lumpur												
Technical visit	Kuala Lumpur												
Provide guidance for the preparation of safety analysis report	Kuala Lumpur												

Work Programme for 2000

Philippines

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
INSARR mission													
Mission to evaluate the situation of the Research Reactor	Manila												
Pre-mission to evaluate the situation of the Research Reactor	Quezon City	24-28											
Expert missions													
Technical visit	Quezon City								22-23				

Work Programme for 2000
Thailand

06-Apr-00

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
IRRT service													
Pre-IRRT mission for the OAEPEP	Bangkok												26-30
Expert missions													
Technical visit	Bangkok												26-30
Radiological assessment review of the TRR-2 reactor at ONRC	Bangkok												21-25

Work Programme for 2000
Viet Nam

06-Apr-00

Activity	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Training													
National training course on nuclear safety analysis of research reactor WS on licensing and regulatory inspection for Dalat research reactor (DRR)	Hanoi					03--07							02--06
Expert missions													
Technical visit to review country specific action plan Advise on review and assessment of the SAR of the DRR	Hanoi			10-13									06-10
Group training													
Scientific visit for Vietnamese experts to the U.S.						xx--xx							