

PROGRESS REPORT
(October 1998 - March 1999)

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

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 25, 1999

I. INTRODUCTION

The Advisory Group (AG) convened by the IAEA in October 1998 to Review Progress and Future Activities of the EBP on the Safety of Nuclear Installations, requested the Secretariat to prepare a progress report by the end of March 1999 including: the Country Nuclear Safety Profile (CNSP) and the action plan for China, the evaluation of new requests presented during the AG meeting and a revised action plan on the basis of this evaluation.

The activities implemented from October 1998 until March 1999 are described in Section II. Other activities planned for 1999 are discussed in Section III and the revised work plan is in Annex 1. The major part of the CNSP of China was completed by the IAEA in consultation with the relevant Chinese organizations and is included as Annex 2 of this report.

II. ACTIVITIES IMPLEMENTED FROM OCTOBER 1998 TO MARCH 1999

The following are the implemented regional and national activities:

II.1. PROGRAMME MANAGEMENT

II.1.1. Database

A database is being developed to manage the entire set of activities of the EBP. For each activity, besides the basic managerial information, this database includes: the Country Nuclear Safety Profiles (CNSPs), the objective of each activity, the results achieved and the associated reports. A demonstration will be given at the next AG meeting in October 1999.

II.1.2. Update of CNSP

The update of the CNSPs is a continuous process. The main sources of information for this update are:

- the technical visits and experts' missions carried out in the framework of the EBP;
- other Agency missions; and
- new information provided by each country.

II.2. REGIONAL ACTIVITIES

II.2.1. Regional Workshop on Nuclear Safety, Phase II

Date: 19-30 October 1998

Place: Korea Institute of Nuclear Safety, Taejon, Republic of Korea

Objective:

To provide training on the basic principles of nuclear safety for current and next generation of NPPs, their design and safety features, and implementation of defence in depth. The workshop included practical exercises using IAEA PC software for simulation of reactor transients and accidents (PWR) and fault tree analysis.

Results:

The workshop was attended by 27 participants who considered it very useful.

The exercises using PCs were particularly appreciated. The participants felt that the time for exercises was short and it was suggested that future workshops should devote more time for exercises.

Many participants requested further training, particularly concerning research reactor safety and siting.

Participants from Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, had less knowledge about nuclear power plants than the Chinese participants. As a result, it was difficult to set a level of detail for the lectures appropriate to all participants.

II.3. NATIONAL ACTIVITIES

II.3.1. China

(i) IPERS Mission to Review the Daya Bay NPP Level 1 Probabilistic Safety Assessment

Date: 30 November to 8 December 1998

Place: Beijing, China

Objective:

The objective of this mission was to carry out an IPERS review of the Daya Bay NPP Level 1 PSA (including internal initiating events during full power and shutdown operational states) with the purpose of assessing the adequacy of the treatment of important technological and methodological issues in the study performed.

Results:

The IPERS team concluded that a good framework has been established for the PSA study in its current state of development. Once the study is completed and the recommendations of this review are implemented, it will provide a good basis for the implementation of a Living PSA model for the plant.

The main findings are related to the definition of initiating events and the assessment of their frequencies, the system analysis, the classification of the end-states and some aspects of the human reliability analysis and of the analysis of low power and shutdown operating modes.

(ii) Seminar on Safety Culture and the Assessment Method

Date: 17-20 November 1998

Place: Beijing, China

Objective and Results: A Safety Culture seminar was held in Beijing with 28 participants from utilities, regulator and technical support organizations. The seminar, which was presented by one Agency staff and one external expert, included presentations and exercises on a number of safety culture topics. Some of the main themes covered were the Concept of Safety Culture - Individual and Organizational Perspectives; Development of Safety Culture; Safety Culture - a Learning Culture, The Role of the Manager and Safety Culture; Assessment of Safety; Improving Safety Culture Through Performance Analysis; Future Actions to Improve Safety Culture in Respective Organizations.

Participants expressed appreciation for the seminar. Discussions held with various organizations after the seminar indicate that the concepts presented are already being considered in various tasks.

(iii) Experts' Mission for Design Safety Review Services for China

Date: 9-18 November 1998

Place; Beijing, China

Objective:

The objective of the review was to advise the NNSA on the design safety aspects based on the Preliminary Safety Analysis Report of China's Experimental Fast Reactor.

Results:

Recommendations provided by the IAEA team addressed: safety requirements on the reactor shutdown systems; instrumentation and control means for core monitoring and reactor shutdown; general principles and rules applied on classification of events for accident analysis; accident analysis and validation of applied computer codes and assumptions for seismic design and high irradiation effects on the core materials.

(iv) Visit to China to develop CNSP

Date: 1-5 March 1999

Place: Beijing, China

Objective:

To compile information to complete China's CNSP and to clarify some aspects of the work programme for the year 1999.

Results:

Information collected by a team of 3 IAEA staff allowed the preparation of the major part of the CNSP for China.

The work programme for 1999 was discussed and updated in accordance with the current needs of the Chinese organizations.

The final version of the CNSP including the completion of some open issues (research reactors, progress of government restructuring) will be completed by the IAEA in May 1999 based on information to be collected in a second technical visit.

II.3.2. Vietnam

(i) Experts' Mission to Review the Licensing Progress of Refuelling and New I&C

Date: 22-26 February 1999

Place: Dalat, Viet Nam

Objective:

At the request of Vietnamese authorities, an experts' mission visited the Nuclear Research Institute in Dalat to advise on safety aspects of the Dalat Research Reactor (DRR) such as the licensing of a new core configuration (refuelling), changes in the reactor instrumentation and control and on training for regulatory inspection.

Results:

The experts held technical discussions with the local personnel and delivered several lectures on safe operation of research reactors with emphasis on operational limits and conditions, core management and fuel handling, ageing management and reactor modifications. As a result of the discussions, the experts made recommendations on the above issues and on the others such as the issuance of a new license for the DRR to comply with recent legislation issued by the Viet Nam Radiation Protection and Nuclear Safety Authority.

III. WORK PROGRAMME FOR 1999

An evaluation of the new requests presented at the AGM (October 1998) was carried out by the EBP Secretariat in consultation with the IAEA's Technical Co-operation Department, East Asia and Pacific Section. As a result of the evaluation, the work plan (**Annex 1**) for 1999 was revised and its implementation started.

The programme includes scientific visits which, when requested to the IAEA, will be considered if the host country agrees to earmark specific funds for this purpose.

The following provides a description of the new activities included in the 1999 work plan and indicates some activities which may be postponed to 2000.

The organization of missions and meetings requires technical information which needs to be provided to the IAEA. It should be noted that the implementation of the proposed activities is strongly dependent on receiving this information well in advance.

III.1. REGIONAL ACTIVITIES

III.1.1. Seminar on Nuclear Safety Information for Decision Makers

The Agency has drafted a TECDOC on "Communications on Nuclear, Radiation, Transport and Waste Safety: A Practical Handbook". This TECDOC may serve as a basis for developing the proposed seminar. Further work on this subject is still required.

No decision has yet been made about the venue for this event.

III.2. NATIONAL ACTIVITIES

III.2.1. China

A first technical visit was carried out in March 1999 to discuss the activities for 1999 and to develop the CNSP.

A second technical visit to China is scheduled to collect information related to research reactors and to complete the CNSP.

Assistance to safety assessment of Lianyungang NPP

Activities to assist the safety assessment of Lianyungang NPP (LNPP) include peer reviews, workshops and experts' missions. The assistance will make use of the IAEA experience gained from previous evaluations of NPPs of Soviet design.

Delays in the submission by the Chinese organizations of technical documents required for the IAEA mission may impair on the schedule agreed for the various IAEA missions. The required documents include information from the Russian designers and evaluations by the Chinese experts.

The reviews will be based on the previous activities of the Agency, particularly the results of the mission to St. Petersburg on the resolution of WWER-1000/320 safety issues in the AES-91 design and the documentation requested from LNPP including questions from the Chinese side for peer review.

The LNPP to be built in Jiangsu province consists of two units of WWER-1000 model 428 of AES-91 design, based on WWER-1000/320 NPPs currently in operation and modernized to enhance safety.

(i) Peer review on comparative evaluation of Russian/Chinese safety codes and standards

In May 1996, the IAEA has conducted an experts' mission in Beijing to evaluate some of the Russian safety standards used in the design of the WWER-1000/428 units. A further request was submitted to the IAEA to peer review the classification of safety related equipment based on the results of the review conducted by the Chinese regulatory body (NNSA).

This request was recently cancelled by NNSA.

(ii) Workshop on external events PSA

To exchange information on methods and international experience on probabilistic safety review of external events and its application for Lianyungang NPP

(iii) Experts' mission to peer review the design modifications of the fuel with focus on the new fuel assembly design to ensure reliable control rod insertion

Among the improvements, modification of fuel assembly design was introduced to reduce fuel deformation in order to avoid delayed control rod insertion and increased power peaking factors due to excessive water gaps between fuel assemblies. The objective is to review the modified design of the fuel assembly.

(iv) Experts' mission to peer review design modifications of safety systems (including new ones)

Among the improvements for AES-91, modifications of newly engineered safety features were introduced. The objective is to review modifications of the design of safety systems.

(v) Experts' mission to peer review design modifications of components including the application of the LBB concept

The scope of the mission also includes the review of the design modifications for main components of the primary and secondary circuit, such as the RPV, steam generators, piping and its layout, main coolant pumps, as well as structural integrity related monitoring and diagnostics systems. The role of the leak before break concept in the plant design will also be discussed including the approach to its application.

(vi) Experts' mission to review I&C Conceptual Design

China has requested to postpone this activity until the end of 1999 or beginning of 2000 due to the current lack of technical information required for the IAEA review.

(vii) Experts' mission to review double containment design and related systems

Focus of this mission will be on the review of design and beyond design basis conditions including accident management for an evolutionary type of reactors with AES-91 design.

The activities (iv), (v) and (vii) will be conducted in parallel to take into consideration the interrelation of these topics and its implication for safety.

(viii) IPERS review of LNPP PSA

An international peer review is to be conducted in the frame of the Agency's IPERS for the level 1 PSA developed by the designers for LNPP.

National Seminar on NPP outage

Intensive inspection, routine tests and maintenance are implemented during the refuelling outage. The national Seminar on NPP outage should discuss regulatory approaches and methodology to prevent safety incidents and to improve safety during the plant outage.

No date has been agreed yet and more details have been requested by the IAEA.

Experts' missions for design safety review services for China Experimental Fast Reactor

Two missions are scheduled: a new mission to complete the review of items related to design verification and tests which was postponed during the 1998 review, and a follow-up mission to complete the previous review in 1998 and to follow-up on the earlier recommendations.

Experts' mission on emergency action levels of NPPs

This mission is to review the national emergency arrangements and to provide advice based on best international practice to both the NPP operators and to the regulatory authority.

Experts' mission on living PSA on NPP operation

Assistance is requested on the development of living PSA models and applications to enhance operational safety.

In March 1998 a related workshop was organized by the IAEA in Beijing. Therefore, discussions are still going on to define specific needs to be addressed.

Group training

Spain has agreed to provide training to a group of Chinese experts on methods and tools for training operations personnel. The training will be hosted by Tecnatom in Spain.

III.2.2. Indonesia

(i) Workshop on regulatory inspection during NPP siting and construction, and an experts' mission to assist BAPETEN on regulatory inspection and enforcement functions

A pre-IRRT mission will be conducted in preparation for a broader review in 2000. The mission should define the scope and further assistance required for BAPETEN to establish an effective regulatory inspection and enforcement programme.

(ii) Experts' mission to assist BATAN to improve the Safety Analysis Report (SAR) of its Multi-Purpose Research Reactor (MPR) in Serpong

This experts' mission is added as a follow-up activity of an INSARR carried out in 1998. The objective is to review the improved SAR with the consideration of the suggestions and recommendations provided earlier by the IAEA.

III.2.3. Malaysia

All the activities planned during the last AG meeting were agreed to be implemented in 1999.

III.2.4. Philippines

No new activities are planned.

III.2.5. Thailand

A seminar on regulatory functions will be conducted to discuss with senior staff of OAEP and relevant government organizations, the international experience and requirements for the establishment of an independent regulatory body. Details of the seminar will be agreed during a technical visit in May 1999.

III.2.6. Viet Nam

A pre-IRRT will be conducted in 1999 to prepare for the IRRT mission scheduled for 2000.

An experts' mission to assist VINATOM in formulating a safety research plan for NPP has been agreed. The objective is to enhance the technical capability of the staff in safety analysis for future NPPs.

IV. PROGRAMME BUDGET

(i) Costs

Based on the revised work plan (Annex I), the following costs have been estimated:

| | |
|-----------------------|-----------------|
| Regional Activities | US\$200,000 |
| National Activities | 410,000 |
| Scientific Visits | 150,000* |
| Data Base Development | 5,000 |
| Advisory Group | 26,000 |
| Staff Costs | 2 Professionals |
| | 3 GS staff |

* Scientific visits will be conducted in case a host country accept it and earmark funds for it.

In addition, there are 4 cost-free experts respectively from Japan (2), Germany (1), France (1) and one staff member from the IAEA Secretariat working in the programme.

(ii) Contributions

The following countries have provided cash and/or in-kind contribution:

| | |
|---------|------------------------------|
| Japan | US\$ 880,000* |
| USA | US\$ 200,000 |
| Canada | CDN\$ 10,000 (US\$ 6,667) |
| Spain | PTS 10,000,000 (US\$ 66,264) |
| France | 1 cost-free expert |
| Germany | 1 cost-free expert |

* excludes 2 cost-free experts from Japan

As recommended by the AG, consultations are proceeding with Member States interested in the Programme with the objective of ensuring their full participation in the EBP. In this context, Singapore has indicated interest to host EBP regional activities and to provide in-kind contributions. The matter will be included in the agenda of the next AG meeting to be held in Vienna from 18 to 21 October 1999.

Annex 1

WORK PROGRAMME FOR 1999

Annex 2

COUNTRY NUCLEAR SAFETY PROFILE FOR CHINA