EBP-ASIA-77
LIMITED DISTRIBUTION
NOVEMBER 2001

# PROGRESS REPORT

## (April - October 2001)

**EXTRABUDGETARY PROGRAMME ON THE
SAFETY OF NUCLEAR INSTALLATIONS
IN THE 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**

November, 2001

## I. INTRODUCTION

Activities implemented from October 2000 to March 2001 were presented earlier in the PROGRESS REPORT, EBP-ASIA-70, which was distributed to all participating countries at the end of March 2001. This report describes the activities implemented from April until October 2001 and further activities planned for 2001.

## II. ACTIVITIES IMPLEMENTED FROM APRIL TO OCTOBER 2001

### II.1. PROGRAMME MANAGEMENT

#### II.1.1. Database

The internet-version of the EBP database was released to registered representatives in the participating countries. It presents information on each activity, including basic information on dates, venue, status, technical officers, national counterparts. In addition, the objective, results achieved, summary and full reports, the Country Nuclear Safety Profiles (CNSPs) and the Nuclear Safety Action Plans (NSAPs), are also displayed. Interrogation capabilities are available using various criteria: searching by country, by type of activities, by year. For training activities, the database contains the actual material presented by the lecturers. Information about other relevant IAEA Technical Co-operation projects, and bilateral agreements and projects related to the countries participating in the EBP can also be retrieved. The database is being updated continuously.

#### II.1.2. Indicators of Programme Achievements

During the last Advisory Group Meeting in November 2000, the following recommendation has been made:

> *Work should be initiated by the Secretariat to define indicators to measure achievements in participating countries to enhance their nuclear safety infrastructure and the safety of research and power reactors.*

As a first step for defining indicators of programme achievement, a questionnaire was developed and circulated to evaluate the impact of the EBP in strengthening nuclear safety in each of the participating countries. A working paper

was prepared by the Secretariat for discussions during the AGM to be held in November 2001.

II 2. REGIONAL ACTIVITIES

**II.2.1. Basic Professional Training Course**

Date: 5 March - 13 April 2001

Place: Argonne, USA

Objective and results:

The objective of this training course, which was hosted by the Argonne National Laboratory (ANL), USA, was to provide basic nuclear safety knowledge to professionals involved in the nuclear safety regulation and operators of RRs and NPPs in the participating countries.

Twenty-four participants from the countries attended the course. The course covered a wide range of safety topics including NPP design, operational safety, regulatory control, safety assessment, safety culture and public communications. The course structure included classroom lectures, group work and technical visits.

The first week of the course was devoted to a review of reactor physics and thermal hydraulics and homework on these topics has been assigned for completion until the end of the course. During the second week, lectures on the IAEA Nuclear Safety Programme, Current Safety Issues, the Nuclear Safety Convention and the IAEA Nuclear Safety Fundamentals were presented, as well as the IAEA Requirements on Legal and Regulatory Infrastructure using an educational video prepared by the IAEA. The course was highly appreciated by the participants who demonstrated great interest in the lectures and engaged in discussions.

**II.2.2. Preparation for the IAEA Workshop on Safety Analysis Methodology (2)**

Date: 13-15 August 2001

Place: Taejon, Korea

Objective and results:

The objective was to co-ordinate the technical and administrative matters for the second IAEA Workshop on Computer Code Utilization to be held in Taejon, Korea, 29 October - 9 November 2001.

**II.2.3. Educational Modules for Long-distance Learning (Physics / Thermal hydraulics)**

The purpose of the tutorial modules (on thermal hydraulics and reactor physics) is to train junior professionals using the state of the art technology for distance learning.

Preparation for this educational modules was completed before in August 2001 and incorporated in the IAEA Nuclear Safety home page.

## II.3. NATIONAL ACTIVITIES

### II.3.1. China

*(i) Experts Mission to Review the Features for the Mitigation of Severe Accidents of the Tianwan NPP*

Date: 23 - 27 April 2001

Place: St. Petersburg, Russia

Objective and results:

The objective of mission was to review the documentation provided to the IAEA on severe accident safety features included in the design of Tianwan NPP. These features include provisions for the following three major areas: management of energy in the containment and implementation of filtered containment venting system; management of combustible gases in the containment; core catcher for the management of the ex vessel molten core conditions.

The expert review was mainly focused on assessing:

- the general strategy to address severe accident on the design of TNPP;
- the completeness and soundness of the information for the definition of the design basis (design basis transients, environmental conditions, loads of internal and external origin, etc..) for the features for severe accident mitigation;
- the compliance of the proposed design solutions with concepts, principles and requirements established nationally and internationally (IAEA Safety Standards);
- the adequacy of proposed design solutions when compared with international practice;
- the implementation of comments and recommendations made during previous IAEA review missions.

The status and the results of research and analysis activities were discussed with the counterpart experts in order to understand the general approach to severe accidents, the assumptions and methods for the analysis and the effectiveness of the proposed design features.

*(ii) Workshop on Reactor Protection System and V&V of the Safety Software for Tianwan NPP*

Date: 14-18 May 2001

Place: Erlangen, Germany

Objective and results:

The objective of this workshop was to present and discuss all the safety relevant tasks connected with reactor protection system (RPS), and verification and validation of the safety software for TNPP.

In the first part of the workshop, the vendors presented their overview reports in accordance with the agreed agenda. Then, the participating experts from Chinese and IAEA teams presented the relevant questions and comments. The IAEA mission recommended on: establishment of a complex V&V (verification and validation) plan; clarification of the process of qualification of RPS in Russia including process of V&V; participation of Chinese experts in the process of design, testing and commissioning of safety I&C system.

*(iii) Technical Visit to China*

Date: 16-21 May 2001

Place: Beijing, China

Objective and results:

The objective of this visit was to update the Country Nuclear Safety Profile (CNSP) and the Nuclear Safety Action Plan (NSAP), to validate the definition of indicators of programme achievements and to launch the process at the national level.

The IAEA side collected information to update the CNSP, including national education and training status for nuclear safety, which will be added as an additional chapter in the CNSP. The IAEA side also collected enough information to demonstrate the importance of EBP for China and the improvements on nuclear safety achieved thanks to this programme, for example the recommendations of IRRT for NNSA or the review missions for Tianwan NPP. The evaluation of the EBP achievements in China indicates positive results.

*(iv) Experts Mission on Acceptance Criteria for DBAs of Fast Reactor*

Date: 11-15 June 2001

Place: Beijing, China

Objective and results:

The objectives of this mission were to introduce accident classification and the design basis criteria of fast reactors in the Member States, to discuss those of China Experimental Fast Reactor (CEFR) with Institute of Atomic Energy (CIAE) engineers and to prepare suggestions / recommendations for the safety design of CEFR.

During the mission, CIAE introduced the CEFR approach on accident classification and acceptable design limits, while the IAEA team introduced those of country practices; Japan (Monju), France (Phenix and Super-Phenix) and UK (EFR). Extensive discussion was held following the presentations, and the IAEA team provided suggestions and recommendations on: defence in depth consideration; basic strategy of accident classification; basic strategy of acceptance design criteria; accident scenarios; and thorough accident analysis.

**II.3.2. Indonesia**

*(i) Technical Visit to Indonesia*

Date: 14-15 May 2001

Place: Jakarta, Indonesia

Objective and results:

The objective of this visit was to update the Country Nuclear Safety Profile (CNSP) and the Nuclear Safety Action Plan (NSAP), to validate the definition of indicators of programme achievements and to launch the process at the national level.

Information to update the CNSP and on national education and training status was obtained. The current preparatory status of several IAEA missions to BATAN and BAPETEN planned in 2001 were discussed. The distribution and use of long-distance learning tools was discussed.

*(ii) Experts Mission on Site Licensing Review of NPP*

Date: 10-14 September 2001

Place: Jakarta, Indonesia

Objective and results;

The objective of this mission was to provide technical information on site evaluation to enhance BAPETEN's technical capability in view of reviewing site evaluation related documents that should be submitted by the applicant in the future.

The IAEA team has presented lectures on: dispersion and impact on population; volcano and meteorological hazards; and seismic hazard and geotechnical issues. Upon the request of the IAEA, BAPETEN invited BATAN to make a presentation on the status of nuclear energy in Indonesia and another one on the history and the main features of the Muria site. The IAEA team advised BAPETEN to enhance its human resources in the field of earth sciences and civil engineering, so as to get a adequate capability in site safety assessment, and to organize a site evaluation of the site of the 30 MW Multi-purpose Reactor as a on-the-job training.

**II.3.3. Malaysia**

*(i) Workshop on Regulatory Requirements for Licensing Research Reactors*

Date: 15-19 October 2001

Place: Kuala Lumpur, Malaysia

Objective and results:

The objectives of this workshop were to introduce the IAEA safety standards on regulatory control and research reactor safety and to enhance the AELB(Atomic Energy Licensing Board)'s technical capability of licensing review for MINT research reactor through lectures, discussion and group exercise.

Three lecturers including one external expert from the Australian Regulatory Authority (ARPANSA) provided twelve lectures on regulatory control, safety requirements on research reactor, safety analysis for research reactor, INSARR (Integrated Nuclear Safety Assessment for Research Reactor) methodology and the Australian experience on licensing review for the research reactor in ANSTO. During the group exercise for 8 hours, the participants practiced how to conduct regulatory review of the safety analysis report(SAR) for MINT research reactor based on the IAEA Safety Guide. This workshop achieved the expected results through enthusiastic and responsive participation of the AELB staff and its impact will bring self-motivation to enhance their technical capability on regulatory activities for research reactor safety.

### II.3.4. Philippines

*(i) Experts Mission on Design Review of the New PRR-1 Core Container*

Date: 16-27 April 2001

Place: Quezon City, Philippines

Objective and results:

The objective of this mission was to provide expert service for the conceptual design of core box and decay tank in PRR-1 and to discuss an expert mission on enhancing regulatory infrastructure in lieu of rehabilitation of research reactor.

The mission covered a broad spectrum of the following areas in respect of the feasibility of the conceptual designs:

- systematic planning for rehabilitating the PRR-1
- feasibility of the conceptual designs of core box and decay tank
- project management of rehabilitation of the reactor

The mission reviewed the current situation of the facility and identified follow-up activities on the recommendations provided in the previous fact finding missions on 23-27 January 2000. The mission was concerned about the financial and human recourses needed for the rehabilitation of the PRR-1, and provided recommendations on that to improve engineering capability of the Philippine Nuclear Research Institute (PNRI) and to accelerate the improvement process of the PRR-1.

### II.3.5. Thailand

*(i) Technical Visit to Thailand*

Date: 27-28 August 2001

Place: Bangkok, Thailand

Objective and results:

The objective of this visit was to update the Country Nuclear Safety Profile (CNSP) and the Nuclear Safety Action Plan (NSAP), and to validate the definition of indicators of programme achievements and to launch the process at the national level.

The NSAP, which was revised on the basis of recommendations by an IRRT conducted in February 2001, was discussed. An approach for the evaluation of programme achievements was presented by the IAEA to discuss it and to collect information on the achievements by training activities and review missions conducted to date under the EBP.

### II.3.6. Viet Nam

*(i) Technical Visit to Viet Nam*

Date: 23-24 August 2001

Place: Hanoi, Viet Nam

Objective and results:

The objective of this visit was to update the Country Nuclear Safety Profile (CNSP) and the Nuclear Safety Action Plan (NSAP), and to validate the definition of indicators of programme achievements and to launch the process at the national level.

An approach for the evaluation of programme achievements was presented by the IAEA side to discuss it and to collect information on the achievements by training activities and review missions conducted to date under the EBP. Requests from Vietnam for national activities in 2002 were also discussed, including an instruction to the use of the EBP database.

*(ii) Workshop on Requisites for Establishment of Regulatory Body, Licensing, I&E*

Date: 15-19 October 2001

Place: Hanoi, Vietnam

Objective and results:

The objective of this workshop was to provide information on requisites for establishment of regulatory body, including licensing procedure and inspection & enforcement, mainly for regulating the research reactor.

Thirteen members of the Vietnam Atomic Energy Commission (VAEC) and the Vietnam Radiation Protection and Nuclear Safety Authority (VRPA) attended the workshop. A number of the participants were involved in feasibility studies for a nuclear power programme for the country.

Topics of the workshop included the status of IAEA guidance documents addressing regulatory supervision, an exercise in incorporating guidance documents into a regulatory supervision programme, presentations and discussion on the establishment of a regulatory supervision programme, an example of the structure of a regulatory body organization, and an example of a comprehensive set of nuclear regulations. In addition to the workshop sessions, discussions were conducted with management on the unique needs of the country in the area of regulatory supervision.

## III. ACTIVITIES PLANNED IN 2001

### III.1. REGIONAL ACTIVITIES

#### III.1.1. Workshop on Safety Analysis methodology and Computer Code Utilization (2)

Date: 29 October - 9 November 2001

Place: Taejon, Korea

Objective:

The objective of this workshop is to provide in-depth training on the use of computer codes for accident analysis. This workshop is followed by two others in 2002 and together with the previous workshop constitute a programme to prepare professionals in participating countries to review Safety Analysis Reports of NPPs and RR using state of the art accident analysis methodology and computer codes.

The detailed workshop programme was agreed with the Korean counterparts during the first workshop in February 2001. Focus will be on modelling research reactors.

**III.1.2. Workshop on the IAEA Nuclear Safety Standards (Safety Requirements)**

Date: 11-14 December 2001

Place: Tokyo, Japan

Objective:

The objective of this workshop, to be implemented in co-operation with the Government of Japan through the Nuclear Power Engineering Corporation (NUPEC), is to provide an overview on the IAEA safety requirements published in the areas of Site Evaluation, Design, Operation, and Legal and Governmental Infrastructure. The workshop will also discuss the relevant safety guides in preparation.

The lectures will be taped and further edited in video as education and training materials.

III.2. NATIONAL ACTIVITIES

**III.2.1. China**

*(i) Review Mission on Control Room Design of Tianwan NPP*

Date: 5-9 November 2001

Place: Erlangen, Germany

Objective:

The objective of this mission is to review the basic design of the main and standby control rooms. The mock-up (dummy) panels will be used for demonstration of operator's actions as a part of functional analysis of MCR and human-machine interface.

*(ii) Workshop on Requirements for Level 2 PSA*

Date: 19-22 November 2001

Place: Beijing, China

Objective:

The objective of this workshop is to provide to the Chinese counterparts comprehensive information on state-of-the-art methods, techniques and software used for performance of PSA Level 2 analysis world wide. The workshop is also intended to provide guidance to the regulatory authority staff on how to set about reviewing a PSA level 2 and on the technical issues that need to be addressed.

*(iii) Experts Mission on PSR Implementation of QNPP (Follow-up)*

Date: 26-30 November 2001

Place: Qinshan, China

Objective:

Qinshan NPP is the first plant to perform the periodic safety review (PSR) in China. The objective of this workshop is to provide more detailed information on implementation of PSR, including PSA, and to review action taken since the previous workshop on PSR conducted in May 2000. The topics of this mission includes; actual condition of the plant; the content and a form of the review; ageing management; the process of equipment qualification; safety analysis; emergency planning; and safety performance.

*(iv) Workshop on Research Reactor Ageing Safety*

Date: 10-14 December 2001

Place: Beijing, China

Objective:

There are several old research reactors constructed in 1950s and 1960s in China, and NNSA has to implement ageing safety assessment for these research reactors. The objective of this workshop is to provide information about regulatory requirements for safety of research reactor ageing based on the IAEA technical documents and experiences in the world. Topics of the workshop includes: operational safety of research reactors; safety standards on research reactors; INSARR methodology; guideline for the review of research reactor safety; INSARR results and experiences; safety guides on ageing management and in-service inspection; ageing mechanism and its effects on specific safety; prevention and mitigation of ageing effects; national activities on ageing management.

**III.2.2. Vietnam**

*(i) Follow-up Mission on Upgrading SAR of Dalat RR*

Date: 3-7 December 2001

Place: Hanoi, Vietnam

Objective:

The objective of this mission is to review follow-up activities on the recommendations provided in the previous safety missions and to provide advice how to improve the safety analysis report (SAR) for DRR-1 through exchange of experience and knowledge between and national experts of MINT and the mission. Topics of the mission includes: follow-up activities against the recommendations; contents and description of SAR; safety analysis methodology and results; nuclear design; radiation protection programme; conduct of operation; utilization and modification; test and maintenance program; and quality assurance program.

## IV. CONTRIBUTIONS 2001

The following countries have provided cash and/or in-kind contributions.

| **Country** | **Contributions** |
|---|---|
| Japan | 1,381,000 US$ (*) |
| USA | 210,000 US$ (**) |
| France | 1 cost-free expert |
| Germany | 1 cost-free expert |
| Korea | 1 expert (***) |

* includes 2 cost-free experts from Japan.
** includes 1 cost-free expert from US.
*** supported by the EBP Funds.