

**India's Participation in 4<sup>th</sup> Review Meeting of the Contracting Parties to Convention on Nuclear Safety (CNS), during April 14 – 25, 2008, Vienna, Austria.**

An 18 member delegation of senior officers from AERB, NPCIL, BARC and India's Permanent Mission in Vienna, led by Chairman, AERB participated in the 4<sup>th</sup> Review Meeting of the Contracting Parties to the CNS during April 14 – 25, 2008, Vienna. India signed the convention in 1994 and ratified it in March, 2005. In 2005, India attended the 3<sup>rd</sup> Review Meeting as observer, as India had ratified the CNS before less than 3 months of the start of the 3<sup>rd</sup> Review Meeting, as per CNS rules. Presently, there are 61 Contracting Parties to the convention which include all the 30 countries which operate nuclear power plants. The CNS is an incentive convention that seeks to maintain a high level of safety in nuclear power plants worldwide through an exhaustive peer review process conducted every three years.

The national report on safety of our NPPs was submitted in September 2007 for review by Contracting Parties. The report demonstrates, through self assessment, how India fulfills its obligations under articles 6 to 19 of the convention. These articles deal with topics like legislative and regulatory framework, regulatory body, responsibility of licensee, human and financial resources, siting, design and construction, assessment and verification of safety, radiological protection, emergency preparedness and Quality Assurance.

A total of 143 questions were raised by 20 countries on the Indian report and detailed responses to these were provided before the meeting. In the Review Meeting the national report was orally presented followed by a discussion session.

In the Review Meeting, the following presentations were made by the Indian delegation.

- 1) Historical development aspects of the Indian nuclear power programme, its strengths including comprehensive capability for the entire fuel cycle, human

resource development, strong R&D support and regulatory structure in the country.

- 2) Siting of NPPs, seismic and flood/tsunami considerations and current R&D work on structural integrity.
- 3) Safety Analysis and Radiation Protection.
- 4) Design, Construction and Operation of NPPs and update since the submission of the National Report to CNS.
- 5) Regulatory Review Process in India and Thematic responses to the questions on the national report posed by the Contracting Parties.
- 6) Concluding remarks highlighting the good practices followed in the country, challenges faced and future activities for enhancement of safety.

Based on the national report, the presentation in the Review Meeting and the discussion thereafter, the rapporteur's summary on India's report, included the following.

### **Highlights**

- India ratified the Convention in 2005 and presented for the first time its national report.
- Facilities :
  - The nuclear facilities cover the complete fuel cycle.
  - 17 Nuclear Power Plants (NPPs) are in operation, 6 NPPs are under construction.
  - Long term programme foresees also fast breeder reactors and Th-cycle based reactors.
- The radiological environmental monitoring is performed by dedicated laboratories, starting operation about 3 years before the plant operation at each NPP site.
- A strong R&D support for NPP safety exists.

- Regulatory body AERB,
  - is a Competent Authority to exercise the necessary powers under the Atomic Energy Rules on all nuclear and radiation facilities;
  - reports directly to the Atomic Energy Commission which is a high level policy making body;
  - gets technical support and advice from research centres, academic institutions and retired senior experts;
  - has extensive collaboration with international counterparts, especially within the CANDU senior regulators group;
  - follows graded enforcement approach going from directives for improvement/rectification up to suspension/revocation of the license;
  - grants licenses for key operating personnel, including station management;
  - is an ISO 9001:2000 certified organization for specific processes;
  - carries out 2 routine regulatory inspections per year for plants in operation and 4 for plants under construction;
  - approves the annual dose budgets on the basis of operator's planning.
  
- Dose limits for external contract workers is half compared to occupational workers.
- PSA level 1 are available for all NPPs and PSA level 2 is available for one NPP. Expansion to PSA level 2 and PSA for external hazards and shutdown are in progress.
- National and international operating experience is analysed by a committee at each plant and its recommendations are reviewed by a committee at station management level. The plant committee tracks the actual corrective actions.
- Significant events and other events are reported to AERB and are extensively reviewed. International events are also systematically reviewed in AERB for their applicability to Indian NPPs. A systematic approach for low level events by the operator is in place and these are also dealt with by AERB during regulatory inspections.

- Complete Periodic Safety Review (PSRs) are performed every 10 years and a brief review is performed in between two PSRs every 5 years. Issues identified by the PSRs have to be addressed.
- Emergency planning and preparedness is covered by AERB Guides and exercises at plant, site and off-site level are performed on a regular basis.
- Only graduate engineers that receive additional training are used for key O&M and Technical Services functions.
- The management system of the utilities follows closely the IAEA Safety Requirements GS-R-3.
- A first round of WANO peer reviews has been performed.

### **Good Practices**

- Conduction of brief reviews every 5 years between two PSRs.
- Presence of a dedicated radiological environmental laboratory at each NPP site that starts its activities well before plant operation starts.
- Dose limits for contract workers that are half compared to regular staff.
- Systematic collective dose reduction programme.
- Utility's internal safety review mechanism and corporate peer review mechanism following closely the WANO methodology.
- Review of siting aspects during PSR.
- Strong experience feedback mechanism that is in place, both in the utility and the regulatory body.

### **Challenges**

- Recruitment and training of about 100 additional experts to strengthen AERB within the next 5 years for future activities.
- Regulatory challenges in the following areas:
  - Reliability and Safety of Digital I&C.
  - Licensing of the new designs for upcoming plants.
  - Reliability of Passive systems.

### **Planned Measures to improve safety**

- Severe Accident Management (SAM) programmes.
- PSA (Level 2, Shutdown, External events).
- Technical improvements in the following areas.
  - EMCCR of NAPS-2 and KAPS-1; All PHWRs with Zr-Nb Pressure Tubes.
  - Life Management of Zr-Nb Coolant Channels.
  - Feeder thinning, Flow Assisted Corrossion (FAC) of Secondary Piping.
  - Safety of Digital I&C (AERB/SG/D-25).
  - Development of a Seismic Qualification Programme by Experience Data Base.
  - Assessment of the reliability of digital I&C for safety functions.

India's report was well received in the Review Meeting and the various safety practices and effective Regulatory Review Structure followed in India were appreciated by the Contracting Parties.

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