

## **Nuclear Engineering Department**

### **1. Organizational Structures and Functions of Nuclear Engineering Department**

Nuclear Engineering Department comprises:

- Thermal Hydraulic and Accident Analysis Section,
- Probabilistic Safety Analysis (PSA) Section,
- Radiation Protection and Emergency Planning Section,
- Waste Management Section,
- Simulation and Control Section.

### **2. Functions of Nuclear Engineering Department**

#### **2.1 Thermal Hydraulic and Accident Analysis Section**

Thermal Hydraulic and Accident Analysis Section includes the following subsections:

- Thermal hydraulic and CFD analysis group,
- Stress analysis Group,
- Accident analysis (DB and BDB) group,
- Sever Accident analysis group
- Safety system group.

The main functions of Thermal Hydraulic and Accident Analysis section are as the following:

- a) Prepare safety analysis, safety evaluations for complex safety issues and modifications which impact several safety systems and/or the BNPP-1 as a whole,
- b) Provide thermo-hydraulic analysis using computer codes for all accidents, transients, operational occurrences,
- c) Prepare all changes and associated safety evaluations to the technical specifications and submit to the regulatory,

- d) Perform all the necessary evaluations and calculations for safety systems interaction and provide guidelines to the operational department with respect to limits, setpoints, operator curves, heat balance, etc.,
- e) Prepare design packages for all modifications and changes to systems, components,
- f) Provide design review of the design packages which are prepared by a third party,
- g) Acquisition, registration, processing and storage of information on failures and flaws of the equipment and its elements, preparation of reporting documents for the BNPP Operating Company equipment safety analysis,
- h) analysis of the advanced international NPP operating practices, their adaptation to the BNPP Operating Company in order to enhance safety of operation, efficiency and quality of the activities performed at the BNPP Operating Company,
- i) Provide Computing fluid dynamic(CFD) and stress analysis for the structure and component of the BNPP-1

## **2.2 Probabilistic Safety Analysis (PSA) Section**

Probabilistic Safety Analysis (PSA) Section includes the following subsections:

- Data analysis group
- System analysis group
- Internal events analysis group
- External events analysis group
- Risk monitoring analysis group

The main functions of Probabilistic Safety Analysis (PSA) Section are the following:

- a) Peer review of NPPs PSA documents in various levels (PSA level I, II, Fire, Seismic, ...) and status (Power, Low power and shutdown),
- b) Prepare and benchmark of PSA /PSA related codes and software,
- c) Performing of LPSA ((living PSA) for the BNPP-1,
- d) Using the results of PSA for:
  - Modification of design (if possible)
  - Optimization of test and maintenance program in operation period
  - Investigation of recovery possibility and effect on improving of safety during of accidents
  - Determination and modification of component operational criteria
  - Investigation of Aging effect on failure probability of components for increasing of PSA model accuracy
  - Consultation with other departments such as radiation protection ones
- e) Development of BNPP Risk Monitoring system during of its operation period for:
  - Illustration of Risk status
  - Illustration of NPP configuration
  - Present of some of proposals for decrease of the overall risk
  - Determination and modification of operational limits such as ACT, AOT,...

### **2.3 Radiation Protection and Emergency Planning Section**

Radiation Protection and Emergency Planning Section includes the following subsections:

- Supervision on radiation protection program group
- Emergency planning group,
- Shielding calculation group,
- Radiation monitoring group

The main functions of Radiation Protection and Emergency Planning Section are the following:

- a) Control of compliance with the radiation safety requirements, codes and standards when dealing with radiation sources on the BNPP-1 territory;
- b) Determination of sources and pathways of radioactive and chemical contamination,
- c) Update/ improvement of the BNPP-1 emergency planning program,
- d) Update/ improvement of the BNPP-1 Radiation Protection,
- e) Calculation of different shield for the source of radioactive material,
- f) Development of the computer codes /software for the radiation monitoring of the BNPP-1,
- g) Participation in the IAEA workshop/meeting and used the IAEA expert consultation in the e Radiation Protection,
- h) Contact with the university and research organization in order to use the potential of these institute for technical support of BNPP-1,
- i) Contact with the IAEA and Russian company/institute for transferring the knowledge of the Radiation Protection,
- j) Provide other technical solution/consultant for the operating organization of the BNPP-1.

## **2.4 Radioactive Waste Management Section**

Waste management Section includes the following subsections:

- Liquid and gas waste management group,
- Solid radioactive waste management group,
- Storage and handling of the waste group,
- Safety analysis and optimization of radioactive waste group.

The main functions of Waste management Section are the following:

- a) Provide technical solution for improvement of the waste management systems and equipment,
- b) Provide technical solution for decreasing the radioactive waste in the BNPP-1,
- c) Development procedure, technical document etc. for the radioactive waste management,
- d) Development of the computer code/ software for the radioactive waste management,
- e) Participation in the IAEA workshop/meeting and used the IAEA expert consultation in the waste management,
- f) Contact with the university and research organization in order to use the potential of these institute for technical support of BNPP-1,
- g) Contact with the IAEA and Russian company/institute for transferring the knowledge of the waste management,
- h) Provide other technical solution/consultant for the operating organization of the BNPP-1.

## **2.5 Simulation and Control Section**

Simulation and Control Section includes the following subsections:

- Simulator and training group,
- Simulation and development of the software group.

The main functions of Simulation and Control Section are the following:

- a) Review of the simulator documents and relevant software for localization of knowledge in the field of control and simulation of nuclear power plant
- b) Participation in the verification process and simulator update according to the latest changes in the BNPP -1

- c) Participation in the BNPP-1 simulator upgrades process and CBT system.
- d) Preparation/updating the of simulator training scenario according to latest changed in the BNPP-1 systems and components,
- e) Development of engineering software used in BNPP-1:
  - Control systems
  - Monitoring systems
  - Commissioning tests
  - Etc.
- f) Participation in the planning, decision making and delivery of required training for NPP operators,
- g) Contact with the university and research organization in order to use the potential of these institute for technical support of BNPP-1,
- h) Contact with the IAEA and Russian company/institute for transferring the knowledge of the waste management.