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# Self Assessment for the Safety of Research Reactor in Indonesia

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## 1. Introduction

At the present Indonesia has no nuclear power plant in operation yet, although it is expected that the first nuclear power plant will be operated and commercially available in around the year of 2016 to 2017 in Muria Peninsula. National Nuclear Energy Agency (BATAN) has three research reactor; which are: Reactor Triga Mark II at Bandung, Reactor Kartini at Yogyakarta and Reactor Serbaguna (Multi Purpose Reactor) at Serpong. The Code of Conduct on the Safety of Research Reactors establishes "best practice" guidelines for the licensing, construction and operation of research reactors. In this paper the author use the requirement in code of conduct to review the safety of research reactor in Indonesia.

## 2. Organization and Management

### *2.1. Safety Management System and Clarification of Responsibilities*

Under the BATAN rule, the chairman of BATAN is responsible for the safe operation off all BATAN facilities but the responsibility for each reactor research facilities is delegated to the Head of the centre as license holder, in respect of the safe operation of reactor and the other facilities in that division.

### *2.2. Safety objectives (policy statement) of organization*

The chairman of BATAN declares BATAN Top Level Policy sets out the over-riding commitment to safety and a strong safety culture. BATAN established organization's safety objectives set out in the organizational strategic plan and implemented through the safety strategy.

### *2.3. Fostering Safety Culture*

Each facility has the activity program in order to fostering the safety culture of the organization and personnel. Safety culture implementation is a site wide project.

### *2.4. Quality Assurance (QA) System*

Each nuclear installation since beginning of operation is subject to audit of quality assurance Tim yearly. At BATAN's level, PSJMN has responsible for QA based on BQAP and at National's level, Nuclear Energy Regulatory Agency (BAPETEN) has responsible for QA audit.

### *2.5. Safety Case*

The original Safety Analysis Report of each research reactor was prepared since early of construction. It was revised continuously as needed (due to some modifications and new safety experiment). BAPETEN conducting a review for the safety case a basis for stipulated license.

## 3. Emergency Preparedness

Each facility established Emergency preparedness team which is responsible for handling the emergency condition to ensure that there are on site and off site emergency, including coordinating with external parties (district, province, and national). The team conducts exercise yearly. The last major exercise was in September 2002 for Serpong area and September 2003 for Yogyakarta area, but there is an exercise every year held in every reactor.

## 4. Education and Training

BATAN has education and training centre for all the BATAN employees. Reactor operations are accredited every 2 years and undergo regular technical training. All operators are accredited and achieve this initial training of 3 months full time with refresher training of 15 days every 72 weeks thereafter, culminating in an exam every 3 years

## 5. Operation and Maintenance

Normal shift for research reactor conduct by six staffs each include supervisor and operator reactor from reactor operation division. The OL&Cs are part of the QA system. The maintenance scheduling system is used to manage the scheduling of maintenance.

## 6. Radiation Protection

### *6.1. Management of Radiation Exposure*

System and organization for radiation and protection set out in the safety directives. It is based in the IAEA BSS and includes directives on: Radiation Protection Principles: Policy on As Low As Reasonably Achievable. The policy requires assessment of all staff having doses greater than 2

mSv/y and documented assessment are required. A monthly limit of 1 mSv is used for monitoring and an annual constraint of 15 mSv is used. No worker exceeded 10 mSv/y.

*6.2. Radiation Monitoring*

All radiation workers wear TLDs and some electronic dosimeters. Staff working with unsealed sources wears wrist and finger TLDs as well. All identified radiological areas have are monitors and a barrier control process exist for these classified areas. For non-routine situations additional controls and air monitoring would occur. Safety division surveyors are available 24 hours per day, 7 days per week in the reactor areas.

*6.3. Treatment and Reduction of Radioactive Waste*

Each centre has Quality management system procedures and instructions address waste minimization at the workplace level. This is done by careful planning of work activities, by appropriate waste segregation methods to ensure that non-radioactive waste is not mixed with radioactive waste and waste clearance systems to segregate and clear waste. This is in line with waste minimization policy. Radioactive wastes are segregated and classified as Low Level or Intermediate Level and high Level by the organization operation (PRSG, PTRKN, PTAPB).

## 7. Measures for Important Safety Issues

*7.1. Critically Safety and Related Issues*

To prevent critically in waste storage, fuel storage is maintained through conservative design and assumptions, engineering safety provisions, and administrative controls. In shutdown and maintenance modes, there is sufficient shutdown margin even allowing for a worst case set of errors in reactivity accounting allowing one control arm to be safely withdrawn in maintenance or shutdown. To ensure decay heat removal and tolerant to expected initiators like loss of off-site power, loss of services, In shutdown mode, pumps primary circuit still running for a few minute.

*7.2. Operating Experience Feedback*

Safety enhancement based on operating experience feedback, systems have been implemented to analyze abnormal events, identify the causes and determine countermeasures. There is an established system of experience feedback, based on the Abnormal Occurrence Report (AOR) and follow-up after-action assignment (FAA) systems.

*7.3. Aging Management*

Each research reactor facility has been established aging management team, and the main task on this aging management team is to study on aging factors and conduct inspection used NDT method on components and systems of each facility, especially on reactor tank using visual, ultrasonic and replica putty and for heat exchanger using eddy current.

*7.4. Safety of all activities and Operations including Experiments*

The systems been established to review and approve the safety of all activities and operations including experiments. Operations and Experiments are Controlees by the reactor operation division and approved by the internal safety division and then the regulator. A safety analysis is also needed of these experiments. The documentation is developing under a QA system.

## 8. Regulation and Licensing

*8.1. Independence*

Regulatory framework governing the reactor safety is established by act no. 10/1997 on nuclear energy. BAPETEN is independent agency, and responsible to the president, as well BATAN. In accordance with act no. 10/1997 on nuclear energy, BAPETEN has been established applicable national safety requirement and regulation in the form of government regulation and decree of BAPETEN Chairman related to reactor safety.

*8.2. Regulatory Process*

Regulatory and safety objectives clearly enunciated by BAPETEN at the nuclear safety policy statement declare by Chairman of BAPETEN in June 2000. And it has a good response from the Operating Organization. The objectives and Practices of BAPETEN regulation are consistent with the IAEA's nuclear safety standards programs.

## 9. Conclusion

The status on the safety of research reactor in Indonesia especially coming from the criteria put on IAEA code of conduct the safety research reactor, and each research reactor has been performed self assessment refer to code of conduct. Up to now the research reactor in Indonesia are in the safety condition.

## REFERENCE

[1] IAEA No. GC48-7, IAEA, Vienna, 1999.
[2] Act No. 10/1997 on Nuclear Energy, BAPETEN, Indonesia, 1997.