

Lessons Learned in Preparation and Review of Safety Analysis Report of PUSPATI TRIGA Reactor in Malaysia

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1. Introduction

PUSPATI TRIGA Reactor (RTP) is the one and only research reactor in Malaysia. Since the day it was supplied by General Atomic (GA) in 1983, periodic safety reviews were carried out but not published in the form of a complete SAR. In fact, the original SAR (SAR 1983) document was provided by GA as soon as GA was selected as the supplier of RTP.

The focus of this report is on the lessons learned from the preparation of SAR. The lessons learned were to address the preparation and regulatory review of the second SAR (SAR 2006). Realizing that safety is important as RTP is ageing, the experiences and lessons learned from SAR development and updating processes are of great value for all parties involved. The purpose of this report is to consolidate and organize the lessons learned and suggest the best practice for the next SAR development both in preparation and regulatory review.

2. Parties Involved

a. Atomic Energy Licensing Board (AELB)

AELB acts as an enforcement body for the implementation of the Atomic Energy Licensing Act (Act 304) [1]. Division involved directly with Nuclear Malaysia in SAR review process is Nuclear Installation Division, headed by Mrs Azlina Mohd Jais, and 4 permanent officers with Nuclear Science background.

b. Malaysian Nuclear Agency (Nuclear Malaysia)

Established in Sept 19, 1972, Malaysian Nuclear Agency was then known as Centre for Application of Nuclear Malaysia (CRANE) before it was formally named as Tun Ismail Atomic Research Centre (PUSPATI). In June 1983, PUSPATI was placed under the patronage of Prime Minister Department and was called Nuclear Energy Unit (UTN). It was then placed under Ministry of Science, Technology and Environment in October 1990. In August 1994, its name was changed to Malaysian Institute for Nuclear Technology Research (MINT) [2].

On September 28, 2006, following its restructuring, MINT was given a new identity, which is Malaysian Nuclear Agency (Nuclear Malaysia).

Division in charge directly in the preparation of SAR is Nuclear Power Division with some chapters was outcome contribution from Engineering Division, Radiation Health & Safety Division, Technical Support Division and Waste Technology & Environment.

3. SAR Development in Malaysia

Safety Analysis Report (SAR) is mainly a document that shall be the basis for the safe operation of the research reactor [3]. It is an important link between the operating organization and the regulatory body since it is the main document for the licensing of the reactor and also as a reference document to the AELB. It was clearly stated that, SAR shall be updated during the operational lifetime of the reactor on the basis of the experience and knowledge gained and in accordance with regulatory requirement [3]. Therefore, the updating of SAR would be ineffective if it is not initiated according to the IAEA related guideline.

4. Lessons Learned

Some useful information and recommendations recorded during the SAR development, review, and approval cycles were highlighted and some significant issues raised by both participating agencies contained in this lessons learned report.

a. Effectiveness of the SAR Process: Preparation & Review

- i. In general, SAR development has succeeded in fulfilling the requirement as per IAEA related document. Although, the timeframe in preparing all the necessary documents were not exactly in time, but the efforts taken by all researchers involved is magnificent.
- ii. Every chapter was developed by various researchers from different divisions. The need to focus into the SAR preparation is not present as researchers have their own workloads.
- iii. The 12 months timeframe for SAR review by the regulatory body is slightly lengthened due to some unnecessary management requirement.
- iv. As part of the SAR review process, issues involving the benefit of early submission of every each chapter were identified. This resulted in identification of information shown twice in two or more chapters.
- v. Applying consistent and same terminology was indeed harmonized communication between two parties.

b. Experiences in both Development and Review Process

- i. As part of the SAR process, issues involving the adequacy of technical calculations and detailed analyses have been identified. Clarity how to

- verify and validate the calculation done is not clarified.
- ii. The experiences of the review meeting in 7 consequence meetings were varied both in technical and management side.
 - iii. Site Characteristics information in chapter 3 of SAR 2006 at time, relied on data gained from the internet (e.g., population data trends, weather, etc). The quality requirements for information gained from internet sources are undefined.
 - iv. Some calculations done mostly based on the initial SAR, assuming no major changes happens in RTP.
 - v. The process of reviewing the SAR should be done in the agency as it reduces a lot of monetary expenses. Furthermore, all technical drawings and calculations were available in the agency, so the need to transport all related documents to the place of meeting (done in hotels, which took 4 to 5 hours driving) is not necessary.
 - vi. Since SAR 2006 is a sort of a new document and the first do it yourself project document, lack of interest resulted in lack of involvement to almost all the researchers and regulators involved.

c. *Identified Best Practices*

- i. Mandatory SAR's chapter briefings from the very early stages of SAR document development was listed as project milestones. Personnel with related background were appointed in this stage with acknowledgement to the head of their division informing the personnel's participation in developing the SAR document.
- ii. The right person was assigned the role of project manager for every each SAR chapter, with the ability to create and lead the team members.
- iii. Everyone involved in the project works together as an integrated team, with effective communication and coordination across the whole team.
- iv. Detailed planning and scheduling, action items lists and weekly project schedule meetings ensured early identification of problem areas and schedule impacts for both Nuclear Malaysia and AELB.
- v. Use of share folder or other means to exchange or store large electronic files will be necessary and will prove to be extremely useful.

5. Recommendation and Conclusion

A well-organized SAR team is one of the key factors for a successful SAR preparation project. The team must be efficient, technically experience and with no critical defects. In this SAR preparation and review experiences, there is one extremely important role in both of the team.

The abovementioned role is the project manager, who must be familiar with the administration and operation processes of the SAR preparation (for Nuclear Malaysia) and review (for AELB). This project would be implemented smoothly only if it is effectively supported by other technical departments. All of these challenge the project manager's capability greatly in communication and cooperation. Moreover, it is also

recommended that SAR project manager should be an experienced technical analyst or at least some knowledge in it. He must be quite clear about what are the parameters involved, and how or where to find and utilize the proper resources and solution in the workflow process.

Therefore, in any project either big or small, clear roles of responsibilities should be clearly defined and understood, not to mention the support by uncomplicated management structure that reflects good practice. *There must be short and effective lines of communication to management so that they can take prompt action when needed.*

Even though the management budgets used is available to bear all the meetings expenses (accommodation, meeting room, meals, etc) held outside agency, there is no reason to consume wastefully: the per said budget is more appropriate if it is consume in training especially in safety basis of the research reactor itself.

As this is the first time experience for Nuclear Malaysia, some minor demerits in technical issues were identified. Although there are not the real obstacles in this SAR preparation process, because it can certainly be solved with sufficient effort, the non-technical issues have uncertain impacts. It is also a big challenge for our regulatory body, although there is an appropriate guideline for the SAR review process, but due to first time experience for them, some lack in interpreting and awkward disposition in reviewing some chapter represents their lack of knowledge which can be phrase as regulatory failure. Fail in a scent of reviewing such an important document.

Although some of these lessons pertain to the effectiveness of the review process and experiences, but it also can be the best suggestions for future SAR development. Hopefully, it can help to improve future preparation guidance documents and regulatory review standards for both Nuclear Malaysia and AELB.

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7. References

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- [3] IAEA Safety Series No. 35-G1, "Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report".