SUMMARY REPORT
WORKSHOP ON ATMOSPHERIC DISPERSION BENCHMARK PROBLEM ASSESSMENT
AND
THE 4TH ANNUAL MEETING (VIRTUAL) OF THE ASEAN NETWORK ON NUCLEAR POWER SAFETY RESEARCH
Singapore, 2nd – 4th June 2021

INTRODUCTION

1. The Meeting (hereinafter referred to as "the Meeting") was held in Singapore on 2nd – 4th June 2021. The Meeting was chaired by *Singapore* and was attended by *Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam.* The list of participants appears in **ANNEX 1.**

AGENDA ITEM 1: ADOPTION OF AGENDA

2. The Meeting adopted the Agenda, which appears as **ANNEX 2**.

Opening Remarks

3. Prof. Chung Keng Yeow, the Director of Singapore Nuclear Research & Safety Initiative (SNRSI) delivered the opening remarks. The full text of the remarks appears as **ANNEX 3.**

4. Assoc.Prof. Dr. Thawatchai Onjun, the Executive Director of Thailand Institute of Nuclear Technology (TINT) delivered the opening remarks. The full text of the remarks appears as **ANNEX 4**.

AGENDA ITEM 2: INTRODUCTION OF ASEAN NPSR FOR NEW PARTICIPANTS AND MEMBER STATES

5. Singapore recalled the background, objectives and scope of the ASEAN Network on Nuclear Power Safety Research (ASEAN NPSR). The full details of the presentation appear as **ANNEX 5**.

AGENDA ITEM 3: ASEAN COUNTRY PRESENTATIONS 1 & 2

6. The participants from Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam reported their progress/updates in the field of Nuclear engineering in their respective countries. The presentation of each Member States appears as **ANNEX 6-12**, respectively.

7. Participant from Cambodia provided a presentation on the current state of nuclear development in their country. The presentation elaborated on the list of nuclear program projects, Cambodia's nuclear related activities and shortcomings in the field of nuclear engineering. The full details of the presentation appear as **ANNEX 6**.

8. Participant from Indonesia provided a presentation on the nuclear program in Indonesia. The presentation highlighted their aim, focus and purpose of the program. The status of nuclear power plant (NPP) infrastructure development in Indonesia was elaborated upon. The nuclear energy plan at the time of presentation included the research reactor such as TRIGA 2000 and small scale nuclear power plant (NPP). The full details of the presentation appear as **ANNEX 7**.

9. Participant from Malaysia reported on the status of nuclear power development in their country. One of the points mentioned was that in 2018, the Malaysian government decided that nuclear will not be used for power generation. Malaysia is currently investigating alternative sources for energy such as solar PV and bio mass. The full details of the presentation appear as **ANNEX 8**.

10. Participant from Philippines provided a presentation on the status of nuclear energy programme in their country. A roadmap for the nuclear power programme was presented in accordance with the IAEA milestone approach. As of December 2020, a proposition of an executive order adopting a National position for a nuclear energy programme was made to the President. This proposition is yet to be approved by the President. The full details of the presentation appear as **ANNEX 9**.

11. Participant from Singapore presented the status of nuclear studies in their country. The presentation outlined the role, purpose, activities and research of the SNRSI was also explained. The full details of the presentation appear as **ANNEX 10**.

12. Participant from Thailand provided a presentation on the progress and interest of nuclear power research in their country. The presentation highlighted their progress in the areas such as traditional nuclear power plants, advanced/innovative power plants, small modular reactors, research reactors and fusion technology. The full details of the presentation appear as **ANNEX 11**.

13. Participant from Vietnam gave a presentation on the emergency preparedness plan with regards to a nuclear plant. Atmospheric dispersion analysis that would be used as part of the emergency preparedness plan and response was explained. The full details of the presentation appear as **ANNEX 12**.

AGENDA ITEM 4: CONCLUSION OF LAST BENCHMARK PROBLEM OF ASEAN NPSR

14. Presenters from Thailand and Singapore presented on the conclusion of the last benchmark problem. This was to give a better understanding among all the member states on the benchmark problem, from the formulation till the end.

15. The motivation for the formulation of the benchmark problem was explained. Followed by the aims of the project. Namely, the necessity to perform our own transboundary atmospheric dispersion using the available dispersion calculation codes, in the event of a nuclear emergency.

16. Thailand, Singapore and Vietnam were part of the research involving the benchmark problem. Each country had their respective dispersion calculation codes namely JRODOS, ARGOS & FLEXPART.

17. The results showed that the different calculation codes could capture the macroscopic details but the microscopic details were displayed with some discrepancies.

18. The results of the benchmark problem were published in the scientific journal, *Progress in Nuclear Energy*. The full details of the presentation appear as **ANNEX 13**.

AGENDA ITEM 5: INTRODUCTION OF NEW RESEARCH SCOPES AND TOPICS

19. Three different topics were introduced, **Atmospheric Dispersion** (*with Dose Assessment*), **Reactor Safety** and **Research Reactors**. The motivation for formulation of the 3 topics were attributed to the previous discussions between the Lead and Co-lead country.

20. **Atmospheric Dispersion** (*with Dose Assessment*) focused on atmospheric dispersion from a NPP and dose assessment from an accidental release. **Reactor Safety** focused on the reactor safety of a nuclear power plant of light water reactor, high temperature gas reactor and possibly fusion. It holistically addresses the safety of reactors. **Research Reactors** focused on different aspects of a research reactor and to help facilitate current research reactor operators to address concerns and improve operability. The full details of the presentation appear in **ANNEX 14**.

21. Discussions were conducted in separate groups depending on the participant's interest indication. Discussions were geared towards establishing each country's interest and expertise level as well as opportunities for future collaboration within the network. The grouping for the discussion appears in **ANNEX 15**

AGENDA ITEM 6: SUMMARY OF DISCUSSION OF THE 3 NEW TOPICS IN GROUPS AND WITH ALL PARTICIPANTS

22. The key summaries of each discussion topic were shared with all participants after the group discussion. In the **Atmospheric Dispersion** (with Dose Assessment) discussion, Vietnam suggested a forecast model comparison between the countries. Singapore and Thailand suggested the extension of the last benchmark problem to dose assessment. Comparing of unique parameters specified to the ASEAN region used in dose assessments between ASEAN countries was also proposed. Workshop for FLEXPART and Dose assessment are also proposed.

23. In the **Reactor Safety** discussion, the discussion spans over a variety of topics due to the wide scope and interest on the subject. The participants are generally interested in two topics neutronics codes and small modular reactor. Workshop on neutronics is also proposed in the discussion.

24. In the **Research Reactor** discussion, Thailand proposed the level 1 PRA as the starting point of discussion. The discussion highlighted the interest of the parties to review plant survey and interviews for senior operators for their valuable insight. These efforts are meant to support level 1 probabilistic risk assessment. Neutronic calculation benchmark assessment was also proposed by the participants.

25. The full details of the individual presentation slides presented by the facilitators during the group discussions appear in **ANNEX 16 to 18**.

AGENDA ITEM 7: SPECIAL LECTURE

26. The network managed to invite speakers from U.S. Department of energy to give a special lecture for the annual meeting. The speakers are Ms Aleshia Duncan and Mr Jose Reyes. Ms Aleshia Duncan presented on U.S. DOE government perspective while Mr Jose Reyes presented on NuScale SMR designs and their potential applications. The full details of the presentation by Mr Jose Reyes appear in **ANNEX 19**.

AGENDA ITEM 8: PMU-B PROJECT INRTRODUCTION

27. Thailand presented on the PMU-Project as an option of funding for the network. The PMU-B Global Partnership scheme by Thailand aims to achieve capacity building through knowledge exchanges and sharing with global partners. The full details of the presentation appear in **ANNEX 20**.

28. The project expect an output with a joint publication and disseminate research results from the project. It is also expected that an outline for sustainable long term collaboration is produced through the project.

29. The result of the application will be known in June 2021.

AGENDA ITEM 9: ADMINISTRATIVE MATTERS

30. New system for Lead & Co-lead country was proposed to the network. The full details of the proposal appears in **ANNEX 21**.

31. The network decided that it was best to adopt option 2 which allow for more countries to get more experience as a co-lead country.

32. The Meeting concluded that Singapore continues as the lead country, and Thailand be the co-lead country 1 and Philippines be the co-lead country 2 for 2021.

33. Member States appointed the contact persons as shown below

. **Member States**	**Contact Persons**
Cambodia	Mr. Fidero KUOK Mr. Boravy MUTH
Indonesia	Mr. Haryo SENO Ms. Indah KUSMARTINI Ms. Afida IKAWATI
Lao PDR	Mr. Houmpheng THEUAMBOUNMY
Malaysia	Ms. Mazleha MASKIN Mr. Mohd Fairus Bin ABDUL FARID
Myanmar	Ministry of Science and Technology (MOST)
The Philippines	Mr. Carl NOHAY Mr. Neil Raymund GUILLERMO
Singapore	Mr. CHUNG Keng Yeow Mr. TANG Jia Hao
Vietnam	Mr. Pham Kim Long Mr. HOANG Sy Than
Thailand	Mr. Wasin VECHGAMA Ms. Natchaya THIPSORN

AGENDA ITEM 9: ADOPTION OF REPORT

34. The Meeting adopted the Summary Report.