Thailand Institute of Nuclear Technology
(Public Organization)

5th Annual Meeting on ASEAN Network
on Nuclear Power Safety Research
25-28 Oct 2021

Progress and Interest in Nuclear Power Safety Research in Thailand

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Thailand Institute of Nuclear Technology (TINT)

National Energy Technology Center (ENTEC)

Chulalongkorn University (CU)

Office of Atoms for Peace (OAP)

Outline

- **Active nuclear safety and risk research in Thailand**
- **Thailand's research interest**

Active nuclear safety and risk research (1)

Current nuclear safety and risk research in Thailand was grouped into the three group;

- Research on atmospheric dispersion assessment of hypostatical nuclear power accident from neighboring ASEAN countries.
- Probabilistic Risk Assessment (PRA) and cyber risk assessment of the Thailand research reactor (TRR-1/M1)
- Nuclear public perception analysis using the Artificial Intelligence (AI) methods (machine and deep learning techniques)

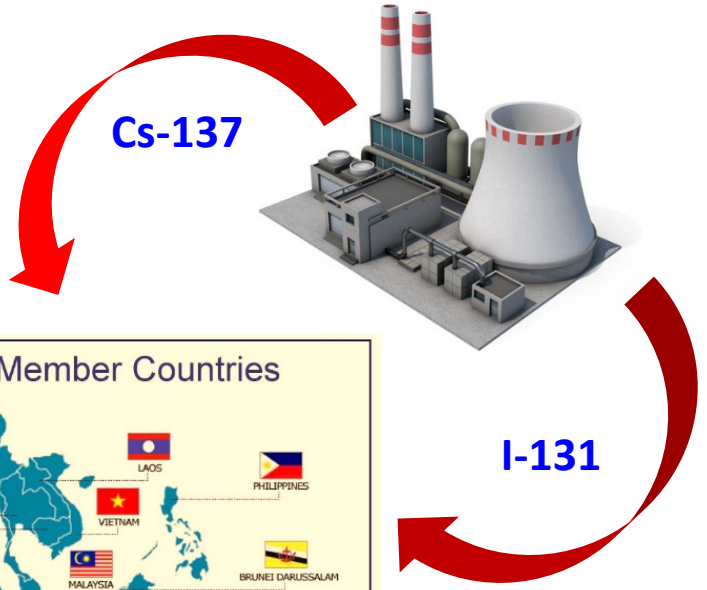
Active nuclear safety and risk research (2)

Research on atmospheric dispersion assessment of hypostatical nuclear power accident from neighboring ASEAN countries;

- TINT, ENTEC, CU and OAP together developed the atmospheric dispersion code named NACAC (the Nuclear Accident Consequence Code) to evaluate the impact of radionuclide from Fangchenggang nuclear power plant.

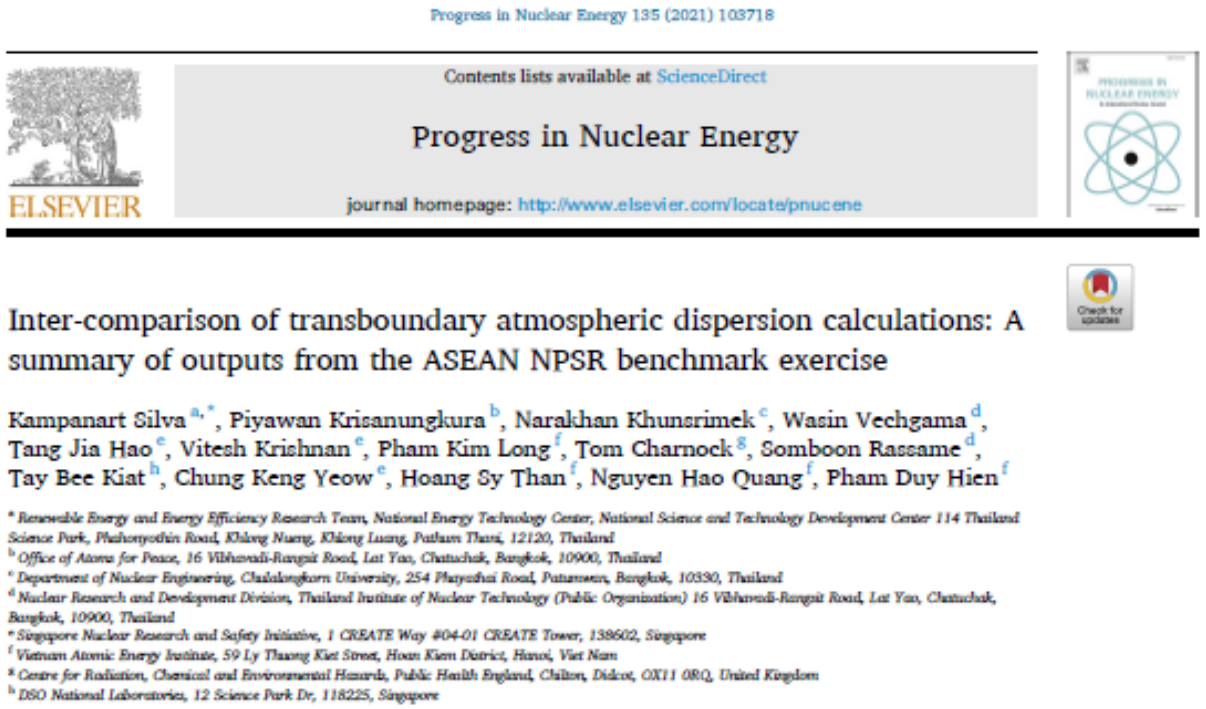
- Verification of NACAC was implemented using JRODOS focusing on the case of loss of coolant accident and station blackout at the Fangchenggang nuclear power plant using meteorological data of fluctuate wind in the period of January 18, 2018: 7 UTC to January 22, 2018.

Radioactive from neighboring ASEAN countries such as China



Active nuclear safety and risk research (3)

Research on atmospheric dispersion assessment of hypostatical nuclear power accident from neighboring ASEAN countries;



Progress in Nuclear Energy 135 (2021) 103718

Contents lists available at ScienceDirect

Progress in Nuclear Energy

journal homepage: http://www.elsevier.com/locate/pnucene

Inter-comparison of transboundary atmospheric dispersion calculations: A summary of outputs from the ASEAN NPSR benchmark exercise

Kampanart Silva [a,*], Piyawan Krisanungkura [b], Narakhan Khunsrimek [c], Wasin Vechgama [d], Tang Jia Hao [e], Vitesh Krishnan [e], Pham Kim Long [f], Tom Charnock [g], Somboon Rassame [d], Tay Bee Kiat [h], Chung Keng Yeow [e], Hoang Sy Than [f], Nguyen Hao Quang [f], Pham Duy Hien [f]

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[c] Department of Nuclear Engineering, Chulalongkorn University, 254 Phayathai Road, Patumwan, Bangkok, 10330, Thailand
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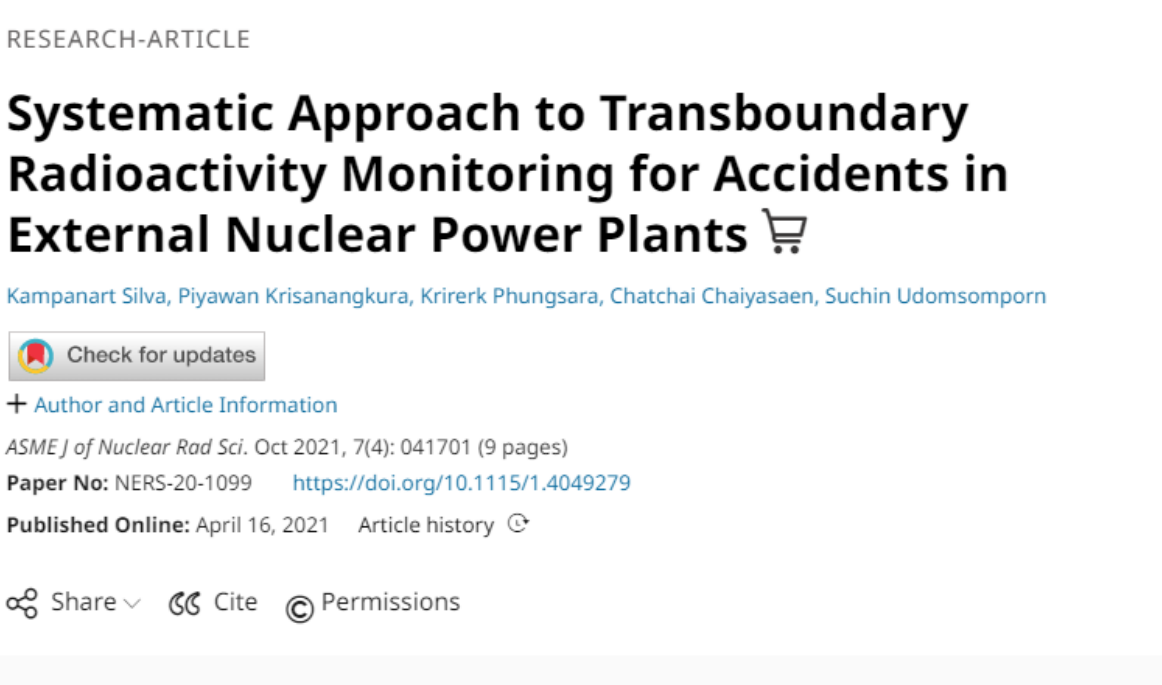
[f] Vietnam Atomic Energy Institute, 59 Ly Thuong Kiet Street, Hoan Kiem District, Hanoi, Viet Nam
[g] Centre for Radiation, Chemical and Environmental Hazards, Public Health England, Chilton, Didcot, OX11 0RQ, United Kingdom
[h] DSO National Laboratories, 12 Science Park Dr, 118225, Singapore



RESEARCH-ARTICLE

Systematic Approach to Transboundary Radioactivity Monitoring for Accidents in External Nuclear Power Plants

Kampanart Silva, Piyawan Krisanangkura, Krirerk Phungsara, Chatchai Chaiyasaen, Suchin Udomsomporn

Check for updates

+ Author and Article Information

ASME J of Nuclear Rad Sci. Oct 2021, 7(4): 041701 (9 pages)

Paper No: NERS-20-1099 https://doi.org/10.1115/1.4049279

Published Online: April 16, 2021 Article history

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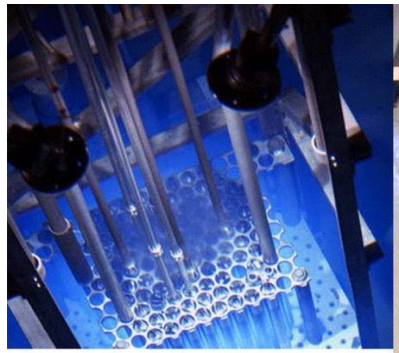
Active nuclear safety and risk research (4)

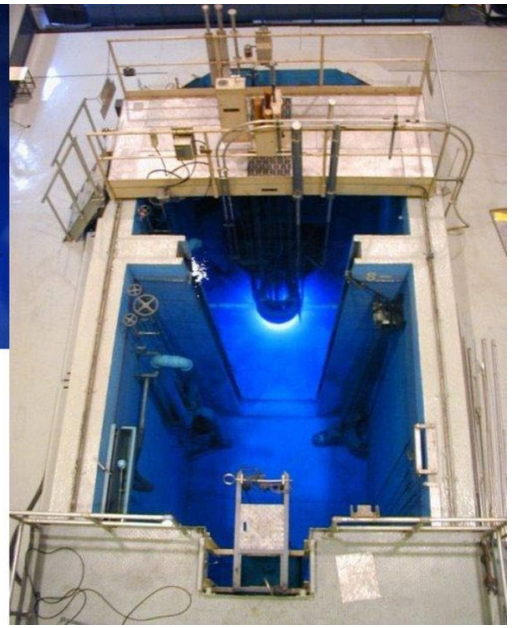
Probabilistic Risk Assessment (PRA) and cyber risk assessment of the Thailand research reactor (TRR-1/M1);

- TINT conduced the level 1 PRA of TRR-1/M1 under the Periodic Safety Review (PSR) of Thai Research Reactor-1/Modification 1 (TRR-1/M1) based on the suggestions of International Atomic Energy Agency (IAEA) and the Thai Ministerial Regulation.

Internal events	• **Hazard and Operability (HAZOP) analysis** ✓
Human failures	• **Human-Hazard and Operability (Human-HAZOP) analysis** ✓
External events	• **Ongoing**



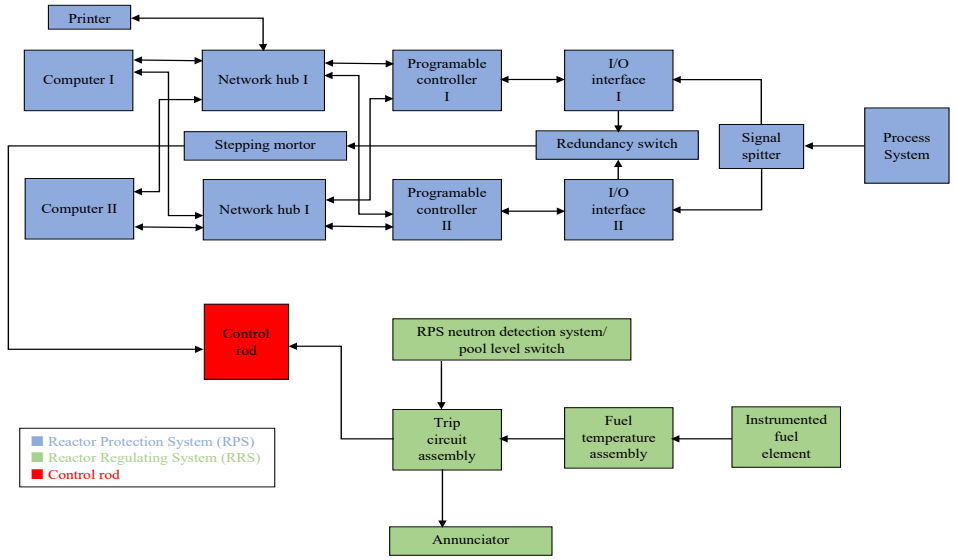
TRR-1/M1

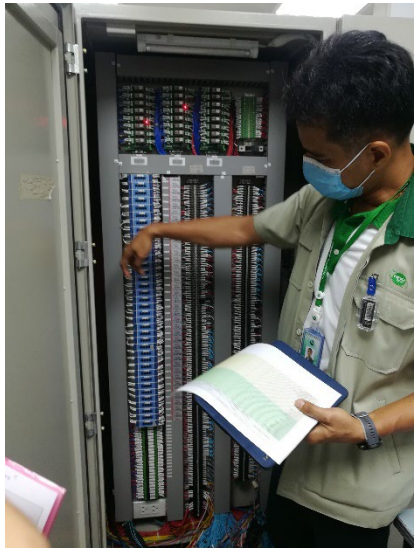


Active nuclear safety and risk research (5)

Probabilistic Risk Assessment (PRA) and cyber risk assessment of the Thailand research reactor (TRR-1/M1);

- Since the advancement of cyber technology has been increasing dramatically, nuclear facility including the Instrumentation and Control (I&C) system is one of digital technologies risking cyber-attacks.





Active nuclear safety and risk research (6)

Probabilistic Risk Assessment (PRA) and cyber risk assessment of the Thailand research reactor (TRR-1/M1);

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Contents lists available at ScienceDirect

Progress in Nuclear Energy

journal homepage: www.elsevier.com/locate/pnucene

Application of Hazard and Operability Technique to Level 1 Probabilistic Safety Assessment of Thai Research Reactor-1/Modification 1: Internal Events and Human Errors

Wasin Vechgama [a,*], Kampanart Silva [b], Anantachai Pechrak [a], Saensuk Wetchagarun [a]

[a] Thailand Institute of Nuclear Technology (Public Organization), 9/9 Moo 7, Sai Mun, Ongkharak, Nakhon Nayok, 26120, Thailand
[b] National Energy Technology Center, National Science and Technology Development Agency, 114 Thailand Science Park, Phahonyothin Road, Khlong Nueng, Khlong Luang, Pathum Thani, 12120, Thailand

ASRAM2020, Asian Symposium on Risk Assessment and Management 2020, A Forum for Nuclear Safety and Sustainable Energy Use in Asia
Online Virtual Conference, November 30 - December 2

ASRAM2020-1049

Consideration of Cybersecurity Analysis Approach of Instrumentation and Control System of Thai Research Reactor-1/Modification 1 under Probabilistic Risk Assessment

Wasin Vechgama[a*], Chotika Dararutana[b], Anantachai Pechrak[c], Saensuk Wetchagarun[c], Kampanart Silva[d]

[a]Nuclear Research and Development Division, Thailand Institute of Nuclear Technology (Public Organization), Bangkok, Thailand
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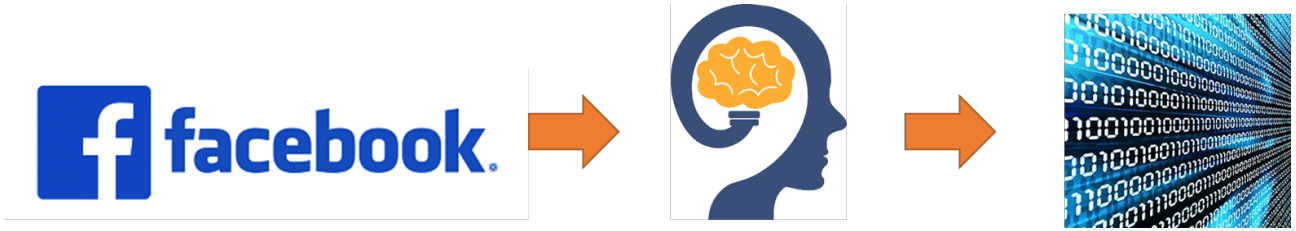
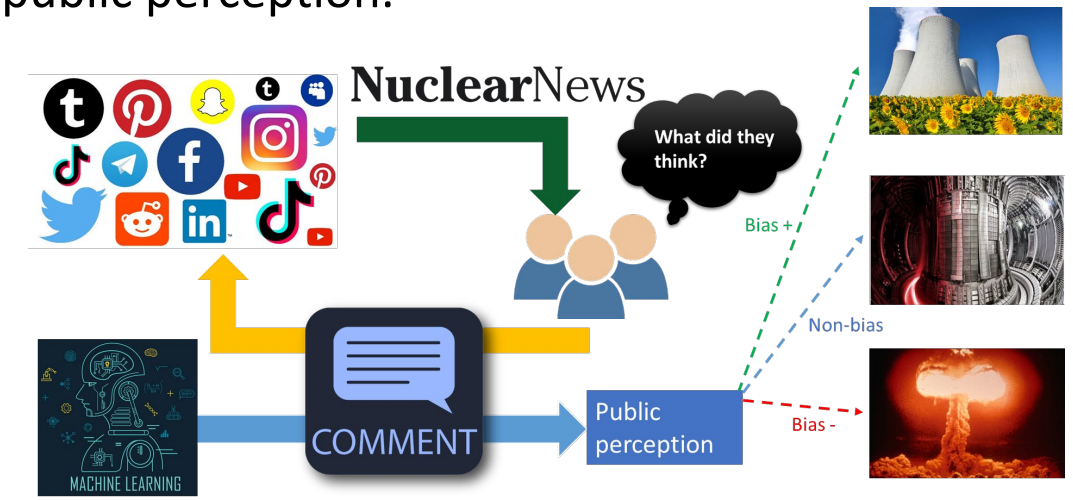
[c]Reactor Center, Thailand Institute of Nuclear Technology (Public Organization), Bangkok, Thailand
[d]National Energy Technology Center, National Science and Technology Development Agency, Pathum Thani, Thailand
[*]Corresponding email: wasin@tint.co.th, wasinvechgama@gmail.com

Active nuclear safety and risk research (7)

Nuclear public perception analysis using the Artificial Intelligence (AI) methods (machine and deep learning techniques);

- Due to the impact of social media platform, the development of classification models for public perception of the nuclear energy of Thai people on Facebook was performed using Artificial Intelligence (AI) methods to understand Thai nuclear public perception.





Active nuclear safety and risk research (8)

Nuclear public perception analysis using the Artificial Intelligence (AI) methods (machine and deep learning techniques);

Nuclear Engineering and Technology
Volume 52, Issue 12, December 2020, Pages 2958-2968

Original Article

Analyzing local perceptions toward the new nuclear research reactor in Thailand

Sarasinee Tantitaechochart [a], Naraphorn Paoprasert [a], Kampanart Silva [b, c]

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https://doi.org/10.1016/j.net.2020.05.013

Probabilistic Safety Assessment and Management PSAM 16, June 26-July 1, 2022, Honolulu, Hawaii

Development of Classification Model for Public Perception of Nuclear Energy in Social Media Platform using Machine Learning: Facebook Platform in Thailand

Wasin Vechgama[a, b, c,*], Watcha Sasawattakul[d], Kampanart Silva[e], Jaehyun Cho[b, c]

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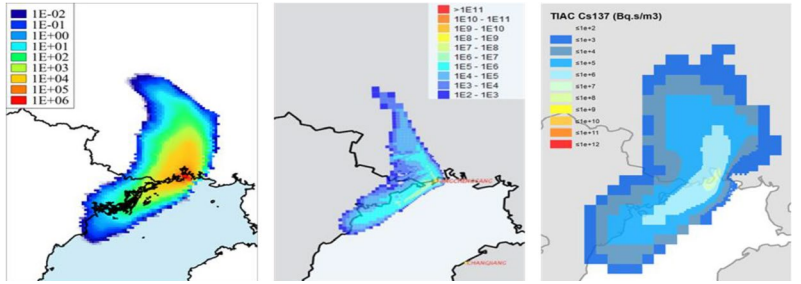
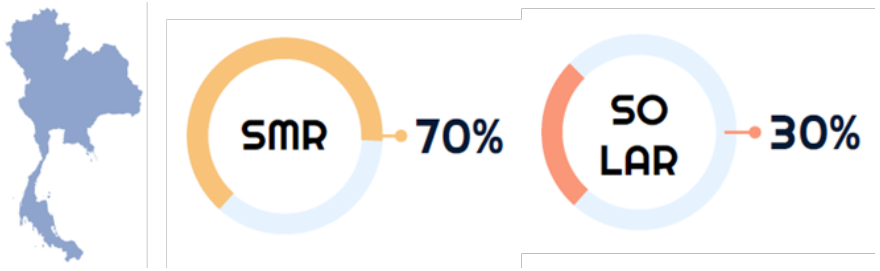
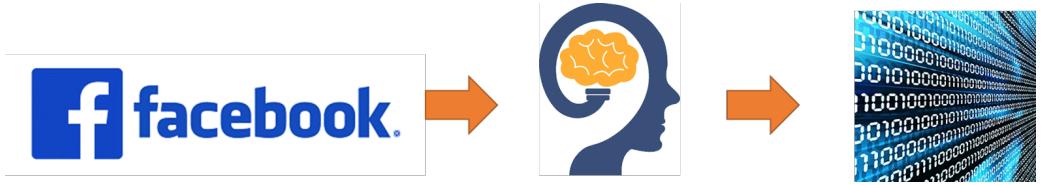
Thailand’s research interest

There are three main research interests that have the potential for the ASEAN network in the Thailand aspect.

- Atmospheric dispersion and dose assessment of hypostatical nuclear power accident from neighboring ASEAN countries. (Continue)
- Comparative assessment of nuclear-renewable hybrid energy system in ASEAN countries e.g. SMR-renewable hybrid energy.
- ASEAN nuclear public perception analysis using the Artificial Intelligence (AI) techniques.







Q&A

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