NUCLEAR SECURITY GOVERNANCE IN INDO/ASIA-PACIFIC: BUILDING OUT FROM SOUTHEAST ASIA?

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Abstract

The paper explores pathways toward building a robust framework for nuclear security governance in the Asia-Pacific, building out from the nuclear security cooperation framework and progress in Southeast Asia. It argues that the progress made in Southeast Asia on building nuclear security cooperation can be expanded to the broader Asia-Pacific region. The paper recommends three practical collaborative mechanisms to expand ASEAN cooperation frameworks to the broader Asia-Pacific region to advance and improve nuclear security governance: (1) strengthening capacity building in regional nuclear security; (2) creating an ASEAN-East Asia network of nuclear security centres of excellence and knowledge centres; and (3) enhancing regional nuclear emergency preparedness and response.

1. INTRODUCTION

Nuclear security is a global concern, and not just for states that have nuclear weapons and nuclear power plants, but also those that do not have one or the other. This is so, since nearly all states have nuclear and radioactive materials being used for other civilian applications. As defined by the International Atomic Energy Agency (IAEA), nuclear security is "*the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities*".[1] Given that nuclear security is a shared concern, enhancing leadership and getting more stakeholders in nuclear governance are therefore important. In spite of the holding of the Nuclear Security Summits (NSS, 2010-2016), which significantly increased global awareness on the issue of nuclear security,[2] there remains concern about the lack of progress on nuclear security governance across the world. With new challenges in the international security environment, including the implications of growing technological rivalry among nuclear weapons states, there is a compelling case for other actors at the national and regional levels to exert more efforts in advancing nuclear security and contributing to global nuclear security regime.

One recent regional initiative on nuclear security is the **East Asia Summit (EAS) Leaders' Statement on Safe and Secure Use, Storage, and Transport of Nuclear and other Radiological Materials**. It urges all EAS participating states to build a robust domestic nuclear safety and security regime and conduct exercises to prepare their communities for incidents involving radioactive materials.[3] It is the first high-level joint statement on nuclear security governance from ASEAN member-states and other Asia-Pacific countries-- Australia, China, India, Japan, South Korea, New Zealand, Russia, and the United States. More significantly, the statement highlights that security governance of nuclear and radiological materials has become a regional concern in the Asia-Pacific.

Aside from putting forward 25 key recommendations to bolster both nuclear safety and security at the regional and national levels, the EAS Leaders statement paid particular attention to the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM) and its role in advancing regional cooperation on nuclear governance, facilitating information exchange in ASEAN and complementing the work of existing national, regional and international mechanisms. Since its establishment in 2013, ASEANTOM has achieved key progress in providing a number of capacity building programmes and raising the level of knowledge and expertise on nuclear safety and

security. [4] It does so through numerous expert missions/exchange programmes, technical meetings and workshops, and capacity building cooperation projects with international organisations such as the IAEA and the EU to strengthen nuclear security.[5] [6]

In this regard, the paper explores pathways toward building a robust framework for nuclear security governance in the Asia-Pacific, building out from the nuclear security cooperation framework and developments in Southeast Asia. It argues that the progress on building nuclear security cooperation in Southeast Asia can be expanded to the wider Asia-Pacific region. It recommends three practical collaborative mechanisms to expand ASEAN cooperation frameworks to the broader Asia-Pacific region to advance and improve nuclear security governance: (1) strengthening regional capacity building in nuclear security; (2) creating an ASEAN-East Asia network of nuclear security centres of excellence and knowledge centres; and (3) enhancing regional nuclear emergency preparedness and response.

2. WHY IS NUCLEAR SECURITY A KEY AGENDA IN SOUTHEAST ASIA?

Several Southeast Asian countries are studying whether to include nuclear energy in their future energy development plans so as to bolster their energy security and cut their CO2 emissions from fossil fuels. Studies have shown that nuclear power will be added to Southeast Asia's energy mix between 2030 and 2040. [7][8] [9] While Vietnam cancelled its first nuclear power plant (NPP) project in 2016, Indonesia and the Philippines are carefully evaluating their nuclear energy option. The Philippines, in particular, is currently acting on the recent findings and recommendations by the IAEA's review mission that assessed the country's infrastructure development for a nuclear power programme.[10] An option being mooted in the Philippines and Indonesia is the possible use of small modular nuclear reactors (land-based and floating) as an emerging nuclear technology .[11] The deployment of floating nuclear reactors may provide alternative power generation source to archipelagic countries in the region at a much cheaper price and less politically controversial than large land-based NPPs. However, the deployment of floating reactors has raised concerns about radioactive leaks or accidents that may cause grave environmental impact on the South China Sea affecting the safety, public health and sources of livelihood of coastal communities. Furthermore, the region's maritime security concerns such as piracy, presence of terrorist groups, unsecured maritime borders, smuggling, hijacking and territorial disputes could pose serious security threats to these floating reactors if states are not adequately prepared to address these issues.

While there are no operable nuclear plants currently in Southeast Asia, there are three Chinese nuclear power plants located near Vietnam and Chinese offshore nuclear reactors may be deployed in the South China Sea in the future. Meanwhile, Bangladesh began construction of its first NPP started in 2017 with Russian collaboration and completion slated for 2024. It must be noted that this first NPP is just 500 kms away from Myanmar. [12] ASEAN member-states have a collective interest in ensuring that nuclear power plants or small modular reactors located in East Asia, and even within Southeast Asia, are safe and secure.

Radiological security is currently an important security issue in Southeast Asia given that radioactive materials are in fact already widely used for peaceful applications in the region, especially in industrial facilities, health and medicine, soil and water management, pollution monitoring, and agricultural production. However without adequate regulatory oversight on the use and handling of radioactive materials there is a risk that such materials could be used in criminal, terrorist or intentional unauthorised acts by a malicious non-state actor, posing a threat to both national security and human security. From 2013 to 2018, as Fig. 1 shows, five cases involving missing, illicit trafficking or theft of radioactive materials were monitored in Southeast Asia and 43 cases in Northeast Asia.[13] Nuclear security incidents could cause radiological emergencies that might have health, societal, economic and environmental consequences.

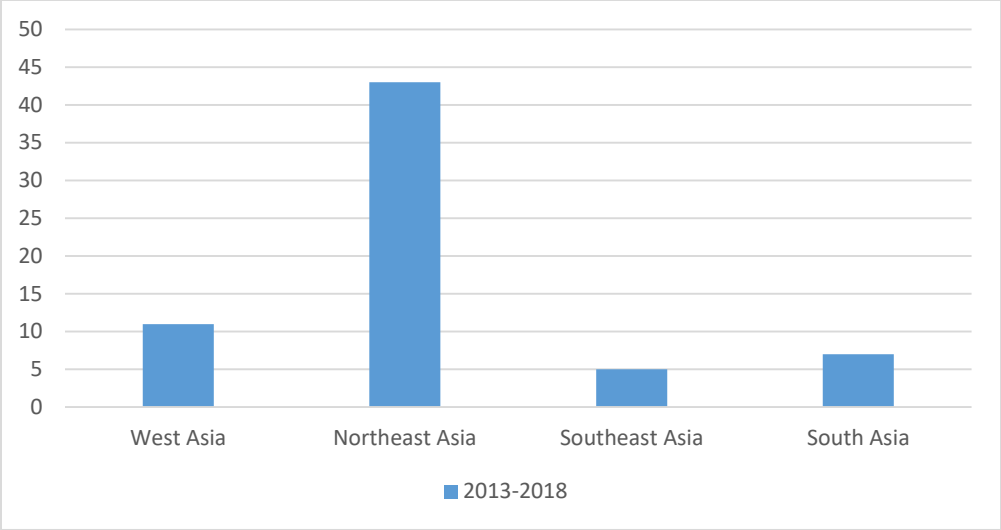

FIG. 1. Number of Monitored Cases of Missing, Illicit trafficking or Theft of Radioactive Materials in Asia from 2013 to 2018[14]

3. STRENGTHENING REGIONAL CAPACITY BUILDING IN NUCLEAR SECURITY

The EAS leaders' statement on nuclear security *"encourages all States to maintain and improve their nuclear security infrastructure, and encourage States in a position to do so to assist others in this regard… and to promote international exchanges of experience, knowledge and good practices."*[15]

Nuclear security is a key regional agenda set by ASEANTOM in view of the need to increase awareness among state and non-state actors on the importance of nuclear security governance in Southeast Asia. Highlighting the importance of collectively adhering to the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment, ASEANTOM has begun to work on a series of capacity building programmes aimed at boosting cooperation and collaboration among ASEAN member-states. Among these include the joint cross-border nuclear security exercises in their maritime and land borders done by regulatory and law enforcement officers in ASEAN to prevent and investigate illicit use and trafficking of radioactive materials. ASEANTOM has also worked with the IAEA in conducting regional workshops on *Security Management and Security Plan on Radioactive Materials and Associated Facilities*, amplifying the growing attention being given by the region to the security of radiological materials.[16]

As part of ASEANTOM's knowledge sharing programme, targeted assistance on boosting nuclear security is also provided to members that need more knowledge and expertise. For instance, Cambodia and Laos do not have enough well-trained staff and regulatory infrastructure, especially for the regulation of radioactive materials. Since 2017, Thailand, which has more robust nuclear expertise, has extended capacity building assistance to Cambodia and Laos on the regulation of nuclear activities and online monitoring of radiation in the environment through technical cooperation workshops.[17]

The nature of regional cooperation on capacity building taking place in Southeast Asia certainly provides a good foundation to pursue a more robust collaborative framework for nuclear security in the wider Asia-Pacific region. A step in this regard is to have regional action plan/roadmap for nuclear security in the Asia-Pacific that could institutionalise cooperation between ASEAN and other countries in the wider region and foster closer collaboration. The action plan may contain necessary mechanisms to facilitate and expand cooperation on knowledge transfer, emulating Southeast Asia's examples. Convening ASEANTOM regional workshops and technical projects on nuclear security could be included in the action plan with the aim of expanding such regional activities to include Asia-Pacific countries. Such expansion could also leverage on existing Asia-Pacific-wide Asia-wide regional networks, e.g., Forum for Nuclear Cooperation in Asia; Asian Nuclear Safety Network; Asia-Pacific Safeguards Network.

Another key regional collaboration in ASEAN on nuclear security is the Regional Radiological Security Partnership in Southeast Asia (RRSP). Launched by Australia in 2004, RRSP primarily aims to improve the physical protection and security management of high-risk radioactive sources in Southeast Asia through technical training and assistance, providing radiation detection devices, sharing of best practices, and facilitating collaborative efforts on

searching of missing radioactive sources and on nuclear emergency response.[18] Given that all Asia-Pacific states possess, use and transport radioactive materials across national borders, it would be strategic to strengthen training, information exchange and joint nuclear security drills among countries in the wider region.

4. CREATING AN ASEAN-EAST ASIA NETWORK OF NUCLEAR SECURITY CENTRES OF EXCELLENCE AND KNOWLEDGE CENTRES

Nuclear security education guarantees that there will be a sustainable pool of experts who are highly qualified to conduct effective regulatory oversight of nuclear and radioactive materials and uphold a robust nuclear security regime in a State.[19] The EAS Statement recommends that regional states must strengthen capacity building efforts through training and education, including COEs.[20] The primary role of COEs is to *"facilitate the development of human resources and the provision of technical and scientific support on several levels to ensure the long term sustainability and effectiveness of nuclear security in a State*."[21] COEs foster nuclear security culture and facilitate coordination and collaboration among government agencies and other stakeholders in nuclear security.

The creation of COEs in East Asia is considered to be a tangible result of the NSS process[22] (see Table 1). In Southeast Asia, Indonesia and Malaysia had already established their COEs, while the Philippines, Vietnam and Thailand also plan to set up their respective COEs. Malaysia's regional Nuclear Security Support Centre is active in disseminating best practices and information sharing within the region.[23] Indonesia's BATAN Centre for Security Culture and Assessment is proactive in promoting nuclear security culture. Its self-assessment project has generated important and tangible outcomes in that it not only offered an assessment of the status of security culture at the country's three research reactors, but it also provided a learning experience for management and the workforce of BATAN in identifying the gaps and improving their security culture.[24] These training projects now need to be expanded to include assessments of security culture in hospitals, industrial facilities, and other stakeholders that utilise radioactive material, apart from the government's research reactors.

The Indonesia- Centre of Excellence on Nuclear Security and Emergency Preparedness (I-CONSEP) serves as the nuclear security support and training centre with a mandate to undertake human resources development, foster security culture, and conduct support functions for nuclear security and emergency preparedness through its training, awareness and educational activities for frontline officers, emergency responders, security officials and border officers.[25] With the establishment of these two specialised centres, Indonesia now aims to ensure that the efforts towards effective nuclear safety and security and work towards security culture are sustainable.

In this regard, synergies can be developed between COEs in Northeast Asia and in Southeast since the latter provides significant help in developing the human resources and providing technical support services to their counterparts in ASEAN, as well as the ASEAN Centre for Energy, and also to the wider Asian region.[26]

TABLE 1. EAST ASIA'S NUCLEAR SECURITY COEs

COUNTRY	CENTRES OF EXCELLENCE	OVERSEEING NUCLEAR AGENCIES	YEAR OF ESTABLISHMENT	MAIN RESPONSIBILITIES
China	State Nuclear Security Technology Center (SNSTC)	China Atomic Energy Agency	2015	nuclear security education, training and certification activities
Indonesia	Centre for Security Culture and Assessment	National Nuclear Energy Agency (BATAN)	2014	Performs nuclear security culture assessment, security trainings and drills
	Indonesia Center of Excellence on Nuclear Security and Emergency Preparedness (I-CoNSEP)	Nuclear Energy Regulatory Agency (BAPETEN)	2014	Provides policy, technical and scientific support to nuclear security regime; ensures nuclear emergency response coordination and capacity building; advances regional collaboration
Japan	Integrated Support Center for Nuclear Nonproliferation	Japan Atomic Energy Agency (JAEA)	2010	Extends capacity building assistance, technical support to state agencies; delivers policy research; shares best practices with other nuclear security officials from Asian countries

	and Nuclear Security (ISCN			
Malaysia	Nuclear Security Support Centre (NSSC)	Atomic Energy Licensing Board	2012	Offers trainings on nuclear security to security officers and law enforcers; shares Malaysia's experiences and best practices with countries in the region
South Korea	International Nuclear Security Academy (INSA)	Korea Institute of Nuclear Nonproliferation and Control (KINAC)	2014	Develops education and training programmes, R&D projects, and capacity building support to emerging countries in Asia

Sources:[27] [28]

Complementing the COEs, knowledge centres like universities and research institutions which are members of the International Nuclear Security Education Network (INSEN), a Track 2 global network of nuclear security educational and research institutions, can also fill in the gaps in countries where there are no established COEs. For example, RSIS actively collaborates with fellow INSEN members through its nuclear policy roundtables, workshops and faculty development courses. In October 2019, RSIS co-organised an IAEA regional faculty development course on nuclear security, involving INSEN members. Around 20 faculty members and trainers from universities and training institutions in the Asia-Pacific region participated in a series of lectures and activities aimed at developing academic programmes and training courses on nuclear security education in their respective institutions. An important outcome of the course was getting participants to design their own curricula for graduate programmes and training courses.

The educational activities of Southeast Asian institutions and the capacity building assistance from Northeast Asian COEs certainly provide a strong foundation for establishing an ASEAN-Northeast Asia Regional Network of Nuclear Security COEs. A collaborative network of COEs in East Asia complement the work of ASEANTOM in terms of promoting security culture as well as sharing of best practices, resources, expertise and training materials.

The importance of promoting a nuclear security culture cannot be understated given the long-term plans by several Southeast Asian states to build NPPs and recent incidents of missing radioactive sources in the region. Furthermore, a network of COEs does not only facilitate knowledge transfer and build capacity and develop regional expertise. More importantly, they can engage with industry and civil society through various platforms and in turn promote public confidence in nuclear and radiological security.

5. ENHANCING REGIONAL NUCLEAR EMERGENCY PREPAPREDNESS AND RESPONSE

Any radiological security incidents and even security threats to NPPs in several Asia-Pacific countries may trigger radioactive leaks and emergencies. In this regard, EAS leaders *"[e]ncourage all States to implement measures nationally, regionally and internationally to ensure nuclear, radiation, transport and waste safety, as well as emergency preparedness and response [EP&R], taking into account IAEA Safety Standards.*"[29]

In Southeast Asia, the foundations of nuclear EP&R at the regional level have already been laid out through the regional projects of ASEANTOM. These projects are essential at both national and regional levels to protect the people and the environment in cases of nuclear or radiological accidents, as well as malevolent use of radioactive material. Most recently, ASEANTOM has been working with the ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) on drafting the ASEAN protocol on nuclear EP&R.[30]

In collaboration with the IAEA, the ASEANTOM launched in 2016 a regional project on *Supporting Regional Nuclear Emergency Preparedness and Response in ASEAN Region*, which was aimed at creating a regional environmental radioactivity database, providing technical assistance to member-states, and fostering a more organised and coordinated regional response for radiological emergencies.[31] ASEANTOM and the IAEA also completed the technical report titled *A Review of the Nuclear and Radiological Hazard Assessment in ASEAN*, as among the outputs of the regional project.[32] This important regional study is extremely important in identifying potential radiological and nuclear hazards that can be found in all ASEAN member-states.

Meanwhile, the EU is also assisting ASEANTOM on an EP&R project, aimed at developing a regional platform for decision-making and coordination during a nuclear or radiological emergency. The project's expected outputs include the *Action Plan for Implementing the ASEAN Strategy for Regional Cooperation on Radiological and Nuclear EP&R*; technical support for decision-making; and an ASEAN Early Warning Radiation Monitoring Network equipped with a regional data exchange platform (expected to be implemented in 2020). [33]

Building on these regional projects, the ASEAN's framework on EP&R could also be used in building a much broader EP&R framework for the Asia-Pacific. The regional hazard assessment on nuclear and radiological materials and facilities could be expanded to include all Asia-Pacific countries, given that all states possess radiological materials for various civilian applications. In addition, Asia-Pacific states could establish an integrated early warning radiation monitoring network and data exchange platform spearheaded by ASEANTOM. Building on the ASEAN EP&R Strategy, an East Asia Summit (EAS) Strategy on Radiological and Nuclear EP&R could be pursued in order to implement the EAS declaration. The EAS strategy could be anchored on and fully explore existing mechanisms at the regional (i.e., ASEAN) and national levels. It must have a flexible approach to accommodate different countries' priorities. Such strategy could help institutionalise ASEAN's EP&R collaboration with neighbours from Northeast and South Asian states that have significant activities involving nuclear and radiological materials.

6. CHALLENGES TO SOUTHEAST ASIA'S NUCLEAR SECURITY GOVERNANCE

Despite notable progress in Southeast Asia in enhancing nuclear security cooperation in the region, and the potential to build and expand their regional mechanisms to the broader Asia-Pacific region, there remains significant challenges and gaps in its nuclear security governance.

One key challenge is getting all ASEAN member-states to be parties to global conventions. Several ASEAN member-states have not yet signed and ratified important global nuclear conventions, including nuclear security treaties and the non-legally binding Code of Conduct on the Safety and Security of Radioactive Sources, as Table 2 shows. And in the absence of NPPs in the region, the CPPNM and its Amendment have also not been signed or ratified by some ASEAN member-states. In addition, not all ASEAN member-states have made political commitments with regard to the execution of the non-legally binding Code of Conduct on the Safety and Security of the Radioactive Sources. Given that many hospitals, research reactors, laboratories and factories utilise radioactive sources, physical protection is of utmost importance. Since the risks to the physical protection of nuclear facilities and materials such as stealing of radioactive materials and nuclear terrorism have regional consequences, it is imperative for all ASEAN member-states to collectively adhere to the CPPNM Amendment as well as the Code of Conduct. The Amendment broadens the scope of the CPPNM to also include physical protection requirements for nuclear facilities and nuclear material in domestic use, storage and transport. It also criminalises nuclear smuggling, trafficking and sabotage. It provides for expanded cooperation among countries on locating and recovering stolen or smuggled nuclear material.[34] It is essential for countries with nuclear activities and radioactive sources for non-power applications to ratify all treaties and to implement even non-legally binding IAEA guidelines, thereby contributing to the enhancement of nuclear security architecture at all levels.[35]

TABLE 2. ASEAN MEMBER-STATES' PARTICIPATION IN KEY NUCLEAR AGREEMENTS

	Safeguards Additional Protocol	**Convention on Physical Protection of Nuclear Materials (CPPNM)**		**Nuclear Terrorism Convention (ICSANT)**	**Comprehensive Nuclear Test-Ban Treaty (CTBT)**	**Convention on Nuclear Safety (CNS)**	**Joint Convention on Spent Fuel and Radiological Waste**	**Convention Early Notification of a Nuclear Accident**	**Code of Conduct on the Safety and Security of Radioactive Sources** *(Political Commitments/non-legally binding)*
		2016 CPPNM Amendment	**1980 CPPNM only**						
Brunei					✓				
Cambodia	✓		✓	signed	✓	✓		✓	
Indonesia	✓	✓	✓	✓	✓	✓	✓	✓	✓
Laos	signed		✓		✓			✓	
Malaysia	signed			signed	✓			✓	✓
Myanmar	signed	✓	✓		✓	✓		✓	✓
Philippines	✓		✓	signed	✓	signed	Signed	✓	✓
Singapore	✓	✓	✓	✓	✓	✓		✓	✓
Thailand	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vietnam	✓	✓	✓	✓	✓	✓	✓	✓	✓

Sources: [36] [37] [38] [39]

A weak nuclear security culture is another evident gap in nuclear security governance in Southeast Asia, accentuating the significance of human factors, such as attitudes, awareness and behaviours.[40] Harnessing nuclear energy and utilisation of radioactive material for non-power applications are not just about the technological aspects. Human failures due to complacency and the lack of critical thinking are significant factors in most reported incidents involving radioactive materials, including cases of loss and theft.[41] Hence, the development and strengthening of the security culture of individuals, organisations and institutions that handle radioactive material must be pursued. With the exception of Indonesia,[42] most of the Southeast Asian countries have yet to develop policy frameworks that engenders a strong safety culture and a security culture. Without these regulatory frameworks it would be challenging for licensees and users of radioactive and nuclear materials to develop their safety and security plans that advance nuclear security.[43]

Meanwhile, the kinds of training courses, workshops and seminars offered by training centres in the Philippines, Malaysia, Thailand and Vietnam focused more on building capacity at the more technical level and less on safety-security cultures. While these technical-oriented training activities enhance the domestic technical expertise in nuclear safety and security, a more comprehensive programme that includes enhanced training and educational activities on security culture and safety culture would be ideal.

Another significant gap is the lack of nuclear training COEs in other Southeast Asian countries. As shown in Table 1, only Malaysia and Indonesia have established their national COEs on nuclear security. It would be more difficult to inculcate safety-security cultures without even a training institution, such as a nuclear security support centre/COE. These countries should therefore consider setting up their national COEs that are mainly dedicated to fostering a nuclear security culture.

7. CONCLUSION

The paper explores some of the potential mechanisms as to how the future nuclear governance in the Asia-Pacific region can be enhanced building on the progress made in ASEAN. The pivotal role that ASEANTOM may play in the future nuclear governance landscape of the Asia-Pacific region should be explored. Moving forward, the key questions that may need to be considered are the following: (i) Could ASEANTOM be the lead driver or facilitator for nuclear governance/cooperation in the Asia-Pacific?; (ii) Should ASEANTOM invite regulators from other Asia-Pacific countries to participate in its meetings (as observers) and activities?; (iii) What would be the future funding arrangements given the issue of sustainability of current funding, financial and technical assistance mechanisms through the IAEA, EU, and bilateral grants?

Meanwhile, there should also be greater synergy and collaboration among COEs, universities and other knowledge centres in building nuclear security culture of excellence in the Asia-Pacific. Education is a powerful tool to raise awareness to educate students and train professionals, thereby strengthening nuclear security culture and practices at the national level. It is recommended that an institutionalised collaboration among the COEs, universities and knowledge centres in Northeast and Southeast Asia can be a good start given that East Asia is a region that will definitely require more enhanced capacity building cooperation in the coming decades. To this end, the contribution of informal networks of knowledge centres like INSEN and other expert communities must be tapped further in order to plug the gaps in nuclear security governances in East Asia and beyond.

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