นโยบายความมั่นคงปลอดภัยทางนิวเคลียร์ในบริบทของการต่อต้านการก่อการร้ายในกัมพูชา

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
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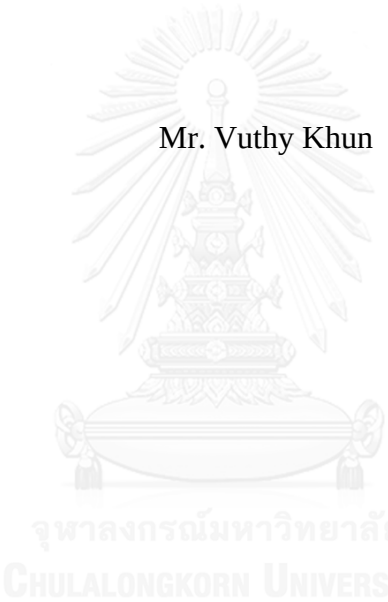
NUCLEAR SECURITY POLICY IN THE CONTEXT OF COUNTERTERRORISM IN CAMBODIA

Mr. Vuthy Khun



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By	Mr. Vuthy Khun
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Thesis Advisor	Associate Professor Doonyapong Wongsawaeng, Ph.D.

Accepted by the Faculty of Engineering, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of the Faculty of Engineering
(Professor Bundhit Eua-arporn, Ph.D.)

THESIS COMMITTEE

.....Chairman
(Associate Professor Sunchai Nilsuwankosit, Ph.D.)

.....Thesis Advisor
(Associate Professor Doonyapong Wongsawaeng, Ph.D.)

.....Examiner
(Associate Professor Nares Chankow)

.....External Examiner
(Channa Oeur, Ph.D.)

วุทที คุน : นโยบายความมั่นคงปลอดภัยทางนิวเคลียร์ในบริบทของการต่อต้านการก่อการร้ายในกัมพูชา (NUCLEAR SECURITY POLICY IN THE CONTEXT OF COUNTERTERRORISM IN CAMBODIA) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดุลยพงศ์ วงศ์แสวง, 90 หน้า.

ความเสี่ยงที่ผู้ก่อการร้ายจะใช้อาวุธนิวเคลียร์หรือระเบิด (กัมมันตรังสี) โจมตีเป็นภัยคุกคามที่อาจเกิดขึ้นได้ในเร็ววัน ยุทธศาสตร์ระดับชาติของกัมพูชาเพื่อต่อสู้กับอาวุธที่มีอานุภาพในการทำลายล้างสูง เป็นระบบการป้องกันหลายชั้นตั้งแต่การรักษาความมั่นคงปลอดภัยที่จุดกำเนิดในต่างประเทศจนถึงการตรวจจับอาวุธ วัสดุนิวเคลียร์หรือวัสดุกัมมันตรังสีที่ท่าเรือ ชายแดนและภายในองค์กรในกัมพูชาที่เกี่ยวข้องกับการรักษาความมั่นคงปลอดภัยทางนิวเคลียร์ที่ดำเนินโครงการป้องกันเหล่านี้

วัตถุประสงค์ของวิทยานิพนธ์ฉบับนี้เพื่อกำหนดแนวทาง บ่งชี้สถานการณ์ที่เป็นภัยคุกคามและมีความเสี่ยง และเพื่อแนะนำกฎหมายทางด้านการรักษาความมั่นคงปลอดภัยทางนิวเคลียร์ที่ควรบัญญัติเพิ่มภายใต้บริบทของการต่อต้านการก่อการร้าย โดยใช้แนวทางการรักษาความมั่นคงปลอดภัยของทบวงการพลังงานปรมาณูระหว่างประเทศ วิธีการวิเคราะห์ในงานวิทยานิพนธ์นี้ใช้แนวทางของทฤษฎีระบอบ กฎหมายและการเมืองระหว่างประเทศ เพื่อที่จะระบุและตีความกฎและบรรทัดฐานต่างๆ ที่เกี่ยวข้องในการจัดตั้งกฎเกณฑ์ทางด้านการรักษาความมั่นคงปลอดภัยทางนิวเคลียร์ การบังคับใช้กฎเกณฑ์เหล่านี้และการปรับปรุงเปลี่ยนแปลงในอนาคต

การศึกษานี้จะพิจารณากรอบกฎหมายระดับชาติของกัมพูชาที่มีอยู่ในปัจจุบันภายใต้บริบทของการต่อต้านการก่อการร้ายเพื่อที่จะป้องกันการก่อการร้ายทางนิวเคลียร์และความเสี่ยงที่จะเกิดการก่อการร้ายทางนิวเคลียร์ภายในเขตแดนกัมพูชา การศึกษานี้จะให้ข้อมูลพนักงานเจ้าหน้าที่ระดับชาติที่มีความรับผิดชอบทางด้านการรักษาความมั่นคงปลอดภัยทางนิวเคลียร์ และให้มุมมองแบบองค์รวมทางด้านทรัพยากรต่างๆ ที่จำเป็นต้องมีเพิ่มเติม และการเน้นนโยบายด้านการรักษาความมั่นคงปลอดภัยทางนิวเคลียร์ภายใต้บริบทของการต่อต้านการก่อการร้ายภายในกัมพูชา

ภาควิชา วิศวกรรมนิวเคลียร์ ลายมือชื่อนิสิต .....

สาขาวิชา เทคโนโลยีนิวเคลียร์ ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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KEYWORDS: NUCLEAR SECURITY, NATIONAL LEGAL FRAMEWORKS, COUNTERTERRORISM

VUTHY KHUN: NUCLEAR SECURITY POLICY IN THE CONTEXT OF COUNTERTERRORISM IN CAMBODIA. ADVISOR: ASSOC. PROF. DOONYAPONG WONGSAWAENG, Ph.D., 90 pp.

The risk of a nuclear or dirty bomb attack by terrorists is one of the most urgent and threatening dangers. The Cambodian national strategy to combat weapons of mass destruction (WMD) depicts a layered system of preventive measures ranging from securing materials at foreign sources to interdicting weapons or nuclear or other radioactive materials at ports, border crossings, and within the Cambodian institutions dealing with the nuclear security to manage the preventive programs.

The aim of this thesis is to formulate guidance, to recommend the scenario of threat and risk and to provide the recommendations on additional laws on nuclear security in the context of counterterrorism by following the International Atomic Energy Agency Nuclear Security Series. The analysis in this thesis is guided by the regime theory, international laws and politics, identifying and interpreting applicable rules and norms establishing the nuclear security regime and how well enforcement of the regime is carried out and what its future reform might be.

This study will examine the existing national legal frameworks of Cambodia in the context of counterterrorism to prevent acts of nuclear terrorism and the threat of a terrorist nuclear attack within the Cambodia territory. It will shed light on departmental lanes of national competent authority for nuclear security responsibility, and provide a holistic perspective on the needs of additional resources and emphasis regarding nuclear security policy in the context of counterterrorism in Cambodia.

Department: Nuclear Engineering Student's Signature .....
Field of Study: Nuclear Technology Advisor's Signature .....
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LIST OF ABBREVIATIONS

ANSTO	Australian Nuclear Science and Technology Organisation
CBRN	Chemical Biological Radiological and Nuclear
CED	Customs and Excise Department
CoE	Centres of Excellence
CPPNM	Convention on the Physical Protection of Nuclear Material
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
DOD	Department of Defense
DOE	Department of Energy
EU	European Union
EURATOM	European Atomic Energy Community
GICNT	Global Initiative Combat Nuclear Terrorism
GTRI	Global Threat Reduction Initiative
HEU	Highly Enriched Uranium
HRD	Human Resource Development
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IND	Improvised Nuclear
INFCIRC	IAEA Information Circular
INSSP	Integrated Nuclear Security Support Plan
INTERPOL	International Criminal Police Organisation
IPPAS	International Physical Protection Advisory Service
IRRS	Integrated Regulatory Review Services
JRC	Joint Research Center
KSFH	Khmer-Soviet Friendship Hospital
MME	Ministry of Mine and Energy
MOE	Ministry of Environment
MOH	Ministry of Health
NAP	National CBRN Action Plan
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NWS	Nuclear Weapon States

OAET	Established Office of Atomic Energy Technology
OPCW	Organisation for the Prohibition of Chemical Weapons
RDD	Radiological Dispersal Device
RPM	Radiation Portal Monitor
SNCTC	Secretariat of National Counter-Terrorism Committee
SOP	Standard Operating Procedure
TENA	Training/Education Needs Analysis
TWG	Technical Working Group
UN	United Nations
UNICRI	United Nations Interregional Crime and Justice Research Institute
UNSCR	United Nations Security Council Resolution
US	United States
USSR	Union of Soviet Socialist Republics
WCO	World Customs Organization
WENRA	Western European Nuclear Regulators Association
WHO	World Health Organization
WMD	Weapon of Mass Destruction

CHAPTER 1
INTRODUCTION

1.1. Rationale

Cambodia became a member state of International Atomic Energy Agency (IAEA) on 06 February 1958 then withdrew on 26 March 2003 with financial problem for paying to IAEA. Therefore Cambodia did not pay for membership since civil war from 1975 to 1979 but Cambodia rejoined IAEA on 23 November 2009 because of need for using the radiological materials for peaceful purpose in the country.

Even though the nuclear energy for peace has been increased around the world, Cambodia remains have limited nuclear facilities such as none of nuclear power reactor, lack of research institute for nuclear reactor, and none of nuclear fuel cycle facilities. The radioactive sources have been used in this country for medical (oncology), industrial (gauges) and agricultural purposes only.[1] This does not mean that the country will not have nuclear power plant forever.

Cambodian government is currently studying the possibility of nuclear power plant. Nuclear energy development is considered a distant and very long-term option.[2] All the current sources of electricity production in Cambodia come from hydropower, fossil fuel, biomass (minor), solar energy (minor) and import from neighbor countries such as Vietnam and Thailand. Although Office of Atomic Energy Technology was established in 2005 under the Department of Energy Technique and Nuclear Science

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[1] Soeung Vandoeun, 2014 IMPRO DIALOQUE FORUM 8th, 2014. Available from: https://www.iaea.org/INPRO/8th_Dialogue_Forum/Breakout_Infrastructure_14_Vandoeun.pdf [2015, January 27].

[2] *The* James Martin Center for Nonproliferation Studies, the Center for Energy and Security Studies, and *the Vienna Center for Disarmament and Non-Proliferation*, Prospects for Nuclear Security Partnership in Southeast Asia, Monterey/Moscow/ Vienna, 2012: 7. Available from: http://cns.miis.edu/opapers/pdfs/120515_seasia_nuclear_security_partnership.pdf [2015, January 27].

of the Ministry of Mines and Energy (MME) has relevant responsibilities to promote radiation/nuclear safety and security of radioactive sources, Cambodia has not established a regulatory body to implement the law on nuclear security.[1] Beside this, currently there are other two main institutions with relevant mandates for the nuclear security: the National Authority for the Prohibition of Chemical, Biological, Radiological and Nuclear Weapons (NACW), and the National Counter-Terrorism Committee (NCTC).

The risk that nuclear or other radioactive materials could be used in criminal or intentional unauthorized acts remains national concerns, and continues to be regarded as a threat and risk to international security. It is well recognized that the responsibility for nuclear security rests entirely with individual state. The appropriate and effective national systems for nuclear security are vital in facilitating the peaceful use of nuclear energy and enhancing global efforts to combat nuclear terrorism. The significant growth is anticipated over the coming years in the use of nuclear applications in general and nuclear power programs in particular by several countries such as Thailand and Vietnam. This requires the development of nuclear security infrastructure to ensure sustainable standard use of the peaceful applications of nuclear energy.

Nuclear security is recognized as the prevention and detection of, and response to unauthorized removal, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or associated facilities.[3] In fact, the factors causing high risks of nuclear security in the different parts of the developing world are varied. With the international legal frameworks, the nuclear security is

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[3] Rhonda Evans, Establishing National Nuclear Security Infrastructure, Office of Nuclear Security, Department of Nuclear Safety and Security, IAEA. Available from: https://www.iaea.org/NuclearPower/Downloadable/Meetings/2013/2013-02-11-02-14-TM-INIG/35b.evans.pdf [2015, 8 October].

a complication implementing with culture, economic, education in relation to the context in each country, against science and technology, natural resource, stability and instability of states.

The national nuclear security infrastructure is a part of global framework and underpinned by key international legal instruments that related to nuclear security. There is a need of, the appropriate training and education at all levels in relevant organizations as well as facilities that can play a major role in the process.[3] The Royal Cambodia Government emphasizes that Cambodia requires human resource development program in nuclear security sector. Therefore, there is a need to conduct a feasibility study to pave the way for Cambodian government to establish sustainable national nuclear security infrastructure as soon as the possibilities for the prevention and for social protection against nuclear terrorism.

1.2. Objective

To conduct the comparative study of the existing national legal frameworks related to nuclear security policy in the context of counterterrorism in Cambodia with IAEA guidelines.

1.3. Scope

The main purpose of this study is to provide a holistic perspective on the needs of additional resources and emphasis on nuclear security policy in the context of counterterrorism in Cambodia.

In detail, the scope of this study:

1. Formulate guidance for the nuclear security policy in the context of counterterrorism in Cambodia;
2. Recommend the scenario of threat and risk from the likelihood that nuclear or other radioactive materials could be used for malicious purposes (criminals or terrorists) such as nuclear or dirty bomb attack within Cambodian territory (by following IAEA Nuclear Security Series); and

3. Provide recommendations to policy makers on additional laws on nuclear security series and policy options on nuclear security policies.

1.4. Research Question

The thesis examines the issue on national competent authorities that should adopt the national legal and regulatory framework as well as study the role and responsibilities of nuclear security infrastructure.

The research study is followed by following research questions and poses these research questions below:

1) What is nuclear security infrastructure?

2) Why does nuclear security infrastructure issue is essential for Cambodia? And which level of national competent authorities involve in nuclear security policy in the context of counterterrorism?

3) What is the legal and regulatory framework and are the role and responsibilities of the competent authorities appropriately defined?

4) What types of assistances that Cambodia requires from IAEA and other donors and related international organizations in order to improve nuclear security infrastructure?

5) How do the national competent authorities implement the nuclear security policy in the context of counterterrorism?

6) How do the IAEA and other international organizations support Cambodia to develop nuclear security infrastructure?

CHAPTER 2
LITERATURE REVIEW

2.1. Introduction

So far there is no single written document on nuclear security policy in the context of counterterrorism in Cambodia. The nuclear security issues recognizes by the low attack of nuclear or dirty bomb using by terrorists in Cambodia. In Cambodia, the low attack of nuclear or dirty bomb used by terrorists became critical nuclear security issue in this country.

Many prominent scholars agree that the likelihood of a terrorist nuclear attack is significant and possibly imminent. According to Graham Allison, he explains "on the current path, a nuclear terrorist attack on America in the decade ahead is more likely than not".[4]

There is controversial agreement among experts about the threat from a dirty bomb. Stephen Pincock, who writes for *The Scientist,* argues that the fear of dirty bombs is overblown, as no one knows what would happen, because no one apparently has ever set one off.[5] Other experts assert that the former government of Iraq, and also al Qaeda, have both experimented and attempted to detonate dirty bombs.[6] Charles Ferguson, a noted author on the threat of nuclear and radiological terrorism, calls dirty bombs "weapons of mass disruption," as opposed to weapons of mass destruction.[7] Ferguson confirms that the devices are primarily a means to

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[4] Alison Graham T., Nuclear Deterrence in the Age of Nuclear Terrorism, Technology Review, November/December 2008. Available from: http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/terrorism/PDFs/Allison,%20Graham.%20Nuclear%20Deterrence%20in%20the%20Age%20of%20Nuclear%20Terrorism.pdf [2015, 8 October].

[5] Stephen Pincock, Terrorists Using 'Dirty Bombs' to Spread Radiation are a Chilling Prospect. But is the Fear Justified by the Actual Danger They Pose?, *Financial Times,* 10 September 2004: 13.

[6] Michael P. Donohue, "Understanding the Dirty Bomb and Its Policy Implications," *Homeland Security Law and Policy,* William C. Nicholson ed. Springfield, Charles C. Thomas, 2005: 278.

[7] Karen Eschbacher, Experts Say Dirty Bombs are more Disruptive than Destructive, *Patriot Ledger*, 20 January, 2005.

spread panic and fear rather than death and destruction. Other researchers explains that label dirty bombs as weapons of mass destruction because the long term environmental clean-up results in an effective loss of the impacted area for possibly decades, while increased cancer rates, resulting in casualties years after the event has taken place, could lead to enormous financial costs.[8]

Andy Oppenheimer is a specialist in nuclear, biological and chemical weapons. In a special report in *Jane's Terrorism and Security Monitor*, which is a highly regarded open source intelligence channel, Oppenheimer challenges the view of Ferguson and other experts that a Radiological Dispersal Device (RDD) is not a weapon of mass destruction (WMD). He revaluates the threat based on expert intelligence opinion and in marked contrast to previous assessments predicts that terrorists could kill hundreds with a RDD and sicken thousands by using radioactive materials that are readily available in commercial and medical use.[9]

Finally, there are numerous technical difficulties in constructing a nuclear weapon. The literature describes the daunting task a terrorist group faces in constructing a nuclear device. A dirty bomb, or RDD, on the other hand, is relatively easy to construct and offers the fear and propaganda value of a nuclear weapon, if not the destructive power. Operationally, for a terrorist group, a dirty bomb is a realistic weapon; instructions are openly available over the internet. The Islamic active online forum Alghorabaa.net, a website that has been used by Al Qaeda and Iraqi insurgents, recently posted instructions in Arabic on how to make a dirty bomb.[10]

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[8] Anonymous, "Dirty Bomb Seen Creating Mass Havoc, According to Year Long Pentagon Study", *Law Enforcement News* 30, no. 616 (Spring 2004): 6.

[9] A. Oppenheimer, The Radiological Threat Widens, *Jane's Terrorism and Security Monitor*, *Special Report, 1* September 2004.

[10] Staff, Al Qaeda Publishes Online Dirty Bomb, How to Guide, *U.S. Fed News*, 1 September, 2006.

Some authors, such as Brian Jenkins, have questioned terrorist predilections toward weapons of mass destruction or the use of chemical, biological, radiological, or nuclear weapons. Bruce Hoffman, a renowned expert on terrorism, argues persuasively that religiously motivated terrorists are more likely to use these types of weapons than secular or ethnic terrorists.[11]

The role of national competent authorities in nuclear security policy and in fighting terrorism has grown considerably since 9/11 event. National competent authorities have been assigned new national counterterrorism roles such as protecting critical infrastructures and key resources.

The Monterey Institute's Center for Nonproliferation Studies: explains the threat of nuclear terrorism "…looms larger today than ever before." These well qualified sources clearly support the contention that a nuclear terrorist attack against the U.S. may occur in the not too distant future.[12]

The thought of a terrorist attack using a nuclear weapon evokes a sense of extreme vulnerability and fear in most people. The instantaneous destruction caused by a nuclear detonation in a major U.S. city provokes an incomparable image of chaos and destruction. A ten-kiloton nuclear bomb blast in virtually any major U.S city would result in hundreds of thousands of deaths and a 1.5mile circle of complete destruction.[13]

White House Press Release, President Obama, in Prague at Hradčany Square on 5 April 2009, stated: …we must ensure that terrorists never acquire a nuclear weapon. This is the most immediate and extreme

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[11] Bruce Hoffman, *Inside Terrorism,* Revised and Expanded Edition New York, Columbia University Press, 2006: 269.

[12] Charles D. Ferguson and William C. Potter, *the Four Faces of Nuclear Terrorism*, Monterey, CA, Center for Nonproliferation Studies, 2004. Available from: https://en.wikipedia.org/wiki/The_Four_Faces_of_Nuclear_Terrorism.pdf [6 May, 2015].

[13] Sean W. Haglund, NUCLEAR TERRORISM: CALIBRATING FUNDING FOR DEFENSIVE PROGRAMS IN RESPONSE TO THE THREAT, Monetary California, December 2009.

threat to global security. One terrorist with one nuclear weapon could unleash massive destruction. Al Qaeda has said it seeks a bomb and that it would have no problem with using it. And we know that there is unsecured nuclear material across the globe. So to protect our people, we must act with a sense of purpose without delay.[14]

The potential for a nuclear bomb that causes massive destruction is not debatable. However, the likelihood of such an attack raises three fundamental questions that must be answered to fairly and rationally characterize the scope of the threat: 1) Do terrorists intend to acquire a nuclear weapon? 2) How do they intend to use it? 3) Do they have the ability to carry out such an attack?[15]

Al Qaeda's efforts to procure a bomb and Osama bin Laden's stated desire to use one clearly demonstrate intent (Jason Pate and Gary Ackerman, "Assessing the Threat of WMD Terrorism," James Martin Center for Nonproliferation Studies, CNS Reports (2011). Similarly, Aum Shinrikyo's use of chemical and biological weapons coupled with its pursuit of a nuclear weapon strongly suggests their intentions for use against the general population in the pursuit of political and ideological objectives.[16]

Nuclear Security Challenge in Southeast Asia: The development of robust nuclear security capabilities in Southeast Asia is critical because of the increased flow of nuclear materials and radioactive sources in the region. The key challenges for nuclear security in the region include the

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[14] Arms Control Association, White House Press Release. Available from: https://www.armscontrol.org/ObamaPragueSpeech [6 January, 2015].

[15] Henry H. Willis et al., Estimating *Terrorism Risk* (Arlington, Virginia: RAND Corporation, 2005)

[16] Jeffrey T. Richelson, *Defusing Armageddon, Inside NEST, America's Secret Nuclear Bomb Squad* (New York: W.W. Norton & Company, Inc., 2009), 123-128 and Jonathan B. Tucker, "Chemical Terrorism: Assessing Threats and Responses," in *Weapons of Mass Destruction and Terrorism*, ed. Howard and Forest (Columbus: McGraw-Hill, 2008): 214–215. Available from: http://books.wwnorton.com/books/Defusing-Armageddon/ [6 May, 2015].

high level of terrorist activity, weak maritime security, insufficient border and export controls, and scarcity of adequately trained as well as supported human resources. These can be emphasized by the following examples:

- ***Indonesia:*** Indonesia has made considerable progress in the area of nuclear safety; both the National Atomic Energy Agency (BATAN) and the Nuclear Energy Regulatory Agency (BAPETEN) have worked closely with the IAEA (nuclear safety and safeguards)
- ***Vietnam:*** Hanoi has expressed interest in cultivating a robust nuclear security capacity and culture, reflecting Vietnam's support for responsible nuclear energy development
- ***Myanmar:*** has expressed interest in developing a research nuclear program since its efforts in the prior decade to commission from Russia the construction of a research reactor.[17]

The national competent authorities of Cambodia have not previously had a formal role in protecting radiological materials. The national competent authorities have issued the guidelines for securing radioactive materials of certain quantities. These guidelines require licensees to collaborate with local law enforcement on security for nuclear and radioactive materials and give local law enforcement a new formal role in radiological security. A review of scholarly journals and research databases reveals that there is no relevant studies on the topic. While there is no research published yet on this area, there is extensive literature on nuclear security regime and on "dirty bombs" and the threat of terrorists using radiological dispersal devices (RDD).

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[17] *The* James Martin Center for Nonproliferation Studies, the Center for Energy and Security Studies, and *the Vienna Center for Disarmament and Non-Proliferation,* Prospects for Nuclear Security Partnership in Southeast Asia, Monterey/Moscow/Vienna, 2012: 7. Available from: http://cns.miis.edu/opapers/pdfs/120515_seasia_nuclear_security_partnership.pdf [2015, January 27].

2.2. Legal Framework for Nuclear Security Policy

2.2.1. Nuclear Security in International Context

Nuclear security

Nuclear security means only one word applies to both safety and security to designate the prevention of hazards and the prevention of malicious acts and the term "physical protection" was introduced to cover. But on the basis of the international work carried out by the IAEA, nuclear security refers to: “The prevention and detection of, and response to theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear or other radioactive substances or their associated facilities.”[18]

International Priority for Nuclear Security

There is an international consensus that the responsibility for nuclear security within a state rests entirely with that state as it’s a matter of its national security. Furthermore each state has its specific context and evaluation of the threat. However, the threat of nuclear terrorism has been recognized by all states as a great important issue, which can be explained the increasing need for international cooperation and exchange of very good practices to carry for enhancing of international, regional and national nuclear security.

It has to be emphasized that EU Member States contribute permanently to the IAEA efforts and promote the Convention on the Physical Protection of Nuclear Material (CPPNM) with all their international relations. With the same overall objectives, the Security

[18] International Atomic Energy Agency, Definition of Nuclear Security. Available from: http://www-ns.iaea.org/security [2015, October 10].

Council of the United Nations Organization decided to adopt specific resolutions against nuclear terrorism such as:

- The Unite Nations Security Council Resolution (UNSCR) 1373: adopted in 2001 after the 11 September attacks, requires member states to take measures tending to fight against the terrorism and to control their borders.
- The UNSCR 1540: dealing with Weapon of Mass Destruction (WMD) was unanimously adopted on April 28th, 2004. It is legally binding, and implies in particular a change of the legislation of member states. It decides that the states shall refrain from supporting by any means non-state actors that attempt to acquire, use or transfer nuclear, chemical or biological weapons and their delivery systems. It reaffirms the interest of an international cooperation in civil nuclear energy. In particular, it requires states to maintain "appropriate effective physical protection".

In September 2005, the International Convention for the Suppression of Acts of Nuclear Terrorism was opened for signature and on July 7th, 2007 it came into effect. It is primarily an international criminal law instrument that defines certain acts as criminal offences and obliges states parties to establish their jurisdiction over such offences, to render them punishable under their domestic law and to provide for extradition or prosecution of alleged offenders. However, it also obligates states parties to protect radioactive and nuclear materials, taking into account IAEA recommendations which include INFCIRC 225.

Even if nuclear security is the responsibility of states but the universal adherence, states have to fulfil the implementing international nuclear security instruments is needed.

Nuclear Security and Role of IAEA

As part of its efforts in nuclear security, the IAEA's Board of Governors has been approved a series of Nuclear Security Plans that set out the IAEA programs for nuclear security. One component of the Nuclear Security Plans has been the development of the Nuclear Security Series of documents which provides nuclear security: fundamentals, recommendations, and implementing and technical guides for member states to assist them in implementing new nuclear security regimes, or in strengthening existing regimes.[19]

IAEA Nuclear Security Recommendations

At the IAEA recommendations level, one key document is the nuclear security recommendations on PPNM and nuclear facilities (INFCIRC/ 225/Revision 5) which has the objective to achieve effective physical protection against the theft or unauthorized removal of nuclear material and against the sabotage of nuclear facilities and transports.

The recommendations in INFCIRC/225/Revision 5 relate to:

- The objectives of a states' physical protection regime; the elements of a state's physical protection regime for nuclear material and nuclear facilities;
- The requirements for measures against unauthorized removal of nuclear material in use and in storage;
- The requirements for measures against sabotage of nuclear facilities and nuclear material in use and in storage;
- And the requirements for measures against unauthorized removal and sabotage of nuclear material during transport.

Such requirements involve with prevention (first line of defense), the detection (second line of defense), the response (third line of defense) and mitigation or recovery procedures (fourth line of defense). The

[19] International Atomic Energy Agency, IAEA Nuclear Security Series. Available from: http://www-ns.iaea.org/security/nuclear_security_series.asp) [2015, June 25].

implementing guides or technical guidance documents give detailed advice on how to implement the recommendations. For instance these documents deal with topics such as threat assessment, vital area identification, security of transport, internal threat (insider) and nuclear security culture.

2.2.2. Nuclear Security in the National Context of Cambodia

Signature and Ratification of Relevant International Agreements

Cambodia has committed a range of international instruments dedicated to chemical, biological, radiological, and nuclear (CBRN) risk mitigation and is a state party to the following majority of international conventions and treaties:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Stockholm Convention on Persistent Organic Pollutants
- Chemical Weapons Convention (CWC)
- Biological Weapons Convention (BWC)
- Convention on Physical Protection of Nuclear Material (CPPNM)
- Convention on Early Notification of a Nuclear Accident
- Convention on Nuclear Safety
- Treaty on the Non-Proliferation of Nuclear Weapons (NPT)
- Comprehensive Nuclear Test Ban Treaty (CTBT)
- International Convention for the Suppression of the Financing of Terrorism.

In addition, it is a party to the Treaty on the Southeast Asia Nuclear Weapons Free Zone (or Bangkok Treaty) and the ASEAN Convention on Counterterrorism. In 2005, Cambodia submitted its first national report with respect to UNSCR 1540 (in 2004). Cambodia has signed the

International Convention for the Suppression of Acts of Nuclear Terrorism in 2006.[20]

National Legal and Regulatory Framework

Cambodia has a range of capabilities for preventing and combating CBRN risks. Notably, several national competent authorities have pertinent expertise and resources, and a range of relevant national legislation has been enacted. However the capacity gaps should be underline. Significantly, Cambodia seeks greater emphasis on prevention and awareness-raising in its risk mitigation approach because these activities have impact the likelihood of CBRN events. Cambodia needs effective response/recovery capacity to deal with CBRN emergencies in order to prevent from occurrences they occur. This section highlights national capacities that are already in place and the main gaps in CBRN risk mitigation that require strengthening. At the national level, the principal legislation, decrees and decisions of Cambodian government with regard to CBRN risk mitigation are identified:

- Prohibition of weapons of mass destruction, as stated in the National Constitution, Art. 54
- Decision on establishment of National Counter Terrorism Committee, 2004
- Law on the Management of Weapons, Explosives and Ammunition, 2005
- Decision on establishment of Secretariat of National Counter Terrorism Committee, 2005
- Royal Decree on the Establishment of the National Authority for the Prohibition of Chemical, Nuclear, Biological and Radiological Weapons,

[20] National CBRN Action Plan, the Kingdom of Cambodia, October 2014.

in 2006

- Decision on the Appointment of the Composition of the National Authority for the Prohibition of Chemical, Nuclear, Biological and Radiological Weapons, in 2007
- Sub Decree on the Organization and Functioning of the General Secretariat of the National Authority for the Prohibition of Chemical, Nuclear, Biological and Radiological Weapons, in 2007
- Law on Customs, in 2007
- Law on Counter Terrorism, in 2007
- Law on Anti-Money Laundering and Combating the Financing of Terrorism, in 2007
- Royal Decree on the appointment of the composition of the leadership of the National Counter Terrorism Committee, in 2008
- Law on the Prohibition of Chemical, Nuclear, Biological and Radiological Weapons, in 2009
- Sub Decree on Chemical Substances involved with the Production of Chemical, Nuclear, Biological and Radiological Weapons, in 2011
- Law on Standards of Cambodia
- Law on Management of Quality and Safety
- Law on Environmental Protection and Natural Resource Management.

Verification – Licensing – Enforcement

The National competent authorities establish verification and enforcement measures to ensure compliance with applicable laws, regulations and requirements, including the imposition of appropriate and effective sanctions. A regulatory body for the safety or security of nuclear

material and/or other radioactive material to undertake enforcement and inspection activities has not yet been established. Such enforcement and verification measures should be enshrined in the comprehensive nuclear law and in relevance of other regulations.

License activities or grant authorization only when activities comply with physical protection regulations, requirements, associated procedures, and law enforcement systems. A clear single regulatory system for the authorization or licensing of operating entities (e.g. industries, hospitals, ports using radioactive sources) that have responsibilities for the security of radioactive material has not yet been established but the clear single regulatory is specified in the provision of the draft Cambodia's nuclear law, including the provisions for transport of nuclear and other radioactive material with regulatory requirements.[21]

Misuse of Orphan Source Risks

CBRN materials have beneficial applications but they can also pose significant risks to public health and the environment, whether due to accidental contamination events, the deliberate release of CBRN agents or natural disease outbreaks. Cambodia recognizes the importance of developing an integrated and comprehensive approach to mitigate CBRN risks and working with international partners to coordinate efforts to reduce dangers. Overall, among the most significant CBRN hazards affecting Cambodia including accidents, negligence/improper waste disposal of CBRN materials and natural disasters. At the same time, deliberate acts of terrorism involving CBRN materials are a relatively lower national priority because of limited terrorist activity in the country.

Approaches to Managing Sources at the End of their Life Cycle

Acquire, install, and calibrate monitoring and radiation detection equipment according to priorities established in the national detection

[21] Integrated Nuclear Security Support Plan, the Kingdom of Cambodia, Revision: 3, January 2015.

strategy. The limitation of resources exist to request the support from IAEA or other donors.

- Radiation detection equipment, including 6 Radiation Portal Monitors (RPMs) for primary inspection, and tools for secondary inspections as well as associated trainings was acquired, installed and calibrated through US Megaport Initiative Program in cooperation with IAEA at Sihanouk Ville Autonomous Port in 2011
- Secretariat of National Counter-Terrorism Committee (SNCTC) has a range of handheld detection equipment provided by the IAEA and United States Department of Energy (DOE)
- National Authority for the Prohibition of CBRN Weapons (NACW) also has detection equipment for responding against CBRN incidents for analysis and identification of CBRN agents.

Nuclear Security Culture

A national strategy is developed for detection of a criminal act, or an unauthorized act, with nuclear security implications involving nuclear or other radioactive material that is out of regulatory control. By following the national training course for development of concept of operations and Standard Operating Procedures (SOPs) for Radiation Detection and Response at Borders, it is recommended that SNCTC, Customs and other involved national competent authorities finalized the Concept of Operations and SOPs. The IAEA and EU provided the expert support for these purposes.

National CBRN Emergency Response Plan

The presence of National CBRN Action Plan (NAP) sets out national priorities for enhancing CBRN risk mitigation in Cambodia, while furthering the objectives of international initiatives such as UNSCR 1540. Cambodia has developed in accordance with a prevention, detection, preparedness and response framework, this NAP covers a wide range of

CBRN activities and is tailored to addressing the CBRN hazards – whether natural, accidental or criminal in origin –of the greatest relevance to the country.

In addition to providing a basis for developing projects to strengthen CBRN risk mitigation, the NAP takes into consideration and seeks to integrate information on existing projects and initiatives, thereby coordinating the activities of international donors through one coherent plan. Consequently, the NAP is fully in line with such initiatives as the Integrated Nuclear Security Support Plan (INSSP) of the IAEA, the activities of the committee established pursuant to UNSCR 1540, the World Health Organization (WHO) protocol for assessing national surveillance and responding capacities for the international health regulations, as well as work by INTERPOL and the World Customs Organization (WCO), among others.

The NAP has been prepared by the National CBRN Team under NACW, combining the views of key national competent authorities and stakeholders, and expresses the strategic priorities of the country. It has been compiled in consultation with United Nations Interregional Crime and Justice Research Institute (UNICRI) within the legal framework of the European Union CBRN Centres of Excellence initiative over a series of workshops hosted by the Cambodian National CBRN Team and attended by IAEA, EU and UNICRI experts.

Human Resource Development Spreading Nuclear Safety and Security Culture

Cambodia performs a Training/Education Needs Analysis (TENA), involving all nuclear security stakeholders in a country to:

- Appoint national focal points in each institution
- Arrange for regular meetings to be able to perform a comprehensive training needs analysis

- Request IAEA assistance to perform TENA, if needed
- Develop a nuclear security human resource development (HRD) program tailored to the country's needs, based on the findings of the TENA
- Identify necessary resources (infrastructure and human resources) that can be used immediately or need to be recruited/developed
- Train and develop qualified instructors.[29]

2.3. Terrorism

Various definition of terrorism

There are difficulty for definition of terrorism, but for defining terrorism is in agreeing on a basis for determining when the person use of violation direct whom, by whom, for what ends, is legitimate; therefore, the modern definition of terrorism is inherently controversial to state and non-state groups. The majority of definitions in use has been written by agencies directly associated with government, and is systematically biased to exclude governments from the definition.

The UN General Assembly Resolution

Terrorism: is criminal acts intended or calculated to provoke a state of terror in the general public, a group of persons or particular persons for political purposes are in any circumstance unjustifiable, whatever the considerations of a political, philosophical, ideological, racial, ethnic, religious or any other nature that may be invoked to justify them. *(Adopted on 9 December 1994, titled "Measures to Eliminate International Terrorism," contains a provision describing)*

The Arab Convention for the Suppression of Terrorism

Terrorism: Any act or threat of violence, whatever its motives or purposes, that occurs in the advancement of an individual or collective criminal agenda and seeking to sow panic among people, causing fear by harming them, or placing their lives, liberty or security in danger, or

seeking to cause damage to the environment or to public or private installations or property or to occupying or seizing them, or seeking to jeopardize national resources. *(Adopted by the Council of Arab Ministers of the Interior and the Council of Arab Ministers of Justice in Cairo, Egypt in 1998)*

UN Security Council Resolution 1566 (2004)

Terrorism: is criminal acts, including against civilians, committed with the intent to cause death or serious bodily injury, or taking of hostages, with the purpose to provoke a state of terror in the general public or in a group of persons or particular persons, intimidate a population or compel a government or an international organization to do or to abstain from doing any act.

United Kingdom

Terrorism: To include an act "designed seriously to interfere with or seriously to disrupt an electronic system". An act of violence is not even necessary under this definition. *(United Kingdom's Terrorism Act 2000)*

FBI

Terrorism: The unlawful use of force or violence against persons or property to intimidate or coerce a Government, the civilian population, or any segment thereof, in furtherance of political or social objectives.

U.S. Army Manual

Terrorism: Is the "calculated use of unlawful violence or threat of unlawful violence to inculcate fear. It is intended to coerce or intimidate governments or societies ... [to attain] political, religious, or ideological goals." *(U.S. Army Field Manual No. FM 3-0, Chapter 9, 37 (14 June 2001))*

Department of Defense Dictionary of Military Terms

Terrorism: As the calculated use of unlawful violence or threat of unlawful violence to inculcate fear; intended to coerce or to intimidate

governments or societies in the pursuit of goals that are generally political, religious, or ideological.

Terrorists determined to unleash the most devastating forms of nuclear terrorism may try to acquire an intact nuclear weapon, however, they are deterred by the security measures surrounding nuclear armaments, they may instead seek to acquire fissile material by purchase, diversion, or force for the purpose of fabricating a crude nuclear bomb, known more formally as an Improvised Nuclear Device (IND).[22] Fortunately there have not been any acts of nuclear or radiological terrorism so far in Cambodia. Nevertheless the attack with the chemical warfare agent Sarin in Tokyo in 1995, the anthrax cases in the USA in 2001 and the smuggling of radioactive material are becoming serious concern. Furthermore, the attacks of 11 September 2001 clearly showed that there are groups with considerable financial and human resources as well as the will to inflict the highest possible damage.

Do any acts of nuclear terrorism which have not occurred is unlikely at present and seems not happen in the future? What is east will be done, what type of difficulty is less likely to happen? A study was conducted to consider the technical difficulties involved, the materials needed and the problems a terrorist group aiming to secretly implement a project would face.

The first part concentrates on the feasibility of nuclear terrorism. It will demonstrate that the use of nuclear materials by terrorists is very unlikely in Cambodia. Conversely, radiological weapons may well be within terrorists' capabilities.

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[22] Charles D. Ferguson, Preventing Catastrophic Nuclear Terrorism, CSR NO. 11, MARCH 2006. Available from: https://www.google.com.kh/?gws_rd=cr,ssl&ei=Gng_Vt_hA4vO0gTkuqi4AQ#q=NucTerr_CSR) [2015, June 17].

2.3.1. Use of Nuclear Materials by Terrorists

There are two imaginable ways that terrorists can get nuclear explosives. They could try to build an improvised nuclear device (IND) or they could steal or buy a nuclear weapon. Before discussing these two cases, we prefer to provide some information on the working principle of the simplest nuclear weapons.

The Working Principle of a Nuclear Weapon

Inside a nuclear weapon there is enough fissile material for the formation of many critical masses, but prior to detonation it is kept in a subcritical state. In other words, the fissile material is arranged in such a way that spontaneous neutrons cannot start chain reactions or only very short ones, which quickly die out. The initiation of the nuclear explosion, the fissile material is brought as quickly as possible into the state of maximum super criticality. At the optimum moment, the chain reaction is started by an injection of neutrons from a neutron source, thereby starting a kind of race between two processes: on the one hand, in a supercritical configuration of neutrons and the amount of energy released rises exponentially; on the other hand, this energy released by the fission events causes an expansion, which tends to make the configuration subcritical again.

If the chain reaction starts before the system is near the maximum reachable overcritical state, the rise in the neutron number is less steep and the energy yield will be only a fraction of the maximum possible one. Because of spontaneous fission, new neutrons are constantly being released and the presence of neutrons that can induce such a pre-ignition cannot be ruled out. It depend on how the initially subcritical mass is made supercritical, one can distinguish between two main types of explosive configurations: the gun-type and the implosion-type.

Gun-type

Before the explosion the fissile material is kept in a number of separate pieces, each below the critical size. Using conventional explosives, the pieces are then joined together to form a single geometrically favorable (spherical would be best) supercritical mass. The density of the fissile material does not change, or changes only insignificantly.

As this method is very slow, pre-ignition can drastically reduce the yield from the design yield of, from 13 kT down to a few tons. To have a good chance of reaching the design yield, only fissile material with a very low spontaneous fission rate is used, i.e. uranium with a high U-235 content.

The nuclear weapon dropped over Hiroshima was based on the gun type. A cylindrical plug of uranium with a diameter of approximately 10 cm and a length of approximately 16 cm was fired into a hollow cylinder of uranium. The joint weight of the two masses was 64 kg and they consisted of 80% of U235 on average. South Africa also built six gun-type bombs which each used 55 kg of 80% U235 and later dismantled them.

Implosion-type

A subcritical spherical mass of fissile material is symmetrically squeezed so that the configuration becomes supercritical. Because the critical mass is inversely proportional to the square of the density, a two-folded compression turns an object of half a critical mass into one with two critical masses. Such compression can be achieved with spherical convergent shockwaves. For that purpose “lenses” of explosives with widely different velocities of detonation waves are used. The lenses must be arranged around the sphere which is to be compressed, so that the whole surface is covered.

Although this method is quick, pre-ignition can still reduce the yield from the design yield of, from 20 kT down to 1 kT or less. Yet the chance

of reaching the design yield is good, even with fissile material with a not very low spontaneous fission rate. Highly enriched uranium and plutonium (preferably with a low Pu-240 content) may be used.

The bomb dropped over Nagasaki was of the implosion-type. The core of this nuclear weapon consisted of 6.2 kg plutonium (approx. 0.9% Pu-240).

Can Terrorists Build an Improvised Nuclear Device (IND)?

Requirements to obtain a plan

To make a working IND an accurate blueprint is required and not only a sketch of the principles. Although it is amazing how much interesting and correct information is publicly available on nuclear weapons physics and technology, especially from the internet, this does not mean by far that the said information would be sufficient for making a nuclear explosive device. It shows on the contrary what extreme difficulties in terms of technical skills and engineering knowledge would have to be overcome.

There was talk of a Chinese bomb design sold by the Khan network (22 kT uranium implosion device) to Libya. Apart from this example, we have not heard of any blueprints being out of governmental control.

But even if a terrorist group could get hold of such a blueprint, they would most certainly be forced to redesign. It is very unlikely that they would have the same fissile material and the same types of explosives China used more than 40 years ago. To adapt a plan they have to understand it, they need to know why some decisions have been taken — basically the same knowledge and expertise is required as for a completely new design. A terrorist group could doubtless pay physicists to do such a job. But as certain information cannot be found in the relevant literature, a few crucial experiments would have to be done. This requires access to materials that are difficult to obtain and gives rise to secrecy problems.

2.3.2. Use of Radiological Weapons by Terrorists

Definition

A radiological weapon (or radiological dispersion device, RDD) is any device that is designed to spread radioactive material into the environment, either to kill, or to deny the use of an area. Sometimes, when high explosives are used to disperse the radioactive material, the radiological weapons are called “dirty bombs”.

A radiological weapon is not a nuclear weapon. Even if uranium or plutonium is spread by a radiological bomb, the blast effect is due only to the high explosive; no nuclear fission occurs, as it would in a nuclear bomb. The blast effect of a radiological bomb is similar to the blast effect of a conventional bomb using the same amount of explosive.

Radiation Effects on Humans

The “dose” is described the amount of radiation a person receives. The dose rate is measured in units of thousands of a Sievert (Sv), we called the milliSievert (abbreviated mSv).

Basically we can distinguish between acute effects with the symptoms of radiation sickness and possible death shortly after the irradiation, and long term radiation effects with an increased probability of cancer mortality many years after the irradiation. The threshold value for the appearance of acute radiation damage is around a whole-body dose of 1,000 mSv. For a population of all ages and genders, the number of cancer deaths resulting from a chronic irradiation is estimated at 5% to 6% per Sv. For this effect, no threshold value is known.

How to Build a Radiological Weapon?

For building a radiological weapon, the terrorists need to have access to a sufficient quantity of radioactive material. The radioactive sources are used in medical, industrial, agricultural and research applications in peace use but they can be found in hospitals, medical and industrial irradiation

facilities, universities and even homes. However, not all of these sources would be suitable for use in an RDD. Most are far too weak to cause extensive damage. Furthermore, many radioactive sources are in metallic form and would not be dispersed very effectively caused high explosives. Nonetheless, we cannot completely rule out that terrorists could get their hands on the appropriate material and in sufficient quantities to contaminate a large area. The safely manipulating a strong radioactive source requires knowledge of radioactive materials and radiation protection. For terrorists or "suicide bombers" we may assume that safety considerations and long-term cancer risks are not their primary concern. According to technical feasibility, we are able to conclude that the construction of a radiological weapon is quite possible. In all cases it requires advanced know-how and planning, a targeted approach and considerable expenditure. Nevertheless, there is no fundamental obstacle to hinder terrorists from building a radiological weapon.

In order to prevent the use of radioactive sources in radiological weapons, the international conference on security of radioactive sources, held in Vienna, Austria, in 2003, addressed these concerns and called for international initiatives. As a direct result the IAEA *"Code of Conduct on the Safety and Security of Radioactive Sources"* was revised in 2003, its supporting "Guidance on the Import and Export of Radioactive Sources" was developed and approved in 2004 and the "Safety Guide on Categorization of Radioactive Sources" was completed recently. The G-8 at its meeting in Evian in 2003 expressed its full political support for the IAEA actions and for the Code of Conduct and encouraged all states working to increase the safety and security of radioactive sources. At Sea Island in 2004, the G-8 gave its support to the "Guidance on the Import and Export of High-Risk Radioactive Sources," which was developed under the auspices of the IAEA and was subsequently endorsed by the General

Conference in September 2004. UNSCR 1540, in its preamble, recognized that most States have taken effectively preventive measures in accordance with the recommendations given in the Code of Conduct. These measures at the international level aim at ensuring the security of radioactive sources and reduce the probability of one falling into the hands of terrorists.

Possible Scenarios for the Use of a Radiological Weapon

Enclosed radiation source

A gamma-emitting source generates a locally limited radiation field with rapidly decreasing intensity as distance from the source increases. A strong gamma emitting source could be hidden in high-profile areas, such as highly populous urban sites or government facilities, which could expose a large number of people to intense radioactivity over a short period of time. It is unlikely that people exposed to such a source would suffer an acute radiation syndrome. However, on discovery panic reactions are to be expected among all persons who have spent time close to it. In the long term, persons irradiated by it could be subject to a very small, probably statistically non-detectable increased risk of cancer. Once discovered, the source can be shielded and removed relatively easily.

An alternative option would be the use of such a source to irradiate a limited number of people over a long period of time. In this case, those persons could suffer from acute radiation syndrome and could even die as a consequence of the irradiation.

Contamination of food

The food or beverages could be contaminated by adding radioactive substances, for example in production plants, during transport or at the retail shop. The main danger in this case is an internal contamination of the consumer. Although a selective and weak contamination of only a small number of items would have a considerable effect, this consequence may be harmful to the public and contribute great economic loss.

Contamination of drinking water

Because of their high dilution in the huge amount of water, the addition of soluble radioactive substances, even in large quantities, to drinking water in water supply and distribution systems is not expected to result in a contamination that would be dangerous for the consumer. However, the low tolerance values for drinking water may be exceeded and require costly mitigation measures.

Explosive device with radioactive material

The detonation of an explosive device to which radioactive substances have been added produces both local and extensive contamination. Such a device is generally called a "*dirty bomb*". The local contamination is caused by ejected radioactive material. The large area of contamination results from the propagation and deposition of aerosols produced by the explosion. The inhalation of radioactive aerosols results in internal irradiation of the people concerned. Injured people may be contaminated. It is very probable that contaminated casualties will be transferred to hospitals, hence contaminating them too. In this case decontamination may be difficult, time-consuming and expensive.

Air contamination by means of aerosols

With suitable technical equipment, an easily respirable aerosol is produced. The spraying of a solution of radionuclides in a major public building would result in the breathing of contaminated air by the people there. In addition, the deposition of aerosols would cause a surface contamination both of the people and of the floor of the building. Such an attack may give rise to fears of cancer for the persons concerned and lead to closure of the building for the time required for decontamination, subsequent economic loss and high decontamination costs.

2.4. Conclusion

There are radiological and nuclear materials in medical and industrial usage within the country albeit in limited numbers. Nevertheless, an expected growth of all activities involving nuclear and radiological materials in South East Asia following both the development of nuclear power, medical and industrial activities may bring an emerging set of risks to the region and to Cambodia in the future.

A significant risk of theft, improper disposal or inadvertent public exposure to radiological waste material or radioactive wastes may arise from the identified vulnerabilities coupling insufficient legislation on the management of hazardous waste with the absence of a repository for disused radioactive sources despite the limited number of sources present in the country. In addition, the fact that responsibilities for handling and managing radioactive substances during their lifecycle are not always clearly allocated adds a further vulnerability leading to the same type of risk for radiological materials in active usage. A further concern is that Cambodia may use a transit route for the trafficking of radioactive materials given the existence of long borders, very difficult to monitor and the presence of known corridors for smuggling in the region. By itself, Cambodia has no significant organized terrorist or criminal groups within its territory and therefore this threat is only considered as a secondary or indirect threat.

The hurdles for terrorists to get a nuclear weapon are extremely high. The probability of terrorist use of such a weapon is therefore extremely low. To build nuclear weapons is a difficult task, even for countries. Iraq tried it 15 years ago with a project on the scale of US$ 10 billion and 7,000 employees, and did not succeed. Moreover, the Non-Proliferation Treaty (NPT), the main pillar of nuclear non-proliferation, has been strengthened and safeguards have been improved, especially for those countries with the

IAEA 1997 Additional Safeguards Protocol in force. The usual tools against nuclear proliferation impede nuclear terrorism. Consequently a stronger commitment to strengthening the NPT, the reduction of warheads and the reduction of critical fissile material would further reduce the risk of nuclear terrorism.

CHAPTER 3
METHODOLOGY

The following methods were used in the study:

1) The primary data collection using in-depth interviews were conducted with national competent authorities of Cambodia including the National Authority for the Prohibition of Chemical, Nuclear, Biological and Radioactive Weapons, Ministry of Mines and Energy (MME), Ministry of Health (MoH), Ministry of Foreign Affairs. Besides this, the interviews were also carried out with International Cooperation and a member of CBRN National Team. This primary data collection was necessary to gain an insight understanding regarding institutional arrangements and related legal frameworks.

2) The secondary data analysis was carried out to collate data related to the IAEA guidance on nuclear security, Organisation for the Prohibition of Chemical Weapons (OPCW), Global Initiative Combat Nuclear Terrorism (GICNT), Comprehensive Test Ban Treaty Organization (CTBTO), legal frameworks in Cambodia, reference documents and newspapers.

CHAPTER 4
RESEARCH RESULTS

4.1. Security of Sources

4.1.1. Introduction

The Cambodian government has previously obtained the assistance of IAEA in drafting the national nuclear law, the drafted law is currently finalizing and will be presented to the parliament before the end of 2015. The law will address safety, security & safeguards, waste management, transport, import & export and eventual plans for nuclear power, and a research reactor.

A number of radioactive sources are presented on its territory and all the sources are used for industrial, medical and agricultural purposes. A registry of radioactive sources was established in 2008, but the process of registration and the updating information as well as categorization according to safety and security criteria has not been complete and still ongoing. To support this process, a technical working Group (TWG) was created since 2009 and a committee for national cooperation on the regulatory framework was established.

The safety and security of radioactive sources at the Khmer-Soviet Friendship Hospital (KSFH), which holds the medical sources for medical purpose in Cambodia, has been managed in cooperation with the IAEA. The safety and security measures are in place for all operational sources at the hospital, and additional measures have been planned in cooperation with the IAEA for the new large sources which will go into operation next years. Furthermore, physical protection upgrades have been put in place for a disused source found on the premises. Beside this medical purpose, in some provinces, there may be radioactive materials that have not been

properly accounted for, for example, the radioactive waste emanating from mining activities.

In general, the disposal of radioactive waste is a key challenge, but Cambodia is working on developing adequate institutional responses to these issues including revision and formulation of legislation and related regulations. Nowadays, there is no storage facility for disused radioactive sources in Cambodia, and this is required to address carefully.

Cambodia rejoined IAEA on 23 November 2009 because of need for using the radiological material for peaceful purpose in the country. Cambodia has restarted its cooperation with the IAEA, which led to the approval of the country's Integrated Nuclear Security Support Plan (INSSP) in June 2013 and is also engaged its cooperation with other international entities, including:

- US Department of State (upgrade to Cambodian control lists for radioactive materials)
- US Department of Energy (National response plan and training on safeguards)
- EU Joint Research Center (feasibility study on an RN response plan)
- EU CBRN CoE (National CBRN Action Plan)

4.1.2. Orphaned Sources

Radioactive sources that are not under institutional controls because of being lost, stolen, or abandoned are called orphaned sources.

An uncontrolled source was located near the oncology department at the KSFH, also known as the Preah Bat Norodom Sihanouk Hospital, in Phnom Penh, Cambodia. During a routine radiological survey by hospital staff in 2005, investigations by experts from ANSTO indicated that this is a Co-60 source with an activity of a few TBq. This source is buried 30-50 cm in the top-soil and is unshielded but concrete and lead blocks have been placed over the source area, which has also been cordoned off.

The vulnerable legacy sources included a high activity Co-60 source buried in the grounds of the KSFH. This buried orphaned radioactive source is most likely one or more Co-60 teletherapy sources used at the hospital before Cambodian civil war (1975-1979). The KSFH dates to around 1960s when the Soviet Union was actively providing development assistance and technical cooperation in South East Asia, including building radiotherapy facilities and supplying radioactive sources which at that time were referred to as cobalt "bombs" for cancer treatment. The Gamma radiation dose rate and surface contamination surveys of the buried source site have been conducted with and without the concrete block shielding in place. When the CerroBend and concrete shielding was removed high radiation levels were measured, up to a maximum of 60 mSv/h at a few centimeters above the ground surface near the hot-spot.[23]

Another case is that the existing of radioactive source was reported to be stolen and then abandoned in Kampong Chhnang province, was informed to the local competent authority by local people. The EU and IAEA expert team had controlled the source with low activity Co-60 and kept in safe place.

Cobalt-60 emits strong gamma rays and poses a significant threat of radiation sickness and skin burns in the short term and causes cancer of the liver, kidneys and bones, according to the U.S. Centers for Disease Control and Prevention.[24]

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[23] Andrew Popp, Cris Ardouin, Mark Alexander, Robert Blackley, and Allan Murray, Improvement of a high risk category source buried in the grounds of a hospital in Cambodia, Australian Nuclear Science and Technology Organisation, Locked Bag 2001, Kirrawee DC, NSW, 2232, Australia. Available from: http://www.ansto.gov.au/__data/assets/pdf_file/0010/62866/IRPA2012_-Cambodia_Buried_Source.pdf [2015, September 25].

[24] NBC News, Available from: http://www.nbcnews.com/news/other/six-released-mexican-hospital-detained-_theft-cobalt-60-f2D11707085 [2015, September 12].

4.1.3. National Competent Authority

The government of Cambodia has developed standard operating procedures (SOPs) for the detection of radioactive material at borders to guide the operations of customs officials with law enforcement and transport operators. The workshop targeting on dissemination of the SOPs is periodically run by the secretariat of NCTC. The government is also involved in other awareness raising initiatives with regard to illicit trafficking of CBRN materials with the support of the IAEA, EU and US government. The secretariat of NCTC is very active in assembling the skills and resources to improve detection capabilities in the country. In this respect, Cambodia hosted some regional meetings on this subject.

The national competent authority (SNCTC) has received the radiation detection equipment and relevant training for the sea port of Sihanouk Ville through the US Megaport initiative program by installing 6 radiation portal monitors (RPM). Further agreement has been reached with the EU's Joint Research Centres (JRC) to provide RPM to cover Phnom Penh's port with the customs officers who have already been trained at the JRC Centre in Europe. Cambodian international airports in Phnom Penh and Siam Reap will be fully equipped with radioactive detection handheld equipment provided through cooperation with the US DOE, US DOD and EU JRC; for further assistance, they have been requested to install portal monitors at several land checkpoints to improve detection of illicit RN materials.

Under the SNCTC, the CBRNE Unit is the first responder team to respond for all radiological emergencies and under NACW, the CBRN national expert team was established and has started working among national competent authorities' experts. The newly formed unit and team will need to be fitted with the necessary tools and equipment and will mostly be manned from the military. Part of the tasks of the unit and team

will include intervention in emergency and rescue operations and they will be equipped with devices allowing the detection of radiation. The human resource has been developed through training on survey methods for recovering radioactive sources being used in Cambodia. This training has been provided by the IAEA, EU JRC and the US National Nuclear Security Administration (NNSA).

4.1.4. Facility Security

The existing of radioactive sources present in Cambodia are being used in industrial, medical and agricultural applications. The safety and security of these radioactive sources is managed with IAEA technical assistance. The safety and security measures are in place for all operational sources at the hospital and additional measures have been planned in cooperation with the IAEA for the new large sources which will go into operation in the near future. Furthermore, physical protection upgrades have been put in place for a disused sources found on the premises.

In some provinces, with mining exploration activities, the radioactive materials have not been properly accounted for with relevant quantities of radioactive waste emanating from mining activities. In general, the disposal of radioactive waste remains a key challenge for Cambodia. Currently, there is no storage facility for disused sources. Therefore, national competent authorities are working on this developing adequate institutional responses to these issues including changes to legislation and regulations. In addition, the strengthening capabilities from the national competent authorities are required to address the challenges.

The physical protection upgrades for high activity radioactive sources in use were implemented at the KSFH. The US DOE GTRI program provided physical protection upgrades to the KDFH in 2008, where one Category I Co-60 source for teletherapy and five Category IV Cs-137 sources for brachytherapy are in use.

The security of facilities containing sealed sources has been questioned by both MME and MoH investigation. The security of these sources typically contained in medical, industrial, agriculture or research facilities have been found to vary widely, from extensive security measures to unlocked and unprotected. The private security is responsible for protecting this material with trainings. The private security industry has been beset by low pay, low or no standards, and little or no training. The physical security of radioactive materials at hospitals has been identified with particularly troublesome news.

The licensing and inspection system of these sources has been criticized as being susceptible to fraud. Certain radioactive isotopes such as cobalt-60(Co-60), cesium-137(Cs-137), iridium-192 (Ir-192) and americium 241(Am-241) pose a greater risk since they have properties which make them attractive to use by terrorists in a dirty bomb.

Thus, the national competent authority has to increase security of sealed sources of quantities of concerns. These security orders are not public information. The orders instructed licensees to install additional physical barriers, enhance coordination with law enforcement agencies, and create more restrictive site access controls.

4.1.5. Offences and Penalties

The Cambodian law on the prohibition of chemical, biological, radiological and nuclear weapons has the objective to absolutely prohibit the production, processing, acquisition, transfer, stockpiling, transportation and use of chemical, nuclear, biological and radiological weapons and chemical substances which are involved in the production of such weapons in the Kingdom of Cambodia (Chapter 1, Article 1). The purpose of this Law is to ensure security and public order, protection of environment and well-being of people as well as to contribute to the protection of security

and peace in the region and the world (Chapter 1, Article 2). For offences and penalties in the chapter 11 of this law said:

- Any person who intentionally produces, processes, acquires, transfers,

stockpiles, transports or uses of chemical, nuclear, biological and radiological weapons shall be punished from twenty (20) years to thirty (30) years or life imprisonment (**Article 26**).

- Any person who produces, processes, acquires, transfers, stockpiles,

transports or uses chemical substances for producing chemical, nuclear, biological and radiological weapons shall be punished from five (5) years to ten (10) years imprisonment (**Article 27**).

- Any person who produces, buys, sells, possesses, processes,

acquires, transfer, stockpiles, transports or uses chemical substance intended for use in the fields of health, industry, mine, energy, agriculture, research and other peaceful purposes without written permission from the competent ministry or institution shall be fined in cash from twenty million (20,000,000) Riels to fifty million (50,000,000) Riels (**Article 28**).

- Any person who publicizes the data of chemical, nuclear, Biological

and radiological weapons without permission from the competent ministries or institutions shall be punished from three (3) years to five (5) years imprisonment (**Article 29)**.

- Any legal entity who is found intentionally committing offences against this law if such legal entity allowed for or agreed directly or indirectly to the conduct of those offences and if that legal entity had been punished for the offences against this law, the court shall define a fine in cash instead of the period of imprisonment as hereunder:

  - The penalty in cash for the legal entity is two million

(2,000,000) Riels for the period of twelve (12) months imprisonment which the court will impose on that legal entity if that legal entity is a natural person.

- In addition to the penalty in cash, the court shall add any of the punishments as hereunder:

  A. Dissolution of that legal entity,

  B. Imposition of court supervision. **(Article 30)**

4.1.6. Conclusion

The research suggests a need to establish public private partnership (PPP) in the radiation industry, government regulators, and our local public safety community. This will help to protect and prevent the country from potential terrorist uses of radiological and nuclear materials. Moreover, the research study suggests the development and shared intelligence on preventing terrorists from acquiring this material. The controls which are mandated for the licensees, and not the local law enforcement agencies, create an opportunity to create a new network for radiation security in cities or in country.

4.2. Results from Primary Data Analysis

This section illustrates findings from semi-structure interviews with key government officials from related institutions in Cambodia.

Most of interviewees believe Cambodia has a range of capabilities for preventing and combating CBRN risk-mitigation. Notably, several national authorities have pertinent expertise and resources, and a number of relevant national legislations have been enacted. However, lack of comprehensive and strong nuclear law for nuclear security remains challenging tasks and need to be strengthened. Cambodia seeks a greater emphasis on prevention and awareness-raising in its risk-mitigation approach. Basically, Cambodia requires more effective response and capacity to improve nuclear security situations. The national capacities are

already in place. The main significant risks of theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances, improper disposal or inadvertent public exposure to radioactive material waste or orphaned source which may arise from the identified vulnerabilities coupling with insufficient legislation on the management of hazardous waste, and with the absence of a repository for disused radioactive sources can be observed. But Cambodia will adopt nuclear law that will address safety, security & safeguards, waste management, transport, import & export and eventual plans for nuclear power, and a research reactor. In addition, a number of interviewees pointed out that the responsibilities for handling and managing radioactive substances during their lifecycle are not always clearly defined. These might cause further vulnerability leading to the same type of risk for radioactive materials in active usage.

Several interviewees identified that the MME and MoH of Cambodia are separately responsible for licensing radioactive sources according to intended use. So far, there is no clear overarching authority exists yet, but it will be established by the national nuclear law which is in the process of being finalized. A joint action between the MME and MoH is expected to establish a regulatory body following the promulgation of the new law. In addition, one interviewee said the MME will soon draft a nuclear safety regulation following the templates/guidelines of the IAEA nuclear security series and will organize a safeguards team in the near future. The MME has previously obtained the assistance of the IAEA in drafting the national nuclear law.

The government has developed Standard Operating Procedures (SOPs) for the detection of radioactive materials at borders that guide the operations of customs officials, law enforcement and transport operators. The workshops targeting the dissemination of the SOPs is periodically run

by the SNCTC. The SNCTC is also involved in other awareness raising initiatives with regard to illicit trafficking of CBRN materials with the support from the US DOE and EU. SNCTC is active in assembling skills and resources to improve detection capabilities in the country. Cambodia also plans to install further equipment at several land checkpoints to improve detection of illicit radioactive and nuclear materials.

Though most interviewees believe Cambodia is not a target for terrorism that can use dirty bomb to attack in the city, Cambodia joints the peaceful use of nuclear energy and enhances global efforts to combat nuclear terrorism. The country recognizes the importance of developing an integrated and comprehensive approach to mitigate CBRN risks. For example, the national competent authority has been working with international partners to coordinate efforts to reduce such dangers concerning terrorist attack/threat by using nuclear or radioactive materials. As a result, the present NAP sets out national priorities for enhancing CBRN risk-mitigation within Cambodia, furthering the objectives of international initiatives such as UNSCR 1540 and UNSCR 1373 which have been developed in accordance with a prevention, detection, preparedness and response framework. NAP covers wide range of CBRN activities and is tailored to addressing all CBRN hazards – whether natural, accidental or criminal in origin – of greatest relevance to the country. As a result, the NAP is fully in line with such initiatives as the INSSP of the IAEA. The activities of the committee were established in pursuant to UNSCR 1540, the World Health Organization Protocol for assessing national surveillance and response capacities for the International Health Regulations, as well as work by INTERPOL and the World Customs Organization (WCO).

One interviewee highlighted that national competent authority is also being used to lead various initiatives on engagement for nuclear

security (also CBRN safety and security) in country. While this may overlap with the aspirations of some of the institutions, it is clear that the strong IAEA, EU and US support is being provided to the new governmental institution to design enhancing nuclear security expertise and to create sustainable security frameworks that the country itself owns and operates.

It became apparent from the interviews that, from the government policy and program level, a number of attempts are being made to enhance collaboration and coordination between the various national competent authorities in recognition of concerns about the upcoming national nuclear law.

Theses interviewees also provided further suggestions as below:

- Information sharing on respective activities in the country should be improved.

- Proactive and constructive exchanges of opinions on how to enhance nuclear security should be encouraged.

- Understanding of best practices in nuclear security should be promoted in the country.

- Cooperation among government institutions to achieve nuclear security goals should be enhanced.

- Respective initiatives in accordance with each national competent authority to achieve the best results in enhancing nuclear security infrastructure in Cambodia should be well coordinated.

4.3. Major Findings

Major findings from this study are illustrated below:

Formulate guidance for the nuclear security policy in the context of counterterrorism

Finding 1: Cambodia needs strongly for human resource development (HRD) in nuclear security. This need has been emphasized by Cambodian

government entities to establish sustainable national nuclear security infrastructure as soon as possible to prevent such acts and to protect society from radiological or nuclear terrorism.

Finding 2: Cambodia is establishing formal governmental organization and measures for managing the national nuclear security regime by:

- Designating national competent authorities and clearly identify and define national nuclear security responsibilities.

- The MME through Department of Energy Technique and Nuclear Science is a national focal point for peaceful uses of nuclear energy and promotes nuclear technology and applications. The functions of the MME include: drafting Cambodia's Nuclear Law, preparing policies and planning for the nuclear energy/peaceful uses of nuclear application, coordinating with national and international institutions for development of policy, strategy and planning for radioactive sources, and facilitating ratification of relevant international legal instruments.

- The National Authority for the Prohibition of Chemical, Nuclear, Biological and Radioactive Weapons or the National Authority for the Prohibition of Chemical Weapons (NACW) was established in 2006. NACW's main functions include: prepare policies, strategies, NAP to control and non-proliferation of chemical, nuclear, biological and radiological weapons; cooperate with national and international organizations or other states for implementing relevant conventions and international agreements; coordinate with relevant authorities to prevent import/export of related CBRN weapons and materials; and enforce implementation of national laws, conventions and international agreements.

- The National Counter-Terrorism Committee, with its Secretariat (SNCTC), established in 2008 has the following functions: preventing and combating illicit trafficking, importing and exporting of nuclear and other

radioactive material; works with customs to set up RPMs program at international airports, ports and international gates. The SNCTC involved in the establishment of a central storage facility for radioactive materials that are not in use, orphan sources and seized materials; acts as first responder; cooperates with National Committee for Disaster Management and other relevant ministries and institutions for responding to nuclear accidents and radiological emergencies.

- The Ministry of Environment (MOE) has responsibilities for the management of hazardous wastes, including radioactive waste management. The MOE approves the export of radioactive waste (jointly with the Ministry of Commerce) in accordance with Article 20 of Sub-Decree No. 36 on Solid Waste Management (1999).

- The National CBRN Team established in 2011 under the NACW Composed of representatives from various Ministries and other national competent authorities to strengthen CBRN safety and security, and has the following functions: evaluates CBRN needs and organizes CBRN incident response exercises; coordinates and cooperates with national and international institutions to prevent CBRN misuse, strengthens communication and cooperation with CBRN Centres of Excellence.

- The Ministry of Health (MOH) is responsible for the operation of public hospitals using radioactive sources and radioactive materials.

- The General Department of Customs and Excise under the Ministry

of Economy and Finance is responsible for the supervision and control of customs services in ports, airports, border areas. The General Department of Customs and Excise inspects goods and opens packages and containers, taking samples for examination. It also has the authority to inspect private residences and business to gather evidence or seize goods.

- The National Police (under the Ministry of Interior) has the primary

responsibility for the investigation and prosecution of offenders who breach terrorism and/or criminal laws.

- Ministry of Water Resources and Meteorology is the user and is responsible for the operation of equipment and laboratory with nuclear technology.

- Ministry of Agriculture, Forestry, and Fisheries is the user and is responsible for the operating of equipment and laboratory with nuclear technology.

Finding 3: Cambodia has completed and maintained a national registry of radioactive sources and other radioactive materials by:

- Establishing procedures for registering and updating information for the inventory of radioactive sources and radioactive material with a technical working group comprising of representatives from relevant governmental agencies. The procedures were established in 2009 by the Former Minister of Industry, Mines and Energy to prepare a national inventory of radioactive sources and radioactive materials, but unfortunately the working group has not been active.

- Maintaining a current register/inventory of categorized radioactive sources and other radioactive materials:
  - The Ministry of Health maintains a list of all radioactive sources in use for medical purposes.
  - A Co-60 teletherapy unit that was in use at the Calmette Hospital before 1975 appears to have been unaccounted for.
  - An uncontrolled source was located near the oncology department at the KSFH during routine radiological survey by hospital staff in 2005 by IAEA and ANSTO.

- The office of safety, security and safeguards under MME is managing the equipment and works related to this action.
- The point of contact list which comprises of the members from various ministries has been established.

Recommend the scenario of threat and risk from the likelihood

Finding 4: According to an opinion from an interviewee who is the member of national CBRN team, Cambodia is not target for terror uses of RDD or IND attack in the city or in the country, but the CBRNE special force for counterterrorism was created under the secretariat of NCTC, who is the first responder against terrorist acts.

Finding 5: Cambodia established a national response system for responding to a criminal act, or an unauthorized act, with nuclear security implications involving nuclear or other radioactive material that is out of regulatory control:

- The NACW has currently developed a NAP related to nuclear security

assessment and response to nuclear security events. The NAP includes relevant agencies that have responsibilities as first responders to CBRN safety and security event. NACW consists of the Ministry of Defense and 17 other national institutions, many of them having established responsibilities through the draft NAP related to nuclear security events.

- The NAP related to response to nuclear security events has a mandate to

coordinate response procedures established by the National Committee for Disaster Management.

Provide recommendations to policy makers on additional laws

Finding 6: Cambodia has no regulatory body yet concerning nuclear security policy but the country has signed a number of international agreements related to nuclear security and counterterrorism acts.

Finding 7: A regulatory body will possibly be established by following the promulgation of Cambodia's Nuclear Law that is currently being finalized the draft and this law will be presented to the parliament before the end of 2015. The law will address safety, security & safeguards, waste management, transport, import & export and eventual plans for nuclear power, and a research reactor.

Finding 8: The present NAP sets out national priorities for enhancing CBRN risk mitigation within Cambodia, while furthering the objectives of international initiatives such as UNSCR1540 and 1373.

CHAPTER 5
CONCLUSION AND RECOMMENDATIONS

5.1. Conclusions

Formulate guidance for the nuclear security policy in the context of counterterrorism

Cambodia has its own procedures for legislative development, which is consistent with its own legal system, structures and practices based on the social, political, economic and cultural values. However, the technical aspects of nuclear security pose unique issues and as discussed elsewhere, the national law on nuclear security policy will need to comply with a range of international instruments and IAEA guidance documents. A harmonized and consistent approach with international practice will be very important for securing assistance and cooperation in addressing nuclear security policy issues and for combating nuclear security threats, including terrorism acts. Therefore, a well-ordered process for developing national legislation in this field can enhance and expedite this very complex task.

Ultimately, the responsibility for the final draft of a robust national nuclear law lies entirely with Cambodian national competent authorities. The safety, security and safeguards of any nuclear and other radioactive materials, nuclear facilities and facilities involved with the management of radioactive sources can be ensured within jurisdiction. The main national competent authorities should aim to establish a nuclear law which is in line with national processes as soon as possible. Additionally, the implementation of the international legal instruments such as IAEA NSS will necessarily involve a wide range of national stakeholders, including government agencies, industry, research institutions and universities, medical centers, etc. In other words, the NAP has been prepared by the

National CBRN Team of Cambodia, combining the views of key national authorities and stakeholders, and expresses the strategic priorities of the country. It has been compiled in consultation with UNICRI within the framework of the EU CBRN CoE initiative over a series of workshops hosted by the MME, SNCTC and National CBRN Team and attended by IAEA, OPCW, EU, DOE and UNICRI experts. As nuclear security infrastructure becomes a widely recognized tool in efforts to bolster nuclear security, it is imperative to introduce user-friendly, universal methods for assessing it. This can be a daunting challenge because intangible human characteristics like beliefs, attitudes and values comprise a culture. The methodology proposed here involves large numbers of staffs of national competent authorities and need more technical and instrumental training, and capacity building with international organization/agency such as IAEA, U.S. DOE, E.U. JRC, UNICRI and CBRN CoE etc. A clear process for addressing disputes should be included in nuclear security legislation as well. The process should include internal procedures to be used by responsible organizations as primarily the regulatory body and among government agencies. The law should clarify how they are to be handled and how continuing activities are to be managed.

Cambodia is responsible for establishing, implementing and sustaining its national nuclear security infrastructure for undertaking or proposing to undertake activities involving nuclear material and other radioactive material. Associated facilities and activities should establish or improve its nuclear security infrastructure in order that it can ensure the protection of people, society and the environment from any adverse consequence that may arise from a nuclear security event. Nuclear security is very important for many different stakeholders within the state, including the government, law enforcement agencies, security and intelligence agencies, border control and customs agencies, health

authorities, first responders to emergencies and crises, nuclear regulatory bodies, authorized parties who store, possess, transport or deal with nuclear and other radioactive material, authorized parties who operate radiation facilities or nuclear facilities, and communities and the public in general.

Recommend the scenario of threat and risk from the likelihood

The roles and responsibilities of the competent authorities should be identified early in the planning stages for the establishment of the state's nuclear security infrastructure. Cambodia should ensure proper coordination of and communication and cooperation between the competent authorities in relation to their respective roles and responsibilities and to perform information exchange on a secure basis with some mechanisms that may be used: interagency agreements, memoranda of understanding, and policies and procedures. To ensure the on-going effectiveness of any implementing mechanism, parties to these should regularly review, update and adjust them as appropriate and as circumstances change. Any weakness in nuclear security undermines all of nuclear security and provides an opportunity for those who would exploit weaknesses to cause harm.

If Cambodia becomes a newcomer in nuclear power programs, the nuclear security infrastructure needs to be established as early as possible by ensuring that the legal and regulatory framework and the role and responsibilities of the competent authorities are appropriately defined. The interfaces between safety and security have to be considered at all levels of the nuclear power program, so that each strength compromise with others. An effective nuclear security infrastructure requires: an understanding of and adherence to the relevant international legal instruments, a legal and regulatory framework with clearly defined responsibilities among all of the key parties within the state, development of human resources to include

education and training, establishment of procedures and coordination functions, and technical support for national infrastructures.

IAEA assistance to states on nuclear security infrastructure addresses this multidisciplinary approach through: the capacity building, the development and dissemination of key guidance on nuclear security to support adherence to key international legal instruments and to encourage best international practice in nuclear security among states and this includes: nuclear security fundamentals, recommendations, implementing guides, and technical guidance.

Overall, the security of nuclear materials, other radioactive materials and associated activities and facilities has been taken on heightened significance because of threats posed by international terrorism and organized crime.

Provide recommendations to policy makers on additional laws

A nuclear security infrastructure is part of a global framework of nuclear security and it relies upon key international legal instruments that relate to nuclear security. At the national level it requires states to ensure that appropriate policies, laws and regulations are in place, that national competent authorities should know their roles and responsibilities, and that nuclear security systems for prevention, detection and response are designed and implemented, maintained and sustained. A national nuclear security infrastructure comprises:

- National policy and strategy for nuclear security, including consideration of a national threat and risk assessment that takes account of possible criminal or intentional unauthorized acts involving or directed at nuclear materials, other radioactive materials, associated facilities and associated activities
- National legislation defining the roles and responsibilities of all authorities and organizations involved in nuclear security

- A regulatory framework for authorizing nuclear security systems and measures and for undertaking inspection and enforcement activities in relation to nuclear security
- Systems and measures, both technical and administrative, for preventing, detecting and responding to nuclear security events; including measures taken by customs and border authorities.

Other relevant legislations includes: Law on Punishment of Terrorism (1992), Law on Management and Control of Weapons, Explosives and Ammunitions (2005), Law on Counter-Terrorism (2007), Law on the Prohibition of Chemical, Nuclear, Biological, and Radioactive Weapons (2009), Customs Law, Sub-decree on Prohibited and Restricted Goods No. 209, Sub-decree on the establishment and functions of the Customs and Excise Department (CED). The Law on Counter-Terrorism criminalizes certain conduct as required by the counterterrorism international conventions, including the CPPNM and the Nuclear Terrorism Convention.

5.2. Recommendation of Measures for National Competent Authorities Action

This section presents the distinct sets of recommendations for national competent authorities action, about strategies and the other tactical measures with the scenario of threat and risk from the likelihood that nuclear or other radioactive materials could be used for malicious purposes (criminals or terrorists) such IND or RDD attack within Cambodia territory by following the IAEA Nuclear Security Series. The framework for establishing and implementing its national nuclear security infrastructure will be based on an appropriate legal framework with clearly defined role and responsibilities for all the national competent authorities, and additional laws on nuclear security will be written according to IAEA

Nuclear Security Series to Cambodian authorities for decision making options regarding nuclear security policies.

Firstly, Cambodia should implement as soon as possible the nuclear security systems and measures for nuclear and other radioactive materials out of regulatory control to prevent, detect and respond to nuclear security event, prevention measures include criminalization of acts as well as protection of sensitive information, trustworthiness checks and promotion of robust nuclear security infrastructure. Detection measures include detection by instrument alarm as well as information alerts. Response to a nuclear security event may include the need for radiological criminal scene management and the support of nuclear forensics (a discipline of forensic science) to support an investigation and eventual prosecution of a criminal offence (where under criminal or penal code of terrorism laws of Cambodia).

Secondly, this study explores a range of tactical measures for national coordination mechanism, training, and exercise an outreach. National competent authorities should produce strategies to help improve the human resource development for nuclear security and cooperation with national, regional and international institutions.

Both sets of recommendations, if implemented, will improve nuclear security infrastructure at all levels of government and will enable each national competent authority to respond more effectively with national legal and regulatory frameworks and will minimize the consequences of misuse of radioactive and nuclear materials within the country.

5.2.1. General Information

Based on the risk identification in the previous chapter, and as recommended by the IAEA guidance from IAEA nuclear security series, and the capacities and gaps analyzed above, the following recommendations are made to strengthen the national capacity of

Cambodia to prevent and counteract radioactive and nuclear risks (numbered from highest (1) to lowest priority):

Prevention

1. Strengthen the regulatory regime of radioactive sources by completing the relevant legislation and ensuring the regulatory authority operates according to IAEA international standards.
2. Ensure that the registry of radioactive sources is up to dated.
3. Enhance mechanisms for disposal of radioactive sources including building a national repository for spent sources.
4. Complete the legal/regulatory framework for waste management to explicitly include provisions for radioactive waste.
5. Enhance controls on imports of dual use materials and establish a control list of dual use materials for import and export.

Detection

1. Enhance detection capabilities at international airports and borders including the installation of radiation portal monitors (RPMs) where appropriate.
2. Improve the detection capabilities of law enforcement and other units or teams involved in interdiction of illicit trafficking.
3. Improve detection capabilities at disposal sites.

Preparedness and response

1. Raise government agencies, private sector and public awareness on radiological and nuclear risks and benefits.
2. Enhance response capacity for all types of radiological and nuclear events:

- Response plans (with clear allocation of responsibilities)
- Training and human resources:

a. Training for professional group.

b. Training for rapid response teams to identify radioactive source, type of contaminant, etc.

- Knowledge for using and handing equipment properly.

3. Conduct exercises on the basis of SOPs, covering all aspects– prevention, preparedness and response, recovery, interagency cooperation – of outbreak events.

4. Establish information sharing and communication mechanism at the administrative level: NACW, MoH, MME, MoC, MoAFF, other relevant agencies/ ministries/actors; and national focal points, phone numbers, etc

5. Develop a nuclear forensics program and related capacity building.

5.2.2. Legislative and Regulatory Framework

Establish a Legislative and Regulatory Framework for Nuclear Security

Cambodia should regularly reviews existing laws to determine where provisions specifically related to nuclear security issues (e.g. physical protection, illicit trafficking, import-export, border control, waste management, transportation, penalties, criminal offenses, etc.). This can be added or amended, taking into account international legal instruments, and recommendations of IAEA guidelines: A draft comprehensive national nuclear law being finalized with the IAEA Office of Legal Advisor (OLA) should adapt as soon as possible because this law will address safety, security and safeguards, waste management, transport, import and export and eventual plans for nuclear power, and a research reactor.

Cambodia should conduct, upon request and as needed, advisory/ familiarization missions to enhance senior level of governmental officials' and legislators' knowledge and understanding of international instruments that constitute the international legal framework for nuclear security:

- An International Team of Experts (ITE) mission to promote states'

adherence to, and implementation of, international agreements, guidelines and recommendation regarding to the prevention of terrorist acts, involving nuclear and radioactive materials, which have been negotiated under the auspices of the IAEA, was completed in April 2005.

- A Radiation Safety and Security of Radioactive Sources Infrastructure Appraisal (RaSSIA) mission to assist in reviewing relevant aspects for radiation safety and control of sources, was completed in 2004. The mission also addressed aspects of the legislative and regulatory framework for the safety and security of radioactive sources.

- An advisory mission regarding the regulatory infrastructure for radiation safety and security of radioactive sources to assist in reviewing relevant aspects for radiation safety and control of sources was completed in May 2010. The mission also addressed the legislative and regulatory framework for the safety and security of radioactive sources.

Implement regulation and law enforcement systems with provisions for nuclear security

A clear single regulatory system for the authorization or licensing of operating entities (e.g. industries, hospitals, ports using radioactive sources) that have responsibilities for the security of radioactive material has not yet been established. The system is only specified in the provision of the draft Cambodia's nuclear law, including import and export requirements for nuclear and other radioactive materials in authorization processes, and provisions for transport of nuclear and other radioactive material in regulatory requirements. Thus, grant license or authorization only when such activities comply with physical protection regulations, requirements, associated procedures, and law enforcement systems.

Establish verification and enforcement measures to ensure compliance with applicable laws, regulations and requirements, including the imposition of appropriate and effective sanctions:

- A regulatory body for the safety or security of nuclear material and/or other radioactive material to undertake enforcement and inspection activities has not yet been established.
- Such enforcement and verification measures should be enshrined in the comprehensive nuclear law and in relevant regulations.

Identify and assess nuclear security threats and identify targets

Conduct an evaluation of internal and external threats to Cambodia in order to identify and assess those threats specifically related to nuclear security, including their credibility, regardless of whether the targets of the internal nuclear security threats are within or outside the jurisdiction of Cambodia. This assessment should identify strategic locations and materials in transport and evaluate the threat of criminal acts and unauthorized acts, with nuclear security implications involving nuclear or other radioactive material out of regulatory control. And Cambodia should establish the threat assessment in place as soon as possible.

Based on the threat, define the threat statement, to determine security requirements for selected materials, facilities, or practices including transport and periodically update the threat statement as the threat changes. Cambodia is encouraged to undertake a national threat assessment taking into account nuclear and other radioactive materials. Such a national threat assessment could be integrated within the structure and methodology used for undertaking an assessment related to any other national security threats.

National competent authority should conduct, upon request and as needed, a national workshop on threat assessment to enable participants to acquire a better understanding of a step-by-step methodology and the need for an interactive process between organizations involved. Cambodia has to continue to indicate the need to organize such workshops with IAEA assistance, DOE, EU, UNICRI, JRC and other organizations to identify and assess targets, which include strategic locations, based on potential

consequences, which require protection from threats and maintain an up-to-date assessment of such targets.

Maintain and complete a national register of radioactive sources and other radioactive materials

Cambodia should establish procedures for registering and updating information for the national inventory of radioactive sources and radioactive materials:

- Cambodia has to organize national training courses on strategies to establish, develop and maintain a national inventory for the security of radioactive sources and radioactive materials as soon as possible.
- Maintain a current register/inventory of categorized radioactive sources and radioactive materials.
- The office of safety, security and safeguards under MME has to manage the equipment and works related to this action.
- The Point of Contact (POC) list which comprises of the members from various ministries has to be established.

Establish and maintain appropriate and effective physical protection measures for radioactive sources and other radioactive material in use, storage, and manufacture in order to prevent unauthorized removal and sabotage

National competent authority should review physical protection measures and security plans at relevant facilities, activities, or other locations and assess compliance with established requirements, and identify upgrades if necessary. This included review of provisions for future sustainability of installed systems such as:

- Physical protection upgrades for high-activity radioactive sources in use were implemented at the KSFH. US DOE GTRI program provided physical protection upgrades to the KSFH in 2008, where one

Category I of Co-60 source for teletherapy and five Category 4 of Cs-137 sources for brachytherapy are in use

- Physical protection upgrades for high activity disused radioactive sources were implemented at the Oncology Department of the KSFH in 2008.

Cambodia should establish/designate secure storage facility(s) with proper physical protection elements for radioactive materials not in use, sources found out of regulatory control, and seized materials. Cambodia should take measures to transfer disused sources and sources found to be out of regulatory control to a secure storage facility and seek periodically perform follow-up technical assessments to confirm the satisfactory maintenance and operation of appropriate effective physical protection measures, as necessary, IAEA or other donor support for carrying out this activity for vulnerable high activity sources.

Establish a national strategy for developing and maintaining appropriate and effective systems for detecting, deterring, preventing, and combating illicit trafficking in nuclear and other radiological materials

Cambodia should develop a national strategy for detection of a criminal act, or an unauthorized act, with nuclear security implications involving nuclear or other radioactive material that is out of regulatory control by following such national training courses for development of concept of operations and standard operating procedures for radiation detection and response at borders. It is recommended that SNCTC, customs and other involved ministries finalize the concept of operations and standard operating procedures with IAEA expert support for these purposes.

Deploy and maintain appropriate and effective monitoring and radiation detection equipment according to priorities established in the national detection strategy

Cambodia should acquire, install, and calibrate monitoring and radiation detection equipment according to priorities established in the national detection strategy. Where resource limitations exist, Cambodia should request support from IAEA or other donors for controlling import and export of radioactive and nuclear materials:

- Radiation detection equipment, including 6 RPMs, and tools for secondary inspections as well as associated trainings were acquired, installed and calibrated through US Megaport initiative project at Sihanouk Ville Autonomous Port.
- SNCTC has a range of handheld detection equipment provided by the IAEA, EU and US DOE.
- NACW also has different types of detection equipment for responding in case of CBRN incident but all equipment have to maintain and calibrate properly with CBRN experts.
- MME has detection equipment provided by the IAEA.

Establish a national response system for responding to a criminal act, or an unauthorized act, with nuclear security implications involving nuclear or other radioactive materials that is out of regulatory control

Develop a national plan to respond to incidents involving nuclear/radioactive materials, searching for materials out of regulatory control and including seizure of such materials by law enforcement authorities:

- The NAP has been developed by national CBRN team under the NACW related to nuclear security assessment and first response to nuclear security events. The plan includes relevant agencies that have responsibilities as first responders to a nuclear security event. NACW consists of the Ministry of National Defense and 17 other national institutions, many of them having established responsibilities through the

drafted NAP related to not only nuclear security events but also CBRN security issues

- The NAP related to response to nuclear security events is coordinated with the response procedures established by the National Committee for Disaster Management. Article 10 of the 2006 Sub-Decree on Organizing and Implementing of General Secretariat of NACW (2006) provides that one role of the Department of Chemical Substance Control is to "make plan and prepare project on the salvation activities and clear up toxin caused by chemical, nuclear, biological substances and radioactivity in the case if the event happened in Cambodia"
- Cambodia needs strongly periodical exercise, test, and plans effective evacuation by relevant competent authorities and authorized persons with the aim of ensuring timely and effective implementation of a comprehensive response plan
- Cambodia has to respond to some training activities and exercises to nuclear security events that have been conducted, including training on the use of instruments for response activities.

Develop a national nuclear security human resources development (HRD) programme

Cambodia need to perform a training/education needs analysis (TENA), involving all nuclear security stakeholders in the country: appointing the national focal points in each institution; arrange for regular meetings to be able to perform a comprehensive training needs analysis in the country; and request IAEA, DOE, EU, UNICRI for assistance to perform TENA, if needed. Cambodia is encouraged to follow a comprehensive and structured approach to the training in nuclear security and to perform a TENA involving all nuclear security stakeholders in the country and develop a nuclear security HRD program tailored to the country's needs, based on the findings of the TENA.

Identify necessary resources (infrastructure and human resources) that can be used immediately or need to be recruited/developed. MME has been working with the IAEA and other ministries to build human resources capacity:

- SNCTC has been working with the IAEA, US DOE, DOD, EU and other national competent authorities such as customs to improve nuclear security in the country
- CBRN Team has been working with the EU UNICRI, JRC, CBRN CoE, CTBTO, Interpol, WCO and other national competent authority to improve nuclear security in the country and in the region
- Qualified instructors need to be trained and developed.

Establish and maintain a nuclear security culture

Regarding the control of material useable for “dirty bombs”, further efforts need to be made to cooperatively implement the Code of Conduct on the Safety and Security of Radioactive Sources, with assistance to Cambodia in updating legislation and licensing practice, promoting awareness among users, and generally achieving a safety and security culture.

Cambodia need to develop national requirements which define national information security program to provide the guidance, technical expertise and outreach in supporting Cambodia in developing a comprehensive and resilient computer and information security program. Further, it assists government in preventing computer acts that could directly or indirectly lead to: unauthorized removal of nuclear/other radioactive materials; sabotage against nuclear materials or of nuclear facilities; theft of nuclear sensitive information, and related information technology systems and provide training in the area of information security related to nuclear and other radioactive materials. Cambodia should participate in the international conference on computer security for:

1. Enhancing response capacity in case of criminal/terrorist attacks, accidents and natural disasters, including:
   - Defining national response plans with clear identification of responsibilities.
   - Providing training and human resources development to the responsible units.
   - Procuring adequate equipment to the competent authority for immediate national response.

2. Enhancing capability of CBRNE Unit and developing the national CBRN expert team (training and equipment) in line with relevant agencies.
   - Enhancing the response capabilities of the CBRE Unit through additional training and equipment.
   - Developing overarching SOPs for CBRN incidents (no matter what their origin).

3. Strengthen the National CBRN Team.

4. Performing awareness raising and education (starting with schools) on different aspects of CBRN substances (including for public and businesses).

5. Developing technical capacity and guidelines including provision of adequate and proper equipment.

6. Strengthening legislation on improper disposal of CBRN waste.

7. Establishing EOC – Emergency Operation Centre (command and control).

5.2.3. IAEA Nuclear Security Series

Nuclear security issues are addressed in the IAEA Nuclear Security Series (NSS) publications. The publications are consistent with and complementary to the international nuclear security instruments such as the CPPNM and its amendment, the supplementary guidance on the import

and export of radioactive sources, the code of conduct on the safety and security of radioactive sources, UNSCR 1373 and 1540 and the International Convention for the Suppression of Acts of Nuclear Terrorism.

The Categories in the IAEA Nuclear Security Series

The publications in the IAEA Nuclear Security Series are issued in the following categories:

a) **Nuclear Security Fundamentals (NSS 20):** Specify the objective of a state's nuclear security regime and the essential elements of such a regime. These provide the basis for the Nuclear Security Recommendations.

b) **Nuclear Security Recommendations (NSS 13, 14, and 15):** The publications set out measures that states should take to achieve and maintain an effective national nuclear security regime consistent with the Fundamentals. With these recommendations, it consists of:
   - NSS13 Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities;
   - NSS14 Nuclear Security Recommendations on Radioactive Material and Associated Facilities; and
   - NSS15 Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control.

c) **Implementing Guides (**NSS 7-11, 18-19, 21-22G**):** provide guidance on means by which states could implement the measures set out in the Recommendations. As such, they focus on how to meet the Recommendations related to broad areas of nuclear security infrastructure for a nuclear power program.

d) **Technical Guidance (NSS 1-6, 16-17):** publications provide guidance on specific technical subjects to supplement the guidance

set out in Implementing Guides. As such, they focus on details of how to carry out the necessary measures.[25]

5.3. Recommendation for Future Research

Further research is recommended in the following areas:

a) Measure the effectiveness of the implemented collaborative strategy for Cambodian nuclear law after it becomes national nuclear law

b) The effectiveness of nuclear security policy could be measured through national competent authorities with their roles and responsibilities after this studies could be conducted

c) Survey of nuclear security and facility personnel using nuclear materials and radioactive sources could be conducted as a measure of the security policy on raising situational awareness

d) Create and analyze intelligence sharing protocols among public and private partners. This analysis should address the continuing dilemma of the "need to know" versus the "need to share," and potential restrictions on sharing intelligence with private partners as well as the impact on security of nuclear or radioactive materials

e) There are similarities between security in the radiological and chemical industries. So future research on expanding the increasing security for chemical/biological safety and security management is very important

f) Another potential area of future research might involve conducting awareness training and workshops of risk-assessment's knowledge of nuclear materials and radioactive sources as this research did

g) Another intriguing area of study this research only rudimentarily addressed is basically on nuclear security infrastructure.

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APPENDIX A

Guide for In-Depth Interview

Date: ...../...../.....

Guide for In-Depth Interview

CONTACT PERSON

Name: ……

Position: ……

Telephone: (Office)…… (Mobile) ……

E-mail: ……

Organization: ……

……

Department: ……

……

	A. General Information	Answer/Comments
1	Do Cambodian people have knowledge about the danger of radioactive sources? តើប្រជាជនកម្ពុជាមានការយល់ដឹងទាក់ទងនឹងគ្រោះថ្នាក់ដោយសារប្រភពសារធាតុវិទ្យុសកម្មដែរឬទេ?	
2	What activities have been done to promote knowledge among Cambodian people regarding the danger of radioactive materials? តើមានសម្ភាពអ្វីខ្លះដែលស្ថាប័នលោកបានធ្វើ ដើម្បីលើកកម្ពស់ការយល់ដឹងដល់ប្រជាពលរដ្ឋកម្ពុជាទាក់ទងនឹងគ្រោះថ្នាក់ដោយសារសម្ភារៈដែលមានសារធាតុវិទ្យុសកម្ម?	
3	What types of radioactive sources are being used in Cambodia? តើមានប្រភពសារធាតុវិទ្យុសកម្មប្រភេទណាខ្លះដែលកំពុង ប្រើប្រាស់ក្នុងប្រទេសកម្ពុជា?	
4	Which international organizations dealing with nuclear security are working with the Cambodian government? What are they working on? Or what activities? តើមានអង្គការអន្តរជាតិណាខ្លះ ដែលធ្វើការទាក់ទងជាមួយនឹងសន្តិសុខនុយក្លេអ៊ែរដែលកំពុងធ្វើការជាមួយរាជរដ្ឋាភិបាលកម្ពុជា? ឬតើអង្គការទាំងនោះកំពុងធ្វើការអ្វីខ្លះ? តើអង្គការទាំងនោះកំពុងមានសកម្មភាពអ្វីខ្លះ?	
5	How many competent authorities are involved with nuclear security policy? តើមានអាជ្ញាធរ ឬស្ថាប័នមានសមត្ថកិច្ចណាខ្លះដែលធ្វើការជាប់ទាក់ទងទៅនឹងគោលនយោបាយសន្តិសុខនុយក្លេអ៊ែរ នៅកម្ពុជា?	
6	What types of convention concerning nuclear security policy have been ratified? Please describe? (including date) តើមានអនុសញ្ញាស្តីពីគោលនយោបាយសន្តិសុខនុយក្លេអ៊ែរណាខ្លះដែលត្រូវបានផ្តល់សច្ចាប័នដោយប្រទេសកម្ពុជា? សូមពិពណ៌នារួមទាំងកាលបរិច្ឆេទ?	

Date: ...../...../.....

7	What support does Cambodia need from international organizations concerning with nuclear security and terrorist attack? តើប្រទេសកម្ពុជាត្រូវការការគាំទ្រពីអង្គការអន្តរជាតិណាខ្លះ ដែលធ្វើការទាក់ទងជាមួយនឹងសន្តិសុខនុយក្លេអ៊ែរ និងការវាយប្រហារដោយភេរវកម្ម?	
8	In your own opinion, what are the challenges in using radioactive sources to environment and people? Please explain? តាមគំនិតលោកផ្ទាល់ តើកម្ពុជាកំពុងប្រឈមមុខទៅនឹង ការប្រើប្រាស់ប្រភពសារធាតុវិទ្យុសកម្មដែលធ្វើអោយប៉ះ ពាល់ដល់បរិស្ថាន និងប្រជាជនយ៉ាងណាដែរ? សូមធ្វើការពន្យល់?	
9	Vietnam will have nuclear power plants (NPPs) in the next 5 to 7 years; do you believe that NPPs would threat the countries in the region? ប្រទេសវៀតណាមនឹងមានរោងចក្រថាមពលនុយក្លេអ៊ែរ ក្នុងរយៈពេលពី ៥ ទៅ ៧ឆ្នាំទៀត តើលោកជឿថារោង ចក្រថាមពលនុយក្លេអ៊ែរទាំងនោះនឹងមានការគំរាមកំហែងដល់ប្រទេសក្នុងតំបន់ដែរឬទេ?	
10	In your own opinion, do you want Cambodia to build a nuclear power plant? តាមយោបល់លោក តើលោកចង់អោយមានរោងចក្រ ថាមពលនុយក្លេអ៊ែរទៅកម្ពុជាដែរឬទេ?	
	B. Legal Framework for Nuclear Security Policy **ក្របខ័ណ្ឌច្បាប់សម្រាប់នយោបាយសន្តិសុខនុយក្លេអ៊ែរ**	
1	How does Cambodia manage the radioactive materials? តើប្រទេសកម្ពុជាគ្រប់គ្រងសម្ភារដែលមានសារធាតុ វិទ្យុសកម្មយ៉ាងដូចម្តេច?	
2	How does Cambodia implement the nuclear security policy? តើប្រទេសកម្ពុជាអនុវត្តគោលនយោបាយសន្តិសុខនុយក្លេអ៊ែរយ៉ាងដូចម្តេច?	
3	What national legal frameworks related to nuclear security policy in the context of counterterrorism does Cambodia have? (Please list all existing laws) តើមានក្របខ័ណ្ឌច្បាប់ថ្នាក់ជាតិស្តីពីគោលនយោបាយសន្តិសុខ នុយក្លេអ៊ែរក្នុងបរិបទប្រឆាំងភេរវកម្មអ្វីខ្លះដែលកម្ពុជាមាន? (សូមរាយព្រ័ឈ្មោះច្បាប់ទាំងនោះ)	
4	Which main institutions in Cambodia who deal with the nuclear security? តើមានស្ថាប័នសំខាន់ៗណាខ្លះដែលធ្វើការពាក់ព័ន្ធនឹងសន្តិសុខនុយក្លេអ៊ែរ?	
5	Which Cambodian organization is responsible for the investigation of theft, sabotage or threats to sabotage or misuse of nuclear materials and for the recovery of such materials?	

Date: ...../...../.....

	តើស្ថាប័នណាដែលទទួលខុសត្រូវក្នុងការស៊ើបអង្កេតទៅ លើការលួច ការបំផ្លិចបំផ្លាញ ឬការគំរាមកំហែងលើ ការបំផ្លិចបំផ្លាញ ឬការប្រើប្រាស់ខុសគោលដៅនៃសម្ភារនុយក្លេអ៊ែរ និងការធ្វើអោយមានដំណើរការឡើងវិញ នូវសម្ភារនុយក្លេអ៊ែរទាំងនេះ?	
6	What action has the competent authorities protected on nuclear materials (or CBRN) threat or attack? តើសកម្មភាពអ្វីខ្លះដែលអាជ្ញាធរ ឬស្ថាប័នមានសមត្ថកិច្ច ការពារលើសម្ភារនុយក្លេអ៊ែរ (ឬសម្ភារ គីមី ជីវសាស្ត្រ វិទ្យុសកម្ម និងនុយក្លេអ៊ែរ) ដែលគំរាមកំហែង ឬការវាយប្រហារមកលើប្រទេសកម្ពុជា?	
7	What is the national action plan from phase I to phase III joint cooperation between competent authorities? តើអ្វីទៅជាសកម្មភាពជំនែការថ្នាក់ជាតិ ចាប់ពីដំណាក់ កាលទី១ ដល់ទី៣ ដែលអាជ្ញាធរ ឬស្ថាប័នមានសមត្ថកិច្ច ធ្វើកិច្ចសហប្រតិបត្តការជាមួយគ្នា?	
8	What is the schedule for performing phase I to phase III? តើអ្វីទៅជាគម្រោងនៃសកម្មភាពជំនែការថ្នាក់ជាតិ ពីដំណាក់កាលទី១ ដល់ទី៣?	
9	Did competent authorities conduct study at each nuclear material threat/attack by terrorist? តើអាជ្ញាធរ ឬស្ថាប័នមានសមត្ថកិច្ចបានធ្វើការសិក្សាដែរ ឬទេអំពីការគំរាមកំហែង ឬការវាយប្រហារដោយប្រើ សម្ភារនុយក្លេអ៊ែរ ដោយភេរវករនៅប្រទេសកម្ពុជា?	
10	What actions have other government agencies taken to reduce the potential for aircraft attack (transit/transshipment)? តើសកម្មភាពអ្វីខ្លះដែលរដ្ឋាភិបាលបានជ្រើសរើសយកដើម្បីកាត់បន្ថយលើសក្តានុពលក្នុងការវាយប្រហារដោយយន្ត ហោះ (សម្រាប់ការឆ្លងកាត់ និងការដ្ឋែរ សម្ភារ នុយក្លេអ៊ែរ)?	
11	Vietnam will start electricity generation from nuclear power plants in the next 5 to 7 years, what should Cambodia prepare for environmental monitoring of radioactive species? ប្រទេសវៀតណាមនឹងចាប់ផ្តើមដំណើរការរោងចក្រថាម ពលនុយក្លេអ៊ែរក្នុងរយៈពេលពី ៥ ទៅ ៧ឆ្នាំទៀត តើ កម្ពុជាគួរតែត្រៀមរៀបចំឧបករណ៍សម្រាប់ការត្រួតពិនិត្យ បរិស្ថាន អំពីជំលប៉ះពាល់ដោយប្រភេទសារធាតុវិទ្យុសកម្ម ផ្សេងៗយ៉ាងដូចម្តេច?	
12	What challenges do you feel Cambodia faces in establishing the nuclear security policy and is it reliant on external expertise to develop sustainable programmes? តើលោកយល់ថាមានអ្វីដែលជាបញ្ហាប្រឈមមុខនៅកម្ពុជាក្នុងការបង្កើតគោលនយោបាយសន្តិសុខនុយក្លេអ៊ែរ និង អ្នកជំនាញពីខាងក្រៅដើម្បីជួយគាំទ្រលើកម្មវិធីគោលនយោបាយទាំងនេះ ?	

Date: ...../...../.....

13	What recommendations do you have for future efforts on nuclear security frameworks? តើលោកមានអនុសាសន៍សម្រាប់កិច្ចខំប្រឹងប្រែងផ្សេងៗទៅថ្ងៃអនាគតទៅលើក្របខ័ណ្ឌច្បាប់សន្តិសុខនុយក្លេអ៊ែរ ទាំងនេះដែរឬទេ?	
	C. **Counterterrorism**	
1	What does terrorist mean or definition of terrorist? តើភេរវកម្មមានន័យដូចម្តេច ឬចូរអោយនិយមន័យភេរវកម្ម?	
2	Do you believe Cambodia possess the risk of potential attack by radiological dispersal device (RDD) against a major city? Who is the first responder? តើលោកជឿថាកម្ពុជាមានហានិភ័យដោយការវាយប្រហារដោយប្រើគ្រាប់បែកកែឆ្នៃដែរឬទេ? តើអង្គភាពណាជាអ្នក សង្គ្រោះបឋម?	
3	How Cambodia develop strategies to counter organized crime and its links with terrorism? តើកម្ពុជាមានយុទ្ធសាស្ត្រយ៉ាងដូចម្តេចក្នុងការត្រៀមរៀបចំដើម្បីប្រឆាំងឧក្រិតកម្មនិងភេរវកម្ម?	
4	What emergency plan does Cambodia have in case of nuclear terrorism or dirty bomb threat/attack in territory? តើកម្ពុជាមានផែនការសង្គ្រោះបន្ទាន់ដែរឬទេក្នុងករណីមាន ភេរវកម្មនុយក្លេអ៊ែរ ឬមានការប្រើប្រាស់គ្រាប់បែកបំផ្លុះ គំរាមកំហែង ឬវាយប្រហារមកលើកម្ពុជា?	
5	In your own opinion, what obstacles and threats in the implementation of the security of radioactive sources do you have? តាមយោបល់លោក តើលោកមានឧបសគ្គ និងមានការគំរាមកំហែងអ្វីខ្លះក្នុងការអនុវត្តន៍នូវសន្តិសុខរប្រភពសារ ធាតុវិទ្យុសកម្ម?	

<u>Any general comments</u> ?

Thank you very much for your help!

APPENDIX B

Nuclear Security Series No.20

IAEA NUCLEAR SECURITY SERIES No. 20

OBJECTIVE AND ESSENTIAL ELEMENTS OF A STATE'S NUCLEAR SECURITY REGIME

NUCLEAR SECURITY FUNDAMENTALS

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Marketing and Sales Unit, Publishing Section
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FOREWORD

The possibility that nuclear material or other radioactive material could be used for criminal purposes or intentionally used in an unauthorized manner cannot be ruled out in the current global situation. States have responded to this risk by engaging in a collective commitment to strengthen the protection and control of such material and to respond effectively to nuclear security events. States have agreed to strengthen existing instruments and have established new international legal instruments to enhance nuclear security worldwide. Nuclear security is fundamental in the management of nuclear technologies and in applications where nuclear material or other radioactive material is used or transported.

Through its nuclear security programme, the IAEA supports States to establish, maintain and sustain an effective nuclear security regime. The IAEA has adopted a comprehensive approach to nuclear security. This recognizes that an effective national nuclear security regime builds on: the implementation of relevant international legal instruments; information protection; physical protection; material accounting and control; detection of and response to trafficking in such material; national response plans; and contingency measures. With its Nuclear Security Series, the IAEA aims to assist States in implementing and sustaining such a regime in a coherent and integrated manner.

The IAEA Nuclear Security Series comprises: Nuclear Security Fundamentals, which include the objective and essential elements of a State's nuclear security regime; Recommendations; Implementing Guides; and Technical Guidance.

Each State carries the full responsibility for nuclear security. Specifically, each State has the responsibility to provide for the security of nuclear material and other radioactive material and their associated facilities and activities; to ensure the security of such material in use, storage, or in transport; to combat illicit trafficking and the inadvertent movement of such material; and to be prepared to respond to a nuclear security event.

This publication is the Nuclear Security Fundamentals in the IAEA Nuclear Security Series. As the top level publication in the series, it provides the objective and essential elements of an appropriate and effective nuclear security regime. This publication is intended to be used by national policy makers, legislative bodies, competent authorities, institutions, and individuals involved in the establishment, implementation, maintenance, or sustainability of a State's nuclear security regime. It is based on a synthesis of provisions from the many international instruments that contribute to defining the international legal framework in the field of nuclear security. It is also based on the experiences of Member States in their existing nuclear security regimes, as well as the IAEA's experience in the areas of nuclear security, safety and safeguards.

The preparation of this publication has been made possible by the contribution of a large number of experts from Member States. An extensive consultation process with Member States included two open-ended technical meetings in Vienna, the first in November 2009, and the second in August–September 2010. Following the second technical meeting, the draft was then circulated to all Member States for 120 days to solicit further comments and suggestions. The comments received from Member States were reviewed and resolved by a representative panel of Member State representatives to produce the final version of this publication. The final text was approved by the Nuclear Security Guidance Committee in June 2012, followed in September 2012 by endorsement by the IAEA Board of Governors

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1. INTRODUCTION

BACKGROUND

1.1. Nuclear security focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at *nuclear material*, *other radioactive material*, *associated facilities*, or *associated activities*.[1] Other acts determined by the State to have an adverse impact on nuclear security should be dealt with appropriately.

1.2. Nuclear security and nuclear safety have in common the aim of protecting persons, property, society and the environment. Security measures and safety measures have to be designed and implemented in an integrated manner to develop synergy between these two areas and also in a way that security measures do not compromise safety and safety measures do not compromise security.

1.3. Nuclear security together with nuclear safety and applicable safeguards is essential for enjoying the many benefits of *nuclear material* and *other radioactive material* in industrial, agricultural, and medical applications, nuclear energy, and many other areas.

1.4. The responsibility for nuclear security within a State rests entirely with the State, which has to ensure the security of *nuclear material, other radioactive material, associated facilities,* and *associated activities* under its jurisdiction. Each State aims to achieve nuclear security by creating its own *nuclear security regime* which is appropriate to that State.

1.5. The threat of nuclear terrorism has been recognized as a matter of grave concern by all States. States also recognize that nuclear security in one State might depend on the effectiveness of the *nuclear security regimes* in other States. There is an increasing need for appropriate international cooperation to enhance nuclear security worldwide.

1.6. The evolution of the IAEA's nuclear security activities has occurred within a legal and policy framework that includes the Statute of the IAEA, resolutions of the IAEA Board of Governors and General Conference, resolutions of the

[1] Italicized words in the text represent defined terms. Definitions of the terms are found in the Definitions section of this publication.

UN Security Council and UN General Assembly, as well as the established practices of the IAEA. Various international instruments, adopted under IAEA and other auspices, have also contributed to the IAEA's mandate and functions, as well as to the international legal framework, in the nuclear security field. These instruments are described in IAEA International Law Series No. 4, The International Legal Framework for Nuclear Security.

1.7. As part of its efforts in nuclear security, the IAEA's Board of Governors has approved a series of Nuclear Security Plans that set out the IAEA programmes for nuclear security. One component of the Nuclear Security Plans has been the development of the Nuclear Security Series of publications.

1.8. The IAEA Nuclear Security Series provides nuclear security fundamentals, recommendations, and implementing and technical guidance for Member States to assist them in implementing new *nuclear security regimes*, or in reviewing and if necessary strengthening existing *nuclear security regimes*. The series also serves as guidance for Member States in carrying out their efforts with respect to binding and non-binding international instruments.

1.9. The IAEA Nuclear Security Series is designed in a tiered approach with the fundamentals level publication providing the objective and essential elements for the entire *nuclear security regime*, recommendations level publications outlining what a *nuclear security regime* should address in specific areas of nuclear security, and the implementing and technical guidance publications providing detailed guidance about how to establish specific *nuclear security systems* and *nuclear security measures*.

1.10. This publication, hereinafter referred to as 'the Fundamentals', is the primary publication in the IAEA Nuclear Security Series. The objective and the essential elements of a *nuclear security regime* set forth in the Fundamentals are based on a synthesis of the provisions in the international instruments, the experiences of Member States in their existing *nuclear security regimes*, and the IAEA's experience in the areas of nuclear security, safety and safeguards.

PURPOSE

1.11. The purpose of this publication is to assist Member States in enhancing nuclear security by providing national policy makers, legislative bodies, *competent authorities*, institutions, and individuals involved in the establishment, implementation, maintenance or sustainability of a State's *nuclear security*

regime with the objective and essential elements of the *nuclear security regime*. The Fundamentals set forth the basis for IAEA Nuclear Security Series publications.

SCOPE

1.12. The Fundamentals apply to *nuclear material* and *other radioactive material*, whether under or out of *regulatory control,* and their *associated facilities* and *associated activities* under the jurisdiction of the State.

1.13. The Fundamentals provide a basis for the protection of persons, property, society and the environment from criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities,* or *associated activities*, and other acts determined by the State to have an adverse impact on nuclear security.

1.14. For *nuclear material* and *other radioactive material* under *regulatory control,* the Fundamentals pertain only to material used for civil purposes. Member States may decide whether or not to extend the publication's use to other purposes.

STRUCTURE

1.15. Section 1 gives an overall view on the background, purpose, scope and structure of the document. Section 2 presents the objective of a State's *nuclear security regime*. Section 3 contains the set of essential elements of a State's *nuclear security regime.* Italicized terms used in this publication are defined in the Definitions section.

2. OBJECTIVE OF A STATE'S NUCLEAR SECURITY REGIME

2.1. The objective of a State's *nuclear security regime* is to protect persons, property, society, and the environment from harmful consequences of a *nuclear security event.*

2.2. With the aim of achieving this objective, States should establish, implement, maintain and sustain an effective and appropriate *nuclear security regime* to prevent, detect and respond to such *nuclear security events*.

2.3. The *nuclear security regime* is part of the State's overall security regime. The *nuclear security regime* covers *nuclear material* and *other radioactive material*, whether it is under or out of *regulatory control*, and *associated facilities* and *associated activities* throughout their lifetimes, and it should reflect the risks of harm to persons, property, society and the environment.

3. ESSENTIAL ELEMENTS OF A STATE'S NUCLEAR SECURITY REGIME

The following set of twelve essential elements of an effective and appropriate *nuclear security regime* should be applied insofar as reasonable and practicable.

ESSENTIAL ELEMENT 1: STATE RESPONSIBILITY

3.1. Responsibility rests with the State for meeting the objective set forth in Section 2 by establishing, implementing, maintaining and sustaining a *nuclear security regime* applicable to *nuclear material, other radioactive material, associated facilities,* and *associated activities* under a State's jurisdiction.

ESSENTIAL ELEMENT 2: IDENTIFICATION AND DEFINITION OF NUCLEAR SECURITY RESPONSIBILITIES

3.2. Nuclear security responsibilities of *competent authorities* designated by the State, as described in Essential Element 3, including *regulatory bodies* and those *competent authorities* related to border control and law enforcement, and responsibilities for all *authorized persons*, are clearly identified and defined. Provisions are identified and defined for appropriate integration and coordination of responsibilities within the *nuclear security regime*, as well as for the State's oversight to ensure the continued appropriateness of the nuclear security responsibilities.

ESSENTIAL ELEMENT 3: LEGISLATIVE AND REGULATORY FRAMEWORK

3.3. The legislative and regulatory framework, and associated administrative measures, to govern the *nuclear security regime*:

(a) Establish *competent authorities,* including *regulatory bodies,* with adequate legal authority to fulfil their assigned nuclear security responsibilities.
(b) Assign the nuclear security responsibilities identified in Essential Element 2 of each *competent authority,* including those of the *regulatory bodies* having nuclear security responsibilities, and provide these authorities with sufficient financial, human and technical resources to fulfil these responsibilities.
(c) Establish measures to ensure proper coordination and communication among *competent authorities*, and between *competent authorities* and *authorized persons,* in fulfilling their nuclear security responsibilities.
(d) Ensure that *regulatory bodies* have appropriate independence in their nuclear security decision making. Independence includes both functional and financial independence from the entities they regulate and from any other bodies that deal with the promotion or utilization of *nuclear material* or *other radioactive material.*
(e) Provide for the establishment of nuclear security regulations and requirements, and associated procedures for evaluating applications and granting *authorizations* or licenses.
(f) Provide for the establishment of systems and measures to ensure that *nuclear material* and *other radioactive material* are appropriately accounted for or registered and are effectively controlled and protected.
(g) Provide for the establishment of regulations and requirements for protecting the confidentiality of *sensitive information* and for protecting *sensitive information assets.*
(h) Ensure that prime responsibility for the security of *nuclear material, other radioactive material*, *associated facilities*, *associated activities*, *sensitive information* and *sensitive information assets* rests with the *authorized persons.*
(i) Ensure that there are procedures for the State, or a designated entity, to assume the primary responsibility for security in the absence of *authorized persons.*
(j) Establish law enforcement systems and measures relevant to nuclear security. These systems and measures should include those for the export, import, and for border control of *nuclear material* and *other radioactive material.* This includes security procedures for transport that are consistent

with the responsibilities as set forth in Essential Element 4 when international transport is involved.

(k) Take appropriate and effective steps to prevent, deter, detect, respond to, and otherwise combat illicit trafficking in *nuclear material* and *other radioactive material*.

(l) Establish verification and enforcement measures to ensure compliance with applicable laws, regulations and requirements, including the imposition of appropriate and effective sanctions.

ESSENTIAL ELEMENT 4: INTERNATIONAL TRANSPORT OF NUCLEAR MATERIAL AND OTHER RADIOACTIVE MATERIAL

3.4. The responsibility of a State for ensuring that *nuclear material* and *other radioactive material* are adequately protected extends to the international transport thereof, until that responsibility is properly transferred to another State, as appropriate.

ESSENTIAL ELEMENT 5: OFFENCES AND PENALTIES INCLUDING CRIMINALIZATION

3.5. A *nuclear security regime* includes measures for:

(a) Defining as offences or violations under domestic laws or regulations those criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities* or *associated activities*;

(b) Appropriately dealing with other acts determined by the State to have an adverse impact on nuclear security;

(c) Establishing appropriate penalties that are proportionate to the gravity of the harm that could be caused by commission of the offences or violations;

(d) Establishing the jurisdiction of the State over such offences or violations;

(e) Providing for the prosecution or, as appropriate, extradition of alleged offenders.

ESSENTIAL ELEMENT 6: INTERNATIONAL COOPERATION AND ASSISTANCE

3.6. A *nuclear security regime* provides for cooperation and assistance between and among States, either directly or through the IAEA or other international organizations, by:

(a) Making known designated points of contact for notification, assistance and cooperation;
(b) Providing timely information as appropriate to States affected or likely to be affected or concerned about criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities* or *associated activities,* or credible threats thereof;
(c) Providing timely response to requests for assistance on nuclear security related matters, including requests for the recovery and protection of *nuclear material* and *other radioactive material*; requests for technical support, including nuclear forensic assistance; and requests for mutual legal assistance;
(d) Cooperating and exchanging experiences and information, including on the establishment, implementation, maintenance and sustainability of *nuclear security systems*;
(e) Ensuring through appropriate arrangements that *sensitive information* or other information exchanged in confidence is adequately and appropriately protected.

ESSENTIAL ELEMENT 7: IDENTIFICATION AND ASSESSMENT OF NUCLEAR SECURITY THREATS

3.7. A *nuclear security regime* ensures that:

(a) *Nuclear security threats*, both internal and external to the State, are identified and assessed, including their credibility, regardless of whether the *targets* of internal *nuclear security threats* are within or outside the jurisdiction of the State;
(b) The State's assessments of *nuclear security threats* are kept up to date;
(c) The State's assessments are used in implementing the State's *nuclear security regime*.

ESSENTIAL ELEMENT 8: IDENTIFICATION AND ASSESSMENT OF TARGETS AND POTENTIAL CONSEQUENCES

3.8. A *nuclear security regime* ensures that:

(a) *Targets* under the State's jurisdiction are identified and assessed to determine if they require protection from *nuclear security threats*;
(b) The assessment is based on the potential consequences should the *targets* be compromised;
(c) An up to date assessment of such *targets* is maintained.

ESSENTIAL ELEMENT 9: USE OF RISK INFORMED APPROACHES

3.9. A *nuclear security regime* uses risk informed approaches, including in the allocation of resources for *nuclear security systems* and *nuclear security measures* and in the conduct of nuclear security related activities that are based on a *graded approach* and *defence in depth,* which take into account the following:

(a) The State's current assessment of the *nuclear security threats*, both internal and external;
(b) The relative attractiveness and vulnerability of identified *targets* to *nuclear security threats*;
(c) Characteristics of the *nuclear material*, *other radioactive material, associated facilities* and *associated activities;*
(d) Potential harmful consequences from criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities, associated activities, sensitive information or sensitive information assets,* and other acts determined by the State to have an adverse impact on nuclear security.

ESSENTIAL ELEMENT 10: DETECTION OF NUCLEAR SECURITY EVENTS

3.10. A *nuclear security regime* ensures that *nuclear security systems* and *nuclear security measures* are in place at all appropriate organizational levels to detect and assess *nuclear security events* and to notify the relevant *competent authorities* so that appropriate response actions can be initiated, including:

(a) At *associated facilities*;
(b) During conduct of *associated activities*;
(c) At *major public events* or *strategic locations*, including locations of critical infrastructure, as designated by the State;
(d) In searches for, recoveries of, or discoveries of *nuclear material* or *other radioactive material* that is missing or lost or otherwise out of *regulatory control*;
(e) Within the State's territory or on board its ships or aircraft, and at its international borders.

ESSENTIAL ELEMENT 11: PLANNING FOR, PREPAREDNESS FOR, AND RESPONSE TO, A NUCLEAR SECURITY EVENT

3.11. A *nuclear security regime* ensures that relevant *competent authorities* and *authorized persons* are prepared to respond, and respond appropriately, at local, national, and international levels to *nuclear security events* by:

(a) Developing arrangements and response plans for ensuring:
  (i) Rapid and effective mobilization of resources in response to a *nuclear security event*;
  (ii) Effective coordination and cooperation during response to a *nuclear security event* among all those carrying out response functions (including intelligence, law enforcement, crime scene investigation, and nuclear forensics) and between the security and safety aspects of the response;
  (iii) Effective use of relevant international emergency assistance and response systems;
  (iv) Investigation of any *nuclear security event* and, as appropriate, prosecution or extradition of alleged offenders.
(b) Periodically exercising, testing, and evaluating the plans for effectiveness by relevant *competent authorities* and *authorized persons* with the aim of ensuring timely implementation of comprehensive measures to:
  (i) Mitigate and minimize harmful consequences to persons, property, society, and the environment from *nuclear security events*;
  (ii) Locate, recover, and secure *nuclear material* and *other radioactive material* that is out of *regulatory control*;
  (iii) Feed back into the preparedness process, including into the response plans, the results of exercises and tests of the plans, and of experience.

ESSENTIAL ELEMENT 12: SUSTAINING A NUCLEAR SECURITY REGIME

3.12. A *nuclear security regime* ensures that each *competent authority* and *authorized person* and other organizations with nuclear security responsibilities contribute to the sustainability of the *regime* by:

(a) Developing, implementing, and maintaining appropriate and effective integrated management systems including quality management systems;
(b) Demonstrating leadership in nuclear security matters at the highest levels;
(c) Developing, fostering and maintaining a robust *nuclear security culture*;
(d) Allocating sufficient human, financial and technical resources to carry out the organization's nuclear security responsibilities on a continuing basis using a risk informed approach;
(e) Routinely conducting maintenance, training, and evaluation to ensure the effectiveness of the *nuclear security systems*;
(f) Having in place processes for using best practices and lessons learned from experience;
(g) Establishing and applying measures to minimize the possibility of *insiders* becoming *nuclear security threats*;
(h) Routinely performing assurance activities to identify and address issues and factors that may affect the capacity to provide adequate nuclear security, including cyber security, at all times.

DEFINITIONS

This section contains the definitions of italicized terms used in this publication. The definitions given below may not necessarily conform to definitions adopted elsewhere for international use. Examples have been added to some definitions in order to assist the reader in understanding the definition. When examples are given they are not intended to be exhaustive, or to limit the definition in any manner.

associated activity. The possession, production, processing, use, handling, storage, disposal or transport of *nuclear material* or *other radioactive material.*

associated facility. A facility (including associated buildings and equipment) in which *nuclear material* or *other radioactive material* is produced, processed, used, handled, stored or disposed of and for which an *authorization* is required.

authorization. The granting by a c*ompetent authority* of written permission for operation of an *associated facility* or for carrying out an *associated activity*, or a document granting such permission.

authorized person. A natural or legal person that has been granted an *authorization*. An *authorized person* is often referred to as a 'licensee', or *'operator'*.

competent authority. A governmental organization or institution that has been designated by a State to carry out one or more nuclear security functions.

— *Example: Competent authorities* may include *regulatory bodies,* law enforcement, customs and border control, intelligence and security agencies, health agencies, etc.

defence in depth. The combination of successive layers of *nuclear security systems* and *nuclear security measures* for the protection of *targets* from *nuclear security threats*.

graded approach. The application of *nuclear security measures* proportionate to the potential consequences of criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material,*

associated facilities or *associated activities* or other acts determined by the State to have an adverse impact on nuclear security.

insider. An individual with authorized access to *associated facilities* or *associated activities* or to *sensitive information* or *sensitive information assets,* who could commit, or facilitate the commission of criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities* or *associated activities* or other acts determined by the State to have an adverse impact on nuclear security.

major public event. A high profile event that a State has determined to be a potential *target.*

nuclear facility. A facility (including associated buildings and equipment) in which *nuclear material* is produced, processed, used, handled, stored or disposed of and for which an *authorization* or license is required.

nuclear material. Any material that is either *special fissionable material* or *source material* as defined in Article XX of the IAEA Statute.

- ***Special fissionable material***: Plutonium-239; uranium-233; *uranium enriched in the isotopes 235 or 233*; any material containing one or more of the foregoing; and such other fissionable material as the Board of Governors shall from time to time determine; but not including *source material*.
- ***Uranium enriched in the isotopes 235 or 233***: Uranium containing the isotopes 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.
- ***Source material***: Uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope 235; thorium; any of the foregoing in the form of metal, alloy, chemical compound, or concentrate; any other material containing one or more of the foregoing in such concentration as the Board of Governors shall from time to time determine; and such other material as the Board of Governors shall from time to time determine. (Note: *source material* does not include ore or ore residue.)

nuclear security culture. The assembly of characteristics, attitudes and behaviours of individuals, organizations and institutions which serve as a means to support, enhance, and sustain nuclear security.

nuclear security event. An event that has potential or actual implications for nuclear security that must be addressed.

nuclear security measures. Measures intended to prevent a *nuclear security threat* from completing criminal or intentional unauthorized acts involving or directed at *nuclear material*, *other radioactive material*, *associated facilities*, or *associated activities* or to detect or respond to *nuclear security events*.

nuclear security regime. A regime comprising:

— The legislative and regulatory framework and administrative systems and measures governing the nuclear security of *nuclear material*, *other radioactive material*, *associated facilities* and *associated activities*;
— The institutions and organizations within the State responsible for ensuring the implementation of the legislative and regulatory framework and administrative systems of nuclear security;
— *Nuclear security systems* and *nuclear security measures* for the prevention of, detection of and response to *nuclear security events*.

nuclear security system. An integrated set of *nuclear security measures*.

nuclear security threat. A person or group of persons with motivation, intention and capability to commit criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities* or *associated activities* or other acts determined by the State to have an adverse impact on nuclear security.

operator. Any person, organization, or government entity licensed or authorized to undertake the operation of an *associated facility* or to perform an *associated activity*.

other radioactive material. Any *radioactive material* that is not *nuclear material*.

radioactive material. Any material designated in national law, regulation, or by a *regulatory body* as being subject to *regulatory control* because of its *radioactivity*. In the absence of such a designation by a State, *radioactive material* is any material for which protection is required by the current version of the International Basic Safety Standards[2].

regulatory body. One or more authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing *authorizations*.

regulatory control. Any form of institutional control applied to *nuclear material* or *other radioactive material, associated facilities*, or *associated activities* by any *competent authority* as required by the legislative and regulatory provisions related to safety, security, or safeguards.

— *Explanation:* The phrase 'out of *regulatory control*' is used to describe a situation where *nuclear material* or *other radioactive material* is present in sufficient quantity that it should be under *regulatory control*, but control is absent, either because controls have failed for some reason, or they never existed.

sensitive information. Information, in whatever form, including software, the unauthorized disclosure, modification, alteration, destruction, or denial of use of which could compromise nuclear security.

sensitive information assets. Any equipment or components that are used to store, process, control or transmit *sensitive information*.

— *Example: Sensitive information assets* include control systems, networks, information systems and any other electronic or physical media.

strategic location. A location of high security interest in the State which is a potential *target* for terrorist attacks using *nuclear material* or *other radioactive material,* or a location at which *nuclear material* or *other radioactive material* that is out of *regulatory control* is located.

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[2] At the time of publication, the current version is: INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards — Interim Edition, IAEA Safety Standards Series No. GSR Part 3 (Interim), IAEA, Vienna (2011).

target. *Nuclear material*, *other radioactive material*, *associated facilities*, *associated activities*, or other locations or objects of potential exploitation by a *nuclear security threat*, including *major public events*, *strategic locations*, *sensitive information*, and *sensitive information assets*.

VITA

PERSONAL DETAILS

Name: Mr. Vuthy Khun, Place of Birth: Kandal Province, Date of Birth:10 October 1976

Phone: (+855) 97 88 45 678 and E-mail: vuthy.khun@gmail.com

EDUCATION QUALIFICATIONS

2001-2003: DEUG MIAS (Mathématique, Informatique et Application aux Sciences), Université de Bretagne Occidentale, France.

1998-1999: Bio-Chemistry at Conservatoire National Des Arts et Metiers (CNAM) in Paris, France.

1993-1997: Bachelor Degree of Chemistry, Faculty of Chemistry, Royal University of Phnom Penh, Cambodia.

June 1993: Senior High School, Koh Thom high school, Kandal Province, Cambodia.

PROFESSIONAL EXPERIENCE

Head of Rescue Office, Institute for Research and Experiment on Chemical, Biological, Radiological and Nuclear (CBRN) Substances, General Secretariat of the National Authority for the Prohibition of CBRN Weapons, Cambodia, and Member of National CBRN Team:

-Working in the Field as Well as Laboratory with the Based on National Authority meeting, Training, Workshops, Seminars on Sampling, Analysis Procedures for Analysis and Verification of Chemical Warfare Agents (CWAs) Related to Chemicals and of Related Instrumental Analytical Methods and Techniques (NPD/FPD, GC-GC/MS, LC/MS and FTIR), Spectral Interpretation, Reporting and QA and QC

-Working in Cooperation With International and National Organizations in the Fields of Disarmament and Non-Proliferation of the Weapons of Mass Destruction (WMD)

-Science and Technology in Nuclear Safety, Security and Safeguards

-Instructor on Individual Protective Equipment (IPE) for Different Missions

-Instructor on analysis of CWA related to the Chemical Weapons Convention (CWC) for Developing a Greater Understanding of Theoretical and Practical Relationships with CWC

-CWC and Chemical Safety and Security Management

-Sharing Experiences Relating to Study, Education and Expert Training Performances on CBRN Issues.