



National Nuclear and Radiological Emergency Plan



Office of Atoms for Peace
Ministry of Science and Technology



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INTRODUCTION

Currently, Thailand has been an extensive user of nuclear and radioactive materials for medical, industrial, research, agricultural and other purposes. Though radioactive materials have been proved to be substantially beneficial, security threats and potential incident of radiological accidents have the tendency to occur. Terrorism incident involving nuclear and radioactive materials, smuggling of radioactive materials into the kingdom, or a breach of the Atomic Energy for Peace Act, B.E. 2504 are just a few examples. Therefore, the Ministry of Science and Technology through the Office of Atoms for Peace, a key government agency, which is committed to nuclear and radiation management, will have to set clear strategies on National Nuclear and Radiological Emergency Plan which can be practically adopted and in consistent with the National Disaster Prevention and Mitigation Plan, the National Security Plan, and the National Policy on Prevention and Suppression of Terrorism through integrated collaboration from a number of relevant agencies and organizations in all sectors.

The Atomic Energy Commission for Peace has been assigned the Sub-Committee on Preparedness and Response for a Nuclear and Radiological Emergency to formulate National Nuclear and Radiological Emergency Plan for involving agencies and organizations in all sectors to use as a guideline for developing corresponding action plans which will be led in the same direction.

The National Nuclear and Radiological Emergency Plan has been approved by the Atomic Energy Commission for Peace since the 1/2553 meeting on 4th June 2010. Therefore, it will be appreciate that the relevant and concerned organizations in this plan would implement the strategy to their own operational plan and procedures for their achievement and effectiveness in nuclear and radiological safety aspect from now on.

Chairman of the Atomic Energy Commission for Peace

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CHAPTER 1 INTRODUCTION

1.1. Objectives

The National Nuclear and Radiological Emergency Plan is being developed to prepare for collaboration and support nuclear and radiological emergency operations at the national level. It is intended for all sectors to achieve an appropriate state of national preparedness for nuclear and radiological emergencies to prevent, mitigate, suppress and rehabilitate disasters in a normal state as well as to ensure effective and timely managements and implementations thereof during an emergency in any circumstances.

1.2. Key relevant agencies

Key relevant agencies as defined in the plan include:

1.2.1 The Prime Minister's Office

Office of the National Security Council

The Government Public Relations Department

1.2.2 Ministry of Interior

Department of Disaster Prevention and Mitigation

1.2.3 Ministry of Defence

Disaster Mitigation Centre, Ministry of Defence
Defence Mobilisation Department
Directorate of Civil Affairs
Royal Thai Army Chemical Department
Naval Science Department
Research and Development Centre for Space and
Aeronautical Science and Technology, Royal Thai
Air Force

1.2.4 Ministry of Science and Technology

Office of Atoms for Peace
Thailand Institute of Nuclear Technology

1.2.5 Ministry of Public Health

Department of Medical Sciences
Department of Medical Services
Department of Disease Control
Emergency Medical Institute of Thailand

1.2.6 Ministry of Natural Resources and Environment

Pollution Control Department

1.2.7 Ministry of Industry

Department of Industrial Works

1.2.8 Ministry of Transport

Department of Land Transport

1.2.9 Ministry of Foreign Affairs

1.2.10 Ministry of Finance

1.2.11 Ministry of Information and Communication Technology
National Disaster Warning Centre

1.2.12 Royal Thai Police

1.2.13 Bangkok Metropolitan Administration

1.3 Roles and responsibilities of agencies

1.3.1 The Prime Minister's Office

1.3.1.1 Office of the National Security Council shall have powers and responsibilities as follows:

1.3.1.1(1) Follow the national security and other relevant laws.

1.3.1.1(2) Propose recommendations to the National Security Council or the Cabinet to formulate the policies and strategies or activity plans in connection with the national security both internal and international affairs, border affairs and national defence and other national security-related affairs.

1.3.1.1(3) Facilitate and coordinate with government agencies, private sectors, academic institutions and educational institutions on implementations and activities according to the National Security Policies and Strategies so that they are consistent and integrated.

1.3.1.1(4) Organize and research, develop and oversee changing security circumstances, including evaluate and develop policies and strategies in pursuant to all national security-related matters and peaceful strategies.

1.3.1.1(5) Recommend and formulate policies, facilitate, improve, cooperate and follow up the assessments of intelligence, counterintelligence, national security, as well as, propose guidelines on development of intelligence policy, intelligence organization, and counterintelligence.

1.3.1.1(6) Recommend and formulate policies, facilitate, coordinate, follow up, evaluate, and develop national security policies in pursuant with the resolutions against the international terrorism, international crime, security crisis management, national preparedness, and policy on prevention and resolutions of other new security threats.

1.3.1.1(7) Perform other duties as required by laws by virtue of the Office of National Security Council or as required by the Prime Minister or the Cabinet.

1.3.1.2 Government Public Relations Department shall have powers and responsibilities as follows:

1.3.1.2(1) Publicize to create moral and psychological supports among people, government officials in unified efforts, to provide cooperation and support the operations.

1.3.1.2(2) Coordinate with the regulatory government agencies relating to control information, release of information, prevention disclosure of government confidentiality and news broadcasting which may be threat to security.

1.3.1.2(3) Support communication equipment and materials in terms of public relations to provide security information services, as well as, specialized personnel to support the operations.

1.3.2 Ministry of Interior shall have powers and responsibilities as follows:

1.3.2(1) Facilitate, oversee, provide sufficient consumer products, temporary shelters, and other remuneration package to the victims radically and expeditiously.

1.3.2(2) Control and maintain peaceful to normal state, provide protection and mitigate the people's dispirited during the disastrous event.

1.3.2.1 Department of Disaster Prevention and Migration shall have powers and responsibilities as follows:

The Department of Disaster Prevention and Mitigation is served as a central government agency in implementing the national disaster prevention and mitigation and shall have powers and duties as follows:

1.3.2.1(1) Establish the National Disaster Prevention and Mitigation Plan, propose to the National Disaster Prevention and Mitigation Committee (NDPMC) and seek for approval by the Cabinet.

1.3.2.1(2) Organize researches on procedures and measures to prevent and mitigate all impacts of disasters effectively.

1.3.2.1(3) Operate, cooperate, support and assist government agencies, local administrations and relevant private sectors on disaster prevention and mitigation, as well as, provide initial aids to the affected people, victims or casualties.

1.3.2.1(4) Guide and provide consultancy, and train other government agencies, local administrations and other private sectors on disaster prevention and mitigation aspect.

1.3.2.1(5) Follow-up, assess and evaluate all activities related to disaster prevention and mitigation at all level.

1.3.2.1(6) Perform other duties in accordance to this and other laws or as may required by Commander in Chief, Prime Minister, NDPMC, or the Cabinet.

1.3.3 Ministry of Defence shall have powers and responsibilities as follows:

1.3.3(1) Establish measures on prevention and mitigation of nuclear and radiological disaster, which has impacts on individuals, facilities, premises and military properties, including, plan on evacuation of military affairs and families, and coordinate with the Department of Disaster Prevention and Mitigation.

1.3.3(2) Facilitate, coordinate, command, and oversee the operations of the Ministry of Defence on providing aids to those affected by nuclear and radiological disaster, including solving unexpected problems, rehabilitation of both central and provincial casualties in prompt, unified, effective and timely manners.

1.3.3(3) Facilitate and organize public relations by utilizing tools and equipment of the Ministry of Defence, or through other media channels to warn and report updated events in all circumstances, including provide recommendations on procedures to be followed to those affected by nuclear and radiological disaster.

1.3.3(4) Cooperate/exercise on operations, support and facilitate the civil prevention in the areas.

1.3.3.1 Defence Mobilisation Department shall have powers and responsibilities as follows:

1.3.3.1(1) Coordinate with the Disaster Mitigation Centre, Ministry of Defence on providing aids to those affected by nuclear and radiological disaster.

1.3.3.1(2) Provide support on resources information of military forces, military arms, devices, equipment, communication tools for nuclear and radiological disaster prevention, mitigation, suppression and rehabilitation according to the Disaster Mitigation Plan, Ministry of Defence, when requested.

1.3.3.2 Directorate of Civil Affairs shall have powers and responsibilities as follows:

1.3.3.2(1) Propose the policy and implementation plan, including guidelines on prevention and resolution of nuclear and radiological disaster, as well as, develop Aide Plan by the Royal Thai Armed Forces Headquarter for those affected by nuclear and radiological disaster.

1.3.3.2(2) Facilitate, coordinate, command and supervise the operational sectors of the Royal Thai Armed Forces Headquarter in providing aids to those affected by nuclear and radiological disaster.

1.3.3.2(3) Served as coordinating centers among military agencies of the Royal Thai Armed Forces Headquarter, civil affairs and private sector, to facilitate the operational aid to those affected by nuclear and radiological disaster.

1.3.3.2(4) Publicize, announce information regarding nuclear and radiological disaster, aide to the people, as well as, provide recommendations on implementations of nuclear and radiological disaster prevention to the public.

1.3.3.3 Royal Thai Army Chemical Department shall have powers and responsibilities as follows:

1.3.3.3(1) Procure forces, equipment and tools to assist on emergency operations to prevent, mitigate, and suppress nuclear and radiological threats as requested by other government agencies via the Royal Thai Army.

1.3.3.4 The Naval Science Department shall have powers and responsibilities as follows:

1.3.3.4(1) Procure forces, equipment and tools in relating to preliminary nuclear and radiological public disaster mitigation to provide aid to the victims as commanded by the Royal Thai Navy.

1.3.3.5 Research and Development Centre for Space and Aeronautical Science and Technology, Royal Thai Air Force, shall have powers and responsibilities as follows:

1.3.3.5(1) Provide the Nuclear-Biological-Chemical (NBC) Team to join the operation as requested.

1.3.4 Ministry of Science and Technology shall have powers and responsibilities as follows:

1.3.4(1) Support on technology services and knowledge of Ministerial agencies concerning nuclear and radiological response in emergency.

1.3.4(2) Promote and assist the research, development and innovation which support the implementation and operation to mitigate nuclear and radiological disaster.

1.3.4.1 The Office of Atoms for Peace (OAP) shall have powers and responsibilities as follows:

1.3.4.1(1) Be responsible for preliminary assessing situations for mitigating nuclear and radiological accidents and emergencies so that such events shall be resolved in the right directions in accordance with the nuclear and radiation protection to limit the expansion of such event which could be detrimental to the public and environment.

1.3.4.1(2) Receive notification and report nuclear and radiological incident(s) and accident(s).

1.3.4.1(3) Coordinate with the Nuclear and Radiological Suppression Forces Operations and other local and international relevant agencies, e.g. Disaster Mitigation Agencies, Royal Thai Police, Army Forces, International Atomic Energy Agency, etc.

1.3.4.1(4) Follow up and collect information on nuclear and radiological accident to plan, manage, operate and prepare efforts for the suppression of nuclear and radiological emergency situations both in and out of the Bangkok Metropolitan.

1.3.4.1(5) Manage database and statistics concerning officials, agencies, etc. in connection with the suppression of nuclear and radiological emergencies for development and improvement of coordination to achieve the highest level of efficiency.

1.3.4.1(6) Cooperate trainings on nuclear and radiological emergencies to raise safety awareness in preparedness and operations during nuclear and radiological emergency circumstances.

1.3.4.2 Thailand Institute of Nuclear Technology (TINT) shall have powers and responsibilities as follows:

1.3.4.2(1) Support response activities of nuclear and radiological emergency, when requested.

1.3.4.2(2) Provide consultancy, propose recommendations on formulating nuclear and radiological emergency plan to other agencies.

1.3.5 Ministry of Public Health shall have powers and responsibilities as follows:

1.3.5(1) Support the formulation of National Nuclear and Radiological Emergency Plan and situation correction.

1.3.5(2) Collaborate with other relevant agencies to identify roles and responsibilities of key agencies to formulate Capability Building Implementation Plan as well as provide necessary resources as follows:

1.3.5(2.1) Survey and supply collected medical and public health resources, as well as, set up medical and radiological response team.

1.3.5(2.2) Establish Emergency Medical Services (Ambulance System) to be available and assist the injured at the site, including establish public health network system to support its nationwide operation.

1.3.5(2.3) Provide medical care, sanitation and disease prevention to the victims.

1.3.5(2.4) Provide trainings to medical professions on treatment of patients exposed to radiation and nuclear.

1.3.5(2.5) Establish system and procedures on safety maintenance of radiological equipments and materials used in the public health facilities.

1.3.5(2.6) Manage data and report effectively.

1.3.5(2.7) Provide knowledge on primary care, sanitation and environmental health to the public so that they can help themselves and others during the crisis.

1.3.6 Ministry of Natural Resources and Environment shall have powers and responsibilities as follows:

1.3.6(1) Provide recommendations and propose guidelines on the formulation of Chemical Substances and Hazardous Materials Emergency Plan in the risk areas.

1.3.6(2) Coordinate with relevant agencies according to the Disaster Prevention and Mitigation Plan on planning to control the prevention of explosion, fire, and chemical and hazardous material leaks to the public and environment.

1.3.6(3) Follow up, oversee, and assess the effects of hazardous residuals on the environment, as well as, plan on the rehabilitation and preservation of the environment to achieve the balancing state which is appropriate to the livings.

1.3.6(4) Plan and develop permanent and sustainable natural resources and environment to be able to endure other threats.

1.3.6.1 Pollution Control Department shall have powers and responsibilities as follows:

1.3.6.1(1) Provide consultancy and recommendations on guidelines of the National Nuclear and Radiological Emergency Plan in collaboration with relevant agencies.

1.3.6.1(2) Coordinate with relevant agencies as defined in the National Nuclear and Radiological Emergency Plan to control, prevent and remedy potential hazards, caused by nuclear and radiological emergency, to the public and environment.

1.3.6.1(3) Support and provide recommendations on guidelines to rehabilitate and remedy damages to the environment caused by nuclear and radiological emergency, in collaboration with other relevant agencies.

1.3.7 Ministry of Industry shall have powers and responsibilities as follows:

1.3.7(1) Regulate, oversee and support operational activities of industrial business, as well as, promote safety, environment and hygiene at the manufacturing facilities.

1.3.7(2) Control and oversee security system to prevent disaster caused by hazardous materials in industrial factories.

1.3.7.1 Department of Industrial Works shall have powers and responsibilities as follows:

1.3.7.1(1) Administrate industrial business, including hazardous materials in terms of manufacturing, environment, safety to be consistent with laws and international agreements.

1.3.7.1(2) Support information and knowledge of machines, manufacturing, environment, hazardous materials and energy for utilization in the industrial business development.

1.3.7.1(3) Provide services on conversion of assets, machineries, into fund.

1.3.8 Ministry of Transport shall have powers and responsibilities as follows:

1.3.8(1) Support transportation vehicles, drivers, and transportation equipment as well as supply fuel.

1.3.8(2) Prepare back-up routes or temporary traffic arrangement, fix or modify transportation, particularly roads, rails, or damaged bridges to be in services.

1.3.8.1 Department of Land Transport shall have powers and responsibilities as follows:

1.3.8.1(1) Support information of vehicle registration and drivers, collaborate, coordinate and facilitate on vehicle procurement in the transportation as appropriate.

1.3.9 Ministry of Foreign Affairs shall have powers and responsibilities as follows:

1.3.9(1) Coordinate with agencies, international organizations to request supporting of civil defence.

1.3.9(2) Request of aids from abroad.

1.3.10 Ministry of Finance shall have powers and responsibilities as follows:

1.3.10(1) Allocate budget as needed and in urgent circumstances

1.3.10(2) Provide consultancy on allocation and integrated utilization of budget.

1.3.11 Ministry of Information and Communication Technology shall have powers and responsibilities as follows:

1.3.11(1) Support communication resources and provide necessary communication system services as contingency plan and remedy nuclear and radiological emergency.

1.3.11(2) Coordinate on information and relevant communicative infrastructure for disaster warning, aide, and suppression of nuclear and radiological emergency.

1.3.11(3) Provide weather forecast information to support 24-hours operation.

1.3.11.1 National Disaster Warning Centre shall have powers and responsibilities as follows:

1.3.11.1(1) Study each type of disaster by simulating different scenarios of disasters and develop anticipated basic information used to make informed, comprehensive, accurate, quick and standardized decision .

1.3.11.1(2) Exchange of disaster information at domestic and international levels for analyzing the level of disaster severity and assess casualties caused by the disaster.

1.3.11.1(3) Warn and broadcast the severity of the disaster and its ending via the Television Pool of Thailand, radio, telephone, and other government and private medias that wish to broadcast news, warning towers, including provide suggestion to minimize loss, evacuate, avoid and mitigate the disaster to staff and relevant agencies in order to provide aids to the public and countries bound by the warning system agreement.

1.3.11.1(4) Announce fact sheets to stop disaster rumor through the Television Pool of Thailand, radio in order that panic, confusion, anxiety of the public can be eradicated.

1.3.11.1(5) Monitor disaster situations closely to learn about casualties of both lives and assets, and support necessary rescue equipment, as well as, coordinate and provide information to the Disaster Mitigation officer so that the mitigation activities can be performed effectively.

1.3.11.1(6) Guide and cooperate trainings to the officials and public to have knowledge on guidelines and means of minimizing losses, evacuation, avoidance, and mitigation of the disaster.

1.3.11.1(7) Perform other duties as assigned.

1.3.12 The Royal Thai Police shall have powers and responsibilities as follows:

1.3.12(1) Control and maintain peaceful state, safety of lives and properties of the people and provide social services.

1.3.12(2) Evaluate the situation, plan the operation, deploy operational forces, facilitate and support, exchange information among operational units, as well as, publicize disaster warning to the civil sector.

1.3.12(3) Organize traffic systems in case the transportation routes are in detour or barred, support the operational activities of other units, and provide aide to mitigate the disaster.

1.3.12(4) Set up Frontline Operational Center to be Joint Operation Center of the Royal Thai Police, control, oversee, facilitate and collaborate on the operational activities until the situation turns to its normal state.

1.3.12(5) Organize Mobile Medical Team with medical supplies to provide medical services to the people and staff affected during the crisis.

1.3.13 Bangkok Metropolitan Administration shall have powers and responsibilities as follows:

1.3.13(1) Direct, control, oversee, and recommend on the operational activities of disaster prevention and mitigation in the Bangkok Metropolitan areas.

1.3.13(2) Support the operational activities of District Disaster Prevention and Mitigation Operation Division or other regions when requested for suppression, mitigation and rehabilitation.

1.3.13(3) Coordinate with government sectors and relevant agencies in the Bangkok Metropolitan areas, including collaborate with the private sectors in all operational activities to prevent and mitigate disaster.



CHAPTER 2

SCOPE AND POLICY

2.1. Scope

The National Nuclear and Radiological Emergency Plan is a practical infrastructure on nuclear and radiation in consistent with the National Preparedness Policy, the National Disaster Prevention and Mitigation Plan, the National Defence Plan, and the National Policy on Prevention and Suppression of Terrorism. It is intended for use in the preparedness and cooperation in domestic and international levels on nuclear and radiological emergency. Being construed as a strategic plan in pursuant to roles of each relevant agency, the Plan is served as guidelines in accordance with the National Preparedness Policy.

2.2. Policy

2.2.1 All relevant parties shall undertake necessary measures to prepare for prevention, mitigation, suppression and rehabilitation of disasters, security threats and emergencies.

2.2.2 Government agencies, state enterprises, private sector organizations and the general public shall participate and cooperate in the implementations of the National Disaster Prevention and Mitigation Plan and Military Defence Plan.

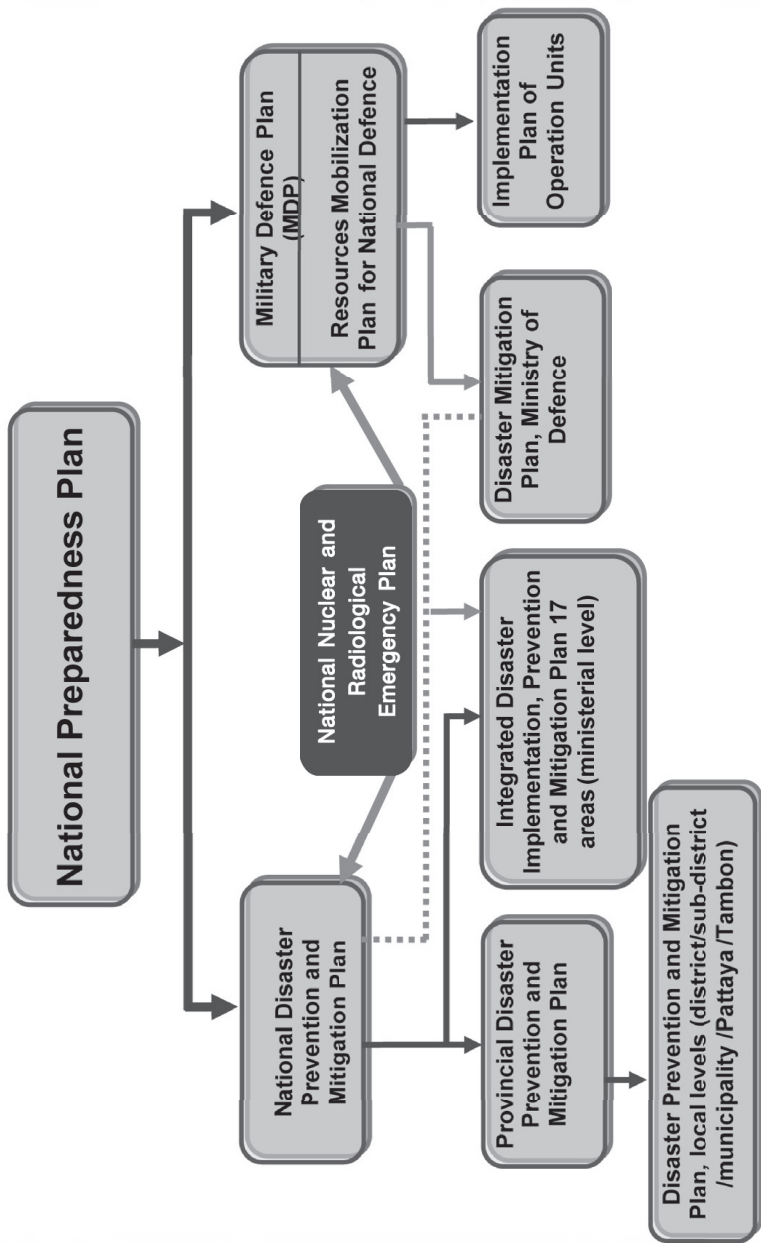
2.2.3 Relevant agencies shall develop their respective implementing plans concerning prevention, mitigation, suppression and rehabilitation of disasters, security threats and emergencies to be in accordance with and systemically linked to the National Preparedness Policy.

2.2.4 Crisis management system shall be administered in comprehensive, unified, effective and timely manners for all circumstances.

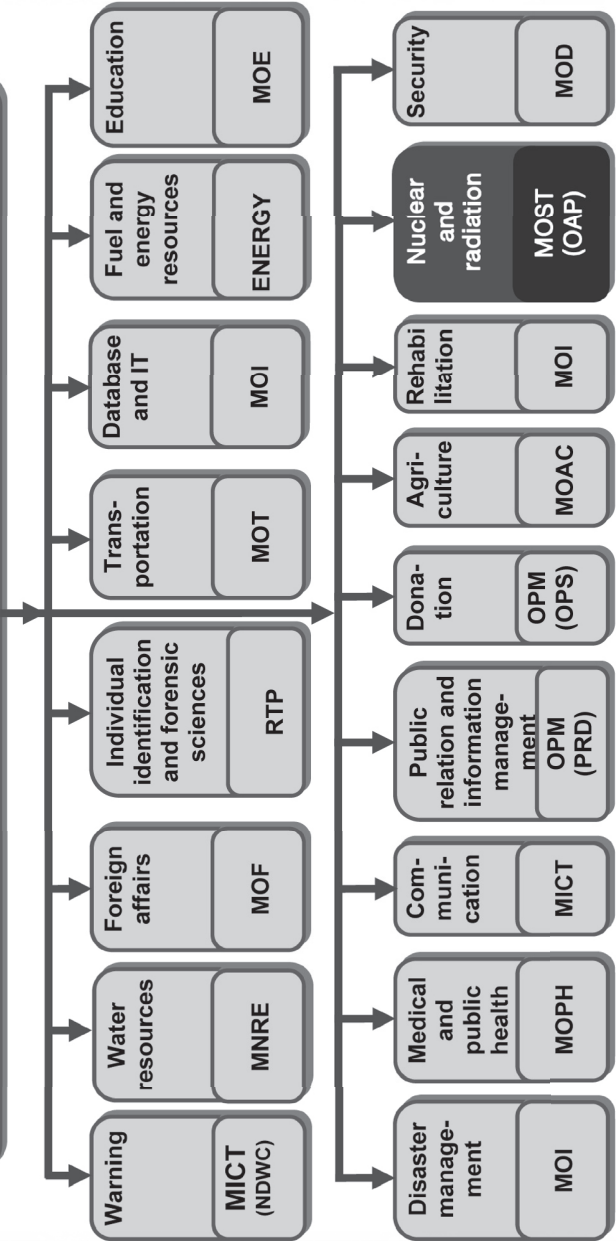
2.3. Relevant policies and national plans

2.3.1 National Preparedness Policy

2.3.2 National Disaster Prevention and Mitigation Plan



Integrated Disaster Implementation, Prevention and Mitigation Plan (17 areas)



2.4. Definitions

“National Preparedness” means preparedness efforts of government agencies, state enterprises, private sector organizations and the general public in a normal state for the prevention and mitigation of negative impacts due to disasters or security threats during an emergency.

“Emergencies” means circumstances that affect or may affect public order or endanger national security; may cause the country or any part of the country to fall into a state of acute difficulty; or other circumstances or actions as appeared in the policy instruments concerning crisis management.

“Disaster” means any of these disasters; fire, storm, strong wind, flood, drought, epidemic in human, epidemic in animals, epidemic in aquaculture, and epidemic in plants and other public disaster either natural disasters or human-made disasters, accidents or all other incidents that effect on life, body or properties of the people, of the government. And in this regards, air threats and sabotages are also included.

“Security threats” means menaces or threats that negatively affect national security, including disturbances, terrorism, bombing, riots, aerial threats, armed conflicts, war or other acts as appeared in the policy instruments concerning military defence or national civil defence.

“Air threat” means any disaster affected and caused by strikes or attacks from the air.

“Sabotage” means any disasters affected from any activities aim to destroy to private or government properties, public utilities, or activities of offensive, deterrence, delay to any operations including any harmful actions toward persons which will create a political, economical and social disturbances or damage to national security as a whole.

“Radioactive materials” means elements or compounds of which their structures are unstable and emit radiation when decayed.

“Nuclear and radiological accident” means any unintended events which occur at a nuclear and radiological facility, including nuclear and radiological operations or equipments failure in connection with safety system, causing the release or nearly release radioactive substances to the environment.

“International Nuclear Event Scale (INES)” means the scale explains the safety significance of nuclear and radiological events occurring at any given nuclear power plant, classified on the scales level 0 to 7 for communicating to the public for immediate understanding (refer to Appendix 1).

“Radiation warning sign” means identified international symbols to alert people to be aware of radiation in the area or warning of radiation. It is a trefoil symbol in magenta or black against a yellow background. This symbol is placed on packages or in radiation areas (refer to Appendix 2).

“Survey meter” means a portable instrument for radiation detection and measurement used to check an area or personnel to radiation dose rate or radioactive contamination.

“Nuclear and radiological emergency” means any incidental event regardless of negligence, unawareness, or technology failure concerning radioactive materials or sources causing radiation field or contamination to the operators or those nearby exposed to radiation. If the emergency is not handled in a timely manner, it can cause severe deterministic health effects on people, properties, and environments.

“Nuclear and radiation threat” means any threat induced by any circumstance in a nuclear and radiological facility. It can be classified into 5 categories in decreasing order of severity (see details in Chapter 4).

2.5 Budget

2.5.1 In nuclear and radiological emergency preparedness, the operations, coordination, trainings on nuclear and radiological emergency, equipment and materials for suppression of nuclear and radiological emergency states, the regular budget of the key agencies shall be allocated by the Bureau of the Budget as necessary and appropriately.

2.5.2 In case of the nuclear and radiological crisis, the Office of Atoms for Peace shall cooperate with the Prime Minister’s Office and Ministry of Finance to allocate reasonable financial resources to suppress and mitigate the crisis.

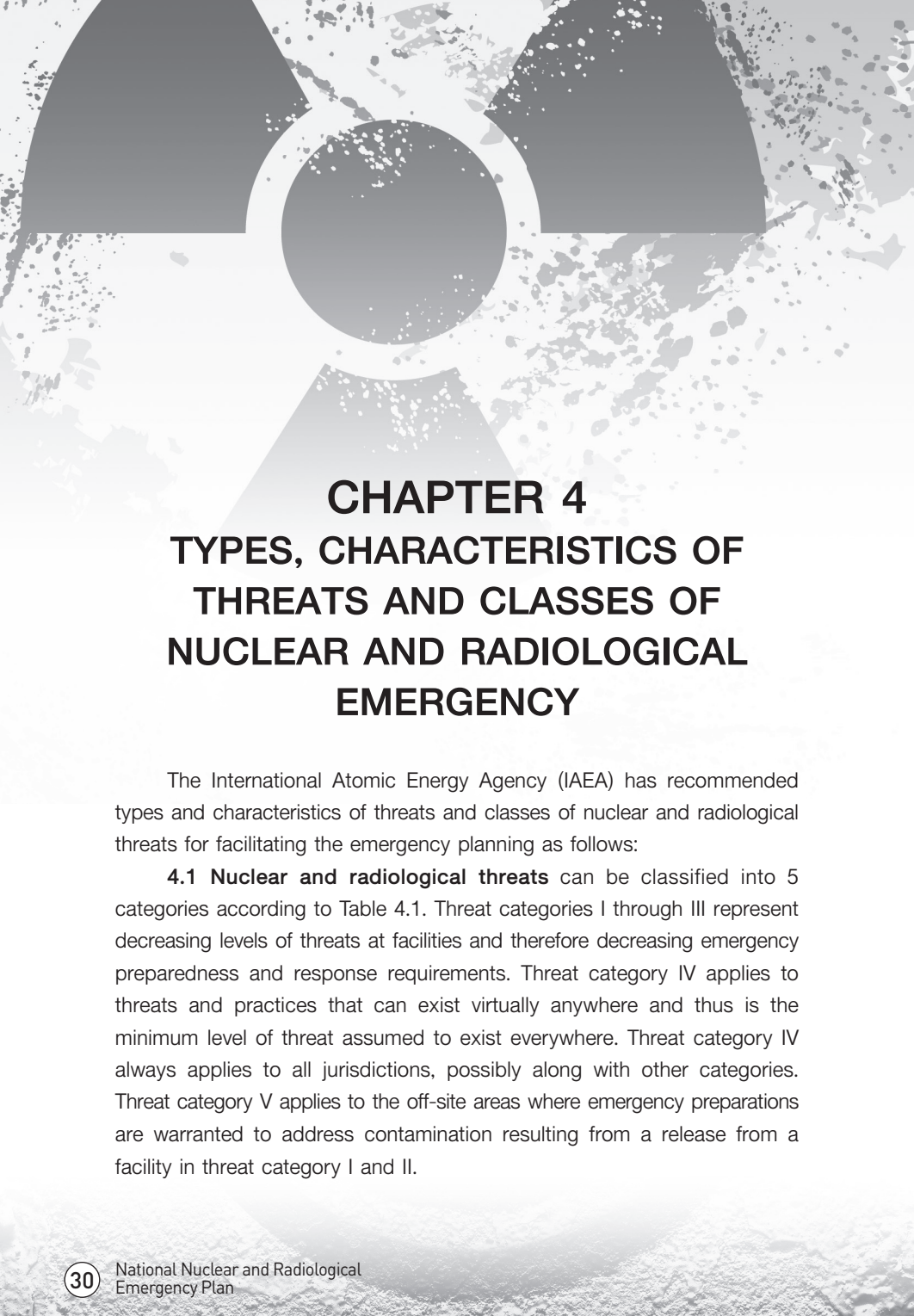


CHAPTER 3

MAIN RELEVANT LAWS

Laws, Ministerial regulations and relevant legislations

- 3.1. The Atomic Energy for Peace Act B.E. 2504, Office of Atoms for Peace, Ministry of Science and Technology
- 3.2. The Atomic Energy for Peace Act (2nd Edition) B.E. 2508, Office of Atoms for Peace, Ministry of Science and Technology
- 3.3. The National Disaster Prevention and Mitigation Act B.E. 2550, Department of Disaster Prevention and Mitigation, Ministry of Interior
- 3.4. The Labor Protection Act, B.E. 2541
- 3.5. The Public Health Act, B.E. 2535
- 3.6. The Arms Control Act, B.E. 2530, Defence Industry Department
- 3.7. The Enhancement and Conservation of the National Environment Quality Act, B.E. 2535
- 3.8. The Airport Authority of Thailand Act, B.E. 2522
- 3.9. The Factory Act, B.E. 2535
- 3.10. The Hazardous Material Act, B.E. 2551, Department of Industrial Works
- 3.11. Other relevant legislations



CHAPTER 4

TYPES, CHARACTERISTICS OF THREATS AND CLASSES OF NUCLEAR AND RADIOLOGICAL EMERGENCY

The International Atomic Energy Agency (IAEA) has recommended types and characteristics of threats and classes of nuclear and radiological threats for facilitating the emergency planning as follows:

4.1 Nuclear and radiological threats can be classified into 5 categories according to Table 4.1. Threat categories I through III represent decreasing levels of threats at facilities and therefore decreasing emergency preparedness and response requirements. Threat category IV applies to threats and practices that can exist virtually anywhere and thus is the minimum level of threat assumed to exist everywhere. Threat category IV always applies to all jurisdictions, possibly along with other categories. Threat category V applies to the off-site areas where emergency preparations are warranted to address contamination resulting from a release from a facility in threat category I and II.

Table 4.1 Suggested Emergency Threat Categories for Planning

Category	Definitions and potential nuclear and radiological threats
I	<p>Emergencies have been postulated that could result in severe deterministic health effects off site of the facilities, to including:</p> <ul style="list-style-type: none"> • reactors with power levels greater than 100 MW(th) e.g. power reactors, nuclear ship and research reactors; • spent fuel pools that may contain some recently discharged fuel and a total of more than about 0.1 EBq (E=exa=10¹⁸) of Cs-137 equivalent to the inventory in a 3000 MW(th) reactor core; • facilities with inventories of dispersible radioactive materials sufficient to result in severe deterministic effects offsite of such facilities. <p><i>Probability of threats in Thailand and potential affected areas</i></p> <ul style="list-style-type: none"> • Currently, there are no nuclear power plants and nuclear facility of such magnitude.
II	<p>Emergencies have been postulated that could result in doses warranting taking urgent protective action off site of the facilities, to including:</p> <ul style="list-style-type: none"> • reactors with power levels greater than 2 MW(th) and less than 100 MW(th), e.g. power reactors, nuclear ship and research reactors; • spent fuel pools containing fuel requiring active cooling; • facilities with potential for an uncontrolled criticality within 0.5 km of the off-site boundary; • facilities with inventories of dispersible radioactive sufficient to result in doses warranting taking urgent protective action off site¹;

Table 4.1 Suggested Emergency Threat Categories for Planning
(cont.)

Category	Definitions and potential nuclear and radiological threats
	<p><i>Probability of threats in Thailand and potential affected areas</i></p> <ul style="list-style-type: none"> • Currently, there are no nuclear power plants but potential threats occur if a nuclear ship is in our territory. The affected sites depend on the climate.
<p>III</p>	<p>Emergencies have been postulated that could result in doses warranting taking urgent protective action on site of the facilities, including:</p> <ul style="list-style-type: none"> • facilities with potential, if shielding is lost, of direct external (shine) dose rates of more than 100 mGy/h at 1 m; • facilities with potential for an uncontrolled criticality more than 0.5 km from the off-site boundary; • reactors with power levels of less than or equal to 2 MW(th); • facilities with inventories of radioactive sufficient to result in doses warranting taking urgent protective action on the site² <p><i>Probability of threats in Thailand and potential affected areas</i></p> <ul style="list-style-type: none"> • A research reactor is located at 16, Vibhavadi Rangsit Road, Chatuchak District, Bangkok. The potentially affected sites could be the nearby area.
<p>IV</p>	<p>Operators of mobile dangerous sources, including:</p> <ol style="list-style-type: none"> 1) a mobile source with: <ol style="list-style-type: none"> 1.1 potential, if shielding is lost, of direct external (shine) dose rates of more than 10 mGy/h at 1 m 1.2 those with inventories in accordance with Appendix 3;

Table 4.1 Suggested Emergency Threat Categories for Planning
(cont.)

Category	Definitions and potential nuclear and radiological threats
	<p>2) satellites with dangerous sources in accordance with Appendix 3;</p> <p>3) transport of quantities of radioactive material that would be dangerous if not controlled, in accordance with Appendix 3.</p> <p>4) facilities/locations with a significant probability of encountering an uncontrolled dangerous source such as:</p> <p>4.1 large scrap metal processing facilities;</p> <p>4.2 national border crossings;</p> <p>4.3 facilities with fixed gauges with dangerous sources in accordance with Appendix 3.</p> <p><i>Probability of threats in Thailand and potential affected areas</i></p> <ul style="list-style-type: none"> • Radioactive materials are used nationwide so threat could have possibly occurred at any of the sites. The affected area is the incident site.
V	<p>Products with a significant likelihood of becoming contaminated as a result of events at facilities in threat categories I or II of neighboring countries, to levels necessitating prompt restrictions on products in accordance with international standards.</p> <p><i>Probability of threats in Thailand and potential affected sites</i></p> <ul style="list-style-type: none"> • The affected sites depend on the climate.
	<p>¹ 10 times the A/D value calculated in Appendix 3 provides an estimate of this inventory if 10% of the inventory is assumed to be released to the atmosphere.</p> <p>² 0.01 times the A/D value calculated in Appendix 3 provides an estimate of this inventory if 10% of the inventory is assumed to be released into room and the people are evacuated within a few minutes</p>

4.2 Descriptions of nuclear and radiological threats

Details of nuclear and radiological threats help those involved fully understand each category of threat so that they can be prepared and know how to respond to the threat and its magnitude. This document, therefore, describes threat Category I to V as follows:

4.2.1 Description of threat category I and II

For reactors and facilities with large amounts of spent fuel or dispersible radioactive material, the primary risk comes from atmospheric releases. For the most severe releases postulated at threat category I facilities, the risk of severe deterministic health effects can only be substantially reduced by taking urgent protective action in **the precautionary action zone (PAZ)** before or shortly after a release. For these emergencies and other general emergencies at threat category I and II facilities, immediately instruct the public not to consume food that could be directly contaminated and promptly initiate monitoring to determine if urgent protective action is warranted in **the urgent protective action planning zone (UPZ)** to avert doses consistent with international guidance. Deposition from severe releases warranting relocation or restrictions on food consumption may occur at a considerable distance, sometime to neighboring countries.

For facilities with the potential for uncontrolled criticalities, the direct external dose (shine) from gamma and neutron radiation from a criticality dominates the hazard; airborne releases are not significant. In the event of a criticality, prompt monitoring is necessary to determine if urgent protective action is warranted in the UPZ. In all these facilities, the off-site releases or doses from criticalities are not predictable with any accuracy and the release could result in very complex dose patterns and contamination off site. However, in most cases, emergency action levels (EALs) indicating serious conditions can be identified in time to classify the emergency and initiate a response before a significant release or exposure occurs.

In all these facilities, the on-site dose rates during an emergency may be very high (e.g. >10 Gy/h) and there is a risk of beta emitter contamination and other hazardous conditions (e.g. steam) in areas where staff action may be needed to mitigate the emergency.

The actions carried out to respond to the long term consequences of these emergencies can have a serious detrimental psychological and economic impact on the public, as demonstrated by the Chernobyl accident response, if they are not based on internationally accepted criteria considering their long term sociological, psychological and economic impact.

4.2.2 Description of threat category III

This threat category has no credible emergencies postulated for which urgent off-site protective actions are warranted. These emergencies may, however, cause considerable concern among the population and off-site officials. In addition, there may be the risk of contaminated persons, products, articles or equipment leaving the site. Emergencies can have a significant adverse psychological and economic impact if the public or off site officials are not aware that these facilities do not pose an off-site risk.

Emergencies at these facilities may occur with little warning and could result only in significant exposure on site. However, for most emergencies, the facility can develop emergency action levels (EALs) for classifying emergencies that ensure prompt, effective on-site response.

On site there may be high dose rates, beta emitter contamination or other hazardous conditions in areas requiring action by the staff to mitigate the emergency. Therefore, people responding on site must be provided with appropriate protective equipment and training.

4.2.3 Description of threat category IV

Threat category IV planning applies everywhere and represents the minimum level of preparedness appropriate for all areas. In general, this applies to emergencies involving:

- sources;
- transport;
- severe overexposure;
- terrorist threats or criminal activities.

Details of each emergency include:

4.2.3.1 Source emergency; the emergencies may involve:

- (1) detection of medical symptoms of radiation exposure;
- (2) lost or stolen dangerous sources;
- (3) dangerous mobile sources;
- (4) fixed sealed sources;
- (5) public exposure/contamination;
- (6) nuclear weapons;
- (7) re-entry of radioactive satellites.

Detection of medical symptoms of radiation exposure

Physicians recognizing radiation-induced injuries have been the first to alert response officials of many, if not most, emergencies involving lost or stolen sources. As such emergencies are very rare, local physicians are inexperienced in the diagnosis of these injuries. There have been several emergencies during which people suffering from radiation induced injuries made several visits to medical professionals before accidental radiation exposure was suspected. In each of these cases, other information prompted the doctors to consider radiation exposure as the cause of the symptoms. If the first physician visited had diagnosed possible radiation exposure and promptly alerted officials, action could have been taken to prevent further injuries or deaths.

Lost or stolen radioactive materials

Numerous dangerous sources are lost or stolen every year. There are typically several fatalities among the public each year resulting from someone, unaware of the hazard, handling a lost or stolen dangerous source. There have been several cases in which prompt public announcements, alerting the public of a hazard, following the loss or theft of dangerous sources resulted in the prompt recovery of the source and thus the prevention of serious consequences.

Highly dangerous mobile radioactive materials

Among the most common types of dangerous mobile sources are radiography cameras (Industrial Radiography). Emergencies involving these sources are generally handled by the operator with no or limited assistance. However, there have been emergencies resulting in serious exposure of operators, other workers and the public due to inadequate response by the operators.

Fixed sealed radioactive materials

Fixed sealed source emergencies involve the rupture of sources or the dispersal of radioactive material that are under control of the operator. In most cases, contamination results from industrial emergencies where sources are damaged at construction or drilling sites; in manufacturing facilities; or during spills, explosions, or fires at research or educational facilities. The most important features of these emergencies are that they should be detected promptly by the operator, they should be limited to an area under some level of administrative control, the source of the contamination and potentially contaminated persons and items should be promptly identified, and the cause and scope of the emergency should be promptly determined.

Public with high radiation exposure or contamination

Public exposure/contamination emergencies may involve the spread of contamination for a long period before detection. There have been cases where the contamination was not detected for several years. These emergencies can result from the rupture or dispersal of uncontrolled (lost/stolen) radioactive material in the public domain. In several cases, a member of the public has unknowingly ruptured a sealed source, followed by other members of the public unknowingly spreading the material. These emergencies can be very serious. For example, the Goiania accident resulted in several deaths and about 370 truckloads of waste.

Public contamination emergencies can also be the result of the undetected dispersal of controlled material. The undetected melting of gauges into metal products, e.g. furniture, watch strap, etc. is an example. The most important feature of these emergencies is that the source and scope are unknown at the time of detection. By the time the contamination is detected, the area contaminated and number of people exposed can be very large.

Nuclear weapons

A nuclear weapon accident would probably involve a vehicle or aircraft crash and a conventional explosion or fire. The primary risk comes from and inhalation of radioactive materials such as plutonium, uranium. The most important feature of these emergencies is that commonly available monitoring instruments and teams may not be able to identify dangerous levels of contamination. Specially trained and equipped teams are required to adequately respond to such an emergency. Consequently, first responders should be made aware of the potential hazard and of the precautions to take until specialized assistance arrives.

Re-entry of radioactive satellites

Several satellites carrying dangerous sources have re-entered the atmosphere. In most cases the State responsible for the satellite provides, often through the IAEA or other UN agency, an estimated time and location for the re-entry. However, these estimations have often been inaccurate. Typically, the radioactive components are less than one cubic meter in volume and shatter upon re-entry and impact in an area of 100,000 km² or more. Thus, in most cases it would be virtually impossible to identify the area of impact with sufficient accuracy to allow reasonable precautionary protective action to be taken in advance. For these emergencies, the risk is very low and consists principally in someone finding and handling radioactive debris. None of the re-entries, to date, have resulted in a known case of significant exposure or food/water contamination. Nevertheless, these emergencies often receive intense attention from the international media.

4.2.3.2 Transport emergency: A transport emergency could result in the release of radioactive material, loss of shielding or loss of criticality control. In the event of an emergency, fire fighters are generally well equipped with standard protective clothing and respiratory protection equipment. This equipment should provide good protection against radioactive contamination and inhalation of airborne radioactive material. Historically, there have been no reported transport emergencies involving radioactive material that have had serious radiological consequences.

4.2.3.3 Severe overexposure emergency: Severe overexposures can result from controlled sources such as radiotherapy devices. In some cases, equipment, software or human factors (e.g. confusing procedures from the manufacturer) were contributing causes. Therefore, it is important to promptly alert other users (national and international) of similar devices of the circumstances involved.

4.2.3.4 Terrorist threat or criminal activities: These may involve bomb threats, bombings, sabotage, attacks, kidnapping, hostage taking, theft of radioactive or fissionable material, or other criminal acts potentially resulting in an actual or perceived radiation emergency. The objective of the perpetrators may be to create “terror” among the public with the resulting psychological and economic impact.

4.2.4 Description of threat category V

Threat category V preparedness is for the area within the food and water restrictions. Normally, the threat category I or II facilities should be prepared for such emergencies. In some cases, they may be trans-boundaries and according to the Early Notification Convention, in case of an emergency, the International Atomic Energy Agency or the member states where radioactive materials have been dispersed should be immediately notified of the event.

4.3 Classification of nuclear and radiological emergency for practical and timely communications

The response to an emergency should begin without delay and be fully coordinated from the start. To facilitate this, a common emergency classification system should be adopted by all response organizations. The requirements suggest the following classes for facility emergencies (items 1–4) and for radiological emergencies (item 5):

4.3.1 Nuclear and radiological emergency class 1 are general emergencies at facilities in threat category I or II involving an actual, or substantial risk of, release of radioactive material or radiation exposure that warrants taking urgent protective action off the site. Upon declaration of this class of emergency, action shall be promptly taken to mitigate the consequences of the event and to protect people on the site and within the precautionary action zone (PAZ) and the urgent protective action planning zone (UPZ) as appropriate.

4.3.2 Nuclear and radiological emergency class 2 are site area emergencies at facilities in threat category I or II involving a major decrease in the level of protection for those on the site and near the facility. Upon declaration of this class of emergency, action shall be promptly taken to mitigate the consequences of the event, to protect people on the site and to make preparations to take protective action off the site if this becomes necessary.

4.3.3 Nuclear and radiological emergency class 3 are facility emergencies at facilities in threat category I, II or III involving a major decrease in the level of protection for people on the site. Upon declaration of this class of emergency, action shall be promptly taken to mitigate the consequences of the event and to protect people on the site. Emergencies in this class can never give rise to an offsite threat (e.g. site area or general emergency).

4.3.4 Nuclear and radiological emergency class 4 are emergency alerts at facilities in threat category I, II or III involving an uncertain or significant decrease in the level of protection for the public or for people on the site. Upon declaration of this class of emergency, action shall be promptly taken to assess and mitigate the consequences of the event and to increase the readiness of the on-site and off-site response organizations as appropriate. Alerts include events that could evolve into facility, site area or general emergencies.

4.3.5 Nuclear and radiological emergency class 5 are other emergencies such as uncontrolled source emergencies involving loss, theft or loss of control of dangerous sources, including terrorist threats involving radioactive material and re-entry of a satellite containing such a source. This emergency classification is intentionally used for communications among the involving agencies in respect to suppress and alleviate of the disaster, enabling prompt and appropriate actions. Typically, the operator declares a class of emergency on the basis of predetermined emergency action levels (EALs). The emergency classification should not be confused with the International Nuclear Events Scale (INES), refer to Appendix 1.





CHAPTER 5

COMMUNICATION

Communication and coordination with relevant agencies when a nuclear and radiological emergency occurs is a significant task. When a disaster or security event occurs, the involving agencies must be notified of the event to take appropriate actions for mitigation, including collaboration and cooperation, commanding, reporting the activities and facilitating all related matters for prompt response and smooth operation during both crisis and normal operation.

Procedures

5.1 Be ready and prepared at all times even in a normal state. A number of communication systems and back-up tools should be available for accurate, reliable and prompt action.

5.2 Test the communication system annually to check its function and assess the problems and obstacles which could have occurred during nuclear and radiological emergency or during normal operation.

5.3 List the main relevant organizations. Internal communication and coordination among inside and outside relevant organizations can take place at any time.

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (Emergency)	Fax	Coordinator
The Prime Minister's Office				
Office of the National Security Council (NSC)	Thai Government House, Pitsanuloke Rd., Dusit, Bangkok 10300	0 2629 8000 ext. 3301 0 2629 8066	0 2629 8068	Director, The Bureau of International Security Affairs
The Government Public Relations Department (PRD)	Rama VI Rd., Phayathai, Bangkok 10400	0 2618 2323 ext. 1718-1721 081 930 9243	0 2618 2372	Head of Public Relations During Crisis Group (Mr. Ananthasak Boonkruephan)
Ministry of Interior (MOI)				
Department of Disaster Prevention and Migration (DPM)	3/12 U Thong Nok Rd., Wachira, Dusit, Bangkok 10300	1784 0 2243 0020-7 0 2241 7470	0 2241 7450-6 0 2243 0030 0 2241 7466 0 2241 7499	Director, Disaster Mitigation Centre
Ministry of Defence (MOD)				
Office of Policy and Planning	Sanamchai Rd., Bangkok 10200	0 2622 3606 081 868 0308	0 2622 3605	Director, Disaster Relief Division Development Coordinating Centre, Office of Policy and Planning (Col. Kajohn Pimkasem)

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (emergency)	Fax	Coordinator
Defence Mobilisation Department Office of the Permanent Secretary	Muangthongthani, Chaengwattana Rd., Ban Mai, Pakkred, Nonthaburi 11120	0 2980 7184	0 2980 7184	Director, Division of Policy and Planning Defence Mobilisation Department (Col. Peerapong Lobmek)
Royal Thai Army Chemical Department (RTACD)	Phaholyothin Rd., Chatuchak, Bangkok 10900	0 2579 561, 0 2579 1183 ext. 99840 0 2940 1625-6	0 2579 4353	Royal Thai Army Chemical Department Col. Prince Chalermasuk Yugala (specialist)
Naval Science Department (NSD)	83 Moo 12 Sala Thammasop Phuthamonthon Soi 3 Rd., Thawi Wattana, Bangkok 10170	1696 0 2475 5845 0 2475 7132 0 2475 7108	0 2475 4119	Director, Public Disaster Prevention and Relief Center, Royal Thai Navy (PDPRC, RTV) Public Disaster Relief Operation Team, Naval Science Department Military Duty Officer of Naval Science Department
Research and Development Centre for Space and Aeronautical Science and Technology (RTAF)	171 Dechatungka Rd., Seegun, Don Muang, Bangkok 10210	0 2534 8885, 0 2534 8883		Chief of Biological and Chemical Warfare Office of Sciences

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (emergency)	Fax	Coordinator
Ministry of Science and Technology (MOST)				
Bureau of Central Administration (BCA) Office of the Permanent Secretary	Rama VI Rd., Ratchatewi, Bangkok 10400	0 2554 4466 ext. 355, 356 081 848 8487	0 2354 3819	Director, Bureau of Central Administration Office of the Permanent Secretary (Mrs. Nicha Hiranyaburna)
Office of Atoms for Peace (OAP) Radiological Emergency Preparedness Coordinator Group (REPCG) Bureau of Radiation Safety Regulation (BRSR)	16 Vibhawadee Rangsit Rd., Lad Yao, Bangkok 10900	0 2596 7699 0 89200 6243 rad_emer@oaepp.go.th 0 2579 7811 0 2596 7600 ext. 1116, 1117, 1624	0 2562 0086	Director, Radiological Emergency Preparedness Coordinator Group (Mr. Sombuun Jerachanchai) (Mr. Kittiphong Saiyut, Miss Piyaporn Sinsrok, Mr. Phakphum Aramrun)
Thailand Institute of Nuclear Technology (TINT)	9/9 Moo 7, T. Saimoon, A. Ongkharak, Nakornmayok 26120	037 392 901-6	037 392 913	Safety Unit (Mr. Dacharchai Chambanchee, Mr. Pariwat Siangsanon, Miss Warunee Toeypho)

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (emergency)	Fax	Coordinator
Ministry of Public Health (MOPH)				
Nopparat Rajathanee Hospital, Department of Medical Services	679 Ramindra Rd., Khannayao, Khannayao, Bangkok 10230	0 2517 4333 0 2517 4270-9 ext. 1659 1658, 1659	0 2517 4270-9 ext. 1659	Head of Occupational Medicine & Environmental Medicine Hospital Center, Department of Medical Services (Adul Bandhukul, M.D.) (Mrs. Wanna Chongchitpaisarn)
Narenthorn Center	Downstairs, Building 5 Office of the Permanent Secretary, Ministry of Public Health	1669 0 2590 2386 0 2590 1669 0 2951 0282	0 2590 2802	Director, Narenthorn Center
Minister of Natural Resources and Environment (MNRE)				
Pollution Control Department	92 Soi Phaholyothin 7, Phaholyothin Rd., Samsen Nai, Phayathai, Bangkok 10400	1650 0 2298 2423 08 9811 2509	0 2298 2425	Director, Waste and Hazardous Substance Management Bureau (Mrs. Sune Piyaphongphong)

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (emergency)	Fax	Coordinator
Chemical Emergency Response Centre		1650 0 2298 2404-7 08 9967 1131	0 2298 2404	Director, Emergency Response and Remediation Division Director, Chemical Emergency Response Centre (Mr. Sumetha Wichienpet)
		1650 02 298 2437 08 9967 1130, 08 6375 4110	0 2297 2427	Hazardous Waste Division (Miss Teeraporn Wirwitikorn)
Ministry of Industry (MOI)				
Department of Industrial Works Safety Technology Bureau	75/6 Rama VI Rd., Ratchathewi, Bangkok 10400	0 2202 4215-6	0 2202 3392	Director, Safety Technology Bureau (Mr. Prasart Rakpanichsiri) (Mrs. Patcharakorn Labcharoenkij)
Ministry of Transport (MOT)				
Department of Land Transport	1032 Phaholyothin Rd., Jomphon, Chatuchak, Bangkok 10900	1584 0 2272 3100	0 2272 5516 0 2272 5343	Public Passenger Protection Centre

List of main relevant agencies for coordination in case of nuclear and radiological emergency

Agency	Address	Telephone (emergency)	Fax	Coordinator
Ministry of Information and Communication Technology (MICT)				
Communication Crisis Management Center	89/2 Moo 3, Building 9, TOT Public Co., Ltd. Chaengwattana Rd., Laksi, Bangkok 10210	0 2505 7269 08 1401 8554	0 2568 2573	Director, Communication Crisis Management Center
Ministry of Transport (MOT)				
Special Operation Forces 191	Rama I Rd., Pathumwan, Bangkok 10330	191 0 2205 3158	0 2251 5870	Special Operation Forces 191 Centre Commander in Chief, Traffic and Civil Service Planning Division
Bangkok Metropolitan Administration (BMA)				
Bangkok Fire and Rescue Department	71/1 Rama VI Rd., Tung Phayathai, Ratchathewi, Bangkok 10400	199, 1555 0 2354 6858 0 2279 7301-5	0 2354 6840	Rama Radio Center 199 Bangkok Call Center 1555 Director, Technical & Planning Division



APPENDIX



APPENDIX 1

THE INTERNATIONAL NUCLEAR AND RADIOLOGICAL EVENT SCALE (INES)

- Level 0** Deviation: no safety significance, a deviated event caused by the operation of nuclear facilities, without impacts on safety
- Level 1** Anomaly: an event different from authorized terms and conditions for operating of nuclear facilities but no safety impacts and radiological contamination or overexposure to the worker in excess of statutory annual limits.

- Level 2** Incident: an event leading to safety impacts but other preventive systems are able to control other abnormal states, and/or events causing exposure of a worker in excess of the statutory annual limits, and/or significant contamination within the facility into an area not expected by design, requiring corrective measures.
- Level 3** Serious incident: an event causing near accident at a nuclear power plant with some safety provisions remaining, and/or an event causing severe dispersal of radioactive material within a nuclear power plant, or exposure to a worker at the deterministic health effect, and/or release of small quantities of radioactive material out of a nuclear power plant (exposure in excess of one-tenth of 1 Sv/h for the worker.)
- Level 4** Accident without significant off-site risk: an accident causing significant damages to a nuclear facility (e.g. parts of reactor core melting), and/or exposure of a worker in excess of statutory annual limits with a high probability of death secondary to the event, and/or release of significant quantities of radioactive material within an installation, resulting in an exposure rate of 2 – 3 Sv/h to risky worker.
- Level 5** Accident with off-site risk: an accident causing severe damages to a nuclear facility, and/or a release of large quantities of radioactive material, comparable to amount of radioiodine-131, with ranges of 100-1,000 TBq, to the public, requiring partial emergency plan.

- Level 6** Serious accident causing a release of large quantities of radioactive material, comparable to amount of radioiodine-131, with ranges of 1,000-10,000 TBq, to the public, requiring full emergency plan.
- Level 7** Major accident causing a release of excessive quantities of radioactive material, comparable to amount of radioiodine-131, with ranges more than 10,000 TBq, to the public, causing widespread health and environmental effects.



The International Nuclear Event Scale

For prompt communication of safety significance

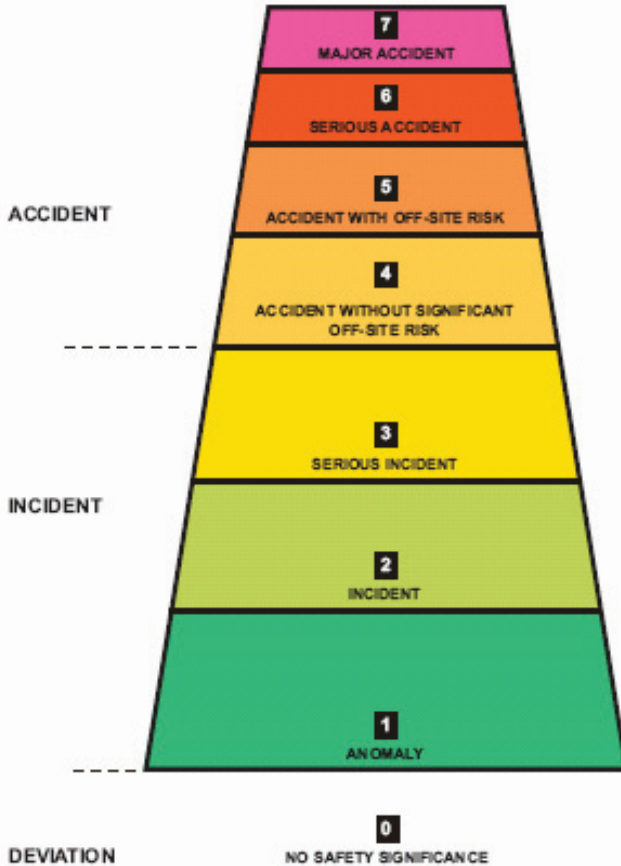


Fig 1.1 shows international nuclear event scale

APPENDIX 2

RADIATION WARNING SIGNS

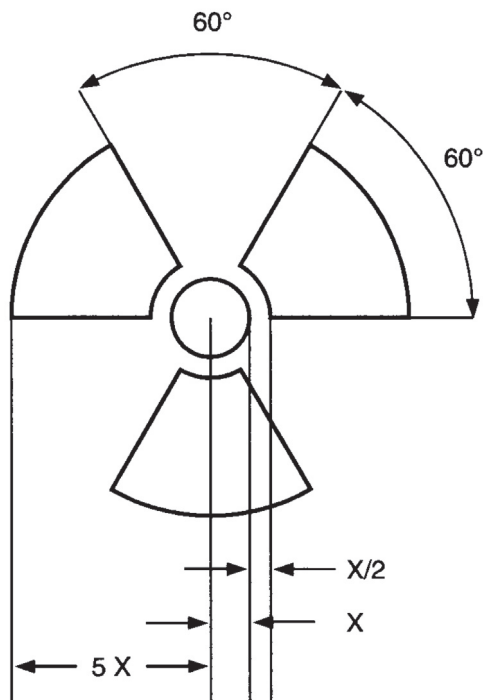


Fig 2.1 Basic trefoil symbol with proportions based on a central circle of radius X . The minimum allowable size of X shall be 4 mm. The background color of the label shall be yellow and the color of the circle and trefoil shall be magenta or black.

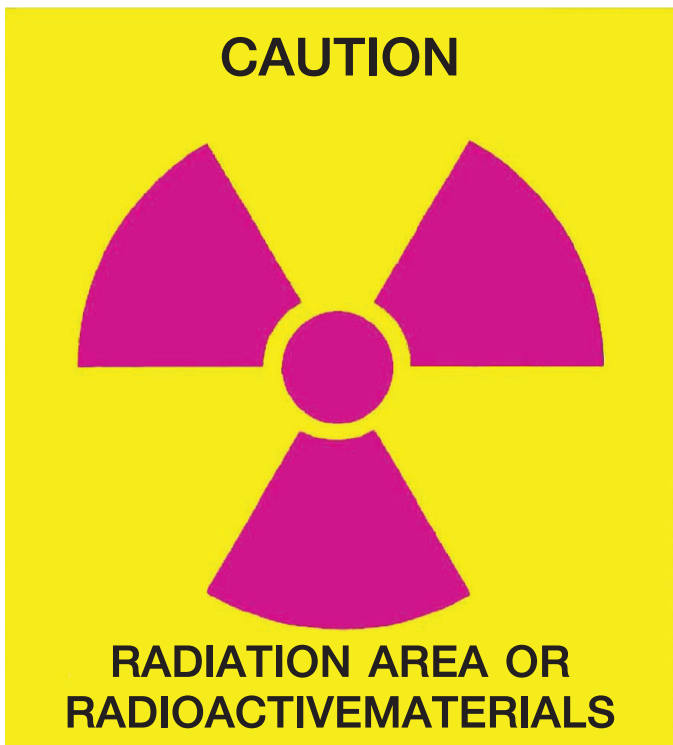


Fig 2.2 Placard for radiation areas or radioactive material storages facility

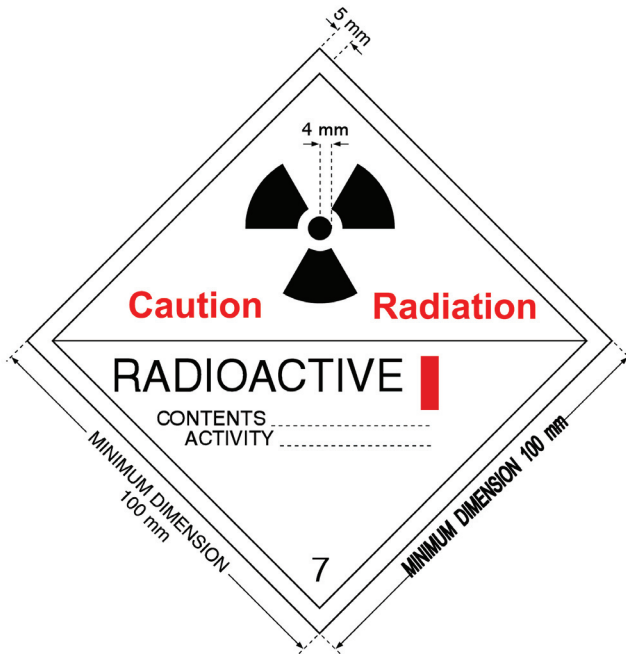


Fig. 2.3 Category I-WHITE label for transportation package of radioactive substances/ materials. The background color of the label shall be white, the color of the trefoil and the printing shall be black, and the color of the category bar (I) shall be red.

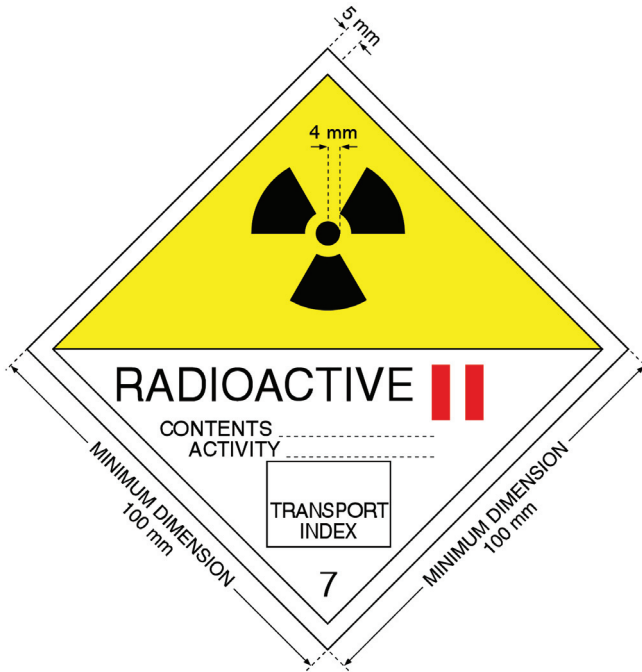


Fig. 2.4 Category II-YELLOW label for transportation package of radioactive substances/materials with transport index. The background color of the upper half of the label shall be yellow and the lower half white, the color of the trefoil and the printing shall be black, and the color of the category bars (II) shall be red.

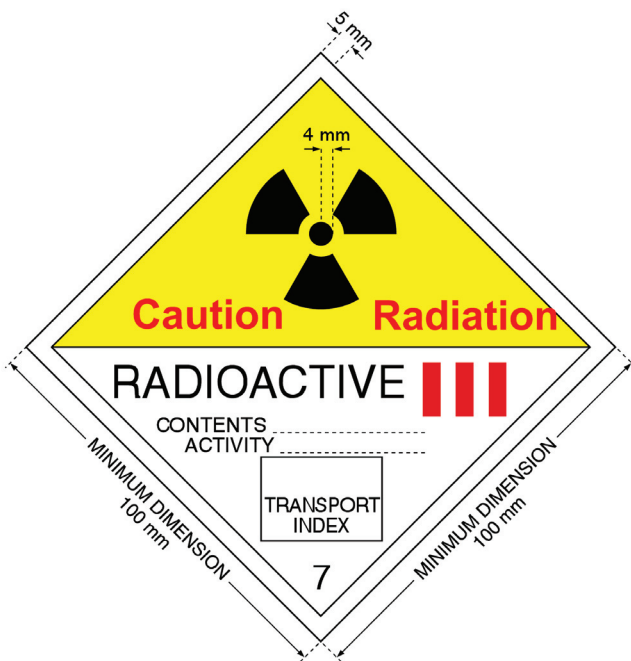


Fig. 2.5 Category III-YELLOW label for transportation package of radioactive substances/materials with transport index. The background color of the upper half of the label shall be yellow and the lower half white, the color of the trefoil and the printing shall be black, and the color of the category bars (III) shall be red.

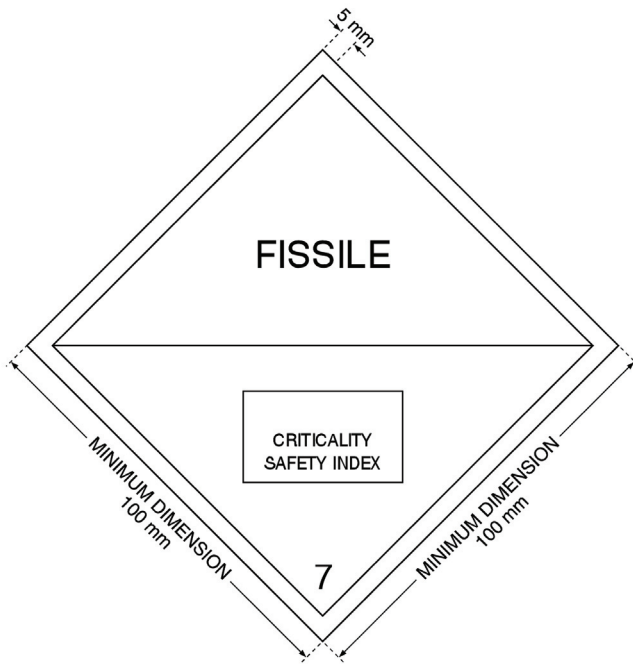


Fig. 2.6 Criticality safety index (CSI) label for fissile materials. The background color of the label shall be white, the color of the printing shall be black.

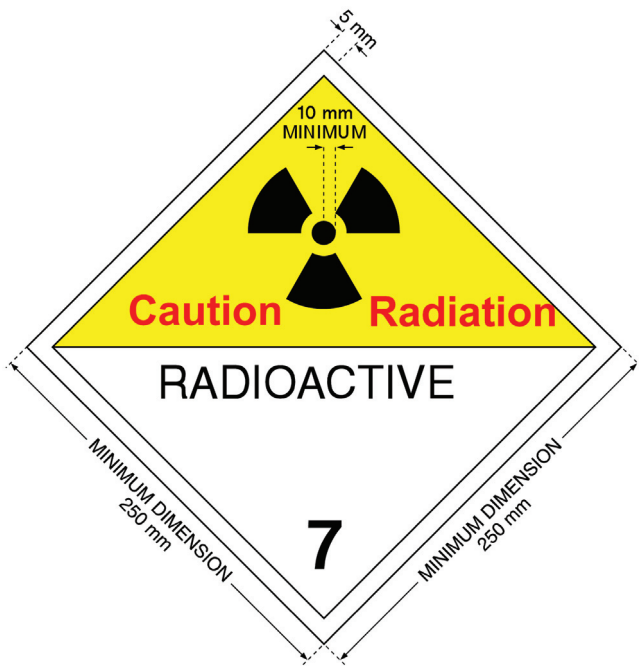


Fig. 2.7 Placard for transportation vehicles of radioactive substances/materials. Minimum dimensions shall be as shown; when different dimensions are used, the relative proportions must be maintained. Except the area is too small for the placard, it shall be reduced to 100 mm. The number “7” shall not be less than 25 mm high. The background color of the upper half of the placard shall be yellow and of the lower half white, the color of the trefoil and the printing shall be black. The use of the word “RADIOACTIVE” in the bottom half is optional as the number 7 is the appropriate UN number for the consignment.

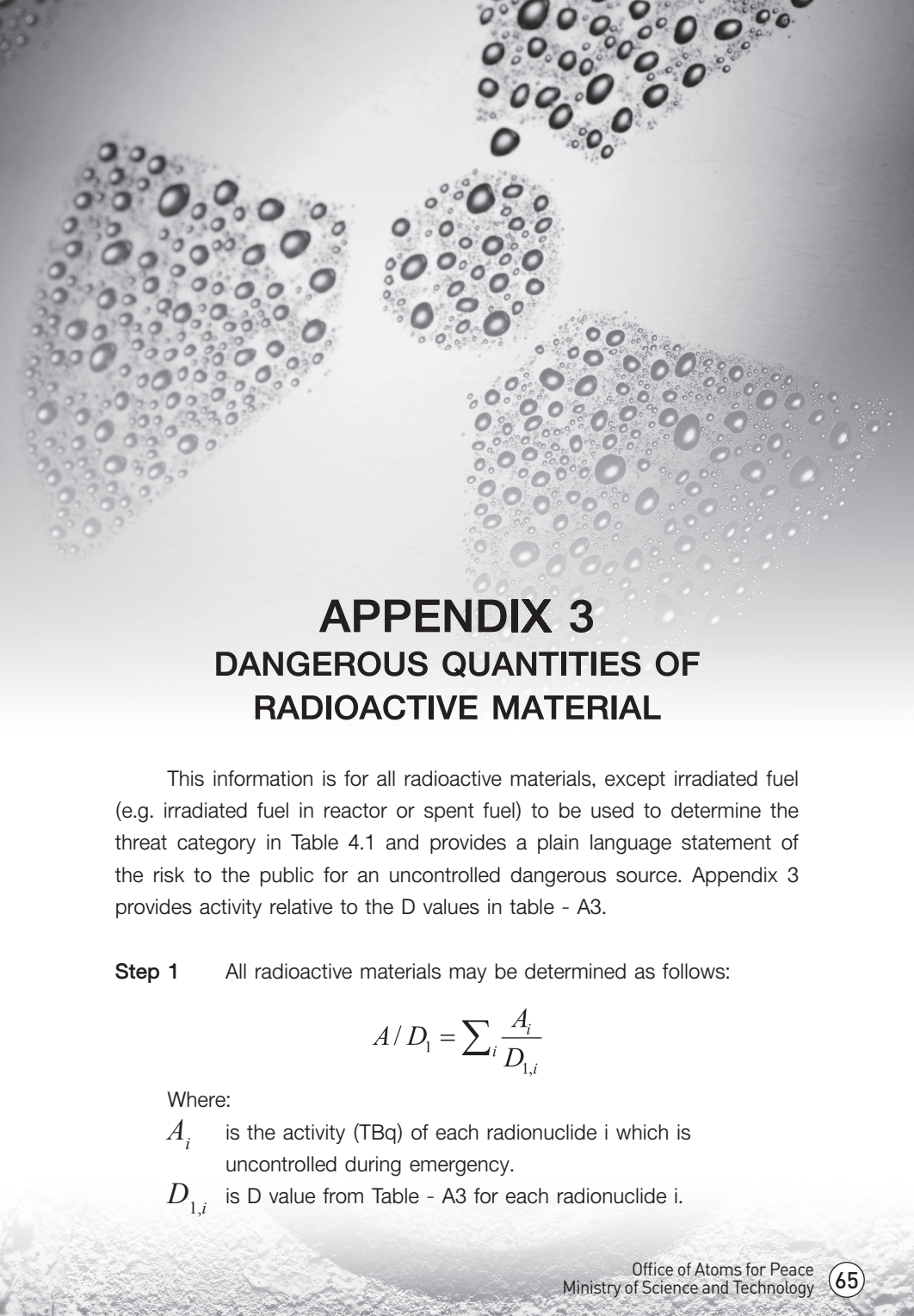


Fig 2.8 Sample of placard on the side of the vehicle



Fig 2.9 Sample of placard on the back of the vehicle





APPENDIX 3

DANGEROUS QUANTITIES OF RADIOACTIVE MATERIAL

This information is for all radioactive materials, except irradiated fuel (e.g. irradiated fuel in reactor or spent fuel) to be used to determine the threat category in Table 4.1 and provides a plain language statement of the risk to the public for an uncontrolled dangerous source. Appendix 3 provides activity relative to the D values in table - A3.

Step 1 All radioactive materials may be determined as follows:

$$A / D_1 = \sum_i \frac{A_i}{D_{1,i}}$$

Where:

A_i is the activity (TBq) of each radionuclide i which is uncontrolled during emergency.

$D_{1,i}$ is D value from Table - A3 for each radionuclide i .

Step 2 Dispersible radioactive materials may be determined as follows:

$$A / D_2 = \sum_i \frac{A_i}{D_{2,i}}$$

Where:

A_i is the activity (TBq) of each radionuclide i which is dispersible and uncontrolled during emergency. iA

$D_{2,i}$ is D value from Table - A3 for each radionuclide i .

Step 3 A mobile or uncontrolled radioactive material is categorized as a 'dangerous source' if the A/D values are greater than 1.

**Table - A3 Activity corresponding to A dangerous source
(D values [TBq])**

Radionuclide	Activity [TBq]	
	D1	D2
H-3	Unlimited	2.E+03
C-14	2.E+05	5.E+01
P-32	1.E+01	2.E+01
S-35	4.E+04	6.E+01
Cl-36	3.E+02	2.E+01
Cr-51	2.E+00	5.E+03
Fe-55	Unlimited	8.E+02
Co-57	7.E-01	4.E+02
Co-60	3.E-02	3.E+01
Ni-63	Unlimited	6.E+01

**Table - A3 Activity corresponding to A dangerous source
(D values [TBq])**

Radionuclide	Activity [TBq]	
	D1	D2
Zn-65	1.E-01	3.E+02
Ge-68	7.E-02	2.E+01
Se-75	2.E-01	2.E+02
Kr-85	3.E+01	2.E+03
Sr-89	2.E+01	2.E+01
Sr-90(Y-90)	4.E+00	1.E+00
Y-90	5.E+00	1.E+01
Y-91	8.E+00	2.E+01
Zr-95	4.E-02	1.E+01
(Nb-95m/Nb-95)		
Nb-95	9.E-02	6.E+01
Mo-99(Tc-99m)	3.E-01	2.E+01
Tc-99m	7.E-01	7.E+02
Ru-103(Rh-103m)	1.E-01	3.E+01
Ru-106(Rh-106)	3.E-01	1.E+01
Pd-103(Rh-103m)	9.E+01	1.E+02
Cd-109	2.E+01	3.E+01
Te-132(I-132)	3.E-02	8.E-01
I-125	1.E+01	2.E-01
I-129	Unlimited	Unlimited

**Table - A3 Activity corresponding to A dangerous source
(D values [TBq])**

Radionuclide	Activity [TBq]	
	D1	D2
I-131	2.E-01	2.E-01
Cs-134	4.E-02	3.E+01
Cs-137(Ba-137m)	1.E-01	2.E+01
Ba-133	2.E-01	7.E+01
Ce-141	1.E+00	2.E+01
Ce-144	9.E-01	9.E+00
(Pr-144m, Pr-144)		
Pm-147	8.E+03	4.E+01
Eu-152	6.E-02	3.E+01
Eu-154	6.E-02	2.E-01
Gd-153	1.E+00	8.E+01
Tm-170	2.E+01	2.E+01
Yb-169	3.E-01	3.E+01
Ir-192	8.E-02	2.E+01
Au-198	2.E-01	3.E+01
Hg-203	3.E-01	2.E+00
Tl-204	7.E+01	2.E+01
Po-210	8.E+03	6.E-02
Ra-226(progeny)	4.E-02	7.E-02
Th-230	9.E+02	7.E-02

**Table - A3 Activity corresponding to A dangerous source
(D values [TBq])**

Radionuclide	Activity [TBq]	
	D1	D2
Th-232	Unlimited	Unlimited
U-232	7.E-02	6.E-02
U-235(Th-231)	8.E-05	8.E-05
U-238	Unlimited	Unlimited
U Natural	Unlimited	Unlimited
U Depleted	Unlimited	Unlimited
U Enriched > 20%	8.E-05	8.E-05
U Enriched > 10%	8.E-04	8.E-04
Np-237(Pa-233)	3.E-01	7.E-02
Pu-238	3.E+02	6.E-02
Pu-239	1.E+00	6.E-02
Pu-239 / Be	1.E+00	6.E-02
Pu-240	4.E+00	6.E-02
Pu-241(Am-241)	2.E+03	3.E+00
Pu-242	7.E-02	7.E-02
Am-241	8.E+00	6.E-02
Am-241/Be	1.E+00	6.E-02
Cm-242	2.E+03	4.E-02
Cm-244	1.E+04	5.E-02
Cf-252	2.E-02	1.E-01

Remarks:

- D1 is defined as all radioactive materials.
- D2 is defined as at risk of dispersal, e.g. powders, gases, and liquids, and especially volatile (at temperature during emergency), combustible, water soluble and pyrophoric materials.
- Unlimited is defined as unlimited quantity.



APPENDIX 4



Order of the Atomic Energy Commission for Peace
No. 16/2548

Subject: Designation of the Sub-committee for the Preparation of
Suppression and Mitigation of Nuclear and Radiological
Emergency

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In compliance with the resolution of the National Preparatory Commission, the Office of the National Security Commission had designated that the Office of Atoms for Peace acts as the main agency to undertake the nuclear and radiological preparedness and relating matters. According to the international standard, the country's infrastructure with respect to the prevention of danger from radiation requires policy and efficient plan of suppression and mitigation of nuclear and radiological disaster.

By virtue of the Section 10 of the Atomic Energy for Peace Act, B.E. 2504 and the resolution of the Atomic Energy for Peace Commission in the meeting No. 3/2548 dated 23 November B.E. 2548, the Sub-committee on Preparation of Suppression and Mitigation of Nuclear and Radiological Disaster is designated with the following composition, powers and authorities.

1. Composition

1.1 Secretary-General of the Office of Atoms for Peace	Chairperson
1.2 Representative of the Ministry of Public Health	Member
1.3 Representative of the Department of Disaster Prevention and Mitigation	Member
1.4 Representative of the Department of Industrial Works	Member
1.5 Representative of the Government Public Relations Department	Member
1.6 Representative of the Pollution Control Department	Member
1.7 Representative of the Defence Mobilisation Department, the Supreme Commander Head Quarter	Member
1.8 Representative of the Royal Thai Police	Member
1.9 Representative of the Office of Atoms for Peace	Member
1.10 Representative of the National Security Council	Member
1.11 Representative of the Civil Emergency Relief Division, Bangkok Metropolitan Administration	Member
1.12 Col. Prince Chalernsuek Yúgala	Member
1.13 Mrs. Darika Gingnetr	Member
1.14 Mr. Suwat Bunnak	Member
1.15 Miss Pawana Phusuwan	Member
1.16 Mrs. Somjai Dangprasert	Member
1.17 Director of the Bureau of Radiation Safety Regulation, Office of Atoms for Peace	Member and Secretary
1.18 Representative of the Office of Atoms for Peace	Assistant to Secretary
1.19 Representative of the Office of Atoms for Peace	Assistance to Secretary

2. Powers and Authorities

2.1 To propose and provide consultancy on policy and master plan in the preparation for suppression and mitigation of disaster from nuclear and radiological emergency; and to set up preparatory network.

2.2 To establish measures for efficiency test of the preparatory network for suppression and mitigation of disaster from nuclear and radiological emergency according to the master plan.

2.3 To develop nuclear and radiological emergency surveillance plan.

2.4 To propose that the Commission designate ad hoc sub-committee to undertake specific matters as necessary.

2.5 To propose a summary report on the operation of the sub-committee to the Commission at least twice a year.

2.6 To perform other duties as assigned by the Commission.

3. The Sub-Committee shall receive remuneration for meeting attendance and expense reimbursement prescribed under the law or the government's regulation from the Office of Atoms for Peace.

Effective as of now onwards

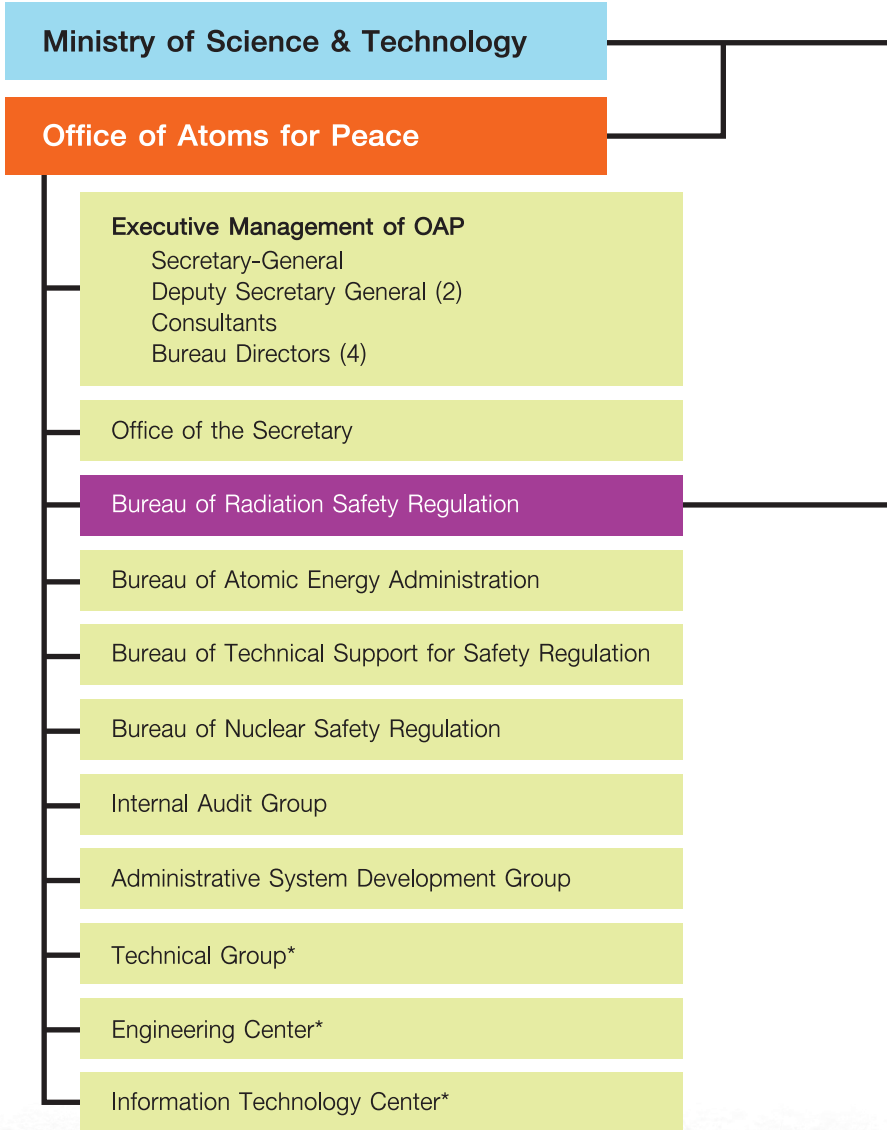
Ordered on 19 December B.E. 2548

Mr. Suchai Charoenrattanakul
Deputy Prime Minister
Chairman of the Atomic Energy
Commission for Peace



APPENDIX 5

ORGANIZATION CHART OF THE OFFICE OF ATOMS FOR PEACE



(* Internal Provisional Function)

Thai Atomic Energy Commission

Sub-Committees (16)

- Sub-Committee for Amendment of Atomic Energy for Peace Act B.E. 2504 and its Amendments
- Sub-Committee for National Atomic Energy Policy & Strategy Planning
- etc.

Radiation Safety Coordinator and Database Group

Radiation Safety Regulatory Group for Medical

Radiation Safety Regulatory Group for Industry

Radiation Safety Regulatory Group for Research, Development and Environment

Radiation Safety Regulatory Group for Radiation Machine

Radiological Emergency Preparedness and Coordinator Group

General Administration Section

Nuclear and radiological accident

Radiation Safety Officer or people notify OAP

Emergency Hotline (OAP)
Tel. 0-2596-7699 (office hours)
08-9200-6243 } 24 hours
Fax 0-2562-0086 } 7 days/week

Preliminary investigation by officer and give advice on initial response (OAP)

Report supervisors according to the org. chart (OAP)

On-site emergency

Licensee responds to nuclear and radiological emergency. (Facility or licensee)

Nuclear and radiological accident

Extension of Nuclear and radiological emergency event

Nuclear and radiological on-scene assessment group

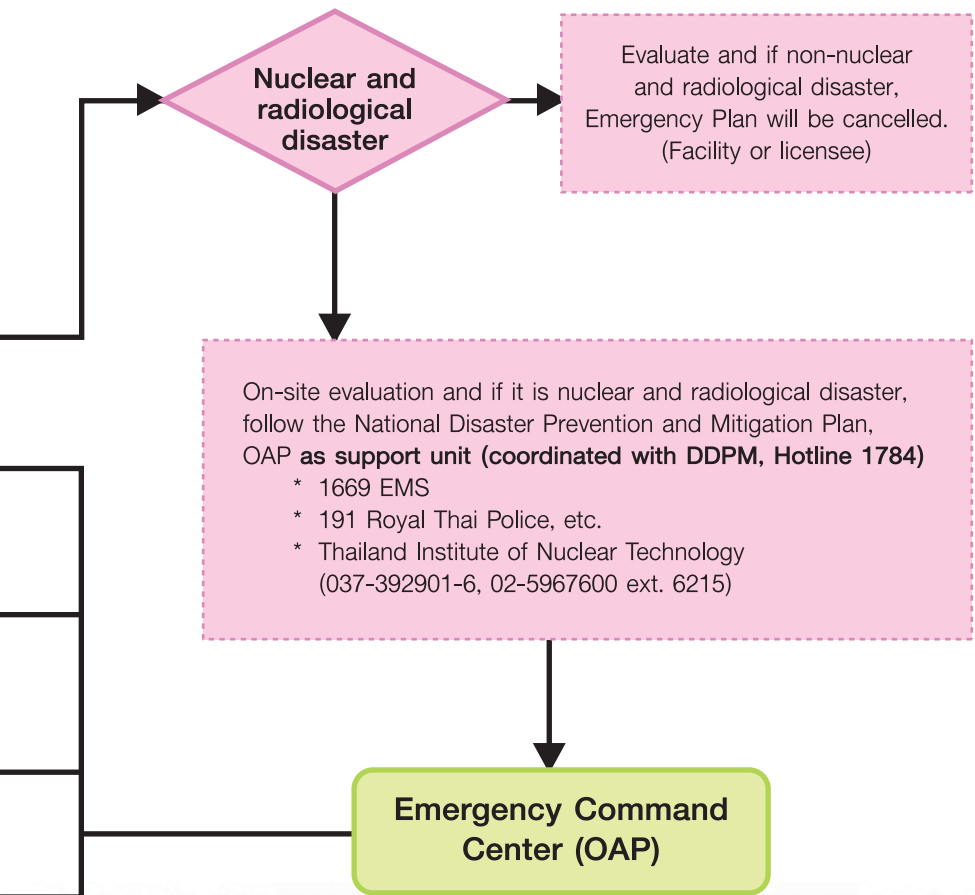
Nuclear and radiological environmental monitoring and assessment group

Logistic group
- Finance - Communication
- Food - Other necessary tools

Public information group

APPENDIX 6

NUCLEAR AND RADIOLOGICAL EMERGENCY MANAGEMENT CHART



REFERENCES

- (1) National Preparedness Policy. National Security Council. Ministry of Interior. Ministry of Defence
- (2) National Disaster Prevention and Mitigation Act B.E. 2550. Department of Disaster Prevention and Mitigation, Ministry of Interior
- (3) National Civil Defence Plan B.E. 2548. The Secretariat of Civil Defence. Department of Disaster Prevention and Mitigation. Ministry of Interior.
- (4) Dictionary of Nuclear Terminologies. Office of Atoms for Peace. Kurusapha Ladprao Press. B.E.2548.
- (5) Method for Developing Arrangement for Response to a Nuclear or Radiological Emergency. Updating IAEA – TECDOC – 953, International Atomic Energy Agency, Vienna, Austria, (2003).
- (6) Generic procedures for medical response during a radiological emergency. IAEA – TECDOC – 1162, International Atomic Energy Agency, Vienna, Austria, April (2005).
- (7) Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency. International Atomic Energy Agency, Vienna, Austria, EPR – EXERCISE (2005).
- (8) Generic procedures for medical response during a nuclear or radiological emergency. International Atomic Energy Agency, Vienna, Austria, EPR – MEDICAL (2005).



National Nuclear and Radiological Emergency Plan

by

Nuclear and Radiological Emergency Management Division

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